IRSTI 65.63.03 DOI https://doi.org/10.48184/2304-568X-2023-4-138-144

FATTY ACID COMPOSITION OF SOFT WHEY CHEESE

*G.N.ZHAKUPOVA , T.CH.TULTABAYEVA , A.T. SAGANDYK *, B.KALEMSHARIV , A.B. NURTAYEVA , Z.S.TOREGELDY*

(NCJSC «S.Seifullin Kazakh agrotechnical research University», Kazakhstan, 010000, Astana, 62 Zhenis avenue)
Coresponding author e-mail: assema.bukeyeva@gmail.com*

Due to the existing environmental and economic situation, there is a tendency to produce new food products with a balanced composition and beneficial properties for the human body. In this context, new groups of products are appearing on the market, whose composition and properties differ from the standards. The key factor for the nutritional and biological value of products is again the fatty acids, which consist of saturated and unsaturated acids. Saturated fatty acids are carbon chains with a number of 4 to 30 or more atoms, found mainly in animal fats. Their function is to saturate the body with energy. Excessive saturation with fatty acids leads to a disturbance in fat metabolism and an increase in blood cholesterol levels. Unsaturated fatty acids are part of the components of cells and tissues, provide growth and metabolism, as well as the elasticity of blood vessels. The studied soft whey cheese was made from whey and is a new product of the dairy industry. In this work, the indicators of soft whey cheese such as proteins, fats, moisture, dry matter as well as fatty acid composition of the product are studied. From the analysis results, it is found that the product contains unsaturated fatty acids and its lipid composition has an optimal balance.

Keywords: whey soft cheese, nutritional value of cheese, whey, fatty acid composition of soft cheese, saturated fatty acids, unsaturated fatty acids.

ЖИРНОКИСЛОТНЫЙ СОСТАВ МЯГКОГО СЫВОРОТОЧНОГО СЫРА

Г.Н. ЖАКУПОВА, Т.Ч. ТУЛТАБАЕВА, А.Т. САҒАНДЫҚ ,
Б.КАЛЕМШАРИВ, А.Б.НУРТАЕВА, З.С.ТӨРЕГЕЛДІ*

**(НАО«Казахский агротехнический исследовательский университет имени Сакена Сейфуллина»
Республика Казахстан, 010000 г.Астана, пр.Жеңіс 62.)**
Электронная почта автора корреспондентта: assema.bukeyeva@gmail.com*

Из-за существующих экологических, экономических ситуаций появляется тенденция потребности в производстве новых продуктов питания со сбалансированным составом и полезными свойствами для организма человека. В связи с чем на рынке появляются новые группы продуктов с отличными от стандартов составом и свойствами. Ключевым фактором питательной и биологической ценности продуктов являются жирные кислоты, которые состоят из насыщенных и ненасыщенных кислот. Насыщенные жирные кислоты представляют собой углеродные цепочки с числом атомов от 4 до 30 и более, которые содержатся в основном в животных жирах. Их функция заключается в насыщении организма энергией. Чрезмерное насыщение жирными кислотами приводит к нарушению жирового обмена и повышению уровня холестерина в крови. Ненасыщенные жирные кислоты входят в состав компонентов клеток и тканей, обеспечивают рост и обмен веществ, а также эластичность кровеносных сосудов. Исследуемый мягкий сывороточный сыр был изготовлен из молочной сыворотки и является новым продуктом молочной промышленности. В данной работе изучаются показатели мягкого сывороточного сыра, такие как белки, жиры, влажность, сухое вещество, а также жирнокислотный состав продукта. По результатам анализа установлено, что продукт содержит ненасыщенные жирные кислоты, а его липидный состав имеет оптимальный баланс.

Ключевые слова: сывороточный мягкий сыр, пищевая ценность сыра, молочная сыворотка, жирно-кислотный состав мягкого сыра, насыщенные жирные кислоты, ненасыщенные жирные кислоты.

ЖҰМСАҚ САРЫСУЫ БАР ІРІМШІКТІҢ МАЙ ҚЫШҚЫЛЫНЫҢ ҚҰРАМЫ

Г.Н. ЖАКУПОВА, Т.Ч. ТУЛТАБАЕВА, А.Т. САҒАНДЫҚ, Б.КАЛЕМШАРИВ, А.Б.НУРТАЕВА, З.С.ТӨРЕГЕЛДІ*

(КеАҚ «С.Сейфуллин атындағы Қазақ агротехникалық зерттеу университеті», Қазақстан Республикасы, 010000, Астана қ., Жеңіс 62 даңғылы)
Автор-корреспонденттің электрондық поштасы: assema.bukeyeva@gmail.com*

Қолданыстағы экологиялық, экономикалық жағдайларға байланысты адам ағзасына теңдестірілген құрамы мен пайдалы қасиеттері бар жаңа тамақ өнімдерін өндіруге деген қажеттілік тенденциясы пайда болады. Осыған байланысты нарықта стандарттардан өзгеше құрамы мен қасиеттері бар жаңа өнім топтары пайда болады. Өз кезегінде, тағамның тағамдық және биологиялық құндылығының негізгі критерийі қаныққан және қанықпаған қышқылдардан тұратын май қышқылдары болып табылады. Қаныққан май қышқылдары-4-тен 30-ға дейін немесе одан да көп атомдары бар көміртегі тізбектері, жануарлардан алынатын майларда басым. Олардың рөлі денені энергиямен қанықтыру болып табылады. Май қышқылдарының артық қанығуы май алмасуының бұзылуына және қандағы холестерин деңгейінің жоғарылауына әкеледі. Қанықпаған май қышқылдары жасушалар мен тіндердің элементтерінің құрамына кіреді, заттардың өсуі мен метаболизмін, тамырлардың серпімділігін қамтамасыз етеді. Зерттелген жұмсақ Сарысу ірімшігі сарысуды қолдану арқылы өндірілді және сүт өнеркәсібінің жаңа өнімі болып табылады. Бұл жұмыста ақуыздар, майлар, ылғал, құрғақ заттар, сондай-ақ өнімнің май-қышқыл құрамы сияқты жұмсақ сарысулық ірімшіктің көрсеткіштері зерттеледі. Талдау нәтижелері бойынша өнімнің құрамында қанықпаған май қышқылдары бар және оның липидті құрамы оңтайлы тепе-теңдікке ие екендігі көрінеді.

Негізгі сөздер: сарысуы бар жұмсақ ірімшік, ірімшіктің тағамдық құндылығы, сүт сарысуы, жұмсақ ірімшіктің май қышқылының құрамы, қаныққан май қышқылдары, қанықпаған май қышқылдары.

Introduction

Every year the situation in the country and in the world changes. Dairy production as a source of vital products is subject to change due to economic, political and demographic factors. The demand for milk and dairy products, as well as for functional and dietary products, is increasing among citizens of all ages [1]. In this context, new product groups are appearing on the market whose composition and properties differ from the standards. The most important criteria for the nutritional value and biological value of products are, in turn, fatty acids, which consist of saturated and unsaturated acids. Saturated fatty acids are carbon chains with a number of 4 to 30 or more atoms, found mainly in animal fats [3]. Their function is to saturate the body with energy [2-3].

According to the framework of the national project for the development of the agro-industrial complex of the Republic of Kazakhstan for 2021-2025, subsidies are provided to processing enterprises for the purchase of agricultural products for the production of deep processed products (butter, milk powder, hard cheese) [4]. This measure was taken due to a shortage of raw milk for the production of a sufficient number of dairy products [5], as only 1.7 million tons of commercial milk for processing are obtained when dairies need 2.2 million tons of raw materials. In this regard, it is clear that the development of a waste-free technology for dairy products using secondary waste of dairy products, namely whey, is an urgent task in the modern life [5].

In the dairy farming, the range of products made from condensed whey, especially soft cheeses, is not very diverse [1]. In this regard, the development of a resource-saving technology for a new type of soft cheese from the raw material complex, which includes the main and secondary raw materials of the dairy industry, is relevant and economically justified [6-7].

In this study, several samples of soft cheese from whey were developed. The aim of the investigation is to study and analyze the composition of the obtained samples.

Materials and methods of research

The following samples of soft whey cheese were selected as study subjects:

- Sample 1 - Soft whey cheese made from whey, condensed whey and pasteurized whole milk.
- Sample 2 - soft whey cheese made from condensed whey and skimmed pasteurized milk.

The following physicochemical methods were used in the scientific research:

1. Determination of moisture content by drying in a drying oven at a temperature of 105 ^{0}C and by an accelerated method on a Chizhova apparatus according to State Standard 3626-73 [8].

2. Determination of titrated acidity according to State Standard 3624-92 [9].

3. Determination of active acidity (pH) according to State Standard 32892-2014 [10].

4. Determination of protein mass fraction according to State Standard 23327-98 [11].

5. Determination of dry matter content in food – State Standart 3626-73 [8].

6. Determination of fatty acid composition of fat phase by gas chromatography according to State Standart 32915-2014 [12].

An experimental batch of whey cheese was produced in the experimental dairy processing production workshop of S. Seifullin KazATRU using the developed starter culture.

As a result of laboratory tests, the temperature of heat treatment of the whey-milk mixture of 60-65^{0}C and the duration of heat treatment of 15 minutes were considered optimal, since under these conditions the maximum amount of coagulation was achieved to obtain a dense cheese mass.

The technological scheme for the production of whey cheese includes the following operations: acceptance and purification of whey, determination of the acidity of the whey, mixing of whey with pasteurized milk in a ratio of 70/30 (%) or cream with a fat content of 10% in a quantity of 90/10, normalization of the mixture, pasteurization of the mixture at a temperature of 90-95^{0}C, cooling of the mixture to the fermentation temperature, the addition of citric acid in a quantity of 2% and 3-5% LEL starter culture, fermentation of the mixture at a temperature of 32-33^{0}C for 30-60 minutes. To achieve better coagulation of proteins, the mixture is heat treated at a temperature of 60-65 ^{0}C for 15 minutes. The coagulum formed is collected and separated into molds. The resulting cheese mass is packaged and then stored.

Literature review

In view of the great demand from consumers, many companies in the food industry are now developing a fundamentally new generation of foods that meet the standards of healthy nutrition. With the help of advanced biotechnological techniques combined with food manufacturing methods, it is possible to produce milk and dairy products that are balanced in composition and properties and have proven physiological and biochemical properties [13].

By using innovative methods of processing raw materials in the dairy industry ensures a more complete and rational use of all components of milk. The most important by-product in the dairy industry is whey. For a long time, it was considered an undesirable component (waste) in cheese processing and was either fed to animals or processed as wastewater. In recent years, environmental protection requirements have become stricter, and one must consider the possibility of costly construction and operation of wastewater treatment plants [14].

Effective use of secondary dairy raw materials, especially whey, is an important reserve for increasing the volume of dairy products produced. In many companies of the dairy industry, the problem of rational processing of whey, which is a by-product of cheese and cottage cheese production and contains about 50% of milk solids, has not yet been fully solved. This harms the environment and increases the likelihood of environmental risks, as the pollution capacity of whey exceeds the same indicator for domestic wastewater by 500-1000 times [15-17].

The development of functional, healthy foods, including dairy products, and the improvement of traditional general food products are the main directions of processing raw materials to obtain health-promoting foods [16].

The composition of whey characterizes its high nutritional and biological value and determines the advisability of using whey as a basis for the production of products with functional properties that have a positive effect on many physiological functions in the human body. The possibility of whey as a raw material in the production of dairy goods has several positive factors [18].

Whey is obtained by rennet coagulation of milk with the addition of lactic acid bacteria cultures (in the form of a starter culture) and calcium chloride. The whey obtained by acid coagulation of milk as a result of the accumulation of lactic acid (the result of lactose fermentation) is called sour or curd [14].

The composition of whey is diverse and consists of many useful substances. The proteins of whey have important biological functions. Thus, immunoglobulins have a protective function as they are carriers of passive immunity, lactoferrin and lysozyme, which are related to milk enzymes, have antibacterial properties, beta-lactoglobulin has a transport function — they transport iron, vitamins and other important compounds to the intestine of a newborn. Whey protein a-lactalbumin

has a special function: it is necessary for the process of lactose synthesis [19].

It is known that whey protein can be incorporated into cheese by various pretreatments of the original milk, such as heating, membrane technology, high hydrostatic pressure, homogenization under ultrahigh pressure, transglutaminase treatment, or hybrid variants of the previously described treatment methods. Furthermore, the addition of whey protein preparations (e.g., whey protein concentrate/isolate, whey protein microparticles) to cheese milk leads to cheese fortification [15]. Considering the above-mentioned positive properties of whey, it was decided to use it in the formulation of soft cheese.

Results and their discussions

To obtain whey cheese, the necessary studies were carried out to determine the physicochemical composition in two variants of cheese:

Sample 1 – whey cheese obtained from whey.

Sample 2 – whey cheese produced with condensed whey.

The analytical data are given in Table 1.

Table 1 – Physicochemical parameters of the studied samples

The name of the indicator	Sample 1	Sample 2
Protein, g/100g	21,12	36,3
Fats, g/100g	3,9	3,9
Moisture, %	63,5	54,08
Dry substances g/100 g	36,5	45,92

From the data obtained, whey cheese falls into the category of low-fat soft cheese. Whey cheese contains a sufficient amount of protein and dry matter.

The study of the general chemical composition of lipids of food products allows you to get an approximate idea of the biological value of the product. As necessary components of food, lipids should be present in the diet in certain amounts and ratios to other foods [19].

The study of the lipid composition of the product helps to assess its biological value. The composition of lipids included in the component structure of products should be balanced in terms of fatty acid composition. A high content of polyunsaturated fatty acids and a low content of trans fats indicate the positive properties of the product. The triglycerides in all cheeses are hydrolyzed by the action of lipases, which leads to the release of free fatty acids in the cheese during ripening [20].

The main fatty acid indicators of whey cheese samples are shown in Figure 1-3.

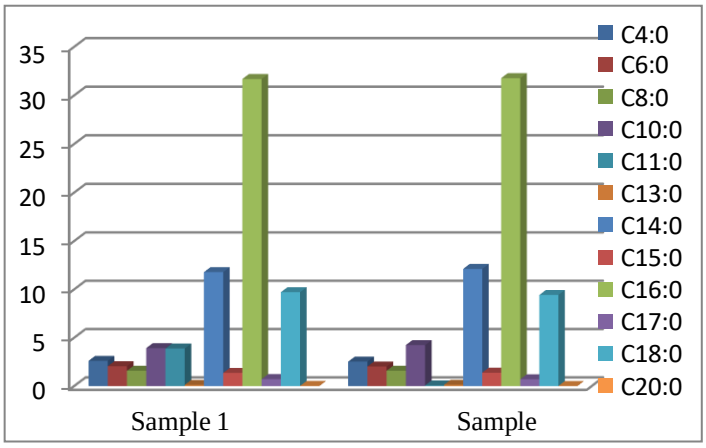

Figure 1- The composition of saturated fatty acids (in %) in the studied samples

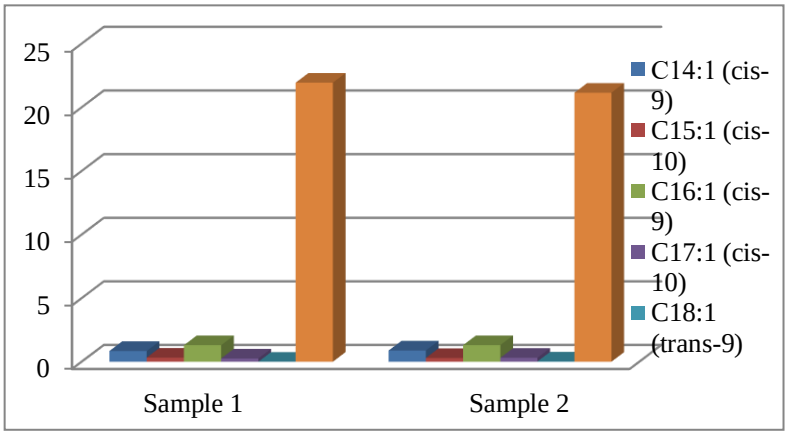

Figure 2- The composition of monounsaturated fatty acids (in %) in the studied samples

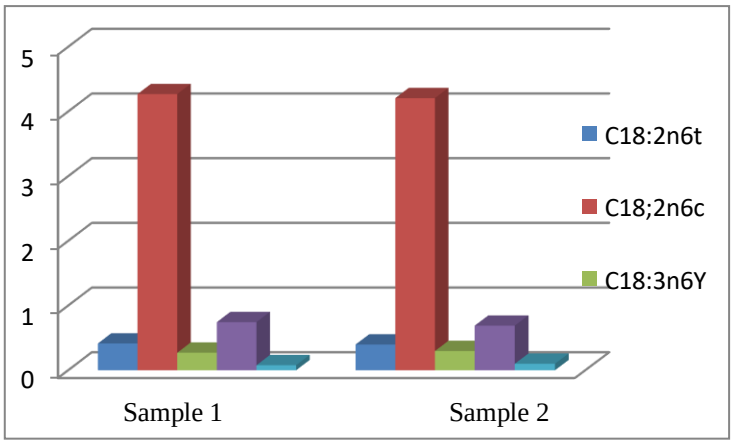

Figure 3- Composition of polyunsaturated fatty acids (in %) in the studied samples

10 saturated fatty acids, 6 monounsaturated fatty acids and 5 polyunsaturated fatty acids were found in the raw materials studied. Saturated fatty acids are present in small amounts, except palmitic acid, myristic acid and stearic acid, which account for 31.686%, 11.79% and 9.715% in sample 1 and 31.775%, 12.12% and 9.426% in sample 2, respectively. In the case of monounsaturated fatty acids, 6 indicators were determined, the highest of which was oleic acid with a content of 21.936% in sample 1 and 21.150% in sample 2. Besides, 4 polyunsaturated fatty acids were found in the investigated raw materials. Of the polyunsaturated fatty acids, linoleic acid had the highest content, 4.207% in sample 1 and 4.269% in sample 2. At the same time, sample 2 contains slightly more saturated fatty acids and polyunsaturated fatty acids in comparison to sample 1. However, in comparison with ordinary pasta filata cheeses [21] mozzarella has a higher content of free fatty acids, such as decanoic acid (120 mg/kg), and palmitic acid (76 mg/kg).

Condusions

The high content of monounsaturated and polyunsaturated fatty acids confirms the biological and nutritional value of the studied product. The content of 21 fatty acids was detected in these samples. Thus, overall studied products have a good combination of fatty acids.

Gratitude, conflict of interest (financing)

The presented research was carried out under the Programme Objective Fund BR 21882184 “Development of a food safety system based on the creation of a set of measures for risk analysis at all stages of the life cycle of food products”, and the Programme Objective Fund BR10764998 “Development of technologies using new strains of beneficial microorganisms, enzymes, nutrients and other components in the production of special dietary foods”, the subproject “Development of a resource-saving technology for the production of economy-class dairy products from whey (whey cheese, soft drinks and starch drinks)”.

REFERENCES

1. Muehlhoff E., Bennett A., McMahon D. “Milk and dairy products in human nutrition” Food and agriculture organization of the united nations, Rome, 2013:376 https://www.fao.org/3/i3396e/i3396e.pdf

2. Zaiceva, L.V. “Rol’ razlichnih zhyrnih kyslot v pitanii cheloveka I pri proizvodstve pishevih productov [The role of various fatty acids in human nutrition and in food production]” Food industry. Vol.10, 2010:60-63.

3. Samigullin, D.I., Ezhkova, A.M., Volkov R.A., Ezhkov V.O. Zhirnokislotnii sostav molochnih productov pri ih modifikacii (falcifikacii) [Fatty acid composition of dairy products during their modification (falsification)]” Scientific notes of the Kazan State Academy of Veterinary Medicine named after N. E. Bauman, vol.6, no.2, 2021:194-197.https://kazanveterinary.ru/wp-content/uploads/2021/06/246-945-MB.pdf

4. "Kazakhstanu neobkhodimo sokhranit sobstvennoe proizvodstvo moloka [Kazakhstan Needs to Preserve Its Own Milk Production]". Dairy News Qazakhstan, 2023. URL: https://dairynews.today/kz/news/kazakhstanu-neobkhodimo-sokhranit-sobstvennoe-proi.html.

5. Zandona, E., Blažić, M., & Režek Jambrak, A. “Whey utilisation: Sustainable uses and environmental approach” Food Technology and Biotechnology Vol. 59, Issue 2. 2021. https://doi.org/10.17113/ftb.59.02.21.6968

6. Syrai, N.M “Issledovanie I razrabotka resursosberegajushei technologii proizvodstva mjagkogo sira iz sgushenoi podsyrnoi syvorotki [Research and development of resource-saving technology for the production of soft cheese from condensed cheese whey]” Dissertation of Candidate of Technical Sciences for the degree, Kemerovo, 2011. https://tekhnosfera.com/issledovanie-i-razrabotka-resursosberegayuschey-tehnologii-proizvodstva-myagkogo-syra-iz-sguschennoy-podsyrnoy-syvorotki

7. Tirishkina, M.E. “Issledovanie I rasrabotka tehnologii mjagkogo sychuzhnogo syra iz koncentrirovanogo moloka [Research and development of soft rennet cheese technology from concentrated milk] abstract of the dissertation on the topic 'Technology of meat, dairy and fish products and refrigeration industries (tekhnosfera.com)

8. State Standart 3626-73. Milk and dairy products. Methods for determining moisture and dry matter. https://docs.cntd.ru/document/1200021586

9. State Standart 3624-92. Milk and dairy products. Titrimetric methods for determining acidity. https://docs.cntd.ru/document/1200021584

10. State Standart 32892-2014 Milk and dairy products. Method of measuring active acidity. https://docs.cntd.ru/document/1200114186

11. State Standart 23327-98 Milk and dairy products. The method of measuring the mass fraction of total nitrogen by Kjeldahl and determining the mass fraction of protein.https://docs.cntd.ru/document/1200021650

12. State Standart 32915-2014 Milk and dairy products. Determination of the fatty acid composition of the fat phase by gas chromatography https://docs.cntd.ru/document/1200115746

13. Pas'ko, O. V., Kulikov, D.A., Burakovskaya, N.V. “Resursosberegayushie technologii proizvodstva kulinarnoi produkcii iz bezsyvorotochnogo tvoroga s rastitel’nimy komponentamy[Resource-saving technologies for the production of culinary products from serum-free cottage cheese with vegetable components]” Food processing industry, no. 7, 2019:67-69.

14. Oesen, T., Treblin, M., Staudacher, A., Clawin-Rädecker,I., Martin, D., Hoffmann,W., Schrader,K., Bode,K., Zink,R., Rohn,S., Fritsche J. “Determination and evaluation of whey protein content in matured cheese via liquid chromatography” *LWT* Vol.174, 2023:114-347. https://doi.org/10.1016/j.lwt.2022.114347

15. Gabrieljan, D.S., Grunskaja, V.A. “ Resursosberegajushaja technologija obogashenih kislomolochnih napitkov [Resource-saving technology of enriched fermented milk drinks]” Food industry no.8, 2014:12-14. https://cyberleninka.ru/article/n/resursosberegayuschaya-tehnologiya-obogaschennyh-kislomolochnyh-napitkov

16. FGBOU-VO-Vologda GMHA “Razrabotka receptur I technologi’ pererabotki selskohozjaistvennoi produkcii (ispol’zovanie koncentrata tvorozhnoi sivorotki) v ekologicheskie chistye funkcional’nie producty sportivnogo pitaniana osnove molochnogo I nemolochnogo sir’ja [Development of recipes and technologies for processing agricultural products (using curd whey concentrate) into environmentally friendly functional sports nutrition products based on dairy and non-dairy raw materials]” (Том 2) - Отраслевая сеть инноваций в АПК (apknet.ru)

17. Ivkova, I.A., Chetvergovan, I.G. “Razrabotka I issledovanie specializirovannih molochnih productov zdorovogo pitania po pokazateljam kachestva I funkcional’noi napravlennosti [Development and research of specialized dairy products of healthy nutrition in terms of quality and functional orientation]” Bulletin of the Omsk State Agrarian University, no.2 (46),2022:100-106. DOI 10.48136/2222-0364 2022 2 100 file:///C:/Users/Jacalope/Downloads/razrabotka- i-issledovanie-spetsializirovannyh-molochnyh- produktov-zdorovogo-pitaniya-po-pokazatelyam- kachestva-i-funktsionalnoy-napravlennosti.pdf

18. Gricaeva, M.V., Hramcov, A.G., Serov, A.V. “Perspectivy proizvodstva I ispol’zovanija prodyktov okislenija I vostanovlenija lactozy [Prospects for the production and use of lactose oxidation and reduction products]” Actual problems of equipment and technology of milk processing: collection of scientific tr. with international involving GNU SibNIIS, Vol. 5, 2008:308-311. https://viewer.rsl.ru/ru/rsl01004970593

19. Donskova, L.A., Beljaev H.M., Leiberova, N.V. “Zhirnokislotni’ sostav lipidov kak pokazatel’ funkcional’nogo naznachenija productov iz mjasa pticy: teoreticheskie I prakticheskie aspect [Fatty acid composition of lipids as an indicator of the functional purpose of poultry meat products: theoretical and practical aspects]” Food industry, Ch. 3, no.1, 2018:4-10.

DOI:10.29141/2500-1922-2018-6-1-1.
https://foodindustry.usue.ru/images/6/1.pdf

20. Prandini, A., Sigolo, S., & Piva, G. A comparative study of fatty acid composition and CLA concentration in commercial cheeses. Journal of Food Composition and Analysis, 24(1), 2011:55–61. https://doi.org/10.1016/j.jfca.2010.04.004
https://thescipub.com/pdf/ajavsp.2021.136.143.pdf

21. Thierry, A., Collins, Y. F., Abeijón Mukdsi, M.C., McSweeney, P. L.H. , Wilkinson, M. G., Spinnler, H. E. Chapter 17 - Lipolysis and Metabolism of Fatty Acids in Cheese, Editor(s): Paul L.H. McSweeney, Patrick F. Fox, Paul D. Cotter, David W. Everett, Cheese (Fourth Edition), Academic Press, 2017:423-444, https://doi.org/10.1016/B978-0-12-417012-4.00017-X

IRSTI 65.59.19 DOI https://doi.org/10.48184/2304-568X-2023-4-144-150

PROBIOTICS ISOLATED FROM THE SHUBAT IN CHICKEN MEAT PRODUCTION: IMPORTANCE AND HACCP ANALYSIS

N. ZH. BEGDILDAYEVA[1,2] SH. N. AKHMETSADYKOVA[1,2,3], A. A. OSPANOVA[2,4]*

([1]Almaty Technological University, Republic of Kazakhstan, 050012, Almaty, 100 Tole bi Str.
[2]LLP "Research and Production Enterprise "Antigen", Republic of Kazakhstan, 040905, Abay, 4 Azerbayev Str.
[3]LLP "Kazakh Research Institute for Livestock and Fodder Production", Republic of Kazakhstan, 055552/A10M6C4, Almaty, 51 Zhandosov Str.
[4]M. Auezov South Kazakhstan University, Republic of Kazakhstan, 160012, Shymkent, 5 Tauke khan Ave.)
Corresponding author e-mail: nbegdildayeva@gmail.com*

Probiotics are becoming more widely acknowledged as a safe and effective alternative to antibiotics for improving the safety of chicken meat. The investigation of potential hazards throughout the chicken meat supply chain enables a thorough assessment of contamination risks, allowing for the establishment of control and corrective actions within the corresponding processes. The ultimate goal is to ensure the safety of chicken meat for consumers. The objective of this study is to ascertain the potential risks that may arise inside the chicken production process, encompassing physical, chemical, and biological factors, with the identification of critical control points (CCPs). The study is also aiming to identify corrective strategies and approaches for decreasing the hazards associated with using of probiotics obtained from shubat. The research conducted involved conducting microbiological evaluations to test the ability of probiotics to withstand the presence of pathogenic bacteria. Additionally, the study examined the use of probiotics in chicken production, employing careful monitoring and comprehensive analyses to figure out the effectiveness of the supplements. For hazard identification and risk assessment, the Hazard Analysis and Critical Control Points (HACCP) approach was used, with the key findings showing that the most critical activities throughout the entire chain pertained to the use of probiotics as an alternative to antibiotics.

Keywords: chicken meat, safety, probiotics, HACCP, antibiotics.

ПРОБИОТИКИ ИЗ ШУБАТА В ПРОИЗВОДСТВЕ КУРИНОГО МЯСА: ВАЖНОСТЬ И АНАЛИЗ НАССР

[1,2]Н.Ж. БЕГДИЛДАЕВА, [1,2,3]Ш.Н. АХМЕТСАДЫКОВА, [2,4]А.А. ОСПАНОВА*

([1]Алматинский Технологический Университет, Республика Казахстан, 050012, Алматы, ул. Толе би, 100
[2]ТОО "Научно-производственное предприятие "Антиген",
Республика Казахстан 040905, п. Абай, ул. Азербаева, 4
[3]ТОО "Казахский научно-исследовательский институт животноводства и кормопроизводства ",
Республика Казахстан, 055552/A10M6C4, Алматы, ул. Жандосова, 51
Южно-Казахстанский университет им. М.Ауезова, Республика Казахстан,
160012, Шымкент, пр. Тауке хана, 71)
Электронная почта автора корреспондента: nbegdildayeva@gmail.com*

Пробиотики все шире признаются как безопасная и эффективная альтернатива антибиотикам для повышения безопасности куриного мяса. Исследование потенциальных опасностей вдоль цепочки поставок куриного мяса позволяет провести всестороннюю оценку рисков контаминации и создать меры управления и корректировки в соответствующих процессах. Конечной целью является обеспечение безопасности