The results of organoleptic assessment of a fermented milk product for functional nutrition

G M Mullagulova¹, O V Avtuyhova², Ya M Rebezov³, D I Vorobyev¹ and A V Goncharov¹

¹K G Razumovsky Moscow State University of technologies and management (the First Cossack University), 73 Zemlyanoy Val, Moscow, 109004, Russian Federation
²Omsk State Technical University, 11, Mira Pr., Omsk, 644050, Russian Federation
³Prokhorov General Physics Institute of the Russian Academy of Science, 38, Vavilova str., Moscow, 119991, Russian Federation

E-mail: g.mullagulova@mgutm.ru

Abstract. The problem associated with the gradual improvement in the quality of human nutrition today is one of the most important and urgent tasks. A balanced diet ensures diseases prevention, creates all the necessary conditions for the normal body development and its ability to withstand various adverse environmental factors. Dairy products have a significant biological value for human nutrition. Fermented milk products contain all the necessary constituent parts of milk, but at the same time in a more digestible form. The purpose of these studies was to conduct an organoleptic assessment of the developed functional fermented milk products. The organoleptic indicators of four samples of the developed product were assessed according to a standard 5-score scale by tasting with filling in tasting cards. A profilogram of the organoleptic indicators of the samples was created. The results showed that the best organoleptic indicators were in the sample with the addition of mint extracts, and the lowest indicators were in the sample with the basil extracts.

1. Introduction
The problem associated with the gradual improvement in the quality of human nutrition today is one of the most important and urgent tasks [1-6]. Due to rational nutrition normal growth and development of children, the activity of adults is ensured. Normal nutrition ensures the prevention of diseases, forms all the necessary conditions for normal body development and its ability to withstand various adverse environmental factors [7-12].

Researchers note the importance of enriching food products consumed by people with various vitamins, minerals, antioxidants, biologically active substances [13-15].

Perhaps one of the most biologically valuable products for human nutrition is milk and various dairy products, their value being determined by the most balanced composition and good digestibility of components [16, 17].

Fermented milk products are very important in dietary and medical nutrition. It is more often used in noted nutrition types of food than milk. This product contains all the necessary components of milk, but at the same time in a more digestible form [18-24].
A functional product is a food product that can be used by healthy people of different ages quite often. Such products can reduce the risk of developing many diseases associated with poor nutrition. It allows to strengthen health due to various physiologically functional components if complying with its safety requirements [25-29].

The purpose of our research was to conduct an organoleptic assessment of the developed fermented milk products of a functional orientation.

2. Material and methods
In the course of the research, the objects were fermented milk products of functional purpose of four samples.

The fermented milk product contains cow's milk, a ferment, a stabilizer, a phytocomponent from an extract of plant leaves or a mixture thereof, characterized in that it additionally contains concentrated milk whey, vitamin 962/6 premix, dry stevioside, while a ferment on pure Lactobacillus bulgaricus and thermophilic streptococcus are used in a ratio of 1: 1, as a stabilizer pectin from sugar beet is used, in the phytocomponent, the product additionally contains plant fruit extracts, green vegetables (table 1).

| Component                  | Content, wt. % |
|----------------------------|----------------|
| Phytocomponent             | 1.0–5.0        |
| Leaven                     | 0.003–0.007    |
| Vitamin premix             | 0.1–0.2        |
| Stabilizer pectin          | 4.0–7.0        |
| Concentrated whey          | 0.1–0.5        |
| Stevioside                 | 0.1–0.3        |
| Cow's milk                 | rest           |

4 samples were developed with the introduction of the following types of extracts:

- blackcurrant leaf extract and blackcurrant fruit extract in a ratio of 1: 4 (fermented milk product, sample 1);
- cherry leaf extract and cherry fruit extract in a ratio of 1: 9 (fermented milk product, sample 2);
- CO2-extract of basil, parsley and dill, and CO2-extract of coriander in a ratio of 0.5: 40: 58: 0.5 (fermented milk product, sample 3);
- CO2 extract of mint, peppermint leaves and CO2 extract of lemon in a ratio of 0.5: 99: 0.5 (fermented milk product, sample 4).

The following methods were used to study organoleptic indicators on the basis of a standard 5-score scale for assessing the quality of fortified fermented milk products and according to the methodology GOST R 53161-2008 (ISO 5495: 2005).

3. Results and discussion
When carrying out the organoleptic assessment, all the existing defects in exterior view (the presence of an uncharacteristic shade, wrinkling, etc.), as well as defects in the smell and taste of the products (bitter, sharp, with the presence of an extraneous aroma and taste, sour, unexpressed, empty taste, oxidized, too sweet). In addition, an assessment was made of the consistency deficiencies of the product (granular, slimy, too dense, loose). When carrying out organoleptic assessment, the color and appearance of the product was evaluated after opening the package.
This type of assessment of existing prototypes of products was carried out by the participants of the tasting committee. At the same time, special tasting cards were filled in. The summary information of the organoleptic assessment using the example of sample 3 is presented in table 2.

**Table 2. Organoleptic characteristics of a fermented milk product.**

| Indicator                  | TR TS 033/2013 and FZ № 88 | Research results                        |
|----------------------------|-----------------------------|----------------------------------------|
| Exterior view and consistency | Uniformly viscous liquid. When a stabilizer is added, it is jelly or creamy. When adding flavoring components - with their presence Fermented milk. When added sugar or sweeteners, moderately sweet taste. When adding flavoring ingredients - due to added ingredients | Homogeneous, creamy liquid, with the addition of green vegetables |
| Taste and smell             | Homogeneous, creamy liquid, with the taste of vegetables |
| Colour                     | Milky white uniform or due to added ingredients | Caused by added components |

The table shows that the organoleptic characteristics of the fermented milk product meet the requirements of regulatory documents.

The organoleptic assessment of the quality of the test samples of the fermented milk product was carried out on a 5-score scale, the results of which are presented in table 3.

**Table 3. Organoleptic assessment of a fermented milk product on a five-score scale.**

| Indicator        | Sample 1 | Sample 2 | Sample 3 | Sample 4 |
|------------------|----------|----------|----------|----------|
| Taste, average score | 4.20     | 4.80     | 4.10     | 4.90     |
| Smell, average score  | 4.10     | 4.75     | 4.20     | 4.80     |
| Consistency, average score | 4.30     | 4.80     | 4.20     | 4.95     |
| Appearance, average score | 4.10     | 4.80     | 4.20     | 4.90     |
| Colour, average score     | 4.35     | 4.40     | 4.30     | 4.40     |

The profilogram of the organoleptic indicators of the test samples of the fermented milk product is shown in figure 1.

**Figure 1. Profilogram of organoleptic indicators of prototypes.**
It can be seen from the above profiles that the prototype with mint extracts has the highest organoleptic characteristics. The use of plant extracts as a filler improves organoleptic characteristics and increases the nutritional value of the product.

Also, the organoleptic assessment of the quality of the test samples of the fermented milk product was carried out in accordance with GOST R 53161-2008 (ISO 5495: 2005). This International Standard specifies a method for determining whether there is a noticeable sensory difference or similarity between samples of two products in terms of the intensity of the characteristic under consideration.

The testers receive a set of two product samples (i.e., samples that are a pair). The tester's task is to choose from them one of the samples that has a more intensely expressed organoleptic characteristic (in this case, identify a sweeter sample between the samples) to be evaluated, even if the choice is based only on guesswork.

The samples were stored at a temperature of 2–6 °C; analyzes were performed in 4 h after preparation.

Difference of samples 1A; 2A; 3A; 4A and 1B; 2B; 3B; 4B consists of different stevioside content. In images 1A; 2A; 3A and 4A is added to the stevioside formulation. In samples 1B; 2B; 3B and 4B stevioside is absent. The samples were served simultaneously.

The α-risk values of 0.05 were chosen, the percentage of the provers who could sense the difference between the products \( p_d \) equal to 50% and β-risk equal to 0.2. According to the table 4, we find the number of testers, which is 23.

Table 4. Number of assessors required to perform a paired comparison test using a one-tailed test.

| \( \alpha \) | \( p_d \) | 0.50 | 0.20 | 0.10 | 0.05 | 0.01 | 0.001 |
|---|---|---|---|---|---|---|---|
| 0.50 | – | – | – | 9 | 22 | 33 | 58 |
| 0.20 | – | 12 | 19 | 26 | 39 | 58 | 70 |
| 0.10 | – | 19 | 26 | 33 | 48 | 70 | 82 |
| 0.05 | 13 | 23 | 33 | 42 | 58 | 82 | 107 |
| 0.01 | 35 | 40 | 50 | 59 | 80 | 107 | 140 |
| 0.001 | 38 | 61 | 71 | 83 | 107 | 140 | 200 |
| 0.50 | – | – | – | 9 | 20 | 33 | 55 |
| 0.20 | – | 19 | 30 | 39 | 60 | 94 | 132 |
| 0.10 | 14 | 28 | 39 | 53 | 79 | 113 | 174 |
| 0.05 | 18 | 37 | 53 | 67 | 93 | 132 | 228 |
| 0.01 | 35 | 64 | 80 | 96 | 130 | 174 | 228 |
| 0.001 | 61 | 95 | 117 | 135 | 176 | 228 | 322 |
| 0.50 | – | – | – | 23 | 33 | 59 | 108 |
| 0.20 | – | 32 | 49 | 68 | 110 | 166 | 213 |
| 0.10 | 21 | 53 | 72 | 96 | 145 | 208 | 322 |
| 0.05 | 30 | 69 | 93 | 119 | 173 | 243 | 322 |
| 0.01 | 64 | 112 | 143 | 174 | 235 | 319 | 412 |
| 0.001 | 107 | 172 | 210 | 246 | 318 | 412 | 515 |
| 0.50 | – | 23 | 45 | 67 | 133 | 237 | 322 |
| 0.20 | 21 | 77 | 112 | 158 | 253 | 384 | 515 |
| 0.10 | 46 | 115 | 168 | 214 | 322 | 471 | 554 |
| 0.05 | 71 | 158 | 213 | 268 | 392 | 554 | 726 |
Then the total number of votes in favor of one and the other sample is calculated by all testers and the significance of the test result is determined with reference to a statistical table (Table 5), selected on the basis of whether it was known a priori which of the samples should be recognized as having a more intensely expressed organoleptic characteristic.

17 out of 23 testers noted that sample 1A is sweeter than 1B; 19 out of 23 testers noted that sample 2A was sweeter than 2B, 16 out of 23 testers noted that sample 4A was sweeter than 4B, 4 out of 23 testers noted a difference between 3A and 3B.

**Table 5.** The minimum number of correct answers required to conclude that there is a significant difference between samples based on the results of a pairwise comparison test, one-tailed test.

| n | Minimum number of correct answers at the level of α-risk | Minimum number of correct answers at the level of α-risk |
|---|---|---|
|   | 0.20 | 0.10 | 0.05 | 0.01 | 0.001 |   | 0.20 | 0.10 | 0.05 | 0.01 | 0.001 |
| 10 | 7 | 8 | 9 | 10 | 11 | 36 | 22 | 23 | 24 | 26 | 27 | 28 |
| 11 | 8 | 9 | 9 | 10 | 11 | 37 | 22 | 23 | 24 | 25 | 26 | 27 |
| 12 | 8 | 9 | 10 | 11 | 12 | 38 | 23 | 24 | 25 | 27 | 29 | 30 |
| 13 | 9 | 10 | 10 | 12 | 13 | 39 | 23 | 24 | 26 | 28 | 30 | 31 |
| 14 | 10 | 10 | 12 | 13 | 40 | 24 | 25 | 26 | 28 | 31 | 32 | 33 |
| 15 | 10 | 11 | 12 | 13 | 44 | 26 | 27 | 28 | 31 | 33 | 34 | 35 |
| 16 | 11 | 12 | 12 | 14 | 15 | 48 | 28 | 29 | 31 | 33 | 36 | 37 |
| 17 | 11 | 12 | 13 | 14 | 16 | 52 | 30 | 32 | 33 | 35 | 38 | 39 |
| 18 | 12 | 13 | 13 | 15 | 16 | 56 | 32 | 34 | 35 | 38 | 40 | 41 |
| 19 | 12 | 13 | 14 | 15 | 17 | 60 | 34 | 36 | 37 | 40 | 43 | 44 |
| 20 | 13 | 14 | 15 | 16 | 18 | 64 | 36 | 38 | 40 | 42 | 45 | 46 |
| 21 | 13 | 14 | 15 | 17 | 18 | 68 | 38 | 40 | 42 | 45 | 48 | 49 |
| 22 | 14 | 15 | 16 | 17 | 19 | 72 | 41 | 42 | 44 | 47 | 50 | 51 |
| 23 | 15 | 16 | 16 | 18 | 20 | 76 | 43 | 45 | 46 | 49 | 52 | 53 |
| 24 | 15 | 16 | 17 | 19 | 20 | 80 | 45 | 47 | 48 | 51 | 55 | 56 |
| 25 | 16 | 17 | 18 | 19 | 21 | 84 | 47 | 49 | 51 | 54 | 57 | 58 |
| 26 | 16 | 17 | 18 | 20 | 22 | 88 | 49 | 51 | 53 | 56 | 59 | 60 |
| 27 | 17 | 18 | 19 | 20 | 22 | 92 | 51 | 53 | 55 | 58 | 62 | 63 |
| 28 | 17 | 18 | 19 | 21 | 23 | 96 | 53 | 55 | 57 | 60 | 64 | 65 |
| 29 | 18 | 19 | 20 | 22 | 24 | 100 | 55 | 57 | 59 | 63 | 66 | 67 |
| 30 | 18 | 20 | 20 | 22 | 24 | 104 | 57 | 59 | 61 | 65 | 69 | 70 |

Using the data obtained, we can conclude that between the two compared samples 1A and 1B; 2A and 2B; 4A and 4B; there is a difference, and no difference was found between samples 3A and 3B.

4. Conclusion

We assessed the quality of the organoleptic characteristics of four samples of the developed fermented milk product. It has a uniform colour due to the added components, a uniform, creamy consistency. Smell and taste are of fermented milk, which corresponds to TR TS 033/2013 and Federal Law No. 88. The organoleptic characteristics of the developed product were assessed according to a standard 5-score scale by tasting with filling in tasting cards. A profilogram of the organoleptic indicators of the samples
was constructed, according to it, it can be found that the best organoleptic indicators are in the sample with the addition of extracts from mint, and the lowest ones are in the sample with extracts from basil.

The tasters noted that the addition of stevioside to the test samples made the taste sweeter in all samples except sample 3.

References
[1] Gavrilova N, Chernopolskaya N, Rebezov M, Shchetinina E, Suyazova I, Safronov S, Ivanova V and Sultanova E 2020 Development of specialized food products for nutrition of sportmen Journal of Critical Reviews 7(4) 233-6 DOI: 10.31838/jcr.07.04.43
[2] Okuskhanova E, Serikova A, Suychinov A, Rebezov M, Nurgazezova A, Anuarbekova A, Harlap S, Maksimiuk N, Zaitseva T and Shcherbakov P 2018 Role Of Calcium, Magnesium And Phosphorous In Human Body RJPBCS Research Journal of Pharmaceutical Biological and Chemical Sciences 9(6) 258-61
[3] Smolnikova F, Toleubekova S, Temerbayeva M, Cherkasova E, Gorelik O, Kharlap S, Derko M, Rebezov M and Penkova I 2018 Nutritive Value Of Curd Product Enriched With Wheat Germ Research Journal of Pharmaceutical, Biological and Chemical Sciences 9(3) 1003-8 WOS:000438847100131
[4] Vaskovsky A, Chvanova M and Rebezov M 2020 Creation of digital twins of neural network technology of personalization of food products for diabetics 4th Scientific School on Dynamics of Complex Networks and their Application in Intellectual Robotics (DCNAIR) 251-3 doi: 10.1109/DCNAIR50402.2020.9216776
[5] Rebezov M, Naumova N, Lukin A, Alkhamova G and Khayrullin M 2011 Food behavior of consumers (for example, Chelyabinsk) Voprosy Pitania 80(6) 23-6
[6] Kassymov S, Amirzhan T, Moldabayeva Zh, Rebezov M, Sharova T, Nikolaeva N, Gribkova V, Gaidarenko L and Karapetyan I 2020 Nutritional and biological value of bakery products with the addition of vegetable powders and milk whey International Journal of Psychosocial Rehabilitation 24(7) 3985-9 DOI: 10.37200/IJPR/V24I7/PR270394
[7] Kassymov S, Amirzhan T, Moldabayeva Zh, Rebezov M, Sharova T, Nikolaeva N, Gribkova V, Gaidarenko L and Karapetyan I 2020 Nutritional and biological value of bakery products with the addition of vegetable powders and milk whey International Journal of Psychosocial Rehabilitation 24(7) 3985-9 DOI: 10.37200/IJPR/V24I7/PR270394
[8] Kulushayeva B, Okuskhanova E, Rebezov M, Burakovskaya N, Kenijz N, Fedoseeva N, Artemeva I, Saranova O and Pershina O 2020 Bread with sesame seeds for gerodietetic nutrition International Journal of Psychosocial Rehabilitation 24(7) 1661-5 DOI: 10.37200/IJPR/V24I7/PR270149
[9] Kulushayeva B, Rebezov M, Igenbayev A, Kichko Yu, Burakovskaya N, Kulakov V and Khayrullin M 2019 Gluten-free diet: positive and negative effect on human health Indian Journal of Public Health & Development 10(7) 906-9
[10] Okuskhanova E, Smolnikova F, Kassymov S, Zinina O, Mustafayeva A, Rebezov M, Rebezov Y, Tazeddinova D, Galieva Z and Maksimiuk N 2017 Development of minced meat ball composition for population from the unfavorable ecological regions Annual Research & Review in Biology 13(3) 1-9 DOI: 10.9734/ARRB/2017/33337
[11] Kazhibayeva G, Issaeva K, Mukhamejanova A, Khayrullin M, Kulikov D, Lebedeva N, Gribkova V and Rebezov M 2019 Development Of Formulation And Production Technology Of Fish Pate For Therapeutic And Prophylactic Purposes International Journal of Engineering and Advanced Technology 8(5C) 1355-9 DOI: 10.35940/ijeat.E1193.0585C19
[12] Imran M et al. 2020 Lycopene as a Natural Antioxidant Used to Prevent Human Health Disorders Antioxidants 9(8) 706 doi:10.3390/antiox9080706
[13] Chernopolskaya N, Gavrilova N, Rebezov M, Dolmatova I, Zaitseva T, Somova Y, Babaeva M, Ponomarev E and Voskanyan O 2019 Biotechnology of specialized product for sports nutrition International Journal of Engineering and Advanced Technology 8(4) 40-5
DOI: 10.35940/ijrte.B3158.078219

[14] Serikova A, Smolnikova F, Rebezov M, Okuskhanova E, Temerbayeva M, Gorelik O, Kharlap S, Baitukenova Sh, Baitukenova S and Tumbasova Y 2018 Development Of Technology Of Fermented Milk Drink With Immune Stimulating Properties Research Journal of Pharmaceutical, Biological and Chemical Sciences 9(4) 495-500 WOS:000438848100062

[15] Varivoda A, Kenijz N, Rebezov M and Okuskhanova E 2018 Development Of Dietary Food With The Use Of Soy Protein Research Journal of Pharmaceutical, Biological and Chemical Sciences 9(4) 1005-13 WOS:000438848100137

[16] Temerbayeva M et al. 2018 Development of Yoghurt from Combination of Goat and Cow Milk Annual Research & Review in Biology 23(6) 1-7 DOI: 10.9734/arrb/2018/38800

[17] Gorelik O et al. 2017 Study of chemical and mineral composition of new sour milk bio-product with sapropel powder Annual Research & Review in Biology 18(4) 1-5 DOI: 10.9734/ARRB/2017/36937

[18] Temerbayeva M et al. 2018 Technology of Sour Milk Product For Elderly Nutrition Research Journal of Pharmaceutical, Biological and Chemical Sciences 9(1) 291-5

[19] Smolnikova F, Rebezov M, Shaydullin R, Knysh I, Yudina O, Nikolaeva N, Sorokin A, Zubtsova Yu and Kozlov V 2020 Vegetable stabilizers used in the production of fermented milk drinks and yogurts International Journal of Psychosocial Rehabilitation 24(6) 7663-7 DOI: 10.37200/IJPR/V24I6/PR260775

[20] Ashan S et al. 2020 Functional exploration of bioactive moieties of fermented and non-fermented soy milk with reference to nutritional attributes J Microbiol Biotech Food Sci 10(1) 145-9 doi: 10.15414/jmbfs.2020.10.1.145-149

[21] Chernopolskaya N, Gavrilova N, Rebezov M, Harlap S, Nigmatyanov A, Peshcherov G, Bychkova T, Vlasova K and Karapetyan I 2019 Biotechnology of specialized fermented product for elderly nutrition International Journal of Pharmaceutical Research 11(1) 545-50 DOI: 10.35940/ijrte.B3158.078219

[22] Gavrilova N, Chernopolskaya N, Rebezov M, Moisejkina D, Dolmatova I, Mironova I, Peshcherov G, Gorelik O and Derkho M 2019 Advanced Biotechnology of Specialized Fermented Milk Products International Journal of Recent Technology and Engineering 8(2) 2718-22 DOI: 10.35940/ijrte.B3158.078219

[23] Gavrilova N, Chernopolskaya N, Rebezov M, Shchetinina E, Dogareva N, Likhodeevskaya O, Knysh I and Sanova Z 2020 Specialized sports nutrition foods: review International Journal of Pharmaceutical Research 12(2) 998-1003

[24] Gavrilova N, Chernopolskaya N, Molyboga E, Shipkova K, Dolmatova I, Demidova V, Rebezov M, Kuznetsova E and Ponomareva L 2019 Biotechnology application in production of specialized dairy products using probiotic cultures immobilization International Journal of Innovative Technology and Exploring Engineering 8(6) 642-8

[25] Ahsan S et al. 2020 Safety assessment of milk and indigenous milk products from different areas of Faisalabad J Microbiol Biotech Food Sci 9(6) 1197-1203 DOI: 10.15414/jmbfs.2020.9.6.1197-1203

[26] Kuramshina N, Rebezov M, Kuramshin E, Tretyak L, Topuria G, Kulikov D, Evtushenko A, Harlap S and Okuskhanova E 2019 Heavy metals content in meat and milk of Orenburg region of Russia International Journal of Pharmaceutical Research 11(1) 1301-5 DOI: 10.21668/health.risk/2019.2.04.eng

[27] Maksimuk N N, Rebezov M B and Guber N B 2018 Experience in auditing in the food safety management system Economics of Agriculture of Russia doi:10.32651/2070-0288-2018-9.15-21

[28] Rebezov M et al. 2020 Improvement of Laboratory Services When using Sample Preparation in Microwave System International Journal of Current Research and Review 12(16) 29-33 doi:10.31782/IJCRR.2020.12167

[29] Kuramshina N, Rebezov M, Kuramshin E, Krasnogorskaya N, Tretyak L, Somova Yu,
Dolmatova I, Zaitseva T, Grigoryeva I and Bakirova L 2018 Heavy Metals Contamination of Soil in Urban Areas of Southern Ural Region of Russia International Journal of Engineering and Technology (UAE) **7**(4.42) 14–8 DOI: 10.14419 / ijet.v7i4.42.25536