

The mountain product label: Choice drivers and price premium

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ABSTRACT

Mountain food production contributes to the support of local economies and cultures and it provides quality food products due to the characteristics of the raw materials combined with traditional processing conditions. Consumers perceive those products as environmentally friendly and of high quality. To support this production, the European Union has introduced the optional quality term 'mountain product label' (MPL). The objective of this paper is to investigate consumer preferences and willingness to pay for cheese with the MPL. Cheese was chosen because it is one of the specialties of these areas. A survey, including a labelled discrete choice experiment, was conducted with 511 Italian cheese consumers. Data were analyzed through a random-parameter logit model. We compared the MPL with the Protected Designation of Origin (PDO) label. The results show that consumers are not aware of the MPL. However, they like it as much as PDO. A higher willingness to pay for the MPL was found compared to products with no quality labels, indicating a premium price for these products. Based on these results, policy intervention strategies are needed to support quality supply chains in mountain areas and publicize this label to the consumer market.

1. Introduction

Local food production contributes to the sustainability of local economies, both socially and economically, by helping rural development, increasing the sense of community, and creating new jobs (Kneafsey et al., 2013; Stein and Santini, 2022). This is particularly true in less-favored areas, such as the mountains, where local development is strictly based on territorial resources (Euromontana, 2004; Mazzocchi et al., 2019). However, for several decades, there has been a gradual process of depopulation in European mountain areas, which has affected the cultural heritage, the environment, and the rural economy of these territories (Mazzocchi and Sali, 2019). This process has also affected traditional extensive agricultural activities, such as pastures and meadows (McDonald et al., 2000), which have gradually been abandoned. These activities are characterized by high production costs and lower yields than lowland agriculture. They have less economic sustainability; therefore, the resilience of traditional extensive agricultural activities is threatened (European Commission, 2008; European Parliament, 2013; Lips, 2014; Pinter and Kirner, 2014; Köhl et al., 2020; Verduna et al., 2020).

Consumer needs have changed significantly in the last decade. New

market niches have been created due to consumers becoming more attentive to environmental and ethical issues (Ricci et al., 2018). Mountain products can fully satisfy these needs (Euromontana, 2023). From an environmental and ethical point of view, the mountain area has many positive characteristics in the collective imagination. Mountains evoke ideas of green valleys, clean waters, and pure air. Mountains have a strong cultural identity based on mountain traditions and traditional processing methods (Borec et al., 2009; Schjøll et al., 2010). Over half of all European consumers find it difficult to distinguish a mountain product from a non-mountain product (Eurobarometer, 2011). The European Union, therefore, introduced the optional 'mountain product' quality label (MPL) through EU Regulation No. 1151/2012 and EU Regulation No. 665/2014 (European Parliament, 2012; European Commission, 2014). The Ministerial Decree approval in August 2018 (Official General Series n. 227 of 29 September 2018) (Mipaf, 2018) regulates the use of the MPL in Italy, implementing the Ministerial Decree n. 57,167 of July 26, 2017 (Fig. 1).

This label is an opportunity for farmers working in these marginal areas to differentiate and improve their products (Finco et al., 2017; Brun et al., 2020). However, to date, few studies have dealt with how consumers approach products with the MPL.

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Fig. 1. Italian mountain product label logo.

We investigate consumer preferences and willingness to pay (WTP) for the optional quality term MPL in comparison with both the ‘Protected Designation of Origin’ (PDO) label and unlabelled products applied to cheese. To achieve this goal, we conducted a labelled discrete choice experiment (DCE) performing a random-parameter logit model.

We chose to analyze cheese for two reasons. First, it is a representative product from mountain areas. In these areas, milk production generally comes from pasture-based farms. The feed these breeds receive provides milk and cheese with a good sensory profile due to volatile organic compounds and fatty acid composition (Bentivoglio et al., 2019; Endrizzi et al., 2021). Second, the dairy supply chain was the second sector to adopt the MPL certification in Italy (Bentivoglio et al., 2020a). Specifically, the product selected for analysis is a short-ripening cheese typical of central Italy, which is produced by cattle herds led to seasonal pasture.

This article is structured into six sections. Following this introduction, Section 2 describes the current literature regarding consumer behavior towards the MPL. Section 3 details the methodology, describing the questionnaire used, the data collection, the design of the DCE, and the model used. Section 4 presents the results. Section 5 comprises the discussion, and Section 6 presents the conclusions.

2. Theoretical background

Mountain food products have specific characteristics attributable to the environment in which they are produced, the quality of natural resources used, and traditional techniques and know-how employed in their production and processing (Euromontana, 2023). However, only a few previous studies have analyzed consumer behavior towards the MPL.

Some studies (Bassi et al., 2021, 2022) analyzed the label per se without analysing its effect on a specific product. Those studies aimed to define consumers’ attitudes towards the MPL and their purchasing intentions, using four latent constructs (mountain attractiveness, mountain food attractiveness, attitude towards the mountain product label, and purchase intention). These studies analyzed the relationships between the constructs. According to the results of their analysis, consumers appreciate mountain products for their capacity to embed characteristics and meanings that directly recall the place of production, such as ethical and positive environmental attributes. The sample these studies analyzed did not exclude *a priori* the possibility of buying those products. However, in the authors’ opinion, a random encounter with these products would not automatically result in buying decisions.

Other studies have analyzed the effect of the MPL on consumer behavior towards specific products. Bentivoglio et al. (2020a) and

Staffolani et al. (2022) analyzed consumers’ perceptions and WTPs for the purchase of milk identified with the MPL through the application of contingent valuation analysis. They found that the participants surveyed were willing to pay a premium price for milk with the MPL. From this research, consumers interested in the MPL emerged as more sensitive to qualitative and nutritional characteristics, emotional issues, and ethical issues, such as the preservation of the environment, animal welfare, and the valorisation of the local territory.

Oliveira Linder et al. (2021; Oliveira Linder et al., 2022), through different qualitative methodologies, studied Italian consumers’ opinions of beef and wine with the MPL. From their study, it emerged that consumers expect mountain products to be healthier and more ethical. They suggested re-evaluating the current quality standards of the regulation and, as far as possible, including some standards related to animal welfare and ecological sustainability.

Zanchini et al. (2023), using a ranking conjoint experiment, found a positive WTP for goat’s milk yogurt with the MPL. Cei et al. (2023), through a choice experiment, analyzed consumers’ WTP for three attributes with lambs’ meat (MPL; local endangered landrace; agroecosystems stewardship through rotational grazing). They found a positive WTP for the MPL. However, the value was influenced by the poor knowledge of consumers.

Other studies have compared the potential of the MPL with other quality brands, directly or indirectly. Mazzocchi et al. (2021) and Mazzocchi and Sali (2022), using both a DCE approach, assessed consumers’ WTP for a mountain cheese by comparing the MPL with the organic certification and other product characteristics, such as animal welfare information. They also investigated attitudinal variables influencing consumers’ propensity towards the three attributes. They found a premium price for the cheese with the MPL, and the MPL was preferred over the ‘organic label’ but less than the ‘grazing cattle’. The preference for the mountain logo is positively influenced by consumers who feel greener.

Other papers, however, made an indirect comparison, placing the MPL among possible factors combined with other labels. Sanjuán and Khliji (2016) studied the role of the MPL among urban consumers for the beef sector through a labelled DCE. For the labels, they surveyed a generic product, a product with a private label, and a product with a public quality label (such as PDO or PGI). The factors included in their study were mountain origin (with the label ‘coming from the Pyrenees’). They found limited impact for the MPL on product choice. For this reason, they suggested associating the MPL with other brands and quality labels to increase consumer attention. They also stated that the MPL would be strengthened if associated with a particular region.

Brun et al. (2020) focused on the honey market and applied a correlation analysis and a one-way ANOVA. In their study, they evaluated the attitude towards mountain honey, observing whether the MPL is associated with other quality markers, such as PDO, organic, and local products. Their study found a general interest in organic and PDO labels among consumers. Mountain honey and honey defined as local reached higher levels of appreciation. Mountain honey showed a correlation with organic honey and with the PDO marker. According to this study, these findings could be linked to the nature of the label, which is halfway between the two, proposing both an environmental character and a quality certification based on origin.

Menozzi et al. (2022) studied the effect of the MPL in combination with the effect of the PDO label on a Parmigiano Reggiano cheese. In this paper, a DCE was applied, and the attributes shown to interviewees were food quality labels (no label, PDO, and PDO + MPL), brand (large scale brand, national brand, and local brand) and price. From their study, it emerged that the most important choice factor for those surveyed was price. They found a positive effect in the combination of PDO and MPL.

Stiletto and Trestini (2022) used a generic cheese to assess consumers’ preferences for the PDO, organic, and MPL labels. They aimed to understand if those EU quality schemes are independent or if there are synergies existing between them, and whether this exchange of value

plays a positive or negative role in terms of consumers' WTP. In this research, they applied a labelled DCE. In the DCE, consumers' preferences for the presence of organic and MPL labels were assessed together with the effect of price for both PDO and generic cheeses. They found interaction effects. In particular, the results showed that the combined use of organic and MPL labels did not decrease consumers' intentions to buy. However, when applied to a PDO product, these attributes generated a lower consumers' WTP in comparison with the generic cheese, highlighting a possible overlap between them.

Considering the current literature, studies making direct comparisons between the MPL and other cheese labels are lacking. This article aims to expand knowledge in this field. In contrast to the studies of Menozzi et al. (2022) and Stiletto and Trestini (2022), this research places the MPL in direct comparison with the PDO, which is another European brand of geographical origin. In the experimental design, we investigated the consumer's attitude towards health-related attributes that could characterize mountain dairy products.

The innovation of this paper lies in the use of labelled DCE. The DCE is a widely used research methodology in food economics studies (Lizin et al., 2022). These DCEs make it possible to infer the value of an attribute from stated or revealed choices, even though the individual may not be aware of this value. This makes a DCE a valuable tool in assessing the factors that influence food choices, which are often the results of habits, heuristics, and low-involvement decisions (Lizin et al., 2022).

There are two general types of DCEs, which are unlabelled and labelled DCEs (Louviere et al., 2000). Unlabelled DCEs use generic titles for the alternatives. Labelled DCEs use alternative-specific titles for the alternatives. By applying a labelled DCE, our study expected to overcome some limitations of unlabelled DCE studies. Labels tend to consist of brand names or logos, which consumers have learned to associate with various product characteristics and feelings (de Bekker-Grob et al., 2010). Our labelled DCE allowed respondents to judge product attributes and compare product alternatives at the same time. Comparative judgement is one of the fundamental dimensions of consumer quality perception because it reflects the interactions between the consumer and the product (Parker and Schrieff, 2011; Steenkamp, 1990). Since the vectors of prices used for the products were different, the WTP elicited in our study was expected to be more accurate than studies using unlabelled DCE (Nguyen et al., 2015; Rahmani et al., 2019). Purchase intentions may diverge from the WTP. The highest purchase intention does not necessarily correspond to the highest WTP (Kallas et al., 2019).

Allowing the comparison between alternatives assisted us in estimating the intrinsic values of the respective label. This estimation reflected how consumers in a real market might be aware of these differences. Another advantage was that the labelled DCE might alleviate the bias of the demand estimates because the labelled products or brands that often add information or product knowledge would, at least partly, account for the positive effects of price (Nguyen et al., 2015).

Despite its numerous advantages, this methodology is still rarely applied in DCEs for food research (Lizin et al., 2022). We opted for a labelled choice design because, in the Italian market, cheeses with quality labels have different price levels than unlabelled cheeses. This factor created a more realistic scenario so that consumer choices reflected the actual preference structure, allowing the effect of labels to be explored (de Bekker-Grob et al., 2010).

3. Materials and methods

3.1. Survey and data collection

The questionnaire used for this research had five sections. The first section collected information about participants' socio-demographic characteristics. In particular, the respondents were asked for information on gender, age, the Italian region of origin, the level of study, the household annual net income, and the household size.

The second section elicited information about participants' cheese consumption habits, including the frequency of purchases, where the products were purchased, the average expenditure, the type of products purchased, and the main factors considered at the time of purchase. This section also included a question to test knowledge about different quality marks that could be found on Italian cheeses.

The third section collected information on consumers' perceptions, consumption behaviors, and attitudes related to mountain products and mountain cheese. Initially, we asked respondents general mountain-related questions, such as how often they visited and the main reasons for their visits. Subsequently, we asked about the frequency of purchasing cheeses produced in the mountains, and we proposed to the interviewees a series of statements to be evaluated on a Likert scale from 1 to 7 (strongly disagree, strongly agree).

We assessed purchasing and consumption behaviors for health benefit products in Section 4 of the questionnaire. In this section, we asked interviewees if they had ever heard of foods with health properties. After providing a definition, we asked how often they purchased cheeses with these properties. We then asked respondents to define how much they agreed with a series of statements regarding cheeses with health-promoting properties. Finally, we asked for the probability of future purchases. The last section comprised the DCE task.

Data were collected during March 2023 through an online survey distributed to the consumer panel database of a third-party company, NorSTAT. The sample was administered nationwide in Italy to a population above 18 years of age who were at least partly responsible for their household food shopping and who had bought cheese in the last three months. Before the full launch, the questionnaire underwent two pre-test sessions. In the first pre-test, conducted on a sample of 17 respondents, the completeness of the choice set and the understanding of the choice cards were evaluated. The second pre-test (extended to 30 respondents) was used to assess the clarity of the questions and the overall consumer understanding of the survey.

3.2. Attribute selection and experimental design

To deploy the labelled DCE methodology, an experimental design was built based on different alternatives and levels. Three alternatives were taken into consideration: MPL label, PDO label, and 'no quality label'.

The PDO was chosen because it is a quality mark widely used in Italian cheese. Italy boasts 55 PDO cheeses and only three protected geographical indication cheeses (eAmbrosia, 2023). In addition, the PDO label, with the MPL, represents one of the main quality labels for the protection of cheeses produced in mountainous areas. According to Martins and Ferreira (2017), between 50 % and 75 % of PDO cheeses are made in mountainous areas. However, part of mountain cheese production is not covered by PDO certifications, either due to the high transaction cost or because it does not fall within the areas covered by specifications. For products outside the areas where these labels are already present, the activation of new PDO brands is a costly and complex practice that is not always accessible. However, these cheeses could be protected by the optional quality term, MPL.

After the definition of alternatives, we proceeded to select the attributes through a three-step process. First, we selected a pool of attributes through a literature review of choice experiments applied to cheeses. At the same time, interviews were carried out with mountain cheese producers to detect their needs. Finally, the attributes were confirmed through focus groups. The three main attributes that emerged from the literature were origin, type of milk used, and price.

The origin attribute has been divided into local, national, and import. In the literature, it is noted that local origin is generally highly appreciated by consumers. However, the importance of national origin also emerged in some articles. The third attribute, foreign (from import), was inserted to allow a better comparison between the levels.

In a conjoint choice experiment to define Albanian consumer

preferences for the use of powdered milk in cheese-making. Imami et al. (2016a) found that local origin (defined as domestic vs. imported) was one of the most important attributes in all four groups. A preference for cheeses of domestic origin emerged in all four groups. Similar results were evident in further research conducted by the same authors (Imami et al., 2016b) on the preferences of Albanian consumers for a local cheese, where the origin was considered among the most important attributes. Origin as an important factor at the moment of choice also emerged from the research of Wang et al. (2015) on U.S. cheese consumers. In their paper, they found that origin influences people who are more attentive to price and that it influences those who seek quality to a lesser extent. These findings indicate that local production leads to the highest WTP.

The study of Viscecchia et al. (2019) investigated consumers' preferences and WTP for functional mozzarella cheese. The origin attribute (expressed as 'from Puglia') was significant for the Italian consumers' choice of the product. In monetary terms, origin appeared to be the most rewarding attribute. The researchers underlined how this could be linked to Puglia's positive reputation as a mozzarella-producing region. The influence of origin on WTP also appeared in Grashuis and Magnier's study (2018), which analyzed consumer perceptions of farmer co-operatives, using a DCE with cheese consumers in the United States. In their paper, origin was divided into three levels: local, from Wisconsin, and not indicated. Similar results were found by Slade et al. (2019) and Norris and Cranfield (2019) who examined the impact of foreign geographical indications on Canadian consumers with three different kinds of cheese (asiago, feta, and gorgonzola), and on four processed dairy products (Gouda and cheddar cheese, ice cream, and yogurt). Both studies found that Canadian consumers were willing to pay more for cheese produced locally. However, Slade et al. (2019) also found that Canadian consumers were willing to pay more for cheese that was produced in traditional production regions, even if it was foreign. Finally, Merlino et al. (2022) analyzed Italian consumers' local origin perceptions of quality, sustainability, and market availability. Their analysis showed that, among those who recognized local origin as one of the principal attributes, there was a clear correlation between local production and higher perceived product quality because it was linked to tradition and territory.

The second attribute selected from the literature was the health benefits of the milk used for producing cheese. The interest of consumers in this type of product has dramatically increased. This can be seen by the evolution of the market, whose size was estimated at USD 280 billion in 2021 and was projected to reach USD 586 billion by 2030 (Grand View Research, 2023a, 2023b). In the last few years, the dairy industry has entered the 'health' niche market by taking advantage of the natural benefits of milk and cheese or developing new dairy products and integrating them with other components to increase their benefits. Various approaches have been successfully employed in this regard, such as the addition of probiotic bacteria, prebiotic oligosaccharides, and fiber, conjugated linoleic acid, and omega-3 fatty acids, which are undoubtedly some of the most broadly disseminated strategies to produce healthy dairy products (Ortiz et al., 2017). To express this attribute, we chose as levels the use of omega-3 milk, A2 milk, and generic milk.

Omega-3 fatty acids have important effects on human health. In particular, they have positive effects on the cardiovascular system and are associated with the treatment of rheumatoid arthritis (Ruxton et al., 2004). Dairy products are among the most suitable food products for enrichment with omega-3 because of their high frequency of consumption and ideal storage conditions (Bermúdez-Aguirre and Barboza-Cánovas, 2012). The presence of those fatty acids in milk can be enriched either by adding this nutrient directly to milk or by feeding cows with flax seeds or fresh grass (Vecchio et al., 2016; Viscecchia et al., 2019). Due to their wide use and positive effects, omega-3 acids are very familiar to consumers (Grunert, 2010) and they are one of the dairy health-related properties most analyzed in the literature (Bimbo

et al., 2017). Despite this, conflicting results have emerged in the literature on consumer opinion towards this enrichment. In a DCE conducted by Bechtold and Abdulai (2014) in a German sample, this attribute was chosen both by those who were more inclined towards functional products and by those who were sceptical or neutral towards these products. According to the authors, consumers' preference for this product was linked to familiarity. From Viscecchia et al. (2019) analysis, conducted on an Italian sample, it emerged that consumer preferences were heterogeneous. Part of the sample was positively influenced by the presence of this attribute, while the others were negatively influenced. Among those who appreciated the presence of this component, the analysis showed that enrichment through feeding cattle with special feed was preferred.

A2 milk is a milk that can be produced from rustic breeds, such as the 'Pezzata Rossa' and 'Bruna' cows (Woodford, 2007), which are suitable for rearing in marginal areas, such as mountain areas. The name of this milk derives from the characteristics of the composition of the beta-casein produced by these cattle breeds. In these more rustic breeds, the production of beta-casein A1 is reduced or absent in favor of a higher production of beta-casein type A2. This difference has effects at the time of protein digestion. At the point of the cleavage of beta-casein A1, β -casomorphine 7 (BCM-7) is formed, which is an opioid with inflammatory effects for the intestine. Since beta-casein A1 is not present in milk A2, this is not the case when the milk is digested (Fernández-Rico et al., 2022). For this reason, A2 milk seems to have beneficial effects on the reduction of digestive intolerance. However, discussion on this topic is ongoing (Kaskous, 2020; Park and Haenlein, 2021; Giribaldi et al., 2022). For its healthy characteristics and the possibility of producing it naturally through rustic breeds of cattle, this kind of milk could represent a means for mountain dairy farms to attract the market niche of consumers who have abandoned the consumption of milk due to the discomfort experienced (Fernández-Rico et al., 2022). The production of this type of milk has begun to spread widely among large companies but also among small businesses, farms, and manufacturers of artisanal products (Nystrom and Winston, 2016; Dantas et al., 2023). The interest in this type of milk also emerged from the interviews conducted with mountain producers.¹ Despite its diffusion in the market, only a few scientific articles in the literature have analyzed the relationship between consumers and this type of milk. To the best of our knowledge, there are only three articles that have studied the consumption of A2 milk (Bentivoglio et al., 2020b; Harwood and Drake, 2020; Oliveira et al., 2022). Only one article has analyzed the consumption of A2 cheese (Mendes et al., 2019), focusing in particular on the sensory characteristics of that product. To try to cover this gap and meet the producers' needs, the level 'A2 cow milk' was included in the analysis. The third attribute, 'generic cow milk', was inserted to allow a better comparison between the levels.

The final attribute, price, was selected to allow estimating the WTP for other attributes. The levels of this attribute are based on realistic average prices detected from a market analysis conducted in December 2022. Three specific price levels were identified for the different cheese types: two for the cheeses with a quality label and one for the cheese without a quality label. The cheese under evaluation was defined in the DCE as a 'short-ripened cheese', sold in pieces of 250 g. The choice of this kind of cheese was the result of in-depth interviews conducted with a cattle farm that is developing this product. The size was chosen because it is the most common in the Italian market for this cheese.

To confirm the final attributes and levels to use in the analysis, three focus group sessions were developed between December 2022 and January 2023, in which 19 participants took part. Each focus group discussion was composed of six to seven participants (Masadeh, 2012),

¹ These interviews were conducted thanks to the operational group (OP) I-MILKA2-Innovation in Dairy Production Using A2 Milk and Assessment of the Beneficial Effects on Human Health (Project ID no: 29228).

of whom 52 % were male and 48 % female, aged between 23 and 69 years. During the focus group, a broad range of short-ripening cheese with different features obtained from local supermarkets was provided to the participants to encourage them to express their opinions. The results of the focus groups revealed the importance of the attributes chosen for the analysis, in particular, the origin and the price, and the consumers' interest in the proposed labels. However, the focus groups showed that consumers are not aware of the existence of A2 milk but are interested in its properties. This outcome could be linked to the fact that this type of milk is still innovative for the Italian market and its use is not widespread.

The final set of attributes selected for analysis, with each one divided into three levels, is shown in Table 1.

After the definition of the attributes and levels, Ngen software (ChoiceMetrics, 2018) was used to generate an efficient experimental design (D-error = 0.193) for main effect estimation with 27 choice sets divided into three different groups. In a choice set, there was also an opt-out option: 'neither of the products presented'. This option made the analysis more consistent with the demand theory and made the choice more realistic because it allowed the respondents to act as they would in real shopping situations. An example of a choice set is shown in Fig. 2.

To make the different alternatives clear to each respondent before presenting the choice cards, the cheese under analysis and the attributes used in each cheese choice set were described and briefly explained in the questionnaire, including the description of the logos employed in the questionnaire. This explanation using text and figures was useful to better explain, in measurable and clearly interpretable terms, the level of the attributes we proposed in the DCE (Mazzocchi and Sali, 2022). To reduce hypothetical bias, before answering the DCE questions, a cheap talk script was presented to respondents (Cummings and Taylor, 1999; Hensher, 2010). This methodology consisted of a brief text in which the gap found in previous studies between what respondents indicate in surveys and what they do in real life was explained. The participants were also informed of the risk of overestimating their WTP for hypothetical products. They were asked to respond as they would in real life, taking into account their budget constraints. This led them to reveal their real preferences.

3.3. Model specification

Based on Lancaster's theory of value (Lancaster, 1966) and on the random utility theory of Thurstone (1927), DCE is a quantitative approach. This methodology consists of combining the attributes and the level of attributes of a certain product to analyze consumer choices. The participants have to choose between different products in a hypothetical market situation very similar to those they often face in the real market. In each purchasing situation, individuals are asked to choose between several alternatives described by a set of attributes and their levels. The DCE makes it possible to estimate the relative importance of the different attributes of the product, the trade-offs between these

attributes, and individuals' preferences for each type of product. The inclusion of price among the product attributes allows researchers to estimate the marginal WTP for each attribute. By examining the trade-off between the chosen attributes and levels, it is possible to obtain the individuals' utility in a choice situation, divided into an observable component, defined by the chosen product's attributes and a random unobservable component (McFadden et al., 1977; McFadden, 1986). The utility function of an individual is expressed as:

$$U_{jn} = V_{jn} + \varepsilon_{jn} \quad (1)$$

where,

' U_{jn} ' represents the total utility derived by an individual n from choosing an alternative j among a set of available alternatives in a given choice situation. ' V_{jn} ' represents a systematic component observable by the researcher, and ' ε_{jn} ' is the random error term not observable by the researcher.

The utility function for alternative j , if we assume linearity, can be expressed as:

$$V_{jn} = \beta ASC_{jn} + \delta X_{jn} + \alpha P_{jn} \quad (2)$$

where,

' j ' is the 'PDO', 'MPL and 'no label cheeses' proposed, ' n ' is the choice of the single consumer, ' ASC ' is the alternative-specific constant (ASC). ' X_{jn} ' are the other attributes (i.e., health benefit milk used and origin) selected. ' P_{jn} ' is the price of alternative j . β are the coefficients of the ASC. ' δ ' is the coefficient representing the effect of the j th product attributes on the utility for the j th product, and α are the coefficients representing the effect of the j th product price on the utility for the j th product.

The probability of choosing an alternative i rather than an alternative j (for any i and j within choice sets, T) is given in Eq. (3):

$$Prob\{j \text{ is chosen}\} = \frac{e^{\mu V_{jn}}}{\sum_{k=1}^j e^{\mu V_{kn}}} \quad \forall k \in T, \quad (3)$$

where μ is a scale parameter that is inversely related to the variance of the error term. This equation represents the multinomial logit (MNL) model (McFadden et al., 1977) and is considered the baseline model for DCEs. However, this model presents two principal limitations. It is unable to capture the heterogeneity of individual tastes and assumes the independence of irrelevant alternatives (Czine et al., 2020; Fiebig et al., 2010).

To avoid those two limitations, we chose to estimate a random-parameter logit (RPL) model. The RPL model extends the MNL model by allowing it to capture preference heterogeneity through randomizing the coefficients of β among the respondents (McFadden et al., 1977; Rigby and Burton, 2003). It resolves the independence of irrelevant alternative assumptions by applying a flexible variance-covariance structure for the random term (Czine et al., 2020). Those characteristics improve the model fit (Hensher and Greene, 2003) and our understanding of choice behavior (McFadden and Train, 2000). The random parameters in this study were assigned to the ASC because this estimate includes all attributes of the product not accounted for in a holistic way. According to this model, the coefficient vectors for person n are given by Eq. (4):

$$\beta + \delta = \bar{\beta} + \bar{\delta} + \sigma \lambda_n \quad (4)$$

where $\bar{\beta}$ and $\bar{\delta}$ are the estimated mean, σ is the standard deviation of the marginal distribution of β and δ , λ_n is a random term assumed to be normally distributed with mean zero and unit standard deviation.

In Eq. (4), the term $\sigma \lambda_n$ is a person's specific vector of deviations from the mean value of β s and δ s. The λ_n is described by an underlying continuous distribution of the attributes and the ASC. In this study, ASCs (ASC_Mountain label, ASC_PDO, ASC_No label) were coded as dummies and assumed to be normally distributed in the population, since

Table 1
Choice experiment attributes and levels.

Attributes	Mountain food product levels	PDO levels	No quality label levels
Origin	Regional (local origin)	Regional (local origin)	Regional (local origin)
	National (from Italy)	National (from Italy)	National (from Italy)
	Foreign (import)	Foreign (import)	Foreign (import)
Health benefit	Omega-3 cow milk	Omega-3 cow milk	Omega-3 cow milk
	A2 cow milk	A2 cow milk	A2 cow milk
	Generic cow milk	Generic cow milk	Generic cow milk
Price (€/250 g)	€4.00	€4.00	€3.00
	€5.00	€5.00	€3.50
	€6.00	€6.00	€4.00

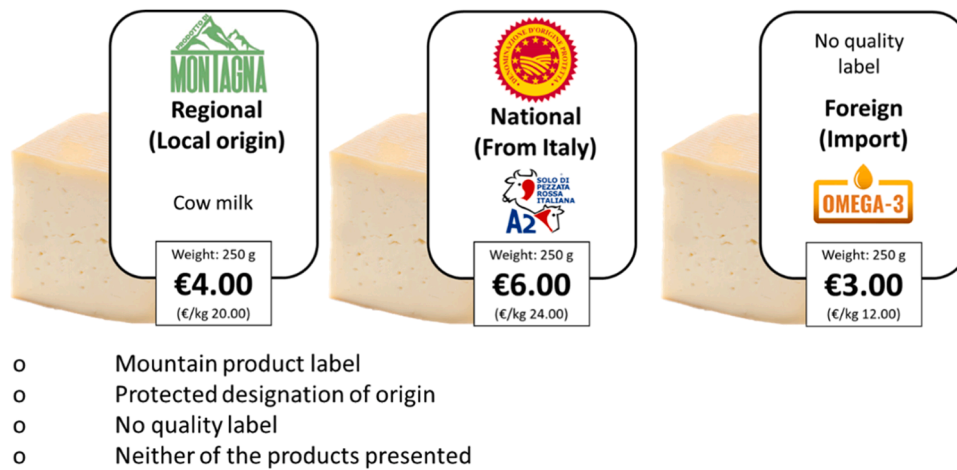


Fig. 2. An example of a choice set.

consumers may like or dislike each type of cheese. Regarding ‘origin’ and ‘health benefit milk’ attributes, they were effect-coded and assumed to be normally distributed. For the ‘origin’ attribute, we considered ‘imported’ as the reference level, and we estimated coefficients for ‘local’ and ‘national’. For the ‘health benefit milk’ attribute, we considered ‘conventional’ as the reference level, and we estimated coefficients for ‘A2 milk’ and ‘omega-3 milk’. Finally, we estimated three coefficients for the cheese-specific prices (Price-Mountain label, Price-PDO, Price-No label), which were considered fixed (i.e., non-random) to ensure finite distribution moments for the WTP.

The total WTP of a product j versus the baseline alternative (‘none of the presented products’) was calculated as the difference between the marginal utilities of an alternative divided by the marginal utility of the price parameter. Eq. (5) expresses an example equation where the WTP was calculated for a cheese with the MPL and the attributes local and national origin were expressed as the best level (effect-coded as 1), while the attributes A2 and omega-3 were expressed as the lowest level (effect-coded as -1).

$$WTP_{\substack{\text{mountain, origin} \\ \text{best level, health milk} \\ \text{lower level}}} = - \frac{(\beta_{\text{mountain}} + (\delta_{\text{local}} * 1) + (\delta_{\text{national}} * 1) + (\delta_{\text{A2}} * -1) + (\delta_{\text{omega}} * -1))}{\alpha_{\text{mountain price}}} \quad (5)$$

This equation relies on the estimation of the marginal rate of substitution of any two coefficients. The determination of WTP is possible because the price coefficient is a monetary one.

The WTP for the label, the origin, and the kind of milk can also be estimated for each type of cheese, as expressed in Eq. (6):

$$WTP_{\text{specific attributes } j} = - \left(\frac{\frac{d}{dX_j} \delta X_j}{\frac{d}{dP_{kn}} \alpha_k P_{kn}} \right) = - \left(\frac{\delta}{\alpha_k} \right) = - \left(\frac{\delta_{\text{specific attributes}}}{\alpha_{\text{price}}} \right) \quad (6)$$

The marginal WTP of a product j versus any other product i was given by the difference between the WTP of the two products (Lusk and Schroeder, 2004). Finally, the confidence intervals of the WTPs are calculated with the Krinsky and Robb parametric bootstrapping method using 1000 random repetitions (Krinsky and Robb, 1986).

The data analysis was conducted using NLOGIT 5.0 software. The coefficients, the WTP, and their confidence intervals were estimated with 1000 random draws.

4. Results

4.1. Sample properties

The final sample consisted of 511 participants, who were representative of the Italian population. Table 2 shows the socio-demographic characteristics of the sample.

Approximately 60 % of the sample came from northern Italy and was made up of 51 % women. The average age of the respondents was 50, and about 60 % of them were over 45 years old. The level of education in the sample was high. About 50 % of the sample had a diploma, while approximately 30 % had a degree. The average size of households was around three, and the most widespread average annual income was between €21,000 and €35,000 (35 %).

Among the respondents, 97 % said they consumed cheese at least once a month and about 60 % said they consumed it at least once a week. Among the types of cheese, the respondents stated that they consumed mainly fresh cheese (57 %), short-ripened cheese (50 %), and long-aged cheese (63 %). The consumption of cheeses of other species, such as

sheep and goat, or mixed cheeses, was rare. Approximately 30 % of the sample said they had never used this type of product.

The most common place where sample purchases of cheese were made were supermarkets (75 %). Only around 20 % of the sample indicated that they ‘frequently used’ other sales channels, such as discounter, traditional shops, and local producers. The near-total absence of online purchases was significant. In the sample, 76 % said they never used this sales channel.

A large portion of the sample (54 %) indicated that, on average, they spent between €10 and €30 per month on buying cheese. However, 40 % of respondents said they spent more than €30 per month, and among them, 13 % exceeded €50.

Turning to the factors considered at the time of purchase, the respondents stated (on a Likert scale from 1, very unimportant, to 7, very important) that they considered safety as the most important factor (6.03 ± 1.12), followed by quality (6.00 ± 1.06), and organoleptic characteristics (5.88 ± 1.10). The brand was the factor with the lowest declared score (4.62 ± 1.39).

Table 2
Socio-demographic classes and levels.

Variables	Categories	Percent	Variables	Categories	Percent
Gender	Male	48.92	Household annual net income	< €10,000	9.59
	Female	51.08		€11,000–€20,000	18.40
Area	Northwest	28.77		€21,000–€35,000	35.23
	Northeast	30.14		€36,000–€50,000	21.14
	Central	22.11		€51,000–€75,000	10.18
	South and Sicily	18.98		> €75,000	5.48
Age	18–24 years	8.81	Level of study	Primary school	0.59
	25–35 years	15.85		Middle school	9.59
	36–45 years	15.07		Secondary school	51.47
	46–55 years	15.85		Graduation	31.31
	56–65 years	18.79	Household size	Postgraduate	7.05
	65+ years	25.64		Average	2.77

Finally, we investigated the knowledge of different quality marks that distinguish cheeses, paying particular attention to the two marks chosen for the DCE. Among the sample, 86 % said they knew the PDO label, while only 48 % said they knew the MPL. Before completing the DCE, consumers were informed about the MPL with a description of the properties of this quality label and by showing them the logo.

Turning to the relationship of the respondents with the mountains, 82 % of the respondents said they visited the mountains at least once a year. Of these, 21 % said they visited at least once a month. Tourism was among the main reasons why respondents visited the mountains. Regarding cheese consumption, 86 % of those surveyed said they consumed cheeses produced in the mountains at least once a year, of which 30 % consumed them at least once a month. The respondents agreed (on a Likert scale from 1, strongly disagree, to 7, strongly agree) that mountain cheese has a good taste (6.01 ± 1.05), is a cultural heritage (5.87 ± 1.19), is important for local tradition (5.82 ± 1.1), and is important for the rural economy (5.82 ± 1.18).

Regarding the relationship of respondents to cheeses with health properties, 72 % of the sample said they did not know what they were. However, after reading a definition, 67 % of the sample said they bought them at least once a year. The sample agreed (on a Likert scale from 1, strongly disagree, to 7, strongly agree) that those kinds of cheeses were expensive (4.82 ± 1.33), but useful in combating (4.67 ± 1.49) or preventing (4.64 ± 1.46) health problems.

4.2. Descriptive analysis of the discrete choice experiment results

Fig. 3 presents the selection frequencies for the different proposed attributes. Among the three proposed labels, there were no major

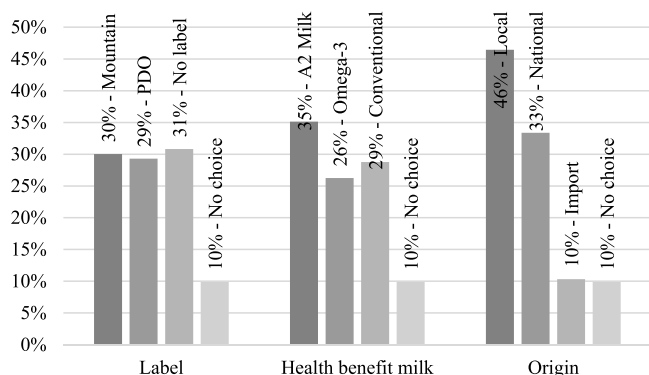


Fig. 3. Total percentage of choice for each attribute in all choice sets.

differences in the frequency of choice. The situation was different for the health benefits milk proposed. The most chosen was A2 milk (35 %), while omega-3 milk was chosen less than conventional milk. Finally, for the origin attribute, there was a clear preference for local (46 %) and national (33 %) origins over imported products (10 %).

4.3. Random-Parameter logit model estimation for the importance of cheese attributes and types

The results from the RPL model (Table 3) showed that between the cheese-specific constants, the MPL and the PDO are statistically significant, while 'no label' was not. This indicates that consumers prefer labelled cheeses to the option of no choice. They do not have specific preferences for non-labelled cheeses.

As expected, the effect of price on the choice of different kinds of cheese was statistically significant and negative. This indicates that increases in price decreased the demand for all kinds of cheese, which is in line with demand theory.

Regarding the attributes related to origin, we observed that both local and national coefficients were statistically significant and positive. These results suggest that the origin indication can attract consumers.

The situation changed with regard to the variables related to the type of milk and health benefits. A2 milk had a significant and positive coefficient. In the case of omega-3, however, the coefficient was negative. This indicates that A2 milk-produced cheeses attracted consumers, while cheeses containing omega-3 milk were not appreciated by the respondents.

Finally, the standard deviations of random parameters all emerged as significant. This result indicates that the choices of the respondents were heterogeneous, showing different preferences. This implies that the simple average of choices that can be detected through conditional logit is not enough to express the behavior of choice. Consequently, it was confirmed that the chosen model was more accurate and better expressed the preferences of respondents than a conditional logic model.

After the estimation of the RPL model, using the parameters calculated as stated in Eqs. (5) and (6), the WTP for each cheese type and related characteristics were estimated. The mean of these WTP estimates is presented in Table 4. The WTP for no label cheese for all the attributes under analysis showed an insignificant value. For both MPL cheese and PDO cheese, every attribute under analysis showed a significant value. Among the labels, the PDO was awarded a slightly higher WTP, equal to €4.55/250 g compared to the MPL, where it was equal to €4.49/250 g. These values are in line with the current average market price (€4.5/250 g) for products with similar characteristics.

As emerged from the RPL model, even in the case of WTP, the most interesting attribute for respondents is their local origin. This attribute has the highest WTP values of €1.50/250 g for PDO price vector and €1.19/250 g for the mountain price vector. In the case of national origin, the WTP was significant, and the values were €0.78/250 g for the PDO price vector and €0.62/250 g for the mountain price vector. Between the attributes linked to the health benefits of milk, a positive WTP was found for A2 milk of €0.29/250 g for PDO price vector and €0.23/250 g for the mountain price vector. The WTP for the omega-3 attribute was negative, so respondents did not show WTP for products with this attribute.

In addition to testing the effect on the WTP of the individual attributes, we also tested the WTP of two different scenarios. In one scenario, all attributes were considered base-level, while in the second, all attributes were considered best-level. In the first scenario, the WTP recorded for cheese with a MPL but without particular attributes was €2.58/250 g, while that of a PDO cheese was €2.15/250 g. Both WTPs detected were lower than the market average for products with similar characteristics. In the second scenario, the highest WTP, €6.95/250 g, was detected for a PDO cheese, and all attributes were considered to be at the best-level. While for a cheese with a MPL and all attributes as best-level, a WTP of €6.40/250 g was detected.

Table 3
Random-parameter logit model output.

CHOICE	Coefficient	Standard error	z	Prop. $ z > Z^*$	95% Confidence Interval		
Random parameters in utility functions							
LOCAL	1.052	0.061	17.180	0.000	0.932	1.172	***
NATIONAL	0.549	0.048	11.360	0.000	0.454	0.644	***
A2-MILK	0.206	0.041	5.050	0.000	0.126	0.286	***
OMEGA-3	−0.125	0.045	−2.770	0.006	−0.213	−0.037	***
ASC-MOUNTAIN	3.957	0.327	12.110	0.000	3.316	4.597	***
ASC-PDO	3.190	0.337	9.460	0.000	2.529	3.852	***
ASC-NOLABEL	0.388	0.445	0.870	0.384	−0.485	1.260	
Non-random parameters in utility functions							
P-MOUNTAIN	−0.880	0.064	−13.860	0.000	−1.005	−0.756	***
P-PDO	−0.701	0.064	−10.880	0.000	−0.827	−0.574	***
P-NOLABEL	−0.234	0.123	−1.900	0.058	−0.476	0.008	*
Standard deviations of the random parameters							
NsLOCAL	1.030	0.063	16.460	0.000	0.907	1.152	***
NsNATION	0.647	0.059	11.000	0.000	0.532	0.762	***
NsA2-MILK	0.456	0.048	9.530	0.000	0.363	0.550	***
NsOMEGA-3	0.581	0.050	11.620	0.000	0.483	0.679	***
NsASC-MOUNTAIN	1.456	0.106	13.790	0.000	1.249	1.663	***
NsASC-PDO	1.364	0.108	12.590	0.000	1.151	1.576	***
NsASC-NOLABEL	1.725	0.117	14.690	0.000	1.495	1.955	***

Note: ***, **, * ==> Significance at 1 %, 5 %, 10 % level.

ASC ==> Alternative-specific constant.

P ==> Price vector.

Table 4
Means of willingness to pay estimates.

	Coefficient	Standard Error	Prob. $ z > Z^*$	
<i>WTP for each specific attribute</i>				
Local/p mountain	1.195	0.107	0.000	***
National/p mountain	0.623	0.066	0.000	***
A2/p mountain	0.234	0.050	0.000	***
Omega-3/p mountain	−0.142	0.055	0.010	***
Local/p PDO	1.501	0.161	0.000	***
National/p PDO	0.783	0.097	0.000	***
A2/p PDO	0.294	0.067	0.000	***
Omega-3/p PDO	−0.178	0.070	0.011	**
Local/p no label	4.495	56.127	0.936	
National/p no label	2.345	32.937	0.943	
A2/p no label	0.879	13.357	0.948	
Omega-3/p no label	−0.534	7.655	0.944	
Mountain/p mountain	4.495	0.137	0.000	***
PDO/p PDO	4.553	0.175	0.000	***
No label/p no label	1.656	29.994	0.956	
<i>WTP for the cheese with every attribute at lower-level vs baseline option</i>				
Mountain	2.585	0.252	0.000	***
PDO	2.153	0.364	0.000	***
No label	−5.530	123.792	0.964	
<i>WTP for the cheese with every attribute at best-level vs baseline option</i>				
Mountain	6.405	0.171	0.000	***
PDO	6.953	0.252	0.000	***
No label	8.842	66.590	0.894	

Note: ***, **, * ==> Significance at 1 %, 5 %, 10 % level.

5. Discussion

From the analysis, it emerges that most respondents knew the PDO label, while less than half of the sample said they did not know the MPL. Most of the sample recognized the PDO label as expected. Italy is the country with the highest number of geographical designations recognized by European law among cheese products (Martins and Ferreira, 2017). Some researchers have identified Italy as a country that is PDO-oriented, reporting high consumer awareness of this label, a strong tradition of using this quality scheme, and a higher interest in obtaining information through quality labels (Verbeke et al., 2012; Grunert and Aachmann, 2016). We also expected low recognition of the MPL. This is in line with the literature and represents one of the major issues for this label (Bassi et al., 2021; Mazzocchi and Sali, 2022; Pagliacci et al., 2022; Staffolani et al., 2022). Despite this finding, it is interesting to note that,

from the results of the RPL model, the MPL was preferred over 'no choice' as much as the PDO. This result is in line with Brun et al. (2020), where similar findings were reported for honey consumers, but differs from the literature related to cheese, in which only the effect of the double labels (PDO + Mountain) has been studied to date. According to Menozzi et al. (2021, Menozzi et al., 2022), the utility given to cheese by these two labels together is higher than the utility given by the presence of the PDO label alone. The mountain label alone has shown the same utility as the PDO and could, therefore, confirm the potential of this label as a certification to provide a strategic advantage to mountain livestock farms that cannot produce PDO products but still want to differentiate their products.

From the analysis of the attributes, the first result was that, as expected, origin influences the behavior of the consumer. Respondents were more inclined to choose products where there was an indication of national or local origin than products that were imported. In line with the literature, local origin, understood as being produced in a specific region, was one of the most important attributes for the sample in the cheese choice (Bernab   et al., 2010; Maroz et al., 2016; Imami et al., 2016a, 2016b; Visc  chia et al., 2019). Local origin could therefore, be one of the factors to leverage when presenting the product to the consumer.

The last attribute under analysis was the health benefits of milk. The analysis revealed a negative propensity among consumers toward cheeses produced with omega-3 milk. This could be linked to consumers' perceptions that dairy products enriched with omega-3 are less natural. They find it difficult to associate the flavor of other omega-3-rich products, such as fish, with the flavor of dairy products (Bimbo et al., 2017). This is also in line with the results of Visc  chia et al. (2019), who in their work found that out of four consumer groups, only two appreciated the enrichment of cheese with omega-3, while the other groups were either not interested or interested only in cheeses produced with milk naturally containing omega-3. However, consumers were well-prepared to choose cheeses made with A2 milk. This could be linked to the fact that, contrary to what happens for omega-3, A2 milk is 'naturally' produced by rustic cows with a less selected genetic heritage. Therefore, it was perceived as more natural by the respondents and was a preferred choice. The positive effect on consumers can be an additional opportunity for producers in mountainous areas, who can leverage this healthy type of milk to further differentiate on the market.

Finally, we found a positive WTP, both for the MPL and for the PDO

label. These results are in line with the literature (Garavaglia and Marcoz, 2014; de-Magistris and Gracia, 2016; Menozzi et al., 2022; Stiletto and Trestini, 2022; Zanchini et al., 2023), confirming the importance of the identifiability of the product through quality schemes that guarantee a link with the place of origin. However, the WTP is higher for products with the PDO label than for mountain products. In particular, for the PDO cheese with all the attributes considered to be at the best level, a WTP of €6.95/250 g was found, equal to +€3.95, compared to generic products on the market today and +€2.45, compared to products with only the quality label. While the cheese with MPL and all attributes as best level was found to have a WTP of €6.40/250 g, equal to +€3.40, compared to generic products on the market today and +€1.90, compared to products with 'no quality labels'. This result could be related to the greater awareness of consumers about the PDO label, which leads to greater trust in these quality schemes and, therefore, a higher WTP (Fandos Herrera and Flavián Blanco, 2011). Despite the lower WTP compared to the PDO, the MPL was recognized as having a higher value than the base product, thus confirming its potential as a quality label.

6. Conclusion

This paper makes a methodological and empirical contribution to the research literature on the MPL label. From a methodological point of view, the use of labelled DCE allowed us to estimate different coefficients (marginal utilities) for the price attribute based on the different types of cheese. This made it possible to estimate more specific and precise WTP values.

The empirical contribution of the paper comprises an increase in information on consumer attitudes towards the MPL and an enhanced understanding of consumer perceptions of the positive characteristics of this quality label.

The results show that consumers do not know about the MPL. However, once they became aware of it, they liked it as much as the PDO. It can be deduced that better communication is essential to increase consumer awareness. This research also presents a contribution to theory for the analysis of consumer behavior towards this label. At the time of choice, respondents opted for MPL as much as the PDO, at least in the case of cheese. This aspect represents an opportunity for companies that decide to apply for MPL without incurring the costs or bureaucracy connected to the PDO. Therefore, this quality label could be a substitute for companies that cannot join the PDO label for various reasons.

Although the MPL was preferred, consumers recognized a greater WTP for the PDO label. This is probably due to the widespread use of this quality brand and its familiarity on the market compared to the MPL, which was recently introduced in Europe. However, we detected a premium price for the MPL applied to the cheeses, so its potential was confirmed. Our results have important marketing implications for the Italian cheese sector. The findings highlighted that European food quality certification schemes, such as the PDO and the MPL, can lead consumers to certain product preferences, according to their quality, perceptions, and trust in the label.

Finally, the respondents showed interest in cheeses made with healthy A2 milk. This could have a significant marketing implication for mountain milk producers, who use hardy breeds particularly suited to less-favored areas and pastures. The production of cheeses based on A2 milk could allow them to enter the market niche of consumers attentive to health aspects, allowing for a diversification of production. However, a premium price has not been recognized. For this reason, it is essential to strengthen communication and marketing strategies for this type of milk.

Policymakers could help producers who want to differentiate themselves through the use of the optional quality term MPL by implementing *ad hoc* communication campaigns to make consumers aware of the existence of this mark. In the second pillar of the Common

Agricultural Policy, the rural development policy provides for financeable measures that affect mountain areas, such as quality schemes and actions to improve the competitiveness of companies. The diffusion of the MPL brand through these measures could be a strategy to enhance mountain farms that operate according to a sustainability model, mainly using resources present in the area. The intervention of policymakers would be necessary to define the properties of A2 milk and its possible use on the label as a promotion factor in Europe.

The main limitation of our study was the hypothetical bias. The respondents were not in their usual context of choice but were in a fictitious market, and this could change the choice. The main disadvantage of DCE approaches lies in the cognitive difficulty of multiple complex choices between bundles with many attributes and levels. Since respondents are typically presented with a large number of choice sets, there is scope for both learning and fatigue effects. To avoid this problem in this research, we divided the sample into three groups to reduce the number of choices for each surveyed.

Future research could include an investigation of other consumers' personal characteristics, such as socio-demographic, to better understand the consumers' needs and feelings about the MPL certification. Other quality labels could be integrated, such as organic and special quality labels. It would be interesting to test the procedure on different products and take into consideration whether to use real-choice experiment contexts or real auction mechanisms. Future studies could be conducted in other European regions to confirm the results observed in Italy.

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Ethical statement

All participants were fully informed about why the research was being conducted, how their data were used and if there are any risks associated with it. Pursuant to Regulation (EU) 2016/679, GDPR (General Data Protection Regulation), and Legislative Decree 196/2003, and subsequent amendments and additions, all information collected with the questionnaires were used exclusively for scientific research purposes. Furthermore, the data collected in the context of this survey are protected by statistical confidentiality and therefore cannot be communicated or disseminated except in aggregate form, so that there is no individual reference, and can only be used for statisticians.

Declaration of Competing Interest

All authors declare that there are not any financial and personal relationships with other people or organizations that could inappropriately influence (bias) the work reported in this paper.

Data availability

Data will be made available on request.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at [doi:10.1016/j.fufo.2023.100270](https://doi.org/10.1016/j.fufo.2023.100270).

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