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Source: Mountain Research and Development, 42(3)

Published By: International Mountain Society

URL: https://doi.org/10.1659/MRD-JOURNAL-D-21-00021.1

Mountain Research and Development (MRD)
An international, peer-reviewed open access journal
published by the International Mountain Society (IMS)
www.mrd-journal.org

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Assessing Italians' Preferences for Mountain Beef Production Using a Best–Worst Scaling Approach

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The European Union (EU) regulation on mountain food products represents a great opportunity for beef producers in mountain areas, particularly as the quality-certified food has received more attention from European consumers in recent years. However, for a food-quality system—such as the European Commission's mountain labeling scheme—to be effective, the regulation standards must meet consumer expectations. In Italy, there are few studies on consumer preferences regarding beef and none focused on meat produced in mountain areas. To help fill this gap, this study assessed the preferences of Italian citizens for attributes associated with beef produced in mountain areas and contrasted the results with the EU regulation on mountain food products. Furthermore, factors that explain the heterogeneity of Italians' preferences regarding beef production attributes were analyzed. Data were collected online using a consumer panel, and a best–worst scaling method and latent class analysis were used. The results indicate that Italians expect mountain beef to be healthier and produced according to higher animal welfare standards. Such preferences reveal the existence of a gap between what Italians expect and the quality standards of the EU regulation on mountain food products, a situation that may jeopardize the objectives of the European Commission's mountain labeling scheme.

Keywords: *mountain areas; mountain products; beef production; Italy; best–worst scaling; latent class.*

Received: *30 April 2021* ***Accepted:*** *21 April 2022*

Introduction

In Europe, most beef production comes from intensive husbandry. This is subject to increasing societal pressure due to its negative externalities both in terms of high greenhouse gas emissions and large water and land footprints (Willett et al 2019) and also damage to human health (Mattiuzzi and Lippi 2020). Traditional mountain agricultural activities (grazing, mowing, etc) could be very effective in offsetting these externalities, at least partially. For instance, extensive husbandry with traditional cattle breeds can help to prevent soil erosion because autochthonous cattle are better adapted to mountain environments (Scotton et al 2014). Like other products from mountain areas, beef could benefit from the positive reputation that mountain products have for some consumers who associate them with health, purity, authenticity, and simplicity (Giraud and Petit 2003; Schjøll et al 2010).

Despite this, European consumers cannot easily identify mountain food products on the market (Schjøll et al 2010; Wymann von Dach et al 2013). To overcome this problem and to foster the development of the mountain agricultural sector, the European Commission has published rules on a quality scheme for mountain food products (EU 2012, 2014). These rules establish that the voluntary quality term "mountain product" can only be applied to food products intended for human consumption and that the animal feedstuff, as well as the raw materials used to produce food products, must originate from mountains. The general guidelines for the definition of mountain areas, by each member state, can be found in Article 32(2) of European Union (EU) Regulation 1151 (EU 2012). Mountain producers who are willing to use the label on beef must meet 3 specific conditions. First, beef must be produced from animals that lived at least the last two thirds of their lives in mountain areas. In the case of transhumant animals, the minimum rearing time in mountain areas is reduced to one quarter of their lifetime. Thus, if the transhumant animal is slaughtered at the age of 4 years, it must have lived for at least 1 year in a mountain area for its meat to bear the mountain label. Second, animals may be fed with up to 40% feedstuff from other areas if the annual animal diet cannot be produced in mountain areas. Third, slaughter and processing plants may be located outside mountain areas with a maximum distance from the mountain area of 30 km. Hence, the certification as a mountain product may represent an interesting market opportunity for mountain beef farmers (Tregear et al 2007). Recent studies have shown, for instance, that consumers generally accept the EU mountain label, despite their scant knowledge of its definition (Finco et al 2017; Bassi et al 2021).

However, as for other labeling schemes, the mountain quality term needs to overcome some critical points at both policy and consumer levels. For instance, at the policy level, all European countries should use the delegated acts provided by the EU legislator to facilitate the use of the quality term among mountain farmers. They may relax some rules if they are perceived as too stringent or if this prevents moral hazard. In this regard, the system still accounts for a high degree of inter- and intranational disparity. For instance, whereas Italy is one of the few member states that has already set up a control scheme to monitor the use of the optional quality term (Bentivoglio et al 2019), only a few Italian regions have high numbers of mountain products registered under this scheme. This ranges from 4 regions (out of 20) with no registered products at all to 1 region (ie Piemonte) with more than 175 products (Peira et al 2020).

The second issue regards potential consumers of mountain beef. The market potential could be better exploited by mountain producers if consumer expectations are well considered by the EU regulation on mountain labeling. A gap between consumers and European regulations could negatively affect the acceptance of the mountain label (Connelly et al 2011), calling into question its usefulness (Sanders and Boivie 2004; Busenitz et al 2005). In such a situation, the market could fail due to uncertainty about product benefits, especially if products simply follow the current quality system specifications, which are not in line with consumer expectations (Akerlof 1970).

In a systematic review, Henchion et al (2017) ranked the importance of beef production attributes and identified place of origin, animal welfare, and production system/feeding as the most important attributes for consumers. In the Italian context, some studies have sought to identify consumer preferences for beef, with different results. Merlino et al (2018) found animal welfare and animal breed were the most important beef production attributes for consumers from northwest Italy. In a study by Migliore et al (2017), consumers from southern Italy showed a high interest in environmentally friendly production, absence of antibiotic residues, and the absence of pesticides and chemicals in animal feed. In Scozzafava et al (2014), the preferred attributes relating to beef production were the place of origin, production system, and breed. Scarpa et al (2013) identified production system (organic), place of origin, and animal welfare as important attributes for Italian consumers. For Banterle and Stranieri (2008b), Italians were more interested in the place of origin, date of slaughter, and production system.

Despite these interesting findings, the aforementioned studies did not focus on beef produced in mountain areas; indeed, studies on mountain food products from a consumer perspective are still scarce (Schjøll et al 2010). In a study of Spanish and French urban consumers, in which the mountainous origin was used as one of the attributes in a discrete choice experiment, Sanjuán and Khliji (2016) found that the mountainous origin had a minor effect on urban consumers' willingness to pay for beef. With the new mountain labeling scheme and the growing interest of consumers in qualified food products, a study providing relevant information on Italian consumer preferences for mountain beef could address the gap in consumer studies. Furthermore, it could contribute to improving policy tools addressing European mountain areas.

Against this background, the objective of this study is twofold: (1) to assess the preferences of Italians concerning the attributes associated with beef production in mountain areas; (2) to analyze the factors that explain the heterogeneity of their preferences regarding these attributes. To do so, this study used a best–worst scaling method (Finn and Louviere 1992) to rank the preferences. A latent class approach was used to segment participants to identify relevant target groups for the mountain food label.

Research design and method

Best–worst scaling model

The best–worst scaling model (BWS) is a stated preference method. It was designed by Louviere and Woodworth (1990) based on the paired comparisons method introduced by Thurstone (Thurstone 1927; Finn and Louviere 1992) and McFadden's studies on economic choice theory, use of psychometric data, and conjoint experiments (McFadden 1986). Also called maximum difference scaling (Cohen 2003), some authors classify best–worst scaling as a variant of discrete choice experiments (Mühlbacher et al 2016).

The BWS model measures individual's relative preferences in relation to a set of items. Individuals are asked to choose the best (or most important) and the worst (or least important) item in a set. The main idea is that the individual's decision is the result of a comparison of differential utilities in a set of items. Louviere et al (2015) suggested a multinomial logit model to explain the probability that an individual n chooses item j as best and j' as worst among a set of items (J):

$$P = \frac{\exp(\beta_n X'_{nj} - \beta_n X'_{nj'})}{\Sigma^{j,j' \in J}_{j \neq j'} \exp(\beta_n X'_{nj} - \beta_n X'_{nj'})}. \quad (1)$$

In Equation 1, the item selected as best is coded as 1. The item not selected by the individual is coded as 0, and the item marked as worst is coded as −1. X'_{nj} is the vector attribute variable. The parameter β_n is the individual-specific preference of individual n.

The results of the BWS model provide an importance score that represents the utility of each item for each individual, thus revealing the most important mountain beef production attributes according to the preferences of the survey participants. The score is relative, as the BWS model implies that the participant selects the best and the worst options in a comparison of all items included in the experiment. The relative importance scores allow further analysis of preference heterogeneity using latent class analysis. This method detects homogeneous consumer segments according to their preferences (Vermunt and Magidson 2002).

Best–worst experiment and questionnaire design

As part of a larger project investigating Italian consumers' interest in beef produced in mountainous areas, most items of the questionnaire had undergone several phases of refinement. Items were discussed with experts to select the most relevant items, ensuring expert validity. These items were then triangulated with previous literature to further refine them. The final questionnaire was divided into 4 mains parts: (1) individual food consumption behavior;

FIGURE 1 Example of 1 of 9 best–worst scaling tasks used in the study. Source: authors' elaboration.

Please choose **THE MOST IMPORTANT AND THE LEAST IMPORTANT** characteristic of **beef from** and **livestock farming** in **mountain area.**

One or more characteristics repeat in the following pages. If you want, **you can repeat your choice.**

(1 of 9)

LEAST Important (mark only one)		**MOST** Important (mark only one)
◯	Livestock farming should use local/authoctonous breeds in beef production.	◯
◯	Beef production should support the economy of mountain areas.	◯
◯	Animals should be raised in small farms.	◯
◯	Animals should be born and raised in mountain areas.	◯
◯	Animals should rarely take medicines, including antibiotics.	◯

(2) best–worst experiment related to beef and beef production in mountain areas; (3) general attitudes toward labeling and mountain food; and (4) participants' demographics. The survey was set up using Sawtooth Lighthouse Studio software.

Food consumption behavior questions encompassed consumption habits and consumer motivations. An adapted version of the Food Choice Questionnaire developed by Pieniak et al (2009) was used for 23 questions. Answers were given on 5 point Likert scale.

The BWS experiment consisted of the sequential presentation of 9 sets of 5 attributes. The attributes tested in the BWS were extracted from Henchion et al (2017) and Oliveira Linder et al (2021). The latter, in particular, included some items that could be used as a proxy for measuring positive externalities on the environment, such as "autochthonous cattle" for the positive effects of adapting to climate change and "small-size farms" for reducing water and land footprints. The attributes tested in the BWS were the following: (1) animals fed on grass/hay only, (2) antibiotic-free production/less medicine used, (3) local/autochthonous breed raised, (4) animals raised as free range, (5) animals raised on small farms, (6) animals born and raised in mountain areas, (7) animals living longer (than lowland cattle), (8) production supports the local economy, and (9) production contributes to preserving the mountain environment.

The 9 attributes were transformed into sentences to make the evaluation easier for the respondents. For each task, participants were asked to select the most and the least important attributes. In total, there were 9 tasks in the survey. Figure 1 shows an example of such a task.

The software algorithm randomized the attributes using a balanced incomplete block design (Auger et al 2007; Sawtooth Software 2019). This assured attribute frequency balance (ie each pair of attributes appeared within the same set across the experiment) and attribute positional balance (ie the attributes appeared approximately an equal number of times in each position). Accordingly, each item appeared the same number of times, equally often in each position, and with the same frequency as every other item.

The measurement of general attitudes toward labeling and mountains included questions on the definition of mountain areas, whether the participants were mountain food enthusiasts, and whether they habitually read labels when buying food.

The demographics section encompassed questions regarding income, age, gender, household size, education, and city of residence, including whether participants lived in a mountain or nonmountain area, and in an urban or rural area.

The original version of the questionnaire was in English, and it was translated into Italian using back-translation (Maneesriwongul and Dixon 2004). The questionnaire was tested with 27 participants from the Autonomous Province of Bolzano, Italy. Considering that no participant reported problems in understanding and completing the questionnaire, no changes were needed.

Data collection and pretreatment

The data were collected through a self-administered online survey via an Italian consumer panel. The questionnaire was designed using Lighthouse Studio (version 9.8.1) and sent to respondents across Italy by the consumer panel provider. Data were collected in January and February 2020.

This study used a quota sample that was representative of the Italian population in terms of age and gender. The authors established the quota, whereas the sample was delivered by a professional panel company. The sample only included beef consumers. To improve data validity, so-called speeders (participants who completed the survey in an unreasonably short time, thereby increasing the measurement error of data analysis) as well as all participants under 18 years of age were filtered out.

The minimum sample size followed the rule of thumb applied to conjoint analysis (Reed Johnson et al 2013). To define the final sample, completed questionnaires underwent a control based on the root likelihood (RLH). The RLH is a probability expression of the goodness of fit of the data (in this case, the utility scores) in predicting the items that respondents choose (Sawtooth Software 2019). In total,

139 questionnaires were excluded for which the RLH was below the minimum value (0.2). The final sample size was 970 respondents.

Best–worst scaling analysis

The hierarchical Bayesian multinomial logit (HB MNL) was used to analyze data. According to Orme (2009), HB MNL can generate estimates by combining information at the individual level and data from other respondents in the sample. The analyses generate a utility score using a probability scale, also known as a rescaled score (0 to 100 scaling) (Sawtooth Software 2019). Ratio scaling is used, which means that, relatively, an item scoring 10 is twice as important as an item scoring 5.

Latent class analysis and characterization of the classes

Latent class analysis was performed using Sawtooth Lighthouse Studio software (version 9.8.1). The analysis identifies clusters (or segments) with differing preferences and estimates part worths (utilities) for each segment (Sawtooth Software 2017). Each class is composed of respondents with similar preferences for attributes in the BWS model. In other words, instead of calculating the utilities for each participant, latent class analysis looks for respondents with similar preferences and then calculates the average utilities within the clusters (Sawtooth Software 2017). We used the probability scale/rescaled score (0 to 100) for the formation of the clusters. No respondent fully belonged to a single cluster. Each respondent was assigned a probability of belonging to different groups according to their preferences (Sawtooth Software 2017).

In comparison to classical clustering methods based on Euclidean distance mathematics, latent class segmentation uses statistical criteria to test the validity of the model, helping to determine the most appropriate number of segments. To do this, so-called "second generation tests" (Homburg and Giering 1996) are employed, such as the Bayesian information criterion (BIC) or the Akaike consistent information criterion (AIC).

To characterize the segments and test for differences among them, one-way analysis of variance (ANOVA) with post-hoc tests (Tukey and Tamhane) and cross tabulation with chi-square and standardized residuals were carried out. The analyses were performed using IBM SPSS Statistics 25.

Results

Descriptive demographic statistics

Table 1 describes the sample in relation to demographic characteristics. The sample followed the distribution in the Italian population in terms of gender and age, as well as the rural/urban location of the interviewees. However, the sample showed a higher level of education. This can be explained by 2 facts: (1) Some characteristics of the consumer panel participants may be skewed in relation to those of the country population because internet users do not necessarily represent the population (Evans and Mathur 2005); (2) in Italy, internet access is greater among people with higher levels of education (Istat and FUB 2018). As regards the mountainous and nonmountainous location of the interviewees, only 8 out of 100 interviewees lived in mountain areas, in contrast to almost a quarter at the population level.

TABLE 1 Sample description.

Demographic characteristic	Sample $n = 970$ (%)	Italian population (%)
Gender		
Male	50.01	48.43
Female	49.90	51.57
Age		
18–29	14.64	14.61
30–44	22.37	23.22
45–59	28.56	27.78
60+	34.43	34.37
Education		
Primary school	0.52	19.51
Middle school	10.31	30.03
High school	59.28	30.71[c]
University degree or higher	29.90	10.78
Residence location		
Rural area[a]	28.25	24.00
Urban area[b]	71.75	76.00
Mountain area	8.35	23.54[d]
Nonmountain area	91.65	76.46

Source: Authors' elaboration based on survey data, Istat (2019), and FMI (2016).
[a] Municipalities with low degree of urbanization according to Eurostat (Istat 2019).
[b] Municipalities with medium or high degree of urbanization according to Eurostat (Istat 2019).
[c] Includes nonuniversity tertiary diplomas of the old system and AFAM (Higher Education in the disciplines of the Arts, Music and Dance).
[d] Based on data from 2015 (FMI 2016).

General ranking of attributes

The aggregate average importance score for each item is displayed in Table 2. The results for the entire sample indicate a prevalence of 3 attributes: animals are free range, less medicine is used, and animals are grass/hay fed. The use of autochthonous breeds is the fourth most important attribute at the sample level. Economic and ecologic sustainability appear, respectively, in fifth and sixth place, followed by whether the animals are reared in mountains, whether they are raised in small farms, and their life span.

Results of the latent class analysis and description of segments

Following Alvarez and del Corral's approach (Alvarez and del Corral 2010) in the latent class analysis, we chose a 4 class solution using the AIC and the BIC fit criteria (AIC = 44,049.93 and BIC = 44,321.80), which gave a better fit than the 3 and 2 class solutions (AIC = 45,521.98; BIC = 45,654.03 and AIC = 44,715.50; BIC = 44,917.46, respectively). The 4

TABLE 2 Ranking and aggregate average importance score of beef production attributes in mountain areas (sample level).

Item (attribute)	Rank	Importance score (probability scale, 0 to 100 scaling)
Animals raised free-range	1	22.18
Less medicines	2	21.55
Animals grass/hay fed only	3	19.07
Local/autochthonous breed only	4	8.26
Production supports the local economy	5	7.75
Production contributes to preserve the mountain environment	6	7.49
Animals born and raised in mountain areas	7	6.07
Animals raised in small farms	8	4.33
Animals that live longer	9	3.24

Source: Authors' calculations from survey data.

segments were described according to the clustering of the variables (Table S1, *Supplemental material*, https://doi.org/10.1659/MRD-JOURNAL-D-21-00021.1.S1) and the sociodemographics, food consumption behavior, and mountain-related and label variables (Tables S2 and S3, *Supplemental material*, https://doi.org/10.1659/MRD-JOURNAL-D-21-00021.1.S1).

Segment 1 (mountain supporters, 21% of respondents): Economic sustainability and environmental sustainability were ranked most important for this segment, followed by the "use of less medicine," "animals raised free range," and "animals grass/hay fed only." Interestingly, all remaining items displayed scores higher than the sample average, with "animals that live longer" placed last (still, this was scored the second highest compared with the other segments). This group showed a higher consumption rate of mountain food products compared to the sample average.

This segment consisted of more female, young (18–29 years), and mid-aged (30–44 years) participants. Households in this group tended to be larger, and greater proportions of them were located in mountain areas. They had lower income, with a large proportion (36.6%) of the participants receiving less than € 24,000 net per year. Regarding education, this segment had the second highest percentage (30.2%) of members holding at least a university diploma.

Concerning food preferences and consumption habits, they vary less in their daily food options ("is what I usually eat"). This group also favored cheaper foods and preferred food that was convenient to prepare, without skipping the importance of naturalness, healthiness, and taste in their daily meals. Eating beef was not a frequent habit for most members of this segment: 80% of the participants ate beef 2 times or fewer per week. Finally, members of this group gave a higher value to the information on labels.

Segment 2 (local free-grazing animals, 23% of respondents): The most important attributes of mountain beef for this group were "animals raised free range" and "animals grass/hay fed only," followed by the use of "local/autochthonous breed only." Furthermore, respondents in this segment gave the lowest importance for the "use of less medicine." Finally, they scored economic sustainability similarly to the average sample and environmental sustainability higher.

This segment had a slightly higher proportion of females and a large proportion of elderly people. The household size was small, and most lived in urban regions outside mountain areas. This group had a lower proportion of middle-income people, as well as of members with a university degree, and a higher proportion of people with a high school certificate.

A total of 79% of this group ate beef 2 or fewer times per week. They sought a little more information about food on labels compared to the sample average. Tradition seemed to be important for these participants, as they attached a medium to high value to the use of local breeds and the highest value to foods that were familiar to them ("is what I usually eat"). It was also the group with the highest declared value for mountain food consumption. To this group, healthy food ("keeps me healthy") and natural food ("contains no artificial ingredients") were more important than convenience in food preparation ("takes very little time to prepare").

Segment 3 (natural living, 19% of respondents): Respondents from this group displayed the highest preference for animals that were raised free range, followed by "less medicine" and "animals fed with hay/grass only." The fourth attribute in order of importance was "animals that live longer." While they scored higher on most animal-related items, the economic ("production supports the local economy") and ecologic sustainability ("production contributes to preserve the mountain environment") were ranked least important.

Segment 3 contained the lowest proportion of elderly people ("60 and over" age group) and the highest concentration of young people (18–29 years age group). The group had a slightly higher proportion of males (56%). Its members lived in comparatively larger households and had at least a middle school degree. They were heterogeneous in terms of income. A total of 82% ate beef 2 or fewer times per week. They tended not to be so sensitive to food prices ("is cheap") and varied their daily meals. Taste was not as important to them as for segments 2 and 4. Food that was convenient to prepare was of less importance than natural ("contains no artificial ingredients") and healthy food. They read labels less than the other groups and had the lowest score for mountain food consumption.

Segment 4 (medicine sensitive, 37% of respondents): The 3 most important attributes for this segment were "less medicine," "animals raised free range," and "animals grass/hay fed only." Interestingly, they scored "animals that live longer" the least. Regarding the economic ("production supports the local economy") and environmental ("production contributes to preserve the mountain environment") sustainability items, respondents of this segment scored them lower than the average sample.

This segment had a slightly higher proportion of males, and 38% of the members were older than 60. The household size was smaller than the Italian average. The proportion of residents in rural or urban and mountain or nonmountain

areas was similar to the national context. This segment had a high proportion of middle- and high-income participants. Likewise, it had a high proportion of people with a higher level of education, with 34% of the participants holding at least a university degree. Its members tended to be health conscious, showing a high interest in healthy and natural food. Notwithstanding, they also valued taste and tended to be open to different foods ("is what I usually eat"). Convenience related to food preparation was not as important. The same can be said about price ("is cheap"). Participants of this group had a middle to high tendency to read labels. Regarding the frequency of beef consumption, the group placed between "light" (2 or fewer times per week; almost 77%) and "heavy eaters" (3 or more times per week; 22%). In terms of their consumption of mountain food products, they did not differ much from the other segments.

Discussion

Evaluation of sample results

The 3 most important attributes for consumers referred to animal rearing conditions. These attributes were related to animal welfare and human health (Fraser 2009; Newman et al 2020; Stampa et al 2020). The preference for these corroborates previous findings on consumer opinions about mountain products (Schjøll et al 2010). However, it points to a gap between consumer interests and the mountain label quality standards, as animal rearing conditions are not regulated in the labeling scheme. Such divergence may negatively affect the acceptance of the mountain label and could cause market failure (Akerlof 1970; Connelly et al 2011).

The importance of local breeds and environmentally friendly production were intermediate, while these attributes have been previously found among consumers' most (Bernués et al 2003; Scozzafava et al 2014; Sanjuán and Khliji 2016; Migliore et al 2017; Merlino et al 2018; Eldesouky et al 2020) or less preferred attributes (Henchion et al 2017). Participants also rated the support for the local economy as having medium importance. The prevalence of ethnocentric attributes over altruistic ones is not unusual (Magnusson et al 2003; Yadav 2016). However, consumers tend to consider mountain products important to the local economy (Schjøll et al 2010), which would lead to a better relative ranking among all attributes. Nevertheless, support for the region's economy as a motivation for consumption tends to be more relevant when there is a strong attachment between the region and consumers (Memery et al 2015). Considering that most of the participants in this study lived in nonmountain areas, we suggest that their identity link to mountain regions was not strong enough. Consequently, the attribute tended to receive less attention from the participants.

The least important attributes were associated with authenticity of origin/provenance (Gangjee 2017), such as small farms, longer lives of animals, and animals that are raised in the mountain region. Schjøll et al (2010) showed that the origin of the raw material for mountain products tends to be of little relevance to consumers. The results of this study show the same trend. Although small-scale production is commonly associated with mountain products by consumers (Schjøll et al 2010; Zuliani et al 2018), the participants in this survey ascribed a low value to small-scale production, similar to the findings of Abidoye et al (2011). No study with Italian consumers places this attribute among the most relevant (Bernués et al 2003; Banterle and Stranieri 2008a; Scarpa et al 2013; Scozzafava et al 2014; Migliore et al 2017; Merlino et al 2018). The last and least important attribute was related to animal welfare (Bruijnis et al 2013). The topic of animal welfare tends to be valued by consumers (Henchion et al 2017; Merlino et al 2018). However, the various facets of animal welfare may have different weights due to differences in consumers' understanding of farming practices and animal welfare (Vanhonacker et al 2008; Zuliani et al 2018).

Evaluation of segment results

The segment of "mountain supporters" (1) valorized attributes associated with the sustainable development of mountain areas. The slightly higher percentage of mountain residents may have strengthened the link between mountains and some of the participants, thus contributing to a higher interest in supporting the mountain economy (Memery et al 2015). This segment also had some characteristics common to ecofriendly consumers, such as a higher percentage of females and participants holding a university degree (Tobler et al 2011; De Silva and Pownall 2014). Such characteristics may help to explain the preference for the preservation of the mountain environment in beef production. It also brings this segment closer to the profile of mountain product consumers interested in environmentally friendly products identified by Tebby et al (2010). Such a consumer profile combined with a greater inclination to read labels may make this segment sensitive to a mountain labeling scheme.

Members of the "local free-grazing animals" segment (2) fit in the mountain food consumer profile with characteristics of regional product consumers (Tebby et al 2010). The 2 most preferred attributes for this segment indicated concerns with animal welfare (Fraser 2009). The medium to high scores for autochthonous breeds and animal origin and place of rearing suggest an interest in regional food products (also known as local, artisanal, and typical products). These preferences may be a sign that, for segment 2 members, beef from mountain areas is a kind of "localized product" (Bérard and Marchenay 2007) that is not mass produced (Grasseni 2011). Tebby et al (2010) identified the link between "local" and "mountain food products" in their study with European consumers. Moreover, some characteristics of segment 2 members—a high proportion of people over 60 years old and a strong tendency to read labels—resemble those of consumers of regional food products (Tregear and Ness 2005; Gracia and de-Magistris 2016). For this segment, producers and marketers should highlight aspects such as the use of local breeds or even the association of mountain labeling with geographic indications.

For the segments "natural living" (3) and "medicine sensitive" (4), health and animal welfare formed the main link between mountains and beef production. The most valued attributes fell within 1 or more of the welfare criteria defined by Fraser (2009), namely, affective state, natural living, and biological functioning. However, there are at least 2 important differences. Although the 3 most important attributes were the same for both segments, segment 3 also

valued (although to a lesser extent) animal welfare and fit the natural living criteria: animal longevity (Bruijnis et al 2013). Such a difference may suggest that members of segment 3 have a more varied and complex notion of beef quality related to animal welfare. The second difference concerns the attribute "less medicine." This was given exceptional attention by cluster 4 members, indicating higher concerns with their own health. From a marketing perspective, using the mountain label for segments 3 and 4 will be useful only if it is associated with animal welfare and health quality standards. For instance, this could be done by adopting production systems that reduce or eliminate the use of antibiotics and other types of medicines or by employing production systems that allow animals to graze. A precise communication of animal welfare practices could affect the perceived value of the mountain beef and therefore the consumers' willingness to pay (Kehlbacher et al 2012).

Conclusions

This study elicited Italian preferences regarding beef produced in mountain areas and the potential congruences with and divergences from the European mountain labeling scheme for mountain food products. The EU regulation on mountain food products represents an institutional advancement toward the protection of mountain areas and their communities. However, the results presented here bring a warning: Concerning beef production in mountain areas, the quality standards of the EU regulation do not converge with the preferences of participants in this survey. Only the items "support of the local economy" and "animals born and raised in mountain areas" are partially protected by the regulation. Thus, a single segment, the "mountain supporters," would be more susceptible to the current mountain labeling scheme.

The gap between the regulation and the preferences of the public may call into question the effectiveness of the labeling scheme as a quality assurance tool for consumers. It would be advisable to reevaluate the current quality standards of the regulation and, as far as possible, include some standards related to animal welfare and ecological sustainability to better meet consumer preferences and to add value to the products.

ACKNOWLEDGMENTS

The authors are grateful for the support of the Autonomen Provinz Bozen-Südtirol (project's name: PERBEEF) as well as the anonymous reviewers and the editor.

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Supplemental material

TABLE S1 Characterization of segments based on segmentation variables.
TABLE S2 Profile of respondents, by segment and total, based on their answers on food consumption behavior and mountain- and label-related questions.
TABLE S3 Sociodemographic profile of respondents by segment and total.

Found at: https://doi.org/10.1659/MRD-JOURNAL-D-21-00021.1.S1.