Role of information in the valuation of unfamiliar goods – the case of genetic resources in agriculture

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Abstract

We analyse information effects in the valuation of agricultural genetic resources using choice experiments. We define two respondent groups based on their information use. Our findings indicate that socio-demographic and attitudinal variables affect information use. There is significant individual preference heterogeneity, but there are no significant differences in scale between the information groups after allowing the mean coefficients for the attributes differ. Those having read the additional information derive higher utility from the protection of agricultural genetic resources. Our results highlight the importance of genetic resource conservation and controlling for the effects of information use in choice experiment models for unfamiliar goods.

Keywords: agricultural genetic resources, discrete choice experiments, environmental valuation, information effects

1 Introduction

Stated preference methods, such as contingent valuation and discrete choice experiments, are commonly used for eliciting citizens' willingness to pay (WTP) for environmental goods to provide policy-relevant information on environmental values. Nowadays, applications are common for both familiar and easily observable goods, such as water quality (e.g. Hanley et al. 2006, Ahtiainen et al. 2015), and for goods that people may be unfamiliar with or have no practical experience of, such as biodiversity (e.g. Christie & Gibbons 2011, Jobstvogt et al. 2014). We examine the public's values for agricultural genetic resources using the choice experiment method. Agricultural genetic resources refer to all animal and plant species and varieties that are of interest in terms of agriculture. Although the public is likely to be aware of agricultural production and its effects on the environment, specific aspects in agriculture, such as the conservation of genetic resources, are likely to be unfamiliar to at least some of the respondents. This provides an excellent setting for studying the effect of information on preferences for unfamiliar environmental goods in a CE setting (Pouta et al. 2014).

In stated preference valuation surveys, respondents are assumed to make informed choices when responding to the value elicitation questions (e.g. Blomquist & Whitehead 1998). In order to obtain informed choices and produce valid estimates of environmental values (WTP), surveys need to provide neutral and sufficient information about the environmental good while avoiding information overload. Hence, both the amount and type of information provided to respondents are important design features of surveys (Johnston et al. 2017).

Providing more information about the quality (characteristics and services) of the environmental good can have various effects: it can increase stated WTP, have no effect, or in some cases decrease WTP (Blomquist & Whitehead 1998). It has been argued that provision of relevant information improves respondents' understanding of environmental commodities and reduces both uncertainty and possible divergence between true and stated WTP (Hoehn and Randall 1987). However, increased information in stated preference surveys increases the load of information processing and therefore the cognitive complexity of the choice process. Increased complexity in turn affects the consistency of respondents' choices and thus their stated WTP (Berrens et al. 2004). When faced with difficult choice questions, respondents often tend to use heuristics. In their recent paper, Sandorf et al. (2016) suggest that providing good and correct information prior to a choice experiment is important, because the more respondents know about the environmental good in question, the less likely they are to use simplifying strategies, such as attribute non-attendance. As the knowledge helps to avoid, at least to some extent, the use of heuristics, providing information helps to obtain more precise welfare estimates.

In addition to the extent of the information, also the nature of the information plays a role. According to Hu et al. (2009), studies assessing the impact of information on consumers' choices have concluded that positive information tends to reduce adverse reactions, and negative information tends to reinforce them. Environmental commodities can have beneficial attributes, but also attributes that can be perceived negatively. Hence, additional information describing these negative consumption services or attributes can induce reductions in WTP (Bergstrom et al. 1990).

Information tends to be regarded as crucial to an individual's decision making in situations where there is much uncertainty involved, for example, in the valuation of unfamiliar goods. It is often assumed that once the information is provided, respondents will access and process it. However, simply making information available does not mean that all of the respondents will read it. Respondents' choice to access voluntary information is reliant on their previous knowledge on the topic and their personal characteristics (Hu et al. 2009). Furthermore, even in the best case scenario, it is not possible to control whether the respondents truly comprehend the information provided.

There is a substantial literature on information effects, their reasons and respondent effort in contingent valuation (CV) studies (see e.g. Berrens et al. 2004, Blomquist & Whitehead 1998, Cameron & Englin 1997, Munro & Hanley 2002), most finding significant information effects on preferences and values. However, only few discrete choice experiment (CE) studies have examined the use of information. Hu et al. (2009) and Vista et al. (2009) focused on respondent effort, indicated by accessing optional information provided in the survey and the time spent on completing the survey. Hu et al. (2009) used data from a CE of genetically modified food to simultaneously model voluntary access of additional information and product choices. They found that the additional information was accessed rather infrequently, and those who held critical views on genetic modification accessed the information more often. There were interlinkages between information access and choices, but they were complex and varied between individuals. Vista et al. (2009) examined the effect of time spent on attribute information, choice questions and completing the survey on preferences, finding no significant effects on parameter estimates.

In the context of unfamiliar goods, it may be especially important to allow for scale heterogeneity in addition to individual preference heterogeneity (Christie & Gibbons 2011). Heterogeneity of scale across individuals has become an important consideration in modelling CE responses (Fiebig et al. 2009, Hensher et al. 2012, Louviere et al. 2002, Louviere 2006). Scale represents the variation in the random component of utility relative to the deterministic component, and scale heterogeneity implies that the scale of the error term varies across respondents. A higher mean scale implies that the respondents' choice behaviour appears less random from the perspective of the analyst. Recent CE studies have investigated information effects and familiarity of the environmental good while allowing for scale heterogeneity. Czajkowski et al. (2016) examined how information provided in the CE survey affected individual preferences and the mean and variance of the scale parameters in the setting of biodiversity conservation, finding that the scale varies across individuals and that the mean scale and its variance are sensitive to the information given. Christie & Gibbons (2011) interpreted scale heterogeneity as respondents' ability to choose, and concluded that accounting for scale heterogeneity can improve the reliability of the results when valuing unfamiliar or complex goods.

In this study, we contribute to the stated preference literature on the effect of information use and respondent effort on respondents' choices and WTP for an unfamiliar good. Our CE survey offered the respondents an opportunity to access additional information on the environmental good, similar to Hu et al. (2009). We examine the determinants of voluntary information acquisition, and the effect of accessing the information on respondents' preferences and scale, allowing for individual preference and scale heterogeneity.

2 Survey and data

2.1 Conservation of agricultural genetic resources in Finland

The intensification of agriculture has led to major changes in the utilization of agricultural genetic resources. Consequently, many previously common animal breeds and crop varieties are currently on the verge of extinction worldwide. In Finland, the majority of indigenous crop varieties, as well as the Finnish landrace pig are already extinct. Furthermore, several native breeds, such as Eastern and Northern Finncattle, the Kainuu Grey Sheep and the Åland Sheep, are endangered according to FAO classification (FAO 2007). Conservation policies for agricultural genetic resources in Finland, as in many European countries, are based on international agreements such as the Convention on Biological Diversity (1992) and the Global Plan of Action for Animal Genetic Resources (FAO 2007). National programmes to strengthen the conservation of genetic resources in Finland were initiated in 2003 for plants and in 2005 for farm animals. There has been some progress in putting the conservation programs into action, but they have not been implemented fully due to the lack of resources and political interest. In addition, there is no information on the economic benefits of such programmes. Thus, the present study estimates citizen's use and non-use benefits from the conservation of agricultural genetic resources to support policy-making, and examines information effects in the context of valuing unfamiliar goods.

2.2 Data collection

The CE survey data were collected using a probability-based Internet panel during the summer of 2011. The Internet panel of a private survey company, Taloustutkimus, comprises 30 000 respondents who have been recruited to the panel using random sampling to represent the population (Taloustutkimus 2013). Before the actual study, the survey was tested with a pilot study of 138 respondents. The final data set consisted of 1860 responses, with a response rate of 30%. Based on the socio-demographic information, presented in Table 1 in comparison with the statistics for the general Finnish population, the data represented the population rather well. Respondents were somewhat older, had lower income and were less likely to have children compared to the population.

2.3 Survey design

The survey had five sections, with questions on environmental issues in agriculture in general, familiarity with and attitudes towards agricultural genetic resources, environmental values (the choice experiment) and respondent's background. Here we present in detail the relevant sections for the analysis. In the beginning of the survey, all respondents were presented with a short description of the most common Finnish agricultural genetic resources (native animal breeds and plant varieties) and were asked their familiarity with them. Next, the survey provided brief information about the conservation of agricultural genetic resources in Finland, after which the respondents were given an opportunity to gain more knowledge by accessing two internet links, separately for animal and plant genetic resources. The voluntary additional information included motivation for conservation, descriptions of conservation methods and facts about the sustainable use of genetic resources. We recorded the time respondents used to read this additional information. Provision of voluntary information enabled identifying respondents who accessed the links and recording how much time they spent on these information pages. This approach was similar to Hu et al. (2009), who provided voluntary access to additional information. In our case, however, the choice tasks and information acquisition were not simultaneous, but the information was provided before the choice experiment. The information page with the links was followed by questions about the perceived importance of animal and plant genetic resources. The survey then presented the current state of conservation (the status quo) and proceeded to the choice experiment.

The CE was framed by explaining that the conservation of Finnish native animal breeds and plant varieties is not yet comprehensive. The respondents were presented with a programme that would increase the conservation of breeds and varieties on farms (*in situ*) and in gene banks (*ex situ*).

There were five attributes for the conservation of plant varieties and animal breeds in gene banks and on farms, with the first attribute level always representing the status quo level (Table 2). Instead of having separate attributes for each animal breed, there was only one attribute for native breeds in gene bank and one attribute for native breeds on farms to ease the cognitive burden of the respondents. Still, individual animal breeds were treated as separate attributes in analyses. The cost attribute was specified as an increase in income tax during a ten-year period (2012-2021).

In the CE, the respondents faced six choice sets (example in Table 3), each containing two policy alternatives and the status quo. After each choice set, the respondents were asked to rate the certainty of their choice on a scale ranging from 1 to 10 (1 completely uncertain - 10 completely certain).

In the experimental design, we employed a Bayesian D-efficient design using the Ngene software (v. 1.0.2) (ChoiceMetrics 2010, Rose & Bliemer 2009). We employed zero priors in the pilot design, and used the parameter estimates obtained from the pilot in the construction of the final design. The final design consisted of 180 choice tasks blocked into 30 subsets, which resulted in six choice situations for each respondent. See Pouta et al. (2014) for more detailed description of the experimental design.

3 Statistical models

In the statistical modelling, we examined the use of information and the effect of information use on preferences, allowing for preference and scale heterogeneity. First, a logistic regression model (logit model) (e.g. Greene 2007) was estimated to examine the association between the use of information and individual socio-demographic characteristics, as well as variables on the perceived responsibilities for the conservation of agricultural genetic resources, the respondent's familiarity with native breeds and varieties and the perceived importance of preserving native breeds and varieties relative to other environmental protection measures. The dependent variable in the logit model was a binary variable describing information use, defined according to the time the respondent spent on the additional information pages for the native animal breeds and plant varieties. The respondents were considered to have read the information if they had spent 30 seconds or more on either of the information pages. For a fast reader, it took approximately 30 seconds to actually read each information page, and thus it was defined as the cut-off.

Second, respondents' choices were modelled using the mixed logit (MXL) model, which allows for unobserved heterogeneity in individual preferences through random parameters that have both a mean and a standard deviation (Hensher & Greene 2003, Hensher et al. 2005, Revelt & Train 1998, Train 2003). In addition to individual preference heterogeneity, the MXL model can account for differences in mean scale across respondent groups, in this case, based on information access (Fiebig et al. 2010, Hensher et al. 2015). Following Czajkowski et al. (2014, 2016), we control for scale and preference differences between respondents who have accessed additional information and those who have not while modelling their choices jointly.

In the modelling, the cost variable was continuous and other attributes were dummy-coded. The parameters of alternative specific constants (ASC) and all other attributes, including the cost, were modelled as random. All parameters were assumed to follow normal distributions with the exception of cost, which was assumed to be negative log-normally distributed.[1]

[1] The models were estimated using a DCE package, which among other things can be used to estimate MXL models. The package has been developed in Matlab and is available at https://github.com/czaj/DCE. The code and data for estimating the specific models presented in this study are available from http://czaj.org/research/supplementary-materials.

4 Results

4.1 Familiarity and use of information

As hypothesized, the responses show that many respondents are unfamiliar with several native animal breeds and plant varieties. In general, people have heard about or have experience of native breeds more often than varieties. Of the 10 breeds and varieties presented in the survey, five are such that over 30% of respondents have never heard about them. The share of respondents having no previous information ranges from 5 to 47 %, depending on the breed or variety.

Out of the 1547 respondents, 64% spent over 30 seconds to read at least one of the two additional information pages. Table 4 presents the results of the logit model that explained the use of information. The results show that female respondents read the additional information more often than males, and older respondents were more likely to read the information. The likelihood of reading the information also increased if the respondent considered the conservation of genetic resources to be the taxpayers' responsibility, but decreased if s/he considered the conservation as the farmers' responsibility. In our case, the importance of preserving native breeds and varieties did not play a role in information acquisition. However, respondent's familiarity with the native breeds and varieties had a negative effect on the use of information. This could suggest that those who had the least knowledge and experience at the outset were more likely to obtain additional information in the course of the survey.

4.2 Choice analysis

We first examined whether the use of information affected the frequency of choosing the status quo alternative or bid acceptance. There was a clear difference in choosing the status quo alternative between the information groups. Respondents who accessed the additional information chose the status quo in 19% of the choice sets, and those who did not chose the status quo in 33% of the choice sets, and this share is significantly different ($p = 0.000$).

Next, we turn to investigating the effects of accessing additional information on respondents' preferences and scale. Table 6 presents the results of the MXL model with correlated parameters[2] in three specifications – assuming that accessing information only causes differences in scale (Model 1), assuming that accessing information can influence means of the preference parameters and scale (Model 2) and allowing for the independent effect for means and standard deviations of preference parameters (Model 3). The models included 9484 observations from 1608 respondents.

The MXL Model 1 (Table 6) includes all respondents (both those who have read the additional information and those who have not), and there are no assumed differences in preferences between the information groups. However, mean of the scale parameter is allowed to differ between groups. Most of the conservation parameters in Model 1 are significant and of the expected sign, with increases in the protection of native breeds and varieties increasing utility. The respondents have the tendency to choose the policy alternatives instead of the status quo. Increase in the programme cost is associated with negative utility, as expected. Highest utility changes result from the conservation of plants on farms and gene banks and cattle breeds on farms. Only the attributes for preserving food plant varieties and native chickens in gene banks and the smaller change for increasing the number of sheep breeds on farms are insignificant.

Model 1 indicates that accessing information increases scale, i.e. reduces error term variance. In other words, respondents' choices appear less random from the modeller's perspective. The comparison with Model 2, in which parameters of the means of each attribute can depend on whether the information was accessed or not, indicates, however, that Model 1 is overly restrictive. Since the models are nested, one can use the likelihood ratio test to confirm this (p-value 0.000). As a result, the results in scale observed in Model 1 seem to be driven by the effect of accessing information on selected mean parameters, as indicated by significant interactions with 'info

[2] Note that the MXL model with all parameters random and correlated accounts for unobserved scale heterogeneity (Hess and Rose, 2012).

accessed' in Model 2 (Table 6). In particular, respondents who accessed information were on average less likely to choose the status quo, had stronger preferences for increasing the number of food plants and native cattle breeds on farms as well as goats in gene banks and had significantly lower marginal utility of money (and hence expected higher WTP). Accessing information did not appear to affect mean preference parameters for other attributes. In addition, once differences in means are controlled, the interaction of scale with a dummy variable for accessing information was no longer significant, i.e. statistically there was no consistent difference in variances of preference parameters of those who accessed information, and those who did not.

Model 3 with two information groups allows for independent effect of accessing information for means and standard deviations. Comparison of the parameter estimates between the information groups reveals that many of the attribute coefficients are higher and there are more significant variables for the group that has accessed the additional information. These respondents are less willing to choose the status quo alternative, and derive higher utility from improvements related to preserving native food varieties on farms, ornamental varieties in gene banks, and native horse and sheep breeds. The results indicate that those who have familiarized themselves with the information obtain more utility from the improvements compared to those who have not accessed the information. However, based on the likelihood ratio test there is no significant difference in the model fit between Model 3 and Model 2 (p-value 0.999).

Table 7 presents the willingness to pay (WTP) estimates, which were obtained by estimating the models in WTP-space. Overall, the group that accessed information had higher WTP for all attributes compared to the group that did not access the information, except for lower level of food plants on farms. All other WTPs were of the expected sign, but the group that did not access the information had negative WTP for higher level of food plants banked and lower level of native sheep breed on farms.

5 Discussion and conclusions

This study investigated the voluntary use of additional information and information effects in the choice experiment setting. The empirical application concerned the conservation of agricultural genetic resources (native breeds and varieties) in Finland, an environmental good many people are unfamiliar with. Respondents were divided into two groups based on the time they spent reading the additional information in the internet survey. We examined the determinants explaining the use of information with the logit model and the effect of information use on respondents’ preferences and scale using the mixed logit (MXL) model.

The results of the logit model suggest that respondents who had read the additional information were more likely to be female, older and perceived the conservation of genetic resources to be the taxpayers’ responsibility. The respondents who were more familiar with native animal breeds and plant varieties were less likely to read the additional information, as well as those who felt the conservation was the farmers’ responsibility. These results are in some part similar to Hu et al. (2009) who modelled information access in a CE for genetically modified food. They found that male respondents and those who were employed or had a higher income were less likely to access the information, and the more children the household had, the lower the likelihood of information access. In their study, also being a member of a consumer group or a rural resident increased the likelihood of accessing the information.

The results of the MXL models indicate the presence of significant individual preference heterogeneity in the sample, and show clear differences in preferences between the two different information groups. The respondents who had read the additional information chose the status quo alternative less frequently, and their choices could be explained with several environmental attributes characterizing the conservation programme of agricultural genetic resources. The choices of the respondents who did not read the information were associated with fewer significant conservation attributes, and the attribute coefficients were lower than for those having read the information. This suggests that in our case, reading additional information had a positive effect on utility derived from the environmental good. Another possible explanation could be that those respondents who had read the additional information were more interested in the environmental good to begin with, and would hence be more likely to support the conservation programmes regardless of the information. However, our results do not support this latter explanation as information acquisition was not significantly explained by the attitudes towards the importance of conserving of agricultural genetic resources.

The findings on significant information effects are in line with several previous studies on stated values (e.g. Bieberstein et al. 2013, Chalak & Abidad 2012, Tisdell & Wilson 2006, van Til et al. 2009). Hu et al. (2009) found interdependence between information access and product choices, but also that there was significant variation across individuals in this interdependence.

Our findings indicated that there was no significant differences in mean scale between the information groups after allowing the mean parameters for the attributes differ. Even though the covariate of scale was significant in Model 1, it was driven by the effect of accessing information on selected mean parameters, as the comparison with Model 2 showed. These results differ from the ones obtained by Czajkowski et al. (2016), who found that respondents who were given more complete information in the CE made less random choices.

Even though the information affected respondents' choices, there were some attributes of the conservation programme that were similar across models and information groups. These attributes included the conservation of plants on farms, horses in gene banks, as well as cattle breeds on farms. Willingness to support the conservation programmes was lower for the group that did not read the information compared to those who read the information, especially at low cost levels.

Czajkowski et al. (2016) raised the issue of how well-informed preferences should be before they are used for cost-benefit analysis or policy-making, and how much information should be provided to the survey respondents. Our results showed that even though neutral information was available, only about 60% of respondents studied the information and used the opportunity to familiarize themselves more with the environmental good. What was promising was that the respondents who were not familiar with the good at the outset were more interested in reading the information. From a policy point of view this is promising, as it suggests that the share of well-informed respondents can be increased by providing an access to additional voluntary information.

Although we found significant differences between the information groups defined based on the time they had spent reading the additional material, setting the cut-off time to 30 seconds was arguably arbitrary. Future research should investigate ways of properly identifying how much effort respondents actually put into reading the provided material in stated preference surveys. More information is required on information effects in choice experiment, for example, examining the relationship between uncertainty and information access, and whether information use affects respondent uncertainty.

In the case of conservation of agricultural genetic resources, there are no strong disagreements between stakeholder groups. Interesting future topic would be to examine how respondents use information from different standpoints; do they have the tendency to select the information that is congruent with their existing perceptions or extend their understanding with new type of information that could, however, make the choice process more demanding.

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Tables

Table 1. Socio-demographic profile of respondents and population.

	In the data	In the population[a]
Proportion of females, %	48	51
Mean age, years	52	47
Proportion of people with a higher educational level, %	24	23
Proportion of people living in households with a gross income under €40 000, %	43	53
Proportion of people with children (<18 years) in the family, %	35	40
Proportion of people living in Southern Finland, %	40	41

[a] Statistics Finland 2010, www.stat.fi

Table 2. Attributes of conservation programmes and their levels

Attribute	Description	Current state / status quo	Levels (unit)
Native food plant varieties in gene banks	Native food plants are stored in a gene bank, either as seeds or plant parts.	The gene bank contains seeds from about 300 landrace varieties. Plants that are added vegetatively (e.g. berry and apple varieties) are missing.	300 , 400, 500 (number of plants)
Farms growing native food plants	Farmers and hobby gardeners cultivate native food plants on farms or in gardens.	Seven farms grow seeds of native food plants with agri-environmental support. Other activities than growing seeds are not supported.	7, 500, 1000 (number of farms)
Native ornamental plant varieties mapped and in gene banks	Scientists identify and register native ornamental plants. Varieties are preserved in a gene bank, either as seeds or plant parts.	Only a small proportion of the native ornamental plants are known. Storage in the official gene bank is not provided.	small proportion, about half, majority (proportion of plants)
Native breeds in gene banks	Landrace breeds are kept in a gene bank as gametes and embryos.	The gene bank contains Western, Eastern and Northern Finncattle, as well as Finn-, Åland and Kainuu sheep. Native chicken, goat and horse breeds are missing from the gene bank.	3 cattle breeds and 3 sheep breeds (status quo level), + all combinations of goat, horse and chicken breeds (breeds)
Native breeds on farms	Native breeds are kept on farms in their natural environment. A breed is considered to be endangered if the number of females is less than 1000.	Farms secure goat, horse and chicken breeds, Finnish sheep and Western Finncattle. Eastern and Northern Finncattle, as well as Åland and Kainuu sheep, are endangered.	1 cattle breed, 1 sheep breed, goat, horse and chicken (status quo level), + all combinations of additional 1-2 cattle and sheep breeds (breeds)
Cost	Cost for taxpayers, €/year during 2012–2021.	No additional costs.	0, 5, 20, 40, 80, 100, 150, 300 (€)

Table 3. Example of a choice set

Attribute	**Current state**	**Conservation programme A**	**Conservation programme B**
Native food plant varieties in gene banks	Approximately 300	400	400
Farms growing native food plants	7 farms	2000 farms	1000 farms
Native ornamental plant varieties mapped and in gene banks	Some	Majority	About half
Native breeds in gene banks	3 cattle breeds 3 sheep breeds	3 cattle breeds 3 sheep breeds Chickens Goats Horses	3 cattle breeds 3 sheep breeds Goats
Native breeds on farms	Goats Horses Chickens Finnsheep Western Finncattle	Horses 3 cattle breeds 3 sheep breeds	Goats Horses Chickens 3 cattle breeds 3 sheep breeds
Cost for taxpayers €/year during 2012–2021	€0/year	€80/year	€200/year
I support the alternative	( )	( )	( )

Table 4. Logit model results for the use of information (Binary dependent variable: Info, 1 if time spent in at least one of the additional information pages is more than 30 seconds)

Variable	**Description**	**Coefficient**	**Standard error**	**Odds ratio**
Constant		0.752*	0.456	2.121
Gender (male)	1 if female, 0 if male	-0.730***	0.127	0.482
Age	Respondent´s age, continuous	0.014***	0.005	1.014
Income	Household gross income (thousands €/year), continuous	0.050	0.136	1.052
Landowner	1 if respondent owns forest, croplands or homegarden, 0 otherwise	0.030	0.127	1.031
High education	1 if respondent has a university or polytechnic education, 0 otherwise	0.050	0.136	1.052
Taxpayer responsibility	Factor score based on 9 measures of stakeholder responsibilities in conservation*	0.286***	0.063	1.332
Consumer responsibility	Factor score based on 9 measures of stakeholder responsibilities in conservation*	0.074	0.068	1.077
Farmer responsibility	Factor score based on 9 measures of stakeholder responsibilities in conservation*	-0.278***	0.061	0.757
Familiarity	The familiarity of native breeds and varieties to the respondent (1 has not heard of, 2 has heard of, 3 has used/tried/experience with)	-0.292*	0.168	0.747
Importance	The importance of preserving native breeds and varieties (4 very important – 1 not at all important)	0.051	0.096	1.052
N		1354		
Nagelkerke R^2		0.089		
Correct predictions		68%		

* Detailed description of these variables can be found in Tienhaara et al. (2015)
Variables are significant at the *** 1%, ** 5% and * 10% level.

Table 7. Annual willingness to pay for attributes in € per individual (standard errors in parenthesis).

	Info not accessed	**Info accessed**
ASC (status quo)	-259.6 (10.0)	-303.5 (22.0)
Food plants banked 300 → 400	-	-
Food plants banked 300 → 500	-13.0 (4.9)	-
Food plants on farms 7 → 1000	56.2 (8.5)	51.4 (6.5)
Food plants on farms 7 → 2000	41.3 (7.1)	47.3 (5.9)
Ornamental plants banked some → half	21.6 (7.5)	32.8 (6.3)
Ornamental plants banked some → majority	20.8 (8.3)	29.0 (6.5)
Native horses banked	18.1 (5.7)	22.9 (4.3)
Native goats banked	-	20.4 (3.7)
Native chickens banked	-	-
Native cattle breeds on farms 1 → 2	-	24.4 (5.5)
Native cattle breeds on farms 1 → 3	-	26.6 (5.7)
Native sheep breeds on farms 1 → 2	-14.4 (8.0)	11.7 (5.8)
Native sheep breeds on farms 1 → 3	-	23.8 (6.1)

- Indicates that the estimate is missing due to the non-significance of the attribute coefficient.

Table 6. The MXL models results – the effects of accessing information for respondents' preferences and scale (standard errors in parentheses)

	MXL Model 1		MXL Model 2			MXL Model 3			
Variable	**Means**	**Standard deviations**	**Means**	**Interactions with 'info accessed'**	**Standard deviations**	**Means 'info not accessed'**	**Standard deviations 'info not accessed'**	**Means 'info accessed'**	**Standard deviations 'info accessed'**
ASC (status quo)	- 4.4850***	5.5511***	-3.1538***	-3.3454***	6.2380***	-3.5692***	7.3236***	-6.1497***	5.7934***
	(0.4070)	(0.5318)	(0.5112)	(0.6496)	(0.6312)	(0.6337)	(0.9922)	(0.5288)	(0.6743)
Food plants banked 300 -> 400	-0.0532	0.8983***	-0.0443	-0.0214	1.0910***	0.0327	0.6261***	-0.1093	1.2196***
	(0.0752)	(0.1439)	(0.1490)	(0.1792)	(0.1839)	(0.1647)	(0.2589)	(0.1124)	(0.2194)
Food plants banked 300 -> 500	-0.0328	0.3971***	-0.0842	0.0607	0.5671***	-0.0870	0.9331***	-0.1069	0.9196***
	(0.0777)	(0.1237)	(0.1572)	(0.1822)	(0.1850)	(0.1927)	(0.2776)	(0.1156)	(0.1925)
Food plants on farms 7 -> 1000	0.5156***	1.1386***	0.3205**	0.4896**	1.4330***	0.5023***	1.6040***	0.7003***	1.4205***
	(0.0862)	(0.1579)	(0.1510)	(0.1904)	(0.2490)	(0.1866)	(0.3405)	(0.1156)	(0.2220)
Food plants on farms 7 -> 2000	0.4823***	1.1521***	0.3370**	0.4042**	1.4594***	0.5346***	1.4439***	0.6138***	1.6122***
	(0.0805)	(0.1218)	(0.1410)	(0.1725)	(0.2090)	(0.1704)	(0.2371)	(0.1103)	(0.1784)
Ornamental plants banked some -> half	0.3287***	0.9614***	0.2776**	0.2014	1.2273***	0.3126*	1.5594***	0.3729***	1.1914***
	(0.0785)	(0.1292)	(0.1416)	(0.1724)	(0.1803)	(0.1749)	(0.2663)	(0.1093)	(0.1960)
Ornamental plants banked some -> majority	0.3002***	1.1419***	0.2441*	0.1961	1.4396***	0.2393	1.9244***	0.4137***	1.6473***
	(0.0778)	(0.1259)	(0.1464)	(0.1727)	(0.1734)	(0.1864)	(0.2810)	(0.1116)	(0.2936)
Native horses banked	0.2399***	0.6793***	0.1868*	0.1771	0.8566***	0.2008	1.1537***	0.3204***	0.8592***
	(0.0538)	(0.0920)	(0.0983)	(0.1182)	(0.1268)	(0.1263)	(0.2004)	(0.0733)	(0.1529)
Native goats banked	0.1881***	0.5800***	0.0255	0.3054***	0.7017***	0.1001	0.9774***	0.2900***	0.8684***
	(0.0505)	(0.1041)	(0.0949)	(0.1128)	(0.1387)	(0.1198)	(0.1778)	(0.0717)	(0.1435)
Native chickens banked	0.0755	0.8949***	0.0412	0.0516	1.1438***	0.1017	1.3835***	0.0783	1.2700***
	(0.0548)	(0.1278)	(0.1064)	(0.1231)	(0.1678)	(0.1356)	(0.2345)	(0.0782)	(0.3301)
Native cattle breeds on farms 1 -> 2	0.2231***	1.1389***	-0.0790	0.5195***	1.4225***	-0.0601	1.6743***	0.3670***	1.7404***
	(0.0723)	(0.1563)	(0.1346)	(0.1635)	(0.2074)	(0.1685)	(0.2635)	(0.1051)	(0.4899)
Native cattle breeds on farms 1 -> 3	0.2085***	1.0317***	-0.1159	0.5725***	1.2748***	-0.0860	1.4891***	0.4080***	1.4475***
	(0.0689)	(0.1496)	(0.1302)	(0.1598)	(0.1894)	(0.1563)	(0.2562)	(0.0990)	(0.2920)
Native sheep breeds on farms 1 -> 2	0.0384	1.1419***	-0.0179	0.1109	1.5157***	0.0086	1.9440***	0.0191	1.8885***
	(0.0698)	(0.1773)	(0.1325)	(0.1557)	(0.2404)	(0.1672)	(0.3351)	(0.1022)	(0.6129)
Native sheep breeds on farms 1 -> 3	0.1940***	1.3742***	0.1506	0.1330	1.7343***	0.0768	1.8998***	0.2527**	2.4775***
	(0.0736)	(0.2293)	(0.1384)	(0.1622)	(0.2819)	(0.1731)	(0.3414)	(0.1127)	(0.9077)
- Cost (EUR)	3.5236***	16.8138**	2.8463***	0.6695***	14.4326**	5.3564***	79.8477	3.9625***	12.5230***
	(0.4943)	(7.8100)	(0.5303)	(0.1637)	(6.8451)	(1.7819)	(73.6185)	(0.4823)	(4.4238)
Covariates of scale									
'Info accessed'	0.2396**		-0.0551						
	(0.0941)		(0.1004)						
Model diagnostics									
LL at convergence	-7222.80		-7172.20			-7129.67			
LL at constant(s) only	-10141.25		-10141.25			-10141.25			
McFadden's pseudo-R^2	0.2878		0.2928			0.2965			
Ben-Akiva-Lerman's pseudo-R^2	0.4854		0.4886			0.4944			
AIC/*n*	1.5518		1.5443			1.5605			
BIC/*n*	1.6545		1.6583			1.6178			
n (observations)	9484		9484			9484			
r (respondents)	1608		1608			1608			
k (parameters)	136		151			270			

The variables are significant at the *** 1%, ** 5 % and * 10% level.