

## FREQUENCY OF CONSUMPTION OF FERMENTED MILK DRINKS AND FACTORS INFLUENCING CONSUMER CHOICE

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### ABSTRACT

The study, performed in January 2017 on a group of 271 consumers, used data obtained from an anonymous internet survey concerning the consumption frequency of different fermented milk drinks and the criteria which determine consumer purchase decisions. Consumption of fermented milk beverages was declared by 83.8% of the respondents regardless of their socio-demographic status (sex, residence, education, social status). The most frequent consumption was recorded for yoghurt (40% of those surveyed, 3–5 times per week), followed by kefir and buttermilk (less than once a week). Respondent purchase choices were most influenced by product quality, in particular flavour (4.48 pts.), shelf life (4.27 pts.), nutritive value (3.82 pts.) and health-promoting value (3.53 pts.). Advertising was of marginal importance (1.94 pts.). When creating new types of fermented milk drinks, it is worth focusing on improving their flavour and making them more attractive while paying attention to product shelf life.

**Key words:** fermented milk drinks, decisive factors for purchase

### INTRODUCTION

Milk, both in its natural form and after processing (such as fermented milk drinks) has been an integral part of the human diet for centuries. Production of fermented milk drinks, the number of which was estimated to be around 2000 types [Szulc 2012], is based on fermentation, which is considered one of the oldest food preservation methods. The use of different microorganism species extends the shelf life of milk while maintaining its nutritive value and ensuring desirable taste [Brodziak and Król 2016]. According to the Food and Agriculture Organization of the United Nations/ the World Health Organization (FAO/WHO) and the International Dairy Federation (IDF/FIL), “fermented milks are products prepared from milks (i.e., whole, partially or fully skimmed, concentrated milk or milk substituted from dried milk) and fermented by means of specific microorganisms which ferment lactose, reduce pH of milk and cause it to coagulate. These microorganisms shall be viable, active and abundant in the final product to the date of minimum durability” [FAO/WHO 1997, FIL/IDF 1997]. Fermented milk drinks are classified based on the

type of microflora used: thermophilic (yoghurt), intestinal (acidophilus milk), mesophilic (buttermilk and curdled milk) or mixed (kefir and koumiss) [FIL/IDF 1997, Szulc 2012]. Fermented milk drinks are products with documented nutritional and health value [Peckenpaugh 2011, Mojka 2013, Brodziak and Król 2016]. The state of the art in the fermented milk market is shown by many innovations connected, for example, with the wide variety of types, tastes and properties (including health benefits). The consumption of fermented milk drinks depends, among others, on the economic, socio-cultural, psychological and marketing factors included in researches [Kudęłka and Marzec 2004, Nowak et al. 2007, Krasnowska and Salejda 2008, Mojka 2012]. Because consumer decisions vary considerably, it is worth performing further studies because their results could be useful in the evaluation of diets, nutrition education, and in the case of food manufacturers, in adapting production to consumer needs [Krasnowska and Salejda 2008].

The aim of the study was to determine, based on a consumer survey, the frequency of consumption of fermented milk drinks and to analyse the criteria which determine respondents' purchase decisions.

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## MATERIAL AND METHODS

The study used data obtained from an anonymous internet survey [<https://docs.google.com/forms/u/0>] and Babbie [2004], which was conducted from 14 to 17 February 2017 on a group of 271 consumers. The questions to determine socio-demographic features (sex, residence, education, social status) were closed ended. The question concerning consumption of fermented milk drinks was a filtering question and divided the respondents into those who consumed fermented milk drinks (A) and those who did not (B). To ensure the greatest possible degree of reliability, group B did not answer the questions about the consumption frequency of fermented milk drinks (5 = very often, 6–7 times per week; 4 = often, 3–5 times per week; 3 = from time to time, 1–2 times per week; 2 = seldom, several times per month; 1 = never) and the criteria which determine the choice of a specific fermented milk drink (5 = very important, 4 = important, 3 = neutral, 2 = unimportant, 1 = very unimportant). The survey accounted for the following fermented milk drinks: yoghurt, kefir, buttermilk, acidophilus milk, ayran, koumiss [FAO:Codex Stan 243-2003].

Chi-square test [SAS 2014] was used to determine the effect of sex, residence, education and social status on the percentage of the respondents who consume fermented milk drinks (A) and those who do not (B). GLM procedure was used in the statistical analysis of the effect of respondents' sex on the criteria which determine their purchase decisions, and significant differences were analysed by means of the Scheffe test [SAS 2014].

## RESULTS AND DISCUSSION

The study involved 271 respondents. The statistical analysis showed that the segmenting factor had no statistically significant effect on the percentage of respondents consuming fermented milk drinks. The respondents were 70.1% female and 29.9% male (Table 1). Nowak et al. [2007] attributed the 81% contribution of women among the surveyed respondents to the fact that they most often make food purchase decisions and food purchases. Almost 84% of those surveyed declared to consume fermented milk drinks, and this result fell within the range of 49.8% – 100% reported by other authors [Kudelka 2005, Nowak et al. 2007, Mojka 2013]. The chi square test did not show a significant effect of the respondents' characteristics on the percentage of those consuming fermented milk drinks or not. Within sex (male, female), the proportion of the respondents consuming fermented milk drinks was similar. Most of those surveyed (60%) lived in large towns (>100,000 inhabitants). The highest proportion (86.1%) of the consumers of fermented milk drinks inhabited large towns, and the lowest proportion (73.0%) was formed by the inhabitants of medium-sized towns,

which confirms the observations of Nowak et al. [2007]. Today it has become popular to treat food as an enhancer of well-being and health, and the residents of large towns more and more often reach for natural foods (including fermented milk drinks), which had once been a regular part of the rural diet. Almost half of the respondents were individuals with higher education (42.86%), and more than one-third were persons with secondary education (37.37%). Pupils formed 13.7% of the respondents, while vocational and primary education was declared by 5.9% and 0.4%, respectively. Like in other studies [Nowak et al. 2007, Kudelka 2009], most of the respondents consuming fermented milk drinks were individuals with higher or secondary education, while the lowest proportion was formed by those with primary and vocational education. A high proportion of the respondents were working persons (63.5%), followed by students (19.2%) and pupils (13.7%). The proportion of the respondents who declared to consume fermented milk drinks ranged from 75.7% (pupils) to 87.8% (workers). Likewise, Kręłowska-Kułas [2011] demonstrated that consumption of fermented milk drinks was most often declared by working persons.

Analysis of the results given in Table 2 indicates that yoghurt was most frequently consumed by the respondents (99% of the consumers), while the least popular fermented milk drinks were acidophilus milk (22%), ayran (14%) and koumiss (9% of the consumers), which is consistent with the findings of other researchers [Nowak et al. 2007, Krasnowska and Salejda 2008, Topolska et al. 2010, Kręłowska-Kułas 2011, Mojka 2013]. The main reason for consumption of yoghurts is their nutritional value [Krasnowska and Salejda 2008]. The results incorporating the scoring scale also show that yoghurt was the most frequently consumed fermented milk (3.4 pts.), kefir and buttermilk was eaten much less often (2.2 pts.), and the other drinks only sporadically (1.1 pts). It can be concluded that consumers prefer products that have been present for many years on the Polish market. By way of example, ayran is most often available in Turkish fast food restaurants, but it is much less frequently offered by Polish stores in the form of a few product items [Marchand 2015]. In turn, the low popularity of acidophilus milk may result from low consumer awareness, because most consumers are not aware that it is marketed [Mojka 2013]. This may be also connected with specific flavour of lactic acid and the weak aroma of this product [Brodziak and Król 2016]. This is supported by Krasnowska and Salejda [2008], who reported acidophilus milk to be the least frequently consumed dairy product (only 12% of the consumers). Likewise, Mojka [2013] reported the frequency of acidophilus milk consumption to be low (1.3 pts).

Daily consumption of fermented milk products was declared by just 11% of the respondents (10%

**Table 1.** Characteristics of the respondents surveyed

**Tabela 1.** Charakterystyka badanych respondentów

Segmenting factors Czynnik segmentujący	Characteristics of respondents Cecha respondententa	Number of respondents Liczba respondentów	Proportion (%) of respondents Udział (%) respondentów	Respondents consuming fermented milk drinks Respondenci spożywający mleczne napoje fermentowane	
				n	%
Sex, $\chi^2 = 0.17$ Płeć, $\chi^2 = 0.17$	Female Kobieta	190	70.1	158	83.2
	Male Mężczyzna	81	29.9	69	85.2
Residence, $\chi^2 = 3.84$ Miejsce zamieszkania, $\chi^2 = 3.84$	Countryside Wieś	49	18.1	41	83.7
	Town, <20,000 inhabitants Miasto do 20 tys. mieszk.	20	7.4	17	85.0
	Town, 20,000–100,000 inhabitants Miasto 20–100 tys. mieszk.	37	13.7	27	73.0
	Town, >100,000 inhabitants Miasto > 100 tys. mieszk.	165	60.9	142	86.1
Education, $\chi^2 = 7.77$ Wykształcenie, $\chi^2 = 7.77$	Primary Podstawowe	1	0.4	1	100
	Vocational Zawodowe	16	5.9	11	68.8
	Secondary Średnie	101	37.3	83	82.2
	Higher Wyższe	116	42.8	104	89.7
Social status, $\chi^2 = 5.72$ Status społeczny, $\chi^2 = 5.72$	Pupil Uczeń	37	13.7	28	75.7
	Unemployed Bezrobotny	5	1.8	4	80.0
	Employed Osoba pracująca	172	63.5	151	87.8
	Retired worker/pensioner Emeryt/rencista	5	1.8	4	80.0
	Student Student	52	19.2	40	76.9
	Pupil Uczeń	37	13.7	28	75.7

yoghurt, 1% kefir), which is much less than reported by Krasnowska and Salejda [2008] (36% of the respondents), Baranowska [2011] (25% women and 15% men), and Nowak et al. [2007] (21% of the respondents). In the case of yoghurt, most of the respondents declared to consume it 3 to 5 times per week. Most of those surveyed consumed kefir and buttermilk less than once per week. Analysts estimate that yoghurts are the most forward-looking and innovative dairy products [Piekut 2011]. The study by Krełowska-Kułas [2011] also reports that the most frequently consumed dairy products are yoghurt (39%) and kefir (34%), with 28% of the respondents declaring to consume these products on a daily basis. Our findings and those of other authors [Krasnowska and Salejda 2008, Baranowska et al. 2011, Krełowska-Kułas 2011, Mojka 2012] indicate that fermented dairy products are

very willingly eaten by the consumers, but according to Bórawski and Kowalska [2017], the average monthly household consumption of yoghurt (l/kg per individual) decreased from 0.54 in 2010 to 0.50 in 2015. According to the Central Statistical Office, in 2016 monthly consumption of yoghurt was 0.4–0.7 kg/person depending on household income [GUS 2016].

Because modern consumers are not passive buyers and moreover, they can choose from a broad range of fermented milk drinks, the results reproduced in Table 3 appear important. When evaluating on a 5-point scale the characteristics considered during purchase of fermented milk drinks, the respondents considered flavour as the most important trait (4.48 pts.). They also attached weight to shelf life (4.27 pts.) and product ingredients (3.98 pts.), and this information was more important ( $P \leq 0.01$ )

**Table 2.** Frequency of consumption of fermented milk drinks

**Tabela 2.** Częstość spożywania mlecznych napojów fermentowanych

Type of fermented milk drink Rodzaj mlecznego napoju fermentowanego	Average consumption frequency (scale in points) Średnia częstość spożycia (skala pkt.)	Number of the respondents consuming fermented milk drinks Liczba respondentów spożywających mleczne napoje fermentowane		Proportion (%) of the respondents consuming fermented milk drinks, Chi <sup>2</sup> = 1196 <sup>xx</sup> Udział (%) respondentów spożywających mleczne napoje fermentowane, Chi <sup>2</sup> = 1196 <sup>xx</sup>				
		n	%	6–7 times per week 6–7 razy w tygodniu	3–5 times per week 3–5 razy w tygodniu	1–2 times per week 1–2 razy w tygodniu	Less often Rzadziej	Never Nigdy
Yoghurt Jogurt	3.40	225	99	10	40	30	19	1
Kefir Kefir	2.26	195	86	1	6	25	54	14
Buttermilk Maślanka	2.14	137	85	0	5	19	60	16
Acidophilus milk Mleko acidofilne	1.24	49	22	0	1	0	21	78
Ayran Ayran	1.14	31	14	0	0	1	13	86
Koumiss Kumys	1.09	20	9	0	0	1	8	91

Notes: <sup>xx</sup> – significant at  $P \leq 0.01$

Objaśnienia: <sup>xx</sup> – istotność przy  $P \leq 0,01$

**Table 3.** The weight of criteria for the purchase of fermented milk drinks depending on respondents' sex

**Tabela 3.** Znaczenie poszczególnych kryteriów decydujących o zakupie mlecznych napojów fermentowanych w zależności od płci respondentów

Criterion of choice Kryterium wyboru	All respondents Ogół respondentów pts./pkt.	Women Kobiety pts./pkt.	Men Mężczyźni pts./pkt.
Price – Cena	3.23	3.13	3.46
Flavour – Smak	4.48	4.51	4.41
Consistency – Konsystencja	3.41	3.47	3.28
Composition – Skład	3.98	4.10 a	3.70 a
Nutritional value – Wartość odżywcza	3.82	3.96 A	3.49 A
Health-promoting value – Wartość prozdrowotna	3.53	3.68 A	3.17 A
Shelf life – Okres przydatności do spożycia	4.27	4.36 a	4.06 a
Advertising – Reklama	1.94	1.84 a	2.19 a
Packaging – Opakowanie	2.36	2.29	2.52
Country of origin – Kraj pochodzenia	3.19	3.15	3.26
Brand – Marka	2.72	2.63	2.94

Values differing significantly within treatment are designated with the same letters as AB at  $P \leq 0.01$ , ab at  $P \leq 0.05$

Wartości różniące się statystycznie w obrębie czynnika oznaczono tymi samymi literami jako AB przy  $P \leq 0.01$ , ab przy  $P \leq 0.05$

for women than for men. Considering product composition, women paid more attention ( $P \leq 0.01$ ) than men to the nutritional compared to health-promoting value. It can be observed that the demand was determined by the health benefits of milk drinks (shelf life, nutritional value, health-promoting value). The least important determinants were advertising (1.94 pts.), packaging (2.36 pts.) and brand (2.72 pts.). In the study by Krełowska-Kułas [2011], 47% of the respondents considered flavour as the most important quality characteristic, 34% paid attention to product wholesomeness, and 16% to its availa-

bility. Krasnowska and Salejda [2008] obtained similar results as the respondents considered sensory characteristics, in particular flavour, to have the most profound impact (57%). According to the same authors, students considered shelf life as the most important information on the product label (79%), whereas the ingredients were much less important as only every third respondent paid attention to it. Also the results of other authors [Kudełka 2005, Baranowska et al. 2011] showed that shelf life is the most important criterion considered when choosing fermented milk drinks (34–51% of the consumers placed it at the

top of the list). Brand confidence, which guarantees that a product will always be of a certain and identical quality, should be an important asset with which companies are able to attract buyers [Kudelka 2005]. In our study, brand was considered to have a minor effect on fermented milk drink purchase decisions, which is consistent with Krasnowska and Salejda [2008]. In turn, Nowak et al. [2007] found brand to be one of the most important determinants. It is generally accepted that advertising, which encourages to buy, provides information and makes choices easier, instills a sense of confidence in the manufacturer of a given product. Our findings show that advertising had little impact on the buyers of fermented milk drinks, which agrees with other authors [Kudelka 2005]. The study by Krasnowska and Salejda [2008] shows that advertising influenced 35% of the respondents to buy fermented milk drinks, but a similar proportion of students (34%) felt no effect of advertising on the purchasing decisions. It can therefore be considered that fermented milk drinks, being widely consumed products, are purchased regardless of advertising, because consumers particularly appreciate their nutritional value and health benefits.

## CONCLUSIONS

It is concluded from the present study that:

1. Consumption of fermented milk drinks was declared by 83.8% of the respondents, which is regarded as a good result, considering that they are a source of nutrients of high nutritional and biological value.
2. The most frequent consumption was noted for yoghurt (most of those surveyed 3–5 times per week), followed by kefir and buttermilk (less than once a week). Ayran, koumiss and acidophilus milk are the least known fermented milk drinks and their consumption by the respondents was sporadic.
3. The respondents based their purchasing decisions primarily on product quality and considered flavour as the most important criterion, followed by shelf life, nutritional value, and health benefits. Advertising was of marginal importance. From the nutritional viewpoint, it is considered beneficial that the respondents attached most weight to factors associated with the nutritive value and paid less attention to marketing factors.
4. When creating new types of fermented milk drinks, it is worth focusing on improving their flavour and making them more attractive while paying attention to product shelf life.

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## CZĘSTOTLIWOŚĆ SPOŻYCIA MLECZNYCH NAPOJÓW FERMENTOWANYCH I CZYNNIKI WPŁYWAJĄCE NA ICH WYBÓR PRZEZ KONSUMENTÓW

### STRESZCZENIE

Materiały do badań pochodziły z anonimowego sondażu internetowego na temat częstotliwości spożycia różnych mlecznych napojów fermentowanych oraz preferencji respondentów odnośnie kryteriów decydujących o ich zakupie, przeprowadzonego w styczniu 2017 r., w grupie 271 konsumentów.. Wykazano, że spożywanie mlecznych napojów fermentowanych deklarowało 83,8% ankietowanych, niezależnie od ich statusu społeczno-demograficznego (płeć, miejsce zamieszkania, wykształcenie, status społeczny). Najczęściej spożywano jogurt (40% ankietowanych 3–5 razy w tygodniu), następnie kefir i maślanke (rzadziej niż raz w tygodniu). Respondenci, podczas zakupów, kierowali się przede wszystkim jakością produktu, jako najważniejsze kryterium uznając smak (4,48 pkt.) następnie trwałość (4,27 pkt.) i wartość odżywczą (3,82 pkt.) oraz prozdrowotną (3,53 pkt). Marginalne znaczenie miała reklama (1,94 pkt.). Przy tworzeniu nowych rodzajów mlecznych napojów fermentowanych warto skupić się na udoskonalaniu i uatrakcyjnianiu ich smaku, równoległe zwracając uwagę na trwałość produktu.

**Słowa kluczowe:** mleczne napoje fermentowane, cechy decydujące o zakupie