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Dairy Product Consumption and Preferences of Polish and Taiwanese Students—NPD Case Study

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Abstract: The present study determined the consumption and preferences of dairy products, especially fermented products, in respect of Polish and Taiwanese students, through their answers to seven research questions (RQs) as part of the design process. The research for the study was conducted in two countries: in Poland at WULS and in Taiwan at NCHU. Two-hundred students in total (19–25 years old) were selected for the study. Responses to the research questions were collected using Paper & Pen Personal Interview (PAPI). The results indicate that Taiwanese students were less likely to declare consuming dairy products daily compared to Polish students ($p < 0.0001$). Poles declared consuming dairy products every day, or once or several times a week, while Taiwanese declared several times a week or several times a month. A total of 89% of Polish students indicated milk as their most commonly consumed dairy product, followed by yoghurts (80%) and ripened cheeses (69%). A total of 95% of Taiwanese students also mentioned milk as their most consumed dairy product, then yoghurt (especially drinking yoghurt) (81%), milk desserts (70%) and Yakult (69%). In the case of fat content preference in yoghurt, Poles significantly preferred yoghurts with regular fat content, while Taiwanese significantly preferred fatty yoghurts ($p < 0.0001$). The most common characteristic of yoghurt that influenced Polish students' purchase decisions was its composition, followed by its consistency, appearance and its sour taste. However, for Taiwanese, the most important factors were the consistency, price and sweetness of the yoghurt. Polish students were significantly more willing to pay a higher price for a dairy functional product than Taiwanese students ($p = 0.0009$). The responses obtained show differences and similarities in the preferences and consumption of these products between Polish and Taiwanese students. The results of this study were used to direct the next stage of the project's development research, the goal of which was to develop a functional dairy product that meets the preferences of consumers.

Keywords: dairy product; yoghurt; preference; consumption; Taiwanese; Poles; NPD



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1. Introduction

The HPA (Health Promotion Administration, Ministry of Health and Welfare) in Taiwan, in its recommendations for dairy consumption, recommends that its citizens consume “a glass of milk twice a day” [1]. In contrast, due to Taiwan's limited milk production and dependence on imported milk, the average availability of milk in Taiwan is only 0.6 servings per person per day [2]. Taiwanese dairy consumption above one serving per day causes resistance among Taiwanese due to cultural barriers, but also socioeconomic barriers, as indicated by the results of dietary trend and balance analyses conducted in Taiwan in consecutive years [3]. In contrast, in Poland, according to the recommendations of the Pyramid of Healthy Eating and Physical Activity, adults are advised to consume at least 2 glasses of milk daily, with the possibility of replacing milk with other dairy products such as kefir or yogurt, or partially replacing milk with cheese [4]. As far as the

consumption of milk and dairy products in Poland is concerned, in the case of milk, its consumption is decreasing. Thus, in 2004, Poles consumed 4.6 liters of milk per person, whereas in 2018, the figure was only 2.94 liters of milk per person. In the case of yoghurt, however, the situation is reversed. In 2004, Poles consumed 0.35 kg of yoghurt per person, while in 2018 yoghurt consumption increased to 0.52 kg per person. The consumption of butter and cheese and curd is the most stable among Poles. Poles consume 0.37 kg of butter and 0.87 kg of cheese and curd per person per month [5].

For the consumption of dairy products in Asia, it is worth referring to historical analyses that indicate a tradition of fermented milk consumption in South Asia and various Asian regions, while changes occurred after the Second World War, when the most consumed dairy products were fresh milk or imported milk powders [3]. Asians are generally lactose intolerant [3], which to some extent affects the consumption of dairy products in Asia, including Taiwan. The problem of lactose intolerance, resulting from the physiological loss of lactase activity [6], is becoming increasingly common worldwide [7,8], whereas large variations in lactose intolerance are evident between regions [8]. Lactose intolerance is estimated to occur in 30% of adults in Poland [6,7]. Based on a meta-analysis by Storhaug [8], the estimated prevalence of lactose malabsorption syndrome in Poland was as high as 43% and in Taiwan was 88%. More and more lactose-free and lactose-reduced dairy products are available on the market to meet consumers' needs [7]. Among dairy products, yoghurt is the most popular fermented milk drink [9–11]. Despite its lactose residue, it is considered by most consumers around the world to be an excellent source of nutrients and health-promoting ingredients [12]. Many studies have proven the increased digestibility of lactose in yogurt compared to milk and other dairy products without live bacterial cultures, and therefore it does not cause discomfort in people with lactose intolerance [13]. According to Gao et al. [14], moderately increasing the daily intake of yoghurt, cheese and other dairy products, especially low-fat dairy products, can help prevent type 2 diabetes (T2DM). Furthermore, a study conducted by Shin et al. [15] on a group of middle-aged Koreans suggests that by consuming dairy products on a daily basis we can protect ourselves from developing metabolic syndrome, particularly abdominal obesity. Yogurt is considered a functional product due to its properties [9,10]. As defined by Diplock and co-authors [16], "A food can be regarded as functional if it is satisfactorily demonstrated to affect beneficially one or more target functions in the body, beyond adequate nutritional effects, in a way that is relevant to either improved state of health and well-being and/or reduction of risk of disease. A functional food must remain food and it must demonstrate its effects in amounts that can normally be expected to be consumed in the diet: it is not a pill or a capsule, but part of the normal food pattern".

In Asian countries, the promotion of coffee and tea with milk, along with yoghurt, has undoubtedly had an impact on increasing the consumption of dairy products [3]. There is an upward trend in the consumption of dairy products as Asian consumption patterns and diets become more westernized [17]. In addition, the growing consumer interest in functional food [18] has led food manufacturers to pay more attention to designing functional foods that meet consumer expectations and preferences. In the design process of new food products, a very important stage is to verify whether the designed product meets the needs of the consumer before it is commercially available [18–20].

The high proportion of consumers with lactose intolerance in Taiwan and Poland (88% and 43%, respectively) [8], cultural differences [3], availability of raw material [2] and high prices of dairy products, especially in Taiwan compared to Poland, may influence lower consumption of these nutritionally valuable products. However, based on the rich experience in dairy production in Poland and the increasing awareness of the nutritional and health-promoting value of fermented dairy products, especially in Taiwan [17,18], offers high hopes for increasing their consumption. Developing a functional dairy product that meets the expectations of consumers in both countries is a challenge, and this study aimed to facilitate this task. Therefore, before starting the stage of designing a new dairy functional product dedicated to young consumers in Poland and Taiwan, a pilot study

was conducted to verify the consumption of dairy products as well as the preferences of students from Poland and Taiwan, by posing research questions (RQs).

There are only a few studies that discuss preferences and consumption of dairy products in Taiwan or Poland, but there is no study that includes both countries and verifies consumption among young consumers (students), and would be a step in the design process for designing a functional dairy product dedicated to a specific group of consumers. The following research questions were posed in order to obtain the necessary information and fill the research gap:

- RQ1 How often do Taiwanese and Polish students consume milk-based products?
- RQ2 Which milk-based products do Taiwanese and Polish students consume most often?
- RQ3 How often do Taiwanese and Polish students consume yogurt?
- RQ4 What characteristics of yogurt influence the decision to purchase yogurt by Taiwanese and Polish students?
- RQ5 What fat levels in yogurt are preferred by Taiwanese and Polish students?
- RQ6 Does the price of yogurt influence the decision to purchase yogurt by Taiwanese and Polish students?
- RQ7 Would Taiwanese and Polish students be more willing to pay for functional dairy products?

Some of the results discussed in this paper were presented at the 2nd International Electronic Conference on Foods—Future Foods and Food Technologies for a Sustainable World and the Proceeding Paper.

2. Materials and Methods

The research for the study was conducted in two countries during the period 2017–2018: in Poland at the Department of Human Nutrition, Warsaw University of Life Sciences, and in Taiwan at the Department of Animal Science, National Chung Hsing University. One hundred students (19–25 years old) from each of the two universities (200 in total) were selected for the study, and each had a basic education and knowledge of food and nutrition from their program of study, which was crucial in selecting them for evaluation. Responses to the research questions were collected using Paper & Pen Personal Interview (PAPI). All individuals agreed to participate in the study and were consumers of dairy products. In preparing the survey, reliance was placed on the knowledge and experience of academic experts from both universities to ensure the validity and relevance of the research. The self-designed survey included demographic questions (such as age, gender, home economic condition), as well as questions related to the consumption frequency of dairy products by Polish and Taiwanese students and the frequency of yoghurt consumption (every day, several times a week, once a week, several times a month, once a month, occasionally or never), the most frequently consumed dairy products (multiple-choice answers from the products indicated), and preference for fat content in yoghurt (fat-free, low-fat, regular fat, fatty, it doesn't matter to me). The questionnaire was also used to verify the influence of the price of yogurt on the decision to purchase it by Polish and Taiwanese students (yes, no), and to provide information on the willingness of Polish and Taiwanese students to pay more for functional dairy products (yes, rather yes, neither yes nor no, rather no, no). In addition, using five-point Likert scales (1—least important, 5—most important), ten characteristics of yogurt affecting the decision to purchase it by Polish and Taiwanese students were measured [21].

Statistical Analysis

Statistical analysis of the results to determine the relationship between consumers was performed using the χ^2 test using Statistica version 13.3 (TIBICO Software Inc., Palo Alto, CA, USA).

3. Results and Discussion

The survey included 57 men and 43 women from Taiwan and 21 men and 79 women from Poland. The students taking part in the survey were between the ages of 19 and 25 (Table 1).

Table 1. Sample characteristics ($n = 200$).

Sample Characteristic		Poland (%)	Taiwan (%)
Gender	Male	21	57
	Female	79	43
Age	19–25	100	100
Economic situation	Very good	11	2
	Good	53	10
	Average	34	82
	Bad	0	5
	Very bad	2	1

Polish students mostly described their wealth situation as good, while Taiwanese students mostly described it as average (Table 1).

3.1. Dairy Consumption Frequency

Based on the data obtained (Table 2), Taiwanese students were less likely to declare consuming dairy products daily (14%) compared to Polish students (39%). A total of 43% of Polish students declared consuming dairy products several times a week and only 13% declared once a week. Taiwanese students were most likely to report consuming dairy products several times a week (60%) or several times a month (20%). Among consumers surveyed, there were no responses that they never consumed dairy products, or consumed them occasionally or once a month.

Table 2. Dairy consumption frequency.

Frequency of Dairy Product Consumption	Poland (%)	Taiwan (%)	p -Value *
Every day	39	14	<0.0001
Several times a week	43	60	0.0161
Once a week	13	6	0.0913
Several times a month	5	20	0.0013

* Test χ^2 .

Frequency of dairy product consumption depended on consumers' country of origin and Polish students were significantly more likely to consume dairy products daily than Taiwanese consumers ($p < 0.0001$), who consumed them only several times a week or a month (Table 2). The high frequency of consumption of dairy products among Poles was also observed in a study by Grębowiec and Korytkowska [22]. A total of 33% of Polish respondents indicated consuming dairy products "several times a day" and 29% reported "several times a week". In Taiwan, the trend is different. The highest intake of dairy is reported in school children (49.3%), the elderly (43.6%) and adolescents (32.1%), while the intake is low in middle-aged people at 22.2–25.9% [2].

The lower consumption among Taiwanese is confirmed by the NAHSIT (Nutrition and Health Surveys in Taiwan) survey conducted on 4771 participants in Taiwan (2005–2008), which shows that 45.4% did not eat dairy. In 25% of cases this was due to physiological limitations (diarrhea, 22%; bloating, 2.9%; constipation, 1.3%). In contrast, more than half of the study participants stated that dairy was not part of their diet due to "lack of habit" (32.2%), "reluctance" (17.1%), "lack of adequate time" (10.3%) or "lack of courage" (7.1%). However, 3% of the respondents cited the high cost as a reason for not consuming dairy products (especially those living in the eastern region and indigenous people) [2]. As indicated by a study conducted in Taiwan [3], low or moderate dairy intake, less than one

serving per day, is accepted by about half of Asians who are lactose intolerant. It was found that those who consume dairy at this frequency gain an advantage over those who consume dairy products with less frequency or not at all in terms of mortality and morbidity [3].

3.2. Most Commonly Consumed Dairy Products

A total of 89% of Polish students indicated milk as their most commonly consumed dairy product (Figure 1), followed by yoghurts and ripened cheeses (80% and 69% of indications, respectively). Further products frequently indicated by consumers were typical Polish dairy products: cottage cheese (52%), quark (45%) and cream cheese (42%). Among the dairy products indicated were also Greek-type yoghurt (38%), cream/sour cream (37%), blue cheese (36%), kefir (28%) and homogenized cheese (24%). Less frequently, Polish students indicated consumption of melted cheese (14%), buttermilk (13%), flavored milk (7%), condensed milk (3%), milk desserts (3%) and powdered milk (1%).

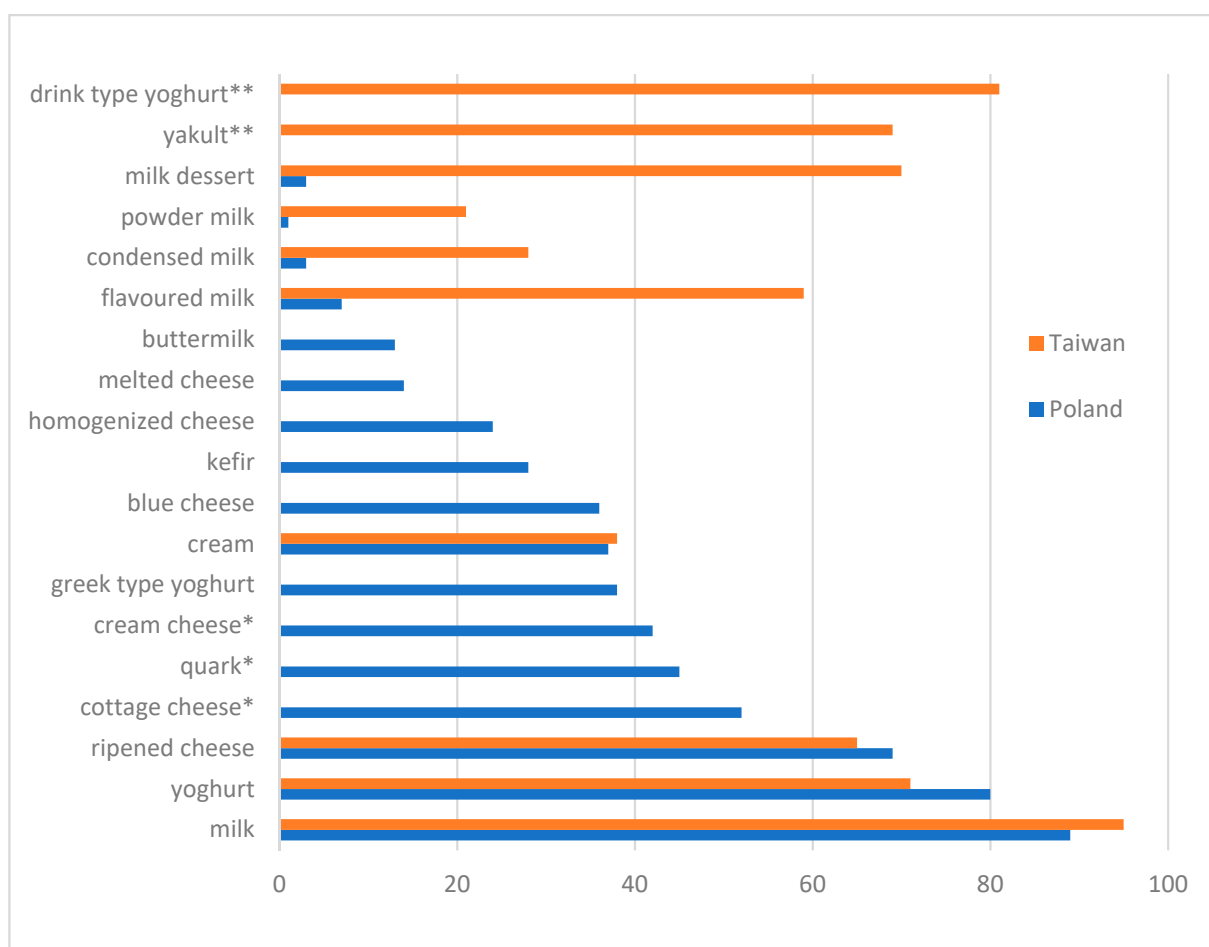


Figure 1. Most commonly consumed dairy products (%) (* products typical for Poland, ** products typical for Taiwan).

A total of 95% of Taiwanese students also mentioned milk as their most consumed dairy product (Figure 1). Then, the most popular products were yoghurt (71%), but especially drinking-type yoghurt (81%). Drinking-type yoghurt was singled out from the “yogurt” product category due to its very high consumption and Taiwanese consumers not treating it as the same product as yogurt in a cup with a solid consistency, to be eaten with a spoon. Other dairy products indicated by the Taiwanese were milk desserts (70%), Yakult (69%), ripened cheese (65%) and flavored milk (59%). Yakult (milk drink with *Lactobacillus casei* Shirota) is a probiotic product very well known in Japan and Taiwan (more than

50 years on the market) [23] but is not available on the Polish market. Less frequently, Taiwanese indicated consumption of cream (38%), condensed milk (28%) and powdered milk (21%). The rest of the products shown in Figure 1, which were indicated by Poles, are not available on the Taiwanese market and were therefore not indicated by the Taiwanese.

In the case of respondents from both countries, most of them indicated consumption of milk and yoghurt. The choice of dairy products on the Polish market is enormous, so we can see that among the wide assortment there are dairy products more and less frequently chosen and thus more and less preferred by Polish students. Taiwanese dairy products almost all exhibited high and medium popularity; this may indicate a high demand for dairy products in the country even though there is a low supply [3]. A 2008 USDA report reminds us that Taiwan does not produce enough milk to make dairy products from it in commercial quantities, so the availability of these products is limited [24].

Yogurt and kefir were among the most frequently consumed fermented products among Polish respondents, which is confirmed by Krasnowska and Salejda's [25] study conducted with Polish students. According to this study, students also consumed yogurt and kefir most frequently among fermented beverages. Jäder [26] identifies yellow-ripened cheese as the cheese most frequently chosen by students from among the cheeses available on the market. The IODIT source also confirms that milk and fermented beverages are the products most frequently purchased in Taiwan [27]. However, from the data on the consumption of the surveyed Taiwanese students, milk powder differs from the New Post data from 2015, where the consumption of this product is at the same level (2017) as ripened cheese—about 30,000 tons per year [28]. Grębowiec and Korytkowska [22] pointed to the low frequency of consumption of dairy desserts (including ice cream) among Poles—35% of consumers declared buying them only a few times a month. Differences in the consumption of dairy desserts may also be due to the specific consumption habits of different foods prevailing in given countries [29]. Hsu and Lin [30] indicate that milk, flavored milk and yoghurt account for 90% of the total dairy market in Taiwan. If we look at the data from 2004 to 2018 on the consumption of dairy products in Poland, we can see that consumption habits have changed significantly. During this period, there was the greatest increase in the consumption of yoghurt (+48.6%), milk (+34.9%) and ripened and processed cheese (+23.5%), while there was a decrease in the average monthly consumption of milk with a fat content below 3.2% (−50.5%), condensed milk (−50.0%), whole milk (−21.2%), cream (−18.8%) and cottage cheese (−17.0%) [31]. In 2019, the average Pole drank 225 liters of milk, and this was a higher figure compared to the previous year [32]. Figures for annual global fluid cow's milk consumption in 2020 (in 1000 metric tons) [33] show that India consumed the most cow's milk in the world in 2020, drinking over 81 million metric tons. The next highest milk consumption was in the European Union, at 33.4 million metric tons. In contrast, the figure was 476 metric tons in Taiwan.

3.3. Frequency of Yoghurt Consumption

Yoghurt consumption by the surveyed students was at different levels in both countries (Table 3). Polish students declared that they consume yogurt at least once a week (22%) or several times a week (44%) and some of them even every day (9%), while in the case of Taiwanese students, yogurt consumption was limited to several times a month (33%) or occasionally (41%) (Table 3). There were no replies from consumers surveyed that they had never consumed yoghurt. Frequency of yogurt consumption was also dependent on the country of origin of consumers. Polish students were significantly more likely than Taiwanese students to consume yogurt daily ($p = 0.0299$), several times a week ($p < 0.0001$), or once a week ($p = 0.0119$). Taiwanese, however, declared consuming yoghurt occasionally.

Table 3. Yoghurt consumption frequency.

Frequency of Yoghurt Consumption	Poland (%)	Taiwan (%)	<i>p</i> -Value *
Every day	9	2	0.0299
Several times a week	44	9	<0.0001
Once a week	22	9	0.0119
Several times a month	23	33	0.1152
Once a month	2	6	0.1489
Occasionally	0	41	<0.0001

* Test χ^2 .

Kowalczyk and Szymański [34], in their study on innovation in the yogurt market, asked Polish respondents about the frequency of yogurt consumption. As many as 20.4% consumed yoghurt daily. If the frequency of consumption of at least once a week is taken into account, the results are similar in both studies at 75% and 79.6%.

In Europe, particularly in Germany and France, yoghurt is regularly consumed as part of the everyday diet. However, data from the period 2015–2017 indicate the highest per capita yoghurt consumption in Sweden and the Netherlands (33.4 kg and 30.5 kg, respectively). Yogurt consumption is also increasing in all Asian countries, e.g., in the period 2015–2017 the highest yogurt consumption per capita was reported in Japan, South Korea and Thailand (6.2 kg; 3.2 kg; 1.6 kg, respectively), while in other Asian countries yogurt consumption is very low or negligible [18]. According to a report on the monthly yoghurt consumption per capita in Poland for the period 2000–2020, the average Pole drank 570 mL of yoghurt per month in 2020, a significant increase compared to 2000, when monthly yoghurt consumption was 330 mL [35].

3.4. Characteristic of Yoghurt Influencing Purchase Decision

The most common characteristic of yoghurt that influenced Polish students' purchase decision was its composition, followed by its consistency (4.3, 4.1 out of 5, respectively) (Figure 2). The next attributes that Polish respondents paid attention to were, in turn, the appearance of yogurt (3.7) and the taste of yogurt, especially sour (3.6) and then sweet taste (3.4). Price was also important, with an average score of 3.4 out of 5. Favorite brand and packaging were less important for choosing a fermented dairy product such as yogurt (2.9 and 2.8 points, respectively). Features such as country of origin (2.4) and advertising (1.7) were less important to Polish students when buying yoghurt (Figure 2).

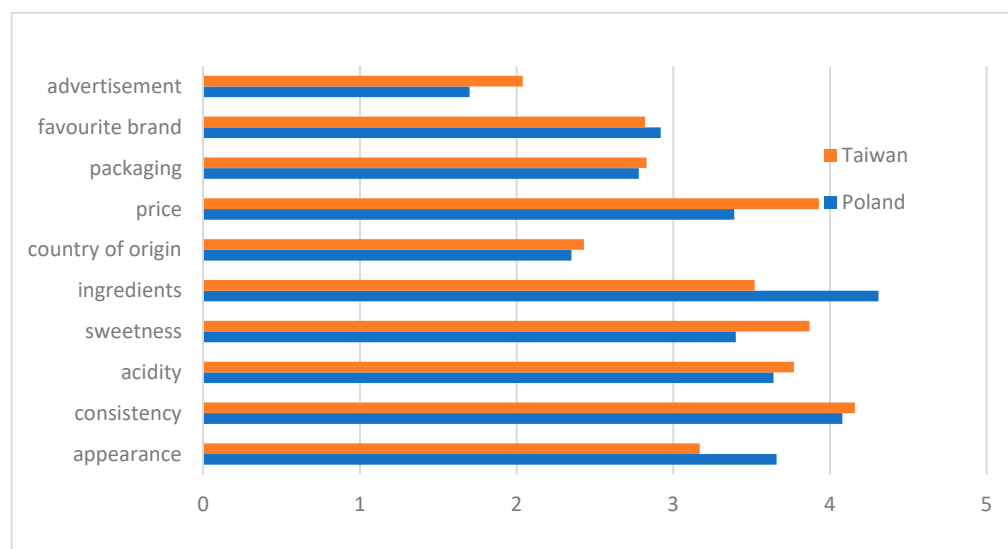


Figure 2. Characteristics of yoghurt influencing the decision to purchase it (1–5 scale: 1—least important, 5—most important).

Respondents were characterized by high nutritional awareness and knew the importance of ingredients on food choices. However, other studies [22,26] indicate other features as the most important in choosing dairy products—e.g., sensory impressions (taste, smell) and one of the least important—advertising. Nowak et al. [36], in a study of consumer preferences of fermented dairy beverages conducted on the inhabitants of Wrocław in Poland, indicated the characteristics of taste, brand and price as the 3 most important when Poles make purchases, and some of the least important characteristics were nutritional value, quality and shelf life.

For Taiwanese students, factors such as consistency (4.2 out of 5), price (3.9) and sweetness (3.9) and sourness (3.8) of yoghurt were the most important determinants of the yoghurt purchase decision (Figure 2). The ingredients and appearance of the yoghurt were fairly important differentiators for these consumers, scoring an average of 3.5 and 3.2 out of 5, respectively. The rest of the differentiators, such as packaging, favorite brand and advertising were rated below 3.0 (2.8, 2.8, and 2.0 out of 5, respectively) (Figure 2). Authors Hsu and Lin [30], in a study on fluid milk consumption and attributes in Taiwan, showed similar results for taste without differentiating between sour and sweet taste (4.0), and price (3.7), while divergent results (higher) were obtained for the attribute ingredients 3.8 and favorite brand 3.7. In terms of price, the Taiwanese in 2000 set its validity at 3.7, similar to the rating in the survey [37].

3.5. Fat Content Preferences in Yoghurt

Differences in results also emerged for the preference of fat content in yoghurt by Polish and Taiwanese students. Among Polish respondents, yoghurt with regular fat content was the most preferred (53% of indications) followed by low fat content (22% of indications). For the rest of the Polish respondents, fat content in yoghurt did not matter (15%) or they chose fatty (5%) or non-fat yoghurt (5%) (Table 4).

Table 4. Preferences for fat content in yoghurt.

Fat Content Preferences	Poland (%)	Taiwan (%)	<i>p</i> -Value *
Fat-free	5	7	0.5515
Low-fat	22	14	0.1409
Regular fat	53	22	<0.0001
Fatty	5	57	<0.0001
It doesn't matter to me	15	0	<0.0001

* Test chi².

Taiwanese students' preferences for the fat content of yoghurt were different from those of Polish students. A total of 57% of Taiwanese students preferred fatty yoghurt and only 22% preferred regular fat yoghurt. Low-fat yoghurts were chosen by 14% of Taiwanese students and fat-free yoghurts by 7%, making a total of 21% (Table 4). In the case of fat content preference in yoghurt, a dependence on the country of origin of consumers was also noted. Poles significantly preferred yoghurts with regular fat content ($p < 0.0001$), while Taiwanese significantly preferred fatty yoghurts ($p < 0.0001$).

The fat in yoghurts is responsible for the texture of the yoghurt [38], so Taiwanese consumers for whom texture, especially the consistency, was the most important feature in choosing yoghurts preferred fatty yoghurts. One solution to produce yoghurt with high nutritional value, sensory characteristics and textural properties comparable to yoghurt with a higher fat content is the addition of inulin. Inulin can be used in dairy products as a prebiotic and also as a substitute for fat and sugar [18,39,40]. A study conducted in Poland on yogurt innovation showed that for 24% of Polish respondents, fat content was important, while sensory characteristics (taste and smell) were the most important (84% of indications), followed by shelf life (64% of indications) [22].

3.6. Yoghurt Price Influencing Purchase Decision

Table 5 shows the answers given by Polish and Taiwanese students to the question about the influence of yoghurt price on the decision to buy it.

Table 5. Yoghurt preference depending on the price.

Price and Yoghurt Preferences	Poland (%)	Taiwan (%)	<i>p</i> -Value *
Yes	65	88	<0.0001
No	35	12	<0.0001

* Test χ^2 .

When asked if they were guided by price when choosing yoghurt, most respondents said yes. Taiwanese indicated this answer in 88% of cases, while for Poles the figure was 66% (Table 5). The frequency of the Taiwanese indications differed significantly from what the Poles indicated ($p < 0.0001$). This confirms the answer given about the influence of price on the purchase of yoghurt, where the price was an important factor for the respondents. Yoghurt selection among Poles and Taiwanese is influenced by similar features, but to a different extent. This is due to differences in the offered assortment and different prices of dairy products. When buying yoghurts, Taiwanese are primarily guided by the consistency; this may be due to the limited selection available in their market. These yoghurts are of a solid consistency and do not differ noticeably between brands/companies, unlike Polish yogurts, which can be more liquid, semi-liquid or more solid. Price also influenced the purchase decision differently among consumers. Yoghurt prices in Poland and Taiwan are very different. Polish yoghurt costs 8 PLN/kg [41], while Taiwanese yoghurt costs 39 PLN/kg [42], nearly 5 times more, with consumers having quite similar earnings and expenses. Due to the different availability of milk products and yoghurt, the frequency of yoghurt consumption differed between countries. Poles consumed yoghurt more frequently. Despite the low consumption of yoghurt, interest in fermented dairy products in the Asian market is increasing.

3.7. Preparedness to Pay More for Functional Milk Product

The responses given by Polish and Taiwanese consumers on their preparedness to pay more for functional milk products are summarized in Table 6. When asked about their willingness to pay more for functional milk products, Polish and Taiwanese consumers said 18% had no opinion, while among Polish consumers 71% agreed to pay more and only 11% felt no need to pay more for such products. In contrast, 25% of Taiwanese consumers were unable to pay a higher price for functional dairy products, while 57% agreed they would pay more (Table 6).

Table 6. Preparedness to pay more for functional milk products.

Willingness to Pay More for Functional Food	Poland (%)	Taiwan (%)	<i>p</i> -Value *
Yes	27	9	0.0009
Rather yes	44	48	0.5703
Neither yes nor no	18	18	1.0000
Rather no	6	15	0.0351
No	5	10	0.1794

* Test χ^2 .

Willingness to pay a higher price for the dairy functional product was also dependent on students' country of origin. Polish students were significantly more likely to pay a higher price for the dairy functional product than Taiwanese students ($p = 0.0009$). When comparing the answers to this question with the answers given about the influence of given features on yoghurt purchase by Poles, they constitute a good, open group of buyers for functional food, in contrast to the Taiwanese. The latter 57% agreed to pay more

for functional products, but price was one of the most important factors for them when choosing dairy products. Tomaszewska et al. [43] cite the results of the On Board PR Ecco Network report, which indicate that 64% of Polish respondents said they were ready to pay more for high-quality food products and 75% of the Poles surveyed were trying to eat healthily.

Functional foods are developing in many food categories, but the products that dominate the global functional foods market are dairy products, cereals, functional beverages and confectionery. In the US and Japan, functional beverages dominate with a 60% share of the total market; cereal products account for 20% of the market. In the US, functional dairy products represent 30%. In Europe, dairy products have a 60% total market share and cereal products have a 30% share [44]. According to a report by Adiuvo Investment, in Japan the market share of dairy products in functional foods is growing by 14.5% per year, followed by snacks, bars and takeaways by 14% and sports nutrition by 9% per year.

The Chinese and Indian markets are growing dynamically, with increasing sales of functional products. In China, the increases include energy drinks at 29% per year, milk and dairy drinks growing 20.4% per year, and confectionery growing 10.9% per year [45]. Initially, functional foods developed were fortified with vitamins and minerals such as vitamin E, vitamin C, iron, calcium and folic acid or zinc [46]. The focus then shifted to foods fortified with omega-3 fatty acids, soluble fiber and phytosterols to prevent disease, including cancer, or maintain good health [47]. As a result, food producers have made further efforts to develop new food products that provide multiple health advantages in one product [48]. One of the best-selling and growing groups of functional foods are products that improve gut function—probiotics and prebiotics [49–51]. Based on a study conducted by Rakuten Insight in 2019 on the types of functional beverages tried by Taiwanese consumers, 68% of Taiwanese have consumed fermented and probiotic beverages, such as raw apple cider vinegar drinks or kombucha tea, which contribute to gut health. In contrast, less than 14% said they never tried any functional drinks [52]. If we consider the results of another study on the most popular types of functional drinks in Taiwan by gender, we see that 72% of women and 61% of men in Taiwan said they consumed fermented and probiotic drinks, such as kombucha tea or drinks with raw apple cider vinegar added [53]. Meanwhile, if looking at the consumption of fermented beverages by age of Taiwanese, it was reported that about 70% of respondents aged between 35 and 44 years old claimed to consume fermented and probiotic beverages such as drinks with raw apple cider vinegar or kombucha tea. In addition, 62% of Taiwanese over the age of 54 confirmed this statement [54].

The research reported in this paper is a preliminary study conducted by our two units in Poland and Taiwan to develop a functional dairy product acceptable to consumers in both countries. Following the NPD procedure, it started with a consumer survey in both countries using the Paper & Pen Personal Interview (PAPI) method. The methodology is similar to the one we used to check trends in the use of sensory analysis by the food industry in the EIT Regional Innovation Scheme countries, with the difference being that in this case an online survey was conducted [20].

Based on the results, yoghurts were developed and evaluated by the Taiwanese and then in Poland (the study has not been published yet). Then, the method was improved and an innovative dairy product based on tea infusion was developed, and the results of this experiment were published [9]. Improvements to the product continued with the addition of inulin as a probiotic and texturizing substance, and these results were also published [18,55]. This research is also a case study of an interdisciplinary approach to the design process, where researchers from two different countries joined forces to create a common food product.

4. Conclusions

The results obtained make it possible to provide answers to the research questions (RQs) posed, which are necessary to take the next steps in the process of designing a functional dairy product.

RQ1 asked about the consumption frequencies of dairy products by Taiwanese and Polish students. Based on the data obtained, Taiwanese students were less likely to declare consuming dairy products daily (14%) compared to Polish students (39%). Poles declared consuming dairy products every day, once or several times a week, while Taiwanese declared several times a week or several times a month.

Thus, RQ2 allowed us to describe the dairy products most often consumed by Taiwanese and Polish students. The results show that 89% of Polish students indicated milk as their most commonly consumed dairy product, followed by yoghurts and ripened cheeses (80% and 69% of indications, respectively). As many as 95% of Taiwanese students also mentioned milk as their most consumed dairy product. Other products they indicated were yoghurt (especially drinking-type yoghurt) (81%), milk desserts (70%) and Yakult (69%). Based on these results, it can be concluded that yogurt, just after milk, is one of the dairy products most frequently consumed by Polish and Taiwanese students.

In addition, RQ3 allowed us to obtain detailed information on the frequency of yogurt consumption by Taiwanese and Polish students. Polish students declared that they consume yogurt most often several times a week (44%) or at least once a week (22%), and some even daily (9%), while in the case of Taiwanese students, yogurt consumption was limited to several times a month (33%) or occasionally (41%).

The objective of RQ4 was to identify the characteristics of yogurt that influence the decision to purchase it by Taiwanese and Polish students. The most common characteristic of yoghurt that influenced Polish students' purchase decision was its composition, followed by its consistency, then the appearance of the yoghurt and its sour taste. For Taiwanese students, factors such as consistency, price and sweetness of the yoghurt were the most important determinants of the yoghurt purchase decision.

RQ5 concerned Taiwanese and Polish students' preference for fat content in yoghurt. Among Polish respondents, regular fat yoghurt was the most preferred (53%), followed by low fat (22%). In contrast, 57% of Taiwanese students preferred fatty yoghurt, and only 22% preferred yoghurt with a regular fat content.

The purpose of RQ6 was to verify the influence of the price of yogurt on the decision to buy it by Taiwanese and Polish students. Both Polish and Taiwanese students confirmed that yoghurt price has an influence on their yoghurt purchase (66% of Polish and 88% of Taiwanese students, respectively).

Question RQ7 provided information on the willingness of Taiwanese and Polish students to pay more for functional milk products. The results show that among Polish consumers, 71% agreed to pay more for functional milk products and only 11% felt no need to pay more for such products. In contrast, 25% of Taiwanese consumers were unable to pay a higher price for functional dairy products, while 57% agreed that they would pay more.

The answers obtained to the above research questions on the consumption and preferences of dairy products (especially fermented products) among the surveyed students from Poland and Taiwan showed differences and similarities in preferences and consumption of these products between the students. The obtained research results made it possible to direct the next phase of project research, aimed at developing a functional yogurt with high sensory quality and corresponding to consumer preferences [9,18,55].

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