A comparative study of food values between the United States and Norway

Abstract

We compare food values in the US and Norway using the best-worst scaling approach. The food values examined are aimed at capturing the main issues related to food consumption such as naturalness, taste, price, safety, convenience, nutrition, novelty, origin, fairness, appearance, environmental impact, and animal welfare. Results show that respondents in both countries have mostly similar food values, with safety being the most important value; while convenience and novelty are the least important values. Specifically, US respondents consider price more important and naturalness less important than Norwegian respondents.

Keywords: best-worst scaling, consumer preference, food values, Norway, US

1. Introduction

The food systems in Europe and the Unites States (US) significantly differ in terms of agricultural production practices, agricultural policy, and marketing of foods. For example, many discussions have been raised regarding the use of genetically modified organisms (GMOs) and growth hormones in food production since European regulations on these food production issues are notably stricter than in the US (Chern *et al.*, 2002; Alfnes, 2004; Delwaide *et al.*, 2015; Loureiro and Umberger, 2007; Lusk *et al.*, 2003). At the same time, food consumption trends in the US can affect food patterns in Europe and vice versa (Mitchell, 2004), e.g., the local food movement. The development of different forms of Alternative Agri-Food Networks (AAFNs) such as farmers' markets or Communities Supported Agriculture (CSA), for instance, first occurred in the US in the 70's and 80's but these have only recently become more popular in Europe (Bazzani and Canavari, 2013; Martinez *et al.*, 2010). In addition, the adoption of nutrition food labelling is currently a widely discussed topic both in US and European food systems; but while nutritional labels have been regulated by the Food and Drug Administration (FDA) in the US since the early 90's, the European Union (EU) has only very recently introduced uniform or harmonized nutritional food labelling regulations (Bonsmann *et al.*, 2012; Soederberg *et al*., 2015; Nayga *et al.*, 1998). Although the presence of ethical and environmental food labels has consistently grown both in Europe and in the US, the development of sustainable food labels occurred more recently in the US in comparison to the European food system (Golden *et al.*, 2010; Getz and Shreck, 2006; Grunert *et al.*, 2014; Ilbery *et al.*, 2005; Louriero and Lotade, 2005). Moreover, the European food system is characterized by the presence of labels indicating specific regions of origin such as protected designation of origin (PDO), protected geographic origin (PGO), or country of origin (COOL) (Aprile *et al.*, 2012; Loureiro and Umberger, 2007). Another notable difference is that the US food market is generally less developed in terms of traceability systems than the European food market, although US consumers have increasingly called for foods labelled as produced in the US (Lim *et al.*, 2013; Loureiro and Umberger, 2007).

In order to capture these similarities and differences across European and US food systems, several studies have explored European and US consumers' attitudes towards food claims, aiming at the development of potential international marketing strategies and policies (Bech-Larsen and Grunert, 2003; Chern *et al.*, 2002; Loureiro and Umberger, 2007; Lusk *et al.*, 2003, 2004; Roininen *et al*., 1999). The existing literature investigating consumers' food attitudes in Europe and the US has mainly focused on consumers' evaluations of food safety claims and their attitudes towards genetically modified (GM) products (Chern *et al.*, 2002; Lusk *et al.*, 2004). The findings in these studies generally suggest that people in Europe are less willing to accept GM foods. For example, Chern *et al.* (2002) showed that Norwegian consumers were more willing to pay for non-GM vegetable oil and salmon than US consumers. Similarly, Alfnes and Rickertsen (2003), Lusk *et al.* (2003), and Alfnes (2004) showed that European consumers were willing to pay a higher price for beef from cattle that had not been administered growth hormones, and Lusk *et al.* (2003) showed a higher willingness to pay for cattle that had not been fed with GM corn among Europeans when compared to US consumers. More recently, Rickertsen *et al.* (2017) assessed consumers' willingness to pay for GM soybean oil, farmed salmon fed with GM soy, and GM salmon. Interestingly, their results suggest a large similarity in WTP in Norway and the US and across the three products.

Additionally, Rozin *et al.* (1991) investigated factors affecting individuals' preferences for different kinds of chocolate bars, using students from universities in the US, Belgium, and

France as a subject pool. They observed that the US students were more health-oriented in making their choices, while the Belgian and French students were more pleasure-oriented. Bech-Larsen and Grunert (2003) also showed that US consumers were more willing to buy functional foods than Danish and Finnish consumers, mainly because of health-related motivations. Finally, Basu and Hicks (2008), investigated US and German consumers' evaluations for fair-trade coffee using a choice experiment approach and found that German respondents were more inequality averse than US consumers.

Generally, studies investigating consumers' preferences in the US and Europe have limited their analyses to the assessment of consumers' evaluations for specific food attributes such as GM production, nutritional content, use of growth hormones, or sustainability issues. Lusk and Briggeman (2009) (henceforth LB) claimed that individuals' food choices may be explained by their preferences for more abstract food quality attributes[1] which LB identified as intermediary values, that "relate specifically to people's food choices" (Lusk and Briggeman, 2009: 186). These so-called "food values" can be considered as more stable than consumers' preferences for a specific set of food attributes on specific food products. According to LB, food values can explain individuals' food choices across a variety of food products and do not depend on the specific context under investigation. However, to the best of our knowledge, no study has compared food values between the US and Europe, which is the aim of our study.

In this study, we identify a set of twelve food values, which differ slightly from the set that was used by LB. These values are aimed at capturing the main issues related to food consumption patterns such as naturalness, taste, price, safety, convenience, nutrition, novelty,

[1] We use the term "food values" in order to be consistent with the terminology used by LB. However, it is important to point out as suggested to us by a reviewer that many of these food values are actually "food quality attributes" and not higher constructs such as "values", which are cognitive representation of concepts of beliefs (Schwartz and Bilsky, 1987).

origin, fairness, appearance, environmental impact, and animal welfare. In order to measure individuals' preferences for food values, we implement a best-worst scaling (BWS) approach. The choice of this approach has been determined by the fact that Lee *et al.* (2007) observed that the use of BWS provided better outcomes than other rating methods in measuring human values. In addition, BWS is particularly appropriate in cross-country comparisons, since the use of other forms of rating scales might lead to scalar inequivalence, which is generally caused by divergences in lexicon and response styles across different cultures (Auger *et al.*, 2007; Baumgartner and Steenkamp, 2001; Jaeger *et al.*, 2008; Mueller Loose and Lockshin, 2013; Ter Hofstede *et al.*, 1999). For example, Mueller Loose and Lockshin (2013) and Dekhili *et al.* (2011) showed that the BWS method worked well to explore differences across countries in rating a set of attributes on wine and olive oil products, respectively. A potential limitation of BWS could be the lack of complete transitivity in attribute importance and therefore of consistency in dominance relations of attribute importance ranking. However, Lagerkvist (2013), in a study investigating Swedish consumers' preferences for food quality attributes on beef, explored these issues using different rating methods such as BWS and Direct Ranking (DR) and showed that estimates at the aggregate level from BWS were more consistent than the estimates from DR both in terms of preference relations and of dominance ordering of attribute importance.

We specifically compare food values in Norway and the US for several reasons. The Norwegian regulations on the use of biotechnology are quite restrictive and so one would expect more resistance against production methods based on modern biotechnology. In addition, the Norwegian food environment is very different from the US food environment. In contrast to the US, Norwegian agriculture is dominated by small scale farming. The average farm size in

Norway was 23.4 hectares in 2015 according to the Norwegian Institute of Bioeconomy Research (NIBIO) (NIBIO, 2016: 24), and the average dairy herd was 25 dairy cows in 2014 (Budsjettnemda for jordbruket, 2015), while in the US the average farm size and the average dairy herd were 438 acres and 2,017 dairy cows, respectively, in 2014 (Progressive Dairyman, 2016; Statistica, 2017). Furthermore, the key tenets of the Norwegian agricultural policy are different from those by the US. There are four main objectives of the Norwegian agricultural and food policy: (i) food security (with emphasis on having high domestic production of agricultural products, especially meat and dairy products), (ii) agricultural production in all parts of the country, (iii) increased value of the agricultural products, and (iv) sustainable agriculture (for example through the target that 15% of the production and consumption should be organic before 2020) (NIBIO, 2016: 12, 49). These objectives are supported by one of the highest levels of agricultural subsidies in the world. Producer support estimates were 61% of gross farm receipts for the period of 2007–2009 as compared with only 9% in the US (OECD, 2010). Moreover, Norway has very high import tariffs for products such as dairy and meats and, consequently, very little trade with these products (NIBIO, 2016: 54). Opinion polls also show a strong public support for the current state. In a recent poll, 90% of the respondents wanted to maintain Norwegian agriculture on at least the present level (Norsk Landbruk, 2014). Finally, while the average per capita income, measured at purchasing power parities, is quite similar in the two countries, Norway is characterized by a more equal distribution of income. According to the OECD (2017), Norway was the second most equal OECD country after Iceland in 2014 while the US was the third most unequal country.

We believe that the differences between food systems in Norway and in the US make these two countries an interesting context to compare food values. Our hypothesis is that differences in agricultural systems might be related to differences in individuals' food values. To illustrate, the adoption of high agricultural subsidies, the enhancement of domestic and sustainable food production in Norway might be respectively related to the importance that Norwegian people give to food values such as fairness, origin, and environmental impact. Moreover, even though food prices are relatively much higher in Norway than in the US, the high degree of income equality in Norway may result in less emphasis on food prices and higher emphasis on fairness.[2]

To sum up, this study advances the literature in two important ways: (1) we adopt the concept of food values and the set of items used by LB to identify which food values are most important among US and Norwegian consumers; and (2) we compare consumers' preferences for food values in a multi-country setting, considering credence (e.g., food safety and origin), as well as experience attributes (e.g., taste).

Results from this study are of value to food marketers and policy makers for two main reasons. First, the comparison of consumers' preferences between a European country and the US is currently of particular interest since Europe and the US are key trading partners and results from this study would help future trade negotiations (Luckstead and Devadoss, 2016). Second, while we do not want to lessen the contribution to the literature of previous studies comparing different countries' consumer preferences for food attributes on specific food products, the results from our study could be applied to various commodities, and, therefore, could be used as a guide in the development and implementation of marketing strategies and food policies for a

[2] It is difficult to find comparable statistics for households' income distribution in the US and Norway. However, according to the OECD database (OECD, 2016a), the GDP per capita calculated at 2011 purchasing power parities was 172 and 138 in Norway and in the US, respectively, as compared with an OECD average of 100. For household consumption expenditures, the numbers were 121 for Norway and 146 for the US The Gini index in 2011 was 0.25 for Norway and 0.39 for the US (OECD, 2016b).

broad range of food products. To illustrate, if our results show for example a high preference for the food value "safety" both in the US and Norway, then this could encourage the support of policies aimed at increasing the traceability of food products, while a high rating for "naturalness" could support the production and trade of foods produced without the use of modern technologies or pesticides, no matter what the product under consideration is.

2. Materials and methods

This section is dedicated to the description of the (1) how the data collection, (2) of the experimental design, i.e. selection of the food values and implementation of the BWS, and (3) of the econometric approach.

2.1 Data collection

Data were collected from an online survey conducted between October and November of 2015 in Norway and the US. More than 1,000 respondents in each country (1,037 in Norway and 1,025 in the US) took part in the survey. Respondents were randomly recruited across regions and urban/non-urban areas in both countries by a professional market research agency called, Ipsos.[3] Respondents were invited to participate in an internet survey and were asked about the aspects they considered more or less important when buying food products. They were assured that any given information was anonymous and that they could quit the survey whenever they wanted to. The survey also contained questions about attitudes towards food claims. The selected samples in Norway and the US were relatively representative of the national populations in terms of socio-demographic information. In Table 1, we report information related to the distribution of

[3] For more information: http://ipsos-mmi.no/

demographic and socioeconomic variables in the two samples and of the US and Norwegian populations, respectively.

Table 1. Demographic and socioeconomic distribution in the US and Norway

	US			Norway	
	Sample	Population		Sample	Population
Female (%)	51	51		50	50
Age (years)	40	39		53	39
Education (%)					
Less than high school	3	17		3	27
High school	46	55		34	40
University degree	38	18		43	23
Post-univ. degree	13	10		20	10
Marital status (%)					
Married	48	50		54	35
Cohabitant	7	NA		15	NA
Never been married	32	31		16	51
Separated or divorced	12	12		11	9
Widow or widower	1	7		4	5
Number of children in household (%)					
No children	55	58		70	72
One child	19	18		11	13
Two children	16	16		12	11
More than two	10	8		7	4
Income (gross annual income) (%)					
Less than $ 15,000	12	$53,718 (median)	Less than $12,500	1[1]	$61,387 (median)
$15,000 – 29,000	17		$12,500-24,900	2	
$30,000 – 44,000	14		$25,000-37,400	3	
$45,000 – 59,000	13		$37,500-49,900	7	
$60,000 – 74,000	12		$50,000-62,400	10	
$75,000 – 89,000	11		$62,500-74,900	12	
$90,000 – 119,000	10		$75,000-87,400	30	
$120,000 – 149,000	6		$87,500-99,900	17	
$150,000 or more	5		$100,000 or more	18	

Rural area (%)[2]	18	19	28	19

Sources: The data of the Norwegian population was extracted from: Statistics Norway and the data of the US population was extracted from the United Census Bureau.

[1] Exchange rate during the survey (October 15th, 2015) was USD 1 = NOK 8.00, which was used to convert the Norwegian income figures to USD.

[2] The standard definition of rural area according to "Norway Statistics" is "a hub of buildings that is inhabited by less than 200 persons", while the definition of rural area in the US census Bureau is an area which is inhabited by less than 2,500 individuals. In our survey, we defined rural area as a settlement with a population lower than 1,000 individuals.

Gender distribution was fairly similar in both samples with about 50% and 51% female respondents in the US and Norway. The average age of the respondents was substantially higher in Norway (53 years) than in the US (40 years). The average age of the Norwegian sample is higher than the average age of the Norwegian population. Regarding the education level, both samples are more educated than their respective country populations. Norwegian respondents, on average, had a somewhat higher education level than the US sample, and the Norwegian sample was also characterized by a higher percentage of married people (54%) and cohabitants (15%) than the US sample (48% and 7%, respectively). However, the percentage of married individuals in the Norwegian sample was higher than the Norwegian population, while the US sample was characterized by a slightly lower percentage of married people in comparison to the US population. On the other hand, respondents in the US tended to have more children in the household as compared with Norwegian respondents; however, most respondents in both countries indicated having no children in their household (70% for Norway and 55% for the US), which closely resemble the statistics of the populations in the two countries. Notably, the majority of the respondents in the US had an annual income below $59,000 (56%), while only 23% of the Norwegian sample had an annual income below $62,400. This is consistent with the median income of the populations in both countries, indicating that the annual median income is higher than in the US. Importantly though, the income differences are calculated at market exchange rates that vary considerably over time and are quite different from the exchange rates calculated at rates that reflect the purchasing power. Finally, Table 1 shows that Norwegian and US populations have the same percentage of people residing in rural areas (19%). However, the Norwegian sample included a higher percentage of people living in rural areas (28%) than in the US sample (18%).

2.2 Experimental design

2.2.1 Food values

As previously mentioned, we followed the work of LB who specified eleven food values (naturalness, safety, environmental impact, origin, fairness, nutrition, taste, appearance, convenience, price, and tradition). LB selected these attributes in an attempt to resemble the ten values identified by Schwartz (1993). LB noted that some values considered by Schwartz, such as achievement and power, might not have a direct relation with food. However, one of the values identified by Schwartz is "stimulation" that could be related to the excitement that "novelty" could present. With the improvement in food technologies and growing globalization, consumers are continuously offered new food products (Lee *et al.*, 2015; Siro *et al.* 2008). In addition, a large body of literature shows that variety seeking plays an important role in consumers' food choices and eating behaviour (Adamowicz *et al.*, 2012; Frewer *et al.*, 2013; Van Trijp and Steenkamp, 1992.; Van Trijp, 1995). Hence, we included "novelty" in our set of food values. Recent literature also shows that consumers are increasingly interested in animal welfare (Barber and Gertler, 2009; Carlsson *et al.*, 2007; Napolitano, *et al.*, 2008). Animal welfare could also be associated with the Schwartz value of "universalism" which resembles individuals' "understanding, appreciation, tolerance, and protection for the welfare of all people and for nature" (Schwartz, 1993: 22). Hence, we also included "animal welfare" in our set of food values. However, we excluded "tradition" which LB defined as "preserving traditional consumption patterns" due to the growing globalization of food markets. Indeed, due to increasing ethnic diversity in the US and Norwegian populations, tradition is likely to be interpreted differently across respondents. Moreover, studies investigating the meaning of food tradition in six European countries (including Norway) showed that respondents tended to give different interpretations of food tradition depending on the country they belonged to and they especially tended to associate food tradition with different aspects of food consumption such as origin, locality, processing-transformation, habits, naturalness, sensory property and familiarity (Almli, *et al.*, 2011; Guerrero *et al.*, 2009; Pieniak *et al.*, Verbeke *et al.*, 2016). Thus, the inclusion of "tradition" in our set of food values would have been a confounder or would have been overlapping with other food values in our study. The twelve food values incorporated into our study, the food values in LB, and the definitions used in the surveys are exhibited in Table 2.

The food values include credence, experience, and price attributes. Naturalness and safety are considered credence attributes since they are product characteristics that consumers cannot decipher just by looking at the product without any label information. In addition to naturalness and food safety, credence attributes were included that are related to sustainability and ethical issues such as environmental impact, origin, animal welfare, and fairness. Finally, nutrition is a credence attribute related to the nutritional content of the food products. On the other hand, taste and appearance are experience attributes. Convenience and novelty can also be considered experience attributes; consumers can personally experience whether a food product is easy or fast to eat, or whether they have never tried a product before. Finally, price is the attribute that identifies the money individuals pay to buy a food product.

LB's definitions were slightly modified in our study in order to make them more understandable to respondents in Norway and the US. To illustrate, for naturalness, we indicated that this is food produced without the use of modern food technologies such as genetic engineering, hormone treatment, and food irradiation.

Table 2. Food values with descriptions in parentheses

Lusk and Briggeman (2009)	This study
Naturalness (extent to which food is produced without modern technologies)	Naturalness (made without modern food technologies like genetic engineering, hormone treatment and food irradiation)
Safety (extent to which consumption of food will not cause illness)	Safety (eating the food will not make you sick)
Environmental impact (effect of food production on the environment)	Environmental impact (effects of food production on the environment)
Origin (where the agricultural commodities were grown)	Origin (whether the food is produced locally, in the US/Norway or abroad)
Fairness (the extent to which all parties involved in the production of the food equally benefit)	Fairness (farmers, processors and retailers get a fair share of the price)
Nutrition (amount and type of fat, protein, vitamins, etc.)	Nutrition (amount and type of fat, protein, etc.)
Taste (extent to which consumption of the food is appealing to the senses)	Taste (the flavor of the food in your mouth)
Appearance (extent to which food looks appealing)	Appearance (the food looks appealing and appetizing)
Convenience (ease with which food is cooked and/or consumed)	Convenience (how easy and fast the food is to cook and eat)
Price (the price that is paid for the food)	Price (price you pay for the food)
Tradition (preserving traditional consumption patterns)	
	Animal welfare (well-being of farm animals)
	Novelty (the food is something new that you have not tried before)

2.2.2 Best-worst scaling

The best-worst scaling (BWS) approach was developed by Louviere and Woodworth (1990) and first published by Finn and Louviere (1992). It consists of a series of choice sets where respondents are asked to indicate among a (sub)set of attributes or statements which one they prefer the most (or consider the most important) and which one they prefer the least (or consider the least important). This approach has been defined by researchers as an extension of Thurstone's (1927) paired comparison method in which respondents are asked to choose the best between paired items. Nowadays, BWS is a popular methodology that has been implemented in several research fields such as psychology, marketing, and social and environmental sciences (Auger *et al.*, 2007; Cohen, 2009; Lancsar *et al.*, 2013; Scarpa *et al.*, 2011). In food consumption literature, BWS has been mainly used for the estimation of consumers' valuations for product attributes, as well as consumers' food attitudes (Cohen, 2009; de-Magistris *et al.*, 2014; Jaeger *et al.*, 2008; Lagerkvist *et al.*, 2012; Lusk and Briggeman, 2009).

The growing popularity of the BWS method is due to the fact that it provides several advantages over other common rating-based methods such as the Likert scale. In BWS, individuals can respond to the question only in one way, indicating which value is the most important and which one is the least important. This method forces individuals to make choices among values of the scale and does not allow the possibility to give the same value to all the issues in question. Comparatively, in rating scales, individuals might have their own evaluation for the scale values; for example, a three for one person could represent a four for another person, so they might use the scale differently. Finally, using a BWS approach, researchers can construct individual-level scales of preference/importance for each issue under consideration and accurately compare these scales (Cohen, 2009; Hein *et al.*, 2008; Lusk and Briggeman, 2009).

In BWS surveys, researchers have the option to use one of three response mechanisms, which are generally described as BWS cases (Beck *et al.*, 2017; Flynn and Marley, 2014; Rose, 2014). In Case 1, the respondents are asked to choose the most preferred (most important) and the least preferred (least important) item among a list of items. In Case 2, items are not presented as a whole; rather for each choice set, respondents are asked to make a selection among a list of associated attributes and attribute levels. In Case 3, for each choice set, respondents are asked to select the best and worst from the alternatives which are described by a number of attributes and attribute levels of the items under investigation. In this study, we chose to use the Case 1 mechanism since this is the most appropriate approach for our research goal, i.e. investigating relative preferences for a list of food values (Flynn and Marley, 2014).

When designing BWS experiments, researchers have to take into consideration both the potential number of choice sets and the potential number of the items per choice set. A large number of choice sets might induce fatigue to respondents, while a large number of items per choice set might decrease individuals' attendance to the different attributes (de-Magistris *et al.*, 2014; Louviere *et al.*, 2008; Scarpa *et al.*, 2011). For the allocation of the different items across the choice sets, we used a nearly balanced incomplete block design (NBIBD). The balanced incomplete block design (BIBD) is in general one of the most implemented experimental designs in Case 1 BWS surveys (Lee *et al.*, 2008; Auger *et al.*, 2007; Cohen, 2009; Flynn and Marley, 2014). This balance is due to each choice set being characterized by an equal number of items, and each item being repeated the same number of times across the choice sets. In addition, the items are orthogonally allocated, meaning that each item is paired with other items an equal number of times across the choice sets. However, researchers might find difficulties in generating a BIBD with a restricted number of choice sets and attributes per choice set. For this reason, different studies have implemented experimental designs where the orthogonality requirement is relaxed, i.e., partially balanced incomplete designs or nearly balanced designs (Erdem *et al*., 2012; Hamada, 1973; Jaeger *et al.*, 2008; Lagerkvist *et al.*, 2012; Orme, 2005; Street and Street, 1996; Thomson *et al.*, 2010). Our nearly BIBD consists of twelve choice sets, with each of the choice sets containing a subset of four food values. Each food value was repeated four times across the twelve choice sets and each food value was compared with each other 1.09 times, maximizing the D-efficiency score (98.71%) to satisfy the orthogonality property (Kuhfeld, 2005). Another important aspect of the nearly balanced incomplete design is that it also helps to minimize the possibility that preferences for values can be unintentionally inferred by features of the design. This way, violations of transitivity and dominance that may be related to the use of BWS can be reduced (Flynn and Marley, 2014; Lagerkvist, 2013). In Figure 1, we report an example of a choice set.

Figure 1. Example of a choice set

Which of the following attributes is most important and which is least important when you purchase food? Please, check only one attribute as the most important and only one attribute as the least important.		
Most important ONE ANSWER	Attribute	Least important ONE ANSWER
☐	Appearance (the food looks appealing and appetizing)	☐
☐	Novelty (the food is something new that you have not tried before)	☐
☐	Fairness (farmers, processors and retailers get a fair share of the price)	☐
☐	Origin (whether the food is produced locally, in the US or abroad)	☐

In every choice set, respondents were asked to indicate which one among the four food values they considered the most important and which one they considered the least important when buying food products. If a respondent tried to choose more than one food value as the most or least important, they were told to choose only one value before they could continue to the next choice set in the online survey.

2.3 Econometric analysis

Marley and Louviere (2005) describe the different probabilistic models for the best, worst, and best-worst choices, by explaining theoretically the processes that respondents might follow in providing best and worst observations in BWS. These models are distinguished in three overlapping classes: random ranking and random utility models, joint and sequential, and ratio scale models. Finally, in their paper, Marley and Louviere (2005) make a larger distinction between sequential and maximum difference (maxdiff) models (Marley and Flynn, 2014). A sequential model assumes that respondents make best and worst choices in a particular order (e.g., best first and then worst), while the maxdiff model, which is a well-established probabilistic model that was introduced by the pioneering work of Finn and Louviere (1992), assumes that respondents simultaneously choose the pair of items that maximizes the difference between the best and the worst choices. In this study, we apply the maxdiff model for two main reasons: 1) the maxdiff is the most appropriate probabilistic model for the Case 1 BWS approach and 2) estimating best and worst values separately can be a source of bias due to potential error variance differences between the best and worst choice observations (Marley and Louviere, 2015; Marley and Flynn, 2014; Rose, 2014, Scarpa et al., 2011).

Data were analysed using a discrete-choice framework. Notably, discrete-choice models are consistent with random utility (McFadden, 1974) and Lancaster consumer theories (Lancaster, 1966). According to random utility theory, the utility for respondent *n* in choosing alternative *j* in choice set *t*, is:

$$U_{njt} = V_{njt} + \varepsilon_{njt} \qquad (1)$$

where V_{njt} is a systematic component that can be observed by the researcher, while ε_{njt} is the unobserved error term, which is assumed to be independent of V_{njt}. Generally, when respondents are presented with a choice set, they make choices on the basis of the maximization of the utility they can derive from each alternative of the presented choice set. As such, in making a choice between alternative *j* and alternative *k*, respondent *n* will pick alternative *j* over alternative *k* when:

$$U_{njt} > U_{nkt} \text{ for all } j \neq k. \quad (2)$$

However, in BWS experiments, respondents make choices depending on which pair of alternatives (most important and least important) maximizes their utility. Specifically, in each choice set, respondent *n* chooses the pair of alternatives *j* and *k* as the best and worst, respectively, when:

$$U_{njt} - U_{nkt} > U_{nlt} - U_{nmt} \text{ for all } j \neq l \text{ and } k \neq m. \quad (3)$$

Given that each choice set has *J* food values (4 in our case), the pair of items chosen by the respondent as best and worst represents a choice from all $J(J-1)$ possible pairs (12 in this study), which maximizes the difference in importance. Following LB, λ_j, is defined as the observable location of the value *j* on the scale of importance. Given taste homogeneity this parameter will be constant across respondents. The unobserved level of importance of food value *j* for respondent *n*, I_{nj}, is given by:

$$I_{nj} = \lambda_j + \varepsilon_{nj} \quad (4)$$

where ε_{nj} is the random error term; hence, the probability that the respondent chooses food value *j* as the best and food value *k* as the worst will be equal to the probability that the difference among I_{nj} and I_{nk} is larger than any of the $J(J-1)-1$ possible differences among the other food values in the choice set. Using a multinomial logit model (MNL), the probability of respondent *n* choosing j as the best and k as the worst among pairs of alternative $J(J-1)$ is specified as follows:

$$P_{njk} = \frac{e^{\lambda_j - \lambda_k}}{\sum_{l=1}^{J}\sum_{m=1}^{J} e^{\lambda_l - \lambda_m}} \tag{5}$$

where the choice of respondent n takes the value of 1 for the pair of values chosen by the respondent as best and worst, and the value of 0 for the non-chosen $J(J-1)-1$ pairs of food values. Specifically, λ_j represents the relative importance of food value j over one of the values, which is normalized to 0. In this way, the dummy variable trap can be avoided. Effects coding was applied: the food value takes the value 1 when the value is described as the best alternative, -1 when the value is described as the worst alternative, and 0 otherwise. The MNL assumes that the error terms are independently and identically distributed (IID) with a Gumbel (Extreme value type I) distribution and implies independence within the alternatives and taste homogeneity across respondents.

Heterogeneity in respondents' food values is likely. When heterogeneity valuations is expected, discrete choice models such as the random parameters logit (RPL) model should be used. The RPL model allows for random taste variations and accounts for the panel structure of the data (Train, 2003). As such, in contrast to the MNL model, the importance parameter of value j in the RPL model is assumed to be different for each respondent n and was specified as follows:

$$\tilde{\lambda}_{nj} = \bar{\lambda}_j + \sigma_j \mu_{nj} \tag{6}$$

where $\bar{\lambda}_j$ and σ_j are the mean and standard deviation of λ_j, and μ_{nj} is a random error term that is assumed to be normally distributed with mean zero and unit standard deviation. Substituting Equation (6) into Equation (5), the RPL can be estimated by maximizing a simulated log-likelihood function for μ_{nj} (Train, 2003).[4] In the standard RPL model, independency across taste parameters is assumed; however, food values are expected to be interdependent. In order to take this interdependency into account[5], the correlation structure of the attribute parameters was assumed to follow a multivariate normal distribution. The estimates from the RPL model might be difficult to interpret because the random error term might vary across respondents, and therefore the mean of the parameter estimates of λ_j may be confounded with differences in scale. Hence, following LB, we calculated the share of preference, S_j, for each value, which explains how important respondents rate one value j over the other J values:

$$S_j = \frac{e^{\hat{\lambda}_j}}{\sum_{k=1}^{J} e^{\hat{\lambda}_k}}. \quad (7)$$

Each share can be interpreted as the forecasted probability that the corresponding value is chosen as the most important. If value j has a twice as big preference share as another value, this indicates that the value j is twice as important as the other value. The share of preferences of all the J values must sum to one.

3. Results and discussion

In this section, we describe the results obtained from the econometric analysis. Specifically, in our study, the standard MNL model and the RPL model were estimated. From the RPL model estimates, the respondents' specific preferences for the different food values were calculated using the estimated parameters as priors and the actual choices made by each

[4] We used 1000 Halton draws for the simulation.

[5] In both samples, most of the estimates in the Cholesky matrix were statistically significant, indicating that correlation across the parameters exists across both models (results are available upon request).

respondent.[6] From these posterior estimates, the mean and individual shares of preferences for the twelve values were calculated.

3.1 Model Estimates

In the BWS approach, the importance of a set of attributes is estimated relative to one of these attributes (de-Magistris *et al.*, 2014; Lusk and Briggeman, 2009; Marley and Louviere, 2005). Following LB, we used as the baseline the least important food value, based on the calculation of the percent of times each item was selected best or worst, which in our case is novelty. Estimates from the MNL and RPL models are reported in Table 3.

[6] These posterior estimates are precisely the means of the parameter distributions, which are conditional on the actual choices of each respondent. These estimates might not be the same as the actual respondent's coefficients (Train, 2003); however, when respondents face several choice scenarios, the difference between the values can be very small.

Table 3. Estimates from MNL and RPL models

Food value		MNL		RPL	
		US	Norway	US	Norway
Naturalness	Mean	1.598***	2.502***	2.974***	4.491***
		(0.036)	(0.042)	(0.091)	(0.107)
	SD			2.719***	3.676***
				(0.085)	(0.122)
Safety	Mean	2.746***	3.381***	5.139***	6.158***
		(0.040)	(0.045)	(0.070)	(0.111)
	SD			3.478***	3.177***
				(0.101)	(0.117)
Environmental impact	Mean	1.360***	2.131***	2.406***	3.801***
		(0.036)	(0.041)	(0.084)	(0.097)
	SD			2.421***	3.207***
				(0.086)	(0.106)
Origin	Mean	0.918***	1.578***	1.732***	2.738***
		(0.037)	(0.040)	(0.079)	(0.102)
	SD			2.010***	3.432***
				(0.081)	(0.117)
Fairness	Mean	1.228***	2.186***	2.185***	3.939***
		(0.036)	(0.041)	(0.091)	(0.098)
	SD			2.146***	3.170***
				(0.094)	(0.010)
Nutrition	Mean	1.922***	2.404***	3.612***	4.466***
		(0.037)	(0.042)	(0.092)	(0.097)
	SD			2.606***	3.170***
				(0.076)	(0.010)
Taste	Mean	2.113***	2.714***	3.912***	5.133***
		(0.038)	(0.043)	(0.095)	(0.086)
	SD			2.648***	1.487***
				(0.081)	(0.098)
Convenience	Mean	0.748***	0.850***	1.331***	1.496***
		(0.033)	(0.036)	(0.069)	(0.084)
	SD			1.826***	2.464***
				(0.080)	(0.084)
Appearance	Mean	1.114***	1.469***	2.112***	2.670***
		(0.036)	(0.040)	(0.076)	(0.077)
	SD			2.015***	1.609***
				(0.102)	(0.073)
Price	Mean	1.741***	1.780***	3.219***	3.337***
		(0.037)	(0.041)	(0.097)	(0.094)
	SD			2.855***	2.388***
				(0.083)	(0.108)
Animal welfare	Mean	1.544***	2.470***	2.750***	4.452***
		(0.036)	(0.042)	(0.091)	(0.100)
	SD			2.738***	3.124***
				(0.102)	(0.104)
Novelty	Mean	0.000	0.000	0.000	0.000
	SD			0.000	0.000
Number of choices		12,300	12,444	12,300	12,444

Log-likelihood	-26,384	-25,057	-22,161	-19,951
BIC	52,897	50,217	45,048	40,628
AIC	52,790	50,135	44,477	40,056
AIC/N	4.292	4.029	3.616	3.219

Note: *** indicate significance at the 1% level. Numbers in parentheses are standard errors.

Table 3 indicates that we obtained a better fit with the RPL than the MNL model in both samples as shown by the increases in the log-likelihood values and the reductions in the AIC, BIC, and AIC/N statistics. In addition, Table 3 shows that the derived standard deviations of the attributes' parameters are statistically different from zero, and our assumption of heterogeneity in preferences for the twelve values across individuals cannot be rejected. The results suggest that in both samples novelty was the least important value, and novelty was used as baseline in both the RPL models.

3.2 Shares of preferences for the twelve food values

On the basis of the RPL estimates, we assessed the preferences for the twelve food values by calculating their shares of preference. In Table 4, we report the shares of preference for the different values, from the most to the least important in each country.

Table 4. Preference shares and rankings of importance of food values in the US and Norway

	US		Norway	
Rank	Food value	Share	Food value	Share
1	Safety	0.380*	Safety	0.313*
2	Price	0.115*	Naturalness	0.125*
3	Taste	0.112	Taste	0.112
4	Nutrition	0.088*	Animal welfare	0.098*
5	Naturalness	0.078*	Nutrition	0.094*
6	Animal welfare	0.077*	Price	0.074*
7	Environmental impact	0.039*	Fairness	0.060*
8	Fairness	0.028*	Origin	0.047*
9	Appearance	0.027*	Environmental impact	0.046*
10	Origin	0.026*	Appearance	0.018*
11	Convenience	0.020*	Convenience	0.011*
12	Novelty	0.012*	Novelty	0.002*

An astericks implies that the hypothesis that the mean of the corresponding values are the same across the two samples is rejected at the 0.05 level of significance according to a two-tailed unpaired *t*-test.

Table 4 shows that the mean preference shares are statistically different in the two countries, except in the case of taste and convenience attributes. However, if we consider the differences in the ranking of the importance of food values across the two countries, respondents' preferences are quite similar in many aspects. In both countries, safety is clearly the most important value with a share of 38.0% in the US and 31.3% in Norway. The high importance of safety is in line with the results of LB, who also found that safety was the most important food value in the US. After safety, there is a group of five values that are fairly close in importance with shares ranging between 11.5% and 7.7% in the US, and 12.5% and 7.4% in Norway (price, taste, nutrition, naturalness, and animal welfare). The remaining values have preference shares ranging between 3.9% and 1.2% in the US, and 6.0% and 0.2% in Norway. Convenience and novelty are the least important values in both countries. These similarities in values may reflect a convergence in food values between Europe and the US.

Within these broad similarities in the rankings of food values, there are also some notable differences. Price was the second most important value among the US respondents, which is consistent with the LB study. In contrast, Norwegian respondents considered price as the sixth-most important value. The relatively lower importance of price in Norway may be a reflection of the more equal income distribution. Furthermore, taste was rated as the third-most important value both in the US and Norway, which again is consistent with the results in LB. Nutrition was predicted as most important for about nine percent of the respondents in each country. This result is somewhat at odds with past studies that showed consumers in the US tend to pay more attention to the nutritional content of food products, as compared to European consumers (Bech-Larsen and Grunert, 2003; Rozin *et al.*, 1991); however, the result may reflect a convergence between the two countries. Additionally, naturalness was the second-most important value of Norwegian respondents, while it was the fifth-most important value of US respondents, which is all consistent with the current literature and not surprising given the differences in food environment. Indeed, several studies have shown that European consumers are generally less willing to consume food that has been produced with technologies such as genetic modification, or with cattle fed with growth hormones (Chern *et al.*, 2002; Lusk *et al.*, 2003; Alfnes and Rickertsen, 2003). In addition, this result is also consistent with LB who found that naturalness was rated as the fifth-most important food value.

Food values concerning ethical aspects of food production such as fairness and animal welfare were ranked as more important by the Norwegian than the US respondents. The higher importance of fairness in Norway is as expected given that the social and economic welfare of farmers are crucial aspects in the Norwegian food system, and the result is also consistent with the high equality in income distribution. The higher importance of animal welfare in Norway may also reflect that animal welfare labelling regulations tend to be more developed in Europe than in the US (Mitchell, 2001; Napolitano *et al.*, 2010; Vandemoortele and Deconinck, 2014). Environmental impact was ranked as the seventh-most important attribute by the US sample and the ninth-most important by the Norwegian sample, however, the actual preference share was slightly higher in Norway. This result is not unexpected given the higher presence of regulated eco-food labels in the European food system than in the US (Czarnezki, 2011). Not surprising, origin was rated as somewhat more important by the Norwegian respondents than the US ones. Although existing literature reports that consumers both in the US and in Europe are generally willing to pay a price premium for local or designated origin of food products (Aprile *et al.*, 2012; Darby *et al.*, 2008; de-Magistris and Gracia, 2014; Meas *et al.*, 2015), origin is ranked relatively low in both countries. This result is consistent with LB, who found that origin was considered as the least important value in their US study.

3.2 Socio-demographic information and shares of preferences for the twelve food values

Overall, results suggest that US and Norwegian respondents differ mostly in terms of the ranking of price and naturalness. However, Table 1 shows that the US and Norwegian samples differ in terms of some socio-demographic variables, which might explain some of the similarities/differences in preferences for food values across the countries. Specifically, we observed that the two samples differ in terms of age, education, having children or not, income and belonging to rural/urban areas. As such, in order to test whether individuals' preferences for food values may differ in terms of socio-demographic characteristics, we divided the US and Norwegian samples into different sub-groups based on age (young/old), education (low/high), the presence of children in the household (with/without), income level (low/high), whether residing in urban/rural area (urban/rural), and whether the respondent had purchased organic food during the previous 12 months (purchased/not purchased). In case of age, education, and income, we determined the grouping based on the median values in the samples, and then divided each sample into two groups. We estimated the RPL model for each subgroup and calculated the respondents' shares of preferences for the subgroups. In addition, we also report results from *t*-tests to test whether the preferences for the food values differed among the sub-groups within each country (indicated with an asterisks in tables 5 to 10).

In tables 5 and 6, we report the shares of preferences respectively for young and old respondents, and for respondents with a high and low education level in each country.

Table 5. Shares of preferences and rankings by country and age

	US				Norway			
Rank	Old (n=526)		Young (n=499)		Old (n=490)		Young (n=547)	
1	Safety	0.411*	Safety	0.352*	Safety	0.287*	Safety	0.362*
2	Price	0.129*	Taste	0.107*	Naturalness	0.147*	Taste	0.131*
3	Taste	0.124*	Price	0.103*	Taste	0.124*	A. Welfare	0.098*
4	Naturalness	0.083	Nutrition	0.094*	Nutrition	0.083	Naturalness	0.087*
5	A. welfare	0.073	A. welfare	0.078	A. Welfare	0.073*	Nutrition	0.087
6	Nutrition	0.072*	Naturalness	0.078	Price	0.072	Price	0.082
7	Env. impact	0.027*	Env. impact	0.051*	Fairness	0.027*	Fairness	0.052*
8	Appearance	0.022*	Fairness	0.033*	Origin	0.022*	Env. Impact	0.039
9	Fairness	0.022*	Origin	0.031*	Env. Impact	0.022	Origin	0.037*
10	Origin	0.021*	Appearance	0.029*	Appearance	0.021	Appearance	0.015
11	Convenience	0.011*	Convenience	0.026*	Convenience	0.011	Convenience	0.010
12	Novelty	0.005*	Novelty	0.018*	Novelty	0.005	Novelty	0.001

An astericks implies that the hypothesis that the mean of the corresponding values are the same across the sub-groups within each country is rejected at the 0.05 level of significance according to a two-tailed unpaired t-test.

Table 6. Shares of preferences and rankings by country and education level

	US				Norway			
Rank	High (n=531)		Low (n=494)		High (n=653)		Low (n=384)	
1	Safety	0.384	Safety	0.363	Safety	0.293	Safety	0.319
2	Nutrition	0.113*	Price	0.139*	Naturalness	0.148*	A. welfare	0.156*
3	Taste	0.112	Taste	0.120	Taste	0.128*	Taste	0.097*
4	Price	0.096*	A. welfare	0.088*	Nutrition	0.108*	Naturalness	0.084*
5	Naturalness	0.093*	Naturalness	0.072*	A. welfare	0.072*	Price	0.077
6	A. welfare	0.063*	Nutrition	0.055*	Price	0.072	Nutrition	0.074*
7	Env impact	0.037*	Env impact	0.042*	Fairness	0.056	Fairness	0.061
8	Fairness	0.026	Fairness	0.031	Env impact	0.050*	Origin	0.059*
9	Origin	0.025	Origin	0.029	Origin	0.040*	Env impact	0.039*
10	Appearance	0.024*	Appearance	0.029*	Appearance	0.017*	Appearance	0.020*
11	Convenience	0.018	Convenience	0.021	Convenience	0.014	Convenience	0.012
12	Novelty	0.005*	Novelty	0.011*	Novelty	0.001*	Novelty	0.003*

An astericks implies that the hypothesis that the mean of the corresponding values are the same across the sub-groups within each country is rejected at the 0.05 level of significance according to a two-tailed unpaired *t*-test.

From tables 5 and 6, we observe that the shares of preferences for the different food values tend to be similar across the age and education groups in both countries. Only in the US, we observe a difference in the rank of the attribute nutrition across higher and lower educated groups. Nutrition is rated as the second most important value by higher educated people, while it is rated as the sixth most important value by lower educated people. We would expect that the presence of children in the household would also conspicuously influence respondents' preferences for the attribute nutrition (Drichoutis *et al.*, 2006.). However, Table 7 shows that this is not the case in either sample.

Table 7. Shares of preferences and rankings by country and presence of children in the household

	US				Norway			
Rank	With (n=457)		Without (n=568)		With (n=307)		Without (n=730)	
1	Safety	0.414*	Safety	0.354*	Safety	0.385*	Safety	0.279*
2	Taste	0.100*	Price	0.140*	Naturalness	0.119	Taste	0.123*
3	Nutrition	0.094*	Taste	0.131*	Taste	0.105*	Naturalness	0.117
4	Price	0.089*	A. welfare	0.082	Price	0.093*	A. welfare	0.116*
5	Naturalness	0.087*	Nutrition	0.076*	Nutrition	0.088	Nutrition	0.101
6	A. welfare	0.071	Naturalness	0.072*	A. welfare	0.062*	Price	0.065*
7	Env impact	0.041	Env impact	0.035	Fairness	0.046*	Fairness	0.061*
8	Origin	0.027	Fairness	0.029*	Env impact	0.042	Origin	0.054*
9	Fairness	0.024*	Appearance	0.028	Origin	0.033*	Env impact	0.048
10	Appearance	0.023	Origin	0.023	Appearance	0.020	Appearance	0.017
11	Convenience	0.019	Convenience	0.019	Convenience	0.006*	Convenience	0.015*
12	Novelty	0.011	Novelty	0.011	Novelty	0.001*	Novelty	0.002*

An astericks implies that the hypothesis that the mean of the corresponding values are the same across the sub-groups within each country is rejected at the 0.05 level of significance according to a two-tailed unpaired *t*-test.

Indeed, nutrition is rated in the US as the third most important value by respondents with children in the household and the fifth most important by respondents without children. In the Norwegian sample, nutrition is equally rated by the two subgroups. Table 7 actually shows that there are no substantial differences in the rating of the importance of the food values across respondents with and without children in the household. However, an interesting result is that price is ranked fourth by respondents living with children both in the US and Norway. In regards to the price attribute, the difference in the importance of price may be explained by a higher income level and a more equal income distribution in Norway. In Table 8, we report the preference shares of low and high income respondents in both countries.

Table 8. Shares of preferences and rankings by country and income level

	US				Norway			
Rank	Low (n=441)		High (n=584)		Low (n=358)		High (n=679)	
1	Safety	0.373*	Safety	0.382*	Safety	0.258*	Safety	0.339*
2	Price	0.160*	Taste	0.123*	A. welfare	0.128*	Taste	0.123
3	Taste	0.096*	Nutrition	0.101*	Taste	0.122	Naturalness	0.113
4	A. welfare	0.080*	Price	0.089*	Naturalness	0.119	Nutrition	0.087*
5	Naturalness	0.076	Naturalness	0.084	Nutrition	0.112*	Price	0.083*
6	Nutrition	0.068*	A. welfare	0.073*	Price	0.070*	A. welfare	0.083*
7	Env impact	0.038	Env impact	0.039	Fairness	0.070*	Fairness	0.061*
8	Fairness	0.028	Appearance	0.026	Env impact	0.052*	Origin	0.059*
9	Appearance	0.026	Origin	0.026	Origin	0.051*	Env impact	0.039*
10	Origin	0.025	Fairness	0.026	Appearance	0.017	Appearance	0.020
11	Convenience	0.021	Convenience	0.019	Convenience	0.014	Convenience	0.012
12	Novelty	0.011	Novelty	0.012	Novelty	0.001*	Novelty	0.003*

An astericks implies that the hypothesis that the mean of the corresponding values are the same across the sub-groups within each country is rejected at the 0.05 level of significance according to a two-tailed unpaired *t*-test.

In the US, lower income respondents considered price to be slightly more important than higher income respondents, and price is the second-most important food value for lower income respondents and the fourth-most important for higher income respondents. On the other hand, price is rated as the fifth-most important food value by higher income Norwegian respondents and the sixth-most important value by lower income respondents. These results suggest that price preferences between the income sub-groups within each country tend to be similar.

Finally, we tested whether residing in rural/urban area had a significant impact on respondents' preferences for the food values. Table 9 shows that in Norway, the ranking of origin notably changes depending on whether the respondent resides in rural or urban area: origin is on average the fifth most important attribute for individuals living in rural areas and the ninth most important for individuals living in urban areas. However, in case of the US, we do not observe this difference in the ranking between the two sub-groups.

Table 9. Shares of preferences and rankings by country and living in urban/rural area

Rank	US Rural (n=188)		Urban (n=837)		Norway Rural (n=257)		Urban (n=780)	
1	Safety	0.369	Safety	0.376	Safety	0.317	Safety	0.315
2	Price	0.132	Taste	0.117	Naturalness	0.159*	Taste	0.118*
3	Taste	0.124	Price	0.110	A. welfare	0.122*	Naturalness	0.109*
4	Naturalness	0.099*	Nutrition	0.088*	Taste	0.084*	Nutrition	0.106*
5	A. welfare	0.087	Naturalness	0.085*	Origin	0.077*	A. welfare	0.090*
6	Nutrition	0.065*	A. welfare	0.072	Fairness	0.065	Price	0.083*
7	Env impact	0.033	Env impact	0.040	Nutrition	0.061*	Fairness	0.057
8	Fairness	0.026	Fairness	0.028	Price	0.049*	Env impact	0.051*
9	Appearance	0.023	Appearance	0.027	Env impact	0.032*	Origin	0.038*
10	Origin	0.020	Origin	0.026	Appearance	0.021	Appearance	0.019
11	Convenience	0.015	Convenience	0.021	Convenience	0.011	Convenience	0.013
12	Novelty	0.006*	Novelty	0.012*	Novelty	0.001*	Novelty	0.002*

An astericks implies that the hypothesis that the mean of the corresponding values are the same across the two sub-groups within each country is rejected at the 0.05 level of significance according to a two-tailed unpaired *t*-test.

According to these results, we might conclude that socio-demographic variables scarcely explain the differences/similarities in preferences for food values between the two countries. However, LB found that the preferences for the different food values particularly differed among organic food purchasers and non-purchasers. Specifically, LB observed that price and naturalness (the two attributes which Norwegian and US respondents valued most differently in our survey) were the most differently rated food values between consumers who purchased organic foods and consumers who did not purchase organic foods in the US. In Table 10, we report the mean shares of preference of the US and Norwegian respondents who have purchased and not purchased organic food during the twelve months before the survey.[7]

[7] In our survey, we asked respondents: "Have you purposely purchased organic foods during the last 12 months?" We also gave them the opportunity to answer "I do not know." In defining the "organic food purchasers" and the "organic food non-purchasers" sub-groups, we did not include the observations of respondents who replied "I do not know."

Table 10. Shares of preferences and rankings by country and organic food purchases

	US				Norway			
	Not purchased (n=441)		Purchased (n=577)		Not purchased (n=491)		Purchased (n=458)	
Rank								
1	Safety	0.373†	Safety	0.367†	Safety	0.311*†	Safety	0.294*†
2	Price	0.160*†	Naturalness	0.131*†	Taste	0.154*	Naturalness	0.167*†
3	Taste	0.096*	Nutrition	0.111*†	Price	0.116*†	A. welfare	0.115*†
4	A. welfare	0.062†	Taste	0.083*	Nutrition	0.090†	Nutrition	0.105†
5	Nutrition	0.053*†	A. welfare	0.076†	Naturalness	0.087*†	Taste	0.084*†
6	Naturalness	0.031*†	Price	0.070*†	A. welfare	0.087*†	Fairness	0.075*†
7	Appearance	0.030*	Env impact	0.045*	Origin	0.046†	Env impact	0.069*
8	Env impact	0.027*	Fairness	0.030*†	Fairness	0.043*†	Origin	0.046†
9	Fairness	0.023*†	Origin	0.030*†	Appearance	0.024*	Price	0.032*†
10	Origin	0.018*†	Appearance	0.022*	Env impact	0.023*	Appearance	0.007*†
11	Convenience	0.014*	Convenience	0.021*†	Convenience	0.015*	Convenience	0.006*†
12	Novelty	0.006*†	Novelty	0.014*	Novelty	0.003*†	Novelty	0.001*†

An astericks implies that the hypothesis that the mean of the corresponding values are the same across the sub-groups within each country is rejected at the 0.05 level of significance according to a two-tailed unpaired *t*-test. (†) implies that the hypothesis that the mean of the corresponding values are the same across the sub-groups within the organic purchasers and non-purchaser is rejected at the 0.05 level of significance according to a two-tailed unpaired *t*-test.

Consistent with LB, the importance of price was rated differently across the organic food purchaser/non-purchaser sub-groups. In the case of the US, organic non-purchasers rated price as the second-most important value, while organic purchasers rated price as the sixth-most important food value. Notably, Norwegian respondents who did not buy organic food, rated price as the third-most important food value, while organic purchasers only rated price as the ninth-most important value. In Table 10, we also report results from *t*-tests to test whether the preferences for the food values differed between organic purchasers in the US and Norway and organic non-purchasers in the US and in Norway (indicated with "†" in the table). Although the mean shares of preferences were statistically different for most of the values both in the case of Norwegian and American organic purchasers and organic non-purchasers, the food values become more similar across the samples when mean shares of preferences between organic purchasers and non-purchasers in the two countries were compared. Generally, organic purchasers gave more importance to naturalness and food values related to sustainability issues, while organic non-purchasers gave more importance to attributes such as appearance and especially price. Specifically, price was rated as one of the least important attributes by organic purchasers, while one of the most important attributes by the organic non-purchasers both in the US and Norway.

4. Conclusions

To the best of our knowledge, our study is the first attempt to estimate consumers' preferences for food values in a multi-country setting. We used a best-worst scaling approach in order to compare consumers' preferences for food values in the US and Norway. We included twelve food values: naturalness, taste, price, safety, convenience, nutrition, novelty, origin, fairness, appearance, environmental impact, and animal welfare. Our results show that there were large similarities in preferences for food values among US and Norwegian respondents. For instance, safety was clearly the most important value in both countries. Similarly, taste was rated as the third-most important value, and convenience and novelty were rated as the two least important values in both countries. There were also notable differences in the evaluation of the importance of price. Price was considered to be the second-most important value by US respondents, but only the sixth-most important value by the Norwegian respondents. In addition, naturalness was rated as the second-most important value by Norwegian respondents, but rated only as the fifth-most important value by US respondents. This difference is in line with the existing literature that shows European consumers are generally willing to pay a higher price for non-GM or hormone free foods, as compared with US consumers (Chern *et al.*, 2002; Lusk *et al.*, 2003).

Specifically, Norwegian respondents gave more importance to food values related to ethical aspects of food production such as fairness and animal welfare; however, it is important to note that animal welfare was rated among the six most important food values in both countries. This finding confirms that the addition of animal welfare to LB's set of attributes is important in assessing food values. This result also suggests that animal welfare labelling could be a potential strategy for the marketing of food products both in the US and in Europe. For example, given that origin is rated less important than animal welfare, this might suggest that imported meat and dairy products might have a better market share if produced respecting the welfare of the animals. On the other hand, novelty, i.e., the other new food value that we have introduced besides animal welfare, was the least important value for both samples. We included novelty in order to capture the value related to enthusiasm, excitement for new products, but this outcome might suggest that novelty in food products may be associated with food neophobia, which could make individuals reluctant towards food products they do not know (Camarena *et al.*, 2011; Lähteenmäki and Arvola, 2001; Mileby *et al.*, 2012). Nutrition was ranked as one of the most important food values in both countries, which should encourage policy makers in Europe to use regulated nutritional labelling on food products.

Furthermore, origin was rated as one of the least important values in both countries. This result is at odds with the existing literature that shows that consumers both in the US and Europe are usually willing to pay a price premium for locally or nationally produced food products, even over other attributes such as organic production, fair trade, or low carbon emission (Basu and Hicks, 2008; Campbell *et al.*, 2013; Darby *et al.*, 2008; de-Magistris and Gracia, 2014; Gracia, *et al.*, 2014; Hu *et al.*, 2009; Onozaka and Mcfadden, 2011). As LB suggest, the low importance of origin may be explained by the fact that in preference elicitation methods such as conjoint analyses or choice experiments, differences in consumers' preferences are estimated in a range of specific attributes levels, which might not be the levels that endogenously come to mind for the consumer. As such, the use of specific attribute levels could be a source of bias in revealing individuals' preferences. In addition, the use of a specific food product might also influence consumers' perceptions for different food attributes. For example, Scarpa *et al.* (2005) observed that consumers' evaluations for locally produced and organic food claims varied according to the product under consideration. In this study, we did not specify any food product or food attribute level. To test the robustness of our findings, more research on comparison of consumers' preferences for food values across countries and also across different product groups is warranted.

On the other hand, regarding the naturalness, consumers who purchase organic food gave more importance to this value, as compared with non-purchasers in both countries. Moreover, our results show that organic purchasers and organic non-purchasers in both countries rated naturalness similarly; the same applied for price. Hence, these findings suggest that purchasing attitudes might also be an important factor when assessing consumers' preferences for food values in different countries. Specifically, we observed that while an attitudinal variable, such as buying organic food, substantially affected how individuals rated the twelve food attributes, sociodemographic information, including the belonging to a certain country, did not have such a relevant impact on respondents' preferences for the food values. These results might then confirm the intuition of LB in defining these more abstract food attributes as more stable, intrinsic meta-preferences which drive consumers' food choices. As such, our results suggest that food values are an important factor in explaining behavioural reasoning in food consumption.

Finally, our findings have important implications for food marketing and policy. For example, since safety is the top food value in both US and Norway, food producers need to constantly be cognizant of potential food safety incidents in their products. The recent insecticide contamination in eggs in Europe is a prime example of how incidents like these can significantly affect the livelihood of food producers and erode the confidence of consumers. The implications for food safety policy are equally compelling obviously given the immense importance that consumers are putting on the safety of the products they consume. In terms of the food marketing benefits, the relative rankings of the food values in our study can be useful and informative in terms of the new products that could be developed by the food industry and also in terms of product differentiation using food labels, particularly for the credence food values that are valued more by consumers (e.g., nutrition and animal welfare). Our results can also potentially be used for ongoing trade negotiations between Europe and the US. The similarities in food values among consumers in both countries are large, with a clear emphasis on safety, suggesting that consumers in both countries highly value the safety of food products, both domestically produced and imported products. Furthermore, price, taste, nutrition, naturalness, and animal welfare are considered to be the five most important food values after safety in both countries. Consumers in both the US and Europe would benefit from increased trade in agricultural products that could potentially lower prices and increase the variation in the attributes of food, as long as the products are safe and adequately labelled for the key attributes related to nutrition, naturalness, and animal welfare.

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