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Malamatenia Panagiotou , Efstathios Kaloudis , Danai Ioanna Koukoumaki , Vasiliki Bountziouka , Evangelia Giannakou , Margarita Pandi , Konstantinos Gkatzionis *

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Key Drivers of Consumption, Conceptual, Sensory, and Emotional Profiling of Cheeses Based on Origin and Consumer Familiarity: A Case Study of Local and Imported Cheeses in Greece

Malamatenia Panagiotou [1], Efstathios Kaloudis [2], Danai Ioanna Koukoumaki [1], Vasiliki Bountziouka [2], Evangelia Giannakou [1], Margarita Pandi [1] and Konstantinos Gkatzionis [1,*]

[1] Laboratory of Consumer and Sensory Perception of Food & Drinks, Department of Food Science and Nutrition, University of the Aegean, Metropolite Ioakeim 2, Myrina, 81400, Lemnos, Greece
[2] Computer Simulation, Genomics and Data Analysis Laboratory, Department of Food Science and Nutrition, University of the Aegean, Metropolite Ioakeim 2, Myrina, 81400, Lemnos, Greece
* Correspondence: kgkatzionis@aegean.gr

Abstract: The origin of a product, consumer familiarity, and purchasing identity are factors that affect perception of cheese consumption. The present study aims at identifying consumers' conceptualizations and attitudes towards local Greek cheeses of the North-Aegean Sea islands, such as Ladotyri, Graviera, Kasseri, Kaskavali, Melichloro, and Kalathaki, some of which have a Protected Designation of Origin (PDO) status, as opposed to cheeses of non-Greek origin, such as Cheddar, Regatto, and Gouda. Sensory and emotional attributes of local, local PDO, and imported cheeses, and drivers associated with consumers' choice and acceptance above and beyond their sensory attributes were studied, using three methods: a) Flash Profile to gain insight into the sensory positioning of products and description of samples, b) qualitative analysis of focus groups to pinpoint consumer knowledge, preference, and consumption criteria, and c) a new methodology for natural language processing and sentiment analysis of social media posts to determine consumer conceptualizations. Social media posts have proven to be a valuable source of linguistic and cultural data for cheeses. Local cheeses, including PDO products, were found to be linked to village life and family gatherings, home, tradition, and childhood memories, with saltiness and hardness being their main sensory attributes. Imported cheeses were linked to fast food, pizza, and snacking, with elasticity and gumminess as prominent sensory qualities. The main criterion of purchase was intended usage and versatility, taste and texture, price, and familiarity. The findings provide key sensory attributes, information about consumer purchasing criteria, and relevant vocabulary for the promotion of cheeses as agri-food and gastronomic identity key products.

Keywords: cheese; social media; Flash profile; focus groups; protected designation of origin

1. Introduction

Gastrotourism is a type of cultural tourism, with local food being an essential destination attribute as production is a locally embedded activity which emphasizes cultural distinctiveness, authenticity, and sense of place, thereby, facilitating competitive advantage for destinations and tourism businesses [1]. Local products in this context have additional value for tourists. Moreover, ethnocentrism and regiocentrism, that is the tendency to consciously prefer products originating from the country or region one belongs, as a means of supporting the local economy and part of consumer's purchasing identity [2,3], attributes value to local products for locals as well. Product origin also determines consumer familiarity, which combined with liking of the sensory attributes of

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foods and the emotional impact they have on the consumer, often alluding to memories, drives purchase [4,5].

For these reasons, a thorough understanding of how consumers perceive food products, conceptually, sensorially, and emotionally, is required for aligned product development and marketing. Although there is an increasing worldwide tendency to monitor consumers' attitudes and behaviors, research related to country or region of origin of products have been studied less extensively, especially in Greece [6,7].

The methods used in the present study comprise the immerging use of social media as a source of consumer related data. Data sources such as online social media networking sites, content communities, online reviews, forums, and blogs provide a rich and expansive source of qualitative data that can be analyzed in a quantitative manner [8]. Especially when the focus of a consumer study is the phenomenon of food neophobia, data mining on social media platforms is preferable compared to common tests of Central Location, to minimise selection bias [9] and gain access to larger data. Age, gender, socioeconomic status, ethnicity, and country of residence seem to be important factors that are associated with social media usage [8], and therefore introduce bias that limits generalization of findings. However, because of the richness and size of data they provide, social media platforms are currently used for language and food related research. Facebook, Instagram, and Twitter are mainly used as they contain text, and image or video in posts by users and businesses, allowing for interaction between the account owner who posts and the account followers.

Food research in social media also utilizes Sentiment Analysis (SA) in search of consumers' emotions towards products. Sentiment Analysis or opinion mining is the computational study of people's affective states (e.g., opinions, emotions, attitudes) toward entities, issues, events, topics, and their attributes [10]. In the case of food consumption, companies want to know consumers' opinions about their products and brand. Sentiment classification is usually formulated as a supervised learning problem with three classes: positive, negative, and neutral.

The present study investigates into how Greek consumers perceive cheese products, local as opposed to non-Greek, by creating the conceptual, sensorial, and emotional profile of cheeses products, and by identifying key drivers of consumption. Additionally, local products with a Protected Designation of Origin (PDO) label were studied to see if they have extra value than the non PDO local cheeses. The insight gained from this study can be applied in gastrotourism marketing and for local cheese production alignment with consumer demands. In this study a new methodology for data collection from social media and sentiment analysis, using natural language processing tools and artificial intelligence applications, is presented, alongside the convenient methods. More specifically, the proposed new methodology has been developed for the mining and handling of data on Instagram for specific language related purposes that combines existing programming and natural language processing tools in an original way to decrease the need for manual data handling. Llama [11], a free open-source tool, is used for the automated application of categorization criteria as a substitute for human to save time and ensure repeatability of results. An original formula is proposed for the measurement of hashtag engagement, that can be also applicable in other settings.

2. Materials and Methods

In total, a convenient sample of 51 Greek volunteers was considered in the study. Three methods were applied for data collection: Flash Profile, focus groups, and a social media platform. Flash Profile methodology was used for conceptual and sensorial profiling of cheeses, focus groups were run for conceptual, sensorial, and emotional profiling of cheeses, and to identify key drivers of consumption and consumer perception of PDO products, and a popular social media platform was used to collect data on concepts and emotions relevant to cheese consumption. The cheese types selected for the study were local cheeses of the North Aegean, the prefecture of Greece where the studies with participants were performed, and imported cheeses corresponding in texture and widely available in the area. Detailed information on the cheeses considered can be found in Table 1. Not all cheeses were studied with all methods, as studies with consumers have a limit in the number of stimuli that can be presented.

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2.1. Flash Profiling of Cheese Samples

Flash Profile was conducted as described by Dairou and Sieffermann [12]. The process comprised three sessions, in which the same 20 panelists (aged 20-33, median age: 22, 20% (n=4) male) participated, with a briefing before each session. In Session 1, each judge created their own provisional list of attributes. Coded samples were presented simultaneously, and judges were asked to list the sensory characteristics that best described the samples, avoiding hedonic terms (e.g., like, dislike, and pleasant). During Session 2, all attributes were pooled into a single list and presented to the judges. They updated their personal lists by adding, excluding, or replacing attributes by comparison with the pooled list. Judges individually proceeded to rank the samples on a free-rating line for each attribute individually using their own definitive attribute list. Session 3 was a repeat of the ranking. Each session lasted 20–30 minutes. Breaks were allowed and ties were permitted during ranking. Judges could evaluate and/or retaste the samples, in any order, as many times as they needed. Samples were presented in randomized order. In Session 1, each judge created their own provisional list of attributes. Coded samples were presented simultaneously, and judges were asked to list the sensory. Seven samples of cheeses were presented to the participants: Kaskavali of Lemnos, Melichloro of Lemnos, PDO Kasseri of Mytilene, Graviera of Mytilene, Regatto, Gouda, and Cheddar, with the cheese names written on labels. The cheese types were selected on grounds of origin and texture. Generalized Procrustes Analysis (GPA) was applied for the consensus configuration between the judges' sensory maps. The GPA plot demonstrates how similar or different the samples were, based on the sensory profile created by each participant. Data were handled in Microsoft Excel and analyzed with ANOVA, Spearman's correlation test, and GPA, using XLSTAT as software (Addinsoft).

2.2. Focus Group Discussions on Cheese Consumption

Following standard focus group methodology, 31 participants were randomly assigned to three groups (10, 10, 11) (aged 21-24, median: 22, 32% (n=10) male). The participants were asked to state their origin (place of birth and place where they had lived the most), using the 13 official prefectures of Greece. The discussion guide was prepared and executed by a member of the research team, experienced in focus group moderating. The discussion consisted of questions on frequency of cheese consumption, criteria of cheese purchase, knowledge about the PDO label (body that assigns the label, process of assignment, what the label means for the product and the consumer), sellers that makes them feel secure, instances of local and imported cheese consumption, and what descriptive words and emotions they correlate with local and imported cheeses (Supplementary Table S3). Participants were also presented with 9 pictures of cheeses, namely PDO Ladotyri of Mytilene, Melichloro of Lemnos, PDO Kalathaki of Lemnos, Graviera of Mytilene, Kaskavali of Lemnos, PDO Kasseri of Mytilene, Regatto, Gouda, and Cheddar, to be grouped after reaching a consensus. The cheese types were selected for the study on grounds of origin, PDO status, and texture. No criteria or number of groupings were imposed.

2.3. Data Collection from Social Media Cheese-Related Posts, Using Natural Language Processing Tools and Artificial Intelligence Applications

Instagram was the social media platform preferred for this study to collect as: a) it facilitates multiform posts compared to Twitter, on which posts contain text only, and to Facebook, on which posts can be text only, b) it has the highest penetration rate in Northern Europe as of January 2023 [13], c) it is the second platform most widely used by marketers worldwide (used by 80%) following Facebook (used by 89%) [14], and Instagram users interact with companies more often than on other platforms in Greece [15], and d) cooking/baking come third among the ten most common hobbies, and second (together with health/ fitness) most common interests of Greek Instagram users [15].

For data collection, Apify [16], a platform that provides a graphical user interface that allows developers to build, deploy, and monitor web scraping and browser automation tools, was used. Llama 3 [11], a large language model (LLM), was used for the automated application of the food-

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relatedness criterion and for sentiment analysis. The Llama 3 was chosen because: a) it has the ability to process data in multiple languages, b) it has the ability to process emoji/emoticons (tested on different types of posts in a preliminary study), c) it is an openly available non-proprietary LLM (no cost), and d) it is one of the top performing non-proprietary LLMs in the LMSYS Chatbot Arena Leaderboard [17].

For this study, post engagement was measured. As there is no standardized method for post engagement measurement yet, and to the extent of our knowledge not any dealing with individual hashtags[1], a new method was developed. Following the model of Eriksson *et al.* [18], the engagement was calculated as the weighted average of the number of likes and of the number of comments, using 1 and 5 as the weights for the number of likes and comments, respectively. The sum of these two values is the engagement of the post as in the following formula:

$$engagement = 1 \times \text{number of likes} + 5 \times \text{number of comments}$$

Since for the present study the focus is on hashtags, not posts, and hashtags appear in posts of various engagement values, the normalized hashtag engagement was computed according to the following formula:

$$normalized\ hashtag\ engagement = \frac{1 \times (\text{number of likes})_{average} + 5 \times (\text{number of comments})_{average}}{\text{engagement}_{median}}$$

The median average engagement was then calculated. Finally, each engagement value was divided by the median (value/ median), and the normalized value for each post expressed how many times the hashtag was more engaging than the average within the collected data. Posts with no likes nor comments were allocated a value of 0.0. The final value of each post was attributed to every hashtag of the post.

Posts on Instagram, a popular social media platform, containing the names of cheeses under study (Table 1) as hashtags in Greek and English were collected. The search was confined to hashtags in Greek for non-Greek cheeses, to ensure focus on posts by Greeks, as the case study focused on Greek consumers (Supplementary Table 1). Meta's Llama 3-8B model was used for sentiment analysis of posts, prompted to check each post (caption, hashtags, emojis, comments) and assign a label: positive, neutral, or negative, , in an automated process using the Python programming language [19] and libraries, e.g., Pandas [20] Then, again using custom Python scripts, hashtag frequency of appearance (i.e., how many times each hashtag appears in the posts collected) and normalized average hashtag engagement were calculated.

Table 1. Cheese product types used as hashtags for collection of Instagram posts.

local Greek cheeses	non-Greek imported
PDO Ladotyri of Mytilene Mastelo® of Chios PDO Kalathaki of Lemnos PDO Feta of Lemnos Anthotyro of Lemnos PDO Kasseri of Mytilene Kefalotyri of Mytilene Melichloro of Lemnos Kathoura of Icaria Graviera of Mytilene	Gouda Edam Regatto Mozzarella Emmental Parmesan Blue cheese, Roquefort, Gorgonzola Cheddar Cottage

[1] a word or phrase preceded by the symbol # that classifies or categorizes the accompanying text (such as a tweet) [33].

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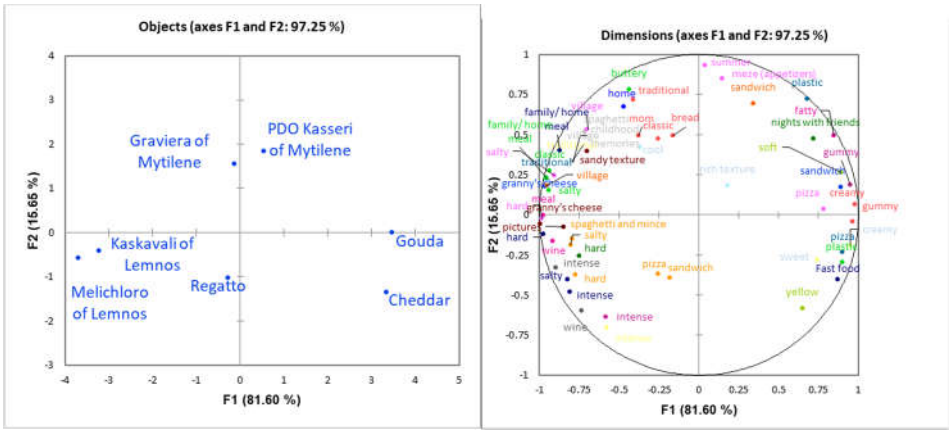
Anthotyro of Samos Dry Mizithra of Mytilene Kaloupaki of Mytilene	

3. Results

3.1. Flash Profiling of Cheese Products

During the first session of profiling the cheese samples, 97 unique descriptive terms were collected from participants in a pooled list, and synonymous terms were grouped together (Supplementary Table S2). During the following two sessions, samples were ranked regarding the vocabulary selected. The samples were analyzed in correlation to the rankings (18 participants' responses qualified as consistent) for each word. Results of the GPA ($p<0.05$) suggest that Kaskavali of Lemnos and Melichloro of Lemnos correlated with words, such as intense, wine, salty, pictures, granny's cheese. Regatto slightly correlated with the same words. Graviera of Mytilene and PDO Kasseri of Mytilene correlated with words, such as meze (appetizers), summer, bread. Gouda correlated with words, such as pizza, soft, gummy, night with friends, sandwich. Cheddar correlated with words, such as fast food, yellow. Kaskavali of Lemnos and Melichloro of Lemnos were very closely placed on the biplot. The same stands for Graviera of Mytilene and PDO Kasseri of Mytilene (Figure 1, Table A1).



(a) (b)

Figure 1. Generalized Procrustes Analysis (GPA) of judge's evaluations of eight cheese samples via Flash profile analysis (a) and (b) variable plot. Only attributes generated by judges with good repeatability and ability of discrimination were included.

3.2. Focus Groups

The participants proved to be frequent consumers of cheese products, most consuming cheese every day or at least 4 to 5 times a week. They consume local cheeses, especially Feta cheese, daily at home or when eating out at a tavern (traditional Greek restaurant) in a salad, with bread, on the side, with pasta, or Kasseri in sandwiches. They consume non-Greek cheeses daily, especially Gouda in sandwiches, Gouda or Mozzarella on homemade pizzas, Parmesan with pasta, and premium cheeses (smoked and spicy) with wine on special occasions, usually on social outings.

They don't usually look at the nutritional statement table on the packaging as they usually purchase the same types or brands, and they are familiar with the amount of salt and fat that the products contain. If they do look at the table they focus on protein, salt, fat, and energy in this order. Manner of consumption (intended usage and versatility) ranked first as the main key driver of cheese type selection, followed by the sensory attributes taste and texture, and price. Saltiness (amount of salt), origin of cheese, familiarity with producer, environmental print of producer, and packaging were mentioned among the top three drivers of purchase. The company being environmentally friendly is not considered a virtue, as it is a minimum requirement for every company as mentioned

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by participants. Packaging is important only regarding practicality, i.e., it must be convenient and able to protect the content after multiple openings. When asked about their preferred cheeses for emotional reasons, local cheeses of various parts of Greece were mentioned, such as Feta, Ladotyri of Mytilene, Mizithra, Kalathaki of Lemnos, Melichloro of Lemnos, Graviera. The only cheeses of foreign origin mentioned were Mozzarella and Haloumi of Cyprus. When asked about their preferred cheeses for sensorial reasons, again Feta came first, followed by Cheddar, Graviera, Ladotyri of Mytilene, and Mozzarella.

When asked about the PDO status, process of status approval, and bodies involved, confusion and uncertainty was notable. They allocated a value of 2.5 out of 5 (allocated values by participants ranged from 1 to 4) on the importance of a cheese product being of PDO status. They stated that local cheeses are important to be based on traditional recipes and processes whether they have a PDO status or not, and that taste is more important than labels. They also mentioned that they expect PDO cheeses to be more expensive because of PDO certification costs and for marketing reasons (i.e., that PDO is of higher quality). Regarding quality, it was not clear to the participants whether a PDO label actually means being of higher quality. They were skeptical and felt that it may be so at the beginning, but they stated that unvaryingly high quality is a requirement for PDO products. Regarding the sensory attributes of PDO products, they are considered to be consistent, but not necessarily tastier than non PDO.

When prompted to provide relevant vocabulary for their favorite non-Greek cheeses, participants used words, such as: gummy, creamy, soft, salty, tasty, fragrant, wine, sensual, wintery, everyday, Italian, expensive, pasta. For their favorite local Greek cheeses, they provided vocabulary, such as: memories, tradition, classic, family, granny, habits, salty, hard, summer, goes with everything, tasty.

The participants generally felt secure when purchasing cheese products. Purchasing packaged products from the supermarket was their first choice, followed by purchasing from a producer they know personally. Packaged supermarket products make them feel secure, because they contain preservatives and are regularly inspected. Products directly purchased from a small-scale producer made them feel secure as well, as such products are expected to contain natural preservatives or no preservatives (Supplementary Table S3).

The nine pictures of cheeses given to the participants of each group were put into three, three, and four groupings by the three focus groups respectively (Table A2).

3.3. Social Media Cheese-Related Posts and Hashtags

The search retrieved 16,878 posts on local cheeses that contained 48,780 hashtags, and 1,158 posts on non-Greek cheeses that contained 6,160 hashtags. The cheeses searched for were ranked in order of frequency of appearance as hashtags in the posts collected and in order of normalized average engagement of the respective posts (Figure 2). Graviera was both the most frequently appearing and the most engaging of the cheeses under study.

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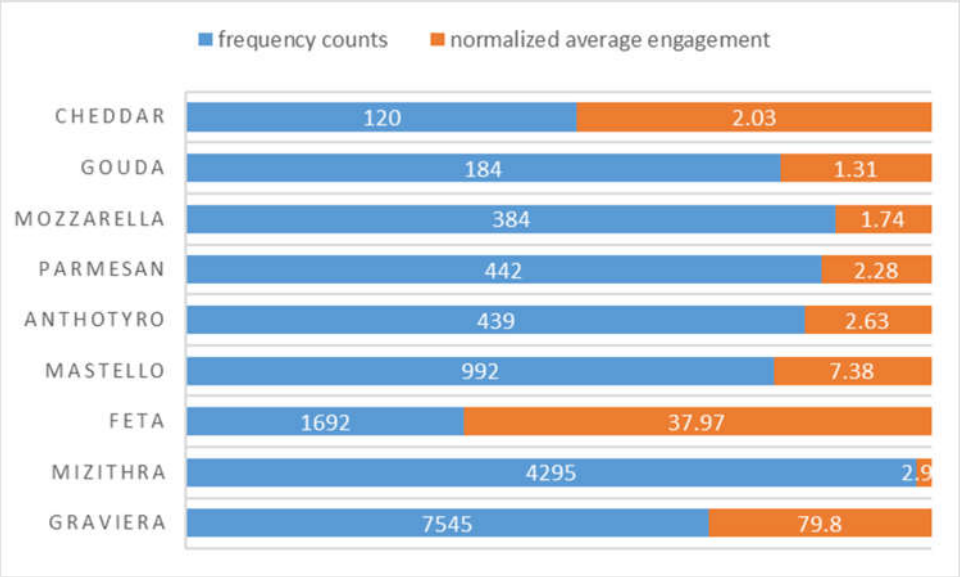

Figure 2. Frequency counts and normalized average engagement of the most frequently mentioned cheeses in the posts collected from Instagram.

Sentiment analysis was performed by Llama 3-8B model on the posts collected. Local cheese related posts were identified as positive (90%), neutral (8.5%), and negative (1.3%), while non-Greek cheese related posts were identified as positive (92%) and neutral (8%) only.

4. Discussion

Each method used in this study provided insight into consumers' conceptualizations, the sensory and emotional profile of local, PDO and not, and non-Greek cheeses, as well as the key drivers of their consumption. The findings have been aggregated in a concept map (Figure 3). The main key driver of cheese consumption is intended usage, which is determined by texture (gumminess and hardness) and saltiness. In a study with Norwegian and French participants, appropriateness was the second most important purchasing criterion after price [21]. Price emerges as the leading key driver of purchase in a study with Spanish [22] and Portuguese consumers [23]. In the present study, texture and saltiness emerge as the most significant attributes of cheese products sensorially, with local cheeses being perceived as hard and salty, while non-Greek as gummy and soft or creamy. Familiarity and price follow as drivers of purchase, in line with relevant literature [24], which is not surprising, as cheese is consumed almost daily in Greece, and consumers' usually buy the same products without having to overthink. Price, however, is a criterion that could alter habitual purchases. Saltiness and fat content are health-related attributes that emerge as important to cheese consumers, correlating with levels of education and knowledge about health [22].

Local cheeses seem to elicit a plethora of vocabulary in consumers' minds, more than non-Greek cheeses, a result of extended past experience and a high level of familiarity [24]. They are conceptualized with childhood memories, family traditions and familiar faces, the countryside and village life, the Greek islands, summer, and other staple Greek foods. Non-Greek cheeses are conceptualized as more modern, alluding to foods closer to the Italian culture. Theses conceptualizations create a dichotomy between local and non-Greek cheeses as perceived emotionally, with non-Greek cheeses eliciting emotions of sensuality and being financially privileged, while local cheeses elicit memories and a feeling of tradition appreciation.

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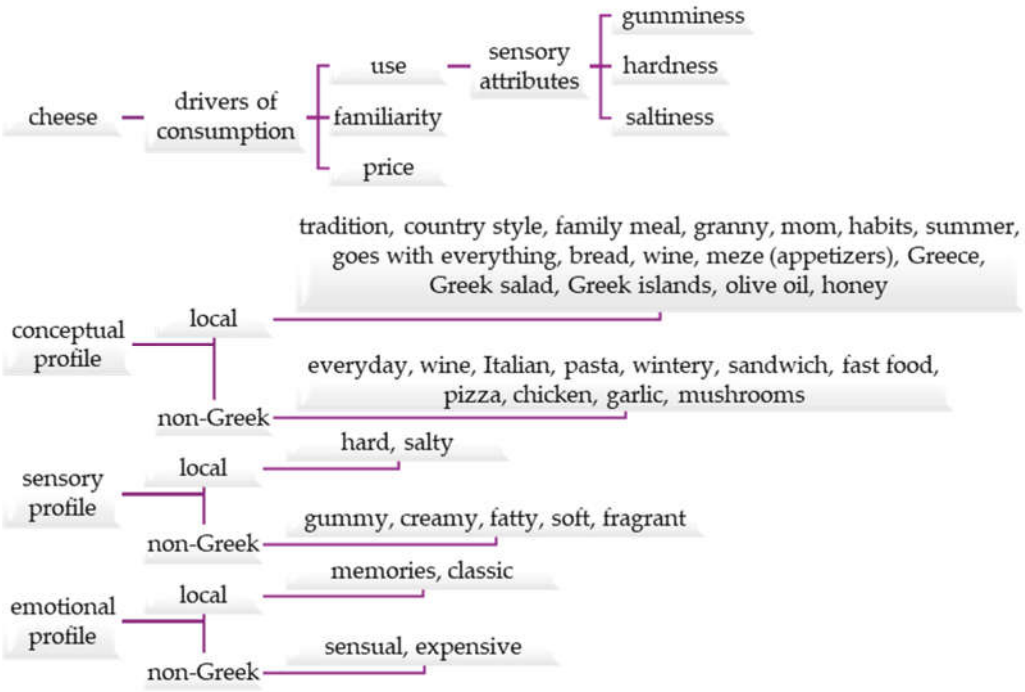

Figure 3. Thorough map of key drivers of consumption, and the conceptual, sensory, and emotional profiles of local and non-Greek cheeses.

Most cheese types mentioned in focus groups, preferred for both sensorial and emotional reasons, were identical, which suggests that both parameters are equally important in cheese consumption. This could be attributed to the tendency of individuals to consume cheeses with which they are familiar, have been consuming for years, and which elicit positive emotions, memories, and satisfaction [24]. Feta appears to be the most popular cheese for both sensorial and emotional reasons according to the focus groups participants, while Graviera was found to be the most popular for Greek Instagram users.

Cheese groupings by Flash Profile analysis and by focus groups participants pinpoint to the fact that local products are generally perceived as different than imported ones. Flash Profile participants, who tasted some samples, identified common attributes among the local cheese, while focus groups participants, who did not taste cheeses, only had a picture, a name, and their experience, placed the local cheeses in different groupings. Intended usage, relating to texture (hardness and gumminess) and saltiness, seemed to be the main criteria. The only local cheese considered similar with the non-Greek ones, both by focus groups and Flash Profile analysis, was PDO Kasseri of Mytilene, probably due to similarities in texture. PDO labelling did not seem to affect groupings, which aligns with focus groups participants' opinions shared during discussion that the label may entail higher quality and price, but the lack of it does not entail poor quality. In literature, consumers of higher educational background were willing to pay more for PDO labelled and otherwise certified products [22,25].

Sentiment analysis of posts related to local and non-Greek cheeses did not provide distinction between the two categories. Both categories are talked about positively to a significant degree on Instagram. This is in line with literature where it is stated that food is in general a positive experience for healthy humans [26], and that social media posts are more likely to be positive than negative, as positive posts elicit higher engagement [27]. Cheese rankings in terms of frequency of appearance and engagement showed that the most frequently posted about and engaging cheeses were all local ones, with Graviera being the most popular (most frequently posted about and engaging) cheese of all for Greek Instagram users.

The present study focused on cheese products of the North Aegean. Its findings could be extended with studies on other local products, such as olive oil and wine, or products local to other areas of Greece and the Mediterranean, to identify similarities and differences nationally and cross-

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culturally. A broader age range of participants could be pursued to test whether age is a parameter in cheese consumption for consumers, as there is conflicting evidence in literature [28], and tourists, both Greeks visiting the area under study and non-Greeks, could be invited for a better insight of what the non-locals are looking to experience. PDO products seem to be in need of further study in terms of conceptualizations, emotions, and expectations [29] for better marketing to convince consumers', especially younger generations, that the label actually certifies quality and is worth the higher price.

The findings of the present study can find applications in creating the gastronomic identity of the North Aegean islands, after enriching it with studies on other local products. This gastronomic identity can in turn help form the gastrotourism identity of the area [30]. Relevant concepts, sensory attributes, and elicited emotions can find their place on menus in local restaurants and hotels, and on the packaging of local products. Local cheeses can be used in modern recipes, substituting non-Greek cheeses of similar sensory attributes, an emerging trend in haute cuisine [31], since texture and saltiness seem to be the main focus of the consumer. If agri-food economy, which seems to be declining in Greece, is linked to tourism, which is booming, it can have a prosperous future [1,32].

5. Conclusions

Intended usage, which is determined by the sensory attributes of cheese, mainly texture and saltiness, seems to be the main driver of cheese consumption, followed by familiarity and price. Sensorial and emotional preferences of cheese seem to coincide. PDO status is not perceived as invariably linked to higher quality. Local cheeses, generally characterized as hard and salty, closely correlate with childhood memories and family meals, while non-Greek cheeses, generally characterized as gummy and soft, with snacking and outings with friends. Studying local products can provide an advantage over their imported counterparts, with an aim to support national and local economy through agriculture and gastrotourism.

Supplementary Materials: The following supporting information can be downloaded at the website of this paper posted on Preprints.org.

Author Contributions: Conceptualization, Malamatenia Panagiotou, Efstathios Kaloudis, and Konstantinos Gkatzionis; methodology, Malamatenia Panagiotou, Efstathios Kaloudis, and Konstantinos Gkatzionis; software, Efstathios Kaloudis; validation, Vasiliki Bountziouka and Efstathios Kaloudis; formal analysis, Malamatenia Panagiotou, Danai Ioanna Koukoumaki, and Efstathios Kaloudis; investigation, Malamatenia Panagiotou, Evangelia Giannakou, Margarita Pandi, and Efstathios Kaloudis; resources, Konstantinos Gkatzionis; data curation, Malamatenia Panagiotou, Danai Ioanna Koukoumaki, Efstathios Kaloudis; writing—original draft preparation, Malamatenia Panagiotou; writing—review and editing, Efstathios Kaloudis and Konstantinos Gkatzionis; visualization, Malamatenia Panagiotou and Danai Ioanna Koukoumaki; supervision, Konstantinos Gkatzionis; project administration, Konstantinos Gkatzionis; funding acquisition, Konstantinos Gkatzionis. All authors have read and agreed to the published version of the manuscript.

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Institutional Review Board Statement: The study was conducted in accordance with the Declaration of Helsinki, and approved by the Ethics Committee of the University of the Aegean (…).

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The data presented in this study are available on request from the corresponding author.

Conflicts of Interest: The authors declare no conflicts of interest.

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Appendix A

Table A1. F-values (p <0.05 for ANOVA) and SCC values (p<0.05) for Spearman's correlation test on sensory attributes from each judge in the Flash profile.

Judge 1	**F**	**SCC**
sandwich	50.63***	
gummy	2.608	
white chocolate	1.255	
earthy	3.377	
fruity	2.500	
granny's cheese	124.83***	0.98**
buttery	6.23*	0.685
Judge 2		
hard	18.75***	0.88**
fatty texture	4.77**	0.607
village	2.722	
nights with friends	14.87***	0.85**
Judge 3		
fatty texture	6.70**	0.704
soft	0.119	
intense	15.94***	0.86**
gummy	35.83***	
soft	0.056	
salty	6.38**	0.691
Judge 4		
pizza	18.40**	0.88**
plastic	60.66***	0.96**
childhood memories	4.56*	0.593
traditional	248.50***	0.99**
Judge 5		
sandwich	31.50***	0.929
village	35.833	0.937
fast food	5.093	0.627
Judge 6		
intense	15.167	0.85*
sweet	257.83***	0.99**
fatty	5.15*	0.631
traditional	24.26***	0.91**
creamy	257.83***	0.99**
salty	8.29**	0.664
Judge 7		
wine	14.07**	0.85*
intense	11.05**	0.81*
home	7.18**	0.721
Judge 8		
soft	8.42**	0.757
smooth	5.83*	0.667
sandwich	8.16**	0.750

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Judge 9		
sandy texture	257.83***	0.99**
granny's cheese	18.39***	0.88*
pictures	50.63***	0.95**
nights with friends	6.09*	0.679
Judge 10		
salty	15.16***	0.85*
family meal	15.16***	0.85*
hard	31.50***	0.93**
fast food	18.75***	0.88*
intense	9.72**	0.78*
Judge 11		
salty	31.50***	0.92**
plastic	27.09***	0.92*
buttery	20.22***	0.89*
fatty texture	2.818	
classic	253.16***	0.99**
countryside	6.40*	0.692
appetizers	9.52**	0.782
family/ home meal	49.70***	0.95**
Judge 12		
meal	64.16***	0.96**
breadsticks	6.99**	0.714
plastic	8.16**	0.750
wine	11.90**	0.82*
fatty	9.72**	0.78*
Judge 13		
salty	1.803	
familiar	7.76**	0.739
bread	11.16**	0.81*
tasty	3.417	
sweet	9.19**	0.775
soft	6.85*	0.709
hard	5.15*	0.631
gummy	14.87***	0.85*
mom	64.16***	0.96**
nights with friends	4.53*	0.591
creamy	30.33***	0.92**
childhood memories	8.16**	0.750
traditional	11.90**	0.82*
rich texture	2.302	
milk	2.926	
fatty	2.818	
intense	7.11**	0.718
sour	6.10*	0.679
classic	16.10***	0.86*
Judge 14		
intense	2.381	
salty	4.58*	0.595

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soft	8.42**	0.757
Judge 15		
traditional	5.36*	0.643
rich texture	15.16***	0.85*
milk	6.10*	0.679
cool	64.16***	0.96**
countrydise	2.112	
holiday	3.542	
spaghetti	8.16**	0.750
childhood memories	3.079	
tasty	1.398	
Judge 16		
spaghetti	10.72**	0.80*
sour milk	0.567	
village		1.00***
childhood memories	248.50***	0.99**
sandwich	7.15**	0.720
breakfast	5.46*	0.648
Judge 17		
salty	31.50***	0.92**
spaghetti with cheese		1.00***
pizza	20.61***	0.89*
sandwich	20.61***	0.89*
hard	15.16***	0.85*
Judge 18		
happy memories	9.19**	0.775
war	1.564	
respect	4.34*	0.577
yellow	6.38*	0.691
home	18.75***	0.88*
smooth	7.76**	0.739
Judge 19		
yellow		1.00***
soft	15.16***	0.85*
salty	2.917	
Judge 20		
salty	31.50***	0.93**
appetizers	50.63***	0.95**
grandpa	7.18**	0.721
spaghetti and mince	4.27*	0.571
pizza	18.75***	0.88*
smooth	0.353	
summer	15.16***	0.85*
village	22.37***	0.90*
hard	11.90**	0.82*

For F values: *P<0.05, **P<0.01, ***P<0.001. For SCC values: * P< 0.05,**P<0.01, ***P<0.001.

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Table A2. Groupings of cheeses by the three focus groups (group 1, group 2, group 3). A, B, C, and D stand for the groupings of cheeses created by each group of participants. Aggregated pairings of cheeses follow, i.e., how many times specific pairs of cheeses were formed by participants. The pairs not mentioned in the table were not formed while grouping the cheeses.

	Graviera of Mytilene	**PDO Kasseri of Mytilene**	**PDO Ladotyri of Mytilene**	**PDO Kalathaki of Lemnos**	**Kaskavali of Lemnos**	**Melichloro of Lemnos**	**Regatto**	**Gouda**	**Cheddar**
group 1	A	A	B	B	B	A	C	C	C
group 2	A	C	A	B	B	B	C	C	C
group 3	A	B	A	D	A	A	B	B	C

regatto- gouda	3	ladotyri- kaskavali	2	regatto- cheddar	2	kasseri- regatto	2	kasseri- gouda	2
graviera-ladotyri	2	ladotyri- melichloro	2	kaskavali- melichloro	2	graviera-melichloro	2	gouda- cheddar	2
kaskavali- kalathaki	2	ladotyri- kalathaki	1	graviera-kaskavali	1	graviera-kasseri	1	kasseri- cheddar	1
kasseri- melichloro	1	melichloro- kalathaki	1						

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