

## New Variant of Cottage Cheese – Use of the Design Thinking Method

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### Abstract

**Aim:** In today's dynamically developing food market, manufacturers face numerous challenges. In the dairy sector there is a growing interest in innovative products that can interest and attract consumers. The aim of the work was to develop a new variant of cottage cheese using the design thinking method.

**Methodology:** The method used emphasises placing the consumer at the centre of the design process and taking into account their needs and preferences. The correct implementation of this method includes several stages: understanding the consumer's needs, identifying problems, generating ideas, prototyping and testing.

**Results:** As a result of the conducted research, the target group was determined and a new product was designed, namely cottage cheese with the addition of pumpkin mousse with a hint of cinnamon. The product was positively assessed during the organoleptic evaluation and recognised as a novelty.

**Implications and recommendations:** The presented research results suggest that work on innovative food products should be continued, both in terms of the use of commonly known and completely new varieties of plant raw materials with high sensory values for consumers.

**Originality/value:** The product proposed in this paper is a novelty among the assortment available on the market. The application of the design thinking method to the development of cottage cheese with the addition of vegetables as a sweet addition is the first attempt of this type.

**Keywords:** food design, design thinking, cottage cheese

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## 1. Introduction

The European Union is the world's second producer of dairy products after India (FAO, 2023). There is an annual increase of about 0.5% in milk production in the EU. In Poland, the consumption of milk and dairy products has been growing since 2006. This is the result of an increase in the supply of dairy products, a more attractive product range, an improvement in the income situation of the population, changes in lifestyle and related eating habits, and actions taken to popularise the consumption of this group of products (European Commission, 2024). However, the consumption of cow's milk, including milk intended for processed products except butter, in 2023 reached the level of 276 litres per inhabitant and was 87 litres higher than in 2010 (GUS, 2024). The Polish dairy market is versatile and offers a wide range of cheeses, including cottage cheese which has a delicate and creamy consistency and its grains are immersed in sweet cream. Cottage cheese is a source of protein, calcium and other nutrients found in milk. It is popular due to its naturalness and the possibility of using it in many dishes. Producers offer cottage cheese with the addition of fruit, lactose-free or with reduced fat content. The cottage cheese market is constantly developing, taking into account the growing demand for products with a unique character. Analysis of consumer preferences and market trends can be crucial for companies operating in this industry.

Design thinking is an approach to solving problems and creating innovative solutions focusing on user needs. It is a method that originated in the field of design, but has also been applied to other areas, such as business, education, and social development. The application of design thinking in the context of food research is relatively new. By integrating the consumer not only as a validator but as a starting point for innovation, the food design thinking (FDT) approach can benefit innovation in this field. Additionally, FDT also offers other advantages in the creation and improvement of food products, as it is claimed to promote faster results through rapid prototyping and a more practical approach (Castanho et al., 2024).

A key element of design thinking is understanding users' needs, preferences and expectations. In the case of food products it is important to understand what their nutritional, dietary, taste and cultural preferences are. Exploration and research can help understand their needs and set the direction for product development (Olsen, 2015).

Generating ideas for innovative products encourages creative thinking and the creation of new products. In the context of food products, there is the opportunity to explore different ingredients, flavours, production technologies and packaging forms to introduce innovative solutions that will stand out on the market (Gadzała & Lesiów, 2019).

In the food industry, prototyping and testing ideas early in the process is equally important. In the case of food products, it is possible to create prototypes of flavours, packaging, labels, and even create preliminary versions of products to see how they react to potential customers. The test results are a valuable source of information for making improvements (Von Thienen et al., 2014). Design thinking promotes collaboration across teams and disciplines. In the case of food products, these could include teams responsible for R&D, production, packaging design, marketing, and sales. Collaborative work and diverse perspectives contribute to better solutions (Von Thienen et al., 2014). FDT helps create innovative, attractive and useful products that meet consumer needs and expectations. Focusing on users, exploration of different solutions and testing in practice contribute to success in the competitive food market (de Paula et al., 2022).

The aim of the study was to develop a new variant of cottage cheese based on the design thinking method. The scope included the following stages: empathy, definition, idea generation, prototyping and testing. A survey was conducted to identify the needs and preferences of consumers. Then, through consultations in the group using the brainstorming session, it was specified what would constitute an innovative product based on the current market trends, needs and survey results. The last stage of the study was to prepare a prototype of the previously developed innovation and subject it to sensory evaluation.

## 2. Methodology

### 2.1. Materials

To prepare the product prototype, the following ingredients were used: cottage cheese (The District Dairy Cooperative in Piątnica), butternut pumpkin (*Cucurbita moschata*) purchased at a local market in Wrocław, ground cinnamon (McCormick Polska S.A.), salt (Cenos Sp. z o.o.), acacia honey (Pszczelarz Kozacki – Apiary Tadeusz Kozak) and juice squeezed from a lemon purchased at a local market in Wrocław.

### 2.2. Methods

The design thinking method was used to achieve the intended research objective. According to its assumptions, in the initial phase of introducing a new product to the market, the needs and requirements of consumers should be identified. The empathy stage consisted of conducting a survey in a group of 102 people. The survey consisted of 26 questions, four of which left respondents free to answer, and in the remaining ones they selected answers. The first part of the survey was a data sheet containing information such as: gender, age, place of residence and professional status. The next questions concerned a wide range of information related to the tastes, preferences and expectations of consumers. This information was obtained using questions from the following categories: awareness of dairy products, awareness of market trends, consumption of cottage cheese, brand awareness, use of the product, importance of the origin of the raw material/product, taste preferences, purchase intentions, importance of opinions and recommendations, openness to innovations in dairy products and preferred additives and ingredients. Based on the results of the survey, the main target group and their needs regarding the innovative product were defined.

A brainstorming session was used to implement the next stage aimed at generating ideas. Creativity and an unconventional approach to the problem were the foundations of this process. Ten participants in the brainstorming session were encouraged to freely express their ideas, without fear of evaluation or criticism. The brainstorming participants were students, four men and six women aged 21-24.

At the prototyping stage, the butternut pumpkin was washed, seeded and then cut into pieces weighing approximately 30 g (510 g in total). The prepared raw material was heat-treated at 180°C for 30 min, and after cooling, the pumpkin was peeled and then blended into a puree of 478.45 g. Salt, lemon juice, acacia honey and cinnamon were added to the resulting pumpkin puree.

As part of the testing stage, a sensory evaluation of the prototype was carried out by a group of 12 panelists. The organoleptic evaluation was performed on a simple five-point hedonic scale. The study was conducted in accordance with PN-EN ISO 8586:2023-10. Each participant received an evaluation questionnaire, sent online, and a product prototype for tasting, and they were informed about the purpose of the study and the rules for completing it. In order to cleanse their taste buds, the participants were given a glass of water at room temperature. The room in which the study was conducted was free of odours and quiet so as not to distract from the evaluation. The study was conducted in the morning, and the room was evenly lit. The panelists were asked to assess the color, smell, consistency, texture, sweetness, saltiness and sourness of the product, as well as to assess the intensity of the cinnamon flavor in the product and the overall taste of cottage cheese with pumpkin. The question was also asked whether the respondent would decide to buy the proposed product and whether he or she considered it to be an innovative product.

## 3. Results and Discussion

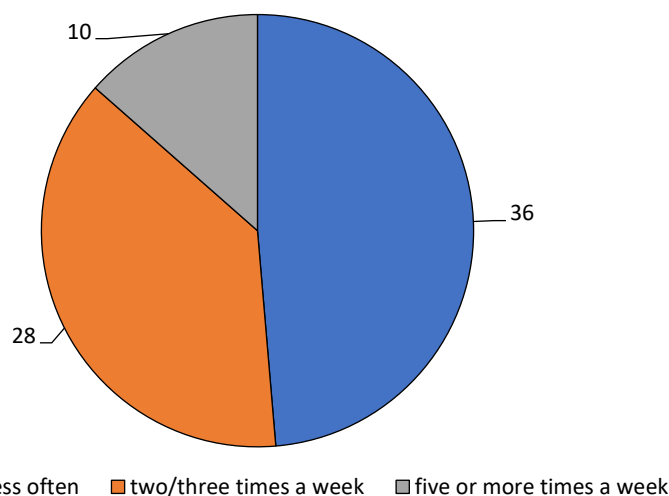
The empathy-assessing stage was carried out by conducting a survey in which important issues for the further course of the experiment were raised. The survey was voluntary and anonymous. The question about the consumption of cottage cheese was crucial at the initial stage of data analysis. Almost two-

-thirds of the respondents answered that they consumed cottage cheese, and over 65% were between 18 and 26 years of age (Table 1), with the majority of the respondents being women (56%). In the group of male respondents 75% declared their consumption of cottage cheese, which is 5% more than in the group of women. The respondents living in cities with up to 50 thousand inhabitants consumed cottage cheese most often, more than five times a week (Figure 1). The smallest percentage of the respondents were residents of cities with 50 thousand to 150 thousand inhabitants, where half of this group consumed cottage cheese. The largest group among the respondents were from cities with more than 500 thousand inhabitants, of whom 57% consumed cottage cheese once a week or less often, whereas the remaining respondents ate cottage cheese two/three times a week (35%) or more than five times a week (8%). Regarding their professional status, more than half were students (63%), of whom one-third also did casual work, and all of the respondents from this particular group included cottage cheese in their diet. Fewer than 30% of the respondents declared having permanent employment, consuming cottage cheese up to three times a week. The rest were unemployed people and pensioners and/or recipients of social benefits who occasionally consumed cottage cheese.

**Table 1.** Age of the respondents in relation to cottage cheese consumption and the content of the survey question

Age of respondents	Question: Do you eat cottage cheese?	
	Yes, I do ( <i>n</i> = 75)	No, I do not ( <i>n</i> = 27)
<18	4	2
18-26	47	20
27-36	7	2
>37	17	3

Source: own research.



**Fig. 1.** Regularity (expressed in numerically) of cottage cheese consumption

Source: own research.

Among the survey participants those who declared that they consume cottage cheese, 49% used this product once or less often during the week, 27% two or three times a week, and the rest five or more times a week (see Figure 1). The answers to the open question regarding the reason for limiting the consumption of cottage cheese provided a lot of valuable information. First of all, the reason were the taste preferences of the respondents, because almost one-third did not like the taste of cottage cheese, mentioning the unusual consistency and texture, which they definitely did not like. They also drew attention to the high salt content, a factor that definitely discouraged them from eating cottage cheese. Some people gave up eating dairy products due to allergies. Cottage cheese consumers were also asked to provide their rationale, and for 41% the protein content was the main factor encouraging them to

consume cottage cheese. Gym users considered this dairy product an essential part of a workout regime, while for others it is a component of a ketogenic diet, and for some just a tasty snack. The reasons why consumers eat cottage cheese are in line with global consumer trends such as the growing concern for health and healthy eating, an active lifestyle and a passion for sports (Mickiewicz & Volkava, 2022).

In general, when asked about knowledge of trends in the dairy market, and more than half of the respondents (59%) answered that they were aware of such trends. Additionally, 65% of people from this group were between 18 and 26 years of age. The remaining part of all the survey respondents (41%) declared that they were not familiar with the subject of current trends in the market. A similar issue was the question about consumers' knowledge of dairy products currently available on the market, where cottage cheese and its types were particularly highlighted. The vast majority, over 80% of the respondents, were aware of the range of cottage cheeses available in stores. This is a positive result, especially in times of growing consumer interest in plant-based substitutes for animal milk (Antoshchenkova & Kravchenko, 2022).

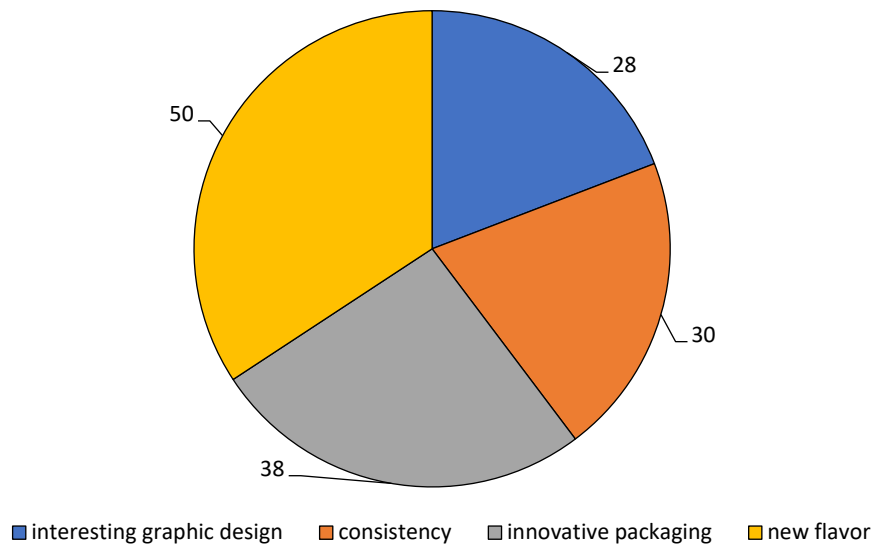
When examining the frequency of consumption of cottage cheese over the course of a week, a question was also asked about factors that could increase the frequency of consumption. Some respondents stated that they could not find anything specific that could change this, and these were also those who had been eating cottage cheese frequently so far. However, those who consumed cottage cheese rarely, not at all, or occasionally, mentioned the following factors, namely "more flavour variations" and "availability of cottage cheese based on goat's or plant milk", noting that there are no interesting alternatives for them on the market.

Note that many catering companies delivering daily meals do not include cottage cheese in their menus, which affects the frequency of eating cottage cheese by clients using, for example, box diets. The respondents also drew attention to the product's composition – according to them, the salt content should be much lower, and the protein content could be even higher.

The research showed that 47% of the respondents chose well-known cheese brands, and 53% declared interest in new, lesser-known brands. Interestingly, these were usually people who mentioned the factor of new flavour variations as a factor that could increase the frequency of their consumption of cottage cheese. It can be concluded that this was related to the desire for culinary experiments and getting to know more interesting flavours than those currently available. Moreover, 56% of the respondents supported local producers. The open question about the circumstances in which the respondents decided to eat cottage cheese was most frequently (65%) answered that in the morning – for breakfast or lunch. The option of dessert and snacks was also frequently chosen. In the context of introducing an innovative product, it is very important to satisfy the tastes of consumers.

Traditional solutions and flavours were chosen by 64% of the respondents, whilst at the same time, 79% were ready to test new flavours and varieties of cottage cheese. It can be concluded here that an alternative to the traditional product could be an innovative additive or, for example, a plant-based equivalent. Consumers want something new, they wish to be surprised and this question provides such information (see Figure 2). An interesting observation was also introduced by the study on recommendations passed between consumers. Half of the respondents were guided by the opinions of other consumers or their recommendations when choosing new dairy products. The respondents indicated their preferences by listing what additives could be found in cottage cheese, and most indicated sweet additives or fruit. Half as many expressed their preference for nuts or spices. The least frequently chosen elements were vegetables or herbs.

The results of the survey clearly indicated the great interest in dairy products among consumers. The respondents were aware of current market trends, which makes them expect greater innovation in the already known products. Despite the availability of various options on the market, they lack alternative proposals for traditional cottage cheeses, so they feel the need to discover new, surprising flavours. The prevalent belief among the respondents was that the classic products deserve respect, but at the same time there is a need for something that brings a fresh approach to them. New flavours can attract even those who usually do not pay attention to advertising. Products with sweet additives are particularly appreciated by consumers.

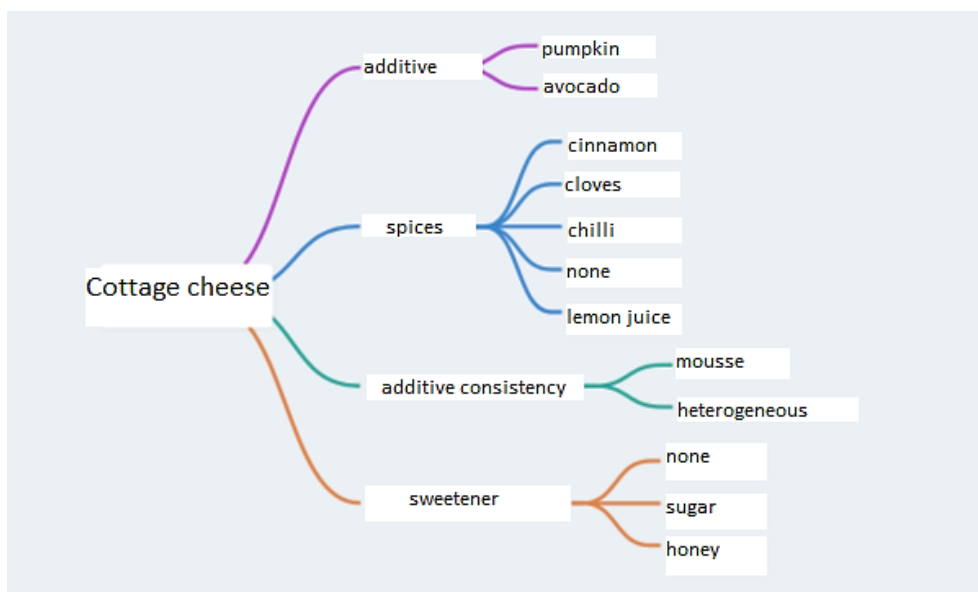


**Fig. 2.** Factors that encourage consumers to purchase of a new type of cottage cheese

Source: own research.

The conducted survey allowed to define the target group of consumers, which mainly included young people aged 18-36 leading an active lifestyle in cities, and consume cottage cheese mainly for breakfast or as a convenient lunch option. They are characterised by openness to culinary novelties and are enthusiastic about new products, and also show high awareness of the products they consume, which indicates an interest not only in taste, but also in the quality and health benefits of the products offered. In relation to taste, the vast majority of the respondents positively assessed cottage cheese with sweet additives.

Thanks to the earlier analyses, the area of idea generation was narrowed down, with the focus was on the problem of selecting attractive sweet and healthy additions to cottage cheese. During the brainstorming session, the participants focused on the market of cottage cheese products with additives, providing various interesting ideas that were presented in the form of a mind map (Figure 3).



**Fig. 3.** Mind map obtained during brainstorming session

Source: own study.

In an atmosphere of the creative exchange of ideas, through the voting process the winning concept was selected: cottage cheese enriched with a unique combination of pumpkin. The results of the survey conducted earlier clearly indicated that consumers preferred sweet additives. After deciding to choose pumpkin as the main sweet ingredient, it was necessary to unanimously determine the appropriate spices. During the discussion, three particularly interesting proposals were identified: cinnamon, cloves and gingerbread spice. The team concluded that enriching the product with cinnamon would not only diversify its taste, but would also fit into the trend of using this spice in other popular products. The possibility of adding salt, lemon juice or honey was also indicated, but the final decision on these additives was made at the prototyping stage. The preference for sweet flavours opened up the field for innovation by introducing the sweet taste of a seasonal vegetable, such as pumpkin, with the addition of a hint of cinnamon. The combination can be surprising for consumers accustomed to the sweetness coming from fruit, offering them a new taste experience.

The prototyping stage resulted in obtaining the final formula of cottage cheese with the addition of pumpkin and cinnamon. The recipe for the cottage cheese additive developed at this stage was: pumpkin puree, 1.7% w/w acacia honey, 1.0% w/w lemon juice, 0.05% w/w salt, 0.05% w/w cinnamon. The prototype was portioned in such a way as to maintain the proportions of cottage cheese to the additive as in products available on the market. The product that was subjected to sensory analysis consisted of 20g of cottage cheese and 5g of mousse. The ingredients were not mixed to leave the respondents a choice of testing method, i.e. each ingredient separately or mixed. Consumer analysis, if necessary, can be performed twice, as in the study by Tkaczewska et al. (2021). The cited authors repeated the consumer analysis of pre-exercise snack food containing carp skin gelatin hydrolysate after their storage.

The panelists rated the product in the sensory evaluation at 4.37 on a five-point scale. Most of them considered the product to have an appropriate, distinct colour, a smell typical of milky-sour cottage cheese and typical of pumpkin with added cinnamon, and the proposed mousse texture appeared to be a good choice on the part of the design team. Some panelists drew attention to the relatively weak taste of cinnamon, which they considered an element requiring improvement. It was suggested that a larger dose of cinnamon could enrich the flavour bouquet of the cheese, which was a valuable tip for further work on the product. In terms of taste evaluation, the cheese was highly rated by the panelists, who appreciated the balance of sweetness, sourness and saltiness, which indicated a well-composed formula of the product. They also stated that they would decide to buy the product if it was introduced to the offered range of dairy products, and considered cottage cheese with added pumpkin mousse to be an innovative product. An additional advantage of the proposed product could be its composition, which differs from the composition of cottage cheeses with additives available on the market. For example, commercially available cottage cheeses with raspberries and cranberries or with peaches contain only 7% and 8% of fruit, respectively (The District Dairy Cooperative in Piątnica, 2024), while the designed cheese with mousse consists of approximately 20% pumpkin. Manufacturers enrich the taste with natural aromas, and obtain sweetness by adding sugar. The product proposed in this work was sweetened with honey, which may be an additional advantage for the consumer.

Despite the positive reception of the product by the panelists, the recipe requires changes. For most study participants, the taste of cinnamon was not sufficiently noticeable. This valuable information may be the key to further improvement of the product, suggesting that small changes in the proportions of cinnamon could further increase consumer satisfaction.

The literature review indicated that there was little interest in the issue of improving and modifying cottage cheese-based snack recipes, however Drake et al. (2009) believed that creating product innovations in this area was desirable from a consumer point of view. Due to changing lifestyle, consumer needs and taste preferences, it is justifiable to create cottage cheese-based products in various flavors, including sweet and fruity.

## 4. Conclusions

Consumer interest in innovations in the dairy industry is a clear signal to producers that the market is open to new products. Cottage cheese with pumpkin and cinnamon is an example of a product with a unique combination of flavours that stands out from traditional products. The potential consumer target group of the proposed cottage cheese with pumpkin mousse with a hint of cinnamon are those with mind open to innovation, curious about novelties and variations, with preferences for sweet additions, and with market awareness, aged between 18-36 years and living in large cities. Cottage cheese with pumpkin and a hint of cinnamon was recognised by the evaluation panel as an innovative and modern product. Its positive reception during the organoleptic evaluation suggests that it will find a wide group of customers looking for new flavours and experiences in the category of dairy products.

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## Nowy wariant serka wiejskiego – wykorzystanie metody *design thinking*

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### Streszczenie

**Cel:** Na dzisiejszym dynamicznie rozwijającym się rynku żywności producenci stają przed licznymi wyzwaniami. W sektorze wyrobów mlecznych rośnie zainteresowanie innowacyjnymi produktami, które mogą zainteresować i przyciągnąć konsumentów. Celem artykułu było opracowanie nowego wariantu serka wiejskiego z wykorzystaniem metody *design thinking*.

**Metodyka:** W zastosowanej metodzie kładzie się nacisk na umieszczenie konsumenta w centrum procesu projektowania i uwzględnienie jego potrzeb i preferencji. Prawidłowa implementacja tej me-



tody obejmuje kilka etapów: zrozumienie potrzeb konsumenta, identyfikację problemów, generowanie pomysłów, prototypowanie i testowanie.

**Wyniki:** W wyniku przeprowadzonych badań określono grupę docelową oraz zaprojektowano nowy produkt, a mianowicie serek wiejski z dodatkiem musu z dyni z nutą cynamonu. Produkt został pozytywnie oceniony podczas oceny organoleptycznej i uznany za innowacyjny.

**Implikacje i rekomendacje:** Na podstawie przedstawionych wyników badań można wnioskować, że prace nad innowacyjnymi produktami spożywczymi powinny być nadal prowadzone, zarówno pod kątem wykorzystania powszechnie znanych, jak i zupełnie nowych odmian surowców roślinnych o wysokich walorach bioaktywnych i sensorycznych.

**Oryginalność/wartość:** Zaproponowany w niniejszej pracy produkt stanowi nowość wśród dostępnego na rynku asortymentu. Zastosowanie metody *design thinking* do opracowania serka wiejskiego z dodatkiem warzywa jako słodki dodatek jest pierwszą tego typu próbą.

**Słowa kluczowe:** projektowanie żywności, *design thinking*, serek wiejski

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