Consumers' willingness to pay for beef direct sales. A regional comparison across the Pyrenees

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ABSTRACT

Willingness to pay (WTP) for direct market of beef is investigated in two Spanish and two French regions located on both sides of the Pyrenees. Given the novelty of this distribution system, especially in Spain, a contingent valuation approach is undertaken, and a double-bounded model is estimated. Different patterns of awareness, use and WTP are found across regions. Likewise, the profile of current and potential users of direct sale chains is investigated. Experience in the different stages involved from choice to final consumption of beef, intensity of varied beef consumption, familiarity with direct market of food in general, and beef in particular, are some of the relevant factors to explain WTP and the probability of getting engaged into a direct distribution system of beef.

Introduction

In the last years, different schemes of direct sales from farmers to final consumers have been developed. Such schemes include farmers' shops, farmers' markets, 'pick your own' operations, roadside stalls, and box schemes[1], as well as sales from farmers to retail or food service outlets (retail stores, restaurants, hospitals, schools, etc.) and more informal networks, such as sharing food with neighbours (Martínez et al., 2010).

The rise in consumer demand and the development of farmers' markets has occurred simultaneously with an increased interest on the part of the national or regional governments to support this distribution system as a way to encourage rural development (Carpio & Isengildina-Massa, 2009; Chambers, Lobb, Butler, Harvey, & Traill, 2007), especially in least developed areas. Despite this evidence of growth and improvement, there are still barriers that prevent some farmers from entering the market and/or expanding their businesses, often related to the small scale of farms, the burden of regulations, difficulty in the access to finance, and the absence of the training and research necessary for developing suitable marketing strategies (Hingley, Boone, & Haley, 2010).

While direct sales to consumers may be considered a form of local food[2] marketing, it may also be developed between producers and non-local consumers through catalogues and the Internet. In the last few decades, consumer demand for local food products has increased considerably, and this trend is projected to continue in the upcoming years. Hingley et al. (2010) point out that, in the UK, the market share in terms of value of local food and beverages is expected to increase, and may account for around 4% of the total grocery retail market by 2013. In the UK, US, France, and other European countries, direct selling has been promoted in part through farmers' markets.

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[1] Box schemes are a subscription system that implies a direct and regular delivery from the producer to the consumer of a mixture of food products (usually fruits and vegetables), where the composition is selected by the producer according to the availability of seasonal produce.

[2] There is not an agreement on the definition of local food in terms of the distance between production and consumption areas. Furthermore, this distance may also depend on the own country size. Thus, Ilbery and Maye (2006), and Hingley et al. (2010) suggest that this distance should be within a geographical radius of 30 miles in UK, while the 2008 US Farm Bill (Martínez et al., 2010) considers food products transported up to 400 miles to be "local" or "regional" in US.

Most schemes of direct sales involve a face-to-face relationship between farmers and consumers. But even if this is not the case (like in the sale through the internet), a personal contact between farmers and consumers emerges which is based on trust and reciprocity (Chiffoleau, 2009; Hinrichs, 2000). If this relationship is strong enough, direct sales can be seen as a useful way to diminish uncertainty to consumers regarding food safety and other quality attributes, including freshness or taste (Sans, de Fontguyon, & Giraud, 2008). Furthermore, this link allows for the maintenance of the farmers' independence and identity. They will take control over the price to a certain extent, and in some cases, as occurs with the box scheme, even the sale can be guaranteed in advance (Lamine, 2005). Farmers can use this level of trust to attract consumers to their unique products and build a loyal customer base, rather than adapting and standardising their products to retailers' requirements. To achieve business success using this strategy, it is essential for producers to become more market oriented and take into account the factors that contribute to explain consumers' food choice.

At the moment of purchasing directly sold food products, consumers make their choices considering different features, including intrinsic characteristics, such as the perceived freshness, colour, size, shape, pigmented skin (in fruits), and fatness (in fresh meat and meat products); ethical considerations, such as whether the animals were raised in a more traditional way, environmentally friendly, and/or in a humane manner, or if the fruits and vegetables were grown pesticide free; and social implications, such as support for local farmers and economy and the sense of a stronger connection with the farmers. Nevertheless, other factors may affect purchasing decisions, such as a trade-off regarding price (Weatherell, Tregear, & Allinson, 2003). High prices may constrain the purchase of directly sold products, so that a positive perception may not result in a final purchase. Therefore, it is important to analyse consumers' perceptions towards direct sales, and investigate to what extent consumers are willing to pay a price premium for directly sold food in comparison to similar products marketed through a more traditional distribution system (i.e. grocery stores, super and hypermarkets).

The majority of studies have focused on consumers' perceptions of local food products, while there is a relative dearth of equivalent research based on direct sales. Some studies have analysed both issues by conducting interviews with farmers (Hingley et al., 2010), focus groups with consumers (Zepeda & Leviten-Reid, 2004), interviews with both farmers and consumers (Asebø, Jervell, Lieblein, Svennerud, & Francis, 2007), using conjoint analysis (Darby, Batte, Ernst, & Roe, 2008), or with factorial and cluster analysis (Thilmany, Umberger, & Ziehl, 2006; Weatherell et al., 2003). Notwithstanding, there are also a few relevant studies which apply contingent valuation techniques in relation to specific food products, such as vegetables, fruits, and animal products (Carpio & Isengildina-Massa, 2009), maple syrup and other specialty food products (Giraud, Craig, & Bond, 2005), and beef (Umberger, McFadden, & Smith, 2009). In the contingent valuation approach, consumers state their willingness to pay (WTP) to procure the good. The use of this method is especially suitable to capture consumers' WTP for a specific product or characteristic in the absence of actual market data. Possible reasons for the lack of actual market data are that the product has been recently launched into the market, its market is still not well developed, or the good is sold with new characteristics.

Direct sale from producers to consumers is still in its infancy in Spain, and it is mainly centred on organic food (Díaz-Mateu, López-Lluch, Del Campo-Gomis, & Vidal-Giménez, 2009). In contrast, France has enjoyed a longer history (Gilg & Battershill, 1998). In the last decade, Spain has witnessed an emergence and France a resurgence of direct sales, with the growth of alternative distribution systems such as box schemes (Brown, Dury, & Holdsworth, 2009; Díaz-Mateu et al., 2009). The degree of development of the different forms of direct sales may also vary among regions within the same country. For example, in France there is some evidence that the number of farmers engaged in direct sales in the southern regions is above the country average (Berger & Darrot, 2009). Taking this fact into account, it is expected that results concerning consumers' purchasing behaviour towards direct sold products may depend not only on the country, but also on the region.

This paper applies the contingent valuation methodology to investigate consumers' WTP for direct sales of beef, in two Spanish regions (Aragón and Catalonia) and two French regions (Midi-Pyrénées and Languedoc-Roussillon) contiguous to the Pyrenees (see Fig. 1). In mountain areas, beef production is associated with traditional and extensive production systems, in which animals use the natural grass resources of the alpine areas during the summer season and other natural grass resources in spring and autumn, being housed in the valleys in winter. This self-sustaining system (Gandini, Díaz, Soini, Lilja, & Martín-Collado, 2010) produces high quality and much appreciated animals to be fattened due to their excellent bone development and potential compensatory growth (Casasús, Ferrer, Sanz, Villalba, & Revilla, 1997; Revilla, 1997). In the Pyrenees, in both French and Spanish sides, beef production is an important economic activity, where local breeds are highly appreciated and, sometimes, become quality labels (Bernués, Manrique, Maza, & Olaizola, 2002) like "Label Rouge Gasconne" in France or "Vedella de Catalunya" in Spain.

Special emphasis is put on the comparison across regions, not only in terms of WTP but also in familiarity and use of this alternative distribution chain, and the identification of relevant personal traits that help to define the most receptive consumers' segment toward direct sales in beef. While a cross-country approach is usual in applied marketing research, cross-regional approaches are encouraged to better account for regional patterns in consumer purchasing behaviour (Mittal, Kamakura, & Govind, 2004; Thelen, Ford, & Honeycutt, 2006). Cross-regional studies provide a more complete picture of reality, capturing within-country heterogeneity, which otherwise can be masked by the use of national average information. When the regions under study share a common border, proximity rather than nationality might be more relevant in depicting similar consumers' traits and behaviour. Besides, a cross-regional approach mitigates misleading implications that could emerge when only one regional sample is used as representative of the entire country population. To the best of the authors' knowledge this is the first empirical application on direct sales in a cross-regional context. This comparison may help farmers to take their marketing decisions, especially those who are closer to the regional borders.

The rest of the article is organised as follows: the second section presents the methods of analysis. The third section describes and discusses the results, and in last section the main conclusions are drawn.

Methods

The survey

A representative sample of the regional population in terms of gender and age was recruited in the main cities of the four regions analysed, between September 2010 and April 2011. The survey was addressed to regular consumers of beef, involved in food shopping. The final sample is composed by 1219 consumers, 299 in Aragón and Languedoc-Roussillon, 317 in Midi-Pyrénées and 304 in Catalonia. Figure 1 shows a map of the four regions located on both sides of the Spanish–French border.

Fig. 1. The four regions of study in Spain and France.

Consumers filled a questionnaire in which, among other information, purchasing and consumption habits of beef, consumers' knowledge and use of direct sales, consumers' perceptions about direct market in beef, and socio-demographic characteristics were requested.

Consumers were asked how frequently they eat beef at home and away from home, with options being: several times a week, once a week, at least once a month and less than once a month. In order to know the intensity of beef consumption among consumers, they were asked to position themselves with respect to the average yearly per capita consumption in their region: 13.76 kg in France (INSEE, 2010), 5.76 kg in Aragón and 7.2 kg in Catalonia (MARM, 2010). Besides, these figures were translated in roughly equivalent quantities per week (see Q1 in the Appendix for the full formulation of the question). Complementarily, consumers were asked to rate themselves in terms of experience at purchasing, cooking and eating beef, in a five point scale (non-expert, little expert, moderately expert, fairly expert and extremely expert); and about the frequency (at least once a week, at least once a month, less than once a month or never) with which different pieces of beef meat (fillet, steak, sirloin, mincemeat, stew, and other) are consumed.

A question was included in order to enquire about knowledge and purchase of labels and brands for beef. The question was adapted to include a full array of brands and labels marketed in each region. To ease interpretation and allow comparisons across regions, those were classified into four groups: EU Quality Labels (i.e. PDO/PGI[3]); collective guaranty labels (e.g. 'Label Rouge' in France, quality labels owned by regional governments in Spain); individual producers' brands; and individual distributors' brands.

To conclude the section about purchasing habits, consumers were asked about the retail outlets they use regularly for purchasing beef meat. Besides direct sales, options available were the butchers', super and hypermarkets, discount supermarket, meat specialised self-service retailers. Specific examples, adapted to each region were included to ease the response, and a multiple choice was allowed.

Questions related to direct sales were introduced by the following paragraph:

"Direct sales of food imply that there are not intermediaries between the producer and the consumer. Producers may sell their produce, for instance, at their farm, farmers' markets and fairs, or deliver it directly at the consumers' home."

Consumers were then asked about their awareness of this channel of food distribution, and if they knew it, subsequent questions about how frequently they use this channel (at least once every fortnight, at least once a month, less than once a month), and which food products they have ever bought, followed. In order to gain insight into consumers' perceptions about the features and benefits of direct market in beef, those respondents familiarised with the system were asked to rate the direct sales chain as better, the same or worse than a traditional distribution channel (identified as purchasing at the butchers', super- and hypermarkets) on an array of items (Q2 in the Appendix).

Cheap-talk previous to the contingent valuation experiment informed the consumer about the average price when buying at the supermarket or the butcher's in his/her region, and how, using a direct distribution system, he/she could buy a typical lot of 5 kg of beef, shown in a picture (including one loin steak of 500 g, 1 kg in pieces for stew, 3 kg of fillets of different qualities, and half a kg of mince meat), delivered at home directly from the farmer. This is similar to the typical box-scheme for fruits and vegetables where the contents cannot be chosen by the consumer. Personal contacts with cattle breeders already engaged in direct sales, as well as a search on the internet in both countries, informed us that the sale of lots of 5 kg is the most usual format of sale for direct delivery at home.

Then the WTP, expressed in price per lot and price per kg was asked following the double bounded method explained in the next section. The contingent valuation question was formulated as follows (e.g. in Aragón):

The mean price of beef meat in Aragón in a traditional distribution channel (e.g. butchers, supermarket, hypermarket) is 9.25€. Through direct sales from the producer to your home, you could buy a lot of 5 kg, vacuum packed, including one loin steak of 500 g, 1 kg in pieces for stew, 1 kg of fillets category 1stA, 1 kg of fillets category

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[3] PDO for Protected Designation of Origin and PGI stands for Protected Geographical Indication.

1stB, 1 kg of fillets to coat in breadcrumbs, and half a kg of mince meat:

Would you be willing to pay €46.25 (9.25 €/kg) to receive this lot at your home directly delivered from the producer?	Yes☐	No☐
If you have answered YES, would you be willing to pay €50.88? (10.18 €/kg)	Yes☐	No☐
If you have answered NO, would you be willing to pay €41.63? (8.33 €/kg)	Yes☐	No☐

The econometrical model

Following a number of applications in the literature (e.g. Markosayan, McCluskey, & Wahl, 2009; Mergenthaler, Weinberger, & Qaim, 2009; Yoo & Yang, 2001) we apply the double-bounded approach (Hannemann, Loomis, & Kanninen, 1991). Each respondent faces two bids (price per unit of product) and elects whether he/she is willing to pay the specified per unit price. If the first bid is accepted, then a second one is offered of higher value. Conversely, if the first bid is rejected, the second is of lower value. Although the double-bound framework is not exempt of bias, it is recognised as more efficient asymptotically (Hanneman, Loomis, & Kanninen, 1999). There are four possible response sequences (j): yes–yes (YY), yes–no (YN), no–yes (NY) and no–no (NN) which allow for isolation of a range of values within which the actual WTP of respondent i lies (e.g. YY answer implies that WTP is at least as large as the superior bid; a YN answer implies that WTP lies between the initial and superior bid; etc...).

The latent WTP of individual i is represented as a linear function of the last bid faced by individual i (Bid_i):

$$\text{WTP}_i = \beta_0 + \beta_1 Bid_i + \varepsilon_i \tag{1}$$

where β_0 and β_1 are parameters to estimate and ε_i are random errors, collecting the non-observable influences on WTP, with a distribution g(.). The probability P_i^j of each possible sequence of responses (j) can be expressed as:

$$\text{Pr ob}(Seq = j)_i = \begin{cases} P_i^{\text{YY}} = 1 - g(\beta_0 + \beta_1 Bid_{superior,i}) \\ P_i^{\text{YN}} = g(\beta_0 + \beta_1 Bid_{superior,i}) - g(\beta_0 + \beta_1 Bid_{initial,i}) \\ P_i^{\text{NY}} = g(\beta_0 + \beta_1 Bid_{initial,i}) - g(\beta_0 + \beta_1 Bid_{inferior,i}) \\ P_i^{\text{NN}} = g(\beta_0 + \beta_1 Bid_{inferior,i}) \end{cases} \tag{2}$$

where $Bid_{initial}$ is the initial bid; $Bid_{inferior}$ is the bid of lower value; $Bid_{superior}$ is the bid of higher value; and the subindex i reflects the different values offered to each individual. In order to avoid the starting point bias (Flachaire & Hollard, 2007), 10 different initial bids were employed in this study. The average beef market price paid by consumers in each region (country in France, due to availability) was used as reference, such as three initial bids were lower and six were higher (±5%). The subsequent bids were modified by ±10% when the initial bid was at least as high as the market price) and +15% and −5% when the initial bid was lower. Reference market prices were €12.76 in France (MAAPRAT, 2009); €9.25 in Aragón and €9.85 in Catalonia (MARM, 2010). The log-likelihood function to maximise is then:

$$\ln L = \sum_{i=1}^{N} \left[D_{\text{YY}} \ln P_i^{\text{YY}} + D_{\text{YN}} \ln P_i^{\text{YN}} + D_{\text{NY}} \ln P_i^{\text{NY}} + D_{\text{NN}} \ln P_i^{\text{NN}} \right] \tag{3}$$

where D_j takes value 1 when the response sequence is the one indicated in the sub-index (j = YY, YN, NY, NN). Different cumulative functions are possible for g(.), where we assume a logistic function as it is one of the most broadly used in the most recent empirical literature (Markosayan et al., 2009). Estimation uses an implemented non-linear maximisation routine programmed in LIMDEP.

Results

Awareness and perceptions of direct sales

In order to contextualize the knowledge and use of direct sales, consumers were first asked about their consumption and purchasing habits of beef in general. Descriptive results across regions are shown in Table 1.

The consumers interviewed are regular eaters of beef: 88.4% consume beef at least once a week at home. This average is higher in Midi-Pyrénées and Catalonia (90.9% and 93.4%, respectively). Besides, 34.1% of respondents also consume beef away from home on a regular basis, with percentages up to 42–43% in France.

Results show that 74.5% of respondents place themselves as more intense consumers than the average. However, it is in Aragón (81.0%) and Catalonia (91.1%) where there is a larger representation of heavier consumers.

With respect to the type of distribution channel more used for purchasing beef, on average, the supermarket occupies the first position (53.4%), followed by the hypermarket (46.4%), and the traditional butcher's (41.4%). Other channels, such as discount supermarkets and meat specialised self-service retailers are used for around one fourth of the consumers. Besides, in France, there exists a specific retail outlet specialised in frozen food, which is used by 31.4% and 15.3% of the respondents in Midi-Pyrénées and Languedoc-Roussillon, respectively. Main differences across regions lie on the use of the traditional butcher's, being minimum in Catalonia (35.2%) and maximum in Midi-Pyrénées (49.7%); the lower use of discount supermarkets in Aragón (16.0% versus around 30% in France, and 27% in Catalonia); and of hypermarkets in Spain (around 40% in Spain and 50% in France); and the more intense use of meat specialised self-service retailers in Catalonia (47.7% versus 30.7% in Aragón, 26.1% in Midi-Pyrénées and 12.0% in Languedoc-Roussillon).

With respect to knowledge and use of direct market chains (Table 1), on average, 69.1% of the respondents are aware of the existence of the direct sales distribution system, and 57.4% has ever used this channel to purchase food. The highest level of recognition is attained in Languedoc-Roussillon (82.6%), followed by Aragón (68.9%), Midi-Pyrénées (66.0%) and Catalonia (around 55%). French consumers, however, are more used to food direct sales than Spanish: the rates of use are 76.7% and 58.5% in Languedoc-Roussillon and Midi-Pyrénées, respectively, versus 49% in Aragón and 45.4% in Catalonia. In every region, low frequency purchases predominate: around 35% of consumers buy food through direct market chains less than once a month. On average, around 12% of the respondents use this channel on a regular basis, every fortnight or monthly. However, regular purchases are more spread in the French Northern regions of the Pyrenees: around 38.7% of consumers in Languedoc-Roussillon and 22.3% of consumers in Midi-Pyrénées buy food at least once a month. Nevertheless, as far as beef is concerned, only 20% of the consumers have ever bought beef directly from the farmer, with percentages significantly higher in France (29.9% and 32.3%, in Midi-Pyrénées and Languedoc-Roussillon, respectively; 9.7% and 7.9% in Aragón and Catalonia, respectively).

Consumers' perceptions about the features and benefits of direct market of beef in comparison to traditional non-direct channels are summarised in Graph 1. Direct market is mainly associated with social and civic benefits, such as an improvement of the producer's income, a benefit for the local economy, reducing food miles between the producer and the consumer, mitigating environ-

Table 1
Direct sales and beef consumption and purchase habits across regions (% of consumers).

		Midi-Pyrénées (%)	Languedoc-Roussillon (%)	Aragón (%)	Catalonia (%)	Total (%)
Frequency of beef consumption at home	At least once a week[***]	90.9	86.0	83.3	93.4	88.4
Frequency of beef consumption away from home	At least once a week[***]	41.8	43.0	22.3	28.9	34.1
Per capita beef consumption	⩾Regional average[***]	65.1	61.0	81.0	91.1	74.5
Main distribution channel for beef purchases	Butcher's[***]	49.7	43.0	37.3	35.2	41.4
	Supermarket	53.4	53.7	54.0	52.6	53.4
	Discount[***]	31.1	29.3	16.0	26.9	25.9
	Hypermarket[***]	52.2	49.3	40.7	43.1	46.4
	Meat specialised supermarket[***]	26.1	12.0	30.7	47.7	29.1
	Spec. supermarket in frozen food[***]	31.4	15.3	–	–	11.9
Knowledge of direct sales[**]		66.0	82.6	68.9	59.2	69.1
Frequency of food purchases through direct sales	Never[***]	41.5	23.3	51.0	54.6	42.6
	Less than once a month[**]	36.2	38.0	39.3	28.9	35.6
	Monthly[***]	14.1	17.0	6.3	11.2	12.2
	Bimonthly[***]	8.2	21.7	3.3	5.3	9.6
Purchase of beef through direct sales[***]		29.9	32.3	9.7	7.9	20.0

[**] Stand for significant differences across regions at 5% of significance level based on a Chi-square statistic.
[***] Stand for significant differences across regions at 1% of significance level based on a Chi-square statistic.

Consumers' perceptions about direct sales in beef in comparison to a traditional channel
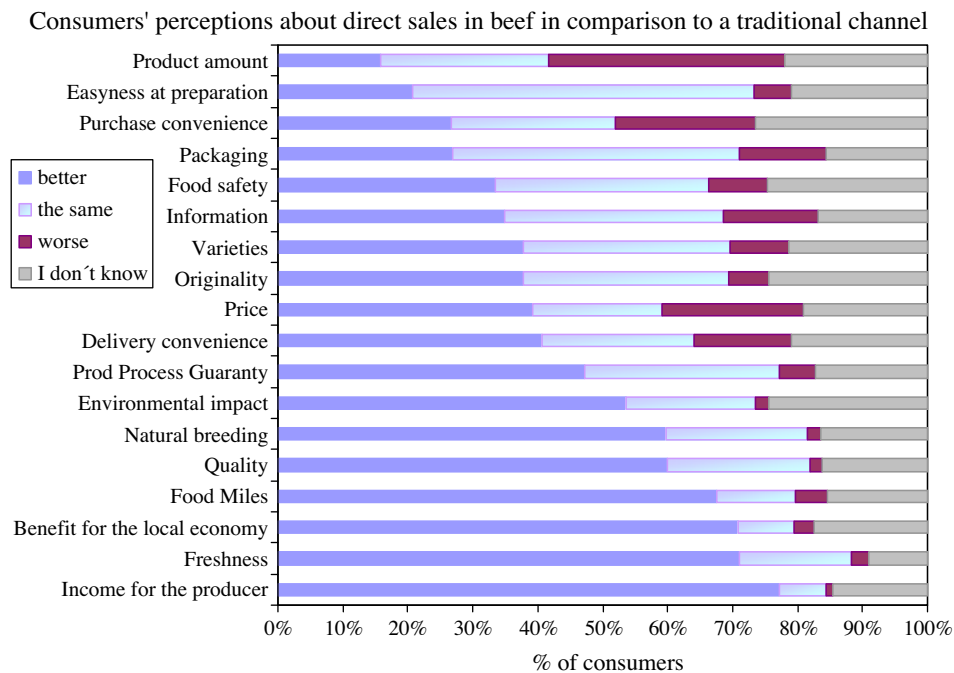
Graph 1. Consumers' perceptions about direct sales in beef in comparison to a traditional channel.

mental impact, as well as freshness, global quality and natural breeding. Interestingly, all those connotations are stronger among French consumers than Spanish consumers[4].

Perceptions about convenience (at purchase) are more polarised, with similar percentages of consumers who view them better or worse than in a traditional channel. In this respect, French consumers significantly value worse the related aspects of convenience (at purchase and delivery) than Spanish consumers. The main perceived disadvantage is the (large) quantity required to purchase, although this limitation is mitigated among French consumers. Price, on the other hand, is considered better by twice as

many consumers as those who consider price worse. This gap, however, enlarges among Spanish consumers while shrinks among French consumers. In other words, French consumers are more cautious about price, and the opinion that this may be equal or worse than in a traditional channel predominates.

Then, we investigate the profile of those consumers who have sometime used a direct supply chain for beef, called 'users' (Table 2) in comparison with those consumers who have never used direct market of beef, named 'non-users'. The Chi-square statistic is applied to test for association between the group of membership and an array of characteristics. In terms of socio-demographics, only location, education and income are found to be significantly different across segments. In particular, among users, there is a higher proportion of people with education level beyond primary

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[4] Regional results are not reported here for space saving reasons but are available from the authors upon request

Table 2
Profile of users and non-users of beef direct market (% over the size of the segment).

	Users 20.05%	Non-users 79.96%
Region[***]		
Midi-Pyrénées	38.78	22.82
Languedoc-Roussillon	39.59	20.78
Aragón	11.84	27.74
Catalonia	9.80	28.66
Education[**]		
Primary	4.92	9.16
Secondary	62.70	53.93
University	32.38	36.74
Net Income[**]		
<1500 € /month	27.08	32.26
1500–3000 € / month	47.08	48.65
>3000 € / month	25.83	19.09
Experience with beef (extremely or fairly expert)		
in consumption[***]	56.20	39.00
in purchase[***]	38.78	25.36
in cooking[***]	48.76	35.09
Frequency of beef consumption at home[***]		
several times a week	64.49	50.00
once a week	28.16	37.50
once a month	4.90	10.45
less than once a month	2.45	2.05
Frequency of beef consumption away from home[***]		
several times a week	23.21	13.24
once a week	25.00	21.13
once a month	36.16	40.82
less than once a month	15.62	24.78
Variety of beef cuts consumed (fillet, steak, sirloin, minced, stew,…): at least three are consumed monthly	80.41	76.69
Knowledge of beef brands and labels		
EU Quality Labels[**]	84.08	76.66
Regional or National Quality Labels[***]	84.49	57.93
Producers' brands[***]	93.88	83.93
Distributors' brands[***]	75.51	63.97
Purchase of beef brands and labels		
EU Quality Labels[***]	56.33	46.57
Regional or National Quality Labels[***]	48.16	28.76
Producers' brands[***]	63.26	53.53
Distributors' brands	38.37	36.54
Direct market in beef in comparison to a traditional distribution channel is better in terms of:		
Freshness[***]	77.87	68.99
Global quality[***]	76.54	55.16
Food miles[***]	75.10	65.56
Natural breeding[***]	71.31	56.65
Environmental impact[**]	60.00	51.78
Guaranty on the production process[***]	56.61	44.66
Variety[***]	47.32	35.05
Food safety[***]	40.98	31.29
Minimum quantity to buy[**]	20.33	14.65

[**] Stand for significant differences between users and non-users at 5% significance level based on a Chi-square statistic.
[***] Stand for significant differences between users and non-users at 1% significance level based on a Chi-square statistic.

studies ($p < 0.05$), higher income ($p < 0.05$) and living in the two French regions ($p < 0.01$). Interestingly, users of direct sales supply chains consider themselves as more experienced in relation to purchasing, cooking and eating beef ($p < 0.01$), and consume beef more frequently at home and away from home ($p < 0.01$). Besides, users are also more familiar with brands and quality labels employed by stakeholders to differentiate beef. In particular, EU quality labels, such as specific PDO/PGI in each region, are more recognised among users of direct market ($p < 0.05$), as well as other collective quality labels, like Label Rouge in France or 'C de Calidad' in Aragón ($p < 0.01$), producers' brands ($p < 0.05$) or distributors' brands ($p < 0.10$). Likewise, EU and regional quality labels, as well as producers' brands, are bought by a higher proportion of users of beef direct sales than non-users ($p < 0.01$). With respect to perceptions about direct market chains, some of the positive opinions are rein-forced among the group of consumers who have bought beef already using this channel. Thus, freshness, global quality, food miles and environmental impact, natural breeding, and guaranty of the production process and food safety, are considered better than in a traditional channel by a significant bigger proportion of 'users' than 'non-users' ($p < 0.01$). Likewise, the main inconvenience about the quantity required to purchase is mitigated among 'users' ($p < 0.05$).

Willingness to pay

The most restricted model assumes that WTP only depends on the final bids offered to respondents. Due to the differences in market prices across regions, consumers in different locations are faced

Table 3
Description of explanatory variables in WTP estimation.

Variable	Description	Mean or Proportion (%) in the sample			
		Midi-Pyrénées	Languedoc-Roussillon	Aragón	Catalonia
$\beta_{Arag}, \beta_{Midi}, \beta_{Lang}, \beta_{Cat}$	Specific regional intercepts	–	–	–	–
Bid_Fr	Last bid offered to consumers in the French regions	68.66 €/ 5 kg lot	69.00 €/ 5 kg lot	–	–
Bid_Arag	Last bid offered to consumers in Aragón	–	–	49.72 €/ 5 kg lot	–
Bid_Cat	Last bid offered to consumers in Catalonia	–	–	–	52.98 €/ 5 kg lot
HFreq	1 if the consumer buys food through direct market at least once every fortnight; 0 otherwise	8.20%	21.73%	3.34%	5.26%
BeefPurch	1 if the consumer has ever bought beef through direct market; 0 otherwise	29.97%	32.44%	9.70%	7.89%
ProdInc	1 if the consumer considers the income for the producer to be better with direct market than in a traditional channel; 0 otherwise	62.14%	73.24%	61.54%	71.71%
Freshness	1 if the consumer considers freshness to be better with direct market than in a traditional channel; 0 otherwise	58.04%	71.91%	58.53%	58.88%
Amount	1 if the consumer considers the amount of product required to buy to be worse with direct market than in a traditional channel; 0 otherwise	23.03%	26.75%	34.45%	42.76%
Guaranty	1 if the consumer considers the guaranty of the whole production process to be better with direct market than in a traditional channel; 0 otherwise	42.90%	51.50%	31.10%	38.81%
FreqVar	1 if at least three different types (among fillet, steak, sirloin, minced, stew, other...) of beef are consumed monthly; 0 otherwise	82.02%	71.90%	71.24%	84.21%
Exper	1 if the consumer self reports a moderate to high level of experience in at least two of the following: purchase, cooking or consumption of beef; 0 otherwise (the highest two levels in a five point scale)	39.12%	42.46%	28.43%	32.57%

with different bids. In the restricted model, the latent WTP of individual i is formulated as:

$$WTP_i = \beta_{Midi,i} + \beta_{Lang,i} + \beta_{Arag,i} + \beta_{Cat,i} + \beta_1 Bid\_Fr_i + \beta_2 Bid\_Arag_i + \beta_3 Bid\_Cat_i + \varepsilon_i \quad (4)$$

where β_{Midi}, β_{Lang}, β_{Arag} and β_{Cat} are specific constants for consumers in each region; Bid_Fr, Bid_Arag and Bid_Cat stand for the last bid offered to consumers in the French regions, Aragón and Catalonia, respectively.

The model was further amplified in order to investigate the role of socio-demographics, the use of and perceptions about direct sales and beef consumption habits on willingness to pay for a direct market chain. Only significant variables, described in Table 3, are kept in the final model.

Estimation results are shown in Table 4. The log-likelihood ratio (LLR) reported uses as a benchmark the value of the log-likelihood obtained in a model that includes the intercepts and bids, as suggested by Herriges (1999), provided that the traditional restricted log-likelihood (with only the intercept) is undefined for the double-bounded likelihood function. Complementarily, the joint significance of all coefficients except for the intercepts is tested with a Wald test (Harpman & Welsch, 1999). Both statistics support the joint significance of the explanatory variables.

The bid variables are found to be negative and highly significant, therefore a normal down slope demand function is found. WTP for direct sale is in correspondence with the knowledge and use of this system. Those consumers who use the direct sales for food purchases in general more frequently (HFreq) are willing to pay more, and the same occurs for consumers more familiarised with beef direct selling (BeefPurch). Likewise, the self perceived experience with beef (Experience) and the variety of beef cuts consumed on a monthly basis, also influences WTP significant and positively. With regard to the perception of the added value of beef direct sales in comparison to a traditional distribution channel, four aspects are found to affect WTP. Thus, those consumers who consider that direct sales is better in terms of freshness (Freshness), guaranty of the whole production process (Guaranty) and improvement of the producer's income (ProdIncome) are also more willing

Table 4
Estimation results of the double-bounded model.

Variable	Coefficient	Std err	p-Value		
β_{Midi}	7.562	0.434	0.000		
β_{Lang}	7.688	0.442	0.000		
β_{Arag}	7.798	0.616	0.000		
β_{Cat}	7.343	0.571	0.000		
Bid_Fr	−0.128	0.006	0.000	N Obs	1219
Bid_Arag	−0.172	0.120	0.000	LL$_0$	−1814.62
Bid_Cat	−0.156	0.010	0.000	LL	−1770.90
HFreq	0.324	0.198	0.099	LLR	87.44
BeefPurch	0.569	0.146	0.000		0.00
ProdInc	0.241	0.132	0.069	Wald test	904.063
Freshness	0.336	0.129	0.009		0.00
Amount	−0.223	0.120	0.064		
Guaranty	0.314	0.121	0.009		
FreqVar	0.402	0.135	0.003		
Experience	0.256	0.114	0.025		

Notes: LL$_0$: value of the restricted log-likelihood in a model with intercepts and bids. LL: maximum value of log-likelihood function with all explanatory variables.
LLR: log-likelihood ratio ($-2[LL_0-LL] \sim \chi^2$ with M degrees of freedom, where M is the number of coefficients restricted to zero = 8). LLR uses LL$_0$ as benchmark (Herriges, 1999) provided that the traditional restricted log-likelihood (only with an intercept) is undefined for the double-bounded likelihood function (critical value at 5% is 15.51).
Wald test on the joint significance of all coefficients except for the intercept, as proposed by Harpman and Welsch (1999) for the double-bounded logit model. Wald test $= [R\beta - r]'[RVRt]^{-1}[R\beta - r]$, where R is the restriction matrix of order $Q \times k$ (Q = number of restrictions = 11; k = number of coefficients = 15); r is a Q vector of zeros; V is the estimated variance–covariance matrix of the coefficients β. The test is distributed as a χ^2 with Q degrees of freedom (critical value at 5% = 19.67).

to pay for a direct market channel, while those consumers who see the minimum amount of meat required to buy (Amount) as an inconvenient in comparison to a traditional channel, are less willing to pay for beef direct sales. On the other hand, socio-demographic variables have not been found to affect WTP for direct sales.

For each region (e.g. Aragón), the point estimate of WTP is calculated as (Hannemann et al., 1991):

$$WTP = -\left(\beta_{Arag} + \sum_{i=8}^{15} \beta_i X_i\right)/\beta_2 \quad (5)$$

Table 5
WTP for direct sales in beef across regions.

	Midi-Pyrénées	Languedoc-Roussillon	Aragón	Catalonia
Mean estimate of WTP (€/5 kg lot)	67.31	69.18	49.93	52.57
90% Confidence interval	(65.95, 68.63)	(67.76, 70.58)	(48.62, 50.75)	(51.44, 53.70)
% Premium over traditional distribution (Mean)	5.50%	8.43%	7.46%	6.67%
90% Premium confidence interval	(3.37%, 7.57%)	(6.21%, 10.63%)	(5.13%, 9.74%)	(4.45%, 9.04%)

Note: Premia are calculated over the regional mean prices (€9.25 in Aragón, €9.85 in Catalonia (MARM, 2010), and €12.76 in France (MAAPRAT, 2009).

Table 6
WTP for direct sales in beef across consumers' segments and regions (€/5 kg lot) (Premium over mean regional price at the traditional distribution).

		Midi Pyrénées	Languedoc Rousillon	Aragón	Catalonia	Mean difference between segments
Frequency of use of direct sales for food	At least once every fortnight	9.12%	11.57%	11.91%	10.72%	4.05%
	Otherwise	5.17%	7.60%	7.85%	6.52%	
Use of direct sales for beef	At least once	10.38%	13.17%	14.44%	13.54%	7.12%
	Never	3.40%	6.19%	7.29%	6.15%	
Producer's income in direct sales...	is better	6.61%	9.25%	9.15%	7.61%	3.01%
	is not better	3.65%	6.30%	6.12%	4.49%	
Freshness in direct sales...	is better	7.23%	9.61%	9.73%	8.53%	4.21%
	is not better	3.10%	5.50%	5.51%	4.16%	
The amount of product required to buy in direct sales...	is worse	3.39%	6.46%	6.14%	5.08%	−2.79%
	is not worse	6.11%	9.18%	8.95%	7.98%	
The guaranty of the whole production process in direct sales...	is better	7.70%	10.33%	10.70%	9.24%	3.93%
	is not better	3.84%	6.47%	6.75%	5.16%	
Frequency and variety of beef products consumed	At least three types of beef are consumed monthly	6.38%	9.84%	9.43%	7.55%	5.02%
	Less than three types are consumed monthly	1.46%	4.92%	4.39%	2.36%	
Experience with purchasing, cooking and consuming beef	Moderate to high in at least two of these actions	7.40%	10.27%	10.29%	8.97%	3.21%
	Less than moderate	4.26%	7.13%	7.07%	5.64%	

where $X_i = \{Hfreq, BeefPurch, ProdIncome, Freshness, Amount, Guaranty, FreqVar, Experience\}$ is the vector of explanatory variables valued at the respective regional average values (see Table 3); the specific constant in the numerator and the coefficient on the last bid in the denominator are replaced by the specific estimated coefficients for each region (β_{Midi} and β_1 for Midi-Pyrénées; β_{Lang} and β_1 for Languedoc-Roussillon; β_{Cat} and β_3 for Catalonia).

Then, 90% confidence intervals are calculated employing the bootstrap technique applied by Park, Loomis, and Creel (1991)[5], with 5000 random draws. Results on WTP are shown in Table 5. In order to compare across regions, the point estimate of WTP is related to the average market price for beef paid by the consumer (see the section on "Methods"). The price premium of direct sale over more traditional distribution systems ranges from 5.50% in Midi-Pyrénées to 8.43% in Languedoc-Roussillon, while both Spanish regions occupy an intermediate position, 7.46% in Aragón and 6.67% in Catalonia. Besides, WTP for 90% of the observations fall in an interval of (about) ±2.7€ in France and (about) ±2.1€ in Spain, around the respective means (per lot).

Next, regional WTP for specific segments of consumers are calculated, in order to ascertain the relative weight of each characteristic in the magnitude of WTP. In Eq. (5), specific values (1, 0) are used in the corresponding segmentation variable (e.g. to calculate WTP for consumers who have used direct sale for beef at least once, the dummy variable *BeefPurch* takes the value one; and to calculate WTP for the remaining group, *BeefPurch* takes the value 0). The remaining variables are kept at their mean regional values.

Results in Table 6 show the premium over the mean market price of the traditional channel in each region. Then, the differences in the premium between segments are averaged across regions (last column in Table 6).

Looking at mean differences across segments, familiarity with direct sales accounts amongst the most influential characteristics on WTP. Thus, having used a direct market channel for beef previously leads to a price premium of 7.12%, and using regularly direct sales for food in general carries a premium of 4.05%.

Beef related consumption habits and the degree of experience imply a premium on beef direct sales. Hence, those consumers who regularly search for variety in the beef cuts are also willing to pay a significant premium of 5.02% over those consumers who are used to buy less variety. Similarly, consumers who consider themselves as more experienced in relation to either purchasing, cooking or consuming beef are willing to pay a premium difference of 3.21% over those consumers who report a lower degree of experience.

Finally, the personal valuation of the direct sales marketing channel, in comparison to a traditional distribution system for beef, becomes also a significant source of WTP variation. In particular, those consumers who consider that direct sales is better in terms of freshness, the guaranty of the production process and of a better income for the producer, are willing to pay premiums up to 4.21%, 3.93% and 3.01% higher, respectively, than those consumers who do not see any of these advantages. Besides, those people who see in the amount of product a pitfall in comparison to a traditional channel, are willing to pay a premium that is 2.79% lower than those consumers for whom such a problem does not exist.

Summing up, familiarity and search for variety seem to be the most discriminatory segmentation variables with respect to WTP for beef direct sale. The same pattern is reproduced in each region, with the peculiarity that differences in the premium assigned by

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[5] Random drawings were made from a multivariate normal distribution, with mean, the estimated coefficient vector, and variance, the estimated variance-covariance matrix. For each drawing, WTP is calculated, and then the corresponding 0.05 and 0.95 percentiles, are obtained.

different groups of consumers is reduced in the French regions, suggesting a higher degree of homogeneity among consumers with respect to the grouping variables employed.

Conclusions

This research is based on a survey carried out in four regions, two in Spain and two in France, which share the Pyrenees as a natural border. The primary aim is to estimate consumers' willingness to pay for direct sold beef in each region in order to explore the possibilities for the development of direct market for this product. Furthermore, the paper provides insights into the characteristics of the current and potential users of direct sales from the producer to the consumer.

Our findings suggest that consumers already involved with direct market chains in food purchases in general and beef in particular, with high experience in the different stages involved from choice to final consumption of beef, and who regularly consume a large variety of beef cuts, are more willing to pay a premium over a traditional distribution system, and accordingly, represent an interesting potential market target.

Direct market of beef is mainly associated with social and civic benefits, such as an improvement of the producer's income, a benefit for the local economy, reducing food miles between the producer and the consumer, mitigating environmental impact, as well as freshness, global quality and natural breeding, while the main inconveniency is related to the quantity required to buy. Among current users, the perception of those public and private benefits is reinforced, while the main pitfall is mitigated. However, the estimation of WTP reveals that the largest price premium is triggered by those consumers mainly motivated by the search of private benefits, such as freshness and the guaranty of the production process, and to a lesser extent by the civic commitment with a fairer income for the producer. Accordingly, the marketing of direct sold beef should put emphasis on freshness and guaranty as main lures to attract new customers. On the other hand, in order to counteract the negative effect of the minimum amount required to buy on WTP, farmes could promote the sale of baskets to collectives of consumers (e.g. through delivery at work places).

As expected, relevant differences are found between countries and within regions of the same country. French consumers in Midi-Pyrénées and Languedoc-Roussillon show bigger differences of WTP premium for direct sales over traditional distribution than Spanish consumers in Aragón and Catalonia. This result reinforces the importance of applying a cross-regional comparison to provide a clearer picture of the peculiarities of direct selling markets.

A possible explanation for the lower price premium in Midi Pyrénées might be, among other factors, the larger proportion of consumers who buy at the traditional butcher's, but also at discount, hypermarkets, and specialised retailers on frozen meat, in comparison to the rest of the regions, whilst simultaneously the direct sales system is less known and used than in the other French region. While the butcher's can provide personal information that may be considered by consumers as reliable as that one provided by the producer in a direct system, the purchase at the other three retail outlets may be reflecting a higher price sensitiveness. Besides, some of the positive connotations of direct sales (i.e. freshness, producer's income) are supported by a lower proportion of consumers in Midi-Pyrénées. By contrast, in Languedoc-Roussillon, the positive opinions are backed up by the largest proportion of consumers. On the other hand, both the highest level of recognition and frequency of food purchases through direct market in Languedoc-Roussillon could be related to the greater development of some types of direct selling such as the box schemes (Aubry & Chiffoleau, 2009; Chiffoleau, 2009), which in turn, may favour a

higher WTP among current and potential consumers. In Spain, consumers from Aragón are more willing to pay a price premium (relative to the average market price) than those from Catalonia, which again could be ascribed to a relatively higher level of awareness of direct selling, and a higher frequency of food purchases, in general, and beef in particular, through direct market. Nevertheless, the explanatory factors for the WTP differences across regions would require further research.

The results of this study suggest that consumers across the Pyrenees are willing to pay a premium for beef sold in bulk as it is characteristic in direct sales. These results are promising for the development of the market at the south of the Pyrenees and may encourage small local farmers to sell beef directly, especially if they are able to improve their accessibility to consumers with home-delivery systems. Whilst the results suggest that Aragonese producers could maximise their revenue addressing their production to Aragonese consumers, producers in Catalonia located at the Pyrenees could benefit from sales across the border to Languedoc-Roussillon.

Results on WTP apply strictly to a home-delivery system where a box-scheme on beefmeat is used, in which the variety is provided by different cuts. Further research on box-schemes applied to other products (such as fruits and vegetables), as well as farmers' markets, would complement the current investigation on direct sales in the specific regions of study.

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Appendix A

Q1. The mean beef consumption at home in Aragón is 5.76 kg per person and year (approx. 100 g per week). In comparison to this figure, you consume…:

☐ Much more   ☐ More   ☐ The same   ☐ Less   ☐ Much less

Q2. In comparison with the purchase of beef that you do through a traditional distribution channel (e.g. butchers', supermarket), how do you rate direct sale from the producer with respect to each of the following issues?:

	Worse	The same	Better	I don't know
Global quality	☐	☐	☐	☐
Freshness	☐	☐	☐	☐
Food safety	☐	☐	☐	☐
Natural breeding	☐	☐	☐	☐
Purchase convenience	☐	☐	☐	☐
Delivery convenience	☐	☐	☐	☐
Easiness at preparation	☐	☐	☐	☐
Price	☐	☐	☐	☐
Originality	☐	☐	☐	☐
Minimum quantity to buy	☐	☐	☐	☐
Information	☐	☐	☐	☐
Packaging	☐	☐	☐	☐
Guaranty on the production process	☐	☐	☐	☐
Varieties	☐	☐	☐	☐
Environmental impact	☐	☐	☐	☐
Food miles from farm to fork	☐	☐	☐	☐
Income for the producer	☐	☐	☐	☐
Benefit for the local economy	☐	☐	☐	☐