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AGRIGRID

Methodological grids for payment calculations in rural development measures in the EU

Summary review of payment calculations for agri-environmental measures

Measures under article 39 of Reg. EC/1698/05
code 214 of Reg. EC/1974/06

(WP2)

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List of abbreviations

AE	Agri- environment
AEM	Agri-environmental measure
AES	Agri- environmental scheme
CZ	Czech Republic
DE	Germany
DE_{MWP}	Mecklenburg West-Pomerania (Germany)
DE_{NRW}	North Rhine – Westphalia (Germany)
dt	1/10 tons
EC	European Commission
EEC	European Economic Community
ES_{BC}	Basque Country (Spain)
ES_{N}	Navarra region (Spain)
EU	European Union
EUR	Euro
FADN	Farm Accountancy Data Network
FI	Finland
GAC	'National Framework Regulation' (DE_{NRW})
GR	Greece
ha	Hectare
HNV	High Nature Value
INEA	Instituto Nazionale di Economia Agraria (Italy)
IP	Integrated production
KTBL	Association for Technology and Structures in Agriculture (Germany)
LFA	Less Favoured Area
LT	Lithuania
Lt	Litas
LU	Livestock Unit
MS	Member State
n.a.	Not applicable
n.d.	No data
NGO	Non- governmental organisation
PL	Poland
RD	Rural Development
RDP	Rural Development Plan
RDR	Rural Development Regulation
SCO	Scotland
t	tons
UAA	Utilised Agricultural Area

Summary review of payment calculations for 'Agri-environmental measures'

1. Introduction

Agri-environmental measures in the European Union

The first generation of the agri-environmental measures was launched in 1992 through Reg. EEC/2078/92. Although in article 19 of the first concise, rural development regulation EEC/797/85 'on improving the efficiency of agricultural structures', there was an authorisation for member states to introduce national schemes in order to compensate farmers for practices compatible with the requirements of conserving the natural habitat in environmental sensitive areas, very few of the, then, member states implemented any such measure, although with an amendment of this regulation, MS could claim part of the aid to farmers.

In 1992, implementation of agri-environmental measures was made obligatory for MS together with two other accompanying measures (early retirement and afforestation of agricultural land). A vast diversity of agri-environmental measures was implemented covering around 20% of the Utilised Agricultural Area (surpassing the target of 15% set in the 5th environmental action programme) and approximately 14 % of the farm enterprises.

The second generation of agri-environmental measures, initiated in 2000 through Reg. EC/1257/99, in terms of payments had the same approach as the first. Farmers could be compensated for income forgone, additional costs incurred and an optional 20% as incentive for farmers to participate was allowed.[1] According to the compilation of the national mid term reviews (Agra CEAS, 2005), there was evidence for both over compensation and under compensation, especially in areas where intensive production systems prevail. There was no reference to the 20% optional incentive as a distorting factor.

The differences among average payments where quite vast as can be seen in Table 1.1, below

1 *Agri-environment is notified to the World Trade Organisation (WTO) under Annex 2 of the Uruguay Agreement which allows agri-environment payments if they are "limited to the extra costs or loss of income involved". As agri-environment payments are calculated that way, their "Green Box" status of agri-environment is preserved, which implies that agri-environment payments are not considered to be trade-distorting subsidies*. (EC, 2005)

Table 1.1 Agri-environmental measures in EU-15 (for year 2003)

Member State	Contracts	Area	Average payment
		ha	€/ha
Sweden		612.035	383
Netherlands	5.092	41.827	366
Italy	89.462	1.353.379	221
Greece	8.677	127.192	200
Portugal	64.923	410.005	167
Belgium	20.042	168.930	163
United Kingdom	22.877	1.273.911	140
Ireland	35.273	1.254.746	138
Germany	233.289	5.936.026	103
Austria	628.884	5.963.274	103
Luxemburg	3.348	137.826	85
Finland[2]	150.845	4.124.567	70
Denmark	11.825	297.901	64
Spain	77.426	2.235.748	60
France	318.321	11.577.659	47
EU 15 total/average	1.670.284	35.515.026	91

Source: EC (2006)

The greater average payment was more than fourfold the average while the smallest almost halved the average, having a relation 1:8 between them. Taking the organic farming case as seen in Table 1.2, one can observe that although a specific measure is under examination the differences are even wider. The highest average per ha payment is more than double the EU-14 average but the lowest is less than 1/5 of the overall average, making thus the ratio between lower and higher per ha average organic farming aid 1:11.

Table 1.2 Organic farming measures in EU-14[3] (for year 2003)

	Contracts	Area ha	Average payment €/ha
Greece	5.224	18.953	404
Italy	19.520	297.919	337
Austria	25.910	295.179	291
Belgium	505	18.873	248
Netherlands	619	10.960	227
France	6.098	207.793	203
Germany	9.754	536.822	182
Luxemburg	43	2.260	172
Spain	8.323	158.194	162
Portugal	557	27.904	141
Sweden		407.000	135
Finland	4.425	142.510	119
Denmark	3.270	110.470	78
United Kingdom	1.669	249.916	36
EU 14 total/average	85.917	2.484.753	185

Source: EC (2006)

[2] In Finland, there is overlap under the areas of basic, additional and special measures. So the same area has been calculated twice or in some cases even three times. Furthermore, all the additional measures have probably been calculated as separate contracts. Therefore the number of contracts is so much larger than the number of farmers in Finland. In 2002 68,803 farmers had an AEM contract and contracted area under AEMs was 2,208,256 hectares. The average payment was approximately 113 €/ha.

[3] No data available for Irish organic farming schemes

In Diagram 1 of the Annex 1 one can see the hectares under AEMs plotted against the average per ha payments for the EU 14.

For the new generation of the AEMs (EC/1698/05) there was a major change in the payment calculation process. The optional incentive of 20% has been annulled. However a provision for a compensation of the transaction costs incurred by the farmer in order to participate in the scheme has been done. This compensation cannot exceed the 20% of the sum of income forgone and additional costs incurred.

According to Reg. EC/1698/06:
The payments shall be granted annually and shall cover additional costs and income foregone resulting from the commitment made. Where necessary, they may cover also transaction cost.

Where appropriate, the beneficiaries may be selected on the basis of calls for tender, applying criteria of economic and environmental efficiency.

Support shall be limited to the maximum amount laid down in the Annex.

2. Comparative analysis

2.1. Basic data of the agri-environmental schemes in participant Member States.

The research team decided to deal with the third generation of agri-environmental measures and schemes, across the MS/Regions participating in the project. There is an extremely great variety of measures, submeasures and schemes offered to farmers across the EU[4]. In the 12 member states/regions examined there are at least 177 different types of contracts available to be signed. They are grouped to 103 measures across MS/regions as shown in Table 2.1 below. A detailed list of all measures and submeasures can be found in Annex 1.

[4] Only for the first generation (EEC/2078/92) a report for the Commission identified 116 different undertakings (EC, 1999).

Table 2.1 Agri-environmental programmes 2007-2013 in participants MS/Regions

MS/Region	Measures	Submeasures	Types of contracts available
CZ	4	19	19
DE	13	15	n.a.
DE_{NRW}	6	9	n.a.
DE_{MWP}	3	3	n.a.
ES_{BC}	24	n.a.	24
ES_{N}	4	n.a.	4
FI	3	34	34
GR	16	22	22
IT_{VE}	15	n.a.	15
LT	4	12	12
PL	8	38	38
SCO*	3	9	9
Total	103		177

*The list only includes those measures which were investigated in the review.

Source: Framework and methods for data collection. 'Agri-environmental measures' questionnaires (2007), elaboration by the authors.

In order to analyse them, we grouped the available agri-environmental contracts according to their main objectives based on the description provided by our project partners. This categorisation draws from the 1999 Commission document collated by Frank Fay (EC, 1999). Objectives set by regions/ MS were related to environmental issues related to agricultural activities. The issues that were included in the objectives of the examined MS/regions were the following:

Natural Resources

- Water

The issue of water presents two aspects. One of them is water quality, having to do with pollution, contamination or salinisation of aquifers and the other is the management of water resources in terms of water extraction and use for irrigation, in the case of the southern, mainly, MS and regions.

- Soil

Soil erosion and the impacts of agricultural activities on soil quality (fertility etc.) are the two main facets that AEMs deal with

In order to identify the specific features of **biodiversity**, AEMs place more weight on, we considered as necessary to distinguish among them. Genetic biodiversity either in the sense of protecting threatened animal breeds and cultivated plant species/varieties or promotion of multicultivation and mixed production systems through supporting crop rotation and avoidance of monoculture. Wildlife conservation and enhancement is another aspect while a specific set of practices were focusing on the protection, maintenance and enhancement of agro-ecosystems of High Nature Value. Finally landscape quality was the third issue where a considerable amount of efforts was dedicated to.

Apart from the fact that a lot of the measures or submeasures are multiobjective, hence we placed them in both categories, some of the measures dealt with more **holistic approaches** such as organic farming and integrated farming either as a whole farm approach or by the promotion of precision agriculture methods.

The following Table 2.2 was constructed by categorising the 189 available contract types (measures or submeasures).

Table 2.2 AE schemes per environmental issue and MS/region[5]

MS/Region	Holistic approaches		Natural Resources		Biodiversity			Landscape
	Organic	IP	Soil	Water	Genetic	Wild life	HNV agroecosystems	
CZ	4	3	2		1	1	11	3
DE	1		8	8		7		6
DE_{MWP}	1	1	2	3		3	1	2
DE_{NRW}	1		6	6	2	7	4	9
ES_{BC}	1	1	2	4	4	3	8	2
ES_{N}	2				1		2	
FI	2		4	23	3	3	4	3
GR	2	1	3	3	2	4	7	3
IT_{VE}	2		2	4	2	6	4	2
LT	1			5	1		6	9
PL	12		3	3	8	3	9	
SCO*	4			1		1	3	
Total	**33**	**6**	**32**	**60**	**24**	**38**	**59**	**39**

*The list only includes those measures which were investigated in the review.

Source: Framework and methods for data collection. 'Agrienvironmental measures' questionnaires (2007), elaboration by the authors.

Agrienvironmental measures are (or should be) intended to respond to specific environmental issues at the appropriate level. The differences in payment calculations among measures should draw their justification from the difficulties to calculate the cost and income changes of locally specific and environmentally targeted changes or maintenance of land use and management practices.

The research team decided to select one common AE scheme across all MS which was organic agriculture and at least two country/region specific schemes. The selected measures were selected applying the following criteria:

- Environmental issues concerned in relation to the importance of these in the local conditions
- Prevailing production systems
- Importance of the AE scheme in terms of acceptance
- Representation of a variety of farming systems as well as environmental issues

The schemes selected are presented in Annex 1 Table A.2. As can be seen all issues and approaches are covered since 32 Organic farming schemes are going to be examined together with one integrated farming, 18 schemes that mainly deal with water quality and management issues, two combating soil erosion, ten schemes concerned with biodiversity and 19 focus towards the maintenance of High Nature Value agro ecosystems. Finally ten schemes aiming at landscape conservation are included in the analysis.

[5] Multiobjective schemes are calculated more than once.

2.2. Payment differentiations

The main factor of differentiation among payments was, obviously, the various practices - methodologies applied in order to achieve the environmental objectives set by AE schemes. This, however, is dealt elsewhere thus we shall deal with other factors of differentiation.

Types of payment differentiation:

- Land use/ Animal type
- Crop/variety/breed
- Intensity of farming practices
- Farm size
- Administrative/ regional/territorial differentiation
- Specific land attributes
- Coincidence of two AES or RD Payments
- Converting of maintaining production

1. A first type of payment differentiation has to do with the crop or generally the use of the land and/or the animal under the AES. The differentiation is:
(a) Across general categories of land use as vegetables, arable crops, permanent plantations, grassland for organic farming in DE (where organic livestock lies within the grassland category); arable land, grassland, permanent crops (orchards, vineyards), vegetables and special herbs for organic farming in CZ (organic livestock is treated as grassland land use) or pork, beef and dairy in organic livestock (which, organic livestock, is treated as a separate scheme) in FI and GR. A variant of is the case of the Finnish Basic Management Scheme were there is a differentiation according to farm type.
(b) Although general categories are used, there are some cases, due either to the importance of the crop/variety/breed for the area or the nature of the specific measure in concern, where the specification is very detailed i.e. species and even variety/breed. For example organic olives are treated separately in ES_N and GR; organic Txakoli vineyards in ES_{BC}; the various breeds in LT and Betizu, Casta Navarra, Burguete and Jaca Navarra breeds in ES_N.

2. A second type of payment differentiation still using farming system characteristics as the differentiation factor is the one used in the case of ES_{BC} where organic farming payments are differentiated according to the intensiveness of the cultivation, within the same crop category i.e. extensive vs. intensive horticulture.

3. Farm size has been reported as a third variable for differentiation related to farming systems. In some case there is a scaling of payment according to the farm size such as Sustainable farming and Organic farming payments in PL or organic farming in ES_N.

4. Another type of differentiation is the spatial differentiation with three dimensions. One dimension is the administrative. That is payment differentiations exist or are provided for, across different federal states (*Länder*), regions or other administrative units. Such are the cases of DE where organic farming payment variations across federal states is allowed or ES_{BC} where territorial differences of organic livestock payments are provided for. However the differentiation is based on farm or natural elements specific for the different areas.

The second dimension in the spatial differentiation is defined by the specific land attributes. Examples of that kind of differentiation are the classification of the land according to its fertility

and/or soil quality in the 'Conversion of arable land into extensively used grass land' scheme (DE), and fodder capacity in Permanent meadows, pastures and meadow-pastures (IT_{VE}). From the same scheme in IT_{VE} originates the third spatial differentiation variable that has to do with whether the area is characterised as Less Favoured or not.

5. There are some 'internal' differentiation factors such as the coincidence of two AES or Rural Development payments in one farm or area (e.g. Diversification of crop rotations in DE_{NRW} where farms' affiliation to an organic scheme differentiates payments). Finally a rather scheme specific differentiation element is the one applying to organic farming schemes in DE_{NRW}, SCO, IT_{VE}, PL and Integrated Farming in DE_{MWP}, where farms converting to the specific type of production receive different amounts than the ones maintaining the existing production type.

2.3. Methodologies of payment calculations

A comparative analysis of the various calculation methodologies used for the estimation of the AE payments, resulted to three main approaches that were used and a fourth hybrid one. We are going to present the various methodologies and provide an example.

Methodologies used on payment calculations

- Comparison of actual farm gross margins of participating and no participating farms
- Use non participant farms as a starting point and change the appropriate cost and income elements.
- Ad hoc approach.
- Hybrid method

The first approach consisted of the direct comparison, in a proper accounting exercise, of a sample of farms participating in a scheme with another sample of similar, in the sense of the cropping and breeding patterns, farms that did not participate in the specific AE measure. In this case all income and cost elements were considered and the gross margin was calculated for both samples. Any differences existing between the average values of the two samples in all income and cost elements, hence in the resulting gross margins, have been attributed to their participation in the AEM under examination. The only case were a proper accounting exercise was used was the case of Organic farming in CZ. An example of the calculation approach is given bellow (Table 2.3) for Organic farming in grassland crops.

The second approach used was also based on the calculation of either the gross margins (Variant 1) or the calculated change in the difference between income and costs (Variant 2). In this case the starting point was a sample of non participant farms of certain characteristics, matching the farming system and area targeted. On the average values of the non-participant farms and on the specific income and cost elements expected to be influenced by the participation to the AE scheme in examination, changes were made in the form of either a proportional or absolute value change. This is the most commonly used method. It was used by almost all examined regions/MS, e.g. the Czech pastures' management schemes, promotion of catch crops' cultivation in DE and CZ, organic farming in most of the cases. An example of this type of calculation (Variant 2) is provided in **Table 2.4** and Box 1. It is the case of the submeasure of wetland maintenance within the Landscape stewardship scheme in LT.

A third way of approaching the problem of calculation of the level of agri-environmental payments was an 'ad hoc' approach. The calculated level of payment, in these cases, was the result

of the summing up of stated changes in concrete income and cost elements or general categories such as ‘variable costs’, ‘other additional costs’ etc. An ad hoc approach was used in the case of the Italian scheme for the ‘Protection of semi-natural habitats and biodiversity / Preservation of wildlife populations’ or the ‘Preservation of rare livestock breeds’ scheme in ES_N, from where the example that follows, in Box 2.

Finally there is a hybrid approach used by CZ authorities where the first approach was used but additional costs which were specific for the crop pattern (arable crops) and the AEM (organic farming) were added to the gross margin differences, and the result was the AE payment level.

Table 2.3 Example of the comparison of Gross Margins between participating and non participating samples in the Czech Republic

A1.2. Organic Farming – grassland

Process of payment calculation

	CZK/LU *	Data source	Reference period
Income foregone			
Gross Margin (GM) for 1 livestock unit (LU) within conventional farming (CF)			(2001- 2004)
for the year 2001			
GM for cattle for fattening (share in LU number = 31.22%)	4 335	FADN / (CSO – animal numbers)	2001
GM for dairy cow (share in LU number = 68.78%)	14 299	- // -	2001
weighted GMs average-2001	***11 188***	x	x
for the year 2002 – the same way			
weighted GMs average-2002	***13 292***	x	x
for the year 2003 – the same way			
weighted GMs average-2003	***12 633***	x	x
for the year 2004 – the same way			
weighted GMs average-2004	***13 115***	x	x
GM from arable land in 0F[6]	**12 557 = 12 560**	**x**	**x**
Gross Margin (GM) for 1 livestock unit (LU) within organic farming (OF)			(2001- 2004)
for the year 2001			
GM for cattle for fattening (share in LU number = 81.06%)	6 907	FADN + NAZV QF3278 + data of KEZ	2001
GM for dairy cow (share in LU number = 18.94 %)	8 456	- // -	2001
weighted GMs average-2001	***7 201***	x	x
for the year 2002 – the same way			
weighted GMs average-2002	***9 829***	x	x
for the year 2003 – the same way			
weighted GMs average-2003	***7 018***	x	x
for the year 2004 – the same way			
weighted GMs average-2004	***8 539***	x	x
GM from arable land in 0F	**8 147**	**x**	**x**
Total income foregone (difference between GMs)	**4 413**		
Total income foregone – recalculation[7]	**2 648 = 2 650**		
Additional costs	x		
Total additional costs	**x**		
Proposed amount of support	**2 100 (70.51 EUR/ha)**		

Source: VUZE (2007)

Gross Margin (GM) for grassland is based on simple average of four weighted average of GMs for two cattle categories with market production. LU numbers are used as the weights

6 Gross Margin (GM) for grassland is based on simple average of four weighted average of GMs for two cattle categories with market production. LU numbers are used as the weights.

7 The calculated difference between GMs for organic and conventional production of cattle has to be recalculated per hectare of grasslands using the corresponding livestock intensity, i.e. number of LU/ha of grassland. For the recalculation the value corresponding to the average between actual intensity in OF (0.35 LU/ha grasslands) and the median value of possible intensity determined by this management (i.e. (0.2 + 1.5) / 2 = 0.85 LU/ha) was chosen. Income loss is thus 0.6 LU/ha * 4 413 CZK/LU = 2 648 CZK/ha.

Table 2.4. Example of comparisons of the outcome of changes specific cost and income elements, induced by the participation in AEMs in Lithuania.

Calculation of payment of wetlands maintained, EUR/ha)

Traditional farming		**Environmental measures applied**			
Costs Lt/ha	Income Lt/ha	Costs Lt/ha		Income Lt/ ha	
		Grass mowing			
		and handling (manual)	**790,5**		
		Total	**790,5**	**Total**	**0**
Profit, Lt/ha	**0,00**	**Profit, Lt/ha**			**-791**
Profit, EUR/ha		**Profit, EUR/ha**			**0**
		Income forgone, Lt/ha			**791**
		Income forgone, EUR/ha			**229**

Agronomic and economic assumptions			
	Haymaking in bogs	**790,5**	
			Daily output quotas:
	Grass mowing using a scythe	569,2	Haying 0,09 ha
	Grass raking	91,5	Hay pick up 0,58 ha
	Grass removal	129,9	Hay removal 0,82 t
			Hourly pay 5,58 Lt*1,2
			Because of hard working conditions (standing in water when haying in bogs)
			the coefficient of 1,2 is applied.

Source: LAEI (2007).

BOX 1

Example of comparisons of the outcome of changes specific cost and income elements, induced by the participation in AEMs in Lithuania.

1. The compensation amount of the income forgone shall be calculated with regard to the income and expenditure resulting from the using of methods of sustainable use of land as compared against regular (traditional) agricultural activities and shall be calculated for X plant of agriculture using the following formula:

$$KP_i = P_i - I_i ;$$

Where: KP_i - compensation amount for the income forgone for xxx plant as a result of sustainable use of land, LTL/ha;

P_i - income forgone for X plant as a result of sustainable use of land, LTL/ha;

I_i - the difference of costs for the production of X plant resulting from the implementation of the sustainable use of land, LTL/ha;

2. Income forgone resulting from the sustainable use of land per a supported agricultural plant shall be calculated using the following formula:

$$P_i = (D_{tr} \cdot K_{tr}) - (D_{eks} \cdot K_{eks}) ;$$

Where: P_i - income for X plant, foregone as a result of the implementation of sustainable (extensive) farming, LTL/ha;

D_{tr} - productivity of X plant in a holding of traditional agricultural production, t/ha;

K_{tr} - the price of X plant, grown in a holding of traditional agricultural production LTL/t;

D_{eko} - productivity of X plant in a holding of sustainable (extensive) agricultural production t/ha;

K_{eko} - the price of X plant, grown in a holding of sustainable (extensive) agricultural production LTL/t;

3. The difference of production costs per ha. of X plant, resulting from the using of methods of sustainable use of land shall be calculated using the following formula:

$$I_i = (IT_{tr} - IT_{eks}) + (ICH_{tr} - ICH_{eks}) + (ID_{tr} - ID_{eks} + (IA_{tr} - IA_{eks}) + (IS_{tr} - IS_{eks}) ;$$

Where: I_i -the difference in terms of expenditure for the growing of X plant, resulting from implementation of sustainable use of land, LTL/ha;

IT_{tr} -expenditure for fertilizers for the growing of X plant in a holding of traditional agricultural production, price, LTL/ha;

IT_{eks} - expenditure for fertilizers for the growing of X plant in a holding of sustainable agricultural production, price, LTL/ha;

ICH_{tr} -expenditure for chemical substances for the growing of X plant in a holding of traditional agricultural production, price, LTL/ha;

ICH_{eks} -expenditure for plant protection materials for the growing of X plant in a holding of sustainable agricultural production, price, LTL/ha;

ID_{tr} -labour costs for the growing of X plant a holding of traditional agricultural production, LTL/ha;

ID_{eks} -labour costs for the growing of X plant in a holding of sustainable agricultural production, LTL/ha;

IA_{tr} -amortization, repair and technical maintenance costs of agricultural machinery for the growing of X plant in a holding of traditional agricultural production, LTL/ha;

IA_{eks} -amortization, repair and technical maintenance costs of agricultural machinery for the growing of X plant in a holding of sustainable agricultural production, LTL/ha;

IS_{tr} -propagation material costs for the growing of X plant in a holding of traditional agricultural production, LTL/ha;

IS_{eks} -propagation material costs for the growing of X plant in a holding of sustainable agricultural production, LTL/ha;

Source: LAEI (2007)

BOX 2

Sub- measure: MAINTAINING NATIVE RARE BREEDS in Navarra Spain.

The payment is based on the income foregone for the decrease in meat production for the four breeds included in the measure (betizu, casta navarra, burguete and jaca Navarra), in comparison with the reference parameter used on Beef cattle production study in 2005.

We are using the breed "Betizu" in the following example to show the income foregone calculation concepts:

Concept	Beef cattle (€/LU)	Betizu (€/LU)	Difference (€/LU)
Gross product	1,259.55	853.00	406.55
Variable costs	579.66	330.00	249.66
Gross margin	679.90	523.00	156.89
Fixed costs	368.36	368.36	0.00
Net margin	311,54	154.64	156.89

With respect to the rest of the breeds, the net margin losses resulting are shown in the table:

Breeds	Loss in net margins (€/LU)
Betizu	156.89
Casta Navarra	155.53
Burguete	140.53
Jaca Navarra	183.53

So, according to these results, the proposed payments are: 140 €/LU for Betizu, Casta Navarra and Burguete, and 180 €/LU for Jaca Navarra.

Source: IDRiSi, 2007

2.3.1. Income forgone and cost elements included in the calculations

In order to calculate income forgone gross margin of the specific crop or average gross margins of several crops/breeds were used as an estimate for income forgone e.g. organic farming in SCO. In most other cases the yield differences were estimated and then multiplied by the price of the output which in some cases (organic farming) was also differentiated. The reduction of the yield would be the result of either reduction of unit productivity or because of limitations of land used or heads bred, provided these limitations were induced by participation to the AES. However in the case of PL and the scheme for the buffer zones area payments as well as LFA payments were reported as income forgone.

As far as the additional costs are concerned the picture was slightly more complicated. A first differentiation was that in some cases costs incurred were referred to in generic terms, as direct costs or variable while in some cases it was much specified as to the source of cost change.

When one examines the breakout of the costs to categories one can see that in terms of inputs usually cost savings are reported especially in the case of fertilisers and plant production products. It is the case of organic farming and land left uncultivated. With the exception, of course,

where more expensive inputs of specific quality, have been necessary (i.e. selective pesticides, organic or rare seeds, special fertilisers, etc.). In the cases where gross margin was used as an estimate for income forgone the cost savings associated were not calculated since they should be included in the gross margin calculation as in the set aside sub-programme in the protection of nitrate vulnerable areas (GR).

Increased labour costs as in the scheme 'Cultivation of catch crops on arable land or cultivation of grass under permanent crops (DE)', machinery utilisation (and subsequently costs) as is the case of 'Management of natural and semi-natural meadows' (LT) as well increased transportation costs (Management of mountain pastures, ES_{BC}) where reported in many cases as the result of management changes. Rent for land to be paid was another cost item like in the Livestock extensification scheme (GR). Finally in some MS/Regions, interests and depreciation were also included in the calculations (LT)

Moving on to another category of costs it is necessary to refer to the next part of our report (Transaction costs). At this point we shall report various cost items reported.
- Book keeping as well as environmental record keeping i.e. personal observations recorded by the farmer-beneficiary,
- Monitoring either through personal observation by skilled workers or through analysis soil, water, foliar.
- Technical assistance taking some times the form of preparation of plans either partial or whole farm plans as in the case of integrated and organic farming.

Finally in organic farming there were some specific costs like
- Certification costs for organic farming
- Management effort increased
- Participation in organisations,
- Marketing costs

all of the three latter related to the participation in the AES.

2.3.2. Transaction costs

A separate reference to the issue of transaction costs is essential in order to see the various approaches used.

The clarification and limitations imposed upon transactions costs are given in Reg. EC/1974/06.

Member States shall determine the need to provide compensation for transaction cost as provided for in Article 39(4) and Article 40(3) of Regulation (EC) No 1698/2005 on the basis of objective criteria.

For the purpose of Article 39(4) and Article 40(3) of Regulation (EC) No 1698/2005, "transaction cost" shall mean cost related to letting the transaction take place and not directly attributable to the implementation cost of the commitment it relates to.

The transaction cost element shall be calculated over the length of the commitment period and shall not exceed 20 % of the income foregone and additional costs due to the commitment given.
Although clarified in the above passage there it seems that there is still a problem of definition thus:

One can identify three types of approach towards transaction costs.

- No transaction cost was calculated
- Simple reference of a certain amount per ha
- Detailed calculations

The first type of approach is followed in CZ where no transaction costs were calculated. Even in the case that the hybrid method was used i.e. direct comparison between the average of participant and a non participant and additional cost elements were used there was no reference to transaction costs. In some cases because there was no need recognised and in some others because the maximum level was already reached.

The second type of approach is when a simple reference that a transaction cost was calculated, the elements included where generally referred to and it was a certain amount per ha.

The third is the case where the calculation procedure was detailed. There was however certain confusion as far as the elements included under the transaction cost and additional costs headings were concerned.

Technical assistance and advisory services sought by farmers are included within the additional costs incurred in the case of all schemes in GR as the preparation of nutrient management plans in the sustainable farming scheme in PL. Similar costs like information seeking, increased management efforts were considered as additional (no transaction costs) as is the case of SCO where '*additional management effort includes time for information and experience gathering, planning and executing the organic farming process, marketing and sales management and administration.'* In DE as well as SCO certification and marketing costs are part of additional costs. In other cases like FI seeking advice is considered as part of the transaction cost for the farmer in the case of organic farming and basic agri-environmental measures scheme.

On the other hand, bookkeeping and monitoring is considered as another additional cost in the case of organic farming in FI and Integrated Farming in DE_{MWP}, while in GR the time additional farmers have to spend for detailed bookkeeping as well as participating to meetings with advisors or training are considered as transaction costs.

The only payment levels imposed were the ones set by the Regulation i.e. 20% of the income foregone and the cost increase.

2.4. Data availability and characteristics

The data used for the calculation of AE payments included data retrieved from FADN, national/regional statistics (CZ and LT), national/regional administrative documents (GR, CZ) and cases studies, consultancy and research reports.

Responsible organisations varied. The most common was research institutes like INEA (IT_{VE}), associations as KTBL[8] in DE, national statistic offices such as in CZ and LT, national/ regional agencies and ministries as in ES_N (Agricultural Ministry of Navarra) and LT. Also data from

[8] KTBL: Kuratorium für Technik und Bauwesen in der Landwirtschaft e.V. , Association for Technology and Structures in Agriculture

colleges and universities as for example did SCO. Other data sources are scientific literature as in the case IT_{VE} and PL, expert studies or expert knowledge as DE_{MWP} (LMS Agricultural consultancy).

Most of data sets are issued annually as data from Yearbook on farm statistics in FI or data for Standard Gross Margins according to EU-typology in DE. Other data are renewed twice a year as the Statistics office data in PL, every two or three years as cost data for agricultural machinery from FI even every few years as in the case of the Organic farming handbook in SCO, irregular but repeatedly as in DE_{MWP} or once as it is the case of specific research or consultancy reports in almost all MS/Regions.

The spatial aggregation in most of the countries/MS is the national /regional level. While in some cases it is more detailed up to municipal level as in LT and even farm or method level (DE_{MWP}). Finally specific aggregation levels used in some cases are the supported area level as in FI, protected area level in PL and process level as in the case of IT_{VE}.

2.5. Contextual information

Table 2.5 AEM Uptake data

MS/Region	UAA (ha)	UAA in RD (ha)	Number of farms (total)	Number of farms in RD	Financial expenditure for RDP total – committed (EUR)	Financial expenditure for AEM – committed (EUR)
DE_{NRW} organic farming		49 848		1 411		12 665 665
Maintenance of extensively used grassland		101 641		4 637		16 663 374
Establishment of water-side strips	1 523 000	4 486	48 439	3 255	151 370 110	3 734 560
Diversification of crop rotations		58 499		808		2 924 970
DE_{MWP} integrated fruit and vegetable production		3 110		29		1 014 000
nature-conserving on four types of grassland	1 341 000	54 000	5 073	995	34 071 000	11 214 000
ES_N organic farming*	557 353	11 659.48	18 895	545	41 617 769	1 703 000
FI	2 293 800	2 229 000	69 442	64 290	691,280 000	295 900 000
CZ	4 254 403	1 168 357*	44 309	9 029*	209 212 442*	110 686 042*
GR**	9 162 740	127 192	825 000	8 677	1 030 400 000	98 120 000

SCO	6 210 084	1 119 000	51 312	8 614	200 400 000	60 700 000
LT	2 633 794	n.a.	212 782	n.a.	189 231 300	20 414 850
IT_{VE}*	831 000	100 169	191 085	8 193	150 270 000	31 661 000
PL	15 906 000*	800 000	1 782 000*	54 000	-	166 000 000

Source: Framework and methods for data collection (VUZE). 'Agrienvironmental measures' questionnaires (2007).
* 2005 data
** 2003 data

As far as the institutions involved in calculations, these were, most of the times, very few, mainly Research and Consultancy institutes, university laboratory and departments. Except in the case of PL where a long list of institutions were involved, including University departments, Research Institutes advisory services.

On the contrary usually the list of organisations commenting on the calculations was long apart from cases as in ES_N or GR where it was limited to one or two. These included Ministries, government agencies, universities and colleges, stakeholders i.e. farmers organisations, NGOs, chambers etc.

3. Problems encountered – solutions given

- Small samples – inference problem
- Obsolete data
- Level of data
- Data reference
- Novel methodological approaches needed

The problems encountered according to the institutions involved in payment calculations have been of various types. They had to do, mainly, with appropriate data availability although lack of relevant experience in terms of methodology was also a reported problem. In deed, methodological problems arose in the cases of FI, GR transaction costs as in the case of the CZ.

The inappropriateness of data had to do first with small samples as in the case of organic farms (CZ, GR, IT_{VEN}) or IP scheme in CZ. Poor inference statistics results created a problem that had to be solved by comparing the results obtained with existing studies or even by conducting their own surveys (CZ).

Obsolete, or rather not adequately updated, data was a problem in SCO where stakeholder consultation was used in order to overcome it while in GR appropriate transformation factors were used.

The level of data specificity was another issue i.e. they were either too specific data available (for a particular crop when more than one crop was an option) or too broad (averages for a whole region or area when farm level data was sought). In those cases assumptions were the only solution available although high variation was admitted as a persistent problem.

Another particular problem was encountered when a lot of options were available. That could amount to a very long and tedious data gathering and calculation procedures, e.g. the case of crop rotations in DE and GR either within organic farming schemes or other schemes. The more common crop rotation (DE) or regional local averages (GR) were used in order to overcome the problem.

The need for a per ha reference of the payments resulted to an other difficulty since a lot of the cost and income as well as the transaction cost data were at the farm level. E.g. transaction cost in GR, machinery and farm labour costs in DE. Average farm sizes were used in these cases.

4. Concluding remarks

- The list of Agri-environmental schemes to be implemented is very long even when they are not analysed further to contractual obligations.
- All main environmental issues seem to be covered from the MS/Regions examined except climate change and Green House Gas emissions.
- The administrative aspects of the calculation procedure follow the same pattern in almost all MS/Regions, a few entities deal with the calculation while commentary is a more participative procedure open to stakeholder consultation.
- As far as the calculations are concerned
  - Payment differentiations are based on crop/animal type, farm structural characteristics, and spatial dimensions.
  - Income is estimated through gross margins or by direct calculation considering yield reductions. Subsidies lost are the third element.
  - Additional cost elements included vary across MS/Regions. However the main problem lies with the calculation of transaction costs and the classification of certain cost items either as additional costs incurred or transaction costs.
  - Three types of methodology were used. In cases where an appropriate data base was available direct comparison of existing samples of participants and non participant farms was conducted. When this kind of data was unavailable or not sufficient (in terms of coverage and representativeness) a transformation procedure was selected having as an initial point non participant farms and applying transformation indicators where appropriate, the respective participant figures were calculated. And the third was, in cases of extreme lack of data, an ad hoc selection of income and/or cost items and the sum of these was the amount to be paid. Hybrid methods were also used but their elements belonged to the three previous mentioned. The selection of the method was data driven.

- The last remark suggests also the main problem faced by MS/Regions. Data availability and accessibility is the main problem stated. In order to overcome it MS/regions recur to case studies, research reports and expert consultation.

5. References

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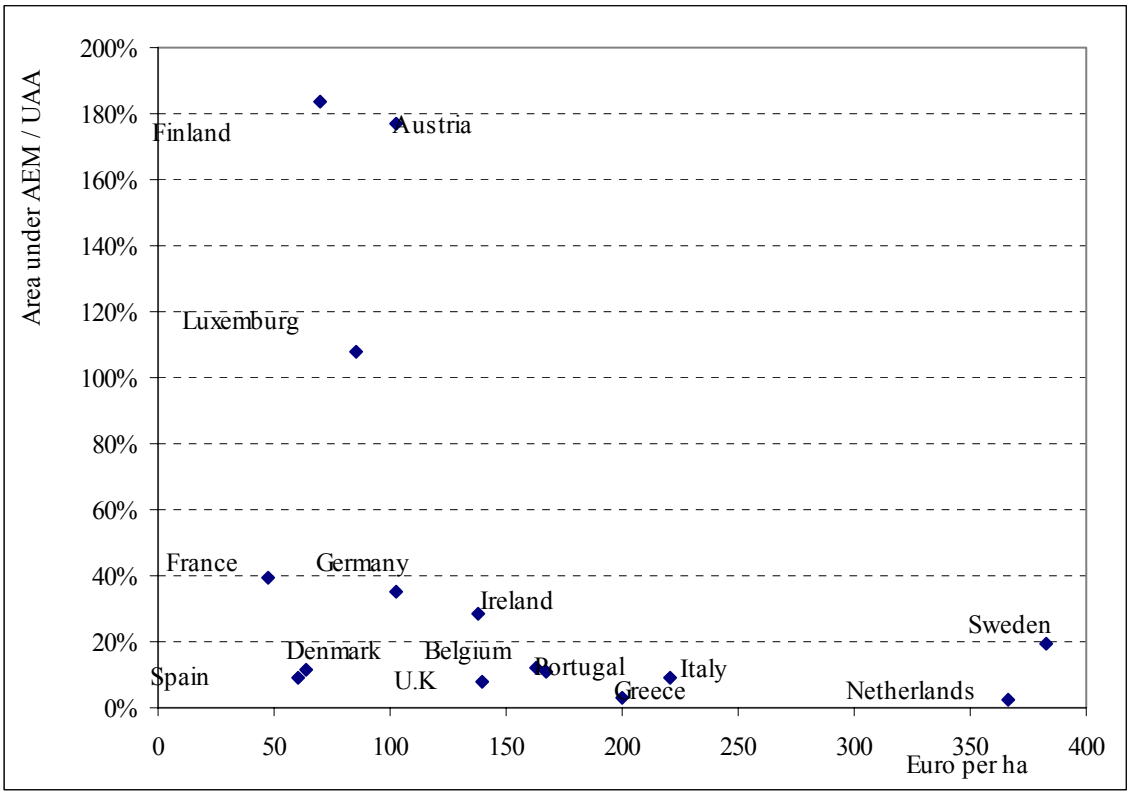
6. Annex 1



Graph A1-1 AEM uptake and average per ha payment in EU 15 (2003)

Table A 1 Agri-environmental programmes in participant MS/regions

MS/Region	Measure	Submeasure
CZ	Environment friendly farming methods	Organic farming (OF) OF - arable land OF - grassland OF - permanent crops (orchards, vineyards) OF- vegetables and special herbs Integrated production (IP) IP fruit production IP vine production IP vegetable production
	B. Grassland maintenance	Meadows (basic management) Mesophilic and hygrophilic meadows (MHM) Mountain and xerophilous meadows (MXM) Permanently waterlogged and peatland meadows Bird habitats on grassland – waders‘ nesting site Bird habitats on grassland- corncrake’s breeding site Pastures (basic management)

		Species rich pastures Dry steppe grasslands and heathlands
	C. Landscape management	Conversion of arable land to grassland Growing of catch crops Bio-belts
DE	Crop species differentiation on arable land (A1)	
	Cultivation of catch crops on arable land or cultivation of grass under permanent crops(A2)	
	Applied mulch or direct seeding techniques on arable land (A3)	
	Application of liquid manure with specific environmentally friendly application methods (A4)	
	Soil conserving production techniques through cultibation of specific forage crops on arable land like grass, cover grass and clay (A5)	
	Renunciation of herbicide applications on permanent crops (A6)	
	Construction of flowering areas or strips respectively conservation strips (A7)	Construction of flowering areas on arable land which is set aside or not used for agricultural production pursuant to article 54 paragraph 2 of directive (EC) number 1782/2003

Table A.1 Agri -environnemental programmes in participant MS/regions (cont.)

MS/Region	Measure	Submeasure
		Construction of flowering areas, flowering respectively conservation strips on arable land which is not set aside and is used for agricultural production pursuant to article 54 paragraph 2 of directive (EC) number 1782/2003
	Application of biological or biotechnical plant protection techniques (A8)	
	Extensive usage of grassland with at most 1.4 LSU/ha fodder area (B1)	
	Conversion of arable land into extensively used grass land (B2)	
	Extensive usage of specific grassland areas (B3)	Extensive usage of specific grassland areas for reductions of operating resources or for application of specific pasture management (B3.1)
		Extensive usage of specific grassland areas for maintenance of plant-genetically valuable grassland vegetation (B3.2)
	Introduction and maintenance of organic farming on total farm areas (C).	

	Support of perennial set-aside (D)	
DE_{NRW}	Introduction and maintenance of organic farming on total farm areas pursuant to Reg. (EEC) 2092/91	
	Extensive usage of grassland with at most 1.4 LSU/ha fodder area (B1)	
	Crop rotation diversification on arable land	
	Establishment of water-side strips	
	Breeding of endangered domestic animal species	
	Nature conservation contracts	VNS 1: nature conserving cultivation of arable land and side-strips on arable land to protect specific ecological communities
		VNS 2 nature conserving usage of grassland including specific additional measures
		VNS 3 management of mixed orchard (maintenance measures)
		VNS 4 cultivation of hedges (cutting hedges, mowing of borders)
DE_{MWP}	Nature conservation program on grassland: Support of nature-conserving management on four different types of grassland.	
	Introduction or maintenance of controlled-integrated fruit and vegetable production in agricultural and horticultural enterprises in MWP for the duration of 5 years.	
	Introduction and maintenance of organic farming on total farm areas pursuant to Reg. (EEC) 2092/91	

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Table A.1 Agri -environnemental programmes in participant MS/regions (cont.)

MS/Region	Measure	Submeasure
ES_{BC}	Fertilization Plan in agriculture holdings.	
	Animal waste and fertilization Management Plan in livestock holdings	
	Organic residues composting in holdings	
	Phytosanitary treatment machinery verification by homologated company	
	Rational phytosanitary treatment	
	Pest integrated control	
	Environmental protection in extensive dryland crops by rotation and alternatives to cereal.	
	Soil protection in extensive crops	
	Soil protection in permanent crops	
	Environmental protection in set-aside and uncropped land	
	Hay-meadows conservation	
	Pasture improvement to increase forage self-sufficiency	
	Management of mountain pastures	

	Promotion of grazing	
	Local breeds conservation	
	Biodiversity conservation in crop rotations	
	Fauna conservation in crop rotations	
	Protection of water courses and wetlands	
	Landscape improvement with hedges	
	Landscape improvement by other elements	
	Organic farming	
	Integrated production	
	Local beans cultivation	
	Bee keeping in fragile areas	
ES_N	Organic farming	
	Organic livestock	
	Conservation of rare livestock breeds (maintaining native rare breeds)	
	Agri-environment measure in steppelands	

Table A.1 Agri-environmental programmes in participant MS/regions (cont.)

MS/Region	Measure	Submeasure
FI	Basic measure related to agri-environment payments for arable crop farms	Environmental planning and monitoring of farm practices Fertilisation of arable crops Set-aside with land cover Headlands and filter strips Maintenance of biodiversity and landscapes
	Additional measures	Reduced fertilisation More accurate nitrogen fertilisation on arable crops Plant cover in winter and reduced tilling Plant cover in winter (in support areas A and B) Intensified plant cover in winter (in support areas A and B) Crop diversification (in support areas A and B) Extensive grassland production (in support areas A and B) Spreading of manure during the growing season Nutrient balance Cultivation of catch plants (in support areas A and B)
	Additional measures for horti-cultural farms	More accurate nitrogen fertilisation on horticultural crops Use of mulch in perennial horticultural crops Use of pest monitoring methods
	Special measures	Establishment and management of riparian zones (in support areas A and B) Establishment and management of riparian zones (in support area C) Management of multifunctional wetlands Arable farming in groundwater areas Run off water treatment methods - Controlled subsurface drainage - Controlled irrigation - Recycling of drainage water Organic production Organic livestock production Efficient use of manure Management of traditional rural biotopes Enhancing of biological and landscape diversity Raising local breeds: Cultivation of local crops

Table A.1 Agri-environmental programmes in participant MS/regions (cont.)

MS/Region	Measure	Submeasure
GR	Organic farming	
	Organic livestock production	
	Protection of areas sensitive in nitrates	
	Wetland protection	
	Livestock farming extensification	
	Livestock farming support	
	Terraces protection	
	Protection of traditional groves	
	Conservation of the traditional vineyard in Thira island	
	Conservation of distressed local breeds	
	Conservation of extensive agriculture from genetic erosion risk	
	Integrated management systems in cotton and tobacco production	
	Promotion of farming practises for wild's life protection	
	Long term set-aside of agricultural land	
	Conversion of arable land in extensive pasture	
	Protection of national marine park of Zakynthos island	
IT_{VE}	Ecological corridors, buffer strips, hedgerows and little woods / Care and improvement of existent buffer strips, hedgerows and little woods	
	Ecological corridors, buffer strips, hedgerows and little woods / Establishment of new buffer strips and single-row hedgerows.	
	Improvement of soil quality / Organic matter	
	Improvement of soil quality / Organic fertilization	
	Organic farming / Introduction of organic farming techniques	
	Organic farming / Maintenance of organic farming techniques	
	Protection of semi-natural habitats and biodiversity / Biotopes and wetlands	
	Protection of semi-natural habitats and biodiversity / Preservation of wildlife populations	
	Protection of semi-natural habitats and biodiversity / Preservation of meadows with high historic and naturalistic value	
	Permanent meadows, pastures and meadow-pastures	
	Biodiversity / Biodiversity keepers (breeders)	
	Biodiversity / Biodiversity keepers (growers)	
	Biodiversity / Regional network of biodiversity	
	Protection and improvement of water resources / Improvement of water quality for human use	
	Protection and improvement of water resources / Improvement of surface waters quality and protection of the flood plains from hydraulic risks	

Table A.1 Agri-environmental programmes in participant MS/regions (cont.)

MS/Region	Measure	Submeasure
LT	Landscape stewardship scheme:	Management of natural and semi-natural meadows Management of wetlands Management of shore belts of water bodies in meadows Protection of water bodies against pollution and soil erosion on the arable land Stubbly field in winter season Strips or plots of melliferous in the arable land Management of the holding landscape elements Management of protection shore belts and slopes of melioration ditches Management of the environment of small cultural elements
	Organic farming scheme	
	Rare Breeds Scheme	
	Scheme for improving the status of water bodies at risk	
SCO*	Organic farming	OF - arable land and mixed conversion OF - improved grassland OF unimproved land and rough grazing OF- fruit and vegetables
	B. Species Rich Grassland	Creation and management of species rich grassland Management of species rich grassland Management of species rich grassland for corn buntings
	C. Water Margins	Creation and Management of Water Margins to enhance biodiversity interest Creation and Management of Water Margins to reduce diffuse pollution

*The list only includes those measures which where investigated in the review.

Table A.1 Agrienvironnemental programmes in participant MS/regions (cont.)

MS/Region	Measure	Submeasure
PL	Sustainable farming	Sustainable farming system
	Organic farming	Agricultural crops (with certificate) Agricultural crops (a year before certification) Permanent grassland (with certificate) Permanent grassland (a year before certification) Vegetable crops (with certificate) Vegetable crops (a year before certification) Herbal crops (with certificate) Herbal crops (a year before certification) Fruit and berry growing (with certificate) Fruit and berry growing (a year before certification) The others fruit and berry growing (with certificate) The others fruit and berry growing (a year before certification)
	Extensive permanent grasslands	Extensive activity on meadows and pastures
	Preservation of threatened species of birds and natural habitats not covered by Natura 2000	Protecting habitats in bird's ground nesting sites Moss Rushes with tall sedge Meadows moorgrass and selernicowe Warmlikes meadows Semi natural wet – hay meadows Semi natural meadows fresh habitats Meadows rich species: sod of white bent grass (*Nardus stricta*) Halophyte Ecological compensation area
	Preservation threatened genetic resources of plants in agriculture	Market production local growing plants species Seed market production local growing plants species Seed production for order genetic bank Traditional orchards
	Preservation threatened genetic resources of animals in agriculture	Preservation local breed cattle Preservation local breed horses Preservation local breed sheep Preservation local breed pigs
	Protecting soil and water	Undersown crop Winter intercrop Stubble intercrop
	Buffer zones	Maintenance 2 - m buffer zones Maintenance 5 - m buffer zones Maintenance 2 – m field strips Maintenance 2 – m field strips

Table A.2 Selected AES

Country /Region	Measure	Submeasure
CZ	Environment friendly farming methods	OF - arable land OF - grassland OF - permanent crops (orchards, vineyards) OF- vegetables and special herbs
	Grassland maintenance	Pastures (basic management) Species rich pastures
	Landscape management	Growing of catch crops
DE	Cultivation of catch crops* on arable land or cultivation of grass under permanent crops	
	Construction of flowering areas or strips respectively conservation strips	Construction of flowering areas on arable land which is set aside or not used for agricultural production Construction of flowering areas, flowering respectively conservation strips on arable land which is not set aside and is used for agricultural production
	Introduction and maintenance of organic farming on total farm areas (C).	
	Conversion of arable land into extensively used grass land	
	Application of liquid manure with specific environmentally friendly application methods	
DE_{NRW}	Maintenance of extensive grassland usage "national framework regulation"	
	Establishment of water-side strips	
	Diversification of crop rotations on arable land)	
	Introduction or maintenance of organic farming.	
DE_{MWP}	Introduction or maintenance of controlled-integrated fruit and vegetable production in agricultural and horticultural enterprises.	
	Nature conservation program on grassland: Support of nature-conserving management on four different types of grassland.	
ES_{BC}	Management of mountain pastures	
	Organic farming	
ES_{N}	Organic farming	
	Conservation of rare livestock breeds (maintaining native rare breeds)	
FI	Basic measure related to agri-environment payments for arable crop farms	Environmental planning and monitoring of farm practices Fertilisation of arable crops Set-aside with land cover Headlands and filter strips Maintenance of biodiversity and landscapes

Table A.2 Selected AES (Cont.)

Country /Region	Measure	Submeasure
FI	Special measures	Organic production Organic livestock production
GR	Organic farming Organic livestock production Protection of areas sensitive in nitrates Livestock farming extensification Protection of traditional groves Conservation of the traditional vineyard in Thira island	 Set aside of irrigated land and reduction of fertilisation on the rest Crop rotation with a dry crop and uncultivated margins Monitoring and controlled use of inputs Expansion of pastures in mainland areas Reduction of flock in insular areas
IT_{VE}	Organic farming / Introduction of organic farming techniques Organic farming / Maintenance of organic farming techniques Protection of semi-natural habitats and biodiversity / Preservation of wildlife populations Permanent meadows, pastures and meadow-pastures	
LT	Landscape stewardship scheme: Organic farming scheme Rare Breeds Scheme Scheme for improving the status of water bodies at risk	Management of natural and semi-natural meadows Management of wetlands Management of shore belts of water bodies in meadows Protection of water bodies against pollution and soil erosion on the arable land Stubbly field in winter season Strips or plots of melliferous in the arable land Management of the holding landscape elements Management of protection shore belts and slopes of melioration ditches Management of the environment of small cultural elements
PL	Sustainable farming Organic farming	Sustainable farming system Agricultural crops (with certificate)

Table A.2 Selected AES (Cont.)

Country /Region	Measure	Submeasure
PL		Agricultural crops (a year before certification)
		Permanent grassland (a year before certification)
		Vegetable crops (with certificate)
		Vegetable crops (a year before certification)
		Herbal crops (with certificate)
		Herbal crops (a year before certification)
		Fruit and berry growing (with certificate)
		Fruit and berry growing (a year before certification)
		Other fruit and berry growing (with certificate)
		Other fruit and berry growing (a year before certification)
	Buffer zones	Maintenance 2 - m buffer zones
		Maintenance 5 - m buffer zones
		Maintenance 2 – m field strips
		Maintenance 2 – m field strips
SCO	Organic farming	OF - arable land and mixed conversion
		OF - improved grassland
		OF unimproved land and rough grazing
		OF- fruit and vegetables
	Species Rich Grassland	Creation and management of species rich grassland
		Management of species rich grassland
		Management of species rich grassland for corn buntings
	Water Margins	Creation and Management of Water Margins to enhance biodiversity interest
		Creation and Management of Water Margins to reduce diffuse pollution