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Abstract

Purpose – In 2012, the European food industry was hit by a food fraud: horsemeat was found in pre-prepared foods, without any declaration on the package. This is commonly referred to as the 'horsemeat scandal'. The aim of this study is to investigate consumers' preferences across Europe for a selected ready meal, ready to heat (RTH) fresh lasagne, to consider whether the effects of potential food frauds on consumers' choices can be mitigated by introducing enhanced standards of RTH products.

Approach – An online survey was administered to 4,598 consumers of RTH lasagne in six European countries (Republic of Ireland, France, Italy, Spain, Germany and Norway), applying discrete choice experiments to estimate consumers' willingness to pay for enhanced food safety standards and highlight differences between countries.

Findings – Many similarities across countries emerged, as well as some differences. Consumers in Europe are highly concerned with the authenticity of the meat in ready meals and strongly prefer to know that ingredients are nationally sourced. Strong regional differences in price premiums exist for enhanced food safety standards.

Originality/value –This research adds relevant insights in the analysis of consumers' reaction to food fraud, providing practical guidelines on the most appropriate practices that producers should adopt and on the information to reduce food risk perception among consumers. This would prove beneficial for the food processing industry and the European Union. The survey is based on a representative sample of European consumers making this the largest cross country study of this kind.

Keywords Discrete Choice Models; food safety; ready meals; horsemeat scandal; willingness to pay; ready to heat; consumer preferences, food fraud.

Paper type Research paper

Introduction

Food has never been safer than nowadays; however consumers are considerably uncertain, anxious and have an increasingly critical perception of food safety (Bánáti, 2011). This has generated a lively debate, with a growing number of studies focussing on the impacts of risk perception on consumers' food choices (Frewer *et al.*, 2015). Indeed, consumers' choices regarding food have always been heavily influenced by risk, as risk perception strongly influences consumers' decision-making process (Grunert, 2002).

In a global and ever expanding food market, consumers continuously make trade-offs between exploring new food products and the risk that these do not meet their expectations or, even worse, that food differs from what its advertising and packaging promise. Food frauds, especially as economically motivated adulterations, have led to serious public health concerns, as well as distrust in consumers (Spink and Moyer, 2011). Therefore, tracking and stopping food frauds have become a major concern of many governments around the world over recent decades (Shears, 2010).

How to effectively communicate messages about food safety, to appropriately provide consumers with necessary information, without alarming the general public to avoid negative impacts on the market, has become a major challenge for the food industry in the last years. Improving the public trust in government actions and food industry strategies to enhance and guarantee food safety is a focal objective for the EU, as confirmed by the establishment of the European Food Safety Authority in 2002.

Notwithstanding the efforts of EU officers and many governments focussing on food authenticity and food fraud prevention, in the late 2012, the European food industry was hit by the presence of horsemeat in pre-prepared food, mainly lasagne and burgers, without any declaration of horse meat on the package, food label or ingredients list. Presence of horse meat

in beef products was then found in several European countries throughout most of 2013. This is commonly referred to as the 'horsemeat scandal', which first came to light when equine DNA was found in beef burger. This led to further investigations which revealed other similar cases in the UK and across Europe, affecting consumers' perception of the integrity of the market in general, and of the sector of pre-prepared food containing meat in particular (Yamoah and Yawson, 2014; Barnett *et al.*, 2016).

As the demand for ready meals has increased in recent years, mainly due to busy lifestyles and enhanced processes in the production of ready to heat (RTH) products (Leroy and Degreef, 2015), it is important to understand how this scandal has impacted on consumers' preferences for RTH products. The aim of this study is to investigate consumers' preferences across Europe for enhanced standards of RTH products, to consider the effects of a food fraud on consumers' choices, and to provide guidance on how the food industry and governments can mitigate consumers' perception of food risk. In this study, a discrete choice experiment was administered online to consumers across six European countries to elicit their willingness to pay for measures improving food safety, food authenticity retention of nutritional values, and place of origin of the meat in RTH lasagne.

The article is organised as follows. The next section presents a review of studies that focused on consumers' food risk perception, consumers' preferences for food attributes, and the effects of information in reassuring consumers of the quality and safety of food. The section 'Research objective and experimental procedure' points out the research objective and hypotheses, and explains the adopted methodology. The following section presents the results and tests the proposed research hypotheses. Finally, 'Discussion' and 'Conclusion' highlight the recommendations of this study for the food industry and governments.

Background literature

Since the '90s, many studies in economics, psychology and marketing have looked at the effects of food safety, quality and origin on consumers' risk perception. A number of studies explored consumers' preferences for reducing specific risk factors, such as avoidance of pathogens, pesticides or genetically modified organisms (GMOs) in food production (e.g., Hayes *et al.*, 1995; McCluskey *et al.*, 2005; Phillips and Hallman, 2013). Others focussed on different features of the food product that might affect consumers' perception of risk and quality, such as traceability (Loureiro and Umberger, 2007; Wu *et al.*, 2015), origin labelling (Loureiro and Umberger, 2003; Lagerkvist *et al.*, 2014; Lim *et al.*, 2014) and quality labelling (Barnett *et al.*, 2016).

Food risk perception has increased in importance when consumers' confidence in the food safety regulation diminished due to food safety incidents (Cope *et al.*, 2010; Barnett *et al.*, 2016). These were heavily covered by the media, which tends to stimulate negative emotions and fears towards the incriminated products (Mitchell *et al.*, 2015). To reduce the negative impacts of possible food frauds, the food industry needs not only to improve controls and enhance the quality standards of its production, but also to find the most effective ways to reassure the consumer by communicating evidence of desirable product authenticity (Fenger *et al.*, 2015).

Espejel *et al.* (2009) and Rubio *et al.* (2014) highlighted the role played by consumers' brand awareness and involvement with the product in reducing risk perception. Other scholars also highlighted the quality signalled by brands with a strong geographical connotation for their products (Grunert, 2005). Verbeke and Ward (2006) found that consumers' interest is generally medium for origin, low for traceability, and high for direct indication of quality. They concluded that traceability has little marketing potential as a quality cue, unless it is accompanied by clear and unbiased quality indication; Wu *et al.* (2015) found similar results. Traceability is a controversial attribute. Loureiro and Umberger (2007) and Ubilava and Foster (2009) found

positive willingness to pay (WTP) for traceability and quality/safety assurance labelling in the US. However, in the latter study, traceability commanded a much higher price premium than quality assurance, whereas the former highlighted a reversed preference ordering.

Bernués *et al.* (2003), focussing on European consumers found that food safety and the knowledge of the region of origin where the product came from were deemed more important than other characteristics including animal welfare and environmentally friendly production. The study also highlighted that consumers in France, Italy and Spain are more concerned with food safety than English and Scottish consumers. Other scholars have shown that preferences are different in different contexts and countries. Roosen *et al.* (2003) found that the origin labelling was deemed most important for French and German residents, whereas UK residents deemed features such as product quality as most important.

Berg (2004) compared the reactions of respondents from the UK, Belgium and Norway to food scandals and found that consumers have different attitudes toward food safety within and across countries. He identified the largest group of naive consumers, who are confident that foods are not harmful for themselves or their families, amongst Norwegian men, and the largest group of sceptical consumers, concerned with food safety, amongst Belgian women. Berg *et al.* (2005) analysed the level of trust in food safety in Russia, Denmark and Norway, highlighting the lower trust in Russian consumers. They pointed out that trust in food safety in the Scandinavian countries mainly depends on trust in public food control.

Van Rijswijk and Frewer (2012) surveyed consumers in four countries across Europe, focussing on traceability, communication means, labelling and food fraud responsibility, finding that traceability was perceived as more important in Italy and Spain than Germany and France.

Many studies investigated the importance of the information about food nutritional values and the perception of food safety among consumers. Miller and Cassady (2015) concluded that

nutritional information is typically underutilised by consumers. This is also confirmed by Liu *et al.* (2015), who highlighted that only one third of Chinese consumers belonging to their sample looked at nutritional labels when buying a food. Conversely, information about nutritional values played an important role in a Spanish sample by Gracia and de-Magistris (2016). They compared nutritional values with other food labelling schemes regulated by the EU and other schemes not yet regulated. Cavaliere *et al.* (2015), analysing Italian consumers, found that the most attentive consumers to nutritional claims were primarily females, belonging to families with young children, with good knowledge about the topic, and particularly interested in the wellbeing of the household. Van Wezemael *et al.* (2014) analysed the most important nutritional claims for consumers from four European countries and pointed out the need to differentiate marketing strategies across Europe.

Research objective and experimental procedure

Research objective and hypotheses

The previous section highlighted that very few studies looked at preferences for enhanced standards of food products in periods in which fraudulent labelling had occurred. The aim of this study is to investigate consumers' preferences for a selected ready meal –RTH fresh lasagne – conducted as the horsemeat scandal spread across Europe, to analyse whether the effects of food fraud on food risk perception, after the fraud has been addressed, can be mitigated introducing enhanced standards for RTH products. Identifying which attributes of RTH products improve consumers' confidence is of invaluable importance to the food processing industry, as well as to policymakers deciding future food standards.

In the light of the literature review, four attributes appear of particular interest to consumer during product evaluation, especially when buying ready meals: enhanced food safety through new processing methods (Hayes *et al.*, 1995; McCluskey *et al.*, 2005; Phillips and Hallman, 2013); origin of the product and its ingredients (Bernués *et al.*, 2003; Roosen *et al.*, 2003;

Grunert, 2005; Verbeke and Ward, 2006); traceability (Loureiro and Umberger, 2007; Ubilava and Foster, 2009; Wu *et al.*, 2015); and information of the nutritional values on the label (Van Wezemael *et al.*, 2014; Cavaliere *et al*., 2015; Liu *et al.* 2015; Miller and Cassady, 2015; Gracia and de-Magistris, 2016).

This study, therefore, aims at identifying the importance of these attributes by estimating consumers' willingness to pay for them when buying RTH fresh lasagne. Given that many studies have identified cross-country differences in the attribute perception and importance evaluation (Bernués *et al.*, 2003; Roosen *et al.*, 2003; Berg, 2004; Van Wezemael *et al.*, 2014), this study aims also to test whether a food fraud can generate different reactions and willingness to pay between countries.

Two hypotheses derive from the research objective and will be tested:

H1: Consumers are willing to pay a price premium for the improved features of RTH lasagne delivered by:

H1a: new processing methods aimed at reducing the risk of food poisoning;

H1b: information on the origin of the meat used in the lasagne;

H1c: information on meat authenticity;

H1d: information on nutritional values.

H2: Cross-country differences exist:

H2a: in evaluating the improved features;

H2b: in food fraud perception, and consumers are differently concerned and aware about food safety and measures adopted to reduce risk.

Survey administration

The research objective was achieved through an online survey administered to a panel of respondents invited by Survey Sampling International from their pool of respondents in January 2014 to over 5,000 respondents across 6 European countries. After cleaning the data, the final dataset comprises a total of 4,598 respondents in 6 European Countries – France (790 respondents), Italy (813), Spain (797), Republic of Ireland (700), Germany (798), and Norway (700) - chosen to represent differences in culture between northern areas of Europe and Mediterranean areas, as well as to explore differences in how the horsemeat scandal impacted each country. The Republic of Ireland was the first country in which the scandal was discovered. Italy was impacted immediately after, while the other four countries – two in the north and two in the south of Europe – were less affected. The sample was stratified in terms of gender, age, education and employment to provide a sample representative of the adult population in the selected countries. Table I reports the descriptive statistics of the respondents. To the authors' knowledge, this is the largest cross sectional study of this kind. ere.

[Table I about here]

The choice experiment

The Discrete Choice Experiment (DCE) is the core of the questionnaire. The attributes used in the DCE were selected based on focus groups, in consultation with small and medium enterprises (SMEs) producing RTH lasagne, and relevant literature. Four attributes, plus price, were selected (Table II).

Risk of food poisoning. An incorrect conservation or processing of the product may lead to negative impacts on health. This attribute was presented in the DCE with one of two levels: either current food safety standards, or enhanced food safety standards provided by a processing method aimed at improving the safety of the product even when the product would not be conserved or consumed following the instructions on the package.

Origin of the meat used in the lasagne. This attribute was designed with three possible levels: i) unknown origin, as in most lasagne packages; ii) imported meat; iii) national meat.

Meat authenticity. It refers to the possibility of a test of the DNA of the meat in the lasagne to prove that it contains only the meat of the animal stated on the label. This attribute can assume two levels: 1) lasagne not tested, as it currently appears in most lasagne packages; 2) lasagne tested to confirm that the lasagne contains only the meat stated on the package.

Retention of nutritional values. Respondents were informed about the positive properties of lasagne as a vitamin C source, which is provided by the tomatoes used in the lasagne (see for example Sánchez-Moreno *et al.*, 2006). Two levels are associated with this attribute: a) current level of retention of nutritional values – specifically, RTH lasagne provides consumers with 20% of the daily recommended intake of Vitamin C; b) twice the current level obtained by adopting modern processing techniques to retain more Vitamin C compared to current standards.

[Table II about here]

The DCE was designed by an experimental approach which optimised the D_b-efficiency index (Ferrini and Scarpa, 2007). Twenty-four different choice sets were produced and divided into three blocks, and shown to respondents in a randomised order to avoid ordering effects. Each respondent faced 8 choice tasks in which they were asked to state their preferred RTH lasagne amongst two experimentally designed alternatives and a current situation. They also had the option to not choose any lasagne. Figure 1 shows an example of a choice task. To reduce the hypothetical bias of the choice tasks, respondents were informed that there were no 'right or wrong answers', that we were just interested in their choices. Respondents were further reminded that they should treat each choice task as independent and that they should keep in mind what they usually spend – and can afford to spend – on food.

[Figure 1 about here]

Econometric approach

DCE is an application of the theory of value (Lancaster, 1966) combined with the random utility maximization theory (Thurstone, 1927). Under this setting, the core assumption of DCE is that choices are driven by the maximisation of respondents' utility. The utility that each alternative brings to respondents can be represented by the equation:

$$U_{nit} = V_{nit}(\beta, X_{nit}) + \varepsilon_{nit}, \quad (1)$$

where *n* indicates the respondent, *i* the chosen alternative, *t* the choice occasion, *X* is a vector of attributes, β is a vector of parameters to be estimated and ε is a random error term (unobserved by the researcher) assumed to be iid Gumbel distributed. Given the utility function of Equation (1), the probability for individual *n* of choosing alternative *i* over any other alternative *j* in a choice set is represented by a multinomial logit (MNL) model (McFadden, 1974):

$$Pr_{nit} = \frac{e^{\mu V_{nit}}}{\sum_{j=1}^{J} e^{\mu V_{njt}}}, \quad (2)$$

where μ is the scale parameter of the MNL model, often assumed to be equal to one, and $V_{nit} = \beta' x_{nit}$.

Direct comparisons between the coefficient estimates for preferences across countries are not possible because under the assumptions of random utility theory only differences in utility matters, and also because there might be differences in scale/preferences across countries that are not identifiable (Swait and Louviere, 1993). To overcome this problem, models were estimated in WTP–space (Scarpa and Willis, 2010; Train and Weeks, 2005), according to the following equation:

$$U_{nit} = -\alpha\, p_{nit} + (\alpha\, w)'\, X_{nit} + \varepsilon_{nit} \ , \quad (3)$$

where α is the price coefficient, *p* is the price shown to the respondent for the alternative *i*, and *w* is the vector of WTP for each attribute computed as the ratio of the attribute's coefficient and the price coefficient: $w = \beta / \alpha$. Note that equation (3) is equivalent to equation (1) when none of the parameters is random. An important feature of the WTP-space specification, in addition to allowing researchers to directly interpret estimates in 'money terms', is the possibility to test the spread of the WTP distribution directly using Log-likelihood tests (Thiene and Scarpa, 2009). Furthermore, in a Mixed Logit (MXL) framework (Train, 2009), the specification in WTP-space allows the analyst to directly identify a convenient distribution for WTP estimates.

In order to explore preferences' heterogeneity and to exploit the full potential of the WTP-space specification, a Random Parameter Logit (RPL) model was estimated (McFadden and Train, 2000). In this context, the utility function includes parameters described by an underlying continuous distribution $\phi(\cdot)$. The unconditional probability of a sequence of *T* choices can be derived by integrating the distribution density over the parameter values:

$$\Pr(nit) = \int \prod_{t=1}^{T} \frac{e^{V_{nit}}}{\sum_{j=1}^{J} e^{V_{njt}}} f(\alpha, \beta) d\alpha, d\beta. \qquad (4)$$

In order to consider that a panel composed by *T* choices for each respondent is observed, Equation 4 integrates the product of the *T* logit probabilities. To consider the choice set composition, an error component was included into the model (Walker *et al.*, 2007).

Results

The results from the RPL model estimations in WTP-space in each country are reported in Table III. All features were coded as dummy variables, with the reference dummies taking on the following values: current level of food safety, no information about the origin of the meat in the

sauce, no DNA test and no improvement in retention of nutritional values. Each attribute was modelled as normally distributed, estimating the mean (μ) and the spread of the distribution (σ).

[Table III about here]

The signs of all WTPs conform to prior expectations across the samples and confirm the first hypothesis H1: consumers are willing to pay a price premium for the improved features of RTH lasagne proposed by our experiment. In fact, positive and significant WTPs have been found for reducing the risk of food poisoning (H1a), for the information on the place of origin of the lasagne's ingredients (H1b), particularly if they are nationally sourced, for the DNA test (H1c) and for an increased retention of nutritional values (H1d). The only exceptions are the retention of nutritional values for French and German consumers and the risk of food poisoning for Italian consumers. The spread of the estimated distributions and the differences in certain attributes, such as enhanced food safety, origin of the meat and test for meat authenticity, show wide heterogeneity within countries.

Regarding the second hypothesis H2, a comparison of the results from the samples within each country confirms hypothesis H2a: the "Cross-country differences exist in evaluating the improved features". In fact, respondents from the Republic of Ireland place a high monetary value on the RTH lasagne if they are tested for meat authenticity (3.47 euros on average) and if they are nationally produced (3.18 euros). They are willing to pay less to reduce the risk of food poisoning (0.54 euros) and to improve the retention of nutritional values (0.66 euros). The same order of preferences, but with higher absolute values associated with each attribute's level, is found among Norwegian, German and Spanish consumers. Preferences are slightly different in France and Italy, where the national origin of the ingredients is rated as the most important product feature. The DNA test of authenticity on meat is second.

To provide a better insight into the confirmation of H2a, kernel distributions for the WTPs associated with each attribute and level in each country are presented in Figure 2.

[Figure 2 about here]

The figure highlights that the mean WTP for a higher retention of nutritional values in RTH lasagne is very close to zero, with little variation across and within countries. WTPs are close to zero for food poisoning reduction as well, however a higher variability across countries emerges. While results for the Republic of Ireland show a very low mean WTP and very little heterogeneity in the sample, results for other countries such as Spain and Germany, present a higher mean WTP, with a much more disperse distribution estimated for the sampled population.

WTPs for the information on the place of origin of the meat and for introducing the DNA test of meat authenticity are more controversial. These present overall high mean WTPs with much more disperse distributions, highlighting heterogeneity within and between countries. The distributions of the WTP for knowing that the meat is imported are concentrated around the average. More specifically, results for the Republic of Ireland show a WTP close to zero, while results for Spain are quite high with mean WTP of 5 euros. The WTP for knowing that the meat is nationally sourced is much more disperse for all countries, except for the Republic of Ireland and Italy.

When we look at the kernel distributions of WTP, figure II confirms both H1, highlighting that consumers are willing to pay for improved food standards, and H2a, showing differences in WTP across countries. However, these differences are not so big for some features like the improvement of nutritional values and an enhanced safety against food poisoning.

These results contribute to confirm H2b "Cross-country differences exist in food fraud perception". In fact, consumers from the Republic of Ireland, the first country to be affected by the scandal, show the highest WTP for a DNA test certifying meat authenticity, whilst Italian

consumers, who were less concerned with the horsemeat scandal, show quite a low WTP for the DNA test.

Table IV reports the results of a Likert scale question on the importance of a correct declaration of ingredients on the label and provides further confirmation of H2b. The table shows that the Republic of Ireland has the highest percentage of consumers that consider very important a correct declaration of ingredients on the label. It appears that consumers who experienced the horsemeat scandal have a clearer and less heterogeneous idea of the value that a DNA test can add to the product, while consumers less impacted by the scandal, who consider, on average, the issue less important (Table IV), present much more heterogeneous WTP distributions.

[Table IV about here]

Discussion

The results highlight that European consumers would benefit from improved standards applied to the production of RTH products, especially to mitigate the impact of the horsemeat scandal. This is in line with evidence highlighted by Cope *et al.* (2010) after previous scandals. As in previous cross-countries research, this study highlights many similarities as well as some differences across the six countries examined. Generally, as shown by previous studies (Loureiro and Umberger, 2007), the country of origin matters, and it represents a relevant attribute for consumers. In particular, our results show that all consumers have strong preferences for meat produced in their own country. Indeed, for Italian and French consumers the price premium is at its highest for reassuring that the meat is nationally sourced, compared to other features in the DCE.

Furthermore, it is possible to speculate that, in order to meet consumers' needs and preferences, food producers should include scientific information on the authenticity of the ingredients on the label. Indeed, this study points out that the WTP for including a DNA test is one of the highest

price premium for consumers in each country, and particularly for consumers from the Republic of Ireland, Norway and Spain. The latter have the highest WTP for this feature overall.

Production processes decreasing the risk of food poisoning exhibit a lower importance for consumers. Discussing this result with RTH producers, it appears that this is related to the fact that food safety is considered a 'must have' and not an optional attribute. Notwithstanding this, Germans and Spain consumers prove to be more worried about this aspect than consumers in other countries. In fact, they are willing to pay about twice as much as consumers in other countries on average for enhanced lasagne safety.

A higher retention of nutritional values generates the lowest WTP in all studied countries, except for the consumers in the Republic of Ireland, for whom it is more important than reducing the risk of food poisoning. This confirms results of previous studies analysing the importance of nutritional claims on consumers' choices (Liu *et al.*, 2015; Miller and Cassady, 2015). This results further confirms that consumers are mostly concerned about the authenticity, the place of origin and the safety of a RTH product, rather than to purchase a product rich in nutritional properties.

Conclusion

This study contributes to the literature on consumers' preferences and WTP for RTH lasagne using DCE focusing on four attributes: enhanced food safety, information on meat authenticity, its place of origin, and nutritional values. This study was conducted right after the horsemeat scandal had spread across Europe in 2013.

The results of this study present strong evidence that consumers in Europe are worried about the authenticity of the meat declared on ready meals, and strongly prefer to know that the meat is nationally sourced. This evidence suggests that there is a great value in providing information on these attributes which boost consumers' confidence in the products and may protect the food industry from possible fraudulent attempts by suppliers to disguise a product for what it is not. In the highly competitive market for food, this suggests that local producers have scope to differentiate and add value to their products through enhancing the safety and quality of RTH meals, emphasising certain attributes, such as origin labelling.

A further important finding from this study is that strong regional differences in price premiums exist for the explored features. This suggests that food producers should differentiate food labelling, highlighting the performance of authenticity tests of raw materials in Northern European countries and in Spain, and emphasising the domestic origin of the meat in Italy and France, where consumers are traditionally more attracted by the information on the origin of a product and by brands with a strong geographical connotation.

The limitations of this study are mainly related to the fact that the data were collected only after the horsemeat scandal, and that no data before the scandal is available. It would be interesting to explore preferences before and after a food scandal as this would add useful material to the current discussion on food risk perceptions and its impacts on food choices. Further research should also incorporate consumers' attitudes in WTP models, investigating the preferences for enhanced attributes of RTH products.

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Table I. Demographic characteristics of respondents across the six countries (%)

	Republic of Ireland	Norway	France	Germany	Italy	Spain
Sample Size (n)	700	700	790	798	813	797
Gender						
Male	44	49	47	48	48	51
Female	56	51	53	52	52	49
Age						
18-24	0	15	12	11	11	10
25-34	5	18	18	18	22	26
35-44	17	18	19	20	21	24
45-54	27	17	18	21	20	16
55-64	27	17	18	16	14	13
65+	24	15	15	14	12	11
Education						
School up to 14 years of age	1	1	10	3	3	1
School 14-16 years of age	7	6	13	10	5	5
School 16-18 years of age	24	43	23	33	27	18
Post-school diploma	37	22	19	31	31	22
University degree	22	27	16	22	34	46
Post-graduate University degree	9	1	19	1	0	0
Employment						
Working full time	36	41	49	48	43	48
Working part time	20	10	8	13	15	10
Unemployed	13	7	7	5	10	16
Student	5	12	5	8	9	9
Retired	10	14	25	19	12	10
Looking after the house	14	5	5	6	10	5
Unable to work for health reasons	3	11	2	2	0	1
Marital status						
Single/never married	18	29	22	26	29	30
Married	54	33	44	42	49	46
Living with a partner, not married	16	22	19	19	15	17
Other	12	16	15	13	7	7

Table II. Attributes and Levels – RTH lasagne

Attributes	Levels
Risk of food poisoning	Current Safety
	Enhanced Safety
Origin of the meat	Unknown
	Imported
	National
Meat authenticity	Not tested
	Tested
Retention of nutritional values	Current level
	Twice the current level
Price[1]	6 levels from 2.80 to 5.50 euros[2]

[1] The price used in each country has been converted in Purchasing Power Parity (PPP) for the analysis, using the tool available on Methodex Currency Converter. Germany 2010 was used as the baseline, a coefficient of 0.917 has been multiplied to the price for France, a coefficient of 0.890 for the Republic of Ireland, of 0.955 for Italy, 0.086 for Norway and 1.084 for Spain.

[2] Prices between 35 and 60 krones were applied in Norway

Table III. WTP for each enhanced attribute

	Republic of Ireland		Norway		France		Germany		Italy		Spain	
	WTP (€)	SE	WTP (€)	SE	WTP (€)	SE	WTP (€)	SE	WTP (€)	SE	WTP (€)	SE
Risk of food poisoning												
Current Safety (reference level)												
μ Enhanced Safety	0.54	0.07 *	0.99	0.25 *	0.83	0.20 *	1.93	0.54 *	1.02	5.73	2.19	0.20 *
σ Enhanced Safety	0.44	0.17 *	1.25	0.48 *	1.86	0.60 *	1.80	0.58 *	1.13	0.27 *	2.89	0.34 *
Origin of the meat												
Unknown (reference level)												
μ Imported	1.10	0.12 *	2.34	0.69 *	2.37	0.61 *	1.26	0.35 *	1.73	0.33 *	3.69	0.41 *
σ Imported	0.30	0.18	2.35	0.80 *	1.98	0.67 *	2.04	0.76 *	1.09	0.33 *	1.15	0.17 *
μ National	3.18	0.25 *	4.94	1.41 *	7.48	2.11 *	6.19	1.83 *	4.19	0.83 *	8.42	0.92 *
σ National	1.70	0.19 *	4.41	1.36 *	4.19	1.25 *	5.23	1.61 *	1.65	0.39 *	5.75	0.65 *
Meat authenticity												
Not tested (reference level)												
μ Tested	3.47	0.26 *	6.16	1.69 *	5.24	1.43 *	7.42	2.17 *	3.63	0.63 *	9.38	1.00 *
σ Tested	1.67	0.18 *	4.36	1.37 *	4.39	1.32 *	5.56	1.77 *	2.15	0.48 *	7.51	0.89 *
Retention of nutritional values												
Current level (reference level)												
μ Twice the current level	0.66	0.08 *	0.89	0.20 *	0.30	0.17	0.16	0.23	0.39	0.11 *	0.51	0.11 *
σ Twice the current level	0.57	0.13 *	1.34	0.50 *	1.16	0.48 *	1.98	0.67 *	1.47	0.34 *	2.30	0.26 *
Error component A - B	4.39	0.44 *	13.00	4.00 *	9.53	2.88 *	8.93	3.06	6.05	1.35 *	17.50	2.06 *
Log-Likelihood	-4,390.74		-4,518.68		-5,110.50		-5,316.20		-5,752.35		-6,403.62	
sample size (N)	700		700		790		798		813		797	
number of parameters (K)	16		16		16		16		16		16	

Note: for each attribute μ represents the mean and σ the spread of the distribution.
SE = Standard Error.
*p-value<0.05

Table IV. Importance of a correct declaration of ingredients on the label

	1 Not important at all	2	3	4	5 Very important	Mean	St. Dev.
Republic of Ireland	2%	1%	9%	15%	73%	4.56	0.86
Norway	2%	2%	22%	20%	54%	4.20	1.00
France	1%	2%	15%	22%	60%	4.38	0.89
Germany	3%	3%	28%	36%	30%	3.89	0.95
Italy	0%	1%	8%	22%	69%	4.61	0.65
Spain	1%	2%	14%	27%	56%	4.38	0.83

Figure 1. Example of choice task

Attribute	Lasagne 1	Lasagne 2	Lasagne with Current standards
Risk of food poisoning	Enhanced safety	Enhanced safety	Current safety
Origin of the meat	Imported	Imported	Unknown
Meat Authenticity	Not Tested	Tested	Not Tested
Retention of nutritional values	Current level	Current level	Current level
Price	**€3.5**	**€4.5**	**€2.5**

I would buy:

- ○ Lasagne 1
- ○ Lasagne 2
- ○ Lasagne with current standards
- ○ I would not buy any of the proposed Lasagne

Figure 2. Kernel distribution of WTP for each attribute across the six countries