

# Exploring sustainable dairy farming practices through consumer surveys

DOI: 10.15567/mljekarstvo.2025.0406

*Snežana Paskaš<sup>1\*</sup>, Jelena Miočinić<sup>2</sup>, Marija Pajić<sup>3</sup>, Elmin Tarić<sup>4</sup>, Zsolt Becskei<sup>4</sup>*

<sup>1</sup>University of Novi Sad, Faculty of Agriculture, Department of Animal Science, 21000 Novi Sad, Serbia

<sup>2</sup>University of Belgrade, Faculty of Agriculture, Department of Animal Science of Food Technology, 11000 Belgrade, Serbia

<sup>3</sup>University of Novi Sad, Faculty of Agriculture, Department of Veterinary Medicine, 21000, Novi Sad, Serbia

<sup>4</sup>University of Belgrade, Faculty of Veterinary Medicine, Department of Animal Breeding and Genetics, 11000 Belgrade, Serbia

**Received:** 30.12.2024. **Accepted:** 15.09.2025.

\*Corresponding author: snezana.paskas@proton.me

## Abstract

This structured consumer survey aimed to analyse perceptions of dairy farming practices, specifically focusing on organic production, genetically modified organisms (GMOs), alternative milk products, and consumers' purchasing behaviours. The study encompassed a sample of 520 respondents in Serbia, with data collected through online and face-to-face surveys. The findings reveal that health considerations and sensory attributes, particularly taste, were the primary determinants influencing the purchase of milk and dairy products, followed closely by economic factors such as price and nutritional composition. While consumers generally favoured organic production, a small proportion reported consuming organic milk and dairy products regularly. Most respondents acknowledged the ecological and ethical advantages of organic farming, including contributions to environmental conservation, biodiversity, and animal welfare. However, these factors played a secondary role in their purchasing decisions. Conversely, GMOs were predominantly perceived as unnatural and potentially detrimental to human health, leading to widespread consumer apprehension. Similarly, dairy products derived from animals fed GMO crops were viewed unfavourably. The results also underscore pasture-based dairy farming as the most esteemed production system, followed by homegrown crops and prolonged maternal feeding. Alternative plant-based dairy products, including lab-derived synthetic dairy, showed low consumer acceptance. The findings illustrate the intricate interplay between consumer values, purchasing behaviours, and the perceived benefits and risks associated with organic and GMO-based products. These insights provide a foundation for developing sustainable dairy farming strategies that align with evolving consumer preferences and market trends.

**Keywords:** dairy farming practices; consumer attitudes; milk and dairy product purchase

## Introduction

Sustainable consumption and production are essential for achieving long-term sustainable development. In recent years, increasing attention has been focused on the role of consumers in driving the transition of the agri-food value chain towards sustainability (Mehrabani et al., 2022). The dairy industry is undergoing significant transformations as a critical component of the global food system. It faces numerous sustainability challenges, including minimising its carbon footprint and greenhouse gas emissions, reducing or eliminating preservatives, ensuring high animal welfare standards, competitiveness of small farms and prioritising simpler, minimally processed ingredient formulations (Schiano et al., 2020; Očić et al., 2023). Over the past two decades, consumer attitudes toward dairy products have shifted considerably. These evolving perceptions are expected to continue adapting in response to advancements in technological research and innovation within the dairy sector (Santhamani and Tharangini, 2021).

Research by Naspetti et al. (2021) indicates that sustainable dairy practices that do not address key ethical concerns or offer tangible societal benefits are unlikely to gain consumer acceptance. Previous studies have consistently shown that consumers mainly prefer organic food, and both organic and conventional pasture-based dairy farming are expected to grow due to increasing public demand. Consumer beliefs mainly drive this trend that grazing is essential for improving welfare and enhancing the nutritional quality of dairy products (Grodkowski et al., 2023; Paskaš et al., 2023). Similarly, Ly et al. (2021) reported that consumers in Canada and the United States consider multiple aspects of farming systems when evaluating animal welfare and generally favour naturalistic approaches over technological solutions, especially those involving genetic modification. Consumers also perceive organic milk as superior to conventionally produced milk in various respects and are willing to pay a premium for it (Naspetti et al., 2021; Grodkowski et al., 2023). Furthermore, Kühl et al. (2024) found that German consumers resisted precision fermentation cheese when informed that it involved genetic modification. Market dynamics and technological progress drive innovation in agriculture and food production, while consumer expectations for health-promoting foods continue to rise (Klimczuk-Kochańska and Klimczuk, 2019; Paskaš et al., 2020).

While consumer attitudes towards agricultural sustainability have been extensively studied, research specifically examining consumer perceptions and responses to various sustainable dairy farming practices remains limited. Existing studies mainly explore broad sustainability trends or individual production factors, but often lack a comprehensive, consumer-focused perspective. A thorough understanding of consumer attitudes and perceptions towards sustainable dairy farming is vital for developing policies and market strategies that promote environmentally responsible production while maintaining consumer trust and demand. For example, extensive research has investigated consumer attitudes towards organic products (Van Loo et al., 2013; Grodkowski et al., 2023), genetically modified

organisms (GMOs) (Sendhil et al., 2021; Kühl et al., 2024), farm animal welfare (Alonso et al., 2020; Hyland et al., 2022), and alternative milk products (Schiano et al., 2020; Moss et al., 2022; Su et al., 2024). However, these studies typically analyse each factor in isolation or alongside one or two other factors rather than within an integrated framework. Unlike prior research focusing on isolated sustainability factors, this study adopts a comprehensive approach by combining multiple aspects of sustainable dairy farming, organic production, GMOs, alternative dairy products, and key farming practices into a unified framework. Moreover, most research emphasises environmental and health dimensions but does not fully consider how well consumer purchasing behaviour aligns with their stated preferences. The link between consumer attitudes and actual purchasing decisions remains insufficiently understood, limiting insights into how sustainability concerns impact market choices. Addressing these gaps is essential for guiding targeted marketing strategies, policy measures, and sustainable dairy sector initiatives.

In Serbia, the vast majority of consumers (96.1 %) primarily purchase bovine dairy products (Paskaš et al., 2020). Research by Džever et al. (2021) shows that tradition continues to strongly influence milk purchasing decisions among Generation Z in Serbia, even when they are aware of the advantages of organic food. Over the past decade, dairy production in the country has generally declined (Đorđević et al., 2023). Additionally, Satrić et al. (2023) emphasise the need to raise consumer awareness about inadequate cheese labelling. However, research on consumer attitudes and purchasing behaviour related to milk, dairy products, and dairy farming practices in Serbia remains limited and largely underexplored. The structured consumer survey was designed to evaluate perceptions, acceptance, and preferences regarding organic production, GMOs, and alternative dairy products. It also examined consumer perspectives on selected sustainable farm-level practices. Furthermore, it explored the relationship between consumer perceptions and actual purchasing behaviour, providing empirical evidence and practical insights to inform stakeholders and support the development of more sustainable dairy production and marketing strategies. By analysing these factors separately, the study aimed to identify variations in consumer acceptance and to determine whether attitudes towards one category (e.g., organic milk) influenced perceptions of others (e.g., dairy farming practices or GMOs).

## Materials and methods

### *Data collection*

The survey was conducted in Serbia, with 520 respondents, and participants were required to be at least 18 years old. The survey sample included participants from diverse demographic backgrounds, reflecting natural variations in age, education, gender, and place of living within the population.

**Table 1.** Frequency distribution of survey sociodemographic characteristics

Demographic variables	Frequency (n)	Percentage (%)
<b>Gender</b>		
Female	301	57.88
Male	219	42.12
<b>Age (years)</b>		
18-29	263	50.57
30-45	99	19.04
46-65	111	21.35
65+	47	9.04
<b>Education level</b>		
Secondary	224	43.08
College Graduate	211	40.58
Postgraduate	85	16.34
<b>Residence</b>		
Urban place (>100000)	227	43.66
Cities (50001-100000)	84	16.15
Towns (10001-50000)	122	23.46
Villages (<10000)	87	16.73
<b>Monthly gross income (Serbian dinar)</b>		
>85000	113	21.73
60001-85000	97	18.65
35001-60000	116	22.31
<35000	194	37.31

Source: Author's survey

While not stratified, the sample provides insights into various consumer perspectives on dairy farming and sustainability. The gender distribution included 57 % female respondents, and the majority of participants held either a university degree or a secondary education (Table 1). Participation was voluntary, and no personally identifiable information was collected. Data were obtained using a random sampling approach, combining face-to-face interviews and an online questionnaire administered via Google Forms. The survey link was disseminated through social media platforms (e.g., Viber, Gmail). A total of 458 valid responses were collected, with face-to-face interviews accounting for the majority. Although online surveys accounted for only 12.51 % of the total responses, they were included to complement face-to-face data collection and enhance accessibility. While web-based surveys often attract younger and more tech-savvy individuals, this study fairly distributed responses across age groups, reducing potential age-related bias. Notably, 3.08 % of respondents identified as non-consumers of milk. The study included these individuals to provide insights into their perceptions of alternative milk products and their attitudes toward organic and GMO foods.

## Questionnaire design

The structured consumer questionnaire consisted of 25 questions, primarily multiple-choice (closed-ended) questions, to facilitate the collection of both qualitative and quantitative data. Multiple-choice questions are widely

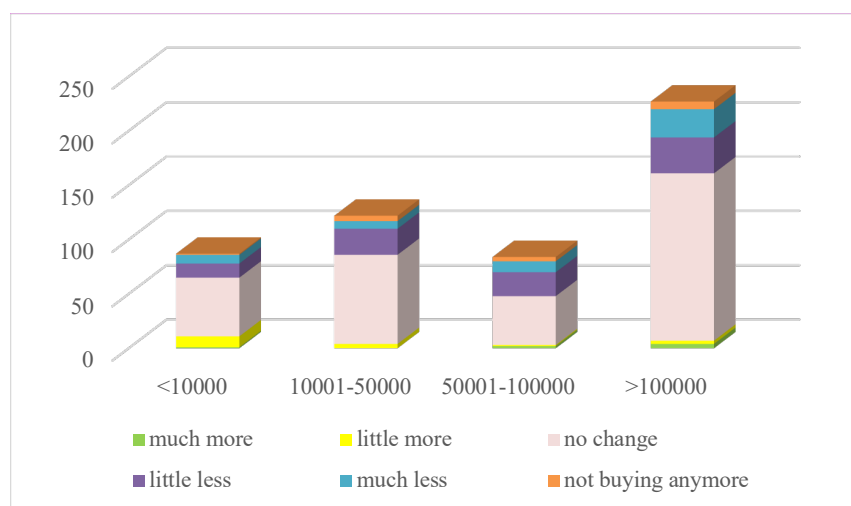
used in consumer research due to their objectivity, ease of analysis, and ability to capture diverse opinions (Rodriguez, 2005; Dehnada and Nasserb, 2014). Closed-ended questions collected nominal data, including dichotomous responses (e.g., “yes” or “no”, “male” or “female”) and polytomous responses, which provided multiple-choice options presented on either a nominal or ordinal scale (e.g., purchase frequency, purchase quantities) or as proportional data (e.g., socio-economic characteristics) (Hyman and Sierra, 2016).

The questionnaire was structured into four sections:

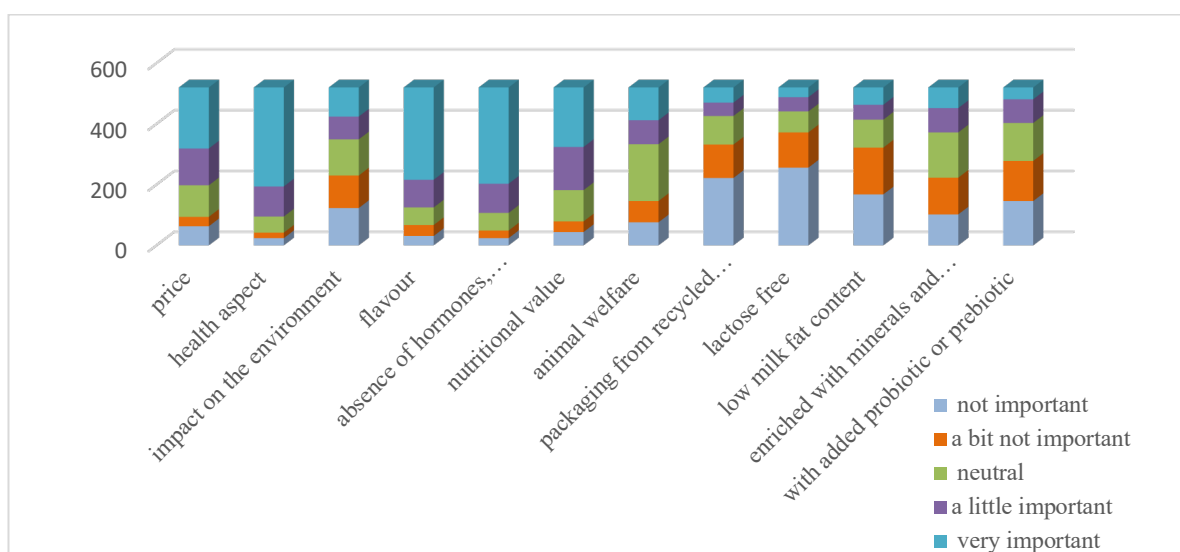
1. Socio-demographic profile - collected key demographic information, including gender, age, education level, geographical location (rural/urban), and income (Table 1).
2. Dairy consumption and purchasing habits - examined factors affecting milk and dairy products consumption and purchasing behaviour.
3. Assesses consumer perception, acceptance and purchasing behaviour toward organic, GMO, synthetic dairy, and plant-based dairy alternatives.
4. Explores consumer awareness and opinions regarding grazing, prolonged maternal feeding, homegrown protein sources (oilseed meals, legumes, etc.), and alternative protein sources in animal feed (insects, single-cell proteins, etc.).

Consumers were asked to respond to the following questions and statements: “What is your overall perception of organic milk production?”, “Organic milk production is better for the environment and biodiversity”, “Organic farming practices are more humane towards animals and contribute to their welfare”, “What is your general attitude towards genetically modified (GMO) foods?”, “How would you rate your knowledge of GMO products?”, “How safe or risky do you believe GMOs are for human health?”, “Would you be more willing to consume GMO foods if their production reduced the amount of pesticides used in plant production?”, “How acceptable do you find milk and dairy products from animals fed with genetically modified (GMO) feed?”, “How frequently do you buy plant-based milk alternatives?” etc.

To evaluate respondents' acceptance and familiarity with organic and GMO foods, a seven-point Likert scale was employed, where 7 = “totally agree” and 1 = “totally disagree” (nine items). This method has been widely used in consumer behaviour research (Van Loo et al., 2013; Joshi et al., 2015; Su et al., 2024). The variables used to assess the importance consumers place on GMO food consumption include health concerns, consumer knowledge, and purchasing behaviour. In terms of organic production, the observed attributes included health benefits, environmental protection, animal welfare and purchasing behaviour. In the second part, consumer opinions and awareness toward dairy farming practices were evaluated using a five-point Likert scale (1 = totally unimportant, 5 = totally important), following established methodologies (Weinrich et al., 2014; Pinto et al., 2016). A seven-point Likert scale was preferred for assessing familiarity with organic and GMO food to provide a greater range of responses, capturing subtle differences in perception. In contrast, a five-point scale was used to measure the importance of dairy farming practices, as it offers sufficient differentiation while maintaining ease of interpretation. To ensure clarity, definitions of key concepts such as prolonged



**Figure 1.** Evaluation of milk and dairy product purchases compared to the previous five-year period (source: Author's survey)



**Figure 2.** Perceived importance of internal and external characteristics of milk and dairy products (source: Author's survey)

maternal feeding, alternative protein sources, home-grown protein sources, and laboratory-produced milk were included in the questionnaire. Consumers' acceptance of organic milk, GMOs, synthetic dairy, plant-based alternatives, and dairy farming practices was assessed separately. By evaluating these factors independently, we aimed to capture a more detailed understanding of consumer perspectives on different sustainability aspects in dairy farming.

## Statistical analysis

This study employs statistical analyses to examine consumer attitudes and preferences, providing a data-driven approach to understanding consumer-driven sustainability in dairy farming. The minimum required sample size (385 respondents) was determined based on Serbia's total

population (~6.6 million), using a 95 % confidence interval and a  $\pm 5$  % margin of error. Categorical and ordinal data were summarised using frequencies and percentages, while descriptive statistical methods were applied to analyse survey responses. To assess relationships between key variables, statistical tests were conducted using Statistica 10.0 software. Contingency tables and the chi-square test were applied for categorical data to examine the association between consumers' views toward organic food, GMOs, and dairy farming practices. Yates' correction and Fisher's exact test were used for small sample groups. Statistical significance was set at  $p < 0.05$ .

## Results and discussion

### *Consumers' preference toward milk and dairy product purchases*

The first part of the questionnaire examined consumer perceptions of milk and dairy products' internal and external characteristics, alongside purchasing behaviour related to these factors. Among the 520 respondents, 96.92 % reported consuming milk and dairy products. Figure 1 illustrates changes in purchasing behaviour compared to the previous five-year period. The majority (64.42 %) indicated no change in their purchasing habits, continuing to buy dairy products in the same quantities. However, 17.69 % reported a slight decrease, and 9.81 % noted a substantial purchase reduction. In contrast, only 3.46 % reported a slight increase, while 1.35 % indicated a significant increase. These findings suggest that most consumers exhibit consistent purchasing behaviours, with dairy products firmly integrated into their household diets, aligning with Grębowiec (2021) findings.

As illustrated in Figure 2, consumers prioritise milk and dairy products that are free from pesticides, hormones, antibiotics, and additives. Health considerations and flavour also rank highly, followed by price and nutritional value. These findings are consistent with previous research, indicating that consumers prioritise taste and health benefits when purchasing dairy products and choosing functional options such as probiotic milk, yoghurt, and organic milk (Paskaš et al., 2020; Balaji Srinivasan and Sasikala, 2024). In contrast, attributes such as lactose-free options, packaging made from recycled materials, probiotics/prebiotics, and low-fat content are regarded as less important. Our results differ from those

of Van Loo et al. (2013), where 50 % of surveyed consumers identified low-fat and cholesterol-free characteristics as important features of healthy dairy products. In our study, only 10.96 % of respondents considered low-fat content significant. Furthermore, regarding the environmental impact of dairy farming, 18.46 % of respondents deemed it very important, 14.42 % as less important, and 22.88 % remained neutral.

### *Consumer perspectives on emerging dairy product trends*

#### *Consumers' purchase and perception of organic milk production*

In terms of organic purchasing habits, 25.96 % of respondents identified as non-buyers, while 63.27 % reported occasional purchases. This indicates that having a positive view of organic products does not consistently lead to regular purchasing behaviour, highlighting a well-documented gap in sustainability research (Selfa et al., 2008). Key purchase drivers for organic products usually include concerns about food safety, health benefits, higher nutritional value, and environmental impact (Basha et al., 2015; Lian et al., 2016). Supermarkets (29.72 %) and greengrocers (29.91 %) were the dominant purchase points, aligning with consumer tendencies to prefer convenience and accessibility. Meanwhile, direct purchases from farmers (16.70 %) and local stores (14.68 %) trailed slightly, suggesting that while interest is in local and transparent supply chains, structural or logistical barriers may limit their uptake. The limited role of speciality stores (8.99 %) could reflect either their relative scarcity or the price premium typically associated with these outlets. Furthermore, most respondents agreed that organic farming contributes to

**Table 2.** Consumers' perception of organic milk production

Variables		Highly positive	Positive	Somewhat positive	Neutral	Somewhat negative	Negative	Highly negative	Chi-square (x2) / p-value
Total	n %	192 36.92	170 32.69	74 14.23	70 13.46	2 0.39	9 1.73	3 0.58	32.58*/ p=0.019
18-29	n %	87 33.08	85 32.32	42 15.97	41 15.59	2 0.76	5 1.90	1 0.38	
30-45	n %	51 51.51	26 26.26	13 13.13	8 8.09	0 0	0 0	1 1.01	
46-65	n %	36 32.43	43 38.74	18 16.22	13 11.71	0 0	1 0.90	0 0	
>65	n %	18 38.30	16 34.05	2 4.25	7 14.90	0 0	2 4.25	2 4.25	
<10000	n %	29 33.33	24 27.59	14 16.09	15 17.24	0 0	5 5.75	0 0	26.39/ p=0.091
10001-50000	n %	43 35.25	44 36.06	11 9.02	22 18.03	1 0.82	1 0.82	0 0	
50001-100000	n %	34 40.48	31 36.90	11 13.09	8 9.53	0 0	0 0	0 0	
>100000	n %	86 37.89	71 31.28	38 16.74	25 11.01	1 0.44	3 1.32	3 1.32	

\*p < 0.05; Source: Author's survey data

environmental protection and biodiversity, with only a small percentage expressing disagreement or strong disagreement. Notably, consumers aged 30 to 45 were significantly more likely ( $p < 0.05$ ) than other age groups to acknowledge the environmental and biodiversity benefits of organic production, indicating their heightened awareness and concern for long-term sustainability. Despite these positive attitudes, the persistent price sensitivity noted by respondents reflects barriers identified in other studies (Rodríguez-Bermúdez et al., 2020). This cost-related hesitancy reinforces the need for economic incentives or targeted education to build trust and highlight long-term health and environmental benefits. To tackle this issue, marketing strategies should focus on increasing awareness, trust, satisfaction, and loyalty, while also working to reduce costs (Lian et al., 2016).

The survey also revealed that consumers hold overwhelmingly positive views on organic milk production (Table 2). A lower proportion of regular organic milk buyers (10.77 %) was found compared to previous findings in Greece (34.8 %; Malissova et al., 2022). This difference may reflect broader variations in national food systems, income levels and consumer culture. While both studies identified supermarkets as the primary source of organic products, Greek consumers likely enjoy greater access, higher disposable incomes, or stronger health-related motivations. Exposure to advertisements for organic milk products enhances intrinsic motivation and purchase intention (Wang et al., 2021), while health claims on packaging significantly increase the likelihood of purchase (Balaji Srinivasan and Sasikala, 2024). For instance, consumers perceive organic yoghurt as superior to conventional yoghurt in terms of health benefits, environmental impact, quality, and safety (Van Loo et al., 2013; Tomić Maksan et al., 2022). Notably, many consumers confuse organic products with homegrown or locally produced foods, indicating that improved consumer

education, clearer labelling, public education, and effective retailer communication are needed to bridge knowledge gaps. Such measures could help expand the organic sector (Rodríguez-Bermúdez et al., 2020).

### **Consumer perceptions of animal welfare in dairy farming**

Most respondents agreed that organic production enhances animal welfare, with the 30-45 age group demonstrating the highest level of agreement ( $p < 0.05$ ) and viewing organic farming as more humane. However, nearly 20 % of respondents expressed no opinion, suggesting a lack of interest in animal welfare (Table 3). This sentiment is also reflected in Figure 2, where 35.96 % of respondents were neutral regarding animal welfare when purchasing dairy products, while 14.61 % deemed it insignificant and 13.64 % somewhat unimportant. In contrast, only 20.77 % rated animal welfare as very important. Heise and Theuvsen (2017) found that many consumers believe improved animal welfare standards for livestock production are needed. While consumers can support welfare-friendly products, citizens have a role in advocating for stronger legislation (Alonso et al., 2020). Many consumers associate animal-friendly products with better health, safety, taste, hygiene, environmental sustainability, and access to pasture (Grodzowski et al., 2023). However, consumer awareness of farming practices and animal welfare remains limited (Alonso et al., 2020). Although over half of the respondents in this study recognised the benefits of organic production for animal welfare, it was not a primary factor in their purchasing decisions. Increasing consumer willingness to pay for enhanced animal welfare standards may be achievable through effective communication and transparent labelling. Detailed information about farm management and housing conditions could foster consumer trust, especially if backed by internationally recognised monitoring systems (Alonso et al., 2020).

**Table 3.** Consumers' perception of organic dairy farming on animal welfare

Variables		Highly positive	Positive	Somewhat positive	Neutral	Somewhat negative	Negative	Highly negative	Chi-square (x <sup>2</sup> ) / p-value
Total	n %	120 23.08	174 33.46	85 16.34	99 19.04	20 3.85	20 3.85	2 0.38	43.45* / p=0.001
18-29	n %	49 18.63	88 33.46	44 16.73	52 19.78	19 7.22	10 3.80	1 0.38	
30-45	n %	38 38.39	27 27.27	15 15.15	12 12.12	1 1.01	5 5.05	1 1.01	
46-65	n %	25 22.52	39 35.13	21 18.92	25 22.52	0 0	1 0.90	0 0	
>65	n %	8 17.02	20 42.55	5 10.64	10 21.28	0 0	4 8.51	0 0	
<10000	n %	19 21.84	23 26.44	11 12.64	28 32.18	1 1.15	5 5.75	0 0	34.73* / p=0.01
10001-50000	n %	32 26.23	36 29.51	20 16.39	27 22.13	4 3.28	2 1.64	1 0.82	
50001-100000	n %	17 20.24	41 48.81	14 16.67	9 10.71	3 3.57	0 0	0 0	
>100000	n %	52 22.91	74 32.60	40 17.62	35 15.42	12 5.29	13 5.72	1 0.44	

\* $p < 0.05$ ; Source: Author's survey data



### Consumer acceptance of GMO products and GMOs in dairy production

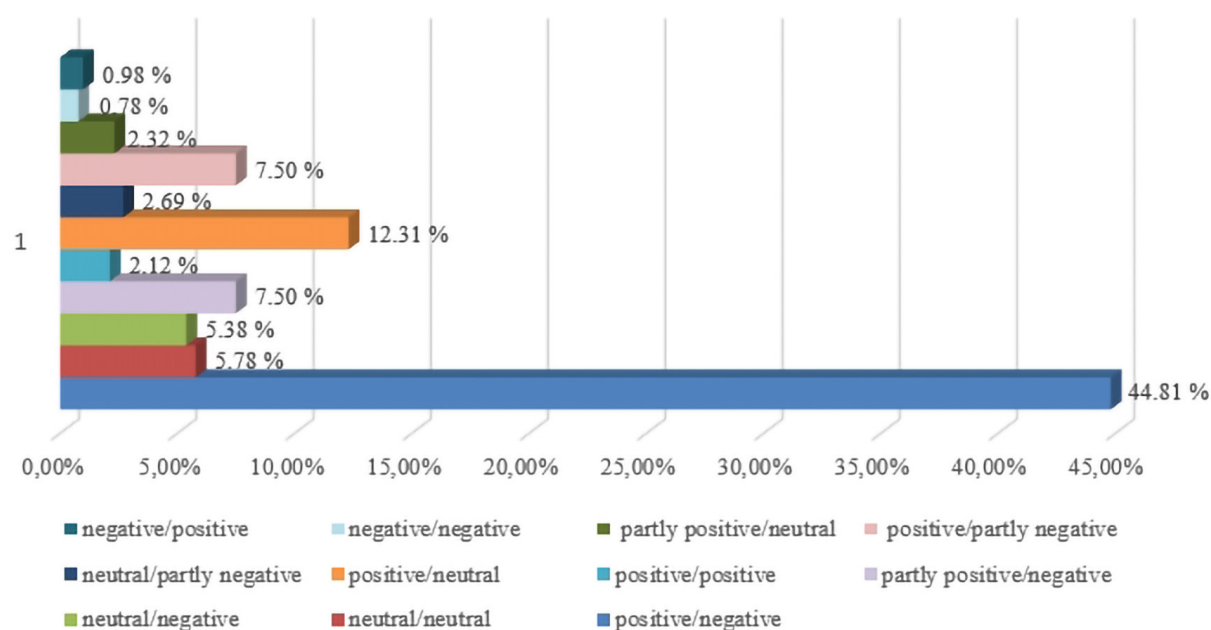
This section provides information on consumer perceptions of safety, ethical concerns regarding GMO food, and willingness to consume dairy products from animals fed on GMO feed. The survey data indicate that a significant majority of respondents (63.08 % strongly agree, 26.15 % agree) support mandatory GMO food labelling, reflecting a growing consumer demand for transparency in food production. Only a small fraction (2.11 %) opposed this view, aligning with findings from Stanton et al. (2021) and Shen et al. (2022). Notably,

a substantial portion of respondents (70.19 %) expressed concerns that GM foods may be marketed without adequate labelling, underscoring a gap in consumer trust regarding the regulation and transparency of GMO products. However, Şanlıer and Ceyhan Sezgin (2020) noted that labelling alone does not convey information about the risks of GM foods, and potential risks must be clear and comprehensive. Regarding consumer awareness of GMOs, the study found that 8.62 % of respondents were unfamiliar with the term “GMO,” while 45.19 % reported having limited knowledge. Nevertheless, a notable portion of participants (42.88 %) were relatively

**Table 4.** Consumers' perception of GMO products

Variables		Highly positive	Positive	Somewhat positive	Neutral	Somewhat negative	Negative	Highly negative	Chi-square (x2) / p value
Respondents' perceptions towards GMO food									
total	n %	6 1.15	22 4.24	26 5.0	106 20.38	58 11.15	163 31.35	139 26.73	51.56* / p=0.001
18-29	n %	5 1.90	12 4.56	21 7.98	72 27.38	28 10.65	65 24.71	60 22.82	
30-45	n %	1 1.01	4 4.04	4 4.04	14 14.14	10 10.10	30 30.30	36 36.37	
46-65	n %	0 0	2 1.80	1 0.90	17 15.31	13 11.71	44 39.64	34 30.64	
>65	n %	0 0	4 8.51	0 0	3 6.38	7 14.89	24 51.06	9 22.68	
<35000	n %	1 0.52	11 5.67	13 6.70	49 25.26	25 12.89	51 26.29	44 22.67	31.87* / p=0.023
35001-60000	n %	1 0.86	0 0	6 5.17	25 21.55	11 9.48	38 32.76	35 30.18	
60001-85000	n %	0 0	7 7.22	2 2.06	16 16.49	8 8.25	39 40.21	25 25.77	
>85000	n %	4 3.54	4 3.54	5 4.43	16 14.16	14 12.39	35 30.97	35 30.97	
Consumers' acceptance of milk and dairy products from animals fed on GM crops									
Variables		Completely acceptable	Acceptable	Somewhat acceptable	Neutral	Somewhat unacceptable	Unacceptable	Completely unacceptable	Chi-square (x2)
total	n %	13 2.50	32 6.15	41 7.89	112 21.54	49 9.42	161 30.96	112 21.54	76.21* / p=0.001
18-29	n %	7 2.66	20 7.60	35 13.31	76 28.90	20 7.60	64 24.34	41 15.59	
30-45	n %	4 4.04	7 7.07	3 3.03	18 18.18	7 7.07	33 33.33	27 27.28	
46-65	n %	0 0	5 4.50	2 1.80	16 14.41	19 17.12	44 39.64	25 22.52	
>65	n %	2 4.25	0 0	1 2.13	2 4.25	3 6.38	20 42.56	19 40.43	
female	n %	5 1.66	15 4.98	30 9.97	74 24.58	25 8.31	84 27.91	68 22.59	14.08* / p=0.029
male	n %	8 3.65	17 7.76	11 5.02	38 17.35	24 10.96	77 35.17	44 20.09	

\*p<0.05; Source: Author's survey data



**Figure 3.** Consumer perceptions of organic/GMO production (Source: Author's survey)

well-informed about GMOs, with only 3.31 % identifying as very well-informed. These findings suggest that while there is a base of informed consumers, significant portions of the population remain either uninformed or uncertain about GMO products, which confirms the findings by Şanlıer and Ceyhun Sezgin (2020).

Providing information about herbicide-tolerant GMOs, highlighting their potential for environmentally friendly herbicide use and conservation tillage, slightly improved consumer perceptions of GMOs. This indicates that well-targeted educational initiatives, emphasising the environmental benefits of GMOs, could help alleviate some of the negative perceptions and concerns regarding their safety. Despite this, negative views on GMOs persist, with over half of respondents considering GMO foods a health risk. A significant portion (21.54 %) remained undecided, underscoring the ongoing uncertainty surrounding GMOs and their potential impact on health. These findings align with Şanlıer and Ceyhun Sezgin (2020), who reported that consumers predominantly view GMOs as harmful to their health, with 49.1 % strongly agreeing and 23.5 % agreeing.

Table 4 shows consumers' perceptions towards GMO products and their acceptance of milk and dairy products from animals fed on GM crops. It was found that most respondents held negative views on GM foods (58.08 %, negative and highly negative). These results are consistent with Deng and Hu's (2019) study, which reported that 55 % of Chinese consumers opposed GM foods, and nearly 60 % distrusted GMO scientists. Younger consumers (18-29 years) and those from higher income brackets were notably more likely to express positive views toward GMOs. Millennials, particularly those with higher education, are also more open to purchasing GM foods (Öz et al., 2017). Furthermore, Kaçmaz et al. (2023) reported a trend consistent with the

present study, confirming that higher-income consumers tend to have more positive views toward GMOs, while younger consumers may exhibit more positive perceptions of GMOs due to increased exposure to scientific discussions and media surrounding agricultural biotechnology. Interestingly, in this study, 8.51 % of respondents aged over 65 also supported GMOs, indicating some degree of openness to these products even among older consumers.

Consumers' acceptance of milk and dairy products derived from GMO-fed animals was markedly low, with only 2.50 % of respondents expressing a strong willingness to purchase these products, and 6.15 % being somewhat open to consuming them. Differences among social groups further emphasise varying acceptance of milk and dairy products from animals fed on GM crops, with gender differences indicating that men exhibited a slightly higher level of acceptance compared to women. Notably, a larger proportion of women (24.58 %) were undecided compared to men (17.35 %). These findings suggest that while some consumers are willing to consider GMO-fed dairy products, overall acceptance remains limited, particularly among women. In line with that, Spendrup et al. (2021) found that 26 % of men had positive attitudes toward GMOs, while only 9 % of women shared this view, showing that women have stronger preferences for natural foods and higher risk sensitivity. However, negative attitudes were similar across genders, with 31 % of men and 36 % of women opposing GMOs.

Figure 3 illustrates the relationship between consumer attitudes toward organic production and GMOs. Almost half of the consumers who view organic production positively also view GMOs negatively. This highlights the scepticism surrounding GMOs and the preference for natural dairy farming practices (Ly et al., 2021). Only 12.31 % of respondents view organic products positively while remaining neutral on GMOs.

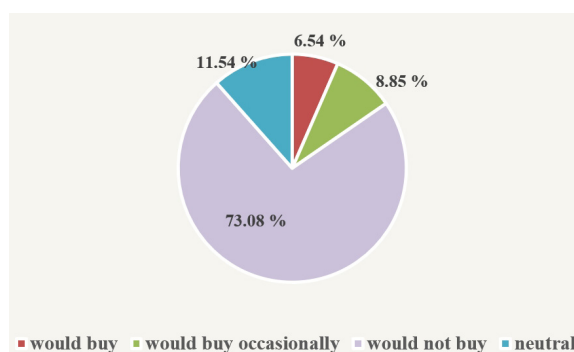


Meanwhile, 5.78 % expressed neutrality towards both organic and GMO production methods.

### Consumer acceptance of plant-based dairy alternatives

As consumer attitudes toward genetically modified organisms (GMOs) continue to evolve, similar concerns about food production methods and environmental impact also shape attitudes toward plant-based dairy alternatives. These products are increasingly viewed as healthier, more environmentally friendly options for individuals seeking to avoid animal products or those with dietary restrictions. However, the findings of this study showed that consumer adoption of plant-based milk alternatives remains relatively low, with only a small percentage of respondents purchasing them regularly. In particular, only 5.19 % regularly purchase plant-based alternatives, such as soy or oat milk, with a higher percentage of women ( $p < 0.05$ ) making these purchases compared to men (Table 5). Women are more likely than men to purchase alternative milk products due to a combination of health consciousness, dietary awareness, ethical concerns, and targeted marketing. Also, women tend to be more attentive to nutrition and more likely to adopt health-promoting behaviours, such as choosing lactose-free or plant-based options (Wardle et al., 2004). Among consumers who typically do not buy milk, 37.5 % and 31.25 % purchase plant-based alternatives regularly or occasionally, while 31.25 % do not. This data strongly suggests limited consumer demand for plant-based alternatives, but it also highlights a potential area for market growth in Serbia. Furthermore, environmentally conscious and health-oriented consumers continue to drive the demand for these alternatives, highlighting the potential for market expansion with better education on their benefits (Su et al., 2024).

Consumers may choose plant-based milk for various reasons, including health benefits, ethical considerations, and environmental concerns. However, their actual purchasing behaviour is frequently shaped by established habits, personal taste preferences, and familiarity with



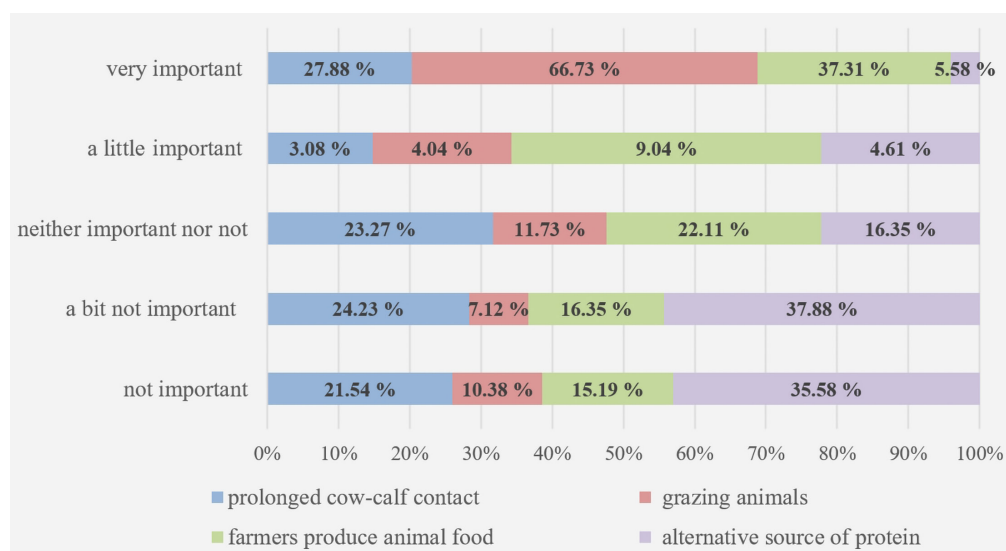
**Figure 4.** Consumer acceptance of lab-made synthetic milk and dairy products (Source: Author's survey, 2024)

these products. Nearly two-thirds of the consumers surveyed reported that a lack of established habits was a significant barrier to regularly choosing plant-based milk, followed closely by taste preferences. Furthermore, sensory challenges and concerns over nutritional adequacy remain barriers to the widespread adoption of these products (Sethi et al., 2016; Singhal et al., 2017; Shori and Al Zahrani, 2022; Banach et al., 2023). Some products, such as oat-based yoghurt, crème fraîche, and desserts, have gained popularity in EU supermarkets (Banach et al., 2023). Plant-based milk alternatives are naturally lactose-free, cholesterol-free, and animal protein-free and also contain bioactive components, antioxidants, and unsaturated fats, contributing to their functional and nutritional value (Besir et al., 2022). However, these products often lack the overall nutritional balance of bovine milk, particularly in terms of protein content. Although many plant-based beverages are fortified with calcium and vitamin D, the bioavailability of these nutrients post-fortification remains unclear. Processing contaminants and anti-nutritional compounds in plant-based alternatives may also interfere with nutrient absorption and pose food safety concerns, such as pesticide and heavy metal contamination (Banach et al., 2023).

**Table 5.** Consumer purchasing patterns for plant-based dairy substitutes

Variables		Regularly	Periodically	No purchase	Chi-square ( $\chi^2$ ) / p-value
Total	n %	27 5.19	190 36.54	303 58.27	8.64 / p=0.195
18-29	n %	16 6.08	97 36.88	150 57.04	
30-45	n %	6 6.06	37 37.37	56 56.57	
46-65	n %	2 1.80	46 41.44	63 56.76	
>65	n %	3 6.38	10 21.28	34 72.34	
Female	n %	19 6.31	120 39.87	162 53.82	6.32* / p=0.042
Male	n %	8 3.65	70 31.96	141 64.38	

\* $p < 0.05$ ; Source: Author's survey data



**Figure 5.**  
Consumers' perceptions of different dairy farming practices (Source: Author's survey)

### Consumer acceptance of lab-made synthetic milk and dairy products

Synthetic milk is a highly contested alternative to traditional dairy, but consumer attitudes toward conventional dairy farming practices highlight sustainability and ethical production concerns. In this study, the overwhelming majority (73.08 %) of respondents expressed unwillingness to purchase synthetic milk (Figure 4), with concerns centred around its perceived unhealthiness, unfamiliarity, and lack of testing. This sentiment aligns with previous studies (Banach et al., 2023), which highlight consumer reluctance to embrace lab-grown food products due to food safety concerns, including allergen risks and processing contaminants. Additionally, consumer readiness to adopt synthetic milk suggests a strong preference for traditional dairy products. Understanding consumers' willingness to purchase and pay a premium for synthetic milk is critical for assessing its potential market success (Guiné et al., 2020).

### Consumers' awareness and perceptions of dairy farming practices

This section explores how consumers perceive farming practices such as pasture access and the use of homegrown crops in dairy production. According to the survey, pasture access was regarded as the most important dairy farming practice by 45.85 % of respondents, followed by homegrown crops (25.67 %) and prolonged cow-calf contact (18.39 %). The least important practice was the use of alternative feed sources, selected by only 4.73 % of respondents, indicating that consumers may find it challenging to recognise their potential benefits in dairy farming and general consumer hesitation towards unfamiliar or technological innovations in animal diets (Figure 5). Furthermore, findings suggest that consumers place a high value on natural animal living conditions, which is consistent with earlier findings associating pasture-based systems with better perceived animal welfare (Naspetti et al., 2021; Grodkowski et al., 2023). This may signal a preference for

"traditional" farming narratives, emphasising naturalness over innovation, even if innovations could improve sustainability or reduce imports (Kühl et al., 2024).

As global interest in sustainable livestock production grows, the environmental, social, and economic impacts of various farming practices must be considered (Castillo et al., 2019). In recent years, there has been increasing attention towards cow-calf separation, a practice largely opposed by consumers due to its perceived unnaturalness and association with animal stress (Placzek et al., 2021). Furthermore, Naspetti et al. (2021) confirmed that prolonged cow-calf contact is highly accepted across six European countries (Austria, Belgium, Denmark, Finland, Italy, and the UK). While sustainable dairy farming offers significant benefits, it often entails higher implementation costs, which may translate into increased consumer prices (Mehrabani et al., 2022). A consumer-oriented approach to evaluating these practices involves not only assessing technical sustainability metrics but also actively incorporating consumer expectations and values into farm management decisions (Meyer-Höfer et al., 2015). This approach recognises that consumer trust and acceptance are crucial for the success of sustainable innovations. The data from this study demonstrate that consumers are not only aware of but also show preferences for certain practices, particularly those aligned with welfare and environmental concerns. Interestingly, in this study, homegrown crops ranked second in importance, indicating a potential increase in consumer awareness of this practice. Homegrown protein crops have been suggested as an alternative to imported soy in dairy cattle feed, but consumer appreciation of this practice remains relatively low, according to research by Naspetti et al. (2021). This supports the idea that aligning farming practices with consumer expectations can strengthen market support for sustainable dairy systems. Therefore, bridging the gap between consumer values and purchasing behaviour is essential. By highlighting consumer-oriented priorities, this study offers insights that can inform not only policy and certification schemes but also on-farm

**Table 6.** The significance of sustainable farming practices when purchasing milk and dairy products

Variables		Completely unimportant	Somewhat unimportant	Neutral	Slightly important	Highly important	Chi-square (x <sup>2</sup> ) / p-value
Total	n %	76 14.61	22 4.24	80 15.38	149 28.65	193 37.12	20.95 / p=0.051
18-29	n %	40 15.21	7 2.66	43 16.35	81 34.20	92 34.98	
30-45	n %	21 21.21	5 5.05	7 7.07	25 25.25	41 41.42	
46-65	n %	9 8.11	6 5.40	21 18.92	35 31.53	40 36.04	
>65	n %	6 12.77	4 8.51	9 19.15	8 17.02	20 42.55	
<35000	n %	21 10.83	11 5.67	22 11.34	66 34.02	74 38.14	39.27* / p=0.001
35001-60000	n %	26 22.41	3 2.59	15 12.93	25 21.55	47 40.52	
60001-85000	n %	22 22.68	5 5.15	24 24.74	15 15.47	31 31.96	
>85000	n %	7 6.20	3 2.66	19 16.81	43 38.05	41 36.28	

\* $p < 0.05$ : Source: Author's survey data

decisions aimed at aligning sustainability with market demand.

37.12 % of respondents considered dairy farming practices essential when purchasing milk and dairy products, indicating lower consumer awareness of these practices at the time of purchase (Table 6). Consequently, Pieper et al. (2016) reported that German consumers lacked fundamental knowledge about milk production, underscoring the need for improved education on food production and modern dairy farming. No significant age-related differences were observed ( $p < 0.05$ ), with positive responses ranging from 36.04 % to 42.55 %. The most negative responses were recorded among the two youngest age groups (19-29 and 30-45). However, significant differences ( $p < 0.05$ ) were found between income groups, with respondents in higher income brackets demonstrating slightly less concern. These groups also exhibited the most neutral responses, whereas the most negative views were found among the second and third-income groups (Table 6).

According to Ly et al. (2021), consumer preferences for dairy practices are often influenced by perceptions of animal welfare and the benefits of dairy products. Survey respondents who expressed support for organic production and held negative views of GMOs most frequently cited pasture access as the most important dairy farming practice (42.81 %), followed by the use of home-grown feed (27.56 %) and prolonged cow-calf contact (22.58 %). Conversely, 19.23 % of consumers without a clear stance on either production method indicated a lack of interest in dairy farming practices. Similarly, respondents who had a positive perception of organic production and a neutral attitude towards GMOs displayed the highest proportion of responses deeming these practices unimportant. Among those with favourable views of GMOs, prolonged maternal feeding was recognised as the most relevant dairy farming practice. These findings enhance the scientific understanding of consumer perceptions regarding sustainable practices in dairy farming, establishing a basis for further investigation into the economic and environmental trade-offs of adopting such practices on a larger scale. While this study identifies

consumer attitudes and perceptions, it does not provide an in-depth analysis of actual purchasing behaviour. Therefore, future studies could focus on understanding the disconnect between consumer perceptions and actual purchasing decisions, as well as the factors that influence this discrepancy. Future research might also centre on utilising larger samples from a more diverse population.

## Conclusion

The findings from this study highlight the key factors influencing consumer attitudes toward sustainable dairy products. Consumers exhibit a clear preference for organic production over genetically modified organisms (GMOs) and regard organic farming practices as more natural and humane. However, these positive attitudes towards organic farming do not always translate into purchasing decisions, indicating that other factors, such as price, product quality, and consumer knowledge, significantly affect actual consumer behaviour. The results also reflect a growing interest in sustainable dairy farming practices, particularly those involving pasture access and the use of homegrown protein sources. In contrast, alternative feed sources, such as insects and single-cell proteins, remain a lower priority among consumers. Despite these trends, overall consumer awareness of the full spectrum of sustainable dairy farming practices, including their environmental, ethical, and nutritional implications, remains limited. These findings enhance the scientific understanding of consumer perceptions regarding sustainable practices in dairy farming, providing a basis for further investigation into the economic and environmental trade-offs of adopting such practices.

# Istraživanje održivih praksi proizvodnje mlijeka kroz ankete potrošača

## Sažetak

Ovaj rad istražuje stavove potrošača prema kupnji mlijeka i mliječnih proizvoda, posebno se fokusirajući na organsku proizvodnju, genetski modificirane organizme (GMO) i alternativne mliječne proizvode. Podaci su prikupljeni od 520 potrošača putem online ankete i ankete licem u lice. Rezultati su otkrili da su zdravstveni aspekti i okus dva najvažnija čimbenika koji utječu na kupnju mlijeka i mliječnih proizvoda, a odmah iza njih slijede cijena i nutritivna vrijednost. Dok su potrošači općenito bili pozitivni o organskoj proizvodnji, samo mali postotak redovito je kupovao organske proizvode, uključujući organsko mlijeko i mliječne proizvode. Većina ispitanika složila se da organski uzgoj doprinosi zaštiti okoliša, bioraznolikosti i dobrobiti životinja. Nasuprot tome, većina potrošača imala je negativan stav prema GMO-u, doživljavajući tu hranu nezdravom i neprirodnom. Dodatno, mnogi potrošači izrazili su negativnu percepciju mlijeka i mliječnih proizvoda dobivenih od životinja hranjenih GMO usjevima. Rezultati su također pokazali da potrošači cijene ispašu životinja kao najvažniju poljoprivrednu praksu u uzgoju mlijeka, nakon čega slijede usjevi uzgajani od strane farmara. Iako većina ispitanika ne kupuje redovito alternativne biljne proizvode (kao što su sojini, zobeni, bademovi ili rižini napitci), otprilike jedna trećina ih kupuje povremeno. Rezultati naglašavaju složen međuodnos između potrošačkih vrijednosti, ponašanja pri kupnji, percipiranih prednosti ili rizika organskih i GMO proizvoda, te relativno malog prihvaćanja alternativnih mliječnih proizvoda. Rezultati ovog istraživanja pružaju informacije o strategijama održive proizvodnje mlijeka koje su u skladu s evoluirajućim preferencijama potrošača.

**Ključne riječi:** menadžment prakse na farmama za proizvodnju mlijeka; stavovi potrošača; kupnja mlijeka i mliječnih proizvoda

## R e f e r e n c e s

1. Alonso, E.M., González-Montaña, R.J., Lomillos, M.J. (2020): Consumers' concerns and perceptions of farm animal welfare. *Animals* 10, 385.  
<https://doi.org/10.3390/ani10030385>
2. Balaji Srinivasan, B., Sasikala, U. (2024): A Study on consumer purchase intention towards functional dairy products in Bengaluru North. *Migration Letters* 21 (5), 539-548.
3. Banach, L.L., Berg, P.J., Kleter, G., Bokhorst-van de Veen, H., Bastiaan-Net, S., Pouvreau, L., Asselt, D.E. (2023): Alternative proteins for meat and dairy replacers: Food safety and future trends. *Critical Reviews in Food Science and Nutrition* 63 (32), 11063-11080.  
<https://doi.org/10.1080/10408398.2022.2089625>
4. Basha, B.M., Mason, C., Shamsudin, F.M., Hussain, I.H., Salem, A.M. (2015): Consumers' Attitude Towards Organic Food. *Procedia Economics and Finance* 31, 444-452.  
[https://doi.org/10.1016/S2212-5671\(15\)01219-8](https://doi.org/10.1016/S2212-5671(15)01219-8)
5. Besir, A., Awad, N., Mortas, M., Yazici, F. (2022): A plant-based milk type: hemp seed milk. *Akademik Gıda* 20 (2), 170-181.  
<https://doi.org/10.24323/akademik-gida.1149875>
6. Castillo, C., Abuelo, A., Hernandez, J. (2019): Ruminant (bovine, caprine, and ovine) milk and meat production: The challenge of food quality and sustainability through the use of plant extracts. *Encyclopedia of food security and sustainability* 2, 25-42.  
<https://doi.org/10.1016/B978-0-08-100596-5.22187-2>
7. Dehnada, A., Nasserb, H. (2014): A comparison between three- and four-option multiple choice questions. International Conference on Current Trends in ELT. *Agha Fatemeh Hosseinic Procedia - Social and Behavioural Sciences* 98, 398-403.
8. Deng, H., Hu, R. (2019): A crisis of consumers' trust in scientists and its influence on consumer attitude toward genetically modified foods. *British Food Journal* 121 (10), 2454-2476.  
<https://doi.org/10.1108/BFJ-07-2018-0476>
9. Džever, S., Tatić, M., Matkovski, B., Đokić, D. (2021): Generation Z's willingness to pay for domestic and organic milk: A discrete choice experiment in Serbia. *Applied ecology and environmental research* 22 (5), 3919-3939.
10. Đorđević, J., Ledina, T., Kovandžić, M., Bulajić, S. (2023): Production and trade of milk and dairy products in Serbia. *Meat Technology* 64 (2), 166-170.  
<https://doi.org/10.18485/meattech.2023.64.2.30>

11. Grębowiec, M. (2021): Consumer determinants of purchasing decisions on the dairy products market. *European Research Studies Journal* 24 (3B), 981-992.
12. Grodkowski, G., Gołębiewski, M., Slósarz, J., Grodkowska, K., Kostusiak, P., Sakowski, T., Puppel, K. (2023): Organic milk production and dairy farming constraints and prospects under the laws of the European Union. *Animals (Basel)* 13 (9), 1457.  
<http://doi.org/10.3390/ani13091457>
13. Guiné, R.P.F., Florença, S.G., Barroca, M.J., Anjos, O. (2020): The link between the consumer and the innovations in food product development. *Foods* 18 (9), 1317.  
<https://doi.org/10.3390/foods9091317>
14. Hyman, R.M., Sierra, J.J. (2016): Open- versus closed-ended survey questions. *Business Outlook* 14 (2), 1-5.
15. Hyland, J.J., Regan, A., Sweeney, S., McKernan, C., Benson, T., Dean, M. (2022): Consumers' attitudes toward animal welfare friendly produce: An island of Ireland study. *Frontiers in Animal Science* 3, 930930.  
<https://doi.org/10.3389/fanim.2022.930930>
16. Heise, H., Theuvsen, L. (2017): What do consumers think about farm animal welfare in modern agriculture? Attitudes and shopping behaviour. *International Food and Agribusiness Management Review* 20 (3), 379-399.  
<https://doi.org/10.22434/IFAMR2016.0115>
17. Joshi, A., Kale, S., Chandel, S., Pal, D.K. (2015): Likert scale: explored and explained. *British Journal of Applied Science & Technology* 7 (4), 396-403.
18. Kaçmaz, K.S., Aşkan, E., Topcu, Y. (2023): Consumer perception and purchase attitude towards genetically modified foods during the Covid-19 pandemic: the case of Erzurum, Türkiye. *Journal of Agricultural Sciences* 33 (4), 543-555.  
<https://doi.org/10.29133/yyutbd.1319800>
19. Klimczuk-Kochańska, M., Klimczuk, A. (2019): Innovation in food and agriculture. In: Thompson, P.B., Kaplan, D.M. (eds.), *Encyclopedia of food and agricultural ethics*, second edition, Springer, Dordrecht 2019, pp. 1635–1641.  
[https://doi.org/10.1007/978-94-007-6167-4\\_628-1](https://doi.org/10.1007/978-94-007-6167-4_628-1)
20. Köhl, S., Schäfer, A., Kircher, C., Mehlhose, C. (2024): Beyond the cow: Consumer perceptions and information impact on the acceptance of precision fermentation-produced cheese in Germany. *Future Foods* 10, 100411.  
<https://doi.org/10.1016/j.fufo.2024.100411>
21. Lian, S.B., Safari, M., Mansori, S. (2016): The marketing stimuli factors influencing consumers' attitudes to purchase organic food. *International Journal of Business and Management* 11 (10), 109-119.  
<http://dx.doi.org/10.5539/ijbm.v11n10p109>
22. Ly, L.H., Ryan, E.B., Weary, D.M. (2021): Public attitudes toward dairy farm practices and technology related to milk production. *PLoS ONE* 16 (4), e0250850.  
<https://doi.org/10.1371/journal.pone.0250850>
23. Malissiova, E., Tsokana, K., Sultani, G., Alexandraki, M., Katsioulis, A., Manouras, A. (2022): Organic food: A study of consumer perception and preferences in Greece. *Applied Food Research* 2 (1), 100129.  
<https://doi.org/10.1016/j.afres.2022.100129>
24. Mehrabi, S., Perez-Mesa, J.C., Giagnocavo, C. (2022): The role of consumer-citizens and connectedness to nature in the sustainable transition to agroecological food systems: The mediation of innovative business models and a multi-level perspective. *Agriculture* 12, 203.  
<https://doi.org/10.3390/agriculture12020203>
25. Meyer-Höfer, M., Nitzko, S., Spiller, A. (2015): Is there an expectation gap? Consumers' expectations towards organic: An exploratory survey in mature and emerging European organic food markets. *British Food Journal* 117 (5), 1527–1546.
26. Moss, R., Barker, S., Falkeisen, A., Gorman, M., Knowles, S., McSweeney, B.M. (2022): An investigation into consumer perception and attitudes towards plant-based milk alternatives. *Food Research International*, 159, 111648.  
<https://doi.org/10.1016/j.foodres.2022.111648>
27. Naspetti, S., Mandolesi, S., Buysse, J., Latvala, T., Nicholas, P., Padel, S., Van Loo, E., Zanolli, R. (2021): Consumer perception of sustainable practices in dairy production. *Agricultural and Food Economics* 9, 1.  
<https://doi.org/10.1186/s40100-020-00175-z>



28. Očić, V., Šakić Bobić, B. Grgić, Z. (2023): Economic analysis of specialised dairy farms in Croatia according to FADN. *Mljekarstvo* 73 (1), 50-58.  
<https://doi.org/10.15567/mljekarstvo.2023.0106>
29. Öz, B., Unsal, F., Movassaghi, H. (2017): Consumer attitudes toward genetically modified food in the United States: Are Millennials different? *Journal of Transnational Management* 23 (4), 3-21.  
<https://doi.org/10.1080/15475778.2017.1373316>
30. Paskaš, S., Miočinović, J., Lopičić-Vasić, T., Mugoša, I., Pajić, M., Becskei, Zs. (2020): Consumer attitudes towards goat milk and milk products in Vojvodina. *Mljekarstvo* 70 (3), 171-183.  
<https://doi.org/10.15567/mljekarstvo.2020.0304>
31. Paskaš, S., Miočinović, J., Pihler, I., Čobanović, K., Savić, M., Becskei, Z. (2023): The influence of grazing and indoor systems on goat milk, brined cheese and whey quality. *Mljekarstvo* 73 (3), 143-154.  
<https://doi.org/10.15567/mljekarstvo.2023.0301>
32. Pieper, L., Doherr, G.M., Heuwieser, W. (2016): Consumers' attitudes about milk quality and fertilisation methods in dairy cows in Germany. *Journal of Dairy Science* 99 (4), 3162-3170.
33. Pinto, A.R.V., Melo, F.L., Balbino, F.D., Novaes, F.J., Negrete, C.M., Sousa, D.T. (2016): The evaluation of consumer behaviour influence on the buying process of dairy products in Minas Gerais state, Brazil. *Journal of Food and Nutrition Research* 4 (1), 51-59.  
<https://doi.org/10.12691/jfmr-4-1-9>
34. Placzek, M., Christoph-Schulz, I., Barth, K. (2021): Public attitude towards cow-calf separation and other common practices of calf rearing in dairy farming - a review. *Organic Agriculture* 11, 41-50.  
<https://doi.org/10.1007/s13165-020-00321-3>
35. Rodriguez, M.C. (2005). Three options are optimal for multiple-choice items: A meta-analysis of 80 years of research. *Educational measurement: issues and practice* 24 (2), 3-13.
36. Rodríguez-Bermúdez, R., Miranda, M., Orjales, I., Ginzo-Villamayor, M.J., Al Soufi, W., López-Alonso, M. (2020): Consumers' perception of and attitudes towards organic food in Galicia (Northern Spain). *International Journal of Consumer Studies* 44, 206-219.  
<https://doi.org/10.1111/ijcs.12557>
37. Şanlıer, N., Ceyhun Sezgin, A. (2020): Consumers' knowledge level, attitudes, behaviours and acceptance of GM foods. *Journal of Human Sciences* 17 (4), 1235-1249.  
<https://doi.org/10.14687/jhs.v17i4.6016>
38. Santhamani, N., Tharangini, P.S. (2021): Consumer attitude towards dairy products – an empirical study in Erode district. *International Journal of Engineering and Management* 11, 1.  
<https://doi.org/10.31033/ijemr.11.1.33>
39. Satrić, A., Miloradović, Z., Mirković, M., Mirković, N., Miocinović, J. (2023). Quality characteristics of 'Pasta-Filata' Serbian Kačkavalj cheese and regulatory compliance assessment. *Mljekarstvo* 73 (1), 38-49.  
<https://doi.org/10.15567/mljekarstvo.2023.0105>
40. Schiano, A.N., Harwood, W.H., Gerard, P.D., Drake, M.A. (2020): Consumer perception of the sustainability of dairy products and plant-based dairy alternatives. *Journal of Dairy Science* 103 (12), 11228-11243.
41. Sendhil, R., Nyika, J., Yadav, S., Mackolil, J., Prashat, G.R., Workie, E., Ragupathy, R., Ramasundaram, P. (2022): Genetically modified foods: bibliometric analysis on consumer perception and preference. *GM Crops & Food* 13 (1), 65-85.  
<http://doi.org/10.1080/21645698.2022.2038525>
42. Selfa, T., Jussaume, A.R., Winter, M. (2008): Envisioning agricultural sustainability from field to plate: Comparing producer and consumer attitudes and practices toward environmentally friendly food and farming in Washington State, USA. *Journal of Rural Studies* 24, 262-276.
43. Sethi, S., Tyagi, K.S., Anurag, K.R. (2016): Plant-based milk alternatives: an emerging segment of functional beverages: a review. *Journal of Food Science and Technology* 53 (9), 3408-3423.  
<https://doi.org/10.1007/s13197-016-2328-3>
44. Shen, C., Yin, X.C., Jiao, B.Y., Li, J., Jia, P., Zhang, X.W., Cheng, X.H., Ren, J.X., Lan, H.D., Hou, W.B., Fang, M., Li, X., Fei, Y.T., Robinson, N., Liu, J.P. (2022): Evaluation of adverse effects/ events of genetically modified food consumption: a systematic review of animal and human studies. *Environmental Sciences Europe* 34, 8.  
<https://doi.org/10.1186/s12302-021-00578-9>



45. Singhal, S., Baker, D.R., Baker, S.S. (2017): A Comparison of the nutritional value of cow's milk and non-dairy beverages. *JPGN* 64 (5), 799-805.
46. Shori, B.A., AL Zahrani, J.A. (2022): Non-dairy plant-based milk products as alternatives to conventional dairy products for delivering probiotics. *Food Science and Technology, Campinas* 42, e101321.  
<https://doi.org/10.1590/fst.101321>
47. Spendrup, S., Eriksson, D., Fernqvist, F. (2021): Swedish consumers' attitudes and values to genetic modification and conventional plant breeding - The case of fruit and vegetables. *GM Crops & Food* 12 (1), 342-360.  
<https://doi.org/10.1080/21645698.2021.1921544>
48. Stanton, J., Rezai, G., Baglione, S. (2021): The effect of persuasive/possessing information regarding GMOs on consumer attitudes. *Future Foods* 4, 100076.  
<https://doi.org/10.1016/j.fufo.2021.100076>
49. Su, W., Zhang, Y.Y., Li, S., Sheng, J. (2024): Consumers' preferences and attitudes towards plant-based milk. *Foods* 13, 2.  
<https://doi.org/10.3390/foods13010002>
50. Tomić Maksan, M., Tudor Kalit, M., Pavlina, A., Mesić, Ž. (2022): Consumers' attitudes, motives and behaviour towards organic yoghurt in Croatia. *Mljekarstvo* 72 (1), 43-53.  
<https://doi.org/10.15567/mljekarstvo.2022.0105>
51. Van Loo, J.E., Diem, H.N.M., Pieniak, Z., Verbeke, W. (2013): Consumer attitudes, knowledge, and consumption of organic yoghurt. *Journal of Dairy Science* 96 (4), 2118-2129.  
<http://dx.doi.org/10.3168/jds.2012-6262>
52. Wang, C., Ghadimi, P., Lim, K.M., Tseng, L.M. (2019): A literature review of sustainable consumption and production: A comparative analysis in developed and developing economies. *Journal of Cleaner Production* 206, 741-754.
53. Wardle, D.A., Bardgett, R.D., Klironomos, J.N., Setälä, H., Putten, W.H., Wall, D.H. (2004): Ecological linkages between aboveground and belowground biota. *Science* 11, 304 (5677), 1629-1633.  
<https://doi.org/10.1126/science.1094875>
54. Weinrich, R., Kühl, S., Zühlsdorf, A., Spiller, A. (2014): Consumer attitudes in Germany towards different dairy housing systems and their implications for the marketing of pasture-raised milk. *International Food and Agribusiness Management Review* 17 (4), 205-222.