

Sustainable agri-food products: a review of consumer preference studies through experimental economics

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Table S1. Studies included in the review

References	Journal	Sustainability attribute investigated	Country	Product	Methodology	Sample (<i>n</i> = number of observations)	Research aims	Main results
Hobbs et al. 2006	Canadian Journal of Agricultural Economics	'local'	Canada	bison meat	second price Vickrey auction	<i>n</i> = 459, five cities, consumers	to evaluate the WTP (willingness to pay) for bison versus beef, plus the marginal WTP for bison with additional health-related attributes	no WTP premium for bison over beef, neither with nor without the additional quality assurances; good tasting was more important than the health-related attributes
Napolitano et al. 2008	Journal of Dairy Science	animal welfare certification	Italy	yogurt	second price Vickrey auction	<i>n</i> = 104, students	to: i) analyse consumers' WTP for yogurt obtained with high standards of animal welfare; ii) test the effect of information and tasting on the WTP	higher WTP for yogurt with improved animal welfare standards in comparison to standard yoghurt; information treatments affect the WTP, but their effectiveness is conditioned by sensory characteristics
Bougherara and Combris 2009	European Review of Agricultural Economics	carbon footprint certification	France	orange juice	Becker, DeGroot, Marschak (BDM)	<i>n</i> = 128, one city, individuals responsible for household shopping	to identify the determinants of consumers' choice for eco-labelled products by testing the effect on WTP of information	preference for eco-labelled products in each situation; WTP premium of 0.284 € for carbon footprint before information treatments and 0.266 € after treatments (no statistically significant difference)

Bazoche et al. 2010	Acta Horticulturae	reduced pesticide use certification	Portugal and France	apples and apple juices	BDM	$n = 207$, two cities, consumers	to: i) measure the consumers' WTP for apples produced with less use of pesticides; ii) compare results from various European countries	WTP for integrated protection apples is 43.6% to 53.6% higher in comparison to conventional ones; WTP for organic apples is 72.5% to 96.4% higher than the average WTP of conventional apples
Costanigro et al. 2010	Food Quality and Preference	'local', organic certification	United States of America (U.S.A.)	apples	fifth price Vickrey auction	$n = 109$, mix of students and non-students (mostly university staff members)	to: i) estimate the WTP premiums for specific local, organic, and organic–local food item (apples); ii) investigate the effects of two experimental treatments: scientific information and taste	WTP for organic-local apples is more than for organic-non-local and non-organic local apples, but lesser than the sum of the two, indicating some degree of substitutability between these attributes; polarisation against conventional products, rather than strong preference for local and organic ones
Xue et al. 2010	Food Quality and Preference	sustainable production methods (grass-feed certification)	U.S.A.	beef	BDM	$n = 404$, in store, consumers	to: i) estimate consumers' WTP for conventional beef and grass-fed beef; ii) test the effects of consumers' nutrition knowledge and information treatments about the nutritional attributes of grass-fed beef on consumers' WTP	premium price for grass-feed meat; sensory attributes deeply influence consumers' preferences and WTP; consumers' nutrition knowledge, beef consumption behaviour, health condition, living alone status, and household size have significant impacts on consumers' WTP for grass-fed beef
Napolitano et al. 2010	Food Quality and Preference	organic certification	Italy	beef	second price Vickrey auction	$n = 95$, three cities, consumers	to assess the effect of information about organic production on beef liking and consumers' WTP	important role of information about organic production in moving consumers' actual acceptability in the direction of expected liking; WTP for organic beef higher than the local commercial value for organic beef

Olesen et al. 2010	Livestock Science	organic and animal welfare certification	Norway	salmon	non-hypothetical choice experiment	$n = 115$, consumers	to elicit consumers' WTP a price premium for organic and animal welfare-labelled salmon	on an average, consumers prefer organic and Freedom Food salmon to the otherwise identical and conventional salmon; premium price of approximately 2 euros per kg (15%) for organic and Freedom Food salmon in comparison to conventional salmon
Gracia et al. 2011	Agricultural Economics	animal welfare certification	Spain	cured ham	random n^{th} price Vickrey auction	$n = 70$, one city, consumers	to study consumers' preferences for products with EU Animal Welfare (EU-CAW) label that implies higher animal welfare standards than the current legal requirements	the average premium for a cured ham with the EU-CAW label approximately ranges between 19–23% of the average price of the unlabelled one, depending on full-bidding or endowment procedure
Van Doorn and Verhoef 2011	International Journal of Research in Marketing	organic certification	Netherlan ds	milk, jam (virtue products), soft drink, chocolate (vice products)	BDM	$n = 233$, students	to: i) assess consumers' WTP a price premium for organic products and investigate reasons why they are not willing to pay a price premium; ii) analyse how organic claims affect WTP in both virtue and vice product categories	the results indicate that in vice food categories, organic claims are associated with lower quality, which appears to be only partly compensated by higher pro-social benefits; the lower-quality perceptions translate into a decreased consumer WTP
Norwood and Lusk 2011	Journal of Environmental Economics and Management	animal welfare certification	U.S.A.	pork meat, eggs	calibrated auction- conjoint method (CACM)	$n = 291$, three cities, consumers	to analyse consumers' preferences for eggs and pork produced from different animal welfare production systems	the consumers' WTP for egg and pork products are affected by animal living conditions
Gifford and Bernard 2011	International Journal of Consumer Studies	organic certification	U.S.A.	chicken meat	fifth price Vickrey auction	$n = 139$, consumers	to determine the effect of providing information about the expected requirements of natural and organic production on consumers' WTP for organic and natural chicken	before information treatment, two-thirds of the participants mistakenly compared natural certification with the organic one; after the information, nearly 50% increased the price of chicken for organic chicken in comparison to the natural one, while 30% decreased their value

Akaichi et al. 2012	Canadian Journal of Agricultural Economics	organic certification	Spain	milk	multi-unit second price Vickrey auction	$n = 78$, consumers	to: i) measure consumers' WTP for additional organic milk units and estimate the factors affecting WTP for each additional unit beyond the first one; ii) test the effect on WTP of three types of information on organic farming: positive, negative, and both	premium price for organic milk ranging from 62% for a unit of milk to 23% for the sixth additional unit, compared to the conventional one; health concerns, high organic food prices, taste, and lack of information are the main determinants of WTP; additional positive information increases WTP (46%), while a negative one decreases WTP (−20%); providing both positive and negative information treatment has no effect
Moser and Raffaelli 2012	International Journal of Consumer Studies	organic, integrated pest management (IPM) and innovative (IPM + biocontrol agents) certifications	Italy	apple	non-hypothetical choice experiment	$n = 96$, in store, consumers	to investigate apple consumers' preferences for alternative and sustainable production systems: conventional, organic, integrated pest management, and innovative technique management	organic production is the preferred sustainable production method by the respondents; other methods do not appear to affect consumer choices
Elbakidze and Nayga 2012	Journal of Dairy Science	human-animal welfare certification	U.S.A.	cheese and ice-cream	second, random n^{th} price Vickrey auctions, incremental second-price Vickrey auction, open ended choice experiment	$n = 215$, students	to: i) determine consumers' WTP for animal welfare in dairy production; ii) test the effect of additional information about the practices that constitute humane animal care in dairy production	WTP a premium price for human animal care–labelled ice cream above the price of conventional ice cream; however, no premium WTP for humane animal care–labelled cheese was detected; higher WTP from uninformed groups than from informed ones

Elbakidze et al. 2012	Canadian Journal of Agricultural Economics	animal welfare certification	U.S.A.	ice-cream and cheese	second, random n^{th} price Vickrey auctions, incremental second-price Vickrey auction	$n = 159$, two cities, students	to estimate the WTP for additional ice cream and cheese units with animal welfare certification, identify WTP determinants, and test the effect of information	no premium price for animal welfare certified cheese was found, but a premium price for ice cream was identified, though only for one unit
Schmit et al. 2013	Journal of Agricultural Economics	eco-friendly certification	U.S.A.	wine	first-price English auction	$n = 169$, students and university staff	to: i) assess WTP premia for eco-labelled wine based on sensory and objective characteristics; ii) investigate the extent of how order and type of additional information influences WTP premia	WTP premiums of 13–14% for wines made following environmentally-friendly management practices; however, the addition of the wine's (negative) sensory characteristics eliminated the environmental premium effects; sensory effects dominate extrinsic environmental attributes
Disdier et al. 2013	Food Policy	Environmental sustainable practice certification	France	milk rolls	BDM	$n = 101$, in laboratory, consumers	to: i) evaluate consumers' WTP for food products made with and without palm oil; ii) test the effect of negative information on WTP	consumers are concerned about the palm oil issue; additional information mainly decreases the WTP expressed for palm oil products, rather than increase WTP for others
Vecchio 2013	Wine Economics and Policy	social/ethical and environmental certification	Italy	wine	fifth-price Vickrey auction	$n = 80$, students	to: i) assess young adult wine drinkers' WTP for sustainable wines; ii) identify factors affecting WTP	average premium price for sustainable wine from 23% to 57% of the average price of the conventional wine, depending on the sustainability certification (social, environmental, or solidarity)

Sacket 2013	Northeast Decision Sciences Institute Annual Meeting Proceedings	sustainable methods of production and organic certification, 'local'	U.S.A.	steak, honey	second price Vickrey auction	$n = 76$, consumers	to: i) determine consumers' WTP for foods labelled as sustainably produced, ii) testing the effect on WTP of additional information on sustainability from different sources	WTP a premium price for sustainable, organic, and local certified products; organic is preferred to 'sustainable', which is preferred to local; being a woman, and having high income and education have moderate, but positive effects on WTP
Disdier and Marette 2013	European Review of Agricultural Economics	fair trade certification e geographical indication	France	pickles	BDM	$n = 92$, consumers	to estimate the WTP for pickles made with fair trade label in developing countries and pickles with geographical indication products in developed countries	76% of the sample shows a positive and similar price premium for geographic and fair trade, and an absence of a strong preference for local products rather than for fair trade ones
Grebitus et al. 2013	Ecological Economics	distance of transportation certification	Germany	apples and wine	second price Vickrey auctions	$n = 47$, consumers	to investigate the extent to which consumers' WTP varies with the distance the food travelled	average WTP decrease with the distance travelled, indicating a preference for local production; the marginal value of a mile travelled depends on the type of food studied
Bazoche et al. 2014	European Review of Agricultural Economics	pesticide use reduction (eco-friendly certification)	France, Greece, Portugal, Holland	apples	BDM	$n = 408$, in laboratory, consumers, four countries	to: i) quantify consumers' WTP for apples with different types of certification concerning pesticide use; ii) study the impact of information provided to consumers concerning pesticide use	WTP premium of 24.5%, on an average, for pesticide reduced-labelled apples in comparison to regular apples; 50.5% higher WTP for organic apples than for regular apples; information treatment had no impact on WTP for pesticide reduced-labelled apples, while it positively affects the WTP for organic apples
Gracia 2014	Empirical Economics	'local', typic breed certification	Spain	fresh lamb meat	real choice experiment	$n = 133$, in store, consumers	to investigate consumers' WTP for local and typical breeds of lamb meat	WTP a premium of 9% for the 'locally grown' lamb meat and 13% price for typical breed lamb meat
Barber et al. 2014	Journal of Environmental Psychology	eco-friendly certification	U.S.A.	wine	second price Vickrey auction	$n = 98$, in store, consumers	to: i) measure consumers' WTP for pro-environmental and conventional products; ii) cluster consumers on the basis of these values	30% of the sample has a high price premium for eco-friendly products; 43% has a neutral price premium; no WTP premium for the remaining 27%

Uchida et al. 2014	Australian Journal of Agricultural and Resource economics	eco-friendly certification	Japan	salmon	second price Vickrey auction	$n = 160$, members of retailer cooperative	to: i) investigate Japanese consumers' WTP for Marine Stewardship Council (MSC) eco- labelled seafood; ii) test the effects of varying degrees of information about the status of world and Japanese fisheries, and the MSC program	WTP a premium price of approximately 20% for MSC-eco-labelled salmon over non- labelled salmon after providing information on both the status of global fish stocks and the purpose of the Marine Stewardship Council (MSC) label program
Vecchio and Annunziata 2015	Journal of Cleaner Production	Fair Trade, Rainforest Alliance, and carbon footprint certification	Italy	chocolate	BDM	$n = 80$, in store, consumers	to: i) evaluate young consumers' preferences for sustainable food; ii) analyse the determinants of their WTP for chocolate bars with different sustainability labels	WTP premium prices for 'sustainable' labelled products; higher WTP for Fair Trade-labelled chocolate bar in comparison to those certified as Rain Forest Alliance (+20%) and carbon footprint (+10%) counterparts
Lange et al. 2015	Food Research International	fairtrade certification	France	coffee	BDM	$n = 119$, in store, consumers	to investigate the interaction between sensory information and external information about fair trade on coffee consumers' choices	higher WTP for ethical products in comparison to regular products when consumers can taste the products before making their bid; strong importance of sensory aspects, in addition to the external information, in driving food product choices
Barlagne et al. 2015	Food Policy	'local', sustainable production certification	Guadeloup e (France)	yam	BDM	$n = 54$, consumers	to assess consumers' WTP for yams with sustainable characteristics: origin, quality, and production method	the consumers' WTP for local yams (2.85 € for 1 kg) was higher than for imported yams (1.80 € for 1 kg); premium price for organic yam after providing additional information
De Magistris et al. 2015	The Journal of Consumers Affairs	Corporate Social Responsibility (CSR) certification	Italy	tuna fish	fifth-price Vickrey auction	$n = 88$, consumers	to assess the effect of providing additional information on consumers' WTP) for food products with corporate social responsibility (CSR) certification	WTP for CSR certified products was higher than the WTP for tuna fish without any CSR certification; information about CSR certification did not significantly influence the consumers' WTP

Chen et al. 2015	British Food Journal	organic certification	China	tomatoes	BDM	$n = 878$, nine cities, in store, consumers	to: i) determine consumers' WTP for tomatoes carrying different organic labels; ii) analyse the factors influencing consumers' preferences	price premiums for different organic tomatoes range from 132% to 180 % of the price of conventional ones; higher WTP price premium for tomatoes with both organic European and Chinese certifications; awareness about food safety issues positively influence WTP
Avitia et al. 2015	Food Quality and Preferences	organic and integrated farming certification	Spain	apples	CACM	$n = 80$, consumers	to: i) determine consumers' preferences for sustainable agricultural products (organic and integrated compared to conventional ones); ii) assess the influence of the price on the purchase decisions	price premium for organic or integrated production compared to the conventional one; decreasing WTP moving from hypothetical to non-hypothetical market context; important role of price, followed by environmental impact and production technique on the WTP
Boncinelli et al. 2016	Agriculture and Agricultural Science Procedia	'local'	Italy	wine	second price Vickrey auction	$n = 56$, in lab, consumers	to: i) estimate the WTP for wines with different shares of international grape varieties; ii) understand consumers' preferences for wine with an increasing international taste to the detriment of typicality	providing information about the grape variety results in a higher WTP for wines produced with typical blends than with international blends; blind tasting has determined a decrease in the premium price for typical grapes varieties
Alphonse and Alfnes 2016	Journal of Agricultural Economics	organic and food safety certification	Tanzania (Africa)	tomatoes	BDM, multiple price list (MPL), multiple price lists with stated quantities (MPLX), real- choice experiments (RCE)	$n = 76$ (BDM); $n =$ 69 (MPL); $n = 44$ (MPLX); $n = 65$ (RCE), consumers	to test the effect of additional information on WTP for tomatoes with reduced use of pesticides certification	all methods showed a WTP a premium price for organic and controlled food safety tomatoes in comparison to conventional ones

Cagalj et al. 2016	British Food Journal	organic certification	Croatia	tomatoes and apples	BDM	$n = 258$, students	to quantify the effect of providing information about environmental impact, health effects, and taste on WTP for organic products	WTP a premium price of 42% for organic apples and 59% for organic tomatoes; Environmental and health information increases WTP by 16–20% and 12% respectively, while taste recommendations have no effect
Del Giudice et al. 2016	Journal of International Food & Agribusiness Marketing	Waste reduction certification	Italy	baguettes	fifth-price Vickrey auction	$n = 79$, students	to: i) study the effect of certification on the containment of food waste within a certain threshold on WTP for baguettes; ii) investigate the effect on WTP of different communication strategies on the consequences of waste	premium price for baguettes with certification of waste reduction; higher WTP for carbon footprint than for water footprint; providing additional information on carbon footprint increases the effect of labelling on WTP, but only for the more restrictive reduction threshold
De Magistris and Gracia 2016	British Food Journal	Organic certification	Spain	cheese	random n^{th} price Vickrey auction	$n = 145$, consumers	to: i) evaluate consumers' WTP for organic, PDO (Protected Designation of Origin) and light cheese; ii) assess the influence of the socio-demographic and personal characteristics on WTP	higher premium price for organic cheese than for the light one, but lower than PDO certified; graduated consumers showed a higher WTP, <i>ceteris paribus</i> ; consumers who are older and more concerned about sustainability issues have a higher WTP for organic cheese
Marette et al. 2017	Food Policy	Sustainable production methods (linseed-feed certification)	France	milk	VCM (voluntary contributions mechanism) and BDM	$n = 134$, in lab, consumers	to understand how different designs and/or periods of time could influence participants' choices for milk with environmental and healthy attributes in lab context	WTP a premium price for milk with public attributes linked to global warming and the private attribute linked to omega-3; additional information leads to a statistically significant decrease in the WTP for conventional milk and a significant increase for the improved one; stability of the WTP is different between products across the orders of mechanisms and periods of experiments

Bazzani et al. 2017	Food Quality and Preference	Organic certification and 'local'	Italy	applesauce	real choice experiments (RCE)	$n = 80$, in store, consumers	to: i) investigate consumers' preferences and WTP for local and organic applesauce; ii) evaluate the influences of personality traits on consumers' WTP for such food product attributes	premium price for both the local and the organic applesauce in comparison to conventional applesauce; organic certification is preferred to the 'local' one; 'Extraversion' and 'Agreeableness' traits affect local food preferences, no effects of personality traits on organic applesauce choice
McFadden and Huffman 2017	Food Policy	Organic and 'natural' certification	U.S.A.	apples eggs, broccoli	random n^{th} price Vickrey auction	$n = 102$, in lab, consumers,	to: i) test the effects of different labels and information treatments on consumers' WTP for organic, 'natural', and conventional foods; ii) verify the role of prior knowledge and demographics aspects as predictors of consumer choices	higher WTP premium price for organic products (22, 34 and 30% of the conventional ones) rather than the 'natural' ones (13, 16 and 14% of the conventional ones); being a woman, younger, with a high income, and having high awareness increases the WTP for organic and 'natural' products; information favouring 'natural' foods increase organic food premiums, while independent information on organic foods have no effect on 'natural' food premiums
Ortega and Wolf 2018	Food Policy	Animal welfare certification	U.S.A. (Michigan)	pork and poultry products	BDM	$n = 218$, in store, consumers	to: i) assess consumer preferences and WTP for livestock and egg products with improved animal welfare practices; ii) identify the determinants of consumer demand for products with animal welfare certification	WTP a premium price of 40.5% for eggs, 34.3% for chicken breast, 43.8% for ground pork, and 29.0% for pork chops with respect to the equivalent conventional ones; premiums are product specific and could not be generalised to the entire animal; age and income positively influence the WTP for eggs, ground pork, and pork chops

Source: authors' elaboration