Valuing Animal Welfare Labels with Experimental Auctions: What do we learn from Consumers?

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Abstract: In this paper two types of experimental auctions (endowment and full bidding) are used to elicit consumer preferences towards different labels providing information on animal welfare practices. The three types of labeling schemes evaluated are the comprehensive "animal welfare label", the "good animal housing", and the "good human-animal relation and transport conditions". Our results suggest that there are no statistically significant differences in the elicited values across labelling schemes. However, there are clear differences across auction types. Bids elicited from auctions in which participants were endowed with the product are higher than those from auctions in which participants had to fully bid for the product. Recommendations and policy implications derived from our findings are discussed.

Keywords: animal welfare, consumer preferences, experimental auctions

1. Introduction

There is already considerable legislation in Europe dealing with animal welfare standards. The current European Union (EU) regulatory framework on animal welfare ensures the highest level of animal protection, in comparison with other producing regions. However, consumers in Europe indicate a lack of information about animal welfare production systems and market transparency (European Commission, 2007). In particular, over 70% of participants in the last Eurobarometer supported the idea of financial rewards for producers who apply high animal welfare standards, while around 89% stated that imports should have to be produced under the same EU animal welfare conditions. Moreover, 62% of respondents said they would probably be willing to change their usual place of shopping in order to buy more animal welfare friendly food products. However, such products still only represent a small segment of the food market because consumers feel that they are not provided with this option at the moment, due to insufficient information on animal welfare in food production. Indeed, 54% of respondents said that current food labels did not help when shopping and 53% could not easily find appropriate information. Finally, when consumers were asked how animal welfare products should be distinguished in the market, 39% were in favour of written information on the labels, 35% supported the idea of logos, and 26% suggested the use of a grading/star system on packaging.

Due to the increasing consumers' demand for higher animal welfare standards, and information on animal welfare practises, the Commission foresees the introduction of an EU-wide animal welfare label for those products providing a higher animal welfare

standard than the legal minimum. This label should be uniform, easy to understand and scientifically based to allow consumers to make informed choices. However, changes in farming systems to improve animal welfare have additional economic cost, which must ultimately be met by consumers (Moynagh, 2000). In any case, products with labels indicating higher animal welfare standards must be produced at lower costs than consumers' willingness to pay for such products, if at least the segment of consumers interested in buying animal welfare products would be reached.

In the current debate on animal welfare labelling (conference on animal welfare labelling, 2007), the assessment of consumers' willingness to pay for animal welfare label is of paramount importance so that a cost-benefit assessment can be made. The aim of this paper is to determine consumer valuation of animal welfare labelling schemes.

To elicit consumers' willingness to pay for an animal welfare label, an experimental auction market was used to avoid the hypothetical bias that can be derived from other non-incentive compatible methods. In particular, two different procedures, the endowment and the full binding auctions, are used to elicit willingness to pay for different animal welfare labels. The data come from a recent survey and experimental auction conducted in Spain (Region of Aragón).

This paper is structured as follows. Section 2 discusses the definition of animal welfare and presents a review of empirical studies on consumers' preferences for animal welfare schemes. Section 3 discusses the experimental design and protocol employed; and section 4 describes the data and descriptive information about consumers'

characteristics. Section 5 presents the results and the main economic implications of the obtained results, in particular, the willingness to pay (WTP) for each animal welfare label. Finally, section 6 contains a discussion of the findings and concluding remarks.

2. Animal welfare: definition and literature review

Defining animal welfare is difficult because of the number of facets related to the concept. However, it is generally accepted that animal welfare encompasses both the physical and mental health of the animal (Dawkins, 2006; Webster, 2005), including aspects such as physical comfort, absence of hunger, thirst, diseases, injuries and stress, and expression of positive behaviour (E.g. 5 freedoms, Farm Animal Welfare Council, 2006). Hence, welfare is definitely a multidimensional concept and the importance attributed to the different aspects of animal welfare may vary between people (Fraser, 1995). According to recent studies, the most important aspects of animal welfare to consumers are[1] : space, outside access, expressing normal behaviour and transport conditions and slaughter (Herper and Henson, 2001; Meehan *et al.,* 2002). Therefore, additional animal welfare demanded by consumers is related to three aspects in the production system: i) improvements in housing; ii) good human-animal relation; and iii) good transport conditions[2]. Good housing conditions drive better physical comfort for animals (i.e, resting, ease of movement,), absence of injuries and disease. Good human-animal relation (the way animals are managed by stockpersons) provides animal's absence of hunger and thirst, better expression of positive behaviour and less stress. Finally, good transport conditions involve not only the physical and distance conditions of the transportation but also a good human-animal relation during travel. A good

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[1] Feed was the most important one but now animal feed is a food safety issue that is regulated
[2] Slaughter practises actually approved are the ones less painful for animals

transport condition drives animals to be better in five aspects: physical comfort, absence of hunger, thirst, diseases, injuries and stress, and expression of positive behaviour.

Previous studies on animal welfare attributes are still rather limited. Most have been conducted in Sweden (Carlsson *et al.,* 2007; Lagerkvist *et al.,* 2006; Liljenstolpe, 2007), although there are some other sparse recent references (Napolitano *et al*., 2007; Napolitano *et al.,* 2008). The current study is conducted in Spain using non-hypothetical experiments, while most previous studies have focussed on the use of hypothetical choice experiments (Carlsson *et al.,* 2007; Lagerkvist *et al.,* 2006; Liljenstolpe, 2007) and likert scores (Napolitano *et al.,* 2007; Napolitano *et al.,* 2008).

3. Experimental design and implementation of auctions

3.1. The animal welfare label

Given that animal welfare differs among animal species, a popular food product from farmed animals was selected. We decided to use a processed meat product instead of a fresh one, in order to isolate the experiment from the ongoing debate about the effect of additional animal welfare standards on the organoleptic characteristics of the product (i.e. taste and tenderness). In other words, we want to avoid the question on whether higher animal welfare standards positively influence the taste, tenderness or any other characteristic of the meat product that it is not yet empirically proven. In a processed meat product, the transformation change the original characteristics of the raw meat product and the organoleptic characteristics can be fixed during the experiment, allowing for changes only on the new attribute of interest, the label on animal welfare.

We have chosen cured ham as the product of analysis because it is one of the most frequently and highly consumed processed meat products in Spain.

In the following experiment, three different types of animal welfare labels were considered. The labels differed depending on the welfare standards provided to animals.   The first label includes all the aspects of animal welfare and this is called the "Animal welfare" label. The second label contains only the improvement of housing aspect of animal welfare and this is called "Good animal housing" label. The third label comprises both the good human-animal relation and good transport conditions and is denoted as "Good human-animal relation and transport conditions" label. The information provided to respondents related to these labels are available upon request.

3.2. Auction procedure and mechanism

We use two procedures to elicit willingness to pay (WTP) estimates: the endowment and full binding auction (Lusk and Shrogren, 2007). The endowment method involves giving subjects one good (i.e., regular good) and eliciting bids to exchange this good for another good (i.e. good of interest such as an upgraded good). The full bidding approach involves subjects bidding simultaneously to obtain one of the two goods. Lusk and Shrogren (2007) discussed the advantages and disadvantages of each procedure/approach. Also, Lusk *et al.* (2004) and Corrigan and Rousu (2006) provide some empirical applications of the two approaches stating that valuations in endowment auctions seems to be reference dependent. In this paper, we used both procedures by splitting the sample into two main groups. One of the groups received 10€and was endowed with a 100 gram package of regular cured ham. The participants were then

asked to bid to exchange this package for a 100 gram package of cured ham with an animal welfare label. The other group of participants received only 10€ and were then asked to simultaneously bid for a 100 gram package of regular cured ham and a 100 gram package of cured ham with an animal welfare label. To avoid demand reduction effects, only one of the goods was randomly selected and sold.

Among the different auction mechanisms that are incentive compatible, we selected the random n^{th} price mechanism because it engages both the on and off the margin bidders and because it helps ensure that consumers reveal their demand truthfully (Shogren et al., 2001). The key characteristic of the random n^{th} price auction is a random but endogenously determined market clearing price. Randomness is used to give all participants a positive probability of being a purchaser of the auctioned good.

We ran five rounds. The prices and identification numbers were written, ordered from highest to lowest, on a whiteboard after each round. After completing the five rounds, one of them was randomly selected as the binding one. Then, a random number (nth price) was drawn between 2 to z (number of participants) and one unit of the good is sold to each of the n-1 highest bidders at the nth price.

3.3. Experimental setting

The auctions were conducted during the spring 2008 in the region of Aragón (Spain), in the town of Zaragoza. Zaragoza is a town widely used by food marketers and market research consulting companies since its socio-demographics are representative of the Spanish Census of Population (see Appendix, Table A1). We conducted twelve sessions

from May to July 2008 with different consumer associations in different districts. Directors of these associations randomly recruited the participants and provided the room for the experiments[3]. All the participants claimed to eat cured ham at least occasionally. They were informed that the session would last between 60 to 75 minutes and were also told that at the end of the session each participant would receive 10€ in cash. Each session included between 14 to 20 participants. The total number of participants in our experiments is 202. As mentioned previously, participants were divided into two groups: the endowment auction, and the full bidding auction. Given that we assessed three different animal welfare labels, participants from the two groups were randomly allocated to the different animal welfare label information settings. Our experiments contained a total of six treatments (Table 1). After arrival of the participants, subjects were first asked to complete a survey requesting information on socioeconomic and demographic characteristics, cured ham shopping and eating behavior, and answered several questions on knowledge, attitudes, and intention to purchase animal welfare products, as well as consumers' lifestyles. Second, a chocolate bar auction was conducted to familiarize participants with the experimental procedure. Then, the cured ham auction was conducted. The next section provides the main results concerning these auctions.

4. Results

Table 1 reports descriptive statistics for the six treatments. Participants' characteristics were fairly homogenous across treatments, although there were some differences between treatments particularly due to their gender composition. Most participants are

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[3] We really thank the people who helped us get participants and offered their facilities for the conduct of the experiments without any payment

female and living in households of 2.70 members on average. More than 20% of the subjects are with university degrees.

Figure 1 shows the mean consumers' WTP for the different animal welfare labels by round for the endowment auction and, Figure 2 depicts the average implied differences for the full bidding auction. Both figures indicate that mean WTP and the implied differences are not increasing during the rounds, and consequently, there is no evidence of bids being correlated or "affiliated" with the posted price. However, we observe that WTP estimates for the three animal welfare labels obtained from the auctions with the endowment procedure are higher than the implied differences from the full bidding. Moreover, both methods provide different valuations for the different labels, while the mean WTP for the *"Good animal housing"* label seems to be the highest across auction types. Table 2 shows descriptive statistics for the bids in the six treatments in round 5. Except for the animal welfare label *"Good human-animal relation and transport conditions",* bids for the endowment auction procedure is higher that the bids (implied differences) for the full bidding. This result is in agreement with Lusk *et al.,* (2004) who found that using the random n^{th} price mechanism subjects highly value the auctioned products in the endowment procedure than in the full bidding. Then, subjects value the auctioned product more highly when it was in their possession as compared to when they were simply bidding to obtain it.

In both auction procedures, mean WTP estimates for the product labelled *"Good animal housing"* was the highest, even above those elicited from the product with the comprehensive *"animal welfare"* label. Initially, it would be expected that participants acting rationally would pay higher amounts for the comprehensive labelling scheme,

which combines both good animal housing and good transportation and human-animal relations. At first glance, the mean WTP estimates seem to indicate that consumer valuation of labelling schemes cannot entirely be explained by economic theory. However, this result can be explained by the limited amount of time that consumers have which induce that they actually use few items of information available on package products. In our case, the messages conveyed by the *"good animal housing"* and the *"good transport and animal-human relationship"* are indeed shorter than the full message on animal welfare (the addition of both messages) and then, less timely and easier to understand by consumers.

Nevertheless, it is necessary to know if both results hold after we control for differences in terms of socio-economic composition of households and food preferences. Keeping such objective in mind, we modelled the bids obtained from each individual as a function of socio-economic variables and auction specific characteristics using a random effect tobit model.

The tobit model incorporating random effects is as follows:

$$Bid_{it} = \max(0, \alpha + \beta' \ x_{it} + u_i + \varepsilon_{njt}) \tag{1}$$

Where Bid_{it} is the auction bid[4] for the ith consumer in the tth bidding round, which is observed only at positive levels; x_{ij} is a vector of independent variables including dummy variables identifying the different animal welfare labels, a dummy variable for the auction procedure, and additional demographic variables, including income and

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[4] The implied differences between bids for the cured ham with animal welfare label and the regular cured ham for the full bidding auction

household composition, as well as attitudinal variables. Moreover, u_i is the individual specific disturbance for the ith consumer constant through time and ε_{njt} is the overall error term.

Table 3 presents the definition of the variables used in the specification and estimation of the tobit model. Means for the continuous variables and percentages for the dummy variables are included. The model defined in equation (1) with the variables defined in table 3 has been estimated with STATA 10.0. Empirical results are presented in Table 4. Estimates suggest that after controlling for different socio-economic conditions and consumers' characteristics, the valuation of the *"good animal housing"* and *"good human-animal relation and transport conditions"* are not statistically different from the baseline omitted category *"animal welfare"* because the corresponding dummy variables (GOOD_HOUSING and HUMAN_TRANSPORT) are not statistically significant at the 5% significance level. This result indicates that any information on animal welfare practises will induce consumers to be willing to pay similar extra price, regardless of the type and amount of information on animal welfare improvement presented. Then, the question on whether higher level of information provide to consumers does not result in higher valuation, because shorter messages are better and quicker to understand, is also corroborated in the tobit estimations. The endowment dummy variable (ENDOWMENT) is positive and statistically significant indicating that consumers tend to highly value the product when they previously posses it than when they have to compare and bid it to obtain.

Other variables that are statistically significant are income, consumers' time constraint measured by the number of household members and the presence of children in the

household, the importance attributed to the animal welfare conditions and consumers'
lifestyles. As expected, income (HIGH_INCOME) is positive and statistically
significant while the number of household members (HSIZE) and the number of
children in the household below six years of age (KIDS6) are negatively significant.
Then, higher income households, with less number of members and without children are
those who highly value the improvements in animal welfare. Moreover, the variable
indicating whether the respondent is the person in charge of buying the food products in
the household (SHOPPING_FOOD) is positive and statistically significant indicating
that the person responsible of feeding the family highly values the animal welfare
conditions. This result is interesting because they are in fact the people that will face the
labelled animal welfare products in the supermarket and the final decision buyer.
Attitudinal variables which cover a range of individual preferences, such as whether
they like to try new products (NEW_PRODUCTS), or whether they like to be in contact
with nature (NATURE_LOVERS) or they like bullfighting (BULLFIGHTING) are also
statistically significant in explaining preferences for animal welfare labels. Those
consumers who like to try new products and be in contact with nature highly value the
improvements in animal welfare, while, as expected, those people who like bullfighting
value the animal welfare the less.

Conclusions

In the present analysis two types of experimental auctions (endowment and full bidding)
were used to elicit consumer preferences towards different animal welfare labels. In
particular, the three types of labeling schemes evaluated are the comprehensive *"animal
welfare"* label, the *"good animal housing"*, and the *"good human-animal relation and*

transport conditions". Our results show that there are no statistically significant differences between the consumer valuations of the three labelling schemes. Anchoring effects linked to the information provided may justify such results. Policy implications derived from this analysis may highlight the importance of providing short, clear and precise information to consumers when labelling new products characteristics, in particular, when labelling animal welfare improvements.

As in Lusk *et al.,* (2004), the valuation consumers give to new food products are higher in the endowment auction procedure than in the full bidding adding empirical evidence on the debate on reference dependent.

Results must taken as preliminary because, further research should analyse more in deep the differences in consumers valuation of a new product (i.e. animal welfare labels) between the endowment and full bidding auction to provide evidence on which one is the best strategy when valuing products that are not yet in the market. Moreover, we should also investigate more in deep the reasons behind the similar valuation given by consumers to the three animal welfare labels evaluated.

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Table 1. Summary statistics of selected demographic variables (% and means)

		"Animal welfare" Label		"Good animal housing" label		"Good human-animal relation and transport conditions" label	
	Definition	Endowed	Full	Endowed	Full	Endowed	Full
Gender	1=female	66.75	91.9	64.7	83.9	56.4	67.9
Age	years	57.3	48.76	47.23	49.4	59.16	59.97
Household size	Number of members	2.68	2.83	2.76	2.84	2.60	2.96
Education	1=university degree	24.24	40.54	35.21	22.58	20.51	32.14
Income	1=more than 2500 €	24.24	16.22	23.53	25.81	15.38	32.14
Number of participants		33	37	34	31	39	28

Table 2. Descriptive statistics for the bids in round 5

Cured ham type	Round 1	Round 2	Round 3	Round 4	Round 5
"Good animal housing" label					
Mean	0.489	1.981			0.311
Standard deviation	0.4506	0.5175			0.2827
Median	0.40	1.95			0.2
"Good human-animal interaction and transport conditions" label					
Mean	0.393	1.898			0.426
Standard deviation	0.4260	0.6346			0.3278
Median	0.21	2.00			0.35

Table 3. Sample characteristics (%, unless stated) and exogenous variables definition.

Variable definition	Name (type)	Value
"Good human-animal interaction and transport conditions" label	HUMAN_TRANSPORT (dummy: 1=yes; 0=otherwise)	33.2
Individual characteristics		
Gender		
Male	FEMALE (dummy: 1=female; 0=otherwise)	30.2
Female		69.8
Age (Average from total sample)	AGE (continuous)	53.55
Education of respondent	UNIVERSITY (dummy: 1=university;0=otherwise)	
Elementary School (1)		48
High School (2)		22.8
University (3)		29.2
Average Household Income		
Less than 600€		10.9
Between 601 and 1,500 €	HIGH_INCOME (dummy: 1=higher than 2,500 €, 0=otherwise)	31.7
Between 1,501 and 2,500 €		35.15
Between 2,501 and 3,500 €		12.9
More than 3,500 €		9.4
Household Size (Average from total sample)	HSIZE (continuous)	2.77

Table 4: Random Tobit Results

	Estimates	Standard Error	Test
Constant term	-0.1493	0.087924	-1.70
GOOD_HOUSING	0.0366	0.028465	1.29
HUMAN_TRANSPORT	0.0032	0.030531	0.10
ENDOWMENT	0.0715	0.024361	2.93
HSIZE	-0.0417	0.009675	-4.31
KIDS6	-0.1055	0.052579	-2.01
HIGH_INCOME	0.0609	0.028675	2.12
SHOPPING_FOOD	0.0696	0.023195	3.00
IMP_AW	0.0791	0.013501	5.86
NEW_PRODUCTS	0.0410	0.011806	3.47
NATURE_LOVERS	0.0302	0.014247	2.12
BULLFIGHTING	-0.0207	0.009648	-2.15
SESSION 11	0.3215	0.049399	6.51
Log-likelihood	-412.53		
Number of observations	1010		

Note: Session 11 is a dummy variable where 1 means that the respondent participated in session eleven (endowment auction and "*good human-animal relation and transport" label)* and 0 otherwise. In the exploratory analysis we realize that bids in this session were higher than in the rest of the sessions and we have included a dummy variable to control for strange situation

Figure 1. Average consumer willingness to pay for animal welfare cured ham by round in the endowment auction
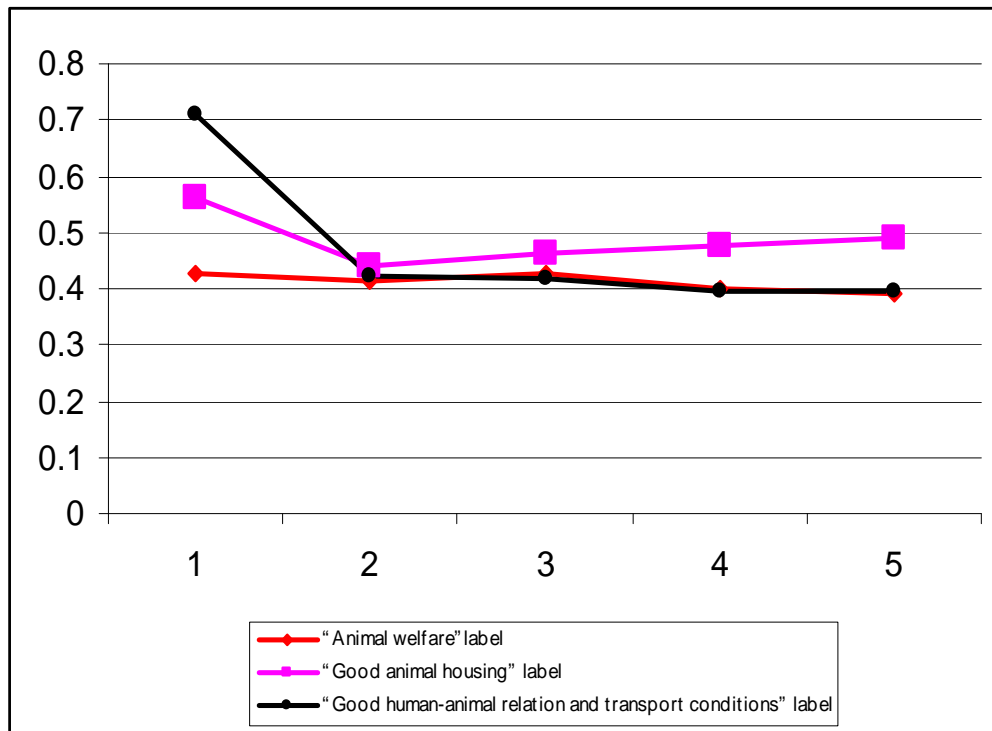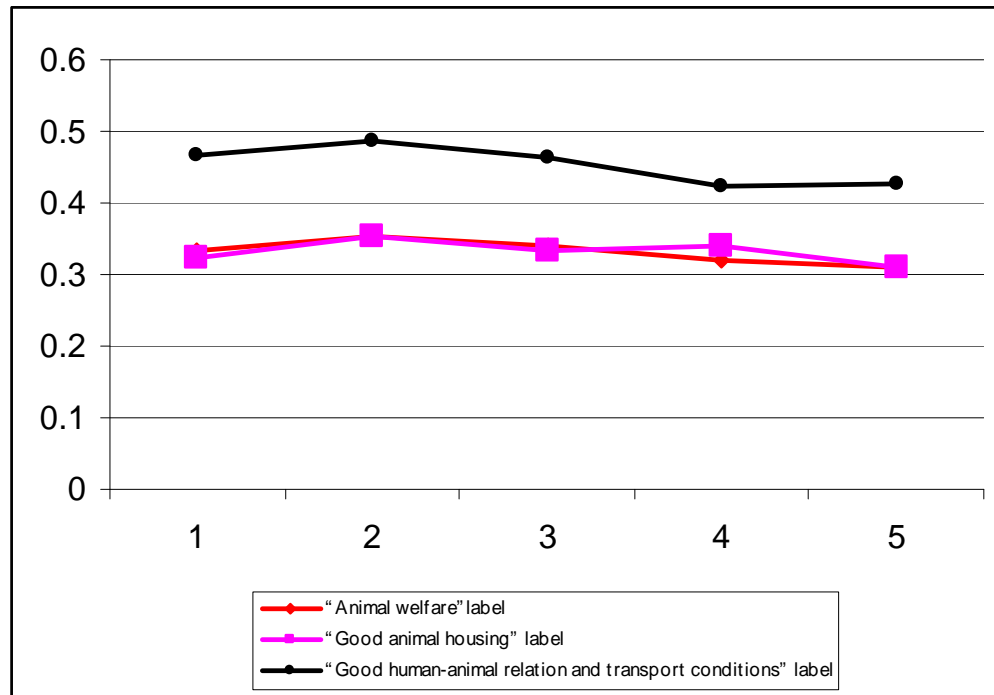
Figure 2. Average consumer implied differences between animal welfare cured ham and regular by round in the full bidding auction

Appendix

Table A1. Population by sex and age in Spain and Zaragoza (%)

	Total	Sex		Age				
		Female	Male	0-19	20-34	35-54	55-64	More than 64
Spain	40,084,371	51.00	49.00	20.56	24.64	27.82	9.95	17.04
Zaragoza	614,905	51.80	48.20	18.33	24.02	29.07	10,67	17.96

Source: Spanish Census of Population, 2001. www.ine.es