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Are Food Neophobic Consumers Reluctant to Innovative Traditional Pork Products? An Analysis in Six European countries using A Non-Hypothetical Choice Experiment

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Abstract:

The EU is supporting measures to stimulate enhanced value-added products in order to promote actions that may conserve local, rustic and threatened livestock breeds. New Traditional Pork Products (TPP) and Innovative Traditional Pork Products (ITPP) from six untapped pig breeds in Croatia (Turopolje), France (Gascon), Italy (Cinta Senese), Slovenia (Krškopolje) and Spain (Porc Negre Mallorquí) were analysed. Consumers' "real" purchase intention and acceptance were investigated with a specific attention on how consumers' Food Neophobic attitude (FNS) may impact their preferences. An integrated experimental approach was applied using two Non-Hypothetical Discrete Choice Experiment (DCE) carried out before and after a sensory test. A "mother" Logit models with Random Parameters specification were estimated and the willingness to pay were derived. Preliminary results showed that food neophobic consumers are reluctant to purchase the TPP and the ITPP and exhibited lower expected and actual liking scores. When consumers are not familiar with the innovations type (meat with added dietary fiber and with natural antioxidant), the eating experience confirms expectations. However, when innovations are known, the eating experience affected preferences. In this case, marketing strategies that give consumers the occasion to taste the new products may help introducing them to new market.

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Abstract

The EU is supporting measures to stimulate enhanced value-added products in order to promote actions that may conserve local, rustic and threatened livestock breeds. New Traditional Pork Products (TPP) and Innovative Traditional Pork Products (ITPP) from six untapped pig breeds in Croatia (*Turopolje*), France (*Gascon*), Italy (*Cinta Senese*), Slovenia (*Krškopolje*) and Spain (*Porc Negre Mallorquí*) were analysed. Consumers' "real" purchase intention and acceptance were investigated with a specific attention on how consumers' Food Neophobic attitude (FNS) may impact their preferences. An integrated experimental approach was applied using two Non-Hypothetical Discrete Choice Experiment (DCE) carried out before and after a sensory test. A "mother" Logit models with Random Parameters specification were estimated and the willingness to pay were derived. Preliminary results showed that food neophobic consumers are reluctant to purchase the TPP and the ITPP and exhibited lower expected and actual liking scores. When consumers are not familiar with the innovations type (meat with added dietary fiber and with natural antioxidant), the eating experience confirms expectations. However, when innovations are known, the eating experience affected preferences. In this case, marketing strategies that give consumers the occasion to taste the new products may help introducing them to new market.

Key words: Food neophobic attitude, innovative traditional pork products, Non-hypothetical Choice Experiment, sensory experience.

1. Introduction

The agricultural biodiversity remained one of the top challenges to be addressed by the last “Health Check” reform of the Common Agricultural Policy (CAP). This issue includes the conservation of all components of biological diversity of relevance for food and agriculture that take accounts of the European rustic, untapped and threatened animal breeds. Different measures have been taken to halt biodiversity loss, to preserve farm-genetic resources and to protect the natural capital inherent to the European citizens’ health and economy (EU, 2017a). In 2001, the EU adopted the Biodiversity Action Plan for Agriculture (EC, 2017b) which integrated the environmental requirements into market policy. One of the main priorities of this plan is the “promotion of actions to conserve local or threatened livestock breeds”. The preservation of the untapped animal breeds plays a relevant role in protecting the genetic value related to specific traits that are nearly disappeared from highly selected breeds. It may also contribute to maintain the cultural landscape associated to the animal habitats and their production systems (Tieskens *et al.*, 2017). It furthermore helps to sustain the cultural and ethnological characteristics of the European rural communities associated to farming and agricultural activities.

This research fit in with the proposed measures that aim to protect the local, autochthonous and untapped pig breeds by creating added-value products that meet consumers’ preferences and market demands. The EU is supporting measures to stimulate enhanced value-added products and considering as a special character the quality cues of food products (Balogh *et al.* 2016). The promotion of the Traditional Food Products (TFP) fall within this approach due to their positive image associated to enhanced quality and taste and to their strong associations with a particular origin and locality (Guerrero *et al.*, 2009; Almlí *et al.*, 2011, Verbeke *et al.*, 2016). There is an increasing interest to analyse consumers’ purchase intention towards the TFP and to understand what these products means to consumers (Vanhonacker *et al.*, 2010, Balogh *et al.*; 2016; Verbeke *et al.*, 2016).

However, the TFPs’ quality traits can be improved by including health enhancement and other food innovations obtaining Innovative Traditional Food products (ITFP). In particular, food innovations that may provide consumers with tangible benefits are relevant. However, tradition and innovation may appear to be incompatible concepts and even contradictory according to consumers’ perceptions (Guerrero *et al.*, 2009). Therefore, a trade-off may exist whose analysis is important to verify how health and quality innovations in food products may affect the “Traditional” concept perceptions. In this context, health concerns and its relation to diet is becoming a determinant factor for food consumption (Siró, *et al.*, 2008, OECD, 2010). Therefore, a relevant part of food innovations is based on producing healthy products and characteristics. Health claims are increasingly playing a

more important role as determinants factors for the purchase decision of food (Nayga, 2008; Viana *et al.*, 2014). Several researches confirmed that when health information is included on food label, the perception of the risk to certain diseases decreases significantly (Kozup *et al.*, 2003; Choi and Springston, 2014; Kallas *et al.*, 2014) and the purchase intention increases considerably. In consequences, the proliferation of these products has led the European authorities responsible for food policy to continuously regulate the appearance of these new claims whose current regulations allow the use of 222 claims (Regulation 432/2012).

To allow food products to be eligible to contain health claims, the food sector is continuously trying new formulations, innovative ingredients and new food technologies in food processing. The market availability of these new and novel products is constantly growing. Their demand has been increasing with respect to what consumers traditionally purchased, making worth the effort to understand consumers' response towards these kind of innovative products. Several studies showed that food neophobic people are reluctant to purchase new foods (Arvola *et al.*, 1999; Fox *et al.*, 2002; Fernández-Ruiz *et al.*, 2013). Moreover, neophobic consumers revealed low expected liking scores toward new food products (Tuorila, *et al.* 2008) and their neophobia level negatively affects their willingness to consume the innovative food products (Labrecque *et al.*, 2006). In this context, the main objective of this research is Threefold: First, a) to analyse the expected consumers' purchase intention and willingness to pay for the "traditional" and "innovative" pork products, b) second, to analyse how the eating experience may affect these preferences and third, c) to verify which role play the consumers' food neophobia attitudes on their preferences. In particular, we focused on different pork products obtained from six untapped pig breeds in Croatia (*Turopolje*), France (*Gascon*), Italy (*Cinta Senese*), Slovenia (*Krškopolje*) and Spain (*Porc Negre Mallorquí*). The following Traditional Pork Products (TPP) and Innovative Traditional Pork Products (ITPP) from the six case studies (Table 1):

Table 1: The Traditional and Innovative Pork Products in each case study

Country	Traditional Pork Product (TPP)	Innovative Traditional Pork Product (ITPP1)	Innovative Traditional Pork Product (ITPP2)	Product
Spain	<i>Porc Negre</i>	Enriched with a natural source of dietary fibre	Enriched with natural source of antioxidants	Patties
Italy	<i>Cinta Senese</i>	With natural preserving agent	-	Salami
Slovenia	<i>Krškopolje</i>	Without preserving agent	-	Salami
France	<i>Gascon</i>	With 36 months of maturation	-	Dry-Cured ham
Croatia	<i>Turopolje</i>	With reduced salting time	With reduced smoking time	Dry-Cured ham

2. Material and methods

2.1. Consumers sample

Data was collected from questionnaires completed in a controlled environment to a sample of at least 120 consumers in each country (753 consumers in total) over 18 years of age who regularly purchase food and beverages and having purchased and consumed the products categories proposed in the last month. A quota sampling procedure was used to guarantee a representative sample in terms of gender and age. The experiment was conducted in Barcelona (Spain), Bologna (Italy), Ljubljana (Slovenia), Zagreb (Croatia) and Toulouse (France) during October to December 2016 and January to March 2017. To motivate consumers in the recruitment process, they were economically compensated for their participation. The experiment lasted approximately one hour and half. Table 2 represents a summary of the sample description across countries.

Table 2: Sample description across countries

Country	Spain	Italy	Slovenia	Croatia	France
Observations	121	121	131	121	124
Percentage lived in a rural area	30.58%	42.02%	57.25%	52.50%	45.53%
Female (%)	48.76%	60.33%	56.49%	49.59%	56.45%
Average family members	2.92	3.23	2.79	3.65	2.41
Have children <12 years old (%)	19.83%	18.18%	16.79%	39.50%	16.13%
Number children < 12 years old	1.46	1.43	1.23	1.71	1.39
Monthly income far below average	18.18%	0.83%	3.05%	3.31%	7.26%
Monthly income below average	26.45%	14.88%	14.50%	9.92%	20.97%
Monthly income on average	32.23%	62.81%	61.07%	49.59%	39.52%
Monthly income above average	18.18%	16.53%	17.56%	32.23%	25.00%
Monthly income far above average	2.48%	0.83%	2.29%	4.13%	3.23%
I don't know	2.48%	4.13%	1.53%	0.83%	4.03%
18-29 years old	12.40%	38.66%	19.85%	17.36%	11.29%
30-39 years old	21.49%	26.05%	22.90%	23.97%	14.52%
40-49 years old	26.45%	16.81%	22.14%	28.10%	30.65%
50-59 years old	22.31%	10.92%	20.61%	14.88%	20.97%
> 60 years old	17.36%	7.56%	14.50%	15.70%	22.58%

2.2. Theoretical approach

We followed the expectancy-disconfirmation model (Oliver, 1980) and the procedure proposed in Baba *et al.* (2016) and Kallas *et al.* (2016). According to this approach, when consumers face for the first time a new product in a grocery store, consumers built expectations (expected purchase intention) on the basis of the information provided and on past experience with similar products (cognitive state before consumption). Once the product

is tasted (cognitive state after consumption) the sensory experience may change expectations in several directions. If the expected purchase intention matches the experienced purchase intention (after tasting the product), confirmation occurs and satisfaction is reached. If there is a mismatch, disconfirmation occurs. In this case, if the sensory evaluation improves expectations, consumers are satisfied, but if it worsens expectations, consumers are dissatisfied.

2.3. Experiment performance

The methodological approach is based on: a) measuring consumers' food neophobic attitudes, b) measuring consumers' hedonic evaluation and finally c) measuring consumers' purchase intention both before and after the eating experience. The experiment performance can be summarized in the following six main steps.

- i. The experiment started by an initial short questionnaire regarding pork consumption, purchasing behaviour and preferences. Consumers' food neophobia attitude and opinions towards the traditional pork products were also obtained. Finally, demographic and socioeconomic variables were collected.
- ii. The expected purchase intention was estimated by asking participants to select their preferred product from different choice sets at competing price levels built within the non-hypothetical DCE design or none of the products. Consumers were also asked to rank the different product from the most preferred to the least (using the Best-Worst approach). At this point, consumers were unexpectedly rewarded by an extra amount of money and informed that a binding choice set will be drawn and they would exchange money for products based on their decision.
- iii. A hedonic evaluation test was carried out for the TPPs and ITPPs jointly with other two competing product from the market: A conventional product (CONV) with regular quality and low price, and a premium product (PREM) with high quality and high price.
- iv. After tasting the products, consumers were informed about the different products they tasted and were asked to review their hedonic scores and to check for the characteristics of each specific product they tasted.
- v. In the fifth step, consumers turned to answer the DCE choice sets, but this time taking into consideration their sensory experience and their likeness scores.
- vi. At the end of the experiment, a real shopping scenario was created to exchange products and money in order to reduce the hypothetical bias (Loomis, 2014) and to enforce incentive compatibility (Carson & Groves, 2007). If the "no-purchase option" was selected, no real exchange was realized.

2.4. Measuring the Food Neophobic attitude

For measuring the Food Neophobic attitude, we used the psychometric tool of the Food Neophobia Scale (FNS) developed by Pliner and Hobden (1992). This scale consists of five positive and five negative statements towards different situations of food consumption. The original scale consists of 7-point Likert scale from “strongly disagree” to “strongly agree”. in this research, we used the 9-point scale because it is the most widely used scale for measuring consumers’ acceptance and also to check for its suitability comparing with the original measurement. Furthermore, Jones *et al.* (1955) showed that longer scales tend to be more discriminating than shorter one. Peryam and Girardot (1952) argued that the data obtained from 9-point scale can be handled by parametric methods as it accomplishes the statistical assumption of normality and allows estimating levels of preference. Our 9-point Likert scale contained the following categories: “disagree very strongly”, “disagree strongly”, “disagree moderately”, “disagree slightly”, “neutral”, “agree slightly”, “agree moderately”, “agree strongly” and “agree very strongly”.

Several studies demonstrated the validity and the internal consistency of the FNS and showed its capacity to predict consumers’ response towards new food products (Raudenbush & Frank, 1999; Ritchey *et al.*, 2003). While Fernández-Ruiz *et al.*, (2013) published the Spanish version of the FNS, to our knowledge, the Italian, Slovenian, Croatian, French and Catalan) versions of the FNS are not available or published in indexed journals to be reused. Thus, we translated the scale from the original English version to the different languages and we tested the comprehension of the items and the whole experiment in a pilot sample of about 10-12 consumers in each country. The translated version of the FNS scale can be found on this link: dom.cat/1f6x

2.5. Sensory Evaluation of the Traditional and Innovative products

As previously commented, the sensory hedonic evaluation of the TPPs and ITPPs was carried out jointly with other two marketed products available in grocery stores but with two different qualities: a regular product with low market price (CONV) and a premium product with high market price (PREM). Spontaneous hedonic likeness test was applied using 9-points Likert scale from “I extremely dislike” to “I extremely like”. The sensory experience was also relied on the Expectancy-Disconfirmation model (Oliver, 1980). The experiment was conducted in three steps (Napolitano *et al.*, 2010). First, consumers were offered the TPP, the ITPP1, the ITPP2¹, the CONV² and the PREM in random order. They were asked to taste

¹The ITPP2 are available only in Croatia and Spain.

the products in blind condition with no information on the product and to state their “blind Liking” scores. Later respondents received a sheet that contains the description of the products (breed type, production system and innovation simple description). They were asked to carefully read the information and to state their “expected liking” scores. Finally, consumers were given the products to taste but with the information sheet that allowed them to identify which products are being tasted. In this case, they were asked to state their “actual liking” scores. Another working paper is being prepared regarding the details of the sensory experiment; how the innovations were introduced from a technical point of view and how the products’ samples were prepared as these details are beyond the objectives of this paper. However, in this version of the paper we will focus only on the actual liking scores (i.e. the informed sensory test) because consumers were asked to carefully verify these liking scores before they return to answer the DCE again.

2.6. Purchase intention of the Traditional and Innovative products

As commented before, Non-Hypothetical Discrete Choice Experiment (DCE) was applied to analyse the consumers’ preferences towards the TPPs and the ITPPs. The DCE was carried out before the sensory hedonic evaluation (expected purchase intention) and repeated afterward (experienced purchase intention). The DCE aims to identify the consumers’ trade-offs in their choice decision. In this study, several products at different price levels were presented to respondents in an array of choice sets. Respondents were asked to select the product that they would purchase for sure in a real market situation, thereby revealing their preference for certain characteristics of the products. They were also asked also to rank them from the most preferred to the least. In this paper, we will only focus only on the choice exercise while the ranking data will be analysed in another research.

In the standard application of DCE, the first step is to identify the main attributes and level that describe the different products. Following Erdem and Swait (1998), Lusk and Schroeder (2004) used an original design in which the same five products (labelled beef steaks without attributes and levels) are repeated in all scenarios (i.e. choice sets) by using a fractional factorial design to only vary the prices of the five alternatives among the scenarios. In the same line, Alfnes *et al.*, (2006) used a similar approach but modifying the original design by varying the prices and the products across choice sets. In our study, the set-up of the choice sets resembles to the design used by Lusk and Schroeder (2004). However, we modify it also asking consumers to rank the products from the most preferred to the least preferred the Best-Worst measurement.

² The CONV was not included in the French case study. The Gascon Dry-cured ham is the only TPP available at market place. The focus was on comparing the TPP and the ITPP with only a premium product.

2.6.1. Experimental design

The choice sets were formed by the TPPs and ITPPs that were jointly presented with a conventional pork product (CONV) and a premium one (PREM). The “NONE” option was also included to be consistent with the demand theory and to make the choice task more realistic as this option is available when shopping. An optimal and efficient experimental design was then applied to create labelled alternative using Ngene software. Accordingly, we designed 8 choice sets by ensuring the orthogonality of prices across the products. Four price levels were identified for the different products in each case study. Price levels and product size identified in choice sets are shown in this link. [**dom.cat/1f8s**](https://dom.cat/1f8s)

Following Lusk and Shroeder (2004), a ninth choice set was added where all the products were priced at the same level as a basis of comparison³. All choice sets that belongs to the different case studies can be consulted by clicking on the following link: [**dom.cat/1f6w**](https://dom.cat/1f6w)

The decision to not include any additional attribute in describing the different products (except the product label and a very short description of the pig breed and innovation) was to ensure that the products evaluated in the choice sets to be the exact products delivered to consumers at the end of the experiment. Thus, any added attribute, should be reflected in our “real” products when offered to consumers which was a very limiting task. Including attributes without guarantying their presence in the “real” products” may deceive consumers. Consumers deception concept is defined as an act or statement intended to make people believe something that is not true (Merriam-Webster Dictionary, 2018). In others words, participants should be told which products exactly they will purchase in the real shopping scenario. Behavioural economic is in general strict about using deception in economic experiments, while other disciplines (e.g. psychology) allow it. There are arguments in favour (Bonetti, 1998) and against it (Jamison, *et al.*, 2008), but there is no clear guideline about which deceptive practices, if any, should be allowed in experimental economics research (Colson *et al.*, 2015). Therefore, in our research we tried to avoid any deception practice by avoiding the inclusion of attributes that we are not able to neither control nor produce. Furthermore, our applied design may allow measuring the relative importance of food innovations across countries as the products in the choice sets are presented in a holistic way. Finally, as also reported by Lusk and Schroeder (2004), this kind of designs are helpful when many of the products offered are either new or unavailable in the local market place (such our breed products) because the definition of the attributes is uncertain.

In this context, each choice set designed contained the TPP, the ITPP, the CONV and the PREM products categories that appear at different price combinations according to each

³ In the French case study, this option was not possible because all the product are at market place and no common price was realistic.

product type and country. The NONE option was also included as commented. For the description of the TPPs it was emphasised that the meat used to elaborate the products was obtained from an autochthonous and untapped pig breed that is reared in an extensive or semi-extensive production system. In the case of the ITPP we provide consumers a simple and short description about the innovations.

We opted for a Non-Hypothetical approach in order to avoid the hypothetical bias which is induced by the hypothetical nature of surveys. This bias is defined as the difference between what a respondent indicates he would purchase in a survey or interview and what he would actually do in real market. According to Loomis (2014), hypothetical bias in surveys reflects the old saying that “there is a difference between saying and doing”. Hypothetical surveys are, in general, not incentive compatible. That is to say, its dominant strategy would not truthfully reveal the real value that the product has to consumer. Loomis (2014) presented an array of different *ex-ante* and *ex-post* approaches to reduce the hypothetical bias in surveys. One of the *ex-ante* ways is to let the survey to be consequential to the respondent. That is in our research we create a “real shopping scenario” at the end of the survey. Individuals who agreed to participate were asked to purchase their selected product and to mandatory pay its posted price. To avoid protest answers, before the DCE tasks, all participants were unexpectedly rewarded by real money that cover the highest price level of all products presented in the choice sets plus an additional margin ranging between 10% and 30% of the highest price depending on the nature of the product in each case study.

We measured the purchase intention in two ways: First, we calculated the total frequency (and percentage) of each product selected from all eight choice sets both before and after the eating experience. Second, we estimated the Universal Random Parameter Logit⁴ model as detailed in Lusk and Schroeder (2004) in both treatments.

2.3.2. The econometric modelling

DCE rely on Lancaster’s Theory of Value (Lancaster, 1966) and on the Random Utility Theory (RUT) of Thurstone (1927). Subjects choose among alternatives according to a utility function with two main components: a systematic (observable) component and a random error term (non-observable):

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

⁴ An Error Component Random Parameter Logit model clearly improves the goodness of fit measures. However, due to time limitation, the results of this model will not be included in this paper. If the manuscript is accepted in ICAE 2018, the new estimated models will be included.

where U_{jn} is the utility of alternative j to subject n , V_{jn} is the systematic component of the utility and ε_{jn} is a stochastic term. Assuming linearity the utility function for alternative j can be expressed as:

$$V_{jn} = \beta_j + \alpha_j P_{jn} \quad (2)$$

Where j are the TPP, ITPP1, ITPP2, CONV, and PREM products. P_{jn} is the price of alternative j for consumer n , β_j are the coefficients of the Alternative Specific constant (ASC) for each product relative to the NONE option. α_j are the coefficients representing the effect of the j th product price on utility for the j th product.

To predict the subjects' preferences for an alternative (i.e. product), we need to define the "probability of choice" that an individual n chooses the alternative i rather than the alternative j (for any i and j within choice sets, T). McFadden (1974) developed the base model for DCE often referred to as the multinomial logit (MNL) model. According to this model, the probability that a consumer chooses product j is

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

Where μ is a scale parameter that is inversely related to the variance of the error term.

However, the MNL impose a very strict structure on cross-price elasticities avoiding the possibility to analyze substitutability between the products (Hensher *et al.*, 2005). In this context, the universal or "mother" logit model can be estimated (McFadden *et al.*, 1977). In this model, the utility of each product is specified as a function of the attributes of the other products. In our specific case studies, the utility of each product is a function of an Alternative Specific Constant (ASC) and the prices of all other products. For instance, the utility of the ITPP is a function of an ASC and the prices of TPP, CONV and PREM products. In this case, the utility function for product j in the universal logit model is:

$$V_{jn} = \beta_j + \sum_{k=1}^J \alpha_{jk} P_{kn} \quad (4)$$

Where $j = \text{TPP, ITPP1, ITPP2, CONV, PREM}$, $k = \text{TPP, ITPP1, ITPP2, CONV, PREM}$, P_{kn} is the k th product's price for consumer n , and α_{jk} represents the effect of the k th product's price on the utility for the j th product. To estimate the universal model, the equation (4) is placed into equation (3). However, the estimation of a universal logit model following the equation (3) clearly may incorporate the violation of the Independence from

irrelevant alternatives (IIA) Assumption. Thus we considered the Mixed or heterogeneous logit models (MIXL) (also in the literature is referred to as Random Parameter Logit model, RPL) that relax the IIA assumption.

The RPL model extends the MNL model by allowing for unobserved heterogeneity through random coefficients on attributes (Ben-Akiva *et al.*, 1997). According to this model, the coefficient vector for person n is $\beta_j = \bar{\beta} + \sigma \lambda_n$, where $\bar{\beta}$ is the estimated mean and σ is the standard deviation of the marginal distribution of β and λ_n is a random term assumed normally distributed with mean zero and unit standard deviation. Thus, the term $\sigma \lambda_n$ is the vector of person n specific deviations from the mean value of the β s. The η_n is described by an underlying continuous distribution for the attributes defined by the researcher. In most applications the multivariate normal distribution is the most used, MVN (0, Σ). In our case, we assumed the ASC independently normally distributed in the population. The price coefficients were considered fixed to ensure that the estimated willingness to pay will be normally distributed. The Willingness to Pay (WTP) of a product j versus the baseline product NONE (i.e. none of them) is calculated as the ratio of the ASC to the price coefficient (Lusk and Schroeder, 2004) as follows:

$$WTP_{\text{Product } j \text{ Vs. No-option}} = - \left(\frac{\beta_{\text{Product } j}}{\alpha_{\text{price } j}} \right) \quad (5)$$

Marginal WTP of any product j versus any other product are simply obtained by subtracting both WTP values (Lusk and Schroeder, 2004). Finally, the Krinsky and Robb parametric bootstrapping method was applied to calculate the confidence intervals of the WTPs with 1,000 random repetitions (Krinsky and Robb, 1986).

Finally, coefficients obtained from the estimated RPL models (we used NLOGIT 5) before and after the sensory experience cannot be directly compared because of the specific scale parameters that belongs to each data sets (Swait and Louviere, 1993). However, the WTP comparison can be carried out because the scale parameter is the same in each data set and is cancelled out. To test the significance of the WTP differences before and after the sensory taste, we used the 1,000 marginal WTP from the Krinsky and Robb procedure to perform the combinatorial test suggested by Poe *et al.* (2005) and test the following hypothesis:

$$H_0 : (WTP_{\text{before sensory experience}, j} - WTP_{\text{after sensory experience}, j}) = 0$$

$$H_1 : (WTP_{before\ sensory\ experience}, j - WTP_{after\ sensory\ experience}, j) \neq 0$$

For the Poe-test we used a Macro in Excel by comparing all possible combinations of the 1,000 bootstrapped values from models before and after the sensory experience. Later, 1,000,000 differences are calculated for each hypothesis test of interest.

3. Results and discussions

3.1. The Food Neophobia attitude

The reliability of the FNS was assessed in each case study by calculating the internal consistency of the scale (Cronbach-Alpha). In Spain the value is 0.847, in Italy is 0.781, in Slovenia is 0.877, in Croatia is 0.755, in France is 0.710 and in Lithuania is 0.709. All values demonstrate highly acceptable validity level. The factor structure of the FNS scale was assessed by means of the Principal Component Analysis (PCA). We identified in each country two factors (Table 3). The low food neophobic factor (Low FNS F1) and the high food neophobic factor (High FNS F2) as confirmed by Olabiet *et al.* (2009) and Fernández-Ruiz *et al.* (2013). Results showed that discarding the fifth and the ninth statements increased significantly the goodness of fit and the consistency of the PCA. As commented by Ritchey *et al.* (2003), the items 5 and 9 may results in unexpected outcome mainly because of the misinterpretation of the items. Therefore, as Ritchey *et al.* (2003) proposed, we excluded the items 5 and 9 in analysing the food neophobia attitude.

Table 3: PCA result of the FNS across countries

	Spain		Italy		Slovenia		Croatia		France	
FNS items	F1	F2	F1	F2	F1	F2	F1	F2	F1	F2
Item 1. (R)	0.76	0.18	0.56	0.37	0.04	0.82	0.79	0.10	0.12	0.73
Item 4. (R)	0.86	0.16	0.79	0.15	0.28	0.82	0.66	0.32	-0.02	0.64
Item 6 (R)	0.72	0.22	0.70	0.41	0.29	0.69	0.72	0.08	0.10	0.70
Item 9 (R)	0.62	0.13	0.39	0.48	0.62	0.23	0.56	-0.09	0.33	-0.14
Item 10. (R)	0.87	0.16	0.84	0.16	0.53	0.61	0.69	0.20	0.27	0.63
Item 2	0.31	0.70	0.31	0.49	0.66	0.33	0.09	0.67	0.68	0.25
Item 3	-0.04	0.78	0.10	0.66	0.80	0.27	0.13	0.73	0.79	0.18
Item 5	0.49	0.51	0.60	-0.30	0.70	0.37	-0.01	0.63	0.67	0.19
Item 7	0.31	0.74	0.46	0.61	0.74	0.31	0.30	0.78	0.78	0.28
Item 8	0.15	0.67	-0.18	0.73	0.75	-0.07	0.34	0.24	0.47	-0.38
Explained variance	34.6%	24.9%	29.9%	22.5%	35.1%	26.6%	26.0%	22.1%	25.8%	22.1%
Total exp. variance	59.42%		52.46%		61.73%		48.05%		47.83%	
Cronbach' Alfa	0.847		0.780		0.877		0.755		0.710	
KMO Test	0.785		0.795		0.879		0.737		0.701	
Bartlett Test	548.6 (0.000)		381.5 (0.000)		593.1 (0.000)		290.6(0.000)		324.8 (0.000)	
Total exp. variance after discarding items 9 and 5	64.76%		59.03%		65.22%		55.26%		53.70%	

For the estimation of the neophobic attitude, the individual FNS scores were calculated by summing all the ratings of the items after reversing the negative statements scores (in our case by discarding the items nine and five) as can be seen in the Table 4 in the last rows). A usual procedure is to split the FNS scores into tertiles based on approximately 33% of membership as suggested by Fernández-Ruiz *et al.* (2013). However, in our research, we used the FNS score to identify consumer neophobia attitude used the Two Step Cluster Analysis (TSCA). This procedure was used to reveal natural groupings by automatically determining the optimal number of clusters using the Bayesian Information Criterion (BIC). The classification procedure was based on the Log-likelihood measure that places a probability distribution on the variables used for classification purpose. Three clusters were automatically identified in each country (Table 5): The Low neophobic cluster (Low FNS C1), the neutral neophobic cluster (Average FNS C2) and the high neophobic cluster (High FNS C3). Results of the cluster analysis are shown in Table 5.

3.2. Aggregate results of the purchase intention and “actual liking”

Analysing the expected purchase intention, results (Table 4) showed a relatively high percentage of election of the TPPs and the ITPPs in comparison to the CONV, PREM and NONE in all countries. At aggregate level (shadowed cells), the highest percentage of election was found in Croatia, followed by Slovenia, Italy, France and Spain. It seems that the products obtained from the untapped pig breed may achieve a reasonable market shares (in unit term) if launched to market. The ITPPs were highly chosen, compared to the TPP, especially in Croatia, Slovenia and Italy.

Before analysing how expectations were varied after the eating experience, we will first analyze the actual liking scores. As can be seen (Table 4), the TPPs received the highest acceptance scores in all countries showing a good sensory experience of the meat from the analyzed breeds. However, all the ITPPs received lowest acceptance scores in comparison to the TPPs with the exception of France. In particular, the ITPP in Spain received the lowest acceptance among all the product alternatives.

The eating sensory experience increased the expectation of the TPPs in Spain, but it decreased it in Italy and remained invariant in Slovenia, France and Croatia. Summing the percentages of the TPPs and ITPPs, results showed that the informed sensory evaluation negatively affected the expected preferences (i.e. it decrease) in all countries, in particular in Slovenia and with the exception of Spain. Focusing only on the ITPP, the sensory evaluation negatively affected the consumers' election of this product in Slovenia and Croatia and remained invariant in the other countries.

Table 5. Aggregated results of purchase intention and consumers acceptance

Products	Spain			Italy			Slovenia			Croatia			France		
	% pre	% post	Actual liking	% pre	% post	Actual liking	% pre	% post	Actual liking	% pre	% post	Actual liking	% pre	% post	Actual liking
Sample size	121 consumers			121 consumers			35 consumers			121 consumers			37 consumers		
TPP	14.6%	21.8%	7.07	35.2%	26.5%	6.92	22.1%	20.7%	5.94	30.4%	30.3%	6.88	34.7%	33.2%	7.18
ITPP1	10.8%	10.5%	5.45	34.3%	34.2%	6.77	48.7%	17.9%	5.92	30.1%	22.2%	6.55	15.7%	15.3%	7.35
ITPP2	18.7%	18.6%	5.71	-	-	-	-	-	-	23.5%	18.0%	6.53	-	-	-
Breed products	44.10%	50.90%	-	69.50%	60.70%	-	70.8%	38.6%	-	84.00%	70.50%	-	50.40%	48.50%	-
CONV	24.6%	21.8%	6.44	6.3%	12.5%	6.02	2.5%	11.4%	5.81	2.4%	12.0%	6.00	-	-	-
PREM	19.3%	14.9%	6.40	11.2%	13.6%	6.29	9.9%	30.2%	5.66	9.1%	10.3%	5.84	16.0%	18.9%	5.81
NONE	12.0%	12.4%	-	13.0%	13.1%	-	16.8%	19.8%	-	4.6%	7.2%	-	33.6%	32.7%	-
Total possible frequency	121 consumers × 8 choice sets= 968			121 consumers × 8 choice sets= 968			131 consumers × 8 choice sets= 1048			121 consumers × 8 choice sets= 968			124 consumers × 8 choice sets= 992		
FNS mean	28.6			28.4			26.0			27.6			26.1		

3.3. Food neophobia impact on purchase intention and sensory acceptance

Results of the purchase intention and the food neophobic clusters are presented on Table 5. The identified clusters were related with the expected and experienced purchase intention measured in term of the total number of times the products were selected. Results should be first interpreted focusing on column differences between the Low NFS cluster and the high NFS cluster. Results showed that, in all countries, the expected purchase intention for the TPP and ITPP increased when consumers exhibited low level of food Neophobia similar to the results commented in Arvola *et al.*, (1999) and Fernández-Ruiz *et al.* (2013). Furthermore, in almost all cases studies, high neophobic consumers, when compared to the low neophobic one, tended to select the NONE option with more frequency exhibiting a risk-averse behaviour by rejecting any alternative, with the exception of France, exhibiting reluctance to purchase any products.

Results of the actual liking confirm the same behaviour. The cluster with the lowest food neophobia (FNS C1) showed the highest acceptance score of the TPP and the ITPP in comparison to the cluster with the highest food neophobia attitude. In this context, the preliminary results confirmed the importance of the analysis of the FNS attitude as it may plays a significant role in defining both consumers' preference and their sensory acceptance towards the new and innovative food products. .These results are in agreement with Turolia *et al.*, (2008) who confirmed that the expected acceptance of new food product is lower for food neophobic consumers.

Focusing on the experienced purchase intention of the TPP and ITPP (i.e. after the eating experience), results showed an interesting change in food neophobia pattern where non-significant differences between clusters (low FNS and High FNS) appeared. Specifically, is relevant the change occurred in Spain and Slovenia. This result might be an indicator that the hedonic evaluation of innovations has had a homogenizing role of preferences. Thus, when a new product is tasted, the food neophobia attitudes turned to be an irrelevant factor in determining the purchase intention. It seems that if innovative food product is tasted, the fear turns to be non-significant in affecting consumers' preferences. In all cases, a detailed analysis of the socio-economic characteristics of the food neophobic consumers is needed to draw a picture on their behaviour. Thus, the observed heterogeneity of the Total FNS mean was analysed by the socio-economic variables. Age variable was significant, showing that consumers with ages more than 60 years presented the highest food neophobia attitudes. These results are in agreement with the funding of (Kühne *et al.*, 2010) who mentioned that consumers with higher age were more opened to innovation in traditional food products. Consumers aged between 30 and 39 years, considered as the millennial

generation, showed the lowest Food Neophobia attitudes. These results are also in agreements with the findings of Verbeke (2005), Lähteenmäki and Arvola, (2001) and Fernández-Ruiz *et al.* (2013). Regarding the gender variable, non-significant results were found with a clear, but non-significant, tendency to women to be less neophobic than men (Tuorila and Cardello, 2001). However, our results are consistent with other studies that showed non-significant difference (Fernández-Ruiz *et al.*, 2013, Schickenberg *et al.*, 2003). Furthermore, having children in the household aged less than 12 years, the educational level, the household monthly expenditure on food and the monthly income did not affect the FNS behaviour.

Table 5: Food Neophobia clusters, purchase intention and consumers acceptance

Clusters	Products	Spain			Italy			Slovenia			Croatia			France							
		% pre	% post	Actual liking	% pre	% post	Actual liking	% pre	% post	Actual liking	% pre	% post	Actual liking	% pre	% post	Actual liking					
Low FNS C1 size		33 consumers			37 consumers			35 consumers			46 consumers			37 consumers							
Low FNS Cluster	TPP	17%	24%	7.60	44%	25%	7.08	20%	15%	5.94	25%	30%	7.26	32%	25%	7.24					
	ITPP1	13%	10%	5.03	33%	48%	7.29	56%	19%	5.88	32%	24%	6.84	15%	21%	7.49					
	ITPP2	32%	32%	6.48	-	-	-	-	-	-	26%	16%	6.65	-	-	-					
	Breed products	62%	66%		77%	73%		76%	34%		83%	70%		47%	46%						
	CONV	20%	21%	6.63	3%	15%	5.97	1%	19%	6.08	2%	11%	5.97	-	-	-					
	PREM	15%	8%	6.54	11%	5%	6.24	9%	33%	5.54	10%	12%	5.69	19%	23%	6.13					
	NONE	3%	5%	-	8%	6%	-	14%	14%	-	4%	5%	-	34%	31%	-					
Total possible frequency	FNS mean	33 consumers × 8 choice sets= 264			16.03	37 consumers × 8 choice sets= 296			18.35	35 consumers × 8 choice sets= 280			15.00	46 consumers × 8 choice sets= 368			16.41	37 consumers × 8 choice sets= 296			17.51
Average FNS C1 size		63 consumers			47 consumers			53 consumers			36 consumers			58 consumers							
Average FNS Cluster	TPP	13%	23%	6.93	34%	27%	6.74	22%	29%	6.13	34%	29%	6.41	38%	29%	7.22					
	ITPP1	12%	11%	5.61	38%	31%	6.76	48%	19%	5.88	31%	20%	6.27	16%	19%	7.41					
	ITPP2	16%	12%	5.52	-	-	-	-	-	-	23%	21%	6.30	-	-	-					
	Breed products	41%	46%		72%	58%		70%	48%		88%	70%		54%	48%						
	CONV	26%	20%	6.41	6%	11%	5.85	4%	7%	5.79	3%	16%	5.86	-	-	-					
	PREM	20%	19%	6.27	9%	16%	6.17	9%	28%	5.71	5%	7%	5.52	14%	7%	5.79					
	NONE	13%	14%	-	14%	15%	-	17%	17%	-	5%	8%	-	32%	28%	-					
Total possible frequency	FNS mean	63 consumers × 8 choice sets= 504			29.46	47 consumers × 8 choice sets= 376			27.04	53 consumers × 8 choice sets= 424			23.77	36 consumers × 8 choice sets= 288			28.16	58 consumers × 8 choice sets= 464			25.97
High FNS C3 size		25 consumers			37 consumers			43 consumers			39 consumers			29 consumers							
High FNS Cluster	TPP	16%	16%	6.68	28%	28%	6.97	24%	15%	5.72	33%	32%	6.87	31%	15%	7.00					
	ITPP1	5%	10%	5.56	31%	24%	6.24	43%	16%	6.00	26%	21%	6.46	16%	16%	7.03					
	ITPP2	9%	17%	5.16	-	-	-	-	-	-	21%	17%	6.59	-	-	-					
	Breed products	29%	42%		59%	52%		67%	31%		80%	70%		48%	31%						
	CONV	26%	26%	6.24	10%	11%	6.29	2%	11%	5.60	2%	9%	6.15	-	-	-					
	PREM	24%	14%	6.57	15%	19%	6.48	12%	30%	5.69	13%	12%	6.30	15%	16%	5.44					
	NONE	22%	18%	-	17%	18%	-	19%	28%	-	5%	9%	-	37%	40%	-					
Total possible frequency	FNS mean	25 consumers × 8 choice sets= 200			43.00	37 consumers × 8 choice sets= 296			40.14	43 consumers × 8 choice sets= 344			37.63	39 consumers × 8 choice sets= 312			40.28	29 consumers × 8 choice sets= 232			37.10

3.4. RPL modelling results and the derived WTP

Results of the RPL (Table 6) showed that at 99% confidence level, we can reject the null hypothesis that all coefficients are jointly equal to zero with a Log-Likelihood ratio test highly significant. The goodness of fit is assessed through the McFadden's pseudo-R² highly acceptable. The positive/negative sign of the coefficient implies higher/lower levels of utility associated with the products, and thereby with their characteristics. In this context, the model estimates showed that all coefficients are statistically significant in all countries and between treatments. However, as commented before, estimates cannot be compared due to the scale parameter and comparisons should be evaluated at the WTP levels.

The expected WTP showed the highest values for the TPP and the ITPP compared to the other products in all countries. These results shed light on the positive evaluation of the breed and the high expectation consumers have of their products. However, after the sensory experience, the WTP for the ITPP decreased significantly in Spain and Slovenia, while it remained invariant in the other countries. It is relevant to highlight, the importance of the WTP differences analysis to improve the understanding of the impact of sensory experience on preferences. For instance, in Spain the total number of the ITPP before and after the sensory experience remained the same, while the WTP exhibited significant differences were significant. The Spanish and Slovenian consumers were unsatisfied while experience for consumers in Croatia, France and Italy confirmed their expectations. Actual liking results may explain in part this behaviour. The ITPPs scores in Spain and Slovenia were relatively lower than those obtained in the other countries, showing the relevance of the sensory experience in the construction of the actual preferences.

Table 6: RPL results and WTP estimated

β_s	SPAIN		ITALY		SLOVENIA		CROATIA		FRANCE	
	RPL		RPL		RPL		RPL		RPL	
	Pre ^a	Pre ^a	Pre ^a	Pre ^a	Post ^b	Post ^b	Post ^b	Post ^b	Post ^b	Post ^b
Random β_s										
ASC-TPP β_1	5.02***	6.49***	5.99***	14.11***	4.95***	11.59***	12.11***	9.00***	11.67***	10.10***
ASC-ITPP1 β_2	4.08***	3.05***	8.44***	8.49***	11.21***	12.58***	11.85***	15.07***	4.67***	2.83**
ASC-ITPP2 β_3	4.94***	2.45***	-	-	-	-	4.21**	2.74	-	-
ASC-CONV β_4	3.12***	2.55***	-0.91***	3.43***	1.13***	4.30***	1.64	2.59	-	-
ASC-PREM β_5	4.68***	3.40***	4.03***	9.77***	5.73***	11.31***	4.58***	3.51*	4.41***	4.12***
Non-random α_s										
PRICE-TPP α_1	-1.30***	-1.68***	-2.19***	-6.54***	-1.15***	-3.09***	-0.77***	-0.57***	-0.71***	-0.65***
PRICE-ITPP1 α_2	-1.25***	-1.20***	-3.60***	-3.62***	-2.31***	-3.88***	-0.88***	-1.11***	-0.28***	-0.28***
PRICE-ITPP2 α_3	-1.27***	-1.21***	-	-	-	-	-0.36***	-0.66***	-	-
PRICE-CONV α_4	-1.09***	-0.99***	-2.21***	-3.41***	-1.45***	-2.47***	-0.60***	-0.56***	-	-
PRICE-PREM α_5	-1.37***	-1.25***	-2.93***	-8.23***	-2.10***	-3.28***	-0.50***	-0.40***	-0.55***	-0.67***
S.D. of random β_s										
S.D. TPP	2.40***	4.56***	2.10***	4.22***	2.54***	5.86***	2.43***	6.34***	3.67***	4.36***
S.D. ITPP1	2.83***	3.50***	2.47***	5.82***	2.79***	7.67***	4.72***	8.15***	4.64***	6.97***
S.D. ITPP2	2.85***	6.47***	-	-	-	-	5.29***	10.0***	-	-
S.D. CONV	2.84***	3.56***	4.09***	4.20***	1.89***	4.66***	3.82***	23.41***	-	-
S.D. PREM	3.08***	6.39***	3.16***	9.57***	3.38***	5.96***	3.02***	3.42***	4.21***	6.43***
Log-Likelihood (θ)	-1155.8	-955.03	-956.9	-754.11	-989.04	-802.92	-873.8	-722.6	-756.1	-712.8
Pseudo R ²	0.33	0.45	0.38	0.52	0.41	0.52	0.49	0.58	0.45	0.48
Willingness to pay										
WTP-TPP $-\beta_1/\alpha_1$	3.85***	3.85***	2.72***	2.15***	4.28***	3.74***	15.64***	15.72***	16.23***	16.03***
WTP-ITPP1 $-\beta_2/\alpha_2$	3.25***	2.53***	2.34***	2.34***	4.84***	3.34***	13.37***	13.46***	16.66***	9.88***
WTP-ITPP2 $-\beta_3/\alpha_3$	3.86***	2.02***	-	-	-	-	11.45***	4.12	-	-
WTP-CONV $-\beta_4/\alpha_4$	2.84***	2.57***	-0.41	1.00***	0.77	1.74***	2.72	4.61***	-	-
WTP-PREM $-\beta_5/\alpha_5$	3.40***	2.71***	1.37***	1.18***	2.72***	3.44***	9.13***	8.78***	7.88***	6.14***

4. Conclusions

We analysed consumers preferences toward the added-value products to promote untapped pig breed in six European countries. Food Neophobia attitudes affected the consumers' acceptance and influenced their "real" purchase intention. Consumers who exhibited low food neophobia attitude showed higher acceptance toward pork innovations. Millennial consumers were identified as the less neophobic consumers who showed the higher preference towards innovative pork products.

The expected real purchase intention showed that the TPP and the ITPP are likely to be purchased in the six analysed countries. Low food neophobic consumers showed the highest likeliness to purchase them in comparison to the high neophobic consumers, in particular in Spain and Slovenia. However, when the products were tasted, the actual purchase intention turns to be independent from the food neophobic behaviour, showing the importance of the eating experience in reducing the reluctance towards unknown features in new products. The preliminary results of this study should be treated carefully if extrapolated to population because of the relatively low sample used in each case study due to budget restriction in creating the "real" shopping scenario. Future research with large sample should be carried out to better understand preferences with more significant results. At the methodological level, is relevant to analyze the impact of the sensory experience and food Neophobia attitude on the rank preference data and to include the observed heterogeneity analysis to better understand the consumers' preferences.

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