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DETERMINANTS OF CHANGES IN PERCEPTION OF THE QUALITY OF DAIRY PRODUCTS BY POLISH CONSUMERS*

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Received 18 May 2024; accepted 18 August 2024; published 30 September 2024

Abstract. The quality of dairy products covers areas that independently determine preferences, purchasing behaviour and eating habits. The concept of a three-dimensional structure of food quality has been the subject of numerous analyses. Many authors emphasize that research on the consumer quality structure should show orthogonal quality areas and the importance of these areas for individual user segments. It can be assumed that a specific modification in the perception of the quality of food products occurred under the influence of the COVID-19 pandemic. The research examines a perception of the quality of dairy products in the Polish market after the COVID-19 pandemic. It is assumed that the obtained research results will allow the adaptation of previously existing quality management systems to the new conditions. The research was conducted in the third quarter of 2022 and involved a survey targeting residents across all 16 voivodeships of Poland. The survey results underwent principal components analysis using the Statistica 13.3 package. The number of principal components was determined using the Kaiser method and the percentage of explained variance method. Factor loadings were calculated post-rotation using the "normalized varimax" method proposed by Pieczonka (2009). According to research, the quality of dairy products, in the opinion of the Polish consumer, is a multidimensional concept. The most critical areas of the quality of dairy products for both women and men are their nutritional and health-promoting value. Consumers considered the elements of the highest importance to be freshness and naturalness, the absence of contamination and chemical additives, durability and essential organoleptic features, taste and smell.

Keywords: dairy products; quality structure; quality management; quality of dairy products; food quality; consumer

Reference to this paper should be made as follows: Baran, J., Kowalczyk, K., Tereszkieicz, K. 2024. Determinants of changes in perception of the quality of dairy products by Polish consumers. *Entrepreneurship and Sustainability Issues*. 12(1), 290-302. [http://doi.org/10.9770/jesi.2024.12.1\(20\)](http://doi.org/10.9770/jesi.2024.12.1(20))

JEL Classifications: Q12, Q13

*The research is financed by the Krosno State Academy of Applied Sciences Stanislaw Pigoń's Scholarship Fund in the academic year 2023/2024

1. Introduction and review of literature

The food industry is crucial to the European Union's economic system. The milk production and processing industry is an integral and vital part of the food sector (Radu et al., 2023).

The Polish dairy products market transformed into a consumer market about thirty years ago. This forced producers to use marketing mix tools actively. One of the primary goals of the marketing mix is the transfer of information between the enterprise and the consumer (Chen et al., 2021; Choroszy, 2021). Information sent by producers should be a source of knowledge about its quality for consumers while limiting the phenomenon of various types of uncertainty (Nowak, 2008). It is believed that the one uncertainty most strongly felt by consumers is the quality of dairy products. The above relationship makes it difficult to attach to the brand's postmodern consumer (Skorek, 2015). Overcoming it with skilful marketing activities and a high-quality product offer allows one to compete in the market (Kraś, 2017), as quality is essential for the consumer when making a purchase decision.

Food quality is a complex phenomenon that has changed dynamically in recent years, and this trend is assumed to continue. The premise for such predictions is the variety of objective and subjective factors determining the quality of food products, resulting from the expectations of all entities involved in the food chain. The main links in the food chain are production, storage, distribution and consumers (Bukała et al., 2000; Chen and Antonelli, 2020; Boustani et al., 2021).

Food quality attributes are vital for consumers. The perception of quality by final recipients is a complex concept, conditioned by many characteristics, the area and rank of which depend on buyers' socio-demographic and psychographic profiles. In management theory, quality is defined as the degree to which the product purchased by the consumer meets his expectations.

One of the classic approaches to the quality of food products, adopted in the marketing literature, is Nelson's proposal (Nelson, 1974), which assumes its three-dimensional structure. According to this concept, in discerning quality, the consumer uses searching features (the consumer can evaluate them before purchasing, e.g., colour), experiential features (the consumer evaluates them only based on direct experience with the product, e.g., taste and smell) and features accepted A priori (usually the consumer cannot consider them himself, e.g., nutrient content) (Nelson, 1970; Pinson and Jolibert, 2001; Stobiecka, 2010).

The concept of a three-dimensional structure of food quality has been the subject of numerous analyses. Many authors emphasize that research on the consumer quality structure should show orthogonal quality areas and the importance of these areas for individual user segments (Sun, 2006). Moreover, these processes change dynamically under the influence of multiple factors (Choroszy, 2021; Kraus, 2015). Many authors have attempted to organize the quality parameters of food products, allowing for substantive interpretation of the results. The above research aimed to make it easier for entities operating in the food market to make accurate marketing decisions. The tool that enables such ordering of the quality determinants of food products is the analysis of the main components. It may be based on the interpretation of the results of the determination of physio-chemical quality parameters or sensory evaluation of selected food groups. Attempts of this type were made by, for example, Iezzoni et al. (1991), Borgognone et al. (2001), Probola and Zander (2007), Luciano et al. (2009), Ghosh et al. (2012), Granè et al., Cozzolino et al. (2014). Principal component analysis is fundamental when it comes to analysing the acceptability of fermented food samples, and the overall acceptance of the sample depends on various attributes, namely, appearance, texture, taste, feel in the mouth, and acidity. These studies also showed that the texture of fermented food samples could be considered the main feature. By analysing the physical quality of fermented food samples, namely compressive load and shear load, it can be concluded that they are the essential criteria for its acceptance, as they are related to the texture of the ready product.

Polish researchers also addressed the issue of consumer assessment of the quality structure. This research involved measuring the importance of individual features and factors shaping consumption behaviour in the food market. Cichočka and Pieczonka, 2004 established the Polish consumer structure of the quality of food products. Pieczonka made another attempt to construct a consumer quality structure for dairy products in 2009. In subsequent research in 2015, Kraus presents the results of a principal components analysis covering factors influencing decisions about purchasing and consuming functional food. This concept was developed in 2021 by Choroszy. The above research shows that there are three segments of Polish consumers, each significantly different in terms of how they perceive behaviour-shaping quality characteristics in the food market. The following properties showed disparities across all three groups: naturalness, visual appeal, shelf life and level of processing, fat content and calorific value, health-promoting ingredients, and absence of chemical additives. Significant discrepancy.

It can be assumed that a specific modification in the perception of the quality of food products occurred under the influence of the COVID-19 pandemic. This assumption seems to be justified because the effects of COVID-19 were the widespread isolation of large human populations, the disruption of existing shopping habits, the emergence of new rules for food distribution, including the intensive development of e-commerce trade (Lee, 2024; Burgess et al., 2023).

The research aimed at the quality of dairy products in the Polish market after the COVID-19 pandemic. It is assumed that the obtained research results will allow the adaptation of previously existing quality management systems to the new conditions.

2. Materials and methodology

The research was conducted in the third quarter of 2022 and involved a survey targeting residents across all 16 voivodships of Poland. Respondents were selected using the quota method, based on Central Statistical Office data concerning gender, age, education level, and place of residence.

The questionnaire was divided into two parts: the first part gathered demographic details, and the second part included eighteen questions to evaluate subjective importance. These questions explored various characteristics that might influence respondents' purchasing decisions and consumption behaviour in the dairy products market.

The characteristics assessed included:

- Nutritional value (protein and calcium)
- The presence of health-promoting ingredients
- Microbiological purity
- Absence of chemical contamination
- Absence of chemical additives
- Freshness
- Low-calorie content
- Taste and smell
- Durability
- Package size
- Producer
- The naturalness of the product
- Presence of probiotics in the product
- Possibility to follow a diet
- Absence of lactose
- Positive impact on well-being
- Aesthetic values of the product or packaging
- Low fat

Respondents rated these characteristics on a 7-point interval scale, a unipolar structural graphic scale with verbal extreme categories: 1 point representing "extremely unimportant" and 7 points representing "extremely important." The survey results underwent principal components analysis using the Statistica 13.3 package (Stanisz, 2007). The number of principal components was determined using the Kaiser method and the percentage of explained variance method. Factor loadings were calculated post-rotation using the "normalized varimax" method proposed by Pieczonka (2009).

3. Results and discussion

51 people aged from 18 to 66 took part in the survey. The socio-geographic characteristics of the study participants are presented in Table 1.

Table 1. Characteristics of respondents

Characteristic	Segment	N	%
Sex	Man	235	45,7
	Woman	279	54,3
Age (years)	16-35	179	34,8
	36-50	228	44,4
	>50	107	20,8
Education	Lower than average	65	12,6
	Medium	258	50,2
	Higher	191	37,2
Domicile	Village	234	45,5
	City up to 100 thousand	177	34,4
	A city with over 100,000 inhabitants	103	20,0

Source: own study

Most respondents were women (54.3%). The largest share of the surveyed population, 44.4%, comprised people aged 36-50. Individuals younger than 35 years old made up 34.8% of the total study population, while the age group above 50 was the smallest, comprising 20.8% of the respondents. Regarding educational background, respondents with secondary education were the most numerous, making up over half of the participants. Additionally, a significant portion, 37.2%, held higher education degrees.

Urban residents dominated the study, accounting for 54.4% of the total respondents, with 20% living in cities with more than 100,000 inhabitants. Rural respondents constituted 45.5% of the study population. According to data from the Central Statistical Office, this socio-demographic distribution closely mirrors the structure of Polish society in 2022. Women comprised approximately 52% of the population, and the age distribution was: pre-working age (18.2%), mobile working age (37.1%), non-mobile working age (22.5%), and post-working age (22.2%). Additionally, about 33% of Poles had higher education, and urban residents made up 60% of the population.

Given these statistics, the research sample can be considered representative of Polish consumers of dairy products. Before performing the principal components analysis, preliminary conditions were checked by determining the correlation matrix between the primary variables and calculating Cronbach's alpha index. The correlation matrix indicated that each variable was significantly correlated ($r > 0.3$) with at least three others. The Cronbach's alpha value was 0.91, suggesting a very high reliability of the variables used, surpassing the acceptable threshold of 0.6.

The principal components analysis was conducted separately for men (Table 3) and women (Table 5). For men, three independent areas in their perception of dairy product quality were identified. These three main components were associated with the significance of nearly all assessed qualitative characteristics. The eigenvalues were 6.59, 2.43, and 1.24, explaining 69.1% of the total variance (Table 2).

Table 2. Results of principal components analysis for men (eigenvalues and percentage of explained variance)

Eigenvalue	% of total variance	Cumulative eigenvalue	Cumulative % of total variance
6,59	31,2	6,59	31,2
2,43	23,6	9,02	54,8
1,24	14,3	10,26	69,1

The values of factor loadings are listed in Table 3.

Table 3. Results of the principal components analysis for men (factor loading values)

Characteristic	Main component		
	1	2	3
Freshness	0,855	-0,138	0,307
Taste and smell	0,709	0,135	0,036
Durability	0,719	0,355	0,157
Package size	0,325	0,803	-0,063
Producer	0,166	0,658	0,299
Aesthetic values the product or packaging	-0,124	0,736	0,168
Low fat	-0,046	0,750	0,224
Nutritional value (protein and calcium)	0,397	-0,013	0,689
The presence of health-promoting ingredients	0,266	0,073	0,735
Microbiological cleanliness	0,289	0,104	0,780
Absence of chemical contamination	0,492	0,022	0,657
Absence of chemical additives	0,307	0,016	0,720
Low-calorie content	0,204	0,153	0,851
The naturalness of the product	-0,099	0,225	0,779
Presence of probiotics in the product	-0,074	0,125	0,791
Possibility to follow a diet	-0,006	0,107	0,241
Absence of lactose	-0,121	0,231	0,362
Positive impact on well-being	0,013	0,236	0,483

Source: own study

The three-dimensionality of men's perception of the quality of dairy products confirms the system proposed by Nelson, 1970;1974. Features correlated with the main component 2 can be called search features, distinguishable before purchasing and after reading the information provided on the packaging. The manufacturer presents its logo and informs customers about net weight and fat content. The correlation of the "aesthetic values of the product or packaging" with this main component indicates that men are interested in the aesthetics of the packaging, not the product contained in it.

The first principal component is represented by features that we can call experiential, i.e. those that can be assessed only after opening the package. The most important thing here is freshness. The product's taste and smell characteristics also co-occur with this main ingredient. This is confirmed by the results presented by other authors (Ruiz-Capillas and Herrero, 2021). Most often, the term "fresh product" is associated with high-quality flavour and aroma; defects in the taste or smell of a dairy product inform us about its staleness. This type of association caused men to place durability next to this main component, which suggests that they treat this term as a simple antonym of freshness. (Tan et al., 2020).

According to Nelson's theory, the third area of quality consists of features taken on faith, elusive to the consumer. The results in Table 2 show that the third principal component represents this area. The highest value of factor loading occurs in the case of the parameter called "low caloric value". This indicates that men do not automatically associate the caloric value of a dairy product with the fat content, but - probably - also with other energy ingredients. Several features are also correlated with this main ingredient: nutritional value, associated primarily with the content of protein and calcium, microbiological purity and lack of contamination and chemical additives, and the presence of health-promoting ingredients. Therefore, this is an area that, according to Szczucki, 1970 and Baryłko-Pikielna, 1983; Baryłko-Pikielna and Wasiak-Zys2004, can be called "health", expanded to include the term "functionality" of a food product, introduced at the end of the 20th century. The analysis also indicates that men believe that the product's naturalness is the fundamental guarantee of dairy products' safety and functionality

Pieczonka presented similar results in 2009. In the men's segment, the same areas of quality of dairy products were revealed: a group of experiential features (freshness, organoleptic properties and durability), features taken on faith (nutritional value parameters, health benefits, harmful contaminants and additives, caloric value), a set of search features (packaging features, brand). Comparing the results and results obtained by Pieczonka with your results, it can be concluded that over the last dozen or so years in Poland, men's understanding of the quality and preferences of quality features of dairy products has stabilized.

A slightly different structure - for all food products - is presented in the study by Cichocka and Pieczonka (2004). Research by these authors carried out about 20 years ago showed that there are also three independent groups of quality characteristics in the men's segment, confirming the system Nelson proposed. The differences lie in the correlation of different quality characteristics with each of these areas. Apart from being healthy and safe to eat, the features taken on faith include freshness, ecological safety and a high degree of processing. Taste is accompanied by three availability parameters: time, ease of culinary preparation and packaging functionality. Men, therefore, treat these properties as empirical. Purchasing decisions are made based on the view of the third group of features called search features by the authors: attractiveness of the packaging, compliance of quality with the canons of current fashion, features that allow you to stand out in the environment (Żakowska-Biemans and Kuc, 2009; Żakowska-Biemans, 2011).

Earlier (last decade of the 20th century) research on the processed meat market and the demand for these products, using principal component analysis, showed the consumer structure of the quality of processed meats in accordance with the so-called commodity theory (Baryłko-Pikielna and Wasiak-Zys, 2004; Szczucki, 1970). Both women and men placed the quality characteristics presented in the survey in three areas: health, organoleptic quality and availability.

The conducted research shows that four main components can be distinguished for the women's segment, which are related to the importance of the indicated quality parameters of dairy products. The subsequent eigenvalues were as follows: 5.72; 2.87; 1.55; 1.17. The remaining eigenvalues were lower than 1.0.

The isolated principal components explain 70.7% of the total variance in the results (Table 4).

Table 4. Results of principal components analysis for women (eigenvalues and percentage of explained variance)

Eigenvalue	% of total variance	Cumulative eigenvalue	Cumulative % of the total variance
5,72	31,2	5,72	31,2
2,87	17,6	8,59	48,8
1,55	11,5	10,14	60,3
1,17	10,4	11,31	70,7

The values of factor loadings (rounded ≥ 0.7) allow for the clear assignment of almost all primary variables (except for the positive impact of the consumed product on well-being) to the next main component (Table 5).

Table 5. Principal components analysis results for women

Characteristic	Main component			
	1	2	3	4
Nutritional value (protein and calcium)	0,727	0,050	0,054	0,216
The presence of health-promoting ingredients	0,791	0,012	0,132	0,109
Microbiological cleanliness	0,844	0,045	0,139	0,136
Absence of chemical contamination	0,867	0,119	-0,142	-0,036
Absence of chemical additives	0,837	0,058	-0,073	0,006
The naturalness of the product	0,717	-0,087	0,050	-0,120
Presence of probiotics in the product	0,701	0,168	0,059	0,128
Freshness	0,377	0,693	-0,249	0,051
Taste and smell	0,143	0,853	-0,017	0,072
Durability	-0,123	0,786	0,310	0,043
Aesthetic values of the product or packaging	0,101	0,695	0,218	0,243
Package size	-0,156	0,255	0,763	0,183
Producer	0,192	0,094	0,743	0,035
Low-calorie content	0,267	0,437	-0,079	0,665
Possibility to follow a diet	0,126	0,165	0,041	0,694
Absence of lactose	-0,030	-0,132	0,352	0,700
Low fat	0,088	0,194	0,074	0,838
Positive impact on well-being	0,241	0,354	-0,110	0,331

Source: own study

From women's perspective, dairy product quality has four orthogonal areas. The quality features in these areas independently determine women's preferences and purchasing decisions. The variables related to the nutritional value of dairy products, traditionally understood as a valuable source of animal protein and calcium, correlate with the first principal component. In addition, there are health-promoting parameters and no microbiological or chemical contamination. These are features directly related to the health and functionality of the product (Baryłko-Pikielna, 1983; Baryłko-Pikielna and Wasiak-Zys, 2004). This area can, therefore, be called quality accepted mechanically (without reflection, without thinking). Additionally, it is attributed to the product's naturalness, which emphasises this parameter's importance for women. It should be added that "naturalness" as one of the critical features of food products is increasingly appreciated by the Polish consumer and is sought among regional or traditional products (Ruiz-Capillas and Herrero, 2021).

The taste and smell of the product mainly represent the second principal component. They also coexist with the main components: freshness, durability and those features that can be visually assessed during purchase or after opening the package. Generally, in the opinion of consumers, these features best describe the freshness of a dairy product. This is, similarly to the men's segment, an area covering experiential features, most often assessed after making a purchase immediately before consumption. It should also be noted that women understand the term "aesthetic values of the product or packaging" - unlike men - as the visual features of the product itself, not the packaging.

Two features correlated with main component 3 can be called search features: package size and manufacturer. This suggests that when purchasing dairy products, women are primarily looking for their favourite (proven) brand and the size of the packaging adapted to the current needs of the household.

The fourth main component can be called the dietary value of the dairy product. It consists of low-fat content, the associated low caloric value, and the possibility of consumption when following a specific diet, e.g., lactose-free. Therefore, regardless of the first main component, these features constitute the second group of parameters accepted thoughtlessly.

Analyses previously performed by other authors also showed that women's perception of the quality of food products is more detailed than men's, manifested in the number of isolated latent variables. According to Pieczonka, 2009 women distinguish five areas of the quality of dairy products: sensory quality, safe consumption, protein content, functional features (including calorie content) and price. The analysis of the principal components performed for all food products also proves that women identify five independent groups of quality characteristics: organoleptic characteristics along with freshness, the healthiness of the product along with the presence of functional ingredients, a group of dispositional characteristics that facilitate the use of the product, features of "symbolic" consumption and dietary values (Cichocka and Pieczonka, 2004). Choroszy (2021) put it slightly differently in her study. The author initially distinguished, using cluster analysis, three segments of respondents participating in the survey, and then analysed the main components of the importance of qualitative characteristics within each segment. The first segment deserves special mention here, constituting 70% of the surveyed population, with approximately 85% of this group being women. This segment of the Polish consumer distinguishes six areas of food product quality: features of the nutritional value of the product, health-promoting nature and the ability to influence well-being, symbolic value of the product, freshness including organoleptic features, parameters determining the safety of consumption, and availability features.

A comprehensive assessment of the quality structure should include comparing the importance of individual quality characteristics for separate market segments. Data on this subject relating to the assessed population are summarized in Table 6.

Table 6. Average importance of features

Characteristic	Women	Men	Together
	\bar{x}		
Freshness	6,54	6,32	6,44
Absence of chemical contamination	6,28	6,05	6,17
Taste and smell	6,05	6,13	6,09
Absence of chemical additives	5,94	5,52	5,75
Durability	5,88	5,59	5,73
Naturalness of the product	5,88	5,64	5,73
Nutritional value	5,55	5,29	5,43
Presence of health-promoting ingredients	5,61	5,10	5,37
Microbiological purity	5,54	5,14	5,36
It has a positive impact on your well-being	5,40	5,09	5,25
Presence of probiotics in the product	5,29	4,71	5,02
Possibility to follow a diet	4,94	4,59	4,84
Aesthetic values of the product or packaging	4,52	4,27	4,40
Packaging size	4,46	4,25	4,35
Low calorie	4,40	4,28	4,35
Producer	4,35	4,26	4,31
Low fat content	3,95	3,68	3,83
Absence of lactose	3,60	3,12	3,38

Values in bold differ significantly in the Fisher-Snedecor F test (p<0.05)

Source: own study

All respondents' perceptions of the importance of the quality parameters of dairy products allow for the identification of four groups of these parameters. The first one, with the highest average importance - from 5.7 to 6.4, which can be described as an "essential element (feature)", features characterizing various areas of quality. They include freshness and naturalness, which indicates the existence of a strong demand for regional or traditional dairy products and the interest in purchasing these products directly from the producer (e.g., at local bazaars). The absence of contamination and chemical additives are also essential parameters, which confirms the "chemophobia" of the Polish consumer that has existed for many years. Other significant features are taste and smell, and durability. It seems evident that the respondents indicated the key organoleptic features, such as taste and smell. These parameters were suggested in many other studies as particularly important in consumer perception (Lim et al., 2022). As shown by the statistical analysis, both women and men in the study group emphasize the high importance of dairy products' durability, which seems complicated to achieve when we expect that there will be no chemical additives in these products, which are substances usually associated with preservatives. There is a well-known view in the literature that modern consumers expect durable products free of preservatives, which may be an indication for producers to implement new methods of preserving dairy products other than chemical and thermal preservation. It should be noted that technological progress in food storage and preservation makes it possible to find alternative systems to ensure the safety and durability of dairy products, e.g., high-pressure packing technology and ozonation (Botondi et al., 2023).

The data in Table 4 further confirm the thesis that the importance of features related to the nutritional value and safety of consumption, the health-promoting and dietary value of a food product, or properties affecting the consumer's well-being is higher in the opinion of women than in the opinion of men. The "important" elements - on average from 4.8 to 5.4 - are nutritional value and features that determine the healthiness of the product or the possibility of its use in dietary nutrition. It seems surprising that the nutritional value of the analysed group of products is included among the moderately essential features. According to contemporary nutritional principles, dairy products are crucial, providing primary and supplementary nutrients, including valuable minerals and vitamins. The results indicate a change in the role of dairy products that modern consumers associate with them. Analogous results are presented in reports by other authors (Cichocka and Grabinski, 2009; Niewczas, 2013; Orkusz, 2014; Tijssen et al., 2017; Hanus, 2017; Hoek et al., 2017; Chen and Antonelli, 2020; Choroszy, 2021).

According to Choroszy, 2021, the very structure of perceived food quality among Polish consumers has changed over the last 15 years. Around 2005, Polish women abandoned the three-dimensional quality model to incorporate two additional independent areas: pro-health and symbolic value. Currently, a similar structure of quality is observed among consumers below 50 years of age, both women and men, except that in their case, the emergence of dietary, rather than pro-health, value can be observed.

According to Cichocka and Grabinski (2009), half of those declaring eco-consumption were consumers who do it for health reasons. The mature consumer type in terms of eating behaviour dominates into two groups of eco-consumers: health-motivated and futuristic. Two types of consumers represent ecological motivation: the sceptic and the traditionalist. In turn, Wardle et al. (2004) found that women in almost all 23 countries were more likely than men to avoid high-fat foods, eat fruit and fibre, and limit salt (to a lesser extent). They were also more likely to diet and attach greater importance to healthy eating. As reported by the authors, gender differences in dietary choices may be partly attributable to women's more significant commitment to weight control and partly to their vigorous belief in healthy eating.

Conclusions

1. In the opinion of the Polish consumer, the quality of dairy products is a multidimensional concept. The results cover five areas that independently determine preferences, purchasing behaviour, and eating habits.
2. The most critical areas of the quality of dairy products for both women and men are their nutritional and health-promoting value, which, in the minds of consumers, is shaped by protein and calcium content, microbiological and "chemical" purity, and the presence of probiotic microflora as a functional factor. These features are perceived as critical factors in determining purchasing decisions. According to the nomenclature proposed in marketing literature, quality parameters taken on trust should be considered.
3. A characteristic feature of the structure women perceive is a second set of features accepted on trust. These are the elements that should be called the dietary values of the product (low fat and calorie content, absence of lactose). The perception of these features is independent of the product's nutritional value or functional properties.
4. The research shows that a significant parameter determining the choice of a product is its freshness. Due to the short shelf life of most dairy products, freshness is associated with durability or naturalness. The importance of these three elements and their co-occurrence indicates that the consumer niche looking for regional or traditional dairy products or purchasing directly from the breeder has significantly increased in the Polish market.
5. The main "search" characteristics that determine the choices made when purchasing is the brand (producer) and the packaging, mainly its size. These are not highly important features, indicating that buyers make a purchase automatically, choosing a product from a well-known manufacturer in an optimally sized package.
6. A comprehensive assessment of the consumer quality structure allowed for the identification of 4 groups of these parameters. Consumers considered the elements of the highest importance to be freshness and naturalness, the absence of contamination and chemical additives, as well as durability and significant organoleptic features, taste and smell.

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Funding: The research is financed by the Krosno State Academy of Applied Sciences StanisławPigoń’s Scholarship Fund in the academic year 2023/2024.

Author Contributions: Conceptualization: *Jolanta Baran; Karolina Kowalczyk*; methodology: *Jolanta Baran, author*; data analysis: *Jolanta Baran; Karolina Kowalczyk*, writing—original draft preparation: *Karolina Kowalczyk; Krzysztof Tereszkiwicz*, writing; review and editing: *Karolina Kowalczyk, Jolanta Baran, Krzysztof Tereszkiwicz*; visualization: *Karolina Kowalczyk, Jolanta Baran, Krzysztof Tereszkiwicz*. All authors have read and agreed to the published version of the manuscript.

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