Are citizens willing to pay for agricultural multifunctionality?

Zein Kallas[a], José A. Gómez-Limón[a] and Manuel Arriaza[b]

[a] Dpt. of Agricultural Economics. ETSIIAA Palencia. University of Valladolid, Spain
[b] Dpt. of Agricultural Economics. IFAPA CICE (Junta de Andalucía). Córdoba, Spain

Contact information: José A. GÓMEZ-LIMÓN
Address: Dpt. Agricultural Economics.
ETSIIAA Palencia. Universidad de Valladolid
Avda. Madrid, 57. 34071 Palencia (Spain)
Phone: +34 979 108341, Fax: + 34 979 108301
E-mail: limon@iaf.uva.es

Contributed paper prepared for presentation at the international Association of Agricultural Economists Conference, Gold Coast, Australia, August 12-18, 2006

Abstract

Agricultural multifunctionality is the recognition of the joint exercise of economic, environmental and social functions by this sector. In order to make this concept operative for the design of public policies, it is necessary to estimate the social demand for such functions. The main objective of this article is to present an empirical application in this line. For this purpose we have taken the agricultural system of cereal steppes in Tierra de Campos (Spain) as a case study. The economic valuation technique used is the Choice Experiment. The results suggest the existence of a significant demand for the different functions, although this demand is heterogeneous, depending on the socio-economic characteristics of the individuals.

Clasificación JEL: Q18, Q11, Q25.

Key-words: Agricultural multifunctionality; Agricultural policy; Economic valuation; Choice experiment, Castilla y León (Spain)

1. Introduction

Recognition of the multifunctional character of farming has entered the political arena to become a relevant issue of academic debate. Its use by the European Council of Agricultural Ministries in 1997 fuelled the expansion of studies dealing with this new conception of the role of the EU agriculture. In this context, farming activities provide Society with not only marketable goods (commodities) but also, to a certain extent, public goods of a environmental and social nature (non-commodities).

Most studies have focused on the theoretical basis underpinning this concept of multifunctionality and on its qualitative analysis (for example, Cahill, 2001; Van Huylenbroeck and Durand, 2003; Prety, 2003; Batie, 2003; Brouwer, 2004). Among these, it is worth mentioning the initial contribution to the debate of the OECD (2000). Afterwards, an International Seminar gathered all major studies (OECD, 2001) and pointed out the relative scarcity of empirical works that limited the potential for public intervention to act in accordance with this new paradigm. However, a growing number of recent studies have put some effort into making quantitative analyses of multifunctionality.

In considering the empirical analysis of multifunctionality we find two clear approaches: (a) that of focusing on the *supply side* of the agricultural systems (provision of commodities and non-commodities outputs) and (b) that which focuses on the *demand side*, taking into consideration social welfare changes due to variation in the supply of different outputs. The combination of both approaches is necessary in order to determine the optimal provision of goods and services from the agricultural sector from a social point of view. In theory, once the optimum has been located, the agricultural policy authorities will be in a position to design appropriate policy instruments to correct market failures existing in real world. As a revision by OECD (2001) shows, the vast majority of studies have taken the first approach. However, the present study aims to expand the relatively sparse literature on the demand side of multifunctionality (Randall, 2002; Hall *et al*., 2004).

We pursued two objectives in the study: first, to analyse the demand of society for non-marketable goods and services provided by the agricultural sector through a money-value approach and, second, to determine which socio-economic characteristics are relevant to define the willingness of individuals to pay for multifunctional outputs. We expect that the results will contribute to the policy-making design aimed to optimize, from a societal point of view, agricultural policy intervention.

2. Methodology

2.1. Approach to multifunctionality valuation

As Randall (2002) points out, the management of the multifunctional concept should involve the *joint valuation* of all the externalities generated in the production of agricultural commodities. By doing so, we avoid the part-whole bias (the sum of the parts usually exceeds the total), as Mitchell and Carson (1989) and Bateman *et al*. (1997) point out.

In order to carry out the analysis, not only does the valuation approach have to be determined, but also its scope. In this research we selected the *agricultural system* as our unit of analysis on the basis of three aspects: (a) the homogeneity of the externalities generated in the process; (b) the prospect of contributing to the design of policy instruments with local and geographically wider implications; and (c) the possibility of making case study comparisons with other studies.

2.2. Valuation technique: the choice experiment

Hall *et al*. (2004) describe the array of techniques available to valuations of the whole set of goods and services provided by the agriculture. Of these techniques, we opted for the choice experiment (hereafter, CE) due to its suitability for evaluating “complex goods”, i.e., goods that comprise several parts or attributes, as is the case of agricultural multifunctionality (a set of externalities).

CE involves the characterization of the object of study, in our case agricultural multifunctionality, through a series of attributes which can be combined to create hypothetical scenarios to be evaluated by the subject. Usually, the number of scenarios shown to the interviewee is three, the first one being the *status quo* (current levels of the various attributes) with zero additional cost, and the other two representing changes in the levels of one or more attributes. The new levels imply an improvement over the *status quo* situation and involve an extra cost for the subject that, in most cases, is paid via his/her annual taxes. Furthers details of this methodology can be found in Bennett and Blamey (2001), Louviere *et al*. (2000) and Adamowicz *et al*. (1998).

2.3. Econometric modelling of CE

Of the probabilistic choice models, the *conditional logit* (CL) model (McFadden 1974) is the most frequently employed model for dealing with CE-sampled data (Adamowicz *et al*., 1998). According to the CL model, the probability that an individual n will choose alternative i (P_{in}) among other alternatives j of a set C_n is formulated as follows (McFadden, 1974):

$$P_{in} = \frac{e^{\mu V_{in}}}{\sum_{j=1}^{J} e^{\mu V_{jn}}} \qquad \forall\, j \in C_n \qquad (1)$$

where V_{in} and V_{jn} are the systematic components of the utility provided by alternative i, and j, respectively.

Equation 1 enables the probability of choice of an alternative to be linked to its utility. To determine the relative importance of the attributes within the alternatives the functional form of V_{in} must be defined. The most common assumption of this function is that it is separable, additive and linear (Equation 2, Table 1), which leads to the *basic CL model* (Equation 3). However, this initial form can take different forms in order to incorporate sample heterogeneity, which can be introduced by including into the utility function the interactions of the constant (ASC, Alternative Specific Constant) with the socio-economic variables (Equation 4). This lead to the *hybrid CL model* (Equation 5).

Table 1

Utility function specification associated to econometric models of CE

Variables	*Utility function*	*Econometric model of CE*
Attributes	$V_{jn} = \beta_0 + \sum_k \beta_k X_{kj}$ (2)	$P_{in} = \dfrac{e^{\beta_0 + \sum_k \beta_k X_{ki}}}{\sum_j e^{\beta_0 + \sum_k \beta_k X_{kj}}}$ ***Basic CL model*** (3)
Attributes + Interaction of socio-economic variables with ASC	$V_{jn} = \beta_0 + \sum_k \beta_k X_{kj} + \sum_p \alpha_p (\beta_0 \times S_{pn})$ (4)	$P_{in} = \dfrac{e^{\beta_0 + \sum_k \beta_k X_{ki} + \sum_p \alpha_p (\beta_0 \times S_{pn})}}{\sum_j e^{\beta_0 + \sum_k \beta_k X_{kj} + \sum_p \alpha_p (\beta_0 \times S_{pn})}}$ ***Hybrid CL model*** (5)

The elements that constitute the equations in Table 1 are:

β_0 = constant (Alternative Specific Constant, ASC)

j = 1…J, representing the selected alternative within the set C_n

k = 1…K, representing the attributes which characterize alternative j.

β_k = model parameter of attribute k.

X_{kj} = value of attribute k in alternative j.

p = 1…P, representing the socio-economic characteristics of individual n.

α_{kp} = coefficient of interaction between the attribute k and the socio-economic p.

$\beta_0 \times S_{pn}$ = combined effect of ASC (β_0) by socio-economic characteristic S_{pn}.

Once the parameters have been estimated, the "implicit prices" (IP) of attributes can be obtained. Mathematically, for a basic CL model these values can be obtained as follows:

$$IP_{non-market\_attribute} = -\left(\frac{\beta_{non-market\_attribute}}{\beta_{monetary\_attribute}}\right) \qquad (6)$$

3. Case of study

The pseudo-steppes are ecosystems whose landscape is characterised by sparse vegetation, with an almost complete absence of trees, either flat or slightly wavy horizon and an annual rainfall below 600 mm. The Autonomous Community of Castilla y León in Northwest Spain has vast areas of such pseudo-steppes, mainly covered by rain-fed cereals, which give these agricultural areas the name of "cereal steppes".

The area of study, *Tierra de Campos*, belongs to this type of ecosystem. With a total of 948,198 hectares, the area of study includes 267 municipalities. Most of this territory is devoted to farming: 84% is considered as usable agricultural area (UAA), with a clear predominance of annual crops (95% of UAA).

Two key aspects make this area of study suitable for the valuation of multifunctionality: first, there is a certain homogeneity in terms of ecological features and land use (generation of similar externalities all over the territory); secondly, this agricultural system is a representative case of extensive farming (low input-low output) close to marginality, an aspect that gives the multifunctional aspects of the agricultural activity greater relevance.

4. Empirical application of the CE

4.1. Determination of attributes and their levels

The choice of attributes should be based on two objectives: first, the information gathered must be relevant to policy-makers for the design of policy instruments; second, the scenarios presented to the public through these attributes must be realistic and easy to understand. In order to meet both of these conditions, the choice of attributes in this research was based on a previous study in the same study area (Gómez-Limón and Atance, 2004) which identifies the objectives that, according to the public, the agricultural policy should target. The information was presented in a focus group made up of agricultural economists, policy-makers and members of the general public. These attributes, as well as the appropriate variables to represent them and their levels, were available for the present study. Table 2 summarizes the results:

Table 2

Attributes, variables and levels used in the CE

Attributes	***Proxy variables***	***Levels***
Contribution to the rural economy	Full-time employees in the agricultural sector	12,600* 14,000 16,000
Maintaining the population in the rural areas and preserving the cultural heritage	Percentage of farmers living in the municipality where the farm is located	70%* 80% 90%
Maintaining biodiversity	Number of endangered species	21* 15 9
Provision of healthy products	Food safety (residues) due to the management of farming systems	Conventional* Integrated Organic
Cost of production of public goods	Levy on income tax	0 €/citizen-year* 10 €/citizen-year 20 €/citizen-year 50 €/citizen-year

* Levels of the *status quo* situation

4.2. Experimental design

Following an orthogonal fractional factorial design, in which only a chosen fraction of full factorial experiment is selected, we estimate all main effects. This statistical design enables us to reduce the number of sets from the initial 3^5x3^5 in the full design to 27 sets. Even so, this number was still too high to be presented to the subjects. Therefore, we decided to separate them into blocks: the 27 sets were randomly divided into three blocks of four sets and three blocks of five sets. Figure 1 shows one of these sets.

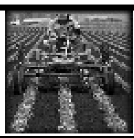
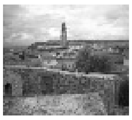
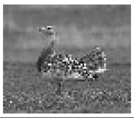
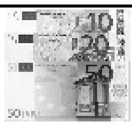
ELECTION # 1		Current situation	Alternative "A"	Alternative "B"
AGRICULTURAL EMPLOYMENT		***12.600 agricultural workers***	***14.000 agricultural workers***	***16.000 agricultural workers***
FARMERS LIVING IN VILLAGES		***70% farmers living in villages***	***90% farmers living in villages***	***70% farmers living in villages***
ENDANGERED SPECIES		***21 endangered species***	***9 endangered species***	***21 endangered species***
FOOD SAFETY		***Food from conventional agriculture***	***Food from integrated agriculture***	***Food from organic agriculture***
LEVY ON INCOME TAX		***0 € / year-inhab.***	***50 € / year-inhab.***	***10 € / year-inhab.***
Supposing these options are the only ones available, which would you prefer?		☐	☐	☐

Fig. 1. Example of choice set.

4.3. Sample selection

First, the target population of the study comprises citizens above the age of 18 living in Tierra de Campos (213,749 inhabitants). In doing so, we focus our attention on the local demand for this type of goods. The decision is based on the impossibility of determining *a priori* the geographical limits of the population that would be interested in the provision of such goods by this agricultural system. Furthermore, selecting non-residents increases the bias due to the embedding effect (see Kahneman *et al*., 1991; Randall and Hoehn, 1996). Yet, although there is a positive willingness to pay for these goods among non-residents (for example in the nearby cities) they were not included in the study. This limitation should be considered when analysing the aggregate values obtained.

We performed quota sampling where quotas reproduce the proportion of population on the basis of the size of the village, age and gender. Finally, a total of 401 valid questionnaires were returned.

4.4. Econometric modelling

Considering the attributes as the only regressors and the direct and linear continuous coding the utility function in the basic CL model, as explained in Section 2, we have:

$$V_{jn} = \beta_0 + \beta_{EMP} EMP_j + \beta_{LIV} LIV_j + \beta_{END} END_j + \beta_{INT} INT_j + \beta_{ORG} ORG_j + \beta_{TAX} TAX_j \quad (7)$$

where:

EMP_j = employment in the agricultural sector generated in alternative *j*.

LIV_j = percentage of farmers living in the same municipality as the farm is located in alternative *j*.

END_j = number of endangered species in alternative *j*.

INT_j y ORG_j = dummy variables for food safety supplied by integrated and organic agriculture, respectively, in alternative *j*. The attribute level chosen for exclusion was conventional agriculture.

TAX_j = levy on income tax associated to alternative *j*.

By including the socio-economic variables we obtain the hybrid CL model. Using the direct and linear continuous coding specification for the quantitative attributes, the utility function takes the following mathematical form:

$$V_{jn} = \beta_0 + \beta_{EMP} EMP_j + \beta_{LIV} LIV_j + \beta_{END} END_j + \beta_{INT} INT_j + \beta_{ORG} ORG_j + \beta_{TAX} TAX_j + \\ + \sum_j \beta_j \left[\text{interactions ASC x socio-economic variables} \right] \quad (8)$$

The socio-economic variables included in the analysis are: sex (SEX), age (AGE), household income (INC), education level (EDU), size of the population of the municipality (POP), labour situation (LAB), household size (FAM), village of childhood (CHI) and knowledge of the agriculture of the area (KNO). All these socio-economic variables are included in the models as dummy variables, as shown in the Annex.

5. Results

5.1. Aggregate results

Table 3 shows the results for the whole population of *Tierra de Campos* of the basic CL model.

Table 3

Results of the basic CL

Var.	*Coeff.*	*SE*	*p-value*
ASC	2.1487	0.1665	0.0000
EMP	0.0002	0.0000	0.0000
LIV	0.0193	0.0037	0.0000
END	-0.0483	0.0062	0.0000
INT	0.4196	0.0748	0.0000
ORG	0.3760	0.0736	0.0000
TAX	-0.0168	0.0019	0.0000
Summary statistics			
No. of observations	1,788		
Log-Likehood (0)	-1,433.6		
Log-Likehood (θ)	-1,322.6		
Log-Likehood ratio	249.81 (0.000)		
ρ^2 *(pseudo* R^2*)*	0.0774		

According to these results, all parameters are statistically significant; hence all the attributes considered are significant determinants of social welfare. Moreover, all the attributes coefficients have the expected signs, according to the Economic Theory. Thus, the positive sign of EMP and LIV attributes imply higher levels of utility as the levels of these attributes increase. With respect to the dummy variables, INT and ORG, these types of farm management are preferred to their conventional alternative. Logically, the negative sign of the END coefficient represents higher utility as the level of this attribute decreases (the fewer endangered species the better).

The economic interpretation can be obtained from the IP of the attributes, that is, the willingness to pay (WTP) for higher utility levels from changes in the attributes levels. Since these estimates are stochastic, it is usual to calculate their confidence intervals. In this study we employed the method of Krinsky and Robb (1986) through 1000 random repetitions. The results appear in Table 4.

Table 4

Implicit prices and confidence intervals for each attribute (€/individual.year)

Attribute	*IP*	*95% C.I.*
EMP	*0.012*	(0.009 ; 0.017)
LIV	*1.148*	(0.683 ; 1.725)
END	*-2.868*	(-4.00 ; -2.02)
INT	*24.93*	(15.52 ; 35.74)
ORG	*22.34*	(13.45 ; 33.76)

All implicit prices in Table 4 are statistically different from zero. People in Tierra de Campos are thus WTP on average €0.012/year for an increase of one full-time employee in the agricultural sector, €1.15/year for a 1% increase in the number of farmers living in the same municipality as their farms, €2.87/year for one less endangered species and €24.93/year and €22.34/year for a change in the current agricultural production system to integrated and organic farming systems, respectively. This proves that agricultural multifunctionality is actually demanded by the public. These differences in implicit prices offer signals of the general public's preferences for particular aspects of the agricultural multifunctionality.

The low valuation of the creation of farm employment obtained in comparison with other studies (Colombo *et al*., 2005; Bennett *et al*., 2004) is worth noting. In fact, the aggregate valuation for the local population, €2,565/year (0.012 x 213,749 inhabitants), falls far below the minimum level of subsidy needed to maintain a full-time worker in the agricultural sector (the current CAP support level is equivalent to €7,277/year, and even so, between 1989 and 1999 the area lost 30% of its agricultural labour force). This result supports the public impression in *Tierra de Campos* that employment in other sectors of the economy makes a greater contribution to the social welfare of society. However, for a more accurate answer, the WTP of non-residents living in nearby cities, or even in further cities such as Madrid (250 km away), should be considered in the analysis.

The apparent paradox of higher valuation of integrated agriculture in comparison with organic farming can be explained on the ground of two general ideas in the area of study: (1) some people perceive integrated agriculture as a more "modern" system of production and therefore safer, and (2) a considerable proportion of the population considers organic products as being of lower quality due to their smaller size, less regular shape and colour, etc.

5.2. Heterogeneity of public preferences

In order to evaluate the heterogeneity of public preferences we estimate the hybrid CL model where the socio-economic characteristics of the respondents are included. The results appear in Table 5.

Table 5

Hybrid CL model with ASC interactions

Variables	***Coeff.***	***SE***	***p-value***
ASC	0.9104	0.7710	0.2377
EMP	0.0002	0.0000	0.0000
LIV	0.0193	0.0037	0.0000
END	-0.0485	0.0062	0.0000
INT	0.4172	0.0749	0.0000
ORG	0.3724	0.0736	0.0000
TAX	-0.0169	0.0019	0.0000
ASC × SEX1	0.7134	0.3788	0.0597
ASC × AGE1	-0.6119	0.4697	0.1927
ASC × AGE2	0.1869	0.6369	0.7692
ASC × INC1	0.8269	0.4695	0.0782
ASC × INC2	0.0127	0.7293	0.9861
ASC × EDU1	-0.2605	0.3586	0.4676
ASC × EDU2	-0.8746	0.4553	0.0547
ASC × POP1	0.0310	0.3914	0.9370
ASC × POP2	1.2314	0.3942	0.0018
ASC × LAB1	1.7193	0.4737	0.0003
ASC × LAB2	0.8146	0.5332	0.1266
ASC × FAM1	1.2733	0.3825	0.0009
ASC × FAM2	1.1128	0.6079	0.0672
ASC × CHI1	0.1770	0.1962	0.3671
ASC × KNO	-0.2616	0.1435	0.0682
Summary statistics			
No. of observations	1,788		
Log-Likehood (0)	-1,433.6		
Log-Likehood (θ)	-1,293.1		
Log-Likehood ratio	280.89 (0.000)		
ρ^2 *(pseudo* R^2*)*	0.09797		

According to these results, an overall improvement of the levels of the attributes mostly benefit women, average income households (between 1,500 and 3,000 Euros per month), urban citizens, full-time workers and average and large family size (three and four and more than four members). Therefore, and maintaining the other socio-economic variables *ceteris paribus*, those respondents revealed a higher WTP. Conversely, respondents with higher levels of education and better knowledge of agriculture are, *ceteris paribus*, more reluctant to pay for this type of goods (higher probability of choosing the *status quo* alternative). Behind these apparently surprising results it may be possible to identify a protest attitude toward the current provision of public goods by the agriculture. According to this idea, for these individuals the CAP does not provide the right incentives to farmers; therefore, for them different payments should be implemented instead of higher taxes.

These results have shown the wide heterogeneity in the demand for multifunctional agriculture, depending on certain socio-economic characteristics of the respondents.

6. Conclusions

The main finding of this study is the identification of a social demand for public goods and services provided by the agricultural sector. This support for agricultural multifunctionality is heterogeneous in its perception by the citizens and the valuation of the various attributes that the concept involves.

The use of CE has revealed a methodology capable of estimating the relative values people place on these attributes. The estimation of these indirect utility functions could turn out to be useful as a means of evaluating agricultural policy measures in terms of their impact on social welfare. In any case, it must be kept in mind that the results are limited to the area of study, although they could be extrapolated to other agricultural systems with extensive farming activities which are close to marginality from a competitive point of view, but relevant from the perspective of provision of positive externalities.

Taking into account the impact of an overall improvement in the attribute levels and the socio-economic characteristics of the respondents, the results suggest that women, average-income households, urban citizens, full-time workers and families with more than three members are those who benefit most from the provision of public goods by agriculture.

Finally, the results of this study support the new orientation of the CAP which makes decoupled payments on compliance with a range of environmental, food safety, animal and plant health and animal welfare standards, as a result of which, the cross-compliance requirement of the EU agricultural support will, presumably, promote a net increase in social welfare.

References

Adamowicz, W., Louviere, J. and Swait, J. (1998). *Introduction to attribute-based stated choice methods.* Edmonton: Department of Commerce.

Bateman, I., Munro, A., Rhodes, B., Starmer, C. and Sugden, R. (1997). Does Part-Whole Bias Exist? An Experimental Investigation. *Economic Journal* 107: 322-332.

Batie, S. (2003). The multifunctional attributes of Northeastern Agriculture: A research Agenda. *Agricultural and Resource Economics Review* 32(1): 1-8.

Bennett, J. and Blamey, R. (2001). *The Choice modelling approach to environmental valuation*. Massachusetts: Edward Elgar publishing.

Bennett, J.; Van Bueren, M. and Whitten, S. (2004). Estimating society's willingness to pay to maintain viable rural communities. *The Australian Journal of Agricultural and Resource Economics* 48(3): 487-512.

Brouwer, F. (2004). Sustaining agriculture and the rural environment: Governance, policy and multifunctionality. Massachusetts: Edward Elgar publishing.

Cahill, C. (2001). The multifunctionality of agriculture: what does mean? *EuroChoices* 1(1): 36-41.

Colombo, S., Hanley, N. and Calatrava, J. (2005). Designing policy for reducing the off-farm effect of soil erosion using choice experiments. *Journal of Agriculture Economics* 56(1): 81-95.

Goméz-Limón, J.A. and Atance, I. (2004). Identification of public objectives related to agricultural sector support. *Journal of Policy Modelling* 27(8-9): 1045-1071.

Hall, C., McVittie, A. and Moran, D. (2004). What does public want from agriculture and the countryside? A review of evidence and methods. *Journal of Rural Studies* 20: 211-225.

Kahneman, D., Knetsch, J. and Thaler R. (1991). Anomalies: The endowment effect, loss aversion, and status quo bias. *Journal of Economic Perspectives* 5(1): 193-206.

Krinsky, I. and Robb, L. (1986). On approximating the statistical properties of elasticities. *The Review of Economics and Statistics* 68(4): 715-719.

Louviere, J., Hensher, D. and Swait, J. (2000). Stated choice models methods: Analysis and applications in Marketing, transportation and environmental valuation. London: Cambridge University Press.

McFadden, D. (1974). Conditional logit analysis of qualitative choice behavior. In Zarembka, P. (ed), *Frontiers in econometrics.* New York: Academic Press.

Mitchell, R. and Carson, R. (1989). *Using surveys to value public goods.* Washington: Resources for the Future.

OECD (2000). Multifunctionality: Towards an Analytical Framework. Paris: OECD.

OECD (2001). Multifunctionality: Applying the OECD Analytical Framework. Guiding Policy Design. Paris: OECD.

Prety, J. (2003). The Externalities and Multifunctionality of Agriculture. *EuroChoices* 2(3): 40-44.

Randall, A. (2002). Valuing the outputs of multifunctional agriculture. *European Review of Agriculture Economics* 29(3): 289-307.

Randall, A. and Hoehn, J. (1996). Embedding in market demand systems. *Journal of Environmental Economics and Management* 30(3): 369-380.

Van Huylenbroeck, G. and Durand, G. (2003). Multifunctional agriculture, a new paradigm for European agriculture and rural development. London: Ashgate.

ANNEX

Table A-1

Definition and coding of the variables in the models

VARIABLES RELATED TO MULTIFUNCTIONALITY			
Variable	***Description***		
Agricultural employment			
EMP	Agricultural labour units (ALU)		
Percentage of farmers living in the same municipality where the farm is located			
LIV	Percentage of farmers		
Endangered species			
END	Number of endangered species		
Food security			
CONV	Conventional agriculture (*status quo*)		
INT	1= Integrated agriculture; 0= otherwise		
ORG	1= Organic agriculture; 0= otherwise		
Additional cost of the alternative			
TAX	Levy on income tax		
SOCIO-ECONOMIC VARIABLES			
Variable	***Description***	***Mean***	***St. Dev.***
Sex			
SEX1	1= female; 0= male	*0.485*	*0.499*
Age			
AGE0	18-34	--	--
AGE1	1= 35-64; 0= otherwise	*0.435*	*0.495*
AGE2	1= >65; 0= otherwise	*0.256*	*0.436*
Monthly household income			
INC0	<1,500 €/month	--	--
INC1	1= 1,500-3,000 €/month; 0= otherwise	*0.324*	*0.468*
INC2	1= >3,000 €/month; 0= otherwise	*0.078*	*0.269*
Education level			
EDU0	Primary	--	--
EDU1	1= Secondary; 0= otherwise	*0.342*	*0.474*
EDU2	1= University; 0= otherwise	*0.252*	*0.434*
Size of the municipality			
POP0	<500 inhabitants	--	--
POP1	1= 500-2,000 inhabitants; 0= otherwise	*0.192*	*0.394*
POP2	1= >2,000 inhabitants; 0= otherwise	*0.634*	*0.481*
Labour situation			
LAB0	Unemployed	--	--
LAB1	1= Employed; 0= otherwise	*0.422*	*0.494*
LAB2	1= Retired; 0= otherwise	*0.280*	*0.449*
Family members			
FAM0	1 or 2	--	--
FAM1	1= 3 or 4; 0= otherwise	*0.492*	*0.499*
FAM2	1= >4; 0= otherwise	*0.123*	*0.329*
Childhood residence			
CHI	1= urban; 0= rural	*0.474*	*0.732*
Agricultural knowledge			
KNO	Likert scale: from 1= none to 5= very high	*3.092*	*1.143*