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Tunisian Consumer Quality Perception and Preferences for Dairy Products: Do Health and Sustainability Matter?

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Abstract: Consumer awareness about dairy quality increased in the last years, specifically after recent food incidents worldwide (aflatoxin contamination in Europe, 2013, *E. coli* outbreak in the USA, 2015). In Tunisia, food security and sustainability are at the center of agricultural and food strategies. Therefore, data collected from a face-to-face survey of 214 participants in three cities of Tunisia were analyzed with the aim to identify the general trends of dairy consumption in Tunisia. A factor analysis was conducted to define the way consumers perceive the concept of dairy quality with regards to health and sustainability perceptions. Then, by means of cluster analysis we explore the existence of specific consumer types in relation to dairy quality perceptions, with clear-cut and statistically solid socio-demographic and behavioral profile. Three consumer types were highlighted to evaluate dairy quality, based on different quality dimensions, such as health and sustainability, experience, visible quality, brand name, price and innovation. The results show the emergence of a specific segment of young and older consumers, more educated, and with health and sustainability concerns toward dairy quality.

1. Introduction

In Tunisia, the dairy value chain is a strategic sector that ensures the country's food security. Maintaining food security has required regular interventions by the Tunisian Government at different levels, especially in terms of prices and subsidies. The governance of the dairy chain—which aims to reconcile the economic challenge (preserving producer margins and the consumer purchasing power) has a significant impact on the number of dairy farmers, milk production, collection centers, processing industries, consumption and the quality of dairy products.

The latest national data released in 2017 stated that the dairy sector occupies an important place in the Tunisian economy with a contribution of 11% of agricultural production; 25% of animal production and 7% of the total value of the food industry [1]. The Tunisian agricultural sector relies on 516,000 farms, among them 22% are breeders representing 113,500 farms [2] with 458,000 females [3], including 228,000 pure-breed. The national network is composed of 240 collecting centers (out of which 229 are Hazard Analysis and Critical Control Point (HACCP) certified) representing 60% of the total produced milk [3]. The industrial dairy sector relies on 11 milk plants and 9 milk derivatives production units [3].

The annual consumption of dairy products has evolved significantly over the past 20 years (1995–2015). Data are published through the census survey which is done every

5 years in Tunisia but data from 2020 are not released yet. The annual consumption of milk increased from 40 kg per capita in 1995 to 109.7 kg in 2015. The same increase is observed for yoghurts, where the annual consumption rose from 28 kg per capita in 1995 to 102 kg in 2015. According to the National Institute of Statistics [4], the consumption of dairy products has multiplied by 1.1 for butter, 2.7 for milk, 3.5 for cheese and 3.6 for yogurt from 1995 to 2005. This increase in dairy consumption is due especially to the development of milk processing centers and the modern retail sector. Indeed, 22% of the total dairy products are currently distributed through supermarkets. It is expected to double in the next 10 years to reach 40%, mainly covering the large cities [5].

Despite these modernizations, dairy supply chain actors are not yet interlinked [5] nor do they trade with each other with a supply chain approach to match products to market demands and consumer preferences [6]. A study on the milk value chain in Sidi Bouzid (central Tunisia) revealed the existence of a governance problem that remains strongly linked to the economic and social stakes of this value chain [7]. The organization of the milk collectors, the revision of quality standards, the cost of implementing milk cooling technology, and the liberalization of prices through the abortion of the system of governmental subsidies are all subjects of a conflict of interest between the stakeholders. In this sense, the social pressure of certain actors (milk collectors or collecting centers) pushes public authorities to advantage the quantitative objective over the qualitative aspect [7].

Meanwhile, during the last few decades, an increase in the epidemiological alteration of the Tunisian population has been observed. Illnesses such as hypertension, cancer, diabetes, and obesity-related diseases have been quickly rising [8]. According to the World Health Organization [9], Tunisia occupies the 4th position in the world, with an obesity rate of 30% of its population. The Tunisian Health Examination Survey [10] confirms these findings, declaring that 64.5% of the Tunisian population suffers from overweight, among which 74.4% are women. The same study reveals that 19% of the Tunisians over 15 years old are diabetic, 36.4% have high blood pressure and 5.1% suffer from depression. Poor lifestyles, unhealthy diets, and lack of physical exercise are the main reasons of overweight and obesity, not to mention chronic diseases including cardiovascular, hypertension and diabetes. In addition, the prevalence of digestive disorders in Tunisia is estimated currently to be 65%, up from 47% in 2005 [11].

Confronted with the increase in concerns related to food safety, human health and environmental preservation, Tunisian dairy industries have launched specific products to meet the new demands from consumers. Processing dairy industries have launched an "active health" segment, representing about 7% of the total dairy market value [1]. This segment offers healthy products for consumers: products rich in vitamins, minerals, calcium for children, low-cholesterol products for the elderly, and products that improve food digestion.

With the growing influence of modern retail outlets and the diversification of dairy products, the Tunisian consumer has also developed new concerns related to the quality of the product including safety, well-being and sustainability. These findings are confirmed by different studies on the dairy value chain [4,6,7] but mostly on studies of Tunisian consumers behavior for dairy products [12–15].

The objectives of the present study are threefold: first, to identify the general trends of dairy consumption in Tunisia; second, to define the way consumers perceive the concept of dairy quality; and third, to explore the existence of specific consumer segments with regards to health and sustainability perceptions.

2. Literature Review on Dairy Quality Perception

"Food quality" is a complex term because it can be viewed and evaluated differently by food producers, food manufacturers, food scientists and technologists, food regulators, food marketers and consumers [11]. A useful classification of quality dimensions for food in general, and dairy products in particular, is hedonic, health-related, convenience-related and process-related dimensions [16]. Hedonic quality is related to sensory pleasure and is

therefore mainly linked to taste, smell and appearance. Health-related quality concerns the ways in which the consumption of a product will affect consumers' physical health. Convenience-related quality is related to the time and effort which has to be expended while buying, storing, preparing and consuming the product. Process-related quality refers to characteristics of the production process which consumers are interested in [17].

The importance of food attributes indicates people's motivation underlying their food choices [18,19]. Therefore, insights gained by segmenting consumers based on these important ratings can help to effectively promote healthy and sustainable food consumption [20]. Aschemann-Witzel [21] also differentiates between social orientation and time. She argues that by stimulating healthy and sustainable food consumption, health and sustainability should get priority over (or should be in line with) the more pro-self and short-term attributes (e.g., taste and price) [20].

Sustainable food is food produced by taking into consideration its environmental impact, economic viability and social justice principles [22,23].

Pelletier et al. [24] showed that young people placing higher importance on sustainable food production have generally better quality dietary patterns. Thus, there is a potential overlap between sustainability and a healthy diet. Dairy products are considered healthy including energy, protein, cholesterol, vitamin, calcium and other materials that benefit for human health [25,26]. Indeed, the consumption of dairy products have a positive impact on various diseases such as obesity [27], hypertension [28] type 2 diabetes [29], cardiovascular diseases [30] and cancer [31]. Adding some dairy product to the daily diet can help to get some of the vital nutrients people need.

However, the dilemma about dairy products consumption still exists, whether these products help or harm the consumer's health. In this context, a bunch of studies questioned about the negative effects that can have the dairy consumption on human health [26,32–34]. The intake of milk and dairy products contribute to meet nutrient recommendations and may protect against the most prevalent chronic diseases, whereas very few adverse effects have been reported.

Previous research has shown that consumers give different importance to sustainability-related attributes for different product categories, yet little research has been done to understand differences within the dairy product category [20,35]. Verain et al. [20] found healthiness and sustainability were synergistically perceived by Dutch consumers across a variety of food categories, including the general dairy category.

Recent studies on consumer preferences of sustainable foods focus on food labels, such as organic labels [36,37], ecolabels [38,39], Fair trade labels [36,38], animal welfare labels [40] and local food [41]. Ares and Deliza [42] pointed out that brand was one of the most frequently mentioned items, after flavor, color and shape of the package, that influenced the purchase of nutrition-modified milk desserts. Annunziata and Vecchio [43] found that brand affected the choice of probiotic yogurts among a segment of young Italians with an average level of education, lower probability to engage in healthy eating habits, and low consumption frequency of probiotic dairy yogurt.

To understand the factors that affect the consumers' choice behavior toward dairy products, Rahnamaand and Rajabpour [44] applied the theory of consumption values, which includes the functional values (taste, price, health and body weight), social value, emotional value, conditional value and epistemic value [45,46]. They indicate that functional value, social value, emotional value and epistemic value have a positive impact on choosing dairy products while conditional value did not have a positive impact. They concluded that the main influential factors for consumers' choice behavior toward dairy products included consumers experiencing positive emotion (e.g., enjoyment, pleasure, comfort and feeling relaxed) and functional value, i.e., health. Indeed, emotions can play a leading role in the consumer behavior toward dairy products. In fact, O'Connor et al. [29] found that consumer's emotion had an impact on the level of acceptance by Irish consumers of a hypothetical genetically modified dairy product. Johansen et al. [47] emphasized that some emotions had significant impact on choosing dairy products. Similarly, Sosa et al. [48]

found that positive, negative or neutral emotions have an important role to food choice among half low income and half middle-income women in Argentina.

Functional value is allied to the "perceived utility acquired from an alternative's capacity for functional, utilitarian, or physical performance and is thought to be generated by a product's salient attributes" [46]. The importance of functional benefits such as taste, price, health, and body weight were highlighted in different researches on dairy products (Ares et al. [42]; Cerjak et Tomic [49–54], Haddad et al. [50]; Haas et al. [51], Johansen et al. [47], Lluch et al. [52], Mobley et al. [53]).

Bimbo et al. [54] found that female consumers showed a high acceptance for some functional dairy products, such as yogurt enriched with calcium, fiber and probiotics. Acceptance for functional dairy products increases among consumers with higher diet/health-related knowledge, as well as with aging. Indeed, they found that brand familiarity drives consumers with low interest in health to increase their acceptance and preference for health-enhanced dairy products, such as probiotic yogurts, or those with a general function claim.

Several studies have been published about consumer behavior toward dairy products globally [50,55–58] but few have been done about consumers' behavior toward dairy products in Tunisia [12–15] and about food quality perceptions [59–62].

3. Methodological Framework

Traditionally, most previous surveys of dairy consumption in Tunisia focused on the food system to investigate the factors influencing dairy consumption, with particular emphasis on its fluctuations [60–62]. These surveys used time series data, while their analyses placed limited value toward investigating the influence of prices and incomes on consumer's dairy preferences. However, socio-economic and cultural factors, as well as consumers' personal value, attitudes and perceptions, are considered important determinants of behavior and predictors of consumers' choices of dairy products in international literature [63,64].

3.1. Data Collection and Data Sources

This study is based on data gathered from a questionnaire survey conducted on a sample of 214 households divided equally between three regions of the country (the city of Tunis and its suburbs, the Northwest and Central West regions). The survey was conducted in the downtown of the governorates. Despite the rise in popularity of online and mobile surveys, face-to-face (in-person) interviews remain a popular data collection method. This method allows researchers a high degree of control over the data collection process and environment.

While the survey was intended at first to reach 600 consumers, only half of the sample was interviewed due to the restrictions resulting from the COVID-19 pandemic. Indeed, due to the national Tunisian lockdown in 2020, the enumerators were not able to continue the surveys that started in late 2019.

The questionnaire covered a set of variables that can affect the consumer behavior. Consumer segmentation is performed based on various criteria which characterize the consumer. The questionnaire of the survey is structured into five sections: (1) supply (location, quantity, frequency, budget), (2) segmentation, (3) consumption preferences, (4) quality variables, and (5) socio-demographic and economic variables of the households. For the selected quality attributes, our assumptions focused on 16 variables that we expect to influence consumer behavior and measure their perceptions of quality. These variables belong to three types of quality defined by Ettabti [65]:

1. The "expected quality": It includes the appearance of the product, its color, packaging, brand, name, price, interactions effects with other products (for example milk with juice), and the newness of the product.
2. The "quality of experience": including flavor, freshness and taste.

3. The "quality of belief": represented by sanitary risks, industry risks (risk of contamination), 0% cholesterol, nutritional value, children benefits (positive effects of dairy products in children growth).

Regarding the different values of dairy product consumption, we asked the consumers the following:

- For economic value: "Are the dairy products expensive"? and "Do you generally buy the promotional dairy products"? [66];
- For health value: "Dairy products are healthy", "Dairy products are high in protein and vitamins", "Dairy products are high in calcium and energy", and "Dairy products are beneficial for teeth, bones, etc." [67];
- For social value: "Like most Tunisians, I should buy dairy products", "All my friends buy it for their children", and "Dairy products are an important element of my family's diet" [68];
- For emotional value: "Dairy products consumption is interesting", "Dairy products consumption is an enjoyment", "Dairy products consumption makes me relax", and "Dairy products consumption makes me feel good" [69];
- For informational value: "Before buying, I would like to have some information", and "Before buying I would like to have a lot of information" [70];
- For sustainability value: "I would buy if the product respects the environment", "I would buy if the product respects the health of animals", and "I would buy if the product respects Fair Trade" [70,71].

The sample is stratified according to a number of socioeconomic criteria (Table 1). The questionnaire was addressed to the household heads. Most of the interviewees were men (62.6%) and 68.7% of the sample were married. The marital status is one of the socio-economic variable that can affect the consumer behavior [44,72]. The "age" variable divides the sample into four categories, with predominance for the group between 40 and 50 (35%). The age of the respondents is an important variable in the determination of the consumption of dairy products as it introduces the "health" dimension, the more people get older, the more they become aware of health. Educational level is also a very important criterion for explaining the consumption of dairy products. An educated population is more likely to behave more responsibly in their purchases, especially in terms of the benefits or risks of the consumed food [73,74]. In fact, significant associations were found between socioeconomic indicators and food purchasing. The least educated, those employed in manual occupations and residents of low-income households purchased fewer types of fruit and vegetables, and less regularly, than their higher status counterparts.

Two levels of education are predominant: the high school leavers and those who completed university, representing respectively 33.6% and 43.9%. People who were illiterate represent only 3.7% of the sample, yet nationally this proportion is nearly 19% [44]. Income is an important variable in determining the consumption of dairy products since it reflects the purchasing power of the consumers. Income is well distributed among the different income classes selected, with the exception of those earning less than 500 Tunisian Dinars (TND) corresponding to households whose salary is close to the minimum wage, and which represent only 5.6% of the sample. As of August 2021, the conversion rate from TND to USD is: 1 TND = $0.36). It should also be noted that about 39.7% of the respondents are in the middle classes whose income is between 1000 and 2000 TND. In 2019, the Gross National Income per capita in Tunisia was 3200 USD. This GNI places Tunisia in the lower middle-income countries according to the World Bank atlas method [75].

The "household size" variable shows that 60.3% of the families are composed of at least four individuals and 2.6% of the households are composed of more than five people.

Table 1. Socio-demographic profile of the sample, *N* = 214, %.

Age				
<30	30–40	40–50	>50	
12.1	29.4	35	23.4	
Gender				
Male	Female			
62.6	37.4			
Educational Level				
Illiterate	Primary	High school	University	
3.7	18.7	33.6	43.9	
Personal Monthly Income				
<500 TND	500–1000 TND	1000–1500 TND	1500–2000 TND	>2000 TND
5.6	29.9	24.3	15.4	24.7
Marital Status				
Married	Other			
68.7	31.3			

3.2. Analytical Technique

In order to define the way consumers perceive the concept of dairy quality, the method of Factor Analysis was implemented (SPSS 22.0), with the aim to investigate the existence of underlying dimensions (factors) of dairy quality, as perceived by the sample. Eleven variables measuring consumer perceptions of dairy quality as well as five variables that investigate consumer concern about dairy health and sustainability were used as a basis for the analysis. The 16 selected quality variables were introduced into the database in numerical forms according to a Likert scale ranging from 1 to 5 (1 = "not important at all", 2 = "not important", 3 = "indifferent", 4 = "important", 5 = "very important").

In order to explore the existence of specific consumer types (clusters) within the sample, based on their perceptions about dairy quality, the method of Cluster Analysis was used (SPSS 22.0). The dimensions of perceived dairy quality emerged previously as factors were used as clustering variables. After the hierarchical analysis, a classification analysis (dynamic cloud classification) was performed using the quality dimensions as variables of the analysis. The choice of the groups was based on the significance between the variables and the type of groups. This significance was identified by the ANOVA variance analysis procedure and the chi-square (χ^2) test. The cross-tabulation procedure was then used to identify the profiles of the consumer groups according to their socio-demographic variables and their consumption preferences.

4. Results and Discussion

4.1. Consumer's Behaviour toward Dairy Products

Dairy products are perishable products that require special attention in terms of transport and storage. In Tunisia, the dairy value chain is highly fragmented, and the risks of fraudulent practices are high. Dairy products are generally transported in non-refrigerated trucks, in which the quality of the products can deteriorate, especially in hot weather. In addition, traditional grocery stores, that account for 80% of the total trade of dairy products, are not well equipped to keep dairy products in a favorable atmosphere and there are some vendors who cut electricity at night from refrigerators storing yoghurt, butter and cheese to save energy.

The place of purchase is sometimes perceived as synonymous with quality assurance or trust for dairy buyers. Nearly 62% of the interviewees purchase milk and yogurts from their "favorite" grocery stores, with over half also purchasing cheese (54%) and butter (51%) (Figure 1). This shows the importance of the purchasing place and the relationship

with the sellers. In contrast, about one quarter of the consumers buy from any grocery store, including for milk (26%), yoghurt (25%), cheese (28%) and butter (22%). These are essentially consumers whose purchases are not numerous, they are passing through, and who do not form lasting relationships with a particular vendor. For cheese and butter, purchases from traditional dairy stores are very low (about 3% of the consumers). This type of trade is in continuous decline and has been accelerated by the recommendations of the Ministry of Trade to stop buying unpasteurized milk because of the risks of tuberculosis and brucellosis. The share of the milk supply from supermarkets varies between 22% for butter and 26% for milk. This percentage reflects the small share of supermarkets in the total trade (20%).
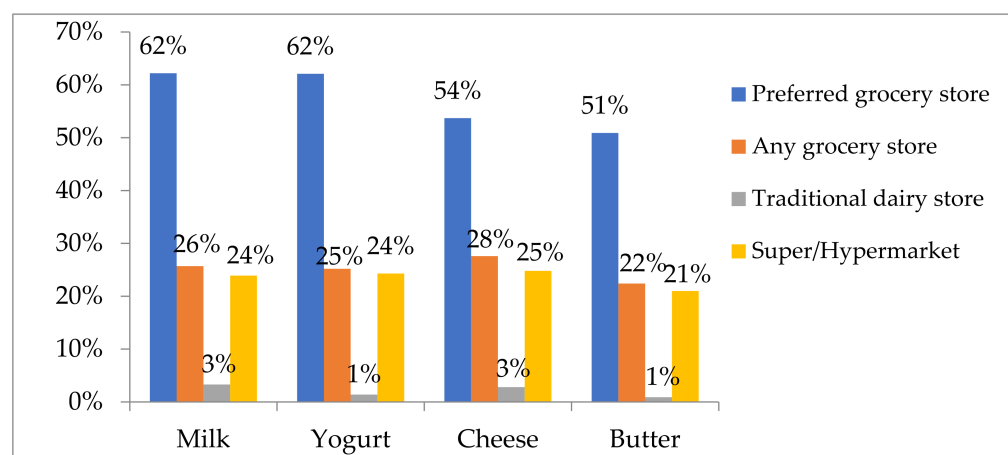

Figure 1. Purchases in different distribution channels per dairy product (%), *N* = 214.

The frequencies of purchase per dairy products are divided into two types according to their degree of consumption (Figure 2). Milk and yoghurt are highly consumed by Tunisian consumers, with a high purchase frequency (67% and 72% of the sample purchasing these goods two to four times a week, respectively). Cheese and butter are less consumed by Tunisians who buy them once a week (49% for cheese and 46% for butter). Moreover, the prices of some cheeses are high compared to the prices of other dairy products, which make them inaccessible to the low-income population. This is illustrated by the fact that 12% of the consumers buy cheese only once a month.
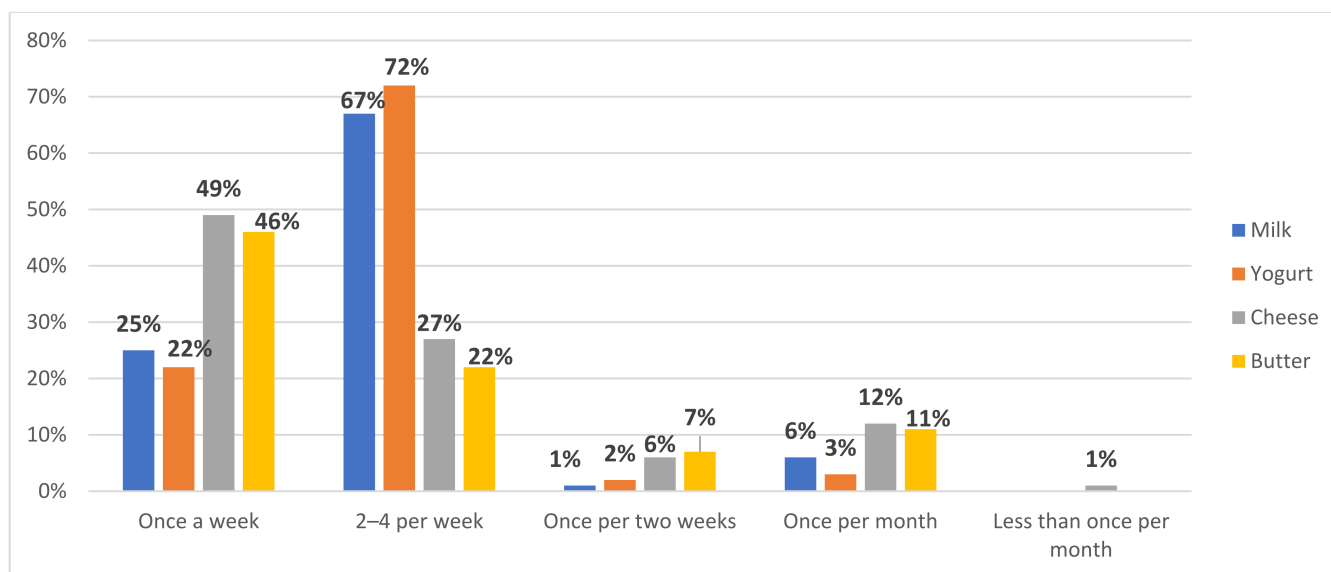

Figure 2. Frequency of purchase per dairy product (%), *N* = 214.

The Tunisian consumer is increasingly aware of the quality of dairy products, thus is paying greater attention to information on the packaging, including the date of manufacture and the deadline for consumption, which encourages him to make several purchases in a week to obtain a better quality product [6]. The design of a package is an important aspect for attracting buyers' attention and for conveying, in addition to information, the anticipation of the product experience [76].

4.2. Development of Cluster Profiles

Five dimensions of quality were identified by the factor analysis, explaining consumers' perceptions of dairy products quality with a cumulative variance of nearly 69% and a Cronbach α greater than 0.682 (Table 2). These dimensions can be explained by the use of the factor loadings of the variables greater than 0.6 (Table 2). The first dimension, "health and sustainability", is determined by attributes related to nutrition, human health (sanitary risks, industry risks, 0% cholesterol, nutritional value, and children benefits). The second dimension "experience" includes attributes of the quality of experience that are essentially related to taste, flavor and freshness after consumption of the product. The third dimension focuses on attributes of visible quality, particularly regarding appearance, color and packaging. The fourth dimension, "brand name", is determined by the brand and appellation attributes. The fifth dimension, "price and innovation", combines the attributes related to price, new products and interaction effects (juice and milk).

Table 2. Factor analysis results of the 16 initial dairy quality attributes (Varimax rotation), $N = 214$.

	Factors				
	Health and Sustainability	**Experience**	**Visible Quality**	**Brand Name**	**Price and Innovation**
Sanitary risks	**0.844**	0.312	0.112	0.198	-
Industry risks	**0.797**	0.179		0.265	−0.352
0% cholesterol	**0.769**	0.255		0.138	-
Nutritional value	**0.745**	0.323	0.145	0.280	-
Children benefits	**0.717**	0.198	0.129	0.247	−0.282
Flavor after consumption	0.241	**0.920**	0.221	0.254	-
Taste after consumption	0.334	**0.878**	0.234	0.242	-
Freshness after consumption	0.344	**0.867**	0.266	0.262	0.217
Appearance	0.150	0.193	**0.889**	0.202	0.204
Packaging	0.148	0.262	**0.862**	0.177	0.231
Color	−0.302	0.260	**0.684**	0.109	0.223
Appellation	0.365	0.209	0.149	**0.914**	-
Brand	0.136	0.311	0.244	**0.907**	0.181
Price	−0.345	-	-	-	**0.737**
New product	-	0.167	0.287	0.171	**0.682**
Interaction effects (milk&juice)	-	0.112	0.291	-	**0.636**
	Factor Statistics				
Eigen values	4.355	2.758	1.501	1.321	1.102
% of variance	27.220	17.240	9.380	8.254	6.885
Cumulative variance	27.220	44.460	53.840	62.094	68.979
Cronbach α	0.830	0.871	0.752	0.798	0.682

To identify the existence of specific clusters, a classification analysis was conducted using the five dimensions of dairy quality. The three-group option was chosen based on the profile of the selected groups and the significance between the analysis variables.

The ANOVA analysis carried out shows the significance of the five groups at *p* < 0.001. In relation to the dimensions of quality, the average scores of the selected groups varies between −0.63 and 0.39 (Table 3). This result confirms the difference between the three clusters in relation to their degree of attachment to the quality dimensions of dairy products. Clusters may look alike for a given quality dimension, but they show significant differences across all dimensions. Cluster 1 is rather "indifferent" to the attributes of the quality of dairy products, with negative scores for most quality dimensions, except for the "price and innovation" dimension (score of 0.24). It includes 49 consumers, representing 22.9% of the sample. Cluster 2 attributes "moderate" scores to the dimensions of the quality of dairy products (scores between 0.24 and 0.52). This group gives more attention to the "experience" and the "price and innovation" dimensions and the least attention to concerns related to health and sustainability. Cluster 3, "health and sustainability concerned" is more concerned with the "health and sustainability" dimension with a score of 0.62. It includes 51 consumers, representing 23.8% of the sample.

Table 3. Description of the three clusters in relation to the importance assigned to the five factors of dairy quality (*N* = 214).

			Consumer Clusters		
			n1 = 49 (22.9%)	n2 = 114 (52.3%)	n3 = 51 (23.8%)
Factors	F	Sig	Indifferent	Moderate	Health and Sustainability Concerned
1. Health and sustainability	91.731	*	−1.217	0.245	0.621
2. Experience	73.946	*	−1.136	0.462	0.058
3. Visible quality	29.543	*	−0.251	0.414	−0.685
4. Brand name	27.837	*	−0.818	0.316	0.080
5. Price and innovation	187.591	*	0.243	0.527	−1.412
Mean	82.129		−0.636	0.393	−0.268

Note: * Statistically significant for *p* < 0.001.

4.3. Socio-Demographic and Economic Characteristics among Consumer Clusters

The three consumer clusters have different socio-demographic and economic profiles (Table 4). Thirteen out of 24 socio-economic variables are significant and related to age, income, educational level, region, number of children, and frequency of purchase.

Cluster 1, "indifferent", gives little importance to the "price and innovation" dimension and does not pay attention to the other dimensions of the quality of dairy products, especially in terms of health and sustainability. This cluster is the least educated with nearly 43% of consumers having a primary level education. It is also a low-income group with 69.4% of its members having an income of less than TND 1000. About 42.9% of the consumers in this group are over the age of 50, which does not justify the assumption that older people are the most concerned about health.

Over half of the consumers in Cluster 1 are from Kef Governorate. Most people in the group are married (69.4%) and 6.1% have more than three children. The frequency of purchase of "twice a week" is high for milk (85.7%) and low for butter (28.3%).

Cluster 2, "moderate", is an intermediate group comprising more than half of the interviewees (52.3%) who assign close scores to all dimensions of the quality of dairy products. It is a group with an average age between 30 and 50 years (77.2%) and a high level of education as 52.6% of its members attended university. Also, it is a balanced group at the income level where 24.6%, 27.2%, 16.7% and 28.9% have respective incomes between 500 and 1000, 1000 and 1500, 1500 and 2000 and higher than TND 2000. The geographical distribution of the consumers is also balanced with 26.3% from the capital and its suburbs, 36% from Kef and 37.7% from Sidi Bouzid. This group is made up of 72.8% of married

people, and 6.1% of them have more than three children. It also has the lowest number of consumers (41.4%) that purchase dairy products "two to four times a week" compared to the other groups.

Table 4. Description of the three clusters in relation to the importance assigned to the socio-demographic variables, frequency and place of dairy products purchase (N = 214, %).

Factors	Sig	Consumer Clusters		
		n1 = 49 (22.9%)	n2 = 114 (52.3%)	n3 = 51 (23.8%)
		Indifferent	Moderate	Health and Sustainability Concerned
Socio-demographic variables				
Age < 30		8.2	12.3	15.7
Age 30–<40	*	20.4	37.7	19.6
Age 40–<50		28.6	39.5	31.4
Age > 50	*	42.9	10.5	33.3
Education				
Illiterate	*	10.2	0.9	3.9
Primary level	*	42.9	13.2	7.8
High school		32.7	33.3	35.3
University	*	14.3	52.6	52.9
Income				
<TND 500 (<$180)	*	14.3	2.6	3.9
500–1000 TND ($180–$360)	*	55.1	24.6	17.6
1000–1500 TND ($360–$540)		16.3	27.2	25.5
1500–2000 TND ($540–$720)		8.2	16.7	19.6
>TND 2000 (>$720)	**	6.1	28.9	33.3
Location				
Tunis (North East)	*	28.6	26.3	56.9
Kef (North West)	*	61.2	36.0	0.0
Sidi Bouzid (Central West)	*	10.2	37.7	43.1
Number of children (>3)	***	6.1	6.1	17.6
Marital status: Married		69.4	72.8	58.8
Gender: Male		63.3	62.3	62.7
Frequency of Dairy Products Purchase (2 to 4 Times/Week)				
Milk	*	85.7	56.1	72.5
Yogurt		79.6	69.3	68.6
Cheese		35.7	22.3	33.3
Butter		28.3	17.8	29.4
Mean		57.3	41.4	50.9

Note: * Statistically significant for $p < 0.001$, ** statistically significant for $p < 0.05$, *** statistically significant for $p < 0.1$ (v^2 tests).

Half of Cluster 3, "health and sustainability concerned", have a higher education level. About one-third (31.4%) are aged between 40 and 50 years, and 33.3% are over 50 years. Compared to the other groups, it has the highest percentage of young people under 30 (15.7%). A quarter of the group has an average income between 1000 and 1500 TND, and 33.3% have an income of more than TND 2000.

High-income consumers generally pay more attention to their health by looking for quality products. Geographically, the regions of North East and Central West represent respectively 56.9% and 43.1% of Cluster 3, while the Northwest region (Kef) is not represented. Cluster 3 is made up of 58.8% of married people, 17.6% of whom have more than

three children. This group has a high purchase frequency (two to four times per week), with a percentage of 72.5% for milk and 33.3% for cheese.

4.4. Description of the Three Clusters in Relation to the Economic, Health, Social, Emotional, Informational and Sustainability Values

To appreciate the consumption preferences of dairy products, the analysis was focused on the "totally agree" point of the scale of Likert. The results found are consistent with the profiles of the consumer segments (Table 5). Cluster 1 focuses on economic values to the extent that nearly 82% of its members have declared that dairy products are expensive and 86.4% are interested in promotional products. This group does not have a great interest in the health dimension as a quality attribute for dairy products (0% for the response "totally agree"). Twenty percent of the consumers declare that their friends buy dairy products for their children and that it is an important part of their diet. The emotional value is very low, with only 2% stating that consumption is an interesting, pleasant or relaxing experience. In terms of sustainability, only 8.2% rate the importance of conserving the environment and animal health, and 12.2% stated that Fair trade, which guarantees small breeders a fair income, was an important factor.

Table 5. Description of the three clusters in relation to consumption preferences ($N = 214$, %).

Factors	Sig	Consumer Clusters		
		n1 = 49 (22.9%)	n2 = 114 (52.3%)	n3 = 51 (23.8%)
		Indifferent	Moderate	Health and Sustainability Concerned
(Strongly Agree)				
Economic Value				
Dairy products are expensive		81.3	50.9	54.9
I generally buy the promotional dairy products		86.4	64.6	55.2
Health Value				
Dairy products are healthy	*	0.0	26.1	63.2
Dairy products are high in protein and vitamins	*	0.0	23.5	70.3
Dairy products are high in calcium and energy	*	0.0	23.5	69.3
Dairy products are beneficial for teeth, bones, etc.	*	0.0	26.3	64.4
Social Value				
Like most Tunisians, I should buy dairy products	**	20.4	36.8	21.6
All my friends buy dairy products for their children	*	18.4	36.8	60.8
Dairy products are an important element of my family's diet	*	20.4	61.9	78.4
Emotional Value				
Dairy product consumption is interesting	*	2.0	32.5	15.7
Dairy product consumption is an enjoyment	**	2.0	13.3	11.8
Dairy product consumption makes me relax		2.0	9.6	7.8
Dairy product consumption makes me feel good	**	0.0	10.5	3.9
Informational Value				
Before buying, I would like to have some information	*	4.1	28.1	35.3
Before buying, I would like to have a lot of information	*	0	5.9	25.4
Sustainability Value				
I would buy if the product respects the environment	*	8.2	25.4	52.9
I would buy if the product respects the health of animals	*	8.2	36.8	70.6
I would buy if the product respects Fair Trade	*	12.2	36.8	78.4

Note: * Statistically significant for $p < 0.001$, ** statistically significant for $p < 0.05$.

Cluster 2 focuses moderately on the different values of dairy consumption. Half of this group reports that the prices of the dairy products are expensive and 64.6% of its members are interested in special offers. A quarter of the consumers thought that dairy products are healthy products, that they provide a lot of vitamins and energy, and are beneficial for the development of bones and teeth. In addition, 61.9% of the consumers thought that dairy products are an important part of the diet, and 32.5% that their consumption is an interesting, pleasant or relaxing experience. Regarding sustainability, a moderate proportion of this group purchases dairy products only if they respect the environment (25.4%), animal health (36.8%) and Fair trade (36.8%).

Cluster 3 focuses on health and sustainability values. More than the half (54.9%) declare that dairy products are expensive. Nearly two-thirds of consumers say that they totally agree that dairy products are healthy products (63.2%), rich in vitamins, proteins, calcium and energy (70%), and that they are beneficial for bones and teeth (64.4%). Regarding social values, 78.4% of the consumers in this group say that dairy products are an important part of their diet. The emotional value for dairy products is not important for this group as only 15.7% say their consumption is an interesting, pleasant or relaxing experience.

Despite the absence of a dairy brand that specifically takes sustainability into account, 52.9% of consumers in Cluster 3 highlight the importance of respect for the environment, 70.6% respect for animal health and 78.4% respect for a Fair trade. One-quarter of this group also looks for information on dairy products prior to purchase. This awareness among Cluster 3 consumers is an important step toward the development of a sustainable high-quality dairy sector [39].

5. Concluding Remarks and Implications

The present study aims to identify the general trends of dairy consumption in Tunisia, define through factor analysis the way consumers perceive the concept of dairy quality, and explore by means of cluster analysis the existence of specific consumer segments through socio-demographic and behavioral profiles with regard to healthiness and sustainability perceptions. The objective of understanding the consumer's perceptions and preferences of sustainable products is to provide crucial information to policy makers to identify the obstacles to the development of such products.

Three consumer types were found to evaluate dairy quality differently, based on different quality dimensions, such as health and sustainability (Cluster 2 and 3), experience (Cluster 2), visible quality (Cluster 2), brand name (Cluster 2) and price and innovation (Cluster 1 and 2). Overall, the survey reveals a clear differentiation between older, less educated consumers on the one hand (Cluster 1) and younger or middle-aged and more educated consumers on the other (Cluster 3). It appears that education (mainly), and then income and age, are the main socio-demographic characteristics that impose different consumer attitudes toward dairy products, especially with regards to healthiness and sustainability perceptions.

Income leads to different Tunisian consumer attitudes toward dairy products, especially with regards to healthiness and sustainability perceptions. Households with monthly incomes higher than USD 720 are most likely to be health and sustainable consumers and those with incomes lower than USD 360 are least likely to be this way [4]. In Tunisia, during 2010–2015, the family's total expenditure of food has increased by 46.52% (USD 402.5 in 2015 against USD 274.7 in 2010). Milk and dairy products accounted for 4.2% of every Tunisian family's total expenditure in 2015 against 5% in 2010 (INS, 2015). One of the important reasons of this situation is the increase of the inflation and the reduction of the household income that have reverse effect on food products consumption especially, dairy products.

Consumers' preference of sustainable dairy products shows that Tunisian consumers' knowledge of sustainable food is limited. Tunisian consumers are making confusion between sustainable dairy products and preserving the environment. They think that the

preservation of the environment, especially using less pesticide for livestock nutrition, is the only way to provide sustainability. The results indicate that consumers have difficulty to fully understand the concept and may thus have difficulty choosing sustainable products even if they are motivated to make sustainable choices. This is consistent with previous studies [38].

The informational value is not important for Tunisian consumers to the extent that only 33% of Cluster 3 would like to have some information before buying. In this direction, consumers expect improved quality of intrinsic attributes (e.g., produce quality) when there is improvement in some of the credence attributes (e.g., better for environment, more socially responsible) [77].

The economic value is important for Tunisian consumers in a way that a large proportion of cluster 3 (almost 55%) consider that dairy products prices are expensive. In Tunisia, the economic crisis since the revolution in 2011 has caused inflation, depression, and stagflation. The results of this situation have been the increased price of food products (i.e., dairy products) and a reduced household income. Hence, the price plays one of the most important role in purchasing dairy products in Tunisia. It is then important for retailers to understand when consumers are willing to buy dairy products regardless of their high price. Grocery retailers could highlight other important benefits of dairy products to those who are willing to pay higher prices. For example, retailers could promote dairy products by featuring how these products contribute positively for health and sustainability (environmental protection, Fair trade and animal welfare) to consumers who would show a willingness to pay the price premiums.

Healthy and sustainable dairy products have been reported as one of the top trends within the Tunisian food industry [1]. The development of these products is expensive and needs special requirements, technological hurdles, legislative regulations, as well as consumer acceptance. However, the studies about Tunisian consumer characteristics, preferences, awareness and knowledge on healthy dairy products are very limited. Based on the study results, the Tunisian manufacturers can develop a novel healthy food and design marketing strategies, which means developing a practical and new approach to attain consumers who want to improve their health, well-being and quality of life.

This paper provides important information for governments and policy makers to promote the demand for healthy and sustainable dairy products. Consumer knowledge and understanding of healthy and sustainable dairy products needs to be improved through public education, awareness campaigns (radio, television, social media, and events). This implementation can be strengthened through the civil society, Non-Governmental Organizations, or international institutions (Food and Agricultural Organization, World Health Organization), etc. The Government should encourage sustainable food consumption and production systems to produce high quality dairy products in an environmental, animal friendly and socially responsible way.

This study has some limitations. The respondents were asked about their broad perceptions of attributes and behavioral intentions toward dairy products as opposed to focusing on a specific product category (e.g., probiotic product). As consumers' expectations and behaviors may differ depending on dairy product categories, future research could investigate more domain-specific attitudes and intentions toward the purchase of various dairy products items. In spite of its relatively limited size, the sample used is comparable to that of other international surveys. Indeed, Gazdecki et al. [78] reviewed the literature concerning the consumer segmentation with regard to sustainable food consumption and found that most of them often lead to distinguish sub-groups allowing the identification of behaviors and motivations, along with an in-depth analysis of the character of attitudes. The sample size of these studies published after 2010 varies between 203 and 2597 consumers. Five studies have nearly the same size as the sample of this study [79–83]. However, the limited sample size due to the COVID-19 pandemic may have reduced the potential of the findings for a better dissemination among the different stakeholders in the Tunisian dairy value chain.

Future research should adopt a larger sample to accurately represent the Tunisian population consumption preferences.

References

1. Interprofessional Group of Red Meat and Milk (GIVLAIT). *Annual Report*; GIVLAIT: Tunis, Tunisia, 2017; 45p.
2. Karray, B.; Boudiche, S.; Ayadi, M.A.; Agrebi, N.; Skandrani, Y. *Mesures Préservant la Filière Agricole et le Bon Fonctionnement de L'industrie Agroalimentaire Face à la Pandémie du COVID-19*; Institut Tunisien des Etudes Stratégiques: Carthage, Tunisia, 2021; Available online: http://www.onagri.nat.tn/uploads/Etudes/ites-covid19.pdf (accessed on 1 March 2021).
3. Food and Agriculture Organization. Analyse des Pertes Alimentaires: Causes et Solutions—Étude de Cas de la Chaîne de Valeur du Lait en Tunisie. 2021. Available online: http://www.fao.org/3/ca7334fr/ca7334fr.pdf (accessed on 1 March 2021).
4. National Institute of Statistics. *Enquête Nationale sur le Budget, la Consommation et le Niveau de vie des Ménages*; Ministère du Développement et de la Coopération Internationale: Carthage, Tunisia, 2015; 127p.
5. Dhraief, M.Z.; Oueslati, M.; Jebali, O.; Ben Salem, M. *Dairy Value Chain Analysis in Sidi Bouzid. INRAT-ICARDA Project*; Technical Report; INRAT-ICARDA Project; INRT: Tunis, Tunisia, 2017; 98p.
6. Soethoudt, H.; Blom-Zandstra, G.; Axmann, H. Dairy value chain analysis in Tunisia: Business opportunities. *Wagening. Food Biobased Res.* **2018**, *1829*, 42. [CrossRef]
7. Zlaoui, M.; Dhraief, M.Z.; Jebali, O.; Ben Salem, M. Analysis of the dairy value chain in Central Tunisia: Challenges and opportunities for a better development. *J. New Sci. Agric. Biotechnol.* **2019**, *63*, 3989–4001.
8. Ammar, A.; Karim, O.A.; Chtourou, H.; Parish, A.; Hoekelmann, A. Prevalence of overweight and obesity and possible effect of intervention program: Tunisian children as model. *Sport Sci. Health* **2015**, *11*, 129–136. [CrossRef]
9. World Health Organization. *World Health Statistics: Monitoring Health for the Sdgs, Sustainable Development Goals*; WHO Library Cataloguing in Publication Data: Geneva, Switzerland, 2016; 136p.
10. National Public Health Institute. *Tunisian Health Examination Survey*; National Public Health Institute: Carthage, Tunisia, 2016; 185p.
11. Leong, S.Y.; Oey, I. Measures of Food Quality. Reference Module in Food Science. Analysis consumers. *Appetite* **2017**, *43*, 135–146.
12. Salah, M.; Boudiche, S.; Ameur, M.; Amara, S.; Bornaz, S. Study of the behavior of the consumer vis-à-vis milk and derivatives and development of the organic milk sector in Tunisia. *J. New Sci. Agric. Biotechnol.* **2015**, *22*, 996–1001.
13. Dhehibi, B.; Laajimi, A. Effects of food prices and consumer income on nutrient availability: An application of the demand for dairy products in Tunisia. *Econ. Agrar. Recur. Nat.* **2009**, *9*, 25–36.

14. Dhehibi, B.; Khaldi, R. Demand and quality index analysis for dairy products in Tunisia: An econometric approach. *Ann. l'INRAT* **2008**, *80*, 151–175.

15. Khaldi, R.; Naili, A. *Dynamique de la Consommation de Lait et de Produits Laitiers en Tunisie. Options Méditerranéennes*; CIHEAM Montpellier: Montpellier, France, 2001; pp. 75–86.

16. Grunert, K.G.; Hartvig Larsen, H.; Madsen, T.K.; Baadsgaard, A. *Market Orientation in Food and Agriculture*; Kluwer Academic Publishers: Boston, MA, USA, 1996; 283p.

17. Grunert, K.G.; Bech-larsen, T.; Bredahl, L. Three issues in consumer quality perception and acceptance of dairy products. *Int. Dairy J.* **2000**, *10*, 575–584. [CrossRef]

18. Grunert, K.G. Foodquality: A means-end perspective. *Food Qual. Prefer.* **1995**, *6*, 171–176. [CrossRef]

19. Onwezen, M.C.; Reinders, M.J.; Van Der Lans, I.A.; Sijtsema, S.J.; Jasiulewicz, A.; Dolors Guardia, M. A cross-national consumer segmentation based onfood benefits: The link with consumption situations and food perceptions. *Food Qual. Prefer.* **2012**, *24*, 276–286. [CrossRef]

20. Verain, M.C.D.; Sijtsema, S.J.; Antonides, G. Consumer segmentation based on food-category attribute importance: The relation with healthiness and sustainability perceptions. *Food Qual. Prefer.* **2016**, *48*, 99–106. [CrossRef]

21. Aschemann-Witzel, J. Consumer perception and trends about health and sustainability: Trade-offs and synergies of two pivotal issues. *Curr. Opin. Food Sci.* **2015**, *3*, 6–10. [CrossRef]

22. United Nations. *Conference on Environment and Development Agenda*; United Nations: New York, NY, USA, 1992; Volume 21, 351p.

23. Yanarella, E.J.; Levine, R.S.; Lancaster, R.W. Research and solutions: Green vs. sustainability: From semantics to enlightenment. *Sustain. J. Rec.* **2009**, *2*. [CrossRef]

24. Pelletier, J.E.; Laska, M.N.; Neumark-Sztainer, D.; Story, M. Positive attitudes toward organic, local, and sustainable foods are associated with higher dietary quality among young adults. *J. Acad. Nutr. Diet.* **2013**, *113*, 127–132. [CrossRef]

25. Dror, D.K.; Allen, L.H. Dairy product intake in children and adolescentsindeveloped countries: Trends, nutritional contribution, and a review of associationwith health outcomes. *Nutr. Rev.* **2014**, *72*, 8–81. [CrossRef] [PubMed]

26. Thorning, T.K.; Raben, A.; Tholstrup, T.; Soedamah-Muthu, S.S.; Givens, I.; Astrup, A. Milk and dairy products: Good or bad for human health? An assessment of the totality of scientific evidence. *Food Nutr. Res.* **2016**, *60*, 32527. [CrossRef] [PubMed]

27. Barrea, L.; Di Somma, C.; Macchia, P.E.; Falco, A.; Savanelli, M.C.; Orio, F.; Colao, A.; Savastano, S. Influence of nutrition on somatotropic axis: Milk consumption in adult individuals withmoderate-severe obesity. *Clin. Nutr.* **2017**, *36*, 293–301. [CrossRef] [PubMed]

28. Gopinath, B.; Flood, V.M.; Burlutsky, G.; Louie, J.C.; Baur, L.A.; Mitchell, P. Dairy food consumption, blood pressure and retinal microcirculation in adolescents. *Nutr. Metab. Cardiovasc. Dis.* **2014**, *24*, 1221–1227. [CrossRef]

29. O'connor, E.; Cowan, C.; Williams, G.; O'connell, J.; Boland, M. Acceptance by Irish consumers of a hypothetical GM dairy spread that reduces cholesterol. *Br. Food J.* **2005**, *107*, 361–380. [CrossRef]

30. Markey, O.; Vasilopoulou, D.; Givens, D.I.; Lovegrove, J.A. Dairy and cardiovascular health: Friend or foe? *Nutr. Bull.* **2014**, *39*, 161–171. [CrossRef]

31. Davoodi, H.; Esmaeili, S.; Mortazavian, A.M. Effects of milk and milk products consumption on cancer: A review. *Compr. Rev. Food Sci. Food Saf.* **2013**, *12*, 249–264. [CrossRef]

32. Dror, D.K. Dairy consumption and pre-school, school-age and adolescent obesity in developed countries: A systematic review and meta-analysis. *Obes. Rev.* **2014**, *15*, 516–527. [CrossRef] [PubMed]

33. Lu, L.; Xun, P.; Wan, Y.; He, K.; Cai, W. Long-term association between dairy consumption and risk of childhood obesity: A systematic review and meta-analysis of prospective cohort studies. *Eur. J. Clin. Nutr.* **2016**, *70*, 414–423. [CrossRef]

34. Story, M.; French, S. Food Advertising and Marketing Directed at Children and Adolescents in the US. *Int. J. Behav. Nutr. Phys. Act.* **2004**, *1*, 1–17. [CrossRef] [PubMed]

35. Bernués, A.; Olaizola, A.; Corcoran, K. Extrinsic attributes of red meat as indicators of quality in Europe: An application for market segmentation. *Food Qual. Prefer.* **2003**, *14*, 265–276. [CrossRef]

36. Sirieix, L.; Delanchy, M.; Remaud, H.; Zepeda, L.; Gurviez, P. Consumers' perceptions of individual and combined sustainable food labels: A UK pilot investigation. *Int. J. Consum. Stud.* **2013**, *37*, 143–151. [CrossRef]

37. Xie, J.; Gao, Z.; Swisher, M.; Zhao, X. Consumers' preferences for fresh broccolis: Interactive effects between country of origin and organic labels. *Agric. Econ.* **2016**, *47*, 181–191. [CrossRef]

38. Grunert, K.G.; Hieke, S.; Wills, J. Sustainability labels on food products: Consumer motivation, understanding and use. *Food Policy* **2014**, *44*, 177–189. [CrossRef]

39. Vlaeminck, P.; Jiang, T.; Vranken, L. Food labeling and eco-friendly consumption: Experimental evidence from a Belgian supermarket. *Ecol. Econ.* **2014**, *108*, 180–190. [CrossRef]

40. Lagerkvist, C.J.; Hess, S. A meta-analysis of consumer willingness to pay for farm animal welfare. *Eur. Rev. Agric. Econ.* **2011**, *38*, 55–78. [CrossRef]

41. Darby, K.; Batte, M.T.; Ernst, S.; Roe, B. Decomposing local: A conjoint analysis of locally produced foods. *Am. J. Agric. Econ.* **2008**, *90*, 476–486. [CrossRef]

42. Ares, G.; Deliza, R. Identifying important package features of milk desserts using free listing and word association. *Food Qual. Prefer.* **2010**, *21*, 621–628. [CrossRef]

43. Annunziata, A.; Vecchio, R. Consumer perception of functional foods: A conjoint analysis with probiotics. *Food Qual. Prefer.* **2013**, *28*, 348–355. [CrossRef]

44. Rahnama, H.; Rajabpour, S. Factors for consumer choice of dairy products in Iran. *Appetite* **2017**, *111*, 46–55. [CrossRef]

45. Sheth, J.N.; Newman, B.I.; Gross, B.L. *Consumption Values and Market Choice*; South Western Publishing Company: Cincinnati, OH, USA, 1991.

46. Sheth, J.N.; Newman, B.I.; Gross, B.L. Why We Buy What We Buy: A Theory of Consumption Values. *J. Bus. Res.* **1991**, *22*, 159–170. [CrossRef]

47. Johansen, S.B.; Naes, T.; Hersleth, M. Motivation for choice and healthiness perception of calorie-reduced dairy products. A cross-cultural study. *Appetite* **2011**, *2011*, 15–24.

48. Sosa, M.; Cardinal, P.; Contarini, A.; Hough, G. Food choice and emotions: Comparison between low and middle income populations. *Food Res. Int.* **2015**, *76*, 253–260. [CrossRef]

49. Cerjak, M.; Tomic, M. Buying motives and trust of young consumers for functional fermented dairy Products: Evidence from croatian students. *J. Int. Food Agribus. Mark.* **2015**, *27*, 177–187. [CrossRef]

50. Haddad, Y.; Haddad, J.; Olabi, A.; Shuayto, N.; Haddad, T.; Toufeili, I. Mapping determinants of purchase intent of concentrated yogurt (Labneh) byconjoint analysis. *Food Qual. Prefer.* **2007**, *18*, 795–802. [CrossRef]

51. Haas, R.; Canavari, M.; Imami, D.; Gjonbalaj, M.; Gjokaj, E.; Zvyagintsev, D. Attitudes and preferences of Kosovar consumer segments toward quality attributes of milk and dairy products. *J. Int. Food Agribus. Mark.* **2016**, *28*, 407–426. [CrossRef]

52. Lluch, A.; Maillot, M.; Clerfeuille, E.; Verger, E.O.; Darmon, N.; Rolf-pedersen, N. The use of individual diet modelling to optimise individual food choices. A focus on dairy products. *Appetite* **2012**, *59*, 631. [CrossRef]

53. Mobley, A.R.; Jensen, J.D.; Maulding, M.K. Attitudes, beliefs, and barriers related to milk consumption in older, low-income women. *J. Nutr. Educ. Behav.* **2014**, *46*, 554–559. [CrossRef] [PubMed]

54. Bimbo, F.; Bonanno, A.; Nocella, G.; Viscecchia, R.; Nardone, G.; De Devitiis, B.; Carlucci, D. Consumers' acceptance and preferences for nutrition-modified and functional dairy products: A systematic review. *Appetite* **2017**, *113*, 141–154. [CrossRef] [PubMed]

55. Ares, G.; Gimenez, A.; Gambaro, A. Understanding consumers' perception of conventional and functional yogurts using word association and hard laddering. *Food Qual. Prefer.* **2008**, *19*, 636–643. [CrossRef]

56. Hatirli, S.A.; Ozkan, B.; Aktas, A.R. Factors affecting fluid milk purchasing sources in Turkey. *Food Qual. Prefer.* **2004**, *15*, 509–515. [CrossRef]

57. Olynk, N.J.; Ortega, D.L. Consumer preferences for verified dairy cattle management practices in processed dairy products. *Food Control* **2013**, *30*, 298–305. [CrossRef]

58. Utami, H.D. Consumer behavior toward goat milk and its processed products in malang, Indonesia. *J. Int. Agribus. Mark.* **2014**, *26*, 1–12. [CrossRef]

59. Dhraief, M.Z.; Oueslati, M.; Dhehibi, B.; Chemak, F. Effects of demographic and economic characteristics of consumers on the meat quality perception in Tunisia. *New Medit* **2016**, *15*, 36–41.

60. Dhraief, M.Z.; Oueslati, M.; Dhehibi, B. Income, education and age effects on meat and fish demand in Tunisia. *Int. J. Food Agric. Econ.* **2013**, *1*, 1–12.

61. Dhraief, M.Z.; Ameur, M.; Khaldi, R. Consumer's segmentation according to their fresh fish quality perception in Tunisia. *New Medit* **2011**, *10*, 49–55.

62. Dhraief, M.Z.; Khaldi, R. Analyse de la qualité perçue des viandes par le consommateur Tunisien. *New Medit* **2012**, *11*, 33–40.

63. Funk, A.; Sütterlin, B.; Siegrist, M. Consumer segmentation based on stated environmentally friendly behavior in the food domain. *Sustain. Prod. Consum.* **2021**, *25*, 173–186. [CrossRef]

64. Sautron, V.; Péneau, S.; Camilleri, G.M.; Muller, L.; Ruffieux, B.; Hercberg, S.; Méjean, C. Validity of a questionnaire measuring motives for choosing foods including sustainable concerns. *Appetite* **2015**, *87*, 90–97. [CrossRef] [PubMed]

65. Ettabti, A. La perception de la qualité de la viande rouge fraîche par la ménagère marocaine. *New Medit* **2005**, *4*, 27–31.

66. Lee, H.J.; Yun, Z.S. Consumers' perceptions of organic food attributes and cognitive and affective attitudes as determinants of their purchase intentions toward organic food. *Food Qual. Prefer.* **2015**, *39*, 259–267. [CrossRef]

67. Rozenberg, S.; Body, J.J.; Bruyère, O.; Bergmann, P.; Brandi, M.L.; Cooper, C.; Devogelaer, J.P.; Gielen, E.; Goemaere, S.; Kaufman, J.M.; et al. Effects of Dairy Products Consumption on Health: Benefits and Beliefs—A Commentary from the Belgian Bone Club and the European Society for Clinical and Economic Aspects of Osteoporosis, Osteoarthritis and Musculoskeletal Diseases. *Calcif. Tissue Int.* **2016**, *98*, 1–17. [CrossRef] [PubMed]

68. Han, H.; Hsu, L.; Sheu, C. Application of the theory of planned behavior to green hotel choice: Testing the effect of environmental friendly activities. *Tour. Manag.* **2010**, *31*, 325–334. [CrossRef]

69. Sweeney, J.; Soutar, G. Consumer perceived value: The development of a multiple item scale. *J. Retail.* **2001**, *77*, 203–220. [CrossRef]

70. Nocella, G.; Kennedy, O. Food health claims—What consumers understand. *Food Policy* **2012**, *37*, 571–580. [CrossRef]

71. De Graaf, S.; Van Loo, E.J.; Bijttebier, J.; Vanhonacker, F.; Lauwers, L.; Tuyttens, F.; Verbeke, W. Determinants of consumer intention to purchase animal-friendly milk. *J. Dairy Sci.* **2016**, *99*, 8304–8313. [CrossRef]

72. Yilmaz-Ersan, L.; Ozcan, T.; Akpinar-Bayizit, A. Assessment of socio-demographic factors, health status and the knowledge on probiotic dairy products. *Food Sci. Hum. Wellness* **2020**, *9*, 272–279. [CrossRef]

73. Turrell, G.; Hewitt, B.; Patterson, C.; Oldenburg, B.; Gould, T. Socioeconomic differences in food purchasing behaviour and suggested implications for diet-related health promotion. *J. Hum. Nutr. Diet.* **2002**, *15*, 355–364. [CrossRef]
74. Vlismas, K.; Stavrinos, V.; Panagiotakos, D.B. Socio-economic Status, Dietary Habits and Health-Related Outcomes in Various Parts of the World: A Review. *Cent. Eur. J. Public Health* **2009**, *17*, 55–63. [CrossRef] [PubMed]
75. World Bank Data. 2021. Available online: https://data.worldbank.org (accessed on 1 April 2021).
76. Clark, E.A.; Duncan, S.E.; Hamilton, L.M.; Bell, M.A.; Lahne, J.; Gallagher, D.L.; O'Keefe, S.F. Characterizing consumer emotional response to milk packaging guides packaging material selection. *Food Qual. Prefer.* **2021**, *87*, 103984. [CrossRef]
77. Labrecque, J.; Doyon, M.; Bellavance, F.; Kolodinsky, J. Acceptance of Functional Foods: A Comparison of French, American, and French Canadian Consumers. *Can. J. Agric. Econ.* **2006**, *54*, 647–661. [CrossRef]
78. Gazdecki, M.; Gory 'nska-Goldmann, E.; Kiss, M.; Szakály, Z. Segmentation of Food Consumers Based on Their Sustainable Attitude. *Energies* **2021**, *14*, 3179. [CrossRef]
79. Palmieri, N.; Forleo, M.B. The potential of edible seaweed within the western diet. A segmentation of Italian consumers. *Int. J. Gastron. Food Sci.* **2020**, *20*, 100202. [CrossRef]
80. Annunziata, A.; Mariani, A.; Angela, M. Consumer Perception of Sustainability Attributes in Organic and Local Food. *Recent Pat. Food Nutr. Agric.* **2018**, *9*, 87–96. [CrossRef]
81. Vanhonacker, F.; van Loo, E.J.; Gellynck, X.; Verbeke, W. Flemish consumer attitudes toward more sustainable food choices. *Appetite* **2013**, *62*, 7–16. [CrossRef]
82. Van Huy, L.; Chi, M.T.T.; Lobo, A.; Nguyen, N.; Long, P.H. Effective Segmentation of Organic Food Consumers in Vietnam Using Food-Related Lifestyles. *Sustainability* **2019**, *11*, 1237. [CrossRef]
83. Hasanzade, V.; Osburg, V.-S.; Toporowski, W. Selecting decision-relevant ethical product attributes for grocery shopping. *Manag. Decis.* **2018**, *56*, 591–609. [CrossRef]