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Integrated Tools to design and implement Agro Environmental Schemes

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Consolidated Report on Farm surveys
ITAES WP8 Final Report

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Abstract
This consolidated report provides an overview of the statistical analysis of the ten surveys. The first section presents background information on the surveys with description of sampling method and implementation of the survey in the ten case-studies. The second section aims at comparing AES participants and non participants according to characteristics of the farm operator and farming characteristics. The third section focuses on the Agri-Environmental Schemes (AESs) contracted by farmers in the sample and gives an overview of the main types of measures. Finally, section four aims at identifying the key factors underlying farmers' decision to apply an AES.

“This document presents results obtained within the EU project SSPE-CT-2003-502070 on Integrated tools to design and implement Agro Environmental Schemes (http//:merlin.lusignan.inra.fr/ITAES). It does not necessary reflect the view of the European Union and in no way anticipates the commission’s future policy in this area.”

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Table of contents

1 Survey methodology and data collection

1.1 Questionnaire design

The objective of WP8 is to provide first-hand data for WPs 6, 7 and 9. Therefore, the WP8 questionnaire has been designed in cooperation with partners in charge of these WPs (Belgium, English and Netherlands teams). Few remarks from other ITAES partners have also been taken into account.

Two different questionnaires have been set up: one for contracting farmers and the other one for non contracting ones. The second questionnaire is actually quite the same as the contracting one except that specific questions on agro-environmental practices related to measures have been logically removed.

The questionnaire is divided into several parts as follows:

1) Farm and farm household description. This part aims at characterising the individual farmer (age, education level, previous experience) and the farming system (farm size and structure, machinery, technical advice, and future prospect). The objective is to analyse the influence of these characteristics on farmers participation in agro-environmental schemes.
2) Agro-Environmental Schemes. It aims at analysing farmers' perceptions and attitudes towards AESs.
3) Preferences for contract attributes. WP7 specific, the objective of this part is to investigate farmers' preferences for governance attributes of AESs.
4) AES management. This part is specific to contracting farmers and provides information about the necessary steps to set up AESs and then to implement them. The objective is also to evaluate the perception of farmers about transaction costs related to AESs.
5) General concerns. It characterises farmers behaviour related to environmental issues. The objective is to determine the influence of environmental awareness on participation in AESs.

To test the questionnaire and the feasibility of the interviews, a pilot survey has been carried out on a sample of 8 farmers in Brittany, France. Thus, 5 contracting and 3 non-contracting farmers have been face-to-face interviewed by K. Latouche and S. Arnaud from the INRA-ITAES staff. This test led to slight improvements of the questionnaires.

Then the questionnaire was translated by partners into their own languages.

1.2 Data collection

One of the most important thing is that the data collection is made in a neutral manner, thereby minimising the occurrence of compliance bias and interview effects.
The objective was to conduct about 200 interviews in each country in order to yield a reasonable representativeness in each country.

The sampling procedures differ between the countries. The main reason for differences are caused by variations in access to farm registers in the 10 case-studies. (Table 1).

Table 1: Overview of the survey procedures in the 10 case-studies :

		Basse-Normandie in France	Friesland in Netherland	Flanders in Belgium	North East England	Brandenburg in Germany	Emilia Romagna in Italy	Veneto Region in Italy	Ireland	Finland	Czech Republic
Survey area	Description	All the case-study area	5 selected locations in Friesland	East and West Flanders	All the case-study area	2 districts in Brandenburg: 'Barnim' and 'Potsdam-Mittelmark'	Provinces of Bologna, Ferrara, and Ravenna; and Province of Forli-Cesena	Provinces of Padua and Vicenza; Province of Belluno	2 selected regions: Clare and Tipperary	Uusimaa Region (NUTS3 district)	All the case-study area
	Farming population	- 34000 farms - 7% of participants - Predominance of dairy farms	- 6 000 farms - 11% of participants - mainly dairy farms	- 20 667 farms - 15% of participants - Mixed farming	- 5 690 main farm holdings - 32.9% of participants - 40% of cattle and sheep holdings	- 286 and 768 farms - 10% of participants	- 34 919 farms - 36.8% of participants in measure 2f	-2.5% of contracting farmers - arable farms in Padua and Vicenza; - Dairy farms in Belluno	-13 233 farms: - 26% of REPS farms - Mainly cattle farming	- 4 600 farms - Mainly grain crops - 95% of participants in GDS and 15% in SPS	- 46 400 farms - 26.5% of contracted hectares - Combined production
Sampling method	Farm registers	Incomplete database obtained from ADASEA, Municipalities	Complete database from the yearly census of farming for the Province of Fryslan	Incomplete database obtained from Flemish administration (ALT); National Institute of Statistics	Incomplete database from Yellow Pages business directory	Complete database obtained from Ministry of Agriculture (MLUV)	Incomplete database from Emilia Romagna region and CRPV (responsible for monitoring database of the RDP); Communita Montana Dell'Acquacheta; and Ferrara Province.	Complete database from *the Unit for European and National Plans and Programs* of the Regional administration	Complete REPS database	Complete database obtained from Rural Business Registry (MoA)	Agricultural agencies (MoA); the SPARD Agency and the Association of organic farmers PRO-BIO

		Basse-Normandie in France	Friesland in Netherland	Flanders in Belgium	North East England	Brandenburg in Germany	Emilia Romagna in Italy	Veneto Region in Italy	Ireland	Finland	Czech Republic
Sampling method	Sampling process	1-Drawing of Groups of Municipalities 2- Participants randomly sampled in those locations 3- Non participants sampled in the selected municipalities	Random sampling methods with adjustments in the 5 selected locations	1- 300 participants selected on the basis of their AES 2- Non participants randomly sampled in different regions	Random sampling from the 1300 farmers registered	Communities randomly chosen	Random sampling from the different databases	1-Selection of municipalities according to the distribution of the two selected measures (02-AI; and 12-PP) 2- Participants randomly sampled in those locations 3- Non participants sampled in the selected municipalities	1- 200 participant farms randomly chosen; 2- non participants sampled among neighbours of REPS farms	400 participants randomly sampled and 200 chosen in a less random way (to tackle national research objectives).	Farms randomly chosen in 12 districts all over the country.
Pilot survey		8 farmers	5 farmers	3 farmers	Focus group with 10 farmers and 10 farmers interviewed	4 farmers in the administrative district 'Barnim'	5 farmers (interviewed for WP6)	No pilot survey	3 farmers	Several farmers	3 farmers
Survey	Type of interviews	Face-to face interviews after recruitment of farmers by phone	Face-to-face interviews	Face-to face interviews	Face-to-face interviews after recruitment of farmers by phone	Face-to-face interviews after sending letters	Face-to-face interviews	Face-to-face interviews after contacting farmers by mail.	Face-to-face interviews	Phone interviews after sending letter.	Face-to-face interviews for non participants; Combination of mails and phone calls for participants.

		Basse-Normandie in France	Friesland in Netherland	Flanders in Belgium	North East England	Brandenburg in Germany	Emilia Romagna in Italy	Veneto Region in Italy	Ireland	Finland	Czech Republic
Implementation of the survey	Interviewers	Professional interviewers hired by a consultancy firm (no agricultural skills)	Students	Students graduate from Ghent University.	Students with agricultural background	11 Students with agricultural background	Researchers and then Postgraduate students	Researchers of UNIPADU-CONTAGRAF	A senior technician; a grad student and a research officer	Students with agricultural background	Research officers for non participants (VUZE and University of Southern Bohemia) and professionals (Czech association of private agriculture) for participants
	Response rate	-	-	-	-	55%	-	-	-	17.5%	Less than 50%
Interviews		328 farmers = 171 AES participants and 157 non participants	221 farmers = 163 AES participants and 58 non participants	308 farmers = 199 AES participants and 109 non participants	209 farmers = 110 AES participants and 109 non participants	206 farmers = 126 AES participants and 80 non participants	150 farmers = 75 AES participants and 75 non participants	150 farmers = 82 AES participants and 68 non participants	296 farmers = 147 AES participants and 149 non participants	105 farmers = 34 SPS participants and 71 non participants	279 farmers = 140 AES participants and 139 non participants

The interview for the contractors takes about 1 to 1.5 hours and for the non contractors about 45 minutes to1 hour.

In most of the countries, it was difficult to encourage farmers to participate in the survey. In France and in Germany, a bottle of wine was offered to farmers who have filled in the questionnaire.
In Czech Republic, the questionnaire was considered as too complex by farmers. It was particularly difficult to explain the "Choice Experiment" to Non participants.

1.3 Adaptation of the questionnaire and homogenisation of data [1]

In most cases, adaptations of the questionnaire consist in removing or adding some specific categories in some questions. For instance in questions 18 and 19 the categories "chamber of agriculture extension service", "environmental cooperatives" and "agronomists" are omitted in the Belgian database because they do not apply for Flanders whereas the category "Regional or local extension services" is added in the Finnish database.

Moreover, the modalities of some questions were adapted to country specificities:

- the question 25 about contracted AESs;
- the question 28 about subcontracting tasks;
- the questions 57 and 58 about incomes.

Finally, in some cases, a few questions/tables were further simplified or withdrawn (English case).

About Choice experiment, the attribute levels regarding the contract terms were adapted by some partners:

- the scale of minimum length of contract was adapted in the Czech and the Dutch cases.
- the average monthly working time was adapted in most of the cases.

Some differences in applying the method have also to be noticed:
- In France, the farmers were asked to choose between contract A or B, with the current contract in mind as a reference. The choice C means that the current contract is preferred to the two contracts A and B.
- In Belgium, and Czech Republic, the farmers were asked to choose between contract A or B, with the current contract in mind as a reference. When the farmers weren't able to choose between the two contracts, this doesn't necessarily mean that they prefer the current contract. It could also mean that none of the contracts is preferred and the farmer wants something completely different.
- In UK and in Germany, farmers were asked to choose which contract they preferred between A and B. Only when the respondent said he/she preferred neither of the choices A and B, they were given the opportunity to say so i.e. they prefer neither. This constituted choice C

An "Access" data entry mask was prepared by the French team to facilitate data entry for partners and avoid some typing mistakes or problem of misinterpretation of variables.
However, some partners chose to use a "Excel" data entry mask:

- the Czech team could not use the Access file;

[1] See Country reports.

- the Finnish team prepared a Excel data entry mask to enter directly on computer during the interviews;
- the Dutch team.

Finally, all the databases were homogenised by the French team. They are available in an Excel format on the ITAES Intranet.

1.4 Global statistical description of the sample

Finally, the European sample is made up of 2 262 farmers from 10 different regions.

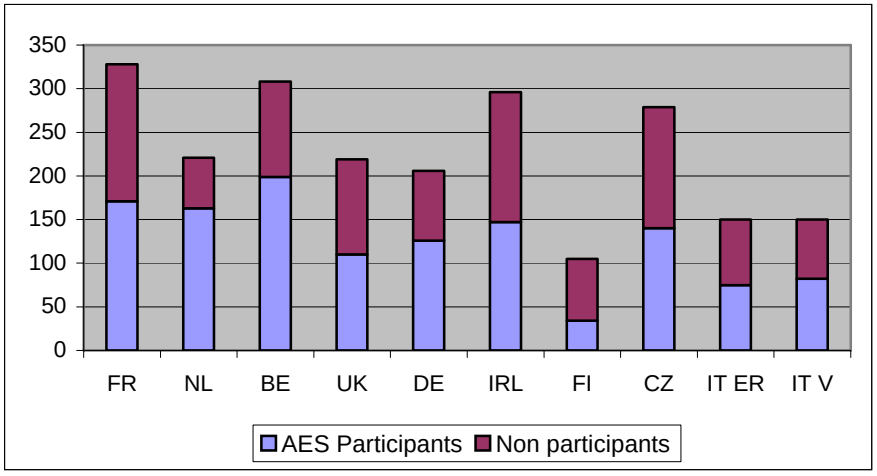

Figure 1: Number of interviewed farmers in the 10 case-studies.

55% of farms are AES participants. The proportion of AES participants is quite the same in all the case-studies except in Finland where only 32% of interviewed farmers have contracted at least one supplementary, non compulsory, measure.

Regarding Finland, it is important to notice that all the farmers of the sample are participant in AESs. However, the Finnish Agri-environmental Programme is divided into two schemes: the General Protection Scheme that targets all farmers, and the Supplementary Protection Scheme including more specialised and effective measures that targets only a limited number of farmers. In the General Scheme, in addition to the 5 mandatory basic measures, each farmer has to select an additional measure. In the Supplementary Scheme special support is paid to farmers who commit themselves implementing one or more special measures. Thus, in this study, *non-participants* are considered as farmers who apply in the General Protection Scheme while the *participants* implement more than the required measures.

AES participants are voluntary over-represented in the ten sub-samples. The reason lies of course in the purpose of this project to study the design and implementation of AESs.

1.4.1 Characteristics of the farm operator

About 40% of respondents are between 40 and 55 years old. Moreover, the distribution of ages is quite the same in the different case-studies.

Most of the farmers have no agricultural education (38%) or a low level of agricultural education (24%). However, the level of agricultural education of farmers is quite different according to countries. Indeed, in France, Belgium, and Germany an important proportion of farmers (respectively 49%; 56% and 44%) have an average to high level of agricultural education.
69% of farmers have a low to average level of general education. However, there are again large differences between countries. Indeed, in Belgium, Germany and Czech Republic, more than 50% of farmers have an average to high level of general education; whereas only 14% of French farmers have an average to high level of general education.

Most of the farmers have not any child and this result is the same in all the case-studies. The proportion of farmers with less than 6 year old children is particularly low (18%).

Table 2: Characteristics of the farm operator.

Variables	Modalities	Freq	%
Age of the Farm head 1	Less than 40	551	24.4
	Between 40 and 55	909	40.2
	More than 55	802	35.5
Sex of the farm head1	Male	2035	90.0
	Female	188	8.3
	No response	39	1.7
Level of agricultural education	None	859	38.0
	Low level	564	24.9
	Average level	425	18.8
	High level	260	11.5
	Other	20	0.9
	No response	134	5.9
Level of general education	None	186	8.2
	Low level	897	39.7
	Average level	664	29.3
	High level	266	11.8
	No response	249	11.0
Children less than 6	Yes	403	17.8
	No	1859	82.2
Children between 6 and 18	Yes	742	32.8
	No	1520	67.2
Children more than 18	Yes	912	40.3
	No	1350	59.7
Off farm activity of the partner	Yes	774	33.2
	No	814	36.0
	No response	674	29.8

1.4.2 Farm characteristics

The average area of farms is around 139ha. However there are important variations in farm size.
First, farm size differs according to the case-studies. Indeed, in England and Germany, respectively 54% and 53% of farms are larger than 150ha whereas in the other case-studies more than 60% of farms are smaller than 100ha. Moreover, the two largest farms of the sample are English ones with 11 352ha and 8 400ha.
Second, there are also important variations in farm size within the sub-samples particularly for Czech Republic, Germany and Italy where there are respectively 11%; 22% and 5% of large farms.

38% of farms are dairy farms. This proportion is particularly high in the French sample and in the Dutch one (respectively 71% and 91%).
The important proportion of grassland in total UAA (more than 50% on average) is consistent with this result.

Table 3: Farm characteristics

- Ownership description:

Variables	N	Mean	Std Dev	Min	Max
UAA	2262	138.37	459.55	0	12246
Proportion of owned area in total UAA	2238	0.56	0.40	0	1
Proportion of rented area in total UAA (short term)	2238	0.20	0.33	0	1
Proportion of rented area in total UAA (long term)	2238	0.24	0.36	0	1

- Type of farm

Variables	Modalities	Freq	%
Large Farm	Yes	101	4.5
	No	2161	95.5
Legal status of farms	Individual farm head	1776	78.5
	Associative farm	242	10.7
	Cooperative farm	105	4.6
	Limited company	114	5.0
	Joint stock company (large farm)	10	0.4
	Other	15	0.7
Type of production	Conventional	2069	91.5
	Organic	179	7.9
	No response	14	0.6
Dairy farms	Yes	851	37.6
	No	1411	62.4

- Production description

Variables	N	Mean	Std Dev	Min	Max
Number of workers per 100ha	2250	6.75	14.36	0	385
Proportion of maize in forage area	1909	0.11	0.19	0	1
Livestock density (LU/ha)	2250	1.83	8.23	0	276.95
Proportion of grassland in total UAA	2250	0.52	0.39	0	1
Proportion of arable land in total UAA	2250	0.37	0.35	0	1

2 Differences between AES participants and non participants.

2.1 Characteristics of the farm operator and his family

2.1.1 Age of the farm operator

Table 4: Average age of the farm operator

	Participation in AESs	
	Yes	No
FR	44.3 *(19.4)*	47.0 *(20.1)*
NL	**46.0** ***(18.8)***	**48.4** ***(20.5)***
BE	47.8 *(22.3)*	48.1 *(24.9)*
UK	50.6 *(19.2)*	52.1 *(21.4)*
DE	48.4 *(23.0)*	50.8 *(20.3)*
IRL	**53.3** ***(23.2)***	**51.4** ***(27.1)***
FI	45.6 *(22.3)*	49.2 *(22.6)*
CZ	50.7 *(23.8)*	50.8 *(22.4)*
IT Em R	**45.2** ***(28.8)***	**55.7** ***(25.4)***
IT v	55.0 *(25.3)*	54.0 *(25.5)*
All	**48.5** ***(11.4)***	**50.4** ***(12.1)***

The standard deviation are indicated in italic.

This is corroborated by comparing the distribution of the age of the farm head in the two sub-samples.

Table 5: Distribution of the age of the farm head

Participation in AESs		Age of the farm head			
		Less than 40 (%)	Between 40 and 55 (%)	More than 55 (%)	**Total (%)**
FR	Yes	29.8	49.7	20.5	100.0
	No	20.4	54.1	25.5	100.0
NL	Yes	**24.5**	**50.9**	**24.5**	100.0
	No	**19.0**	**39.7**	**41.4**	100.0
BE	Yes	25.6	44.7	29.6	100.0
	No	22.0	42.2	35.8	100.0
UK	Yes	14.5	45.5	40.0	100.0
	No	13.8	42.2	44.0	100.0
DE	Yes	46.8	29.4	23.8	100.0
	No	35.0	35.0	30.0	100.0
IRL	Yes	**12.2**	**39.5**	**48.3**	100.0
	No	**23.5**	**35.6**	**40.9**	100.0
FI	Yes	23.5	41.2	35.3	100.0
	No	23.9	36.6	39.4	100.0
CZ	Yes	28.6	31.4	40.0	100.0
	No	25.2	36.7	38.1	100.0
IT EmR	Yes	**40.0**	**33.3**	**26.7**	100.0
	No	**16.0**	**30.7**	**53.3**	100.0

IT v	Yes	19.5	28.0	52.4	100.0
	No	19.1	29.4	51.5	100.0
All	Yes	**26.4**	**40.7**	**32.9**	100.0
	No	**21.9**	**39.5**	**38.6**	100.0

Significant differences at 90% level confidence according to the Chi2 Test are presented in bold type.

Except for Ireland, farmers who contract an AES are likely to be younger than the average farmer.

2.1.2 Education of the farm operator

There are differences between participants and non-participants with respect to formal education (Table 6 & Table 7) and non-formal education (Table 8).

2.1.2.1 Agricultural education

Table 6: Agricultural education of the farm operator

Participation in AESs		Level of agricultural education					
		None (%)	Low level (%)	Average level (%)	High level (%)	No answer (%)	**Total** (%)
FR	Yes	**12.3**	**33.3**	**36.8**	**14.0**	**3.5**	100.0
	No	**18.5**	**25.5**	**35.7**	**11.5**	**8.9**	100.0
NL	Yes	21.5	60.7	4.9	0.0	12.9	100.0
	No	24.1	50.0	12.1	0.0	13.8	100.0
BE	Yes	38.7	7.5	44.7	9.0	0.0	100.0
	No	33.0	7.3	48.6	11.0	0.0	100.0
UK	Yes	**57.3**	**0.9**	**0.0**	**40.9**	**0.9**	100.0
	No	**59.6**	**8.3**	**0.0**	**31.2**	**0.9**	100.0
DE	Yes	7.1	21.4	19.8	22.2	29.4	100.0
	No	11.3	18.8	18.8	27.5	23.8	100.0
IRL	Yes	53.7	42.9	0.7	2.0	0.7	100.0
	No	53.0	45.0	0.0	1.3	0.7	100.0
FI	Yes	2.9	82.4	0.0	14.7	0.0	100.0
	No	1.4	88.7	2.8	7.0	0.0	100.0
CZ	Yes	38.6	15.7	21.4	14.3	10.0	100.0
	No	40.3	15.1	23.0	10.1	11.5	100.0
IT EmR	Yes	**66.7**	**0.0**	**20.0**	**5.3**	**8.0**	100.0
	No	**73.3**	**0.0**	**22.7**	**4.0**	**0.0**	100.0
IT v	Yes	89.0	0.0	4.9	1.2	4.9	100.0
	No	77.9	0.0	11.8	2.9	7.4	100.0
All	Yes	37.0	25.0	18.8	11.9	7.2	100.0
	No	39.1	24.8	18.7	11.0	6.3	100.0

Significant differences at 90% level confidence according to the Chi2 Test are presented in bold type.

Regarding **France**, **England**, Finland, the Czech Republic, and **Emilia Romagna in Italy**, participants are more likely to have an agricultural education than non-participants.

On the contrary, in Belgium and Veneto in Italy AES participants have a lower agricultural education.
The heterogeneity between countries do no allow to conclude about the influence of the agricultural education in AES participation.

2.1.2.2 General education

Table 7: General education of the farm operator

Participation in AESs		Level of general education					
		None (%)	Low level (%)	Average level (%)	High level (%)	No answer (%)	**Total** (%)
FR	Yes	38.6	48.0	9.4	4.1	0.0	100.0
	No	31.2	54.1	12.1	2.5	0.0	100.0
NL	Yes	8.0	27.0	2.5	0.6	62.0	100.0
	No	8.6	6.9	8.6	0.0	75.9	100.0
BE	Yes	0.5	19.1	63.8	16.6	0.0	100.0
	No	3.7	18.3	62.4	15.6	0.0	100.0
UK	Yes	1.8	52.7	10.0	34.5	0.9	100.0
	No	0.9	61.5	7.3	30.3	0.0	100.0
DE	Yes	**5.6**	**6.3**	**34.1**	**24.6**	**29.4**	100.0
	No	**0.0**	**16.3**	**31.3**	**28.8**	**23.8**	100.0
IRL	Yes	**10.2**	**44.9**	**37.4**	**6.8**	**0.7**	100.0
	No	**2.7**	**59.1**	**36.2**	**1.3**	**0.7**	100.0
FI	Yes	5.9	70.6	11.8	11.8	0.0	100.0
	No	16.9	74.6	4.2	4.2	0.0	100.0
CZ	Yes	0.7	38.6	31.4	19.3	10.0	100.0
	No	0.0	35.3	42.4	10.8	11.5	100.0
IT EmR	Yes	2.7	42.7	36.0	10.7	8.0	100.0
	No	2.7	48.0	42.7	6.7	0.0	100.0
IT v	Yes	0.0	56.1	36.6	2.4	4.9	100.0
	No	0.0	44.1	44.1	4.4	7.4	100.0
All	Yes	**8.7**	**36.2**	**28.9**	**12.9**	**13.2**	100.0
	No	**7.6**	**43.8**	**29.9**	**10.3**	**8.4**	100.0

Significant differences at 90% level confidence according to the Chi2 Test are presented in bold type.

Regarding the whole sample, farmers with a high secondary and higher education diploma are more likely to participate in AESs. Moreover, there is a higher proportion of farmers with a low level of general education among non participants.
Although this result is corroborated by three sub-samples (UK, **IRL**, FI), it is difficult to conclude given the important heterogeneity between countries.

2.1.2.3 Professional training

The most striking difference, is in the professional training of the farm head: the percentage of farmers who had a professional training is considerably higher in the group of the participants.

Table 8: Professional training of the farm operator

	Participation in AESs	Professional training			
		Yes (%)	No (%)	No answer (%)	**Total** (%)
FR	Yes	14.0	86.0	0.0	100,0
	No	12.1	87.9	0.0	100.0
NL	Yes	64.4	26.4	9.2	100.0
	No	67.2	27.6	5.2	100.0
BE	Yes	**40.7**	**58.3**	1.0	100.0
	No	**26.6**	**72.5**	0.9	100.0
UK	Yes	36.4	60.9	2.7	100.0
	No	34.9	63.3	1.8	100.0
DE	Yes	32.5	29.4	38.1	100.0
	No	35.0	33.8	31.2	100.0
IRL	Yes	**26.5**	**70.1**	3.4	100.0
	No	**8.0**	**91.3**	0.7	100.0
FI	Yes	**55.9**	**44.1**	0.0	100.0
	No	**22.5**	**77.5**	0.0	100.0
CZ	Yes	15.7	70.0	14.3	100.0
	No	14.4	74.1	11.5	100.0
IT EmR	Yes	**28.0**	**61.3**	10.7	100.0
	No	**21.3**	**77.3**	1.3	100.0
IT v	Yes	21.9	73.2	4.9	100.0
	No	27.9	64.7	7.3	100.0
All	Yes	**32.9**	**58.7**	8.4	100.0
	No	**23.2**	**71.4**	5.3	100.0

Significant differences at 90% level confidence according to the Chi2 Test are presented in bold type..

Regarding the whole sample, AES participants have an higher probability to have done professional training than non participants.

Except for Netherland, Germany, and the Veneto Region in Italy, this result is confirmed for all the case-studies with significant differences between participants and non participants.

This result may be due to several things:

- there are more participants without an agricultural education, necessitating additional agricultural training;
- AESs are taken up mostly by most motivated and up-to-date farmers;
- AES contracting induces a higher demand for training.

2.1.3 Size of the family of the Farm operator

Table 9: Size of the family of the farm operator

	Participation in AESs	
	Yes	No
FR	3.7 *(1.2)*	3.6 *(1.3)*
NL	4.0 *(1.7)*	3.9 *(1.5)*

BE	3.7 *(1.3)*	3.4 *(1.3)*
UK	3.7 *(1.2)*	3.7 *(1.3)*
DE	3.2 *(1.4)*	3.4 *(1.2)*
IRL	3.1 *(1.6)*	3.2 *(1.6)*
FI	3.7 *(2.2)*	2.9 *(1.2)*
CZ	3.1 *(1.3)*	3.4 *(2.3)*
IT Em R	3.1 *(1.0)*	3.6 *(2.4)*
IT v	2.7 *(1.0)*	2.7 *(0.9)*
All	3.5 *(1.4)*	3.4 *(1.6)*

Regarding family size, the difference between participants and non participants is not significant.
Nevertheless, participants' families globally seem to be slightly larger than non-participants' ones except for Germany, Ireland, Czech Republic and Emilia Romagna in Italy.

The main point is concerned with the distribution of children by age. Participants being younger, they have generally more children under eighteen years old, and less children over eighteen years old than non-participants (Table 10 and Table 11).
As participants are older than non participants in Ireland and in the Veneto Region, the result is opposite.

Table 10: Number of children of the farm operator under 18

Participation in AESs		Number of children under 18					
		0 (%)	1 (%)	2 (%)	3 (%)	More than 3 (%)	**Total** (%)
FR	Yes	**39.8**	20.5	**22.8**	**16.4**	0.6	100.0
	No	**63.1**	17.2	**11.5**	**7.0**	1.3	100.0
NL	Yes	**44.8**	**10.4**	**17.2**	**17.2**	**10.4**	100.0
	No	**55.2**	**20.7**	**10.3**	**12.1**	**1.7**	100.0
BE	Yes	56.8	12.6	16.1	11.6	3.0	100.0
	No	65.1	13.7	12.8	6.4	1.8	100.0
UK	Yes	70.9	10.9	11.8	5.4	0.9	100.0
	No	69.7	9.2	13.8	5.5	1.8	100.0
DE	Yes	75.4	6.3	11.9	4.0	2.4	100.0
	No	78.7	7.5	10.0	3.7	0.0	100.0
IRL	Yes	71.4	4.1	4.8	10.2	9.5	100.0
	No	63.1	5.4	13.4	8.7	9.4	100.0
FI	Yes	44.1	23.5	11.8	8.8	11.8	100.0
	No	66.2	14.1	9.9	5.6	4.2	100.0
CZ	Yes	68.6	15.0	12.1	3.6	0.7	100.0
	No	74.8	10.1	10.8	3.6	0.7	100.0
IT EmR	Yes	65.3	12.0	17.3	5.3	0.0	100.0
	No	81.3	9.3	8.0	1.3	0.0	100.0
IT v	Yes	85.4	8.5	4.9	1.2	0.0	100.0
	No	77.9	11.8	8.8	1.5	0.0	100.0
All	Yes	**61.1**	11.87	**13.79**	**9.46**	**3.77**	100.0
	No	**69.0**	11.5	**11.3**	**5.7**	**2.5**	100.0

Significant differences at 90% level confidence according to the Chi2 Test are presented in bold type.

Table 11: Children over 18

Participation in AESs		Number of children over 18		**Total** (%)
		None (%)	One or more (%)	
FR	Yes	**69.6**	**30.4**	100.0
	No	**54.1**	**45.9**	100.0
NL	Yes	69.9	30.1	100.0
	No	58.6	41.4	100.0
BE	Yes	57.3	42.7	100.0
	No	57.8	42.2	100.0
UK	Yes	48.2	51.8	100.0
	No	44.9	55.0	100.0
DE	Yes	34.1	65.9	100.0
	No	27.5	72.5	100.0
IRL	Yes	80.9	19.1	100.0
	No	84.6	15.4	100.0
FI	Yes	85.3	14.7	100.0
	No	81.7	18.3	100.0
CZ	Yes	55.7	44.3	100.0
	No	46.8	53.2	100.0
IT EmR	Yes	**60.0**	**40.0**	100.0
	No	**44. 0**	**56.0**	100.0
IT v	Yes	65.9	34.1	100.0
	No	69.1	30.9	100.0
All	Yes	**61.6**	**38.4**	100.0
	No	**57.3**	**42.7**	100.0

Significant differences at 90% level confidence according to the Chi2 Test are presented in bold type.

2.1.4 Involvement of the farm operator in organisations

Farmers were asked to indicate their involvement in the listed organisations:

- Farmers'Union;
- Local farmers group mainly oriented at improving agriculture
- Group of farmers mainly oriented at wildlife and landscape management
- Environmental Group;
- Community Work club;
- Church;
- Sport club;
- Educational association;
- And local political party.

Only the results discriminating significantly AES participants and non participants are presented here.

Table 12 : Involvement in Farmers' Union

Participation in AESs		Member of Farmers' Union			
		Yes (%)	No (%)	No answer (%)	**Total** (%)
FR	Yes	36.8	63.2	0.0	100.0
	No	29.9	70.1	0.0	100.0
NL	Yes	76.1	23.9	0.0	100.0
	No	67.2	31.0	1.7	100.0
BE	Yes	51.3	48.7	0.0	100.0
	No	52.3	47.7	0.0	100.0
UK	Yes	**71.8**	**28.2**	0.0	100.0
	No	**56.9**	**43.1**	0.0	100.0
DE	Yes	50.0	50.0	0.0	100.0
	No	43.8	56.3	0.0	100.0
IRL	Yes	62.6	37.4	0.0	100.0
	No	62.4	37.6	0.0	100.0
FI	Yes	70.6	29.4	0.0	100.0
	No	81.7	18.3	0.0	100.0
CZ	Yes	40.7	59.3	0.0	100.0
	No	34.5	64.7	0.7	100.0
IT EmR	Yes	88.0	12.0	0.0	100.0
	No	86.7	12.0	1.3	100.0
IT v	Yes	84.1	15.8	0.0	100.0
	No	80.9	19.1	0.0	100.0
All	Yes	**54.2**	**45.8**	0.0	100.0
	No	**49.9**	**49.9**	0.3	100.0

Significant differences at 90% level confidence according to the Chi2 Test are presented in bold type.

Except in Finland and Belgium, there are more AES participants who are member of a farmers' Union.

Table 13: Involvement in local farmers group mainly oriented at improving agriculture

Participation in AESs		Member of local group (farming orientation)			
		Yes (%)	No (%)	No answer (%)	**Total** (%)
FR	Yes	29.8	70.2	0.0	100.0
	No	24.8	75.2	0.0	100.0
NL	Yes	**19.6**	**80.4**	0.0	100.0
	No	**32.8**	**65.5**	1.7	100.0
BE	Yes	30.7	69.3	0.0	100.0
	No	34.9	65.1	0.0	100.0
UK	Yes	40.9	59.1	0.0	100.0
	No	36.7	63.3	0.0	100.0
DE	Yes	37.3	62.7	0.0	100.0
	No	28.8	71.3	0.0	100.0
IRL	Yes	8.2	91.8	0.0	100.0
	No	9.4	90.6	0.0	100.0

FI	Yes	50.0	50.0	0.0	100.0
	No	57.7	42.3	0.0	100.0
CZ	Yes	14.3	85.7	0.0	100.0
	No	15.8	84.2	0.0	100.0
IT EmR	Yes	30.7	69.3	0.0	100.0
	No	44.0	54.7	1.3	100.0
IT v	Yes	**36.6**	**63.4**	0.0	100.0
	No	**54.4**	**45.6**	0.0	100.0
All	Yes	**24.9**	**75.1**	0.0	100.0
	No	**27.3**	**72.5**	0.2	100.0

Significant differences at 90% level confidence according to the Chi2 Test are presented in bold type.

Except for France, England, and Germany, non participants are more likely involved in local farming group mainly oriented at improving agriculture.

Table 14: Involvement in group of farmers mainly oriented at wildlife and landscape management

Participation in AESs		Member of local group (nature orientation)			
		Yes (%)	No (%)	No answer (%)	**Total** (%)
FR	Yes	**12.9**	**87.1**	0.0	100.0
	No	**4.5**	**95.5**	0.0	100.0
NL	Yes	**66.9**	**33.1**	0.0	100.0
	No	**12.1**	**86.2**	1.7	100.0
BE	Yes	2.5	97.5	0.0	100.0
	No	0.9	99.1	0.0	100.0
UK	Yes	**20.9**	**79.1**	0.0	100.0
	No	**5.5**	**94.5**	0.0	100.0
DE	Yes	58.7	41.3	0.0	100.0
	No	51.3	48.8	0.0	100.0
IRL	Yes	2.0	98.0	0.0	100.0
	No	0.7	99.3	0.0	100.0
FI	Yes	0.0	0.0	100.0	100.0
	No	0.0	0.0	100.0	100.0
CZ	Yes	**8.6**	**91.4**	0.0	100.0
	No	**3.6**	**96.4**	0.0	100.0
IT EmR	Yes	5.3	94.7	0.0	100.0
	No	8.0	90.7	1.3	100.0
IT v	Yes	1.2	98.8	0.0	100.0
	No	5.9	94.1	0.0	100.0
All	Yes	**20.2**	**77.1**	2.7	100.0
	No	**7.4**	**85.4**	7.2	100.0

Significant differences at 90% level confidence according to the Chi2 Test are presented in bold type.

Except in Emilia Romagna in Italy, AES participants are broadly more involved in groups oriented at wildlife and landscape management than non participants.

Table 15: Involvement in environmental group

Participation in AESs		Member of environmental group			
		Yes (%)	No (%)	No answer (%)	**Total** (%)
FR	Yes	3.5	96.5	0.0	100.0
	No	4.5	95.5	0.0	100.0
NL	Yes	**33.1**	**66.9**	0.0	100.0
	No	**6.9**	**91.4**	1.7	100.0
BE	Yes	**8.5**	**91.5**	0.0	100.0
	No	**1.8**	**98.2**	0.0	100.0
UK	Yes	20.0	80.0	0.0	100.0
	No	12.8	87.2	0.0	100.0
DE	Yes	11.1	88.9	0.0	100.0
	No	7.5	92.5	0.0	100.0
IRL	Yes	3.4	96.6	0.0	100.0
	No	1.3	98.7	0.0	100.0
FI	Yes	0.0	100.0	0.0	100.0
	No	1.4	98.6	0.0	100.0
CZ	Yes	0.0	0.0	100.0	100.0
	No	0.0	0.0	100.0	100.0
IT EmR	Yes	4.0	96.0	0.0	100.0
	No	1.3	97.3	1.3	100.0
IT v	Yes	8.5	91.5	0.0	100.0
	No	4.4	95.6	0.0	100.0
All	Yes	**9.7**	**79.1**	11.2	100.0
	No	**3.6**	**82.5**	13.9	100.0

Significant differences at 90% level confidence according to the Chi2 Test are presented in bold type.

Participants are globally more involved in environmental groups which shows that their involvement in AESs is certainly based on a sound environmental awareness.

However, in France, there are more non participants who are involved in an environmental group. Indeed, some farmers environmentally aware undertake environmental actions without any compensation payment or any legal obligations. In other words, some non participants implement agro-environmental practices without applying AESs.

Moreover, it is important to notice that in some countries, there are significant differences between participants and non participants regarding the involvement in religious activities. Thus, in Czech Republic and Finland, there are significantly more participants who are member of a church.
On the contrary, in Belgium, more non-participants are a member of a church, which may indicate that these farmers have a more conservative and traditional view.

The Table 16 summarizes the main differences between participants and non participants in the whole sample and in the different sub-samples:

- AES participants are globally younger than non participants; except in Ireland where participants are significantly older. Indeed, in Ireland, AESs are often contracted by disengaging farmers.
- AES participants have a higher general education than non participants;
- AES participants have an additional professional training;
- AES participants have more children under 18 years old and less children over 18.
- AES participants are more likely involved in Farmers'Unions; Farming group with nature orientation and environmental association. On the contrary, they are less involved in farming group aiming at improving agriculture than non participants.

Table 16: Correlations between AES participation and operator' characteristics

Variables		Whole sample	Sub-samples									
			FR	NL	BE	UK	DE	IRL	FI	CZ	IT ER	IT V
Age		-		-				+				
Education	Agricultural education		+			+					+	
	General education	+						+				
	Professional training	+			+			+	+		+	
Children	Under 18	+	+	+								
	Over 18	-	-								-	
Involvement in organisations	Farmers' Union	+				+						
	Farming group oriented at improving agriculture	-		-								-
	Farming group with nature orientation	+	+	+		+				+		
	Environmental association	+		+	+							

Note: (+) means that the variable is positively correlated with the participation in AESs
(-)means that the variable is negatively correlated with the participation in AESs

2.2 Farm characteristics

2.2.1 Type of farming

Table 17: Breeding farms

Participation in AESs		Breeding farms (%)	Dairy farms (%)
FR	Yes	93.0	73.1
	No	90.4	68.8
NL	Yes	99.4	91.4
	No	96.6	91.4
BE	Yes	91.0	51.8
	No	88.1	42.2
UK	Yes	90.0	8.2
	No	89.0	11.0
DE	Yes	**74.6**	16.7
	No	**53.8**	8.8
IRL	Yes	98.0	**20.4**
	No	98.7	**51.0**
FI	Yes	**20.6**	**14.7**
	No	**47.9**	**29.6**
CZ	Yes	**97.9**	16.4
	No	**73.4**	12.2
IT EmR	Yes	**38.7**	**4.0**
	No	**9.3**	**0.0**
IT v	Yes	78.0	30.5
	No	66.2	26.5
All	Yes	**86.3**	**39.5**
	No	**75.8**	**35.3**

Significant differences at 90% level confidence according to the Chi2 Test are presented in bold type

Except for Finland, the proportion of breeding farms is higher among participants.

Moreover, except in Ireland, and in Finland again, dairy farms are globally more likely to participate in AESs.

2.2.2 Farm size

There are two alternative indicators of farm size: Usable Agricultural Area (UAA) and working capacity calculated in Full Time Equivalent units.

Table 18: Distribution of UAA

		Distribution of UAA (ha)					
Participation in AESs		under 50 (%)	50-100 (%)	100-150 (%)	150-200 (%)	over 200 (%)	**Total** (%)
FR	Yes	**11.7**	**47.4**	**26.3**	**11.7**	**2.9**	100.0
	No	**24.2**	**47.8**	**17.8**	**5.1**	**5.1**	100.0
NL	Yes	62.0	35.0	3.1	0.0	0.0	100.0

	No	63.8	36.2	0.0	0.0	0.0	100.0
BE	Yes	**74.9**	**24.1**	**0.5**	**0.0**	**0.5**	100.0
	No	**87.2**	**11.9**	**0.0**	**0.0**	**0.9**	100.0
UK	Yes	5.5	20.0	17.3	12.7	44.5	100.0
	No	11.9	22.9	13.8	19.3	32.1	100.0
DE	Yes	**18.3**	**9.5**	**10.3**	**7.9**	**54.0**	100.0
	No	**33.8**	**13.8**	**12.5**	**2.5**	**37.5**	100.0
IRL	Yes	**70.1**	**25.9**	**4.1**	**0.0**	**0.0**	100.0
	No	**55.0**	**33.6**	**8.1**	**1.3**	**2.0**	100.0
FI	Yes	29.4	50.0	5.9	8.8	5.9	100.0
	No	35.2	36.6	14.1	7.0	7.0	100.0
CZ	Yes	61.4	14.3	3.6	2.1	18.6	100.0
	No	59.7	9.4	9.4	1.4	20.1	100.0
IT EmR	Yes	**56.0**	**18.7**	**9.3**	**2.7**	**13.3**	100.0
	No	**81.3**	**12.0**	**1.3**	**1.3**	**4.0**	100.0
IT v	Yes	92.7	4.9	2.4	0.0	0.0	100.0
	No	88.2	10.3	0.0	1.5	0.0	100.0
All	Yes	49.4	25.1	8.4	4.2	12.9	100.0
	No	51.3	24.6	8.8	4.1	11.1	100.0

Significant differences at 90% level confidence according to the Chi2 Test are presented in bold type

Except in Ireland, there are some evidences that participation increases with farm surface. Indeed, mean surface is 157.2 ha for participants and 111.0 for non-participants, median is respectively 50.0 ha and 45.0 ha.
Thus, in most of the case-studies, farms under 50 ha are unlikely to participate in a scheme. This can be explained by the investments and transaction costs needed to apply AESs which cannot be compensated by AES payments for the smallest farms; the payments being calculated per ha of contracted area.

In Ireland, the results are consistent with the fact that the original structure of the REPS payment system suited farms of approximately 40 hectares. Indeed, for the larger farms, all hectares must comply with REPS conditions but not all hectares received payment. This has now changed somewhat but there is still a larger incentive for the small to medium sized farm to participate in REPS.

The heterogeneity between countries does not allow to conclude on the influence of the UAA in participation for the whole sample.

Table 19: Number of workers in Full time units (FTU)

Participation in AESs		Number of workers (FTU)						
		under 1 (%)	1 – 2 (%)	2 – 3 (%)	3 – 4 (%)	over 4 (%)	No answer (%)	**Total** (%)
FR	Yes	**23.4**	**39.8**	**29.2**	**6.4**	**1.2**	**0.0**	100.0
	No	**31.8**	**43.9**	**15.3**	**7.0**	**1.9**	**0.0**	100.0
NL	Yes	17.8	55.8	22.1	3.7	0.6	0.0	100.0
	No	25.9	55.2	17.2	1.7	0.0	0.0	100.0
BE	Yes	22.6	53.8	19.1	2.5	2.0	0.0	100.0
	No	28.4	56.9	14.7	0.0	0.0	0.0	100.0

UK	Yes	10.9	29.1	27.3	15.5	17.3	0.0	100.0
	No	22.0	30.3	22.0	11.9	13.8	0.0	100.0
DE	Yes	**11.9**	**11.9**	**13.5**	**7.9**	**25.4**	**29.4**	100.0
	No	**26.3**	**30.0**	**7.5**	**5.0**	**7.5**	**23.8**	100.0
IRL	Yes	63.3	32.0	3.4	0.7	0.0	0.7	100.0
	No	58.4	38.9	2.0	0.7	0.0	0.0	100.0
FI	Yes	32.4	50.0	11.8	0.0	5.9	0.0	100.0
	No	35.2	47.9	14.1	1.4	1.4	0.0	100.0
CZ	Yes	21.4	26.4	24.3	7.9	10.0	10.0	100.0
	No	16.5	28.8	17.3	10.1	15.8	11.5	100.0
IT EmR	Yes	**18.7**	**30.7**	**24.0**	**6.7**	**12.0**	**8.0**	100.0
	No	**14.7**	**40.0**	**22.7**	**17.3**	**5.3**	**0.0**	100.0
IT v	Yes	14.6	46.3	23.2	7.3	3.7	4.9	100.0
	No	8.8	35.3	27.9	10.3	8.8	8.8	100.0
All	Yes	**24.1**	**38.1**	**20.1**	**5.8**	**6.9**	**5.0**	100.0
	No	**28.9**	**40.0**	**15.1**	**6.4**	**5.6**	**4.0**	100.0

Significant differences at 90% level confidence according to the Chi2 Test are presented in bold type.

The larger farms for the participants in AESs are consistent with the fact that they have more labour input.

2.2.3 Land use

Table 20: Proportion of grassland in UAA

Participation in AESs		Proportion of grassland in UAA					
		0 (%)	less than 25% (%)	25-50% (%)	50-75% (%)	more than 75% (%)	**Total** (%)
FR	Yes	**4.1**	**9.9**	**20.5**	**39.2**	**26.3**	100.0
	No	**8.9**	**15.9**	**22.9**	**31.8**	**20.4**	100.0
NL	Yes	0.0	0.0	0.0	4.9	95.1	100.0
	No	0.0	0.0	0.0	3.4	96.6	100.0
BE	Yes	10.6	17.1	35.7	27.6	9.0	100.0
	No	17.4	20.2	24.8	27.5	10.1	100.0
UK	Yes	**5.5**	**29.1**	**15.5**	**12.7**	**37.3**	100.0
	No	**10.1**	**13.8**	**15.6**	**11.0**	**49.5**	100.0
DE	Yes	**22.2**	**27.0**	**23.0**	**13.5**	**14.3**	100.0
	No	**33.8**	**36.3**	**16.3**	**5.0**	**8.8**	100.0
IRL	Yes	2.7	0.7	2.7	3.4	90.5	100.0
	No	0.7	0.7	2.0	4.0	92.6	100.0
FI	Yes	52.9	29.4	14.7	2.9	0.0	100.0
	No	50.7	33.8	14.1	0.0	1.4	100.0
CZ	Yes	**1.4**	**17.1**	**10.7**	**10.7**	**60.0**	100.0
	No	**47.5**	**32.4**	**11.5**	**0.7**	**7.9**	100.0
IT EmR	Yes	**68.4**	**18.4**	**7.9**	**3.9**	**1.3**	100.0
	No	**90.5**	**4.1**	**5.4**	**0.0**	**0.0**	100.0
IT v	Yes	**13.4**	**24.4**	**12.2**	**18.3**	**31.7**	100.0
	No	**54.4**	**13.2**	**5.9**	**19.1**	**7.4**	100.0

All	Yes	**11.9**	**14.9**	**15.4**	**16.0**	**41.7**	100.0
	No	**27.4**	**17.0**	**12.8**	**11.6**	**31.1**	100.0

Significant differences at 90% level confidence according to the Chi2 Test are presented in bold type.

The results reflect the farm types in the sample: the high share of grassland in the total surface is consistent with the high proportion of breeding farms.

In addition, the share of grassland is globally higher among participants' farms.

2.2.4 Intensity of farming

- Shift in land use between 2000 and 2005

Table 21: Changes in Permanent grassland

Participation in AESs		Changes in Permanent grassland			
		Increase (%)	Decrease (%)	No change (%)	**Total** (%)
FR	Yes	**22.3**	**5.4**	**72.3**	100.0
	No	**6.3**	**9.4**	**84.3**	100.0
NL	Yes	17.2	29.8	53.0	100.0
	No	24.1	24.1	51.9	100.0
BE	Yes	**15.0**	**5.6**	**79.4**	100.0
	No	**4.9**	**4.9**	**90.2**	100.0
UK	Yes	13.4	5.2	81.4	100.0
	No	12.7	5.1	82.3	100.0
DE	Yes	25.0	10.2	64.8	100.0
	No	16.7	12.5	70.8	100.0
IRL	Yes	**2.4**	**1.6**	**96.1**	100.0
	No	**7.8**	**3.5**	**88.7**	100.0
FI	Yes	16.7	0.0	83.3	100.0
	No	9.1	9.1	81.8	100.0
CZ	Yes	**32.8**	**5.8**	**61.3**	100.0
	No	**12.9**	**3.2**	**83.9**	100.0
IT EmR	Yes	14.3	0.0	85.7	100.0
	No	14.3	14.3	71.4	100.0
IT v	Yes	14.1	1.4	84.5	100.0
	No	19.4	3.2	77.4	100.0
All	Yes	**17.9**	**8.6**	**73.5**	100.0
	No	**10.9**	**7.6**	**81.5**	100.0

Significant differences between AES participants and non-participants according to the Chi2 Test are presented in bold type.

Except in Netherland, in Ireland and in Veneto Region in Italy, participants have increased the surface of permanent grassland between 2000 and 2005 more than non participants.

- Livestock density in breeding farms

Table 22: Livestock density in LU/ha

Participation in AESs		Livestock density in LU/ha			
		0- 1 (%)	1 to 2 (%)	more than 2 (%)	**Total** (%)
FR	Yes	**28.9**	**64.8**	**6.3**	100.0
	No	**29.6**	**54.9**	**15.5**	100.0
NL	Yes	3.7	43.8	52.5	100.0
	No	0.0	53.6	46.4	100.0
BE	Yes	**18.8**	**29.8**	**51.4**	100.0
	No	**4.2**	**22.9**	**72.9**	100.0
UK	Yes	66.7	24.2	9.1	100.0
	No	58.8	23.7	17.5	100.0
DE	Yes	89.4	8.5	2.1	100.0
	No	93.0	4.7	2.3	100.0
IRL	Yes	**48.6**	**43.1**	**8.3**	100.0
	No	**34.0**	**51.7**	**14.3**	100.0
FI	Yes	85.7	14.3	0.0	100.0
	No	100.0	0.0	0.0	100.0
CZ	Yes	**97.1**	**2.9**	**0.0**	100.0
	No	**90.2**	**8.8**	**1.0**	100.0
IT EmR	Yes	79.3	13.8	6.9	100.0
	No	85.7	0.0	14.3	100.0
IT v	Yes	68.8	12.5	18.8	100.0
	No	64.4	13.3	22.2	100.0
All	Yes	47.6	31.4	21.0	100.0
	No	46.0	32.0	22.0	100.0

Significant differences between AES participants and non-participants according to the Chi2 Test are presented in bold type.

Except in Netherland again, breeding farms with a livestock density lower than 2 are more likely to enrol AESs.

These results show that AESs are globally more incentive for extensive farms. Indeed, we can assume that for intensive farms AES payments cannot compensate the production losses due to the implementation of agro-environmental practices.

- Changes in arable land management between 2000 and 2005

Table 23: Changes over the last five years in arable land management
(% of positive answers)

Participation in AESs		less manure/ha (%)	ploughing in the manure (%)	less mineral fertilisation/ha (%)	less chemicals /ha (%)
FR	Yes	48.0	**62.6**	**80.1**	65.5
	No	37.6	**52.2**	**63.7**	54.8
NL	Yes	9.2	12.9	15.3	12.9

	No	3.4	10.3	10.3	8.6
BE	Yes	**49.7**	**77.9**	63.8	**33.7**
	No	**40.4**	**82.6**	52.3	**24.8**
UK	Yes	17.3	27.3	34.5	34.5
	No	12.8	21.1	28.4	22.9
DE	Yes	**18.3**	13.5	**34.9**	**34.1**
	No	**11.3**	13.8	**22.5**	**15.0**
IRL	Yes	4.8	0.0	3.4	2.0
	No	2.0	0.7	1.3	2.0
FI	Yes	**17.6**	**64.7**	50.0	11.8
	No	**25.4**	**42.3**	46.5	23.9
CZ	Yes	**26.4**	37.9	12.1	**15.0**
	No	**16.5**	30.9	20.1	**32.4**
IT EmR	Yes	4.0	18.7	41.3	48.0
	No	8.0	20.0	40.0	38.7
IT v	Yes	11.0	7.3	**24.4**	22.0
	No	4.4	7.4	**7.4**	11.8
All	Yes	**24.1**	**34.1**	**37.0**	**29.1**
	No	**17.8**	**30.1**	**30.5**	**25.3**

Significant differences between AES participants and non-participants according to the Chi2 Test are presented in bold type.

These indicators reveal some trends in the farming practices over the last five years.
We have to notice that in some cases, the interviewed might have not understood that the question handled changes rather than common practice. Therefore the true “change” percentage may be smaller than indicated.

Globally, participants have made more changes in arable land management towards extensification:

- more participants have decreased the quantity of manure used per hectare;
- more participants have introduced the ploughing the manure in as a new practice;
- more participants have decreased the mineral fertilisation per hectare;
- more participants have decreased their use of chemicals per hectare.

However, there are differences between countries:
In Czech Republic, there are significantly more non participants who have decreased their use of chemicals per hectare.
In Belgium, the ploughing the manure in has been introduced as a new practice in many farms; especially among the non participants (82,6%). An important cause of the changes regarding manure application is a change in the manure regulation
In Finland, the use of manure has decreased in many farms, especially so in non-participants. On the other hand a significant amount of participants have increased their use of manure. This could be explained by the structural change of animal production. The number of farms having production animals has decreased, but at the same time the number of animals per farm has increased. Animal production has concentrated both regionally and at the farm level

2.2.5 Investments in buildings and machinery

Table 24: Changes in buildings and machinery between 2000 and 2005.
(% of positive answers)

Participation in AESs		New buildings (%)	renovation/ extension buildings (%)	New tractor (%)	New equipment (%)
FR	Yes	**56.7**	**46.2**	**77.2**	**77.2**
	No	**36.3**	**31.8**	**60.5**	**58.6**
NL	Yes	22.1	58.3	52.8	65.0
	No	13.8	44.8	43.1	65.5
BE	Yes	**23.1**	33.2	44.7	**63.8**
	No	**32.1**	33.9	41.3	**45.0**
UK	Yes	37.3	32.7	55.5	61.8
	No	32.1	27.5	53.2	69.7
DE	Yes	**31.0**	57.1	**62.7**	**73.0**
	No	**11.3**	55.0	**37.5**	**51.3**
IRL	Yes	18.4	21.1	**20.4**	**23.8**
	No	27.5	20.8	**32.2**	**35.6**
FI	Yes	14.7	44.1	47.1	97.1
	No	12.7	40.8	50.7	94.4
CZ	Yes	17.1	**37.1**	32.9	**50.7**
	No	14.4	**26.6**	31.7	**34.5**
IT EmR	Yes	18.7	26.7	53.3	**66.7**
	No	13.3	24.0	38.7	**49.3**
IT v	Yes	**3.7**	31.7	20.7	43.9
	No	**14.7**	33.8	20.6	42.6
All	Yes	**26.6**	**39.5**	**47.8**	**60.1**
	No	**23.1**	**32.0**	**41.8**	**52.2**

Significant differences at 90% level confidence according to the Chi2 Test are presented in bold type.

Globally, more participants report new investments benefiting machinery and buildings than non participants. Indeed, participants are generally younger than non participants. That may also mean that participants are more likely to develop their farm.
The most striking difference between participants and non participants is in France. This can be explained by the "Investment part" of the French AESs implemented in 1999: the CTEs. In addition of the environmental measures, farmers participating in AESs could contract economic measures aiming at improving labor conditions; quality of production ; animal welfare; diversification and preservation of buildings.
In Ireland, the non participants are more likely to invest in new equipment; which is consistent with the fact that AES participants are older with disengaging and smaller farms.

The Table 25 summarizes the main differences between participants and non participants in the whole sample and in the different sub-samples:

- Farms with a breeding unit are more likely to participate in AESs; except in Finland.
- Dairy farms are more likely to participate in AESs; except in Finland and in Ireland.

- Participant farms are larger than non participants'; except in Ireland again;
- Several indicators show that participants have more extensive practices than non participants:
    - the proportion of grasslands in UAA is higher among participant farms; except in England
    - more AES participants have increased their proportion of permanent grasslands; except in Ireland;
    - AES participant farms have a lower livestock density;
- More AES participants have adopted more environmental friendly farming practices in arable land between 2000 and 2005:
    - decreasing the use of manure per ha; except in Finland;
    - introducing the ploughing the manure in as a new practice; except in Belgium
    - decreasing the use of mineral fertilisation per ha;
    - decreasing the use of chemicals per ha; except in Czech Republic;
- More AES participants have made investments in buildings and machinery between 2000 and 2005:
    - more participants have invested in new buildings; except in Belgium and in Veneto.
    - more participants have extended or renovated buildings;
    - more participants have new tractor; except in Ireland;
    - more participants have invested in new equipment; except in Ireland.

It is interesting to notice the specificity of Ireland where AES participant farms are more disengaging and smaller than non participants. Moreover, dairy farms are less likely to enrol in AESs than the other types of farms.

Finland is also quite different from the other countries in particularly because farms with a breeding unit and dairy farms are less likely to adopt AESs than the other types of farms.

Table 25: Correlations between AES participation and farm characteristics

Variables		The whole sample	Sub-samples									
			FR	NL	BE	UK	DE	IRL	FI	CZ	IT ER	IT V
Type of production	Animal production	+					+		-	+	+	
	Dairy production	+						-	-		+	
Size of farms	UAA		+		+		+	-			+	
	Workers (FTU)	+	+				+				+	
Grasslands	Proportion of grasslands in UAA	+	+			-	+			+	+	+
	Shift towards more grasslands	+	+		+			-		+		
Ani-mals	Low livestock density (LU/ha)		+		+			+		+		
Changes in arable land management	Less manure per ha	+			+		+		-	+		
	Ploughing in the manure	+	+		-				+			
	Less mineral fertilistaion/ha	+	+				+					+
	Less chemicals/ha	+			+		+			-		
Changes in buildings and machinery	New buildings	+	+		-		+					-
	Extension/renovation of buildings	+	+							+		
	New tractor	+	+				+	-				
	New equipment	+	+		+		+	-		+	+	

Note: (+) means that the is positively correlated with the participation in AESs
(-) means that the variable is negatively correlated with the participation in AESs

3 Agro-Environmental Schemes

3.1 Starting year of AES

Farmers in Finland, Ireland and Germany are early starters. For example, in Finland 76% entered AESs in 1995, when Finland joined the EU.

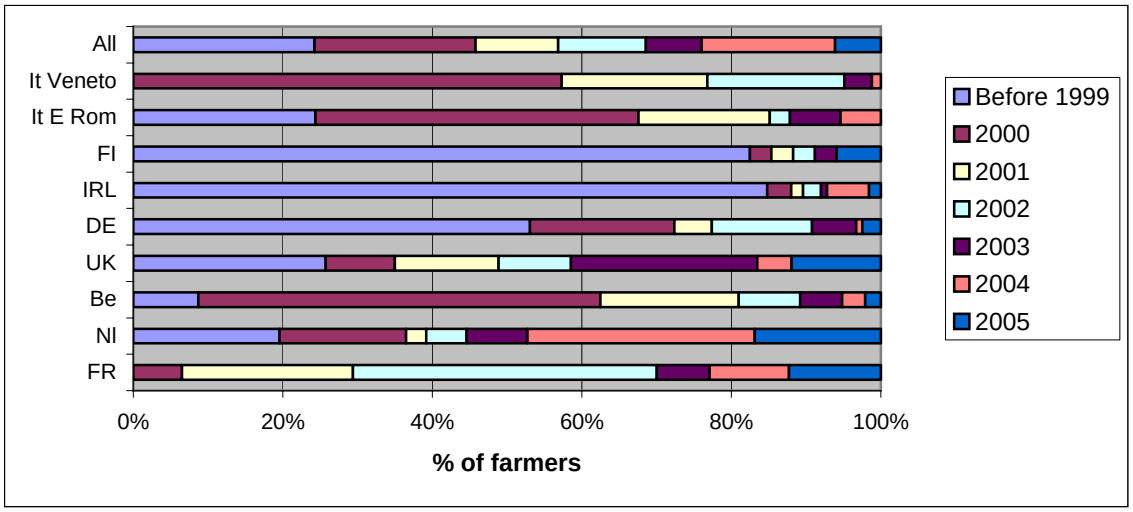

Figure 2: Starting year of AES

In Belgium, the majority of interviewees started with AESs in 2000 or 2001. From 2002 until now, only a small percentage of farmers have taken up AESs, which confirms that some farmers remain reluctant.

In Veneto, 57.3% of surveyed farms were enrolled in 2000, when the first call for application have been launched by the Veneto Region for all the measures included in the RDP. Afterwards, due to budget restrictions mainly linked to the previous commitments under Reg. 2078/92, the following annual calls have been restricted to measures with a stronger landscape-environmental positive impact.

In France, most farmers only started in 2001 or 2002. Indeed, the complexity of the Farming Territorial Contracts (CTEs) have delayed the starting year for most farmers. Moreover, CTEs were closed at the end of 2002 and more than a year went by until the official enforcement of the replacing scheme. Only the CTEs already in the administrative pipeline were signed during this period of time, while the ones that were about to be submitted were cancelled. That explains the low percentage of farmers who started in 2003. Moreover, the new Sustainable Agricultural Contracts (CADs) are less incentive for farmers that may explain the decrease in the number of starters between 2001-2002 and 2004-2005 .

In Fryslan, a large proportion of respondents started in AESs in 2004 or 2005. This can be explained by changes in organisational settings. Indeed, before 2004, environmental co-operatives received the financial compensation directly to their bank accounts and then paid farmers according to their contribution to wildlife and landscape management. Whereas, since 2004, in order to comply with the EU's rules, farmers are paid directly, and the co-operative is only a 'contracting partner' for the Government.

3.2 Annual payment per farm

Table 26: Annual payment per farm

	France	Nl	Belgium	England	Germany	Ireland	Finland	Czech Republic	Italy_ Em. R.	Italy_ Veneto
Mean (€)	6632	7174	2627	16666	24240	7635	7415	10610	41779	2564
Median (€)	5567	5175	1194	7777	11208	7234	6132	1669	7800	1574
Min (€)	183	180	69.3	195	180	899	899	216	540	121
Max (€)	21300	35900	30635	127867	148800	95190	18850	220652	717297	22067

For all case studies, the distribution of annual payment is asymmetric with a fat right tail, which involves that the median is lower than the mean. The median is then a more robust indicator of central tendency.

Annual payment per farm is comparable in France, Netherlands, Ireland, Finland (mean is around 7000€; and median is around 6000€). As expected it is slightly higher in Emilia-Romagna and England. Indeed, average contracted area per farm is greater in England (Figure 3). Moreover, annual payment per hectare is the highest in Emilia Romagna (Table 27).

The leading average payment per farm is observed in Germany and Emilia Romagna thanks to very large farms in the sample. In contrary, the lowest annual payment is observed in Belgium, Czech Republic and Veneto (median is around 1500€ per farm).

In Belgium and Veneto, this is due to the limited number of hectares under contract (respectively 8.3 and 5.7 ha per farm), whereas in the Czech Republic, this mainly results from small compensation per hectare (Table 27).

Table 27: Average annual payment per hectare of contracted area

	France	Netherlands[2]	Belgium	England	Germany	Ireland	Finland	Czech Republic	Italy_ Em. R.	Italy_ Veneto
Mean (€/ha)	119.7	168.4	455.6	389.1	163.4	164.7	124.1	90.8	317.4	334.4
Median (€/ha)	109.4	137.1	180.9	76.9	129.9	169.2	105.8	90.9	277.8	183.6

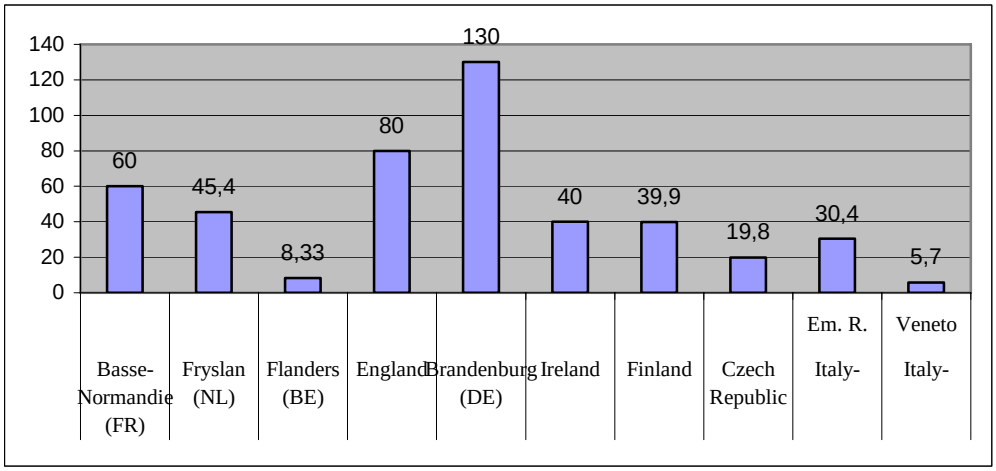

Figure 3: Average contracted area per farm (Median, ha)

[2] Due to mistakes in the dataset regarding the total contracted area, the average payment per hectare and the average contracted area per farm has been calculated with farms whose the total contracted area is superior than 10ha (only 72 farms).

3.3 Mean characteristics of applied measures

Given the great number of measures proposed to farmers in some countries, contracted measures have been categorised to facilitate the comparison between case-studies. Categories are precisely defined in Annex 1.

In Brandenburg, Basse-Normandie, Veneto, and in the Czech Republic the most popular category is related to 'Extensive management of grassland' with respectively 52%, 72%, 77% and 90% of enrolled farmers (Table 28). However in the Veneto Region, the proportion of farmers under this heading is overestimated by the sampling procedure that emphasised the measure 'Conservation of meadows/pastures in hill/mountain'.

Otherwise, grassland measures promoting biodiversity are also popular in Brandenburg and Belgium, while these more restricting measures attract a relatively low number of people in Basse-Normandie and in the Czech Republic. Moreover, this category of measures is the most popular in Fryslan with 67% of enrolled farmers.

It is important to notice that globally, measures related to grassland represents 44% of the total contracted area in the sample. The proportion of these measures is particularly high in Netherlands, in Veneto and in the Czech Republic (more than 70% of contracted area) as well as in Brandenburg (more than 60% of contracted area).

'Winter cover' is the leading category in Flanders and in Finland, with respectively 55% and 47% of participants. In Belgium, this is likely due to the fact that many farmers already applied it even without any compensatory payment.

Otherwise, measures related to 'Extensive management of arable land' concern also a high proportion of AES participants with respectively 43%, 34% and 40% of enrolled farmers in France, Belgium and Finland. The contracted measures are mainly related to the limitation of fertilisation. In Belgium, the AESs 'Water farmland' included in this category are geo-targeted in green and yellow areas where fertilisation is restricted anyhow. A further restriction because of the AES, for which they receive a compensation, is then a consistent choice.

Globally, measures related to arable land represents 20% of the total contracted area. The proportion of arable land in the contracted area in particularly high in Finland, in Belgium and in France with respectively 71%, 65% and 52% of the total contracted area in the samples.

There is also a significant interest for measures dealing with the 'Landscape'. Indeed, in France, this category concerns 56% of enrolled farmers who primarily selected measures taking care of hedges. Moreover, in Fryslan, in Flanders and in Emilia Romagna, respectively and 51%, 34% and 32% of farmers have chosen measures related to landscape protection .
A possible explanation would be the minor impact these AESs have on farm profitability. Environmentally concerned farmers may easily contribute to environmental improvement.

In Emilia Romagna, the most contracted measures are related to changes in the type of production including the whole farm. Thus, the leading one is 'Integrated production' with 51% of enrolled farmers and 73% of the total contracted area. This measure is also contracted by a high proportion in Veneto, which is due to the fact that this measure was the second one originally selected for the survey.
Moreover, 'Organic farming' is contracted by 41% of enrolled farmers in Emilia Romagna. This measure is also popular in Brandenburg and the Czech Republic with around 21% of contracting farmers.

Table 28: Type of measures applied in the different case-studies

		Basse-Normandie in France	Fryslan in Netherlands	Flanders in Belgium	Brandenburg in Germany	Finland	Czech Republic	Emilia Romagna in Italy	Italy Veneto
	Number of measures applied	4.1	3.3	2.1	1.7	1.3 additional measures	1.9	1.8	1.1
Winter cover on arable land	Proportion of contracted farms (%)	64.3		54.8	7.1	46.7		4.0	1.2
	Annual payment[3] (€)	1867		551	5197	4576		14282	1080
	Entered area (ha)	15.6		10.7	5.3	38.4		123	4
Conversion of arable land	Proportion of contracted farms (%)	16.4			8.7		10.0	14.7	2.4
	Annual payment[1] (€)	1777			21830		4406	12924	1223
	Entered area (ha)	6.7			25.3		17.7	21.8	3.2
	Entered length (m)	650			0		0	0	0
Extensive management of arable land	Proportion of contracted farms (%)	42.7		34.2	17.5	40.0			
	Annual payment[1] (€)	1257		1486	5316	3676			
	Entered area (ha)	40.5		6.7	61.4	37.8			
Extensive management of grassland	Proportion of contracted farms (%)	71.9		25.6	51.6	0.0	90.0		76.8
	Annual payment[1] (€)	3986		4312	15471	0	4675		1561
	Entered area (ha)	30.7		10.7	60.4	0	54.1		9.7
	Entered length (m)	27		0	0	0	0		0
ement of grassland promoting Biodiv	Proportion of contracted farms (%)	11.7	66.9	34.2	28.6	13.3	9.3		
	Annual payment[1] (€)	1626	2432.3	1043	8473	5342	2320		

[3] Average annual payment related to this category of measures per farm.

	Entered area (ha)	16.2	13.8	3.5	30.2	12.1	291.8		
	Entered length (m)		334.2						
Landscape	Proportion of contracted farms (%)	55.6	51.5	34.2		1.0	15.0	32.0	2.4
	Annual payment[1] (€)	182	996.4	314		336	10761	21740	1537
	Entered area (ha)	29.7	9.2	0.5		1	71.9	52.7	0
	Entered length (m)	2290	2455.9	339.4		0	0	0	1250
Organic farming	Proportion of contracted farms (%)	3.5		0.5	21.4	4.8	20.7	41.3	12.2
	Annual payment[1] (€)	2093		10000	28560	4575	7259	17749	3211
	Entered area (ha)	22.6		4.7	22.3	40.2	179.4	70.8	4.9
	Entered length (m)	11		0	0	0	0	0	0
Integrated farming	Proportion of contracted farms (%)				16.7			50.7	13.4
	Annual payment[1] (€)				25845			45747	5244
	Entered area (ha)				38			318	12.3
Safeguard Genetic Biodiversity	Proportion of contracted farms (%)							25.3	3.7
	Annual payment[1] (€)							3293	5182
	Entered area (ha)							8.9	0
Others	Proportion of contracted farms (%)	17.5	14.1	3.5	9.5	23.8	0.7	9.3	
	Annual payment[1] (€)	1518	4941.26	3137	6059	5856	30648	23068	
	Entered area (ha)	15.8	37.94	1.4	10.6	43.1	233.4	64.2	
	Entered length (m)	801.7	0	0	0	0	0	0	

Note:

Category not proposed to farmers
Most contracted category
Second most contracted category

In Ireland, the menu of measures proposed to farmers is included in the Rural Environment Protection Scheme (REPS). REPS-prescriptions apply to the whole farm.

Table 29: Applied Schemes in Ireland

Schemes	Enrolled farms (%)	Annual payment (€)
Reps1 (1994-2000)	55,8	6772
Reps2 (2000-2004)	74,8	3756
Reps3 (from 2004)	53,1	3287

The REPS includes 11 compulsory basic measures and optional supplementary measures. It would have been interesting to analyse the supplementary measures chosen by farmers but the related data were not available.

In England, AESs aim at maintaining/enhancing the conservation of landscape, wildlife, and historical value of the key environmental features. The CS scheme covers nearly the whole region, which explains that 64% of the contracted farmers are enrolled in this scheme. For the ESA scheme, only farmers in the environmentally sensitive area (Pennine Dales in this case) are eligible. It is worth noting that, from 2005, all schemes have been merged into a single national scheme (Environmental Stewardship scheme (ESS)) tied as entry and higher level ESS.

Table 30: Applied Schemes in England

Measures	Enrolled farms (N)	Annual payment (€)	Entered area (ha)	Entered length (m)
Countryside stewardship (CS)	64,5	19083	258	12236
Environmentally sensitive area (ESA)	9,1	12827	257	4700
Environmental stewardship (ES)	28,2	8375	183	10596
Other	6,4	8360	647	2980

4 Participation in AESs

4.1 Data processing

The farm survey provides a huge data set that is not in the relevant format for econometric modelling. So a preliminary step is required in order to summarize the available information with a more limited number of variables that will be the explanatory variables of the econometric models in the following steps. To proceed through this preliminary step a specific methodology has to be applied. The easiest way to introduce it is to adopt a geometric viewpoint. Data consist of a matrix of values where the rows are associated with the surveyed farms, and the columns are associated with the whole set of variables. Among the possible methods to handle this matrix, principal components analysis and correspondence analysis are particularly relevant to reveal relationships among variables, among categories of farms, and between variables and categories of farms by dimension reduction.

Any matrix of data can be viewed as being a set of n row-vectors of dimension p, thus the data set is a set of n points in the space $\Re^p$. Dimension reduction means projecting this data set in a space of lower dimension but minimising the loss of information. Principal components analysis is relevant to deal with continuous indicators. But it does not work for qualitative indicators. Indeed the topology of the data set is not correctly described with a Euclidean distance. Therefore other concepts of distance have to be considered to deal with qualitative indicators. The chi-squared distance is well adapted to dummy indicators and the correspondence analysis method is based on the underlying topology. But our data set is more complex since there is a combination of quantitative and qualitative indicators. Qualitative indicators do not pose any problem *per se* because they can always be converted into a set of dummy indicators without loss of information. This procedure can also be applied to continuous indicators but it leads to a loss of information. However it is probably the only practical way to deal with a huge set of indicators of different categories. This methodology named multiple correspondence analysis has been applied and the chi-squared distance used.

However the whole set S of variables has been divided into L subsets S_l of dimension p_l such as:

$$S = \bigcup_{l=1}^{L} S_l \quad \text{and} \quad \sum_{l=1}^{L} p_l = p$$

and then the methodology has been applied L times *i.e.* to each subset S_l of variables. The rationale behind that is to get a set of synthetic variables, in which each synthetic variable is associated to a specific subset S_l of original variables. All synthetic variables were considered as possible explanatory variables of farmers' behaviour related to AESs participation. However the focus is on the subset of those that significantly influence the probability of enrolment and are exogeneous. Indeed, endogeneity leads to a biased estimation of the model coefficients.

Five synthetic continuous variables are finally considered.

Right information (binfo)

This indicator is based on a series of statements related to AESs. They concern eligibility rules, prescriptions, financial compensations, controls and sanctions. Farmers who got correct and precise information about AESs have a positive value while the others have a negative one.

Free time (tplib2)

This summarized all the information on both outdoor and indoor recreational activities. Outdoor activities include hunting, fishing, collecting berries…; walking and hiking; nature watching. Indoor activities include mainly reading (farming and environmental journals, general journals and books), TV and DVD watching. Positive values are associated with a significant involvement in diverse activities.

Reliability (ct)

Participation in AESs is expected to depend on the credibility of the information given by public authorities and local stakeholders. So farmers were asked questions if they trust or not a series of local, national and European bodies (including the government and ministries) as well as local people and other farmers. In addition an assessment of easiness of the contractual process, and fairness of public administration is also considered. Positive values of reliability are associated to farmers who broadly consider that the information is credible and transparent.

Environmental awareness (sensi)

This easy to interpret indicator takes positive values for farmers who are aware of environmental issues. It is based on information related to outdoor activities, participation in environmental organisations and charities, and specific interest such as reading environmental journals.

Demand of extension services (tech2)

This targets farmers who actively use all the opportunities to get information and training related to technical, administrative and financial issues. It is based on a series of questions reviewing all the possible sources of information (public and private extension services, agribusiness, relatives and other farmers, banks). Highest positive values correspond to the most demanding farmers.

Past change (chgt)

This summarises the information related to all changes that had occurred over the last five years. It incorporates data about the different categories of assets, as well as information related to agricultural technology. Positive values are associated with farmers who did major changes.

In addition, seven original variables are considered. There are three dummy variables:

Type of production (prod)

This discriminates organic from conventional farming.

Experience (experience)

This discriminates farmers who previously participated in AESs and the others.

Children under six years (child06)

This discriminates families with young children, under six years, and the others.

And there is one qualitative variable:

General education level (nivgene*)*

Four levels are considered: none, low (primary school), intermediate (secondary school) and high.

And there are three continuous variables: **Surface (sautot)**, **Share of grassland (pprairie)** and **Share of owned area (partprop)**.

4.2 Model of participation (pooled sample)

It is assumed that farmers behave similarly among countries and then the Probit model of participation is estimated free of country dummies. This model gives 76% of correct predictions (Table). However it is more accurate to predict participants' behaviour than non-participants', indeed correct predictions being equal to 81% and 69%.

Table 31: Comparison of predictions and observations (numbers)

		Observation		
		Participation	Non Participation	Total
Prediction	Participation	1012	313	1325
	Non Participation	235	702	937
	Total	1247	1015	2262

According to Table 32 the probability to participate in AESs increases with the surface of the farm and the share of grassland in total area, but decreases with the share of area owned. The positive influence of both total size and grassland was expected, while the negative effect of area owned was not. This may be due to an artefact and is revisited below. Otherwise, organic farmers are more inclined to participate than the others.

A group of indicators allows portraying the average participant. Education, open-mindedness, information, past experience and reliance in public bodies matter. Indeed, more educated and well-informed farmers who trust public authorities, and rely on available opportunities to be trained are likely to participate. Otherwise, the demand for extension service (tech2) negatively influences the probability of participation. This is an unexpected result that will be revisited.

In addition, environmental awareness and young children in the family (under six years) positively influence the probability of enrolment. This is consistent with a bequest behaviour targeting sustainable development. Finally, involvement in leisure activities negatively impacts participation. This results from a time allocation that favours free time given a time constraint and can be easily explains using the household production model.

Table 32. Model of participation (pooled sample)

Parameter	Label	DF	Estimation	Standard error	Pr > Khi 2
Intercept	Intercept	1	-0.5120	0.0833	<.0001
binfo	Right information	1	0.6943	0.0382	<.0001
tplib2	Free time	1	-0.2130	0.0398	<.0001
ct	Reliability	1	0.0760	0.0312	0.0149
sensi	Environmental awareness	1	0.2666	0.0441	<.0001
General education level (nivgene)					
	Non response	1	-0.2473	0.1211	0.0412
	None	1	0.1168	0.1193	0.3276
	Low	1	-0.0616	0.0749	0.4110
	High	1	0.1961	0.1073	0.0676
	Intermediate	0	0.0000	.	.
Type of production (prod)					
	Non response	1	1.0953	0.4959	0.0272
	Organic	1	0.7499	0.1308	<.0001
	Conventional	0	0.0000	.	.
pprairie	Share of grassland	1	0.8325	0.0838	<.0001
Experience					
	Yes	1	0.7159	0.0661	<.0001
	No	0	0.0000	.	.
Children under 6 years (child06)					
	Yes	1	0.2986	0.0870	0.0006
	No	0	0.0000	.	.
partprop	Share of area owned	1	-0.2988	0.0807	0.0002
tech2	Extension service demand	1	-0.0585	0.0325	0.0720
sautot	Surface	1	0.0001	0.0001	0.0595
Mac Fadden R^2 = 26.94%					

Table 33 gives the marginal effects of the variables of interest on the probability to participate in AESs. They are calculated for an average farmer (reference) whose probability to participate is 0.41. Only significant effects are indicated. This allows ranking variables according to their estimated effect on participation. From this standpoint the most influential factors are the type of farming, past experience and information. This means that an efficient strategy to increase enrolment should primarily target organic farmers and enterprises based on grassland. In addition, it should emphasise training and information, and focus people who had a previous experience of AESs.

Table 33. Marginal effects (pooled sample)

Variables	Label	Marginal effect
Prod	Type of production	0.29
Experience	Experience	0.28
Child06	Children under 6 years	0.12
Nivgene	High education level	NS
Tech2	Extension service demand	NS
Binfo	Right information	0.25
Tplib2	Free time	-0.08
Ct	Reliability	NS
Sensi	Environmental awareness	0.10
Pprairie	Share of grassland	0.31
Partprop	Share of area owned	-0.11
Sautot	Surface	NS

Note. Only significant marginal effects are given. NS means non significant.

4.3 Model of participation (pooled sample with country dummies)

Country specificities, including characteristics of sampling in each case study, are taken into account through country dummies, which are introduced as control variables. France is the reference. The introduction of country dummies leads to a slightly better adjustment with 77% of correct predictions (Table 34). While it remains more accurate to predict participants' behaviour than non-participants' (correct predictions equal 82% and 72%), there is an improvement for non-participants.

Table 34: Comparison between predictions and observations (numbers)

		Observation		
		Participation	Non Participation	Total
Prediction	Participation	1025	288	1313
	Non Participation	222	727	949
	Total	1247	1015	2262

Introducing dummies in a model is an easy means to capture effects that are more or less difficult to specify. So there are differences between both models as shown by a comparison of Table 32 and Table 35. Two unlikely negative effects are non-significant in the revised model. Indeed, given countries are heterogeneous, there is no significant influence of the share of area owned and of the demand for extension service on the probability to participate in AESs. In addition, the influence of the farm size is now taken into account by the dummies. Otherwise, Table 35 strengthens the preliminary results related to the influence of the other factors on participation: right information, free time, reliability, environmental awareness, education, experience and young children. This leads to significant marginal effects as shown by Table 36, the probability associated to the reference being now 37%.

Heterogeneity is corroborated since several dummies are significantly either positive (Belgium, United Kingdom, Veneto) or negative (Ireland, Finland, Romagna). These results

underline specific differences related to country specificities (historic, geographical, environmental and institutional factors) which are not taken into account in the model. However, the marginal effects indicated in Table 36 have not to be interpreted in differences in the probability to participate compared to France. Indeed, these results are influenced by the proportion of participants in each sub-sample (sampling bias). Thus, marginal effects are positively correlated with the proportion of participants in the sub-sample.

Table 35. Model of participation (pooled sample with country dummies)

Parameter	Label	DF	Estimation	Standard error	Pr > Khi 2
Intercept	Intercept	1	-0.7666	0.1268	<.0001
binfo	Right information	1	0.6756	0.0393	<.0001
tplib2	Free time	1	-0.1735	0.0432	<.0001
ct	Reliability	1	0.1802	0.0376	<.0001
sensi	Environmental awareness	1	0.2423	0.0471	<.0001
General education level (nivgene)					
	Non response	1	-0.1714	0.1508	0.2557
	None	1	0.3177	0.1351	0.0187
	Low	1	0.0872	0.0830	0.2935
	High	1	0.1683	0.1133	0.1375
	Intermediate	0	0.0000	.	.
Type of production (prod)					
	Non response	1	1.1070	0.5030	0.0278
	Organic	1	0.8475	0.1389	<.0001
	Conventional	0	0.0000	.	.
pprairie	Share of grassland	1	0.8191	0.1123	<.0001
Experience					
	Yes	1	0.9820	0.0754	<.0001
	No	0	0.0000	.	.
Children under 6 years (child06)					
	Yes	1	0.3659	0.0892	<.0001
	No	0	0.0000	.	.
Country					
	Netherlands	1	-0.2252	0.1766	0.2023
	Belgium	1	0.4276	0.1297	0.0010
	United Kingdom	1	0.2569	0.1332	0.0538
	Germany	1	-0.0672	0.1508	0.6560
	Ireland	1	-0.6353	0.1442	<.0001

Parameter	Label	DF	Estimation	Standard error	Pr > Khi 2
	Finland	1	-0.9524	0.1734	<.0001
	Czech Republic	1	0.0769	0.1404	0.5837
	Italy E. Romagna	1	-0.5395	0.1674	0.0013
	Italy Veneto	1	0.2729	0.1604	0.0888
	France	0	0.0000	.	.
Mac Fadden R^2 = 30.01%					

Table 36. Marginal effects (pooled sample with country dummies)

Variable	Label	Marginal effect
Prod	Type of production	0.33
Experience	Experience	0.37
Child06	Children under 6 years	0.14
Nivgene	General education (none)	0.12
Binfo	Right information	0.25
Tplib2	Free time	-0.06
Ct	Reliabiliy	0.07
Sensi	Environmental awareness	0.09
Pprairie	Share of grassland	0.31
Country		
BE	Belgium	0.17
UK	United Kingdom	0.10
IRL	Ireland	-0.20
FIN	Finland	-0.27
IT-R	Italy Romagna	-0.18
IT-V	Italy Veneto	NS

Note. Only significant marginal effects are given. NS means non significant.

4.4 Country specific models of participation

The standard model of Table 32 has been estimated separately for each country. While results are not directly comparable, some conclusions can be made based on significantly positive or negative coefficients (Table 37). They corroborate some preliminary findings. Primarily there is a positive influence of farm size and grassland area on participation; in addition organic farmers are more likely to enter AESs than conventional farmers. Moreover, trust in public authorities and environmental awareness have a positive effect, while free time has a negative one. Results also support the influence of the composition of household with a positive coefficient attached to the presence of young children (under six years). Other results are puzzling and indicate differences among countries especially for information, area owned and the demand of extension services. Results also support a significant influence of education for five sub samples, but it is not possible to make any clear conclusion concerning the influence of the various levels on the probability of participation.

Table 37: Country specific models of participation

Variable	Label	France	NL	Belgium	UK	Germany	Italy Romagna	Italy Veneto	Ireland	Finland	Czech Republic
intercept	Intercept	-				-	-	-	-		-
binfo	Right information	+	+	+	+	+	+	+	+	-	+
tplib2	Free time		-					-	-		
ct	Reliability					+			+		+
sensi	Environmental awareness		+	+	+				+		
nivgene	General education level										
	Non response										
	None	+	+	-						-	
	Low		+			-				-	
	High										
	Intermediate	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
prod	Type of production										
	Non response										
	Organic	+				+		+		+	
	Conventional	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
pprairie	Share of grassland	+				+	+	+			+
experience	Experience										
	Yes					+	+	+	+		+
	No	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
child06	Children under six years										
	Yes	+					+			+	
	No	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
partprop	Share of owned area						-		+		
tech2	Extension service demand	+		-	-						
sautot	Surface	+		+		+					
McFadden R^2 (%)		21.14	43.74	52.12	27,08	35.16	42.28	64.61	66.12	21.49	63.61
Number of observations		328	221	308	219	206	150	150	296	105	270
Number of participants		171	163	199	110	126	75	82	147	34	140

Only significantly positive and negative effects are indicated.

Some results may be explained by the specificities of schemes offered to farmers in the different countries. In particular, two groups of case-studies can be distinguished:

- In Friesland, Flanders, Ireland and North-East England, environmental awareness has a significant positive effect on AES adoption while the proportion of grassland in UAA has no significant effect.
- On the contrary, in Basse-Normandie, Brandenburg, Czech Republic, Veneto and Emilia Romagna, the proportion of grassland in UAA has a significant positive effect on AES participation while environmental awareness has no significant effect.

These differences may be explained by the type of schemes offered to farmers. Indeed, in the first group of case-studies, prescriptions are globally more restrictive and measures are more oriented towards production of amenities (preservation of biodiversity and conservation of landscape).

For instance in Ireland, AES prescriptions are quite restrictive because all the basic measures of REPS have to be implemented in the whole farm. Besides, in Friesland, most of the measures aim at preserving threatened birds. Thus, 66.9% of surveyed farmers have contracted measures related to 'Nest protection' or 'Meadow bird grassland delay of first cut of grass'.

In the same way in Flanders, more than a third of farmers are involved in measures aiming at promoting biodiversity of flora and fauna and/or maintaining elements of landscape. In North-East England, AESs aim at the Nature preservation through the maintenance of landscape.

However, in the second group, AESs mainly aim at the extensification of farming system by reducing inputs, and implementing more environment-friendly practices. Thus, there are more transverse measures as 'Organic Production' or 'Integrated production'. These types of contract are so logically more attractive for extensive grazing farming systems. It is particularly the case in Basse-Normandie, in Veneto and in Czech Republic where more than 70% of surveyed farmers have contracted measures related to 'Extensive management of grasslands'.

Moreover, in Basse-Normandie, the demand of extension services has a positive effect on participation while in North-East England and in Flanders, this factor has a negative effect.

This result confirms that in France, participation in CTEs was promoted by a facilitated access to information. Indeed, the application process implied the design of a farming diagnostic and the set up of a contract in accordance with this diagnostic and with the territorial stakes defined at an upper level. Moreover, the implementation of the contract implied to administratively record the farming practices with respect to prescriptions. Even if the implementation of CADs in 2003 simplified this procedures, all these administrative tasks justify that the more farmers are involved in the institutional farming network, the more they participate in AESs. Moreover, this result is consistent with the fact than two third of surveyed farmers in Basse-Normandie think that administrative tasks related to AESs are not easy.

In Flanders and in North-England, the negative effect of the demand of extension services on AES adoption may be explained by the fact that concerned farmers mainly aim at improving the productivity and the economic competitiveness of their farming system. So, they do not participate in AESs in particular in Flanders and in North-East England where the offered Schemes are quite restrictive and mainly oriented at the production of amenities. Moreover, this tendency is not compensated by a demand of participating farmers. Indeed, in these two case-studies, the application process is quite easy. Thus, only respectively 16.2% and 46.6% of surveyed farmers in Flanders and in North-East England think that administrative tasks related to AESs are not easy.

4.5 Modelling enrolled surface

AESs involve specific prescriptions, which leads to additional costs of production. So participation results from a comparison between compensation and compliance costs. According to production economics, marginal compliance costs increase with the enrolled surface. For a profit maximiser, enrolled surface is defined as that value at which marginal compliance costs are equal to the premium.

Following the above argument, decision-making can be viewed as a two-step process. First of all, farmers consider the opportunity to participate or not in AESs. Secondarily, given a positive decision they calculate the number of hectares. This can be easily modelled using the Heckman procedure, which includes a Probit model to discriminate participants and non-participants, and then a standard regression restricted to participants to estimate the area under contracts. An alternative procedure is based on a Tobit model i.e. a censored regression model in order to estimate a single model for both categories of farmers.

The two modelling strategies have been considered and applied to a subsample of 1996 farmers including 981 participants. Indeed, participants for which enrolled surface is unavailable have been deleted from the sample. In addition, to exclude a possible scale effect, the ratio of enrolled surface to total surface has been considered instead of the absolute value of enrolled surface. This ratio may be greater than one, because several schemes can be applied on the same piece of land.

Table 38 provides the estimation with the Heckman procedure. The lambda parameter is calculated in the first step and used in the second one to correct data. This specific parameter accounts for differences between participants and non-participants that are captured by the error term. Lambda being non-significantly different from zero, it may be considered that omitted factors do not account for differences between the two categories. In other words, explanatory variables are enough to discriminate farmers and to estimate the share of area entering AESs.

Three explanatory variables (type of production, share of grassland and environmental awareness) of the standard model positively influence the relative area under AESs. Enrolled surface increases with grassland area and environmental awareness. Moreover, other things being equalled, organic farmers enter more hectares than conventional farmers.
An additional explanatory variable (Chgt) whose effect is positive is also considered. As expected, farmers who made significant changes over the last five years enter a larger area than the others.

As shown in Table 38, there is a significant effect of farm size on the contracted surface. This effect has been modelled using two components, a linear one and a quadratic one. Based on the estimation of the coefficient of the surface and square surface, a threshold (around 2 600 ha) has been calculated. There is a negative effect under the threshold and a positive one over.
This is consistent with the difference observed between dairy and non-dairy farms, dairy farms globally being smaller than other. However the number of milk enterprises is limited except in France, the Netherlands and to a less extent in Belgium.

Finally there is a specific country effect which is mainly due to the difference of Schemes proposed to farmers.

Table 38. Estimation of enrolled surface (Heckman model)

Parameter	Label	Estimate	Std Error	Pr > |t|
Intercept	Intercept	-.8727298580	0.16742980	<.0001
Lambda		-.0438625370	0.10410348	0.6736
Type of production (prod)				
	Non response	0.2142744523	0.40451213	0.5964
	Organic	0.2723302941	0.11917956	0.0225
	Conventional	0.0000000000	.	.
Pprairie	Share of grassland	0.8977250712	0.13164175	<.0001
Dairy farm				
	No	0.2393878533	0.09396251	0.0110
	Yes	0.0000000000	.	.
Chgt	Past change	0.0855884538	0.04574164	0.0616
Sautot	Surface	-.0016433282	0.00035784	<.0001
Sau2	Square-surface	0.0000006327	0.00000016	<.0001
Sensi	Environmental awareness	0.0807421636	0.03441212	0.0192
Country				
	Netherlands	-.9753571983	0.14039227	<.0001
	Belgium	-.9449815533	0.12739594	<.0001
	United Kingdom	-.3397437324	0.16588490	0.0408
	Germany	0.0818029894	0.19125851	0.6690
	Ireland	0.3155391451	0.32391383	0.3302
	Finland	0.5412057225	0.21137309	0.0106
	Czech Republic	-.1289224798	0.14007584	0.3576
	Italy E. Romagna	0.2997065079	0.18331602	0.1024
	Italy Veneto	-.3639447799	0.17064959	0.0332
	France	0.0000000000	.	.
R^2 = 23.17%. Number of observations= 1996. Number of participants = 981				

The estimation of the Tobit model corroborates most findings and provides additional insights (Table 39). Primarily, all significant coefficients are related to explanatory variables considered either in the standard Probit model or the Heckman model. As already discussed, there is some evidence of a size effect on enrolled area, with a threshold, whose value is around 2 700 ha, which is very close to the value given by the Heckman procedure. The positive role of grassland as well as dairy production on the area under contract is also restated.

Moreover, there is a positive influence of the demand of extension services. Otherwise, there are some unexpected results related to four explanatory variables: right information, free time, experience and children under six years. Indeed, their effect on enrolled area is the opposite of their effect on the probability to participate. Finally, the Tobit leads to a similar country effect as the Heckman model.

Table 39. Estimation of enrolled surface (Tobit model)

Variable	Label	Estimate	Std Error	Pr > ChiSq
Intercept	Intercept	-0.04511	0.10699	0.6733
tech2	Extension service demand	0.07145	0.03188	0.0250
pprairie	Share of grassland	0.25451	0.10150	0.0122
sautot	Surface	-0.0012632	0.0002955	<.0001
sau2	Square surface	4.67092E-7	1.34074E-7	0.0005
Dairy farm				
	No	0.18491	0.07588	0.0148
	Yes	0	0	.
binfo	Right information	-0.35324	0.03721	<.0001
tplib2	Free time	0.05604	0.03144	0.0747
Experience (experience)				
	Yes	-0.24384	0.07053	0.0005
	No	0	0	.
Children under six years (child06)				
	Yes	-0.15633	0.07374	0.0340
	No	0	0	.
Country				
	Netherlands	-0.52195	0.11684	<.0001
	Belgium	-0.85493	0.10173	<.0001
	United Kingdom	-0.33812	0.12880	0.0087
	Germany	0.24740	0.15828	0.1180
	Ireland	0.95660	0.23038	<.0001
	Finland	0.46907	0.17019	0.0058
	Czech Republic	0.06052	0.11858	0.6098
	Italy E. Romagna	0.47905	0.15594	0.0021
	Italy Veneto	-0.33025	0.13103	0.0117
	France	0	0	.
Scale		1.02218	0.02250	
McFadden R^2 = 11.79%. Number of observations= 1996. Number of participants = 981				

4.6 Concluding comments

Table 40 summarizes the whole outcome of the above econometric derivations. Although the lambda of the Heckman model is not significant, they support a two-stage process. Primarily, farmers consider the opportunity to enter or not AESs. Then participants make a decision about the area to be entered. As shown in Table 40, a common set of variables is taken into account in both stages. However a factor that positively influence the probability to enter may negatively influence the surface, the opposite may be also true. Nevertheless, three factors positively participate in both stages of the decision making process: type of production, share of grassland and environmental awareness. This leads to some recommendations on public policy to improve the efficiency of AESs. Specific types of farming, including organic farming and enterprises based on grassland, should be primarily target. Otherwise, public policy should favour environmental education and training in order to increase environmental awareness.

Table 40. Categorisation of variables according to their effect on the probability to participate and the area under AESs

		Probability to participate in AESs		
		Negative effect	Positive effect	Non-significant effect
Enrolled area in AESs	Negative effect		Right information Surface under a threshold Experience with AESs Children under six years	Dairy farming
	Positive effect	Free time Demand of extension	Type of production Share of grassland Environmental awareness	Past change
	Non-significant effect	Share of area owned	Reliability	

Annex 1

Group of Measures	Winter cover on arable land	Conversion of arable land : includes buffer strips; and conversion set-aside	Extensive management of arable land: includes limited fertilisation, and use of chemicals and no deep ploughing.	Extensive management of grassland	Management of grassland promoting Biodiversity (flora & fauna) And conservation of specific biotopes (wetlands…)	Maintenance of landscape elements: includes plantation and maintenance of hedges; ditches; parcel edges or other landscape elements	Conversion to organic farming	Integrated farming	Safeguard Genetic Biodiversity	Others
B.Normandie (FR)	3;7	1;2;31-32	8;13-23;40-41; 43	26-30	24-25; 44	9-12;33-39	45			46
Flanders (BE)	1		3;9-10	2	4; 11-13; 20-24	5-8; 14-19				25-27
Czech Republic		11; 17; 21		4-10; 20	15-16; 18-19; 22-25; 28; 30-31	12-14; 27; 32	1; 3; 26			29
Brandenburg (DE)	8	4;6	3	2	1;9;12		5	11		7; 10; 13; 14; 15; 16; 17
IT E.R.	3	10				9	2	1	11	4-8
IT Veneto	4	3		5-6		7	2	1	9	
Finland	2; 10		1; 9; 16		17-18; 11-12	19	14		21-22	4-7; 22-23
Fryslân (NL)					Everything between 1800 and 2200 and everything between 3000 and 3200	Everything larger than 3300 and smaller than 5500				Geese protection (not part of RDP) 5500 and others