



Consumer's willingness to pay for indigenous meat products: The case of a Spanish sheep breed

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Abstract

European farmers of indigenous local breeds have benefited from European Union economic support in the past and it is forecast to continue being supported in the future. However, it is in the public debate that economic support cannot last forever. Then, for the long-run maintenance of indigenous local breeds to be possible, the derived meat products from these breeds should be demanded by consumers or at least by a group of local consumers. This is the aim of this paper, to study consumers' demand for indigenous local meat products. In particular, to assess how much consumers are willing to pay for a Spanish lamb meat from an indigenous sheep breed ("Ojinegra de Teruel"). To do that, a non-hypothetical experimental auction with local consumers (those living in a medium-size town around 150 km the producing area of this meat) was used. Results indicated that consumers were willing to pay, on average, €0.45 (15% of the market price) more for the lamb meat with the "Ojinegra de Teruel" breed claim than for the one without breed indication (as it is now sold in the market). Then, local consumers clearly accept the differentiated meat through the indigenous breed indication. Then, producers in the area could have more opportunities to sell in the local market if they differentiate their meat using the indigenous "Ojinegra de Teruel" claim than using the undifferentiated strategy they are undertaken now.

Additional key words: differentiated; experimental auction; "Ojinegra de Teruel"; preferences.

Abbreviations used: OJITER (Ojinegra de Teruel); WTP (Willingness to Pay).

Authors' contributions: Conceived, designed, performed the experiments and wrote the paper: AG and TdM. Analyzed the data, obtained funding and supervised the work: AG.

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Introduction

For decades, the aim of the agricultural production was to increase food yields to cover the increase demand for food products. This intensification process has been especially important in the animal production because of the increasing demand for protein of animal origin. Then, breeds were intensively selected for food purposes and widely disseminated while native local breeds were abandoned, although some of them have survived for cultural or environmental reasons (Hiemstra *et al.*, 2010). Recently, a tendency to a local breeds indigenous to the area and in danger of being lost (en-

dangered) has been observed and indigenous breeds have been promoted by the European Rural Development Programme (EC, 2004). Within this framework, regional and national public administrations usually support extensive production systems based on indigenous local breeds to guarantee the maintenance of these breeds as a way to provide public goods such as biodiversity conservation, landscape preservation, cultural heritage, etc. The maintenance of these breeds is also important because they are better adapted to the local environmental conditions, more resistant to pests and diseases and help to preserve genetic resources (Dominguez-Torreiro, 2014). Then, European farmers

of indigenous local breeds have benefited from European Union economic support in the past and it is forecast to continue being supported by regional and national authorities in the future. However, it is in the public debate that economic support cannot last forever. Then, for the long-run maintenance of indigenous local breeds to be possible, the derived meat products from these breeds should be demanded by consumers or at least by a group of local consumers (Dominguez-Torreiro, 2014). This is the aim of this paper, to study consumers' demand for indigenous local meat products.

Despite of the importance of assessing consumers' willingness to pay for indigenous local varieties or breeds, few empirical papers have dealt with this topic. Some empirical papers measured consumers' willingness to pay for indigenous local varieties for crops (Brugarolas *et al.*, 2009; Dinis *et al.*, 2011; Martinez-Carrasco *et al.*, 2015) and the remaining for indigenous local breeds (Bett *et al.*, 2013; Gracia & de-Magistris, 2013; Dominguez-Torreiro, 2014; Gracia, 2014). Results indicate that consumers are willing to pay more for food product from indigenous local varieties or breeds. These papers used to measure willingness to pay different hypothetical valuation methods (contingent valuation or choice experiment) except for Brugarolas *et al.* (2009) who used a non-hypothetical experimental auction and Gracia (2014) who used a non-hypothetical choice experiment. In this paper, we followed the last two papers.

The name of the analysed indigenous sheep breed is "Ojinegra de Teruel" with a total number of animals around 29,000 heads. Therefore, this breed is considered one of the indigenous promotion breeds ("raza autóctona de fomento") under the Spanish National Regulation on conservation, improvement and promotion of animal breeds (BOE, 2008). It is native from the counties of Bajo Aragón, Andorra and Maestrazgo (Teruel province, NE of Spain) characterized by a harsh geography (mountainous), an extreme continental climate (large temperature fluctuations, low rainfalls) and a remarkable demographic dispersion. Then, families in the area were forced to search for animal production alternatives that were able to use the available resources. The "Ojinegra de Teruel" breed has been produced for a long time in this area because other breeds could not adapt to the climatic characteristics of this geographic environment. This breed has a high capacity to run on top of mountains in semi-extensive farms, maximizing the use of the natural resources. Therefore, "Ojinegra de Teruel" plays an important economic, social and environmental role (Ripoll *et al.*, 2010) supporting the local economy in the area in terms of jobs and income but also it is an important animal genetic resource. However, the long conservation of this breed would only be possible if consumers or at least a group of local consumers are willing to buy and therefore, to pay for lamb

meat from this breed. The specific aim of this paper was to assess local consumers' willingness to pay for the lamb meat from the "Ojinegra de Teruel" breed.

Material and methods

To measure consumers' willingness to pay for the indigenous local breed, a non-hypothetical experimental auction was conducted in a medium-sized town within 150 kilometers from the sheep breed producing area using consumers of lamb meat.

Since the seminal paper of Hoffman *et al.* (1993), who used an incentive compatible experimental auction to value a new beef packaging, numerous studies used experimental auctions to elicit consumer preferences for product attributes or new products (Lusk & Shogren, 2007). In a typical experimental auction, subjects bid to obtain one or more goods and the highest bidder(s) have to buy the auctioned product and pay a price that is determined in the auction. Then, participants face a well-defined economic incentive structure that enables the researchers to more accurately elicit the value of a "new product". In addition, another advantage of experimental auctions is that one could collect willingness to pay values from individual subjects, in contrast to other elicitation techniques (*e.g.*, choice experiments) which generally rely on statistical models and assumption about people's utility functions to generate estimated willingness to pay values (Lusk & Shogren, 2007).

In this paper, we used a simultaneous experimental auction as it has been done in several studies in the past (*e.g.*, Huffman *et al.*, 2003; Nalley *et al.*, 2006; Bernard & Bernard, 2009). Moreover, Alfnes (2009) indicated that the simultaneous bidding approach seems to be the best choice when valuing products' quality attributes. In this auction, we asked subjects to simultaneously submit bids for two different lamb meats. One of the auctioned products was the lamb meat with the indication that comes from animals of the indigenous breed "Ojinegra de Teruel", named OJITER breed claim. To have a benchmark, we also auctioned a lamb meat, as it was sold in the market, without indication of the sheep breed, named without breed claim. We selected lamb ribs because there are well-known cuts in the market of the town (a package of three lamb ribs of approximately 250 g). To avoid demand reduction effects or diminishing demand utility, a product was randomly drawn as the binding product at the end of the auction (Lusk & Shogren, 2007). To avoid consumers' deception, we used the corresponding real products in the auctions (Croson, 2005). Among the different incentive compatible auction mechanisms, we used a fourth-price auction because it provides more winners

than a typical Vickrey second-price auction (Lusk *et al.*, 2007). The second-price auction method will only produce one winner per session and this situation could disengage some of the participants (*e.g.*, off-margin bidders). Lusk *et al.* (2007) found that if the number of participants who could purchase the product is approximately half the session size (N), then this auction mechanism would generally be more effective in engaging all bidders (low, medium and high value bidders). Consequently, we planned of having an average of 10 participants per session so that either a fourth- or fifth-price auction would then be appropriate. In addition, the fourth-price auction was selected because it was used in several papers in the past (*e.g.*, Alfnes *et al.*, 2008; Yue *et al.*, 2009; Muller & Ruffieux, 2011).

We conducted five rounds in each session as suggested by Lusk *et al.* (2004). The price and identification number of the highest bidders for each product were written on a whiteboard after each round. The use of multiple rounds with price feedback (posted prices) was first applied in experimental auctions because as Plott (1996) suggested, people's preferences are learned through experience and market exposure. Hence, price feedback in multiple rounds was used as a mechanism for subjects to learn the auction market¹.

We used an artefactual experiment (Harrison & List, 2004) because we recruited consumers to ensure that people in the experiments were generally representative of shoppers in the store (Chang *et al.*, 2009). The experiment was conducted in the medium-size town of Zaragoza (Spain) around 150 kilometers from the area where the "Ojinegra de Teruel" lamb meat is produced. We used 14 sessions of approximately 11 people per session. We randomly recruited participants from different districts using two criteria. The first criterion was their involvement in food shopping decisions and lamb meat consumption. Only individuals who stated to be involved in these two activities were selected. During the recruitment stage, participants were not informed about the specific objective of the study. After arrival of the participants, subjects were informed that they would receive €10 participation fee at the end of the session. After subjects consented to participate in the auction, they were assigned an ID number and received the experimental instructions together with

the product information. The monitor read the instructions aloud emphasizing that their dominant strategy is to reveal their true values and that one round and one product will be randomly drawn as binding. Before the lamb meat auction, we ran a practice auction using different candy bars to fully familiarize participants with the auction mechanism and to inform them that it is in their best interest to bid their true values. After this practice auction, we conducted the lamb meat auction. First, the monitor passed the packages of lamb ribs to be auctioned around so that each participant could inspect the products. The lamb auction was then conducted in several steps:

- Step 1. Subjects were asked to simultaneously submit a bid for each of the lamb ribs packages. The bids were collected and ranked from highest to lowest and the ID number of the top three bidders and the 4th highest price were posted on the board.
- Step 2. Step 1 was repeated for four additional rounds.
- Step 3. A random drawing determined which of the five rounds was binding.
- Step 4. A random drawing determined which of the lamb ribs packages was binding.
- Step 5. The top three bidders on the binding product in the binding round must purchase the lamb ribs package and paid a price equivalent to the 4th highest bid for the product. After the auctions, the participants were asked to complete a questionnaire about their demographic information.

Results and discussion

The total number of participants in the experiment was 155. Table 1 reports the descriptive statistics for the socio-demographic characteristics of the subjects. Most of participants were female (66%), living in households of 2.8 members on average and with an average age of 52 years old. Around 26% of participants had a university degree and a net monthly income higher than €2,500².

Table 2 shows the bids for the lamb ribs packages across the five rounds of bidding as well as the mar-

¹ However, some researchers have cautioned that repeated exposure of subjects to market price might cause their bids to become affiliated, which could then cause the incentive compatibility property of the auction mechanism to break down (Harrison *et al.*, 2004; Harrison, 2006). These researchers are in favor of one-shot institutions rather than repeated ones. On the other hand, there is another group of researchers who is supportive of the use of multiple rounds, arguing that this procedure yields valuations more consistent with neoclassical economic theory (Alfnes & Rickertsen, 2003; Shogren, 2006; Lusk & Shogren, 2007). However, List & Shogren (1999) and Alfnes & Rickertsen (2003) stated that the increase in bids across rounds is mainly due to learning effects rather than to affiliation caused by specific psychological effects (*e.g.*, anchoring effect, detachment effect, etc.).

² Although the percentage of participants with a university degree and a net monthly income higher than €2,500 was the same (28.6%), they were not the same participants who belonged to both groups.

Table 1. Sample characteristics and variables definition (% unless stated).

Variables	Definition	Sample
Gender (GENDER)	1= female; 0= otherwise	65.8
Age (AGE)	Years (average)	51.7
Household Size (HSIZE)	Number of members (average)	2.8
Education level		25.8
Primary school		45.8
Secondary school		28.4
University (UNIVERSITY)	1= university degree; 0= otherwise	25.8
Income		
Less than €1,500		44.4
Between €1,500 and 2,500		29.7
More than €2,500 (HINCOME)	1= more than €2,500; 0= otherwise	25.8

Table 2. Descriptive statistics of bids and marginal willingness to pay for the lamb ribs packages by round (euros per package). Standard deviations are in parenthesis.

	Round 1	Round 2	Round 3	Round 4	Round 5	Mean
Bids (average)						
Without breed claim	2.16 (0.94)	2.26 (0.94)	2.23 (0.88)	2.22 (0.89)	2.23 (0.93)	2.22 (0.89)
With OJITER breed claim	2.56 (1.15)	2.76 (1.17)	2.67 (1.02)	2.71 (1.07)	2.67 (1.11)	2.68 (1.10)
t-test of equality	7.82	9.29	10.35	11.26	10.15	26.74
p-value	0.00	0.00	0.00	0.00	0.00	0.00
Marginal WTPs (average)						
Without/with OJITER breed claim	0.40 (0.64)	0.50 (0.67)	0.43 (0.52)	0.49 (0.54)	0.44 (0.54)	0.45 (0.58)

ginal willingness to pay (calculated as the difference between bids for the lamb meat with the indigenous OJITER breed claim and without breed claim). It can be observed that bids increased from round 1 to round 2 but generally stabilized after round 2. Consequently, there seems to be no evidence of the bids being correlated or “affiliated” with the posted price. It can be observed that the bids for the lamb meat without breed claim were statistically lower than the ones with the indigenous OJITER breed claim (the *t*-tests of equality³ between them were rejected in all the cases at the 5% significant level). Moreover, it can be noticed that marginal WTPs or premium consumers were willing to pay for the lamb meat with the indigenous OJITER breed claim instead of the lamb meat without breed claim were positive indicating that consumers were willing to pay a premium for the lamb meat when it is claimed that comes from the indigenous OJITER breed.

To control for socio-demographic and affiliation effects on willingness to pay and to further test if consumers are willing to pay a positive premium for the lamb meat with the indigenous OJITER breed

claim as shown in Table 2, we pooled the bids for the two packages of lamb ribs (without breed claim and with OJITER breed claim) and modelled the bids for each individual as a function of some control variables defined in Eq. [1]:

$$Bids_{it} = \alpha + Bx_{it} + \delta_1 round_1 + \delta_2 round_2 + \delta_3 round_3 + \delta_4 round_4 + \gamma OJITER_{it} + \varepsilon_{it} \quad [1]$$

where $Bids_{it}$ is the bids for the i^{th} consumer in the t^{th} bidding round; x_{it} is a vector of socio-demographic characteristics; the $OJITER$ is a dummy variable where 1 indicates the lamb meat with the OJITER breed claim and 0, otherwise; and ε_{it} is the overall error term.

We estimated the model defined by Eq. [1] using a random-effect to take into account individuals' heterogeneity (Baltagi, 2003). Table 3 presents the estimation of Eq. [1] with the round dummy variables and the socio-demographic characteristics (x_{it}) defined in Table 1 using the STATA 10.1 software. First, the round dummy variables were not statistically different from zero (except for round 1) according to the individual

³ Walpole *et al.* (2004).

Table 3. Random effects model results.

	Parameters	z-test	p-value
Round 1	-0.088**	-2.49	0.013
Round 2	0.057	1.61	0.107
Round 3	0.000	0.02	0.984
Round 4	0.012	0.36	0.723
OJITER	0.454**	4.44	0.000
GENDER	0.071	0.64	0.520
AGE	-0.007**	-2.15	0.031
HSIZE	-0.105**	-2.26	0.024
UNIVERSITY	0.088	0.64	0.525
HINCOME	0.363**	2.74	0.006
Intercept	2.755	9.63	0.000
Log likelihood	-1,410.47		
Likelihood Ratio -LR (10)	59.01**		
N	1,550		

** Statistically significant at 5% level.

statistical test (z-value) indicating that bid affiliation does not occur⁴.

Results show that the estimated parameter for the dummy OJITER variable was positive and statistically different from zero at 5% significance level. The estimate parameter for the OJITER variable was the marginal WTP or price premium consumers were willing to pay for the lamb meat with the OJITER breed claim over the lamb meat without breed claim. This means that consumers positively valued the indigenous OJITER breed and the valuation of this lamb meat was higher than the valuation for the lamb meat as sold in the market (without breed indication). In particular, consumers were willing to pay a premium of €0.45 per package for the lamb ribs with the indigenous OJITER breed claim over the lamb meat without breed indication. Results are in line with other previous empirical papers conducted in Spain. Dominguez-Torreiro (2014) states that local consumers were willing to pay a premium for breed cattle from the region (Cantabria). Gracia & de-Magistris (2013) indicates that consumers are willing to pay a positive extra premium for the OJITER breed which lies between 0 and 0.75 depending on the segment of consumers. Gracia (2014) states that consumers are, on average, willing to pay an extra premium of €0.29 for the lamb meat from the OJITER breed.

Table 3 also presents the impact of socio-demographic characteristics on participants' total WTPs. Three socio-demographic variables were statistically different from zero (AGE, HSIZE and HINCOME) at 5% significance level. The estimated parameter for the AGE and HSIZE variables were negative, which indi-

cates that older consumers who live in larger households were less willing to pay for the indigenous OJITER breed. However, the estimated parameter for the high income (HINCOME) was positive which means that higher income consumers were willing to pay more for the lamb meat with the indigenous OJITER breed claim.

Then, we can conclude that local consumers (those living in a medium-size town around 150 km from the producing area of this meat) clearly accept the differentiated meat through the indigenous breed indication. Then, producers in the area could have more opportunities to sell in the local market if they differentiated their meat using the indigenous OJITER claim than using the undifferentiated strategy they are using now.

Taken those results into account, regional and local authorities could incentivize producers to implement differentiated strategies and to promote the information about the breed from which the meat lamb comes from. For example, the regional government could introduce a new regulation on local production together with an action plan to assist local producers to differentiate their products using the breed claim. Due to the credence nature of the attribute, local and regional authorities should also promote the differentiated lamb meat to local consumers by organizing fairs, exhibitions, and generic promotional campaigns. In addition, to increase consumers' trust and credibility, local authorities could build a public and accessible website with a list of authorised producers of the differentiated meat. Although those indigenous local foods are produced in close proximity to the consumer, the existing distance between producers and consumers can impose a burden since it increases the transaction costs. For those producers who are closer to the consumers and are in easily accessible areas, they can directly sell their products in the farm or implement some direct delivery system to consumers. However, "Ojinegra de Teruel" lamb producers are located far from the consumers and in one difficult to access area, then, they should use other ways to sell their products, perhaps through farmers markets and through the internet. Local authorities to help them could organize, on a regular basis, local food markets in important consumer areas and/or build an electronic infrastructure that can be used as an online sales or promotion platform that would help farmers connect with potential consumers.

Finally, our results also provide some indications on the potential consumers of these labelled lamb meat products. Specifically, the results suggest that the con-

⁴ We could have removed round dummy variables in the final estimations but we kept them to show the round dummy variables test.

sumers who are willing to pay more for the indigenous OJITER breed are younger, living in households of smaller size and with higher income level. Hence, as a first step, producers could focus their marketing strategies on reaching this consumer segment. Any promotional campaign should take this profile into account.

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