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Evaluation of fatty acid profile and naturalness of butter marketed in Bulgaria

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Abstract. *The predominant influence on the structural-mechanical characteristics (hardness, brittleness, etc.) and the chemical parameters (acidity, oxidation-reduction potential, etc.) of butter is exerted by its lipid composition. The aim of the study was to establish the fatty acid composition of some Bulgarian brands of butter and those imported from abroad, offered in the trade network of Bulgaria, in connection with their naturalness and health indicators. Five brands of butter produced in Bulgaria and imported from countries in the European Union were tested three times. The content of saturated fatty acids in the studied Bulgarian brands of butter varied from 66.16 to 75.15%, and for brands of butter imported from EU countries they varied in a significantly narrower range - from 67.51 to 72.49%. The amount of short-chain saturated fatty acids is higher for EU-imported butter brands. The data for the identification characteristics of all tested samples from the trade network of the country meet the requirements for naturalness of butter. The atherogenic index of butter varied from 2.56 to 3.26 for the imported brands of butter and from 2.41 to 3.70 for the Bulgarian ones, and the thrombogenic index from 1.49 to 2.36 for the imported brands, and from 1.44 to 2.17 for the Bulgarian ones, respectively.*

Keywords: butter, fatty acid composition, healthy indexes, naturalness

Abbreviations: SFA- saturated fatty acids, MUFA- monounsaturated fatty acids, PUFA- polyunsaturated fatty acids, USFA- unsaturated fatty acids, SCFA- short-chain fatty acids, MCFA- medium-chain fatty acids, LCFA- long-chain fatty acids, LDL- low-density lipoprotein, HDL- high-density lipoprotein, IA- index of atherogenicity, IT- index of thrombogenicity, EU- European union.

Introduction

Butter is a fat-rich product, mainly in the form of a water-in-oil emulsion with complex rheological properties, and its structure and consistency are determined by a number of factors (Truong et al., 2018; WHO/FAO, 2018). Butter contains more than 80% milk fat, which shows a decisive influence on its properties (Wright and Marangoni, 2006).

Milk fat is one of the most complex dietary fats in terms of fatty acid composition, in which more than 400 fatty acids can be identified (Butler et al., 2011). About 16 of these have been found in large quantities and are responsible for the properties of butter, including the melting temperature and the hardening of butter (Chen et al., 2004). Medium- and long-chain saturated fatty acids are predominant components and represent about 50-60% of total fatty acids. Milk fat can also be rich in mono- and polyunsaturated fatty acids, which can vary from 26% to 36% and from 2% to 4%, respectively (He et al., 2011). The fatty acid profile of butter depends on the composition of the raw material used, the season, technological and other factors that in turn determine the physicochemical properties of the product (Blaško et al., 2010; Liu et al., 2017). As a result of seasonal changes, fatty-acid composition of some brands of butter produced in Poland shows that the content of short- and medium-chain saturated fatty acids is higher in winter (13.10%) and spring (12.38%) and lower in summer (11.88%) and autumn (10.83%). The same is found for long-chain saturated fatty acids (Rutkowska and Adamska, 2011).

In Pakistan, Anwar et al. (2006) for 10 popular butter brands found a content of saturated fatty acids in the range of 63.74÷68.85%, cis-monounsaturated - 23.00÷27.06% and cis-polyunsaturated - 1.20-2.94%. Büyükoğlu et al. (2017) found that fatty acids, which differences in the physical properties of milk butter are due to are myristic acid (C14:0), palmitic acid (C16:0), stearic acid (C18:0) and oleic acid (C18:1). Couvreur et al. (2006) found that the C16:0/C18:1 ratio affects the melting temperature of milk fat and the sensory perception by consumers of characteristics such as butter hardness.

Due to the growing phenomenon of adulteration of milk fats by adding those of vegetable origin, knowledge of the fatty acid composition of milk fat, including the content of individual fatty acids is of paramount importance today. The Bulgarian market offers a wide variety of local and imported brands of butter, which allows the consumer to choose from, but information about fatty acid composition and its healthy lipid indices and ratios is insufficient.

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The aim of the study is to establish the fatty acid composition of some Bulgarian and imported brands of butter, offered in the trade network of the country, in connection with their naturalness and health indicators.

Material and methods

Five brands of Bulgarian (A1, A2, A3, A4, A5) (n=15) and imported butter (B1, B2, B3, B4, B5) (n=15), offered in the trade network of the country, were tested three times (from October 2017 to November 2019). According to the labels, all samples are produced without the addition of non-dairy fats. The composition of the purchased Bulgarian and imported butters is shown in Table 1.

Table 1. Indicators of the studied brands of butter according to the label

Indices	Bulgarian brands of butter (n=15)					Imported brands of butter (n=15)				
	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5
Fat, g	82	82	87 (45)	82	82 (55)	82	82	82	82,5	82
(SFA, g)	(55.08)	(53)					(56.6)	(57)	(55)	(52.5)
Total protein, g	0.5	-	0.33	-	0.7	-	0.6	0.7	0.5	0.7
Carbohydrates, g	0.5	-	0.45	-	0.6	-	1	0.5	1	0.6
Salt, g	-	0.57	<0.5	-	-	-	0.03	0.03	0.02	0.1
Energy, kcal	740	744	786	-	743	-	744	743	749	743

*SFA- saturated fatty acids

The extraction of milk fat was done by the method of Rose-Gottlieb using diethyl ether and petroleum ether (Methodenbuch, Bd. VI VDLUFA-Verlag, Darmstadt, 1985). After that the solvents were evaporated on a vacuum-rotary evaporator. Sodium methylate was used for obtaining methyl esters of the fatty acids. The fatty acid composition of butter was determined by gas chromatography "Clarus 500" with flame ionization detector and column ThermoScientific, 60 m, ID 0.25 mm, Film: 0.25 μm.

From the data on the fatty acid composition, the following indices were calculated:

1) Index of atherogenicity (IA) – indicating the relationship between the sum of the lauric, myristic and palmitic fatty acids and that of the main classes of unsaturated ones, the former being considered proatherogenic and the latter anti-atherogenic (Ulbricht and Southgate, 1991):

IA = C12:0 + 4xC14:0 + C16:0 / ∑(MUFA + PUFA)

2) Index of thrombogenicity (IT) – showing the tendency to form clots in the blood vessels. This is defined as the relationship between the pro-thrombogenetic fatty acids (saturated) and the antithrombogenetic fatty acids (MUFAs, PUFAs – 6 and PUFAs – n3) (Ulbricht and Southgate, 1991):

IT = C14:0 + C16:0 + C18 / 00.5xC18:1 + 0.5x∑MUFA + 0.5xPUFA – ∑n6 + 3xPUFA n3 + (PUFAn3/ PUFAn6)

Statistical software (Statistica 6.0) was used for statistical analysis (mean, standard error of mean).

Results and discussion

The fat content is the main defining characteristic of the wholesale and retail of butter (Bradley, 2018). European Union regulations currently require >80% fat in salted butter and >82% fat in unsalted butter (Council regulation (EC) No 1234/2007). The fat content of the studied types of butter varies from 83.5% to 87.4% for Bulgarian (Table 2) and respectively - from 82.5% to 84.9% for the imported ones (Table 3), as the degree of deviation from that indicated on the label is higher in Bulgarian butters. From the Bulgarian samples, the closest to the fat content announced on the package is A3, as the deviation is +0.4%, and from the imported ones - B5 with a deviation of +0.5%. The biggest deviation from what is noted on the label are A4 - by +3.5% and B2 - by +2.9%, respectively. Deviations from this basic indicator also lead to a difference in the real energy value of the product and that indicated on the label.

According to some studies, one of the most characteristic fatty acids of butter fat is butyric acid (C4:0) (Derewiaka et al., 2011). However, its content in the analysed samples ranged from 0.28 (B4) to 2.52% (A1) and this fatty acid was not even detected in four of the tested samples. Tietz and Hartel (2000) compared the composition of winter and summer milk fat and found that one of the biggest differences was the butyric fatty acid content. Summer milk fat contained about 4.9% butyric acid and winter milk fat contained only 1.9%. Our results indicate that the butters investigated in the study came mainly from the winter period.

In all studied brands (Bulgarian and imported) the content of palmitic C16:0 is the highest, followed by oleic C18:1, myristic C14:0 and stearic C18:0 fatty acids (Tables 2 and 3). These data coincide with those established for different brands of butter produced in the United States (Plans Pujolras et al., 2015), Poland (Tomaszewska-Gras, 2016a), Sudan (Abdalla et al., 2017) and Turkey (Akgül et al., 2021).

In this study, the content of myristic acid (C14:0) which can serve as an indicator of the "originality" of the composition of milk fats (Stołyhwo and Rutkowska, 2007), in the samples was slightly higher (11.46÷14.55%) than the results from studies by other authors - 10.50-13.00% (Anwar et al., 2006) and 9.7 to 12.0% (Rutkowska and Adamska, 2011). On the other hand, the amount of palmitic (C16:0) is lower - 32.79÷40.53%, against 37.0÷41.5%, while in the content of stearic acid (C18:0) there is no significant difference - 9.12-12.54% vs. 9.70-12.04% (Anwar et al., 2006). C14, C16 and C18 belong to the long-chain fatty acids, which are related to the consistency of the butter and their content is important from a technological point of view.

Table 2. Fatty acids composition of Bulgarian brands of butter, expressed as % of total fatty acids

Fatty acids	Bulgarian brands of butter (n=15)				
	A1	A2	A3	A4	A5
Fat	83.5±0.252	83.8±0.071	87.4±0.151	85.5±0.058	83.6±0.207
			Short-chain FA		
C 4:0	2.52±0.044	0.55±0.003	-	-	-
C 6:0	2.32±0.022	1.46±0.012	-	0.83±0.035	-
C 8:0	1.50±0.043	1.05±0.006	-	0.91±0.032	-
C10:0	3.47±0.064	2.46±0.009	2.39±0.006	2.65±0.086	1.42±0.02
Σ SCFA	9.81±0.076	5.52±0.024	2.39±0.006	4.39±0.096	1.42±0.02
			Medium-chain FA		
C 12:0	4.01±0.034	2.93±0.167	3.72±0.012	3.27±0.056	3.54±0.013
C 14:0	13.2±0.029	11.54±0.026	13.26±0.030	11.36±0.095	11.94±0.014
C 15:0	1.12±0.037	1.17±0.005	-	0.98±0.005	-
C 16:0	35.08±0.20	34.61±0.260	39.24±0.052	33.54±0.136	40.53±0.009
C 16:1	0.27±0.019	0.28±0.012	-	2.07±0.029	-
C 16:2	-	0.31±0.01	-	2.04±0.009	-
C 17:0	2.17±0.020	1.6±0.004	-	2.99±0.037	2.21±0.006
Σ MCFA	55.85±1.31	52.44±0.347	56.22±0.147	56.25±0.334	58.22±0.110
			Long-chain FA		
C 18:0	9.76±0.074	10.73±2.086	12.54±0.136	9.38±0.058	13.51±0.02
C 18:1	21.91±0.467	27.07±0.014	25.85±0.046	25.26±0.191	25.15±0.005
C 18:2	1.59±0.012	3.13±0.013	1.4±0.023	1.76±0.017	1.2±0.084
C 18:3	1.08±0.092	1.11±0.023	1.6±0.040	2.97±0.108	0.5±0.058
Σ LCFA	34.34±0.130	42.04±0.92	41.39±0.200	39.36±0.293	40.36±1.04
			SFA and USFA		
Σ SFA	75.15±0.069	68.10±3.165	71.15±0.205	66.16±0.227	73.15±0.023
Σ USFA	24.85±0.527	31.9±0.055	28.85±0.110	33.96±0.085	26.85±0.126
Σ MUFA	22.18±0.486	27.35±0.019	25.85±0.043	27.33±0.162	25.15±0.006
Σ PUFA	2.67±0.080	4.55±0.037	2.89±0.064	6.87±0.132	1.70±0.120

Some studies contradict the thesis that the consumption of milk and dairy products would increase the synthesis of low-density lipoprotein (LDL) and the risk of coronary heart disease. It is currently thought that the increased concentration of LDL in the blood is due to lauric (C12:0), myristic (C14:0) and palmitic (C16:0) fatty acids, but other saturated fatty acids in milk neutralize their effect by increasing HDL (Parodi, 2009). The total content of these three fatty acids in Bulgarian butters varies from 48.17 to 56.22%, and in the imported ones - from 48.76 to 54.32%.

Short- and medium-chain fatty acids (C4:0÷C17:0) are valuable components of milk fat, as in the human body they are used entirely as a source of energy and thus do not cause obesity. They are credited with valuable antifungal, antibacterial, antiviral and antisclerotic properties (Rutkowska and Adamska, 2011). In the analyzed butter samples, the amount of short-chain fatty acids is higher in the brands imported from the EU - an average of 6.30±0.79% with a variation in the range of 4.09÷8.42%. In the case of Bulgarian butter brands, the variation in the content of these fatty acids is in a wider range of 1.42÷9.81%, 4.71±1.47% on average ($p>0.05$) (Tables 2 and 3). Our results for the considered fatty acids for all brands of butters are lower than those for the studied butter samples in France (Ledoux et al., 2005) and Poland (Rutkowska and Adamska, 2011). The significant amount of short-chain fatty acids contributes to the quality of butter as softer fat with lower melting point. This ensures quick flavour release when melting, which is desirable in numerous foods (Devi and Khatkar, 2018).

The tested butter samples contain mainly medium-chain fatty acids, with dominating palmitic acid, followed by myristic and lauric. These results are consistent with those established by Fadzillah et al. (2016) for butter produced in Malaysia.

A characteristic feature of milk fat is a considerable content of long-chain saturated fatty acids (LCFA) (above C 18). The variation in the content of long-chain fatty acids is greater for Bulgarian brands – from 34.34 to 42.04% compared to imported butters – from 34.39 to 38.54%. This group of fatty acids is important from technological perspective, for they determine traits associated with consistency (Jensen, 2002).

Table 3. Fatty acids composition of Imported brands of butter, expressed as % of total fatty acids

Fatty acids	Imported brands of butter (n=15)				
	B1	B2	B3	B4	B5
Fat	83.8±0.104	84.9±0.104	83.5±0.186	83.7±0.179	82.5±0.252
			Short-chain FA		
C 4:0	1.14±0.012	1.29±0.031	0.57±0.006	0.28±0.033	-
C 6:0	1.37±0.06	2.14±0.023	2.11±0.082	1.02±0.017	0.31±0.015
C 8:0	1.1±0.025	1.51±0.050	1.44±0.035	0.96±0.030	0.75±0.012
C10:0	2.9±0.033	3.48±0.194	3.36±0.182	2.73±0.144	3.03±0.046
Σ SCFA	6.51±0.106	8.42±0.075	7.48±0.159	4.99±0.106	4.09±0.040
			Medium-chain FA		
C 12:0	3.92±0.173	3.87±0.108	3.75±0.116	3.39±0.203	4.2±0.120
C 14:0	13.36±0.072	12.69±0.220	13.05±0.032	11.46±0.229	14.55±0.281
C 15:0	1.06±0.017	1.09±0.032	0.65±0.060	1.02±0.017	1.19±0.058
C 16:0	35.69±0.191	32.79±0.306	33.85±0.070	33.82±0.104	35.57±0.209
C 16:1	1.83±0.029	1.98±0.115	0.25±0.012	2.13±0.033	1.9±0.145
C 16:2	-	1.41±0.046	0.41±0.038	0.94±0.088	3.87±0.063
C 17:0	0.44±0.006	2.45±0.076	2.12±0.313	3.71±0.119	0.24±0.003
Σ MCFA	56.30±0.485	56.28±0.837	54.08±0.481	56.47±0.791	61.52±1.876
			Long-chain FA		
C 18:0	10.28±0.026	9.31±0.136	11.59±0.145	9.12±0.078	10.0±0.577
C 18:1	24.3±0.088	22.18±0.127	23.75±0.098	24.77±0.045	22.34±0.058
C 18:2	1.49±0.038	1.98±0.021	2.33±0.087	1.92±0.032	1.67±0.027
C 18:3	1.12±0.012	1.83±0.058	0.77±0.151	2.73±0.117	0.38±0.018
Σ LCFA	37.19±0.155	35.3±0.327	38.44±0.378	38.54±0.185	34.39±0.173
			SFA and USFA		
Σ SFA	71.26±0.424	70.62±0.789	72.49±0.542	67.51±0.509	69.84±0.785
Σ USFA	28.72±0.034	29.38±0.048	27.51±0.110	32.49±0.087	30.16±0.043
Σ MUFA	26.13±0.059	24.16±0.039	24.0±0.090	26.90±0.026	24.24±0.087
Σ PUFA	2.61±0.026	5.22±0.066	3.51±0.052	5.59±0.061	5.92±0.077

The content of saturated fatty acids in the studied Bulgarian brands of butter varies from 66.16 to 75.15% (70.74±1.94% on average), results higher than those established by Antova et al. (2008) for different butters sold in Bulgaria (from 65.2% to 62.4%). For the brands of butter imported from EU countries, an average content of saturated fatty acids of 70.34±0.83% was found, which varies in a significantly narrower range - from 67.51 to 72.49%. These data are higher than those found by Aro et al. (1998) who stated that European butters contained only 59.84-66.02% of SFA.

The average content of unsaturated fatty acids in the studied Bulgarian butters (29.28±1.94%) is slightly lower than that of the imported ones (29.66±0.86%) and varies in a wider range - 24.85÷33.96%, against 27.51÷32.49%. Our data on saturated and unsaturated fatty acids in the studied butter samples are close to the results of other authors (Ledoux et al., 2005; Anwar et al., 2006; Derewiaka et al., 2011; Rutkowska and Adamska, 2011). It should be noted that the variation in the fatty acid composition of the butter samples from Bulgaria is to a greater extent than in the studies of the cited authors. In addition, Ledoux et al. (2005) and Anwar et al. (2006) found a slightly lower content of saturated fatty acids in the butter samples they studied. This can be attributed to differences in diet, breed, climate and other factors that have influenced the composition of raw milk, and hence the butter produced.

Monounsaturated fatty acids (MUFA) in the studied butter samples are represented by palmitoleic (C16:1) and oleic (C18:1) acids, the amount of which varies from 0.25 to 2.13% and 21.91 to 27.07%. A higher degree of variation and higher values for oleic acid are found in Bulgarian butter brands (22.18-27.35%) than in those imported from the EU (24.0-26.90%).

Polyunsaturated fatty acids (PUFA) in the study of butter samples in Poland (Rutkowska and Adamska, 2011) are represented by linoleic (C18:2 cis9-cis12) and linolenic (C18:3 cis9-cis12-cis15) fatty acids. The content of these two fatty acids in the butter samples varies in the range of 1.40÷3.13 and 0.38÷2.97%, respectively. The amount of linoleic acid (C18:2) is higher in the Bulgarian butter brands (1.40÷3.13%) than in the imported ones (1.49÷2.33%). Tomaszewska-Gras (2016b) show that the content of linoleic fatty acid in butter varies from

1.0 to 1.5%, and linolenic acid from 0.1 to 1% mainly under the influence of factors of nutrition and breed of the studied areas. The high content of linoleic acid in some of the tested samples may be due to the use of vegetable oils with high content of linoleic acid in order to increase the level of essential fatty acids (Antova et al., 2008).

The data on the identification characteristics for the naturalness of the samples studied by us are presented in Table 4. The ratio of palmitic (C16:0)/lauric (C12:0) fatty acids in natural cows' milk butter should be in the range of 5.8÷14.5 (Vyshemirsky, 2010). For Bulgarian brands, this ratio varies in a wider range - 8.75 to 11.81 than for brands imported from some EU countries - 8.47÷9.98. For all brands this index is responsible for the naturalness of butter. The same is established for the other indices.

The ratios of stearic/lauric fatty acids, oleic/myristic, linoleic/myristic and C18:1+C18:2/C12:0+C14:0+C18:0 meet the requirements for naturalness of cows' milk butter and vary accordingly in the range of 2.87÷3.66 and 2.38÷3.09 (at the norm of 1.9÷5.9), 1.66÷2.35 and 1.54÷2.16 (norm 1.6÷3.6), 0.38÷0.50 and 0.37÷0.46 (at the norm 0.4÷0.7), respectively, for the Bulgarian and imported brands.

Table 4. Identification indices for the naturalness of the tested samples of cows' milk butter from the trade network

Indices	Bulgarian brands of butter (n=15)					Imported brands of butter (n=15)				
	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5
C16/C12	11.81	8.75	11.45	10.55	10.26	9.10	8.47	9.03	8.47	9.98
C18/C12	3.66	2.43	3.82	3.37	2.87	2.62	2.41	3.09	2.38	2.69
C18:1/C14:0	2.35	1.66	2.11	1.95	2.22	1.82	1.75	1.82	1.54	2.16
C18:2/C14:0	0.27	0.12	0.10	0.11	0.15	0.11	0.16	0.18	0.11	0.17
C18:1+C18:2/ C12+C14+C16+C18	0.50	0.38	0.38	0.40	0.47	0.41	0.41	0.42	0.37	0.46

A number of human diseases are affected by the fatty acid composition of fat, including the omega-6/omega-3 ratio (Simopoulos, 2013). In the study of imported brands, the ratio C18:2 n-6/C18:n-3 varies from 0.7 to 4.39 (Table 5). For Bulgarian brands, the variation of this index is within a narrower range - from 0.59 to 2.82. A balanced omega-6/omega-3 (ratio 1-2/1) is one of the most important dietary factors in the prevention of obesity, along with physical activity. A lower omega-6/omega-3 ratio should be considered in the management of obesity (Simopoulos, 2016).

The ratio of MUFA/PUFA in the tested butters varies in the range from 4.04 to 10.01 for the ones imported from abroad and from 4.04 to 8.62 for those produced in Bulgaria, respectively (Table 5). Various studies have shown that a diet high in mono/polyunsaturated fatty acids provides better protection against cardiovascular disease than foods rich in polyunsaturated acids alone (De Lorgeril and Salen, 2004; Nicolosi et al., 2004).

Table 5. Health indices in the studied samples of commercial butter

Indices	Bulgarian brands of butter (n=15)					Imported brands of butter (n=15)				
	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5
Omega 6/Omega 3	1.47	2.82	0.88	0.59	2.4	1.33	1.08	3.03	4.39	0.70
MUFA/PUFA	8.31	6.01	8.62	4.04	14.8	10.01	4.63	6.84	4.81	4.09
IA	3.70	2.62	3.33	2.41	3.36	3.24	2.98	3.26	3.25	2.56
IT	2.17	1.75	2.00	1.44	2.10	1.97	1.79	2.11	2.36	1.49

*IA- Index of atherogenicity; IT- Index of thrombogenicity

The IA and the IT indices are of interest to human nutrition and they are related to the risk of development of cardiovascular diseases (Ulbricht and Southgate, 1991). The higher the values of these coefficients, the higher the risk of developing cardiovascular diseases, because IA indicates the risk of diseases such as atherosclerosis (deposition of fat in the walls of the arteries), and IT determines the possibility of blood clots (Ivanova and Hadzhinikolova, 2015).

Due to the high content of saturated fatty acids, the atherogenic index of butter is about 3-5 times higher than other foods of animal origin. It varies from 2.56 to 3.26 for imported brands and from 2.41 to 3.70 for Bulgarian ones. These results are consistent with those obtained by Tsisaryk (1994) and Bobe et al. (2003) - 2.76 and 2.71, respectively.

The thrombogenic index considers essential saturated fatty acids to be prothrombogenic, while unsaturated fatty acids are considered antithrombogenic (Ulbricht and Southgate, 1991). The thrombogenic index of imported brands varies from 1.49 to 2.36, and for Bulgarian - from 1.44 to 2.17. These values are close to those obtained by Tsisaryk (1994) for butter produced during summer and winter.

The use of foods characterized by low atherogenic and thrombogenic indices can reduce the potential risk of cardiovascular disease (Menezes et al., 2009).

Conclusion

Based on the results obtained it was found that: 1) The content of saturated fatty acids varies from 66.16 to 75.15%, 70.74±1.94% on average, in the studied Bulgarian brands of butter and in much narrower range - from 67.51 to 72.49% (70.34±0.83% on average) for the brands of butter imported

from EU countries. 2) The amount of short-chain saturated fatty acids - butyric (C4:0), capric (C6:0), caprylic (C8:0) and capric (C10:0) is higher for imported EU brands of butter. 3) The data for the identification characteristics of all tested samples from the trade network of Bulgaria meet the requirements for naturalness of cows' milk butter. 4) The atherogenic index of butter is from 2.56 to 3.26 for the imported brands and from 2.41 to 3.70 for the Bulgarian ones. 5) The thrombogenic index of imported brands varies from 1.49 to 2.36, and for Bulgarian ones - from 1.44 to 2.17.

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