AGRIGRID

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

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8.1.B.1.1 Modernisation and sustainability of agriculture and forestry, including their multifunctional role in order to ensure the sustainable development and promotion of rural areas

Task 14 New methods for calculating premiums in the rural development measures

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Report D4
Methodological grids for Agri-environmental payments

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EXECUTIVE SUMMARY

Introduction

The payments for the new generation of the AEMs (EC/1698/05) should be based on the sum of income foregone and additional costs incurred. 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 20%. In order to facilitate communication and linkage to the standard terminology used, instead of income foregone the research team agreed to use the term revenue change.

The research team decided to deal with the third generation of agri-environmental measures and schemes, across the EU. There is a extremely great variety of measures, sub-measures and schemes offered to farmers across the EU. In the 12 member states/regions examined there are 177 different types of contracts available to be signed. They were grouped to 103 measures across MS/regions.

Methodological approaches

One crucial point in the logic framework is when the decision has to be made about which methodological approach to follow. The comparative analysis of the various calculation methodologies used for the estimation of the AE payments resulted in two main approaches: the Balance sheet approach and the Practices approach.

The Balance sheet approach consisted of a direct comparison, in a proper accounting exercise, of a sample of farms participating in a scheme with another sample of similar farms, in the sense of the cropping and breeding patterns, that did not participate in the specific AE measure. In this case all revenue 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. Such was the case of DE and the scheme 'Introduction and maintenance of organic farming' and Organic farming in grassland and permanent crops in CZ.

Partial budgeting, a variation of the Balance sheet approach, was also based in the calculation of either the gross margins or the calculated change in the difference between revenue and costs. In this case, the starting point was a sample of non-participant farms of certain characteristics, matching the farming system and area targeted. On average, for the non-participant farms, values of specific revenue and cost elements known to be influenced, changes were made in the form of either a proportional or absolute value change, in order to estimate the policy on situation. This is a method used by almost all examined regions/MS, e.g. the Czech pastures management schemes, 'promotion of catch crops' cultivation in DE and CZ.

The Practices approach consisted of breaking down the measure into commitments and consequently describing the detailed practices using the official RDP design documents. The determination of the baseline situation related to the specific practice was next in line by using the official design documents and/or legislative and normative documents and/or scientific texts. The following phase was the

identification of the specific cost and revenue changes that were attributed to the implementation of the specific practice. These cost and revenue changes were consequently calculated and the specific cost and revenue differences due to practices were quantified. These changes and their economic assessment were always considered above or beyond the pertinent baseline. It is obvious that it was a reiterative process for each practice and commitment.

Baseline criteria

The baseline criteria based on Statutory Management Requirements (SMRs), Good Agricultural and Environmental Conditions (GAECs) or the specific Codes of Good Agricultural Practice for AEMs, however, do affect payment calculations. The relevant baseline practice must be taken into account when calculating payments in the AEM measures, since it is the difference between the economic elements at the baseline situation and the respective elements under the AEM commitment which determines the level of the agri-environmental payment. One should not forget that there could be also additional baseline requirements at the national/regional level. Finally the common practice used in every country could be used as baseline.

The application

The parts that form the logic framework consist also the steps that had been followed in the creation of the methodological grids i.e. the step by step approach. In the case of the AEMs those steps are:

- step 1: Definition of the commitments
- step 2: Identification of the relevant to the commitment practices and the choice of feasible or appropriate to the specific commitment approach.

In the case where the balance sheet approach has been followed

- step 3: Definition of the relevant baseline
- step 4: Selection of the relevant differentiation categories and elements
- step 5: Identification of cost and revenue elements for each of the differentiation elements
- step 6: Calculation of cost and revenue elements . Grids are provided for more than one level for calculations, when there is a need for a more detailed level in the calculation process.

In the case there are more than one commitments in a sub-measure, step 2 to 6 are repeated for each commitment

- step 7: Adjustment of the calculated payments to RDP or other payment limits
- step 8: Report of total calculated payments for all differentiation categories after all adjustments have been made.

When the practices approach is used there are additional two steps to follow.

- step 3: Selection of practices
- step 4: Definition of the relevant baseline

- step 5: Identification of cost and revenue elements
- step 6: Selection of the relevant differentiation categories and elements
- step 7: Calculation of cost and revenue elements .Grids are provided for more than one level for calculations, when there is a need for a more detailed level in the calculation process,
- step 8: In case there are more than one practices in a commitment, step 2 to 7 are repeated for each commitment

In cases where there are more than one commitments in a sub-measure, step 2 to 8 are repeated for each commitment

- step 9: Adjustment of the calculated payments to RDP or other payment limits
- step 10: Report of total calculated payments for all differentiation categories after all adjustments have been made.

Transaction costs

The following cost items can be included in the calculation of transaction costs

- information seeking.
- provision of technical advice and other advisory services.
- increased management efforts.
- certification costs.

The opportunity cost of the additional time farmers have to spend

- for detailed bookkeeping
- participating to meetings with advisors or
- training courses.

Payment differentiations

Payment differentiation can be made according to various criteria. Using spatial criteria one can identify at least three categories of differentiation using either administrative or environmental or agronomic criteria. The second broad classification approach is the use of structural characteristics of a farm. While the next differentiation type utilised general agronomic criteria termed production process specifications.

Conclusions and remarks

The procedure proposed for the creation of the calculation grids is a rather complicated one, for both approaches used. This complexity was considered necessary because of the nature of the AEMs.

Policies, in general, affect decisions of actors. Agricultural policy, part of which are the AEMs under examination, affect farmers' and land managers' decisions, which in turn concern land use and management practices. Therefore the agronomic hypothesis assumed in order to design AEMs, led to direct the emphasis towards farming practices as the main element for the calculation process. However in some particular cases, where sufficient data existed and the difficulty to attribute the

changes of economic components was great, the different approach used, the balance sheet approach allowed for a sufficiently good coverage of the range of varying needs.

Specific remarks

1. Baseline criteria.

In order to calculate payments some agronomic hypothesis on which AEM were based on were used. Consequently the baseline used had to be of an agronomic nature. Policy designers placed more emphasis on the environmental consequences of their choices as to which of the available alternatives they would choose to promote. The selection of the pertinent, locally adopted cross compliance or Good agricultural practice provisions has been one of the necessary but tedious steps of the calculation process.

2. Differentiation criteria

The environmental focus of the measures studied made necessary the use of payment differentiation criteria in addition to the ones usually used, i.e. administrative, economic. These were not considered sufficient for the environmental issues concerned. An additional complexity was added since the majority of the data are available on administrative bases.

3. Data availability and appropriateness.

This section is mainly concerned with economic data. There are various dimensions in the lack appropriate economic data inventory. A specific recommendation concerning data gathering is that during the design of the AEMs, economic (as well as the other) assessment of these should be borne in mind. The development of a reliable data collection system is an essential part of the overall policy design.

General remarks

In a situation complex as is the case of AEMs, policy makers and administrators tend to adopt measures easier to handle. Proposed innovative schemes that could be not easily monitored requiring with complicated calculations for their design and assessment should not be very popular.

That is the main argument for the usefulness of the calculation grids proposed through the specific project. The proposed methodological grid for the calculation of AE payments as well as the software will enable policy makers at all levels of administration to overcome the problem of complexity, increase their flexibility and thus allow them to adopt innovative measures.

Table of contents

List of abbreviations

AEM	Agri- environmental measure
CF	Conventional Farming
CZ	Czech Republic
DE	Germany
DE_{MWP}	Mecklenburg West-Pomerania (Germany)
DE_{NRW}	North - Rhine Westphalia (Germany)
EC	European Commission
EEC	European Economic Community
ES_{BC}	Basque Country (Spain)
ES_{NAV}	Navarra (Spain)
EU	European Union
FADN	Farm Accountancy Data Network
FI	Finland
GAEC	Good Agricultural and Environmental Condition
GFI	Gross Farm Income
GM	Gross Margin
GR	Greece
ha	hectare
IT_{UMB}	Umbria (Italy)
LT	Lithuania
MS	Member States
N	Nitrate
NVZ	Nitrate Vulnerable Zones
OF	Organic Farming
PL	Poland
RDP	Rural Development Programme
RDR	Rural Development Regulation
SCO	Scotland
SGM	Standard Gross Margin
SMR	Statutory Management Requirement
UAA	Utilised Agricultural Area

1. Introduction

1.1. 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 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 foregone, additional costs incurred and an optional 20% as an 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 were quite vast as can be seen in Table 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: 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	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 four-fold 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 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-15 average but the lowest is less than 1/5 of the overall average, making the ratio between lower and higher per ha average organic farming aid 1:11.

Table 2: Organic farming measures in EU-14[2] (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

[2] No data available for Irish organic farming schemes

United Kingdom	1.669	249.916	36
EU 15 total/average	85.917	2.484.753	185

Source: EC (2006)

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.

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

The research team decided to deal with the third generation of agri-environmental measures and schemes, across the EU. There is an extremely wide variety of measures, sub-measures and schemes offered to farmers across the EU[3]. In the 12 member states/regions examined, there are 177 different types of contracts available to be signed. They are grouped into 103 measures across MS/regions as shown in Table 3 below. A detailed list of all measures and sub-measures can be found in Annex 1.

Table 3: Agri-environmental programmes 2007-2013 in participant 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_{NAV}	4	n.a.	4
FI	3	34	34
GR	16	22	22
IT_{UMB}	15	n.a.	15
LT	4	12	12
PL	8	38	38
SCO	3	9	9
Total	103		177

Source: Framework and methods for data collection. 'Agri-environmental measures' questionnaires (2007), elaboration by the authors. The list only includes those measures which were investigated in the review.

In order to analyse them, we grouped the available agri-environmental contracts according to their main objectives based on the description provided by the project partners. This categorisation draws from the 1999 Commission document collated by

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

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 issues that AEMs deal with

In order to identify the specific features of biodiversity AEMs place more weight on, it was necessary to distinguish among them. Genetic biodiversity, either in the sense of protecting threatened animal breeds and cultivated plant species/varieties or promotion of 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 to which a considerable amount of effort was dedicated.

Because many of the measures or sub-measures are multi-objective, 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 4 was constructed by categorising the 177 available contract types (measures or sub-measures).

Table 4: AE schemes per environmental issue and MS/region

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_{NAV}	2				1		2	
FI	2		4	23	3	3	4	3
GR	2	1	3	3	2	4	7	3
IT_{UMB}	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**

Source: Framework and methods for data collection. 'Agri-environmental measures' questionnaires (2007), elaboration by the authors. Multi-objective schemes are calculated more than once.

2. **Methodology, Logic framework**

The aim of this part of the report was to develop a logic framework based on a comprehensive review of payment calculations in AE measures. This logic framework provides a generic structure of the payment calculations in order to achieve better understanding of the calculation process. In the case of AE measures the logic framework is a very general one because of the vast variety of different sub-measures and schemes. Fundamental parts of the payment calculations are integrated in the logic framework such as relevant baseline, payment differentiations and calculation of revenue and cost components. A graphical representation of the logic framework is shown in Figure 1.

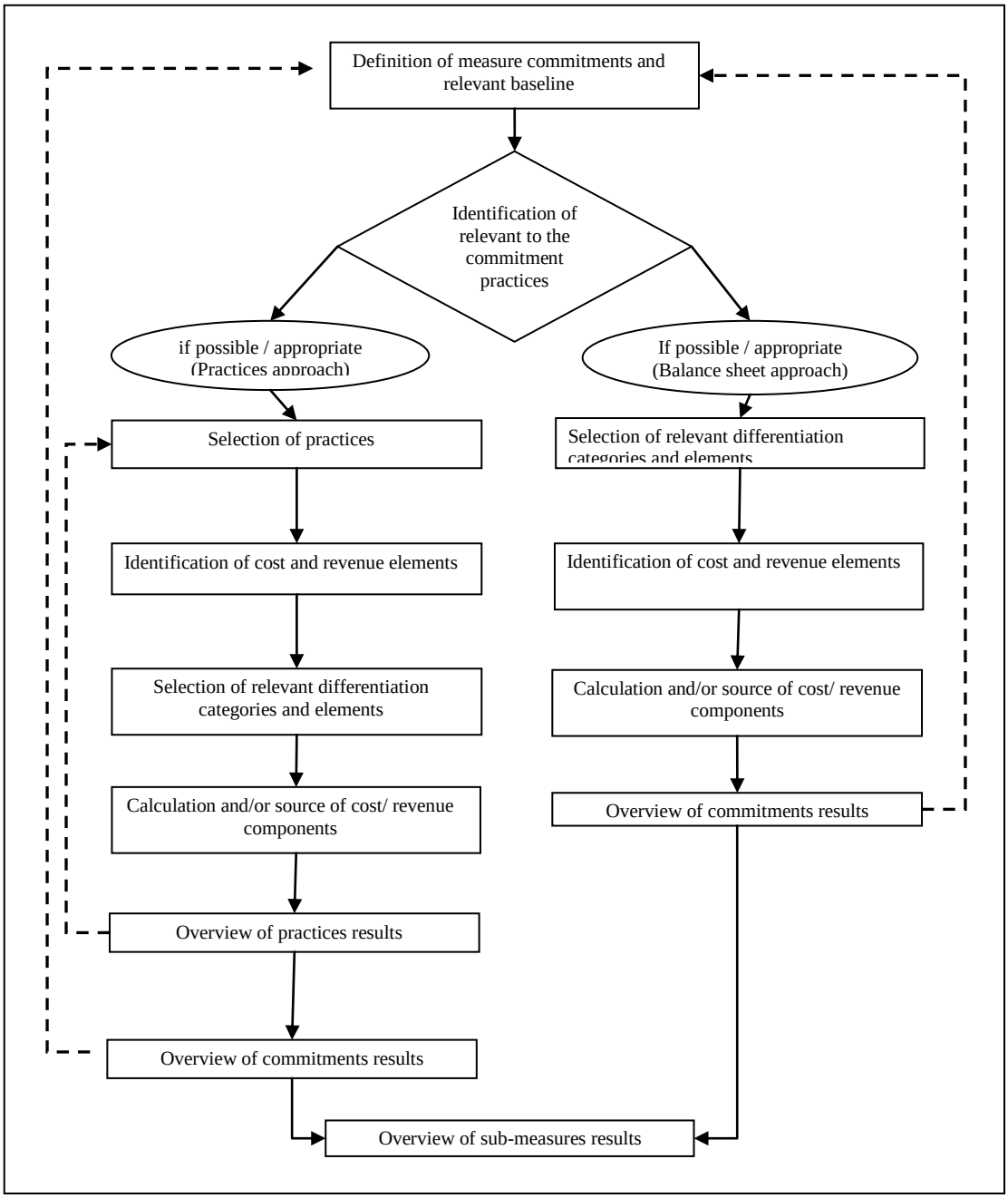
One crucial point in the logic framework is when the decision has to be made about which methodological approach to follow. The comparative analysis of the various calculation methodologies used for the estimation of the AE payments, resulted in two main approaches: Balance sheet approach, and Practices approach.

The Balance sheet approach consisted of a 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 revenue 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. Such was the case of DE and the scheme 'Introduction and maintenance of organic farming' and Organic farming in grassland and permanent crops in CZ.

A partial budgeting, a variation of Balance sheet approach used was also based on the calculation of either the gross margins or the calculated change in the difference between revenue and costs (Roth and Hyde, 2002; Gutierrez and Dalsted, 2008) . In this case the starting point was a sample of non participant farms of certain characteristics, matching the farming system and area targeted. On average, for the non participant farms, values of specific revenue and cost elements known to be influenced, changes were made in the form of either a proportional or absolute value change, in order to estimate the policy on situation. This is a method used by almost all examined regions/MS, e.g. the Czech pastures management schemes, 'promotion of catch crops' cultivation in DE and CZ.

The Practices approach consisted of breaking down the measure into commitments and consequently describing the detailed practices using the official RDP design documents. The determination of the baseline situation related to the specific practice was next in line by using the official design documents and/or legislative and normative documents and/or scientific texts. The following phase was the identification of the specific cost and revenue changes that were attributed to the implementation of the specific practice. These of the cost and revenue changes were consequently calculated and the specific cost and revenue differences due to practices were quantified. These changes and their economic assessment were always considered above or beyond the pertinent baseline. It is obvious that it was a reiterative process for each practice and commitment.

Figure 1: Logic framework for Agri-environmental Measures



The parts that form the logic framework also consist of the steps that had been followed in the creation of the methodological grids i.e. the step by step approach. In the case of the AEMs those steps are:

- step 1: definition of the commitments and the relevant baseline
- step 2: identification of the relevant commitment practices and the choice of those feasible or appropriate to the specific commitment approach.

In the case where the balance sheet approach has been followed

- step 3: selection of the relevant differentiation categories and elements
- step 4: identification of cost and revenue elements for each of the differentiation elements

- step 5: overview of cost and revenue components according to the applied differentiations (level 1)
- step 6: calculation of cost and revenue elements (level 2). Since it might be different level of detail in the calculation process, grids provide more than one level for calculations (step 7)

In cases where there are more than one commitment in a sub-measure, steps 2 to 6 are repeated for each commitment.

- step 7: Adjustment of the calculated payments to RDP or other payment limits
- step 8: Report of total calculated payments for all differentiation categories after all adjustments have been made.

When the practices approach is used, there are additional two steps to follow.

- step 3: Selection of practices
- step 4: Definition of the relevant baseline
- step 5: Identification of cost and revenue elements
- step 6: Selection of the relevant differentiation categories and elements
- step 7: Calculation of cost and revenue elements .Grids are provided for more than one level for calculations, when there is a need for a more detailed level in the calculation process,
- step 8: In case there are more than one practices in a commitment, step 2 to 7 are repeated for each commitment

In cases where there are more than one commitments in a sub-measure, steps 2 to 8 are repeated for each commitment.

- step 9: Adjustment of the calculated payments to RDP or other payment limits
- step 10: Report of total calculated payments for all differentiation categories after all adjustments have been made.

2.1. Analysis of the methodological approaches

2.1.1. Definition of relevant commitments

A commitment is the contractual obligation that a producer undertakes when signing the contract that allows participation in an AE measure. Each AE measure can be analysed to commitments related to specific environmental goals. Commitments consisted of a combination of practices. This analysis can be done using the official design document. For example in the measure for the protection of areas sensitive in nitrates applied in GR, we can identify at least three environmental commitments which are: the reduction of irrigation water used, the reduction of N fertilizers used and the environmental management plan. Each practice may be related with more than one of one commitments, consequently an environmental goal, but it is used only once in the calculation.

2.1.2. Definition of relevant practices

A practice is a simple process that is relevant to a single productive procedure (See Annex 1 table) and can be used as the basis to estimate any changes in the economic figures of known cost elements e.g. hired labour or cost of seeds.

A general observation is that most commitments in AEM measures consisted of a single practice. However, there were very significant exceptions. Within AEM measures, a long list of commitments and practices applied in EU countries is encountered. These practices can be grouped under more general categories such as input use, natural resources management, landscape and biodiversity protection. In the third category, for instance, there are practices such as maintenance of grassland, conservation of rare livestock breeds and maintenance of buffer zones. Within these commitments, practices such as the growing of catch crops, construction of flowering areas are included.

On the other hand there are measures in which commitments related to more than one practice can be encountered. Such is the protection of NVZs, where the commitment of reduction of irrigated water used is related with three practices namely:

- set-aside on 25% of the irrigated land,
- dry crop rotation on 20% of the irrigated land and
- uncultivated field margins in 5% of the irrigated land.

Within the same framework, the commitment to reduce the use of Nitrogen fertilizers is related with the practices of

- set-aside on 25% of the irrigated land,
- reduction over 25% of the N fertilisers use in the rest of the area and
- uncultivated field margins in 5% of the irrigated land.

As mentioned above although the specific practices are linked to multiple commitments i.e. environmental objectives, each practice must be taken in account only once in the payment calculation process.

2.1.3. Definition of relevant Baseline

There is a long list of environmental requirements farmers have to comply with. These range from local or regional regulatory documents up to EU legislation, adapted to the National – local level. Apart from these, scientific evidence and usual practice have and can be used as baseline criteria. The main challenge in the calculation is to select out of this long list of requirements the one pertinent to the specific AEM.

Each Member State has adapted the EU regulations to the local environmental conditions and to the National legislation. Each country has different sets of requirements based on that regulation either SMRs included in Annex III or GAEC included in Annex IV of Regulation (EC) No 1782/2003, which are not possible to pay out within the AEM payments.

The relevant baseline which affects payment calculation may be based on Statutory Management Requirements (SMRs), Good Agricultural and Environmental Conditions (GAECs) or the specific Codes of Good Agricultural Practice for AEMs, issued in some MS. There could be additional baseline requirements at the national/regional level. Finally the common practice used in every country could be used as baseline. The relevant baseline practice must be taken into account when calculating payments in the AEM measures, since it is the difference between the baseline and the AEM commitment which determines the level of the agri-environmental payment.

When using the Practices approach it is again the individual practices that arise from an RD commitment that provide the base for the comparison with the baseline requirements. Although all regulative measures hold when implementing an Agri-environmental measure, not all of them influence payment calculations. For example, baseline criteria for the scheme of Protection of Nitrogen Vulnerable Zones in GR are derived from the local Special Action Plans issued by the Ministry for the Environment, Planning and Public Works, in compliance to the Council Directive 91/676/EEC concerning the protection of waters against pollution caused by nitrates from agricultural sources (which forms part of the Statutory Management Requirements of the cross compliance framework).

When using the Balance sheet approach, we are considering the non-applicant as following the usual practice and complying with all baseline requirements and then proceeding with comparison between the applicant and the non-applicant, as in the case of organic farming where the baseline used is the common practice implemented in each country. In Table 5 one can find some of the baseline criteria applied in CZ for the Agri-environmental measures such as growing of catch crops and pastures.

Table 5: Examples on Baseline requirements

Type of baseline	Description	Baseline practice	RD commitment
SMR	Specific requirements on storage, handling and application (period, method, location) of manure and fertilisers (specific obligations for nitrates).	An interval without any growth during annual crops cultivation is required to be limited because of the elimination of increased risk of nutrient elutriation according to Nitrate Directive	Applicant shall sow annually a specified catch crop (defined types of possible / recommended seeds in defined amount = kg/ha) within the crop rotation on a specified area and a set deadline
Additional Baseline	National statistics (consumption of mineral fertilizers per 1 ha of agricultural land)	The typical/general fertilisation level = 80 kg N/ha (mineral)	The average annual application of fertilizers may be at most 80 kg N/ha (the limit encompasses application of fertilizers, farm manure and livestock grazing). At least 5 - 55 kg N/ha of each land block need to be supplied annually by grazing livestock, which means limitation of mineral fertilizers application and at the same time a decrease of livestock density.
Additional Baseline	National statistics	Average intensity of animal rearing on permanent grassland = 1.5 LU/ha	

2.1.4. Definition of cost/revenue components

In the Balance sheet approach there is a direct comparison between a sample of farms participating in a scheme with another sample of farms that did not participate in the specific AE measure similar, in the sense of the cropping and breeding patterns. Cost and revenue components for both situations accrue from statistical data (FADN database or other).

In the cases where there is no representative or reliable sample of AE scheme participants available. There is a need to resort to the variant in the Balance sheet approach; the partial budgeting variant. Using as a starting point a sample of non participant farms conversion factors to specific cost and revenue elements are applied. These conversion factors accrue from cases studies, research reports, literature and stakeholders consultation.

In the Practices approach every practice is related with a specific change in costs or in revenues or in both. For example, the practice of reduction in the use of N fertilizers in the scheme 'protection of NVZs in GR results to a reduction of the amount produced . This amount multiplied by the price of the product results to the related revenue losses (SE 135 in Table 6). The practice includes also reduction of the quantity of fertiliser applied, which in turn multiplied by the price of fertiliser results to the reduction of fertilizer cost (SE 295 in table 6 below).

In order to facilitate the use of the AGRIGRID methodological tools, an attempt was made to use the FADN nomenclature, as much as possible, in all methodologies proposed. It is a commonly used classification system, well known all over the EU and MS policy making community. An indicative list of such cost and revenue elements used in the calculation processes can be found in Table 6 below.

Table 6: List of costs/revenues elements based on FADN classification

Production (Yield * Price)
SE131 Total output
SE135-Total output crops & products
SE140-cereals
SE145-protein crops
SE150-potatoes
SE206 Total output livestock and livestock products
SE220 Beaf and veal
SE230 Sheep and goats
SE235 Poultry meat
SE256-Other output
Income
SE410-Gross Farm Income
Gross Margin
Standard Gross Margin
SE415 Farm Net value added
Costs
SE270-Total Inputs
SE281-Total specific costs
SE285-seeds and plants
SE295-fertilisers
SE305-other crop specific costs
SE336-Total farming overheads
SE340-machin.& build. current costs

SE350-contract work SE356-other direct inputs **SE365-Total external factors** SE370-wages paid SE375-rent paid SE380-interest paid **Subsidies** **SE605 Total subsidies** SE610 Total subsidies on crops SE615 Total subsidies on livestock

2.2. Transaction costs

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.

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.

The following cost items can be included in the calculation of transaction costs

- Information seeking.
- Provision of technical advice and other advisory services.
- Increased management efforts.
- Certification costs.

The opportunity cost of the additional time farmers have to spend

- for detailed bookkeeping
- Participating to meetings with advisors or
- Training courses.

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, as the preparation of nutrient management plans. Similar costs like information seeking, increased management efforts, certification and marketing costs were considered as additional costs. In other cases, costs like seeking advice, detailed book-keeping as

well as participating to meetings with advisors or training are considered as transaction costs.

A solution to that is to consider as transaction costs all cost elements that accrue before the incorporation to the measure and those raised after the signing of the contract and the implementation of the measure by the farmer to be considered as additional costs.

The payment levels imposed were the ones set by the Regulation (20% of the rest of the calculated potential aid.

An example of the calculations for transaction cost is taken from the Greek agri-environmental measures where a detailed calculation for transaction cost is performed. In that case, transaction cost are considering the costs for preparation and submission of the application (document collection, validation, etc) plus legal and other expenses. With an average of 15 hectares per farm, transaction cost is estimated at 10 Euros per 5 years or 2 Euros per year (See Table 7).

Table 7: Transaction cost calculations

	Not based on calculation of sub-elements	**Based on calculation of available sub-elements**						
	Aggregated amount	Sub-element 1:	Sub-element 2:	Sub-element 3:	Sub-element 4:	Sub-element 5:	Equation	Value
		SE370 Wages paid	days of work	legal fees	years of contract	average hectares per farm		
Data source								
Transaction cost		**30**	**3**	**60**	**5**	**15,0**	=[(S1*S2)+S3]/S4/S5	2,00
Total transaction cost								**2,0**

2.3. Payment differentiation

Payment differentiation can be made according to various criteria. Using spatial criteria one can identify at least three categories of differentiation. For the first category of payment differentiation administrative criteria prevail. In this category payment differentiation is based on administrative units such as NUTS II and NUTS III or administrative –geographically specific differentiation such as the coherent areas.

In the next category, within the spatial framework, is the one where environmental criteria are used. This could be used for measures targeted towards specially designated areas, based on EU or national/regional legislation. Differentiation

elements in this category are river basins under the Water Framework Directive. (60/2000) , Nitrate Vulnerable Zones (Dir. 91/676), Natura 2000 sites (Dir. 89/407, 92/43), Less Favoured Areas (Dir 75/268) (with high altitude, steep slopes , relief, latitude, accessibility or other permanent handicaps) or other type of designated, sensitive and Protected Areas (National or Regional).

In the third category of spatial differentiation the criteria of categorisation is agronomic. In this category the classification used is based on land fertility and/or soil quality with differentiation elements such as degree of fertility, vulnerable soils.

The second broad classification criteria are the structural characteristics of a farm. Economic size classes are first encountered in that group, since there are cases where there is a scaling of payment according to the farm economic size. A variance of this classification system could be the size classes of the UAA managed by the farm

Next category of differentiations is the one called land use/type of farming in its broad sense. Differentiation according land use contains classes as

- arable land	- fieldcrops
- land under permanent crops	- horticulture
- pastures	- grazing livestock and
- heterogeneous agricultural areas	- set-aside/ not used for agricultural production

Specific crop grown / animal bred is the last in the farm structural classifications with the more numerous levels. This type of differentiation could include more general categories as

- cereals	- Horse
- other field crops,	- Cattle
- vegetables and non-perennial fruit and	- Sheep
- permanent crops	- Goat
	- Pig
	- Poultry

but also very narrowly defined elements such as crop varieties or animal breeds as well as end products as receivers of payment amount thus subject to individual calculations. E.g.

- Durum Wheat	- Dairy cows
- Soft Wheat	- Burlina
- Maize	- Rare breeds
- Rye	- Lithuanian Ash-Grey cattle
- Barley	- Lithuanian White-Backed cattle
- Oats	
- Rice and	- Lithuanian Rufous cattle and
- Other cereals	- Lithuanian Black and White cattle

The next type of differentiation uses general agronomic differentiation criteria termed production process specifications. This category is consisted of elements of specific technical choices in the planning level such as type of propagation material and seeding frequency, specific practices in the management level such as the method of fertilisation with the differentiation elements of fertirrigation, or conventional fertilisation.

2.4. Calculation of cost / revenue components

2.4.1. Balance sheet approach

The Balance sheet approach is applied in the agri-environmental measure of Organic farming. The selected examples for the application of the grids are organic farming in the Czech Republic (CZ) and Introduction and maintenance of organic farming in Germany (DE).

2.4.1.1 Organic farming in CZ

Organic farming scheme in CZ is separated in four different sub-measures -managed here as four payment differentiation categories:

- Arable land,
- Grassland,
- Permanent crops (orchards, vineyards) and
- Vegetables and special herbs.

The baseline for organic farming is the common practice existing in the country. That means that for baseline is considered every farm that does not participate in the scheme and has the same cropping or breeding patterns.

a. arable land

In arable land the payment calculation is based mainly on the determination of Gross margin (GM) for individual farming methods (conventional farming (CF) and organic farming (OF)) and their comparison. At the end they add the costs of catch crops and increased application of farmyard manures (Practices approach).

To define GM for arable land in CF were selected three main crops covering 45% of total arable land (wheat, barley and rape) and their GMs area averaged by the weighted average where their acreage in total arable land is used as weight. The same process is used for the calculation of GM in OF where six main crops with highest acreage were used (wheat, spelt, rye, barley, oats and triticale). Final GMs for both CF and OF are based on simple average of calculated GMs in particular 3 of 4 years period. Finally the calculated payments according the balance sheet approach is the difference between GMs. The final payment is the total income foregone where in the

GM differences we add the costs of catch crops and increased application of farmyard manure calculated according the practices approach.

b. grassland

In grassland payment calculation is based mainly on the determination of GM for CF and OF and their comparison. In this case there are not any additional costs. GM is calculated only for cattle categories with market production (milk, meat).

GM has been determined as the simple average of four weighted averages of GMs for two cattle categories with market production (dairy cows and cattle for fattening) and LU numbers were used as weights. Total income foregone is equal to the difference between GMs while for the final payment the income foregone must be recalculated per hectare of grassland using the corresponding livestock density.

c. permanent crops

The payment calculation for permanent crops is based on the comparison of GMs for two farming systems, for vineyards and orchards, separately, and a simple average of the two GMs differences create final payment for organic permanent crops.

d. vegetables and special herbs

The payment calculation for vegetables and special herbs is based on the difference between GMs of organic and conventional vegetable production for three main crops carrots, onions and cabbage. Total income foregone is calculated as the weighted average of GMs differences between CF and OF for these three main crops where the weight is the size of their cultivated area in organic farming.

2.4.1.2. Introduction and maintenance of organic farming in DE

Organic farming in DE is differentiated between the type of beneficiary (introduction and maintenance of OF) and between type of farming and type of crops (arable land, horticulture, vegetables and permanent crops (fruit and berry orchards)). Payment calculations in DE are done on basis of most representative organic farm types and products. There are some methodological differentiations between the payment calculations of vegetables, arable land and permanent crops. Baseline also in this case is the common practice applied in the country.

Cost-benefit analysis, comparison of gross margins of reference crop rotations with a typical crop rotation of organic farming, comparison of gross margins of conventional and organic farming

In *vegetable production* payment levels are done for two most common species carrots and cabbage. During the first two years of introduction, organic products can exclusively be sold as conventional ones. Therefore total gross margins are composed of different amounts and proportions of conventional and organic products. Differences between introduction and maintenance refer to marketed yields, mean prices, variable machine costs and labour requirements. Yield levels for introduction

of organic farming are calculated on basis of weighted mean yields of target yields on organic farms and initial yields on conventional farms. Yield levels for maintenance of organic farming are approximately 10% lower; contrarily prices are more than doubled.

In *arable farming* calculations are based on a crop rotation within a purely arable farm. Introduction and maintenance are different in terms of prices for organic products, variable costs and labour effort. For introduction of organic farming it needs to be considered that during the first two years organic products can exclusively be sold with conventional prices. Yield levels for introduction of organic farming are calculated on the basis of weighted mean yields of target yields on organic farms and initial yields on conventional farms. During the first two years of introduction, organic products can exclusively be sold as conventional ones. Therefore total gross margins are composed of different amounts and proportions of conventional and organic products. Yields and prices for maintenance are those which organic farms obtain.

In *permanent crops* viticulture and fruit production serve as examples for payment calculations since they obtain high importance among them. Calculations are carried out under consideration of additional costs (negative value) and saved costs (positive value). Equal difference values are assumed for introduction and maintenance with reference to costs for marketing and participating in organisations and institutions. These costs are different between viticulture and fruit production. During the first two years of introduction, organic products can exclusively be sold as conventional ones. Reductions in yields are exclusively considered to 2/3.

2.4.1.3. Calculation process in Balance Sheet approach

The measure of organic farming in CZ was chosen as a real case study for the grid development in the balance sheet approach because of its representativeness of the approach.

The steps described earlier in the logic diagram were followed for the creation of the grids. The first step was the definition of the measures commitments and the relevant baseline. The commitment here is organic farming and the relevant baseline is considered the conventional farming (CF) for vegetable production. Next step is the identification of relevant to the commitment practices. OF affects a lot of management and farming practices, hence it is not possible to attribute specific cost and revenue changes to each one of them, which is why a direct comparison between average Gross Margins of farms under organic scheme and conventional ones was used for the payment calculation.

The next step was the selection of relevant differentiation categories and elements. In the specific case study all payments were differentiated according to the crop type and farms cultivated with arable crops, grassland, permanent crops and vegetables and special herbs received varying payments. For simplicity reasons the first differentiation element was chosen for example for the calculation process the one of arable farming.

The payment calculation is based on the determination of Gross Margin (GM) for both of these farming methods (OF and CF) and their comparison. To define GM for arable land in CF, three main crops (wheat, barley and rape) were selected, covering around 45% of total arable land. Their GMs were averaged by the weighted average while their acreage in total arable land was used as weight. For the definition of GM in OF, in order to keep the same share in organic arable land, six main crops with highest acreage were selected (wheat, spelt, rye, barley, oats and triticale) covering around 46% of organic arable land.

Final GM for arable land for OF and CF are based on simple average of calculated GMs in particular years. Those are the GMs of three years for CF (2001, 2002 and 2004) while in the case of OF four years there were covered (2001 to 2004). Data source for costs of individual crops is FADN.

Next step is the identification of cost and revenue elements for these crops. In OF there are lower yields compared with CF because of the exclusion of intensifying factors and of different cropping structure. Also the price for certified organic products is higher than conventional ones. First cost element identified is the higher labour costs because of increased manual work and higher costs for work organization because of higher rate of agro-technical measures to control weeds, diseases and pests. Other costs elements identified are higher cost for certified seeds in OF and lower cost for crop protection and fertilizers.

The calculation of cost and revenue components is the next step, in order to obtain Gross Margins for OF (AEM situation) and CF (Baseline situation) for these crops. In the lowest level of calculations (level 5), revenue is calculated by multiplying the crop yield by the price and the calculation for costs are the sum of cost seeds, fertilizers, crop protection, other direct material and other direct cost and services. Spreadsheets were used the FADN codification for costs and products, starting with the calculations from wheat in CF, repeating for the rest of the products in CF and then for OF (See Table 8 and 9).

Table 8: Example of Revenue calculation in Balance sheet approach (level 5)

Total output					
	Not based on calculation of sub-elements	**Based on calculation of available sub-elements**			
	Aggregated amount	Sub-element 1:	Sub-element 2:	Equation	Value
		crop yield	sale price		
Data source		**FADN**	**FADN**		
K121 Durum wheat		**5,9253**	**3095**	=S1*S12	**18339**

*Data for arable land in the Baseline situation (CF), for the year 2004. Data for barley and oilseed rape, were not available at this level of calculations.

Table 9: Example of Costs calculation in Balance sheet approach (level 5)

Costs								
costs, saved costs, additional costs	Not based on calculation of sub-elements	Based on calculation of available sub-elements						
	Aggregated amount	Sub-element 1:	Sub-element 2:	Sub-element 3:	Sub-element 4:	Sub-element 5:	Equation	Value
		SE295-fertilisers	SE285-seeds and plants	SE300-crop protection	SE356 Other direct inputs	SE340 Machinery & building current costs		
Data source		**FADN**	**FADN**	**FADN**	**FADN**	**FADN**		
K121 Durum wheat		**2489**	**1460**	**2178**	**169**	**1612**	=S1+. .+S5	**7908**

*Data for arable land in the Baseline situation (CF), for the year 2004. Data for barley and oilseed rape, were not available at this level of calculations.

The outcomes of these calculations goes to an upper level (level 4) where revenues minus costs gives us the GM of each product in OF and in CF. By multiplying every GM by the share of crop for the particular year and cultivation method, for example 56.06% for wheat, 21.83% for barley and 22.1% for rape in 2001 for CF, the calculations for the weighted average GM is performed for both situations, OF and CF (see Table 10).

Table 10: Example of Gross Margin calculation in Balance sheet approach (level 4)

Gross Margin in Baseline Situation (Weighted Average)								
	Not based on calculation of sub-elements	Based on calculation of available sub-elements						
	Aggregated amount	Sub-element 1:	Sub-element 2:	Equation	Value	Sub-element 3:	Equation	Value
		Revenue in Baseline Situation	**Costs in Baseline Situation**		**Gross Margin**	**ratio on agricultural area (%)**		
Data source	**FADN / VUZE**	Revenue - costs (level 5)	Revenue - costs (level 5)			**SCO**		
K121 Durum wheat		**18339**	**7908**	=S1 - S2	**10431**	**56,68**	=GM*S3%	**5912**
K123 Barley	**11329**				**11329**	**24,98**		**2830**
K132-331 Oilseed rape	**11096**				**11096**	**18,34**		**2035**
Weighted Average Gross Margin								**10777**

In the next level (level 3), the calculation is performed of the simple average of the three weighted averages of GM for CF and the simple average of the four weighted averages of GM for OF that were calculated in level 4 (see Tables 11 and 12). The final level of calculation (level 2) is the calculation of total income foregone which is the GM differences between OF and CF (see Table 13).

Table 11: Example of calculation of W.A. G. M. in Balance sheet approach (level 3)

Gross Margin in Baseline Situation (Weighted Average)						
	Not based on calculation of sub-elements	**Based on calculation of available sub-elements**				
	Aggregated amount	Sub-element 1:	Sub-element 2:	Sub-element 3:	Equation	Value
		G.M. in year 1	**G.M. in year 2**	**G.M. in year 4**		
Data source		G.M. Average (level 4)	G.M. Average (level 4)	G.M. Average (level 4)		
Gross margin (W.A)		**9277**	**6195**	**10777**	=(S1+S2+….)/n	8749,82
Weighted Average Gross Margin						**8749,82**

Table 12: Example of calculation of W.A. G. M. in Balance sheet approach (level 3)

Gross Margin in AEM Situation (Weighted Average)							
	Not based on calculation of sub-elements	**Based on calculation of available sub-elements**					
	Aggregated amount	Sub-element 1:	Sub-element 2:	Sub-element 3:	Sub-element 4:	Equation	Value
		G.M. in year 1	**G.M. in year 2**	**G.M. in year 3**	**G.M. in year 4**		
Data source		G.M. Average (level 4)	**FADN/ (CSO - shares)**	**FADN/ (CSO - shares)**	**FADN/ (CSO - shares)**		
Gross margin (W.A)		**5147**	**4976**	**3398**	**8103**	=(S1+S2+..)/n	5406,034
Weighted Average Gross Margin							**5406,03**

Table 13: Example of G.M. differences calculation in Balance sheet appr. (level 2)

Gross Margin Differences								
	Not based on calculation of sub-elements	**Based on calculation of available sub-elements**						
	Aggregated amount	Sub-element 1:	Sub-element 2:	Equation	Value	Sub-element 3:	Equation	Value
		Weighted Average GM in Baseline situation	**Weighted Average GM in AEM situation**			**transformation coefficient**		**Recalculation**
Data source		W.A. G.M. (level 3)	W.A. G.M. (level 3)					
Differentiation categories								
Arable land		**8750**	**5406**	=S1-S2	**3344**	**1,00**	=S3*Val	**3344**
Pastures		**12557**	**8147**		**4410**	**0,60**		**2646**
Permanent crops		**88170**	**47387**		**40783**	**1,00**		**40783**
Horticulture		**90527**	**60061**		**30466**	**1,00**		**30466**

* Transformation coefficient is for pastures since the calculation were in LU and has to be recalculated per hectare of grasslands using the corresponding livestock intensity. The value of intensity = 0.6 LU/ha of grassland was used for that.

Finally, by following the same procedure for all differentiation categories in level 1, we have an overview of the calculations (see Table 14).

Table 14: Example of calculation in Balance sheet approach (level 1: Overall results)

Calculated payments according to Balance sheet approach				
Differentiation category	**Land use/ Type of farming**			
Differentiation element	**Arable land**	**Pastures**	**Permanent crops**	**Horticulture**
Data source	GM differences (level 2)	GM differences (level 2)	GM differences (level 2)	GM differences (level 2)
Gross Margin Differences	**3344**	**2646**	**40783**	**30466**
Calculated payments according to Balance sheet approach	**3344**	**2646**	**40783**	**30466**

Grids were further modified according to data derived from 'Introduction and maintenance of organic farming' in DE for more integrated results.

2.4.2. Practices approach

Practices approach is applied in the agri-environmental measure of protection of Nitrate Vulnerable Zones. This measure is applied only in GR and has three sub-measures two of which is in our interest for the development of the grids. The relevant Baseline for this measure is the National legislation that defines the fertilizing treatment through plans of action for nitrate vulnerable zones.

2.4.2.1. Sub-measure 1: Set- aside of irrigated crops and reduction of N fertilizers

In this sub-measure can identified three different practices. First practice can be identified is Set- aside in 25% of the irrigated land. Second practice is reduction of N fertilizers in the rest of the area and the third practice is the environmental management plan. There is also transaction cost included in the calculations.

In the first practice of set-aside in 25% of irrigated land there are two differentiation categories according the type of crop and administrative land division. Under each of these differentiation categories there are several differentiation elements such as cotton, maize under the Type of crop and NUTS II Regions (North Greece, Thessaly etc.) under Administrative land division.

For each one of these differentiation elements the payment calculation is based on Standard Gross Margin (SGM) which is an estimator of Gross Farm Income (GFI). Through SGM we calculate the reduction in revenues because of seizing in production over 25%.

In the second practice of reduction by 20% of N fertilizers in the rest of the area we can identify four differentiation categories; type of crop, administrative land division, land characteristics and planning and management. The differentiation elements under Type of crop are wheat, maize, cotton, tomatoes and potatoes while under Administrative land division are NUTS III Regions (Thessalonica - Pella - Emathia plain areas, Strymona's river basin, Pinios river basin in Helia prefecture, Arta' s - Preveza' s valley, E. Thessaly, W. Thessaly, Plain areas of lake Kopaida). Under the differentiation category of Land characteristics there are elements of fertility class (medium fertile, infertile) and under Planning and Management are elements for fertilization method (solid fertilization, fertirrigation).

For each one of these differentiation elements we calculate the reduction in revenues caused by the change in fertilization treatment and also because of the consequential change in the cost of fertilizers. The calculation in this case was based in a mathematical model which combines natural, technical and economic parameters. The calculations are accomplished in two levels. In the second level data from the model are entered for the revenue losses [(Crop yield in the baseline situation – Crop yield in the AEM situation) multiplied by the sale price of the product] and for cost gains of the reduced use of fertilizers [(N requirements in baseline situation – N requirements in AEM situation) multiplied by the price of the fertilizer].

In the third practice of Environmental management plan there is an aggregated amount based on calculations for preparation, observation and updating of the plan. The calculations based on data provided by official documents.

Transaction cost is calculated based on the costs for the preparation and application of the application and cost for legal expenses.

The presumed environmental benefits are the reduction over 25% of irrigation water, the overall reduction of N fertilization up to 43% and the rational use of biodiversity and natural resources.

2.4.2.2. Sub-measure 2: Crop rotation, reduction of N fertilizers and field margins

In this sub-measure we can identify four different practices. The first practice is crop rotation in 20% of the land with a non irrigated crop. The second practice is uncultivated field margins in 5% of the land. The third practice is reduction of N fertilizers in the rest of the area (same practice as for the sub-measure 1. The last practice is again the environmental management plan. Also in this sub-measure are included calculations for transaction cost same as sub-measure 1.

In the first practice of crop rotation in 20% of the land and the second practice of uncultivated field margins up to 5% of the eligible area there are two differentiation categories according the type of crop and administrative land division. Under each of these differentiation categories there are several differentiation elements such as cotton, maize under the Type of crop and NUTS II Regions (North Greece, Thessaly etc.) under Administrative land division.

The difference between the two sub- measures as far as it affects the calculations is the revenue gains from the cultivation of a non irrigated crop in the 20% of the eligible area. The calculation for these gains is again based on SGM.

The presumed environmental benefits are the reduction over 25% of irrigation water, the overall reduction of N fertilization up to 23% and the rational use of biodiversity and natural resources.

2.4.2.3. Calculation process in Practices approach

The measure of protection of sensitive in nitrate pollution in GR was chosen as a real case study for the grid development in the practices approach.

The steps described earlier in the logic diagram were followed for the creation of the grids. The first step was the definition of the measures commitments and the relevant baseline. The commitment here is reduction of N fertilizers and the relevant baseline is derived from the local special action plans issued by the Greek State in compliance to the Council Directive 91/676/EEC of 12 December 1991 concerning the protection of waters against pollution caused by nitrates from agricultural sources (SMR).

Next step is the identification of relevant to the commitment practices. In the 1st sub-measure we can identify two practices related with this commitment which are set-aside on 25% of the irrigated land and reduction over 25% of the N fertilisers use in the rest of the area. For example for the calculation process was chosen the second practice.

Next step is the identification of cost and revenue elements for that practice. There are lower yields compared with the baseline because of the reduction in the use of N fertilizers. The cost element identified is the lower cost for fertilizers.

The next step was the selection of relevant differentiation categories and elements. In the specific practice payments were differentiated according to type of crop, administrative land division, land characteristics and planning and management. For simplicity reasons was chosen for example two differentiation categories for a specific crop in one area. The differentiation elements under the differentiation category of Land characteristics there are elements for fertility class (medium fertile, infertile) and under Planning and Management are elements for fertilization method (solid fertilization, fertirrigation).

The calculation of cost and revenue components is the next step. In the lowest level of calculations (level 2), revenue is calculated by multiplying the crop yield change (crop yield in baseline situation – crop yield in AEM situation) by the price of the crop. The cost of fertilizers is calculated by multiplying the N requirements change (N requirements in Baseline situation – N requirements in AEM situation) by the price of the fertilizer. Calculations were based in a mathematical model of combination natural, technical and economic parameters (Rozakis et al, 1998).In excel sheets were used the FADN codification for costs and products (see Tables 15 and 16). It is important here to notice that according the fertilization method and the fertility class the produced yield is different.

Table 15: Example of revenue calculation in Practices approach (level 2)

SE135 Total output crops & products							
25% reduction of N fertilisers in the rest of the area		**Not based on calculation of sub-elements**	**Based on calculation of available sub-elements**				
		Aggregated amount	Sub-element 1:	Sub-element 2:	Sub-element 3:	Equation	Value
			Crop Yield in Baseline Situation	Crop Yield in AEM Situation	Sale Price		SE135 Total output crops & products
Data source			**model**	**model**	**model**		
differentiations							
differentiation 1	differentiation 2						
Land characteristics	Planning and management						
Medium Fertility	Solid fertilization		**4500**	**3928,2**	**0,3**	=(S1-S2)*S3	**172**
Medium Fertility	Fertirrigation		**4500**	**3907,1**	**0,3**		**178**
Infertile	Solid fertilization		**3500**	**2743,1**	**0,3**		**227**
Infertile	Fertirrigation		**3500**	**2740,9**	**0,3**		**228**

Table 16: Example of costs calculations in Practices approach (level 2)

SE270 Total Inputs							
25% reduction of N fertilisers in the rest of the area		**Not based on calculation of sub-elements**	**Based on calculation of available sub-elements**				
		Aggregated amount	Sub-element 1:	Sub-element 2:	Sub-element 3	Equation	Value
			N requirements in baseline situation (kg per ha)	N requirements in AEM situation (kg per ha)	sale price of fertilisers		SE295 Fertilisers
Data source			**model**	**model**	**model**		
differentiations							
differentiation 1:	differentiation 2:						
Land characteristics	Planning and management						
Medium Fertility	Solid fertilization		**504**	**382,5**	**0,15**	=(S1-S2)*S3	**18,23**
Medium Fertility	Fertirrigation		**360**	**270**	**0,5**		**45,00**
Infertile	Solid fertilization		**643,25**	**482,4**	**0,15**		**24,13**
Infertile	Fertirrigation		**459,5**	**344,3**	**0,5**		**57,60**

The outcomes of these calculations goes to an upper level (level 1) were revenues minus costs multiplied by the area eligible for the practice gives us the income foregone (see Table 17).

Table 17: Example of calculation in Practices approach (level 1)

Calculated payments according to Practices approach							
25% reduction of N fertilisers in the rest of the area		**Not based on calculation of sub-elements**	**Based on calculation of available sub-elements**				
		Aggregated amount	Sub-element 1:	Sub-element 2:	Sub-element 3:	Equation	Value
			SE135-Total output crops & products	*SE270-Total Inputs*	*% of the total area*		*SE410 Gross Farm Income*
Data source			practice 2-level 2-output	practice 2-level 2-input			
differentiations							
differentiation 1:	differentiation 2:						
Land characteristics	Planning and management						
Medium Fertility	Solid fertilization		**171,54**	**18,225**	**75**	=(S1 – S2)*S3%	**115**
Medium Fertility	Fertirrigation		**177,87**	**45**	**75**		**100**
Infertile	Solid fertilization		**227,07**	**24,1275**	**75**		**152**
Infertile	Fertirrigation		**227,73**	**57,6**	**75**		**128**

With the same procedure we continue in the analysis for the rest of the practices of the commitment following by the other commitments of the measure.

3. **Data sources**

For the calculation of AE payments can be used from data retrieved from FADN, national/regional statistics, national/regional administrative documents and cases studies, consultancy and research reports. Reports from advisory and consultancy services either public or private can also be used. Finally, short ad hoc surveys can be proven also a valuable tool for achieving the information needed.

Responsible organisations vary, with most common being the research institutes, associations, national statistic offices, national/ regional agencies and ministries, as well as data from colleges and universities. Other data sources can be scientific literature, expert studies or expert knowledge.

Most of data sets are issued annually while some are renewed twice a year, every two or three years even every few years, irregular but repeatedly or even once.

The spatial aggregation is recommended to be municipal level and even farm or method level. Specific aggregation levels can be used such as supported area level, protected area level and process level. Finally, for less detail, there is the national /regional level.

4. Implementation and application of payment limits and RDP requirements

According the EU Regulation 1698/2005, there is a limit for AE payments to a maximum of EUR600 per hectare for annual crops, EUR900 per hectare for specialized perennial crops, EUR450 per hectare for other land uses and EUR200 per livestock unit for local breeds in danger of being lost to farming.

Limitations in AE payments may be applied because of limited budgeting or a large number of farms entering AEM schemes. Additional limitations to EU requirements could be based on the maximum area for support, on the maximum amount per holding or even a gradual payment according the farm size.

Other payment limitations in agri-environmental measures could be by applying specific eligibility criteria as for example limitations in the maximum number of hectares which can be entered into the different sub-measures.

5. Conclusions and remarks

The procedure proposed for the creation of the calculation grids is a rather complicated one, for both approaches used. This complexity was considered necessary because of the nature of the AEMs.
Since the beginning of the application of AEMs, EU policy makers recognised the need for discretion of their national/regional counterparts in the design process. The reasons were the difference in the environmental situation and agricultural structures in the MS. These two have been the main sources of differentiation in the design of AEMs together with the difference in the administrative functions and procedures. Due to the differing environmental conditions, the same problems could have different causes. For example, nitrate pollution could be caused by overgrazing in one case and excessive use of nitrate fertilisers in another. This fact, apart from the differences of the agronomic practices necessary to be employed in order to mitigate the problem, also affect payment calculations, the selection and assessment of relevant baselines, for instance. On the other hand, the same farming practices could result to exert negative pressure to different environmental elements. For example, the main environmental impact of overgrazing in plain areas is nitrate pollution of waters while in mountainous regions this is not a very important aspect, especially in comparison to the soil erosion problems caused by the excessive number of grazing animals.

The second source of variation for AEMs was the vast difference among the structural characteristics of the farming sector both within the EU as a whole as well as in the national and regional level, among regional and locally prevailing farming systems. A continuum starting from highly intensive systems (like vegetable greenhouses) to simple extensive systems (like free range cattle raising and non – irrigated olive groves) can illustrate the variety of conditions. Vast differences in the number of farming households, the UAA per farm as well as their economic size is another element of the picture (See Table 18).

Table 18: Number of UAA per farm and number of holding in EU

	Utilized agricultural area (1 000 ha)	Number of holdings (1 000 holdings)	UAA per holding (ha)
	2006	2005	2005
EU-27	182 103	14 479	11.9
Belgique/België	1 382	52	26.9
Bulgaria	5 190	535	5.1
Česká republika	3 566	42	84.2
Danmark	2 699	48	53.6
Deutschland	16 951	390	43.7
Eesti	762	28	29.9
Éire/Ireland	4 307	133	31.8
Elláda	3 254	834	4.8
España	25 359	1 079	23.0
France	29 538	567	48.6
Italia	14 710	1 729	7.4
Kypros/Kibris	169	45	3.4
Latvija	1 856	129	13.2
Lietuva	2 791	253	11.0
Luxembourg	129	2	52.7
Magyarország	5 809	715	6.0
Malta	10	11	0.9
Nederland	1 899	82	23.9
Österreich	3 240	171	19.1
Polska	15 957	2 477	6.0
Portugal	3 767	324	11.4
România	14 117	4 256	3.3
Slovenija	491	77	6.3
Slovensko	1 939	69	27.4
Suomi/Finland	2 301	71	32.1
Sverige	3 150	76	42.1
United Kingdom	16 761	287	55.4
EU-25	162 796	9 688	16.0
EU-15	145 404	5 843	21.4

Source: EC, 2008 Agriculture in the European Union - Statistical and economic information 2007. 2.0.1.2 Basic data - key agricultural statistics.
http://ec.europa.eu/agriculture/agrista/2007/table_en/2012.pdf

In addition, the different administrative mechanisms, active in policy making as well as policy implementation processes which both influence the actual policy outcome, a complex system is described.

Following these general observations concerning the complexity of AE measures and their calculation process, a series of specific conclusions are mentioned.

Baseline criteria.

In order to calculate payments, some agronomic hypothesis on which AEM were based on were used. Consequently, the baseline used had to be of an agronomic

nature. Policy designers placed more emphasis on the environmental consequences of their choices as to which of the available alternatives they would choose to promote. On the other hand, existing EU or national regulatory documents, providing baseline information for AEMs, were mainly focused on the aspects of the baseline criteria. Hence the problem is to translate environmental or agronomic baseline criteria, provided by policy designers, to concrete economic figures.

Each MS, using the increased degrees of freedom left, has implemented the Cross compliance provisions (GAECs throughout the EU, SMRs only for the old member states) in a different manner. In addition, in certain member states, codes of Good Agricultural Practice, specifically for AEMs, were already in place and should be taken into account. The result is that, although a common framework existed, the locally implemented Cross Compliance and CGAP sets of obligations that could be used in the calculation process, for the definition of baseline criteria, also varied (Dimopoulos et al, 2006, Farmer, 2007). The selection of relevent, locally adopted cross compliance or Good agricultural practice provisions, has been one of the necessary but tedious steps of the calculation process.

The problem of data availability will be analysed later but it is worth noticing here that it was more acute in the case of baseline criteria assessment.

Differentiation criteria

The environmental focus of the measures studied made necessary the use of payment differentiation criteria in addition to the ones usually used, i.e. administrative, economic. These were not considered sufficient for the environmental issues concerned. Payments were differentiated depending on whether the farm was within the limits of a Natura 2000 site, Nitrate Vulnerable Zone or High Nature Value areas. In some cases there was a differentiation according to the specific protected or sensitive area the holding was active in, e.g. the specific local action plans in the Nitrate Vulnerable Zones provided for different baseline N-fertilisation levels. As a consequence, the payment was differentiated. An additional complexity was that the majority of the data are available on administrative bases.

Data availability and appropriateness.

This section is concerned mainly with economic data, since the environmental ones have been already dealt with above. There are various dimensions in the lack of appropriate economic data inventory.

The inappropriateness of data has to do first with small samples as in the case of organic farms. Poor inference statistics results may create problems which could be solved by comparing the results obtained with existing studies or even by conducting specific rapid surveys (via telephone, e-mail) or resorting to expert knowledge. Obsolete, or rather not adequately updated, data can be another problem. Expert opinions and stakeholder consultation could be used in order to mitigate the problem.

The level of data detail could be another issue e.g. availability of the averages for a whole region or area instead of farm level data. The use of assumptions as a solution for this problem should be balanced the need to use the more detailed data possible bearing in mind the existing high variation.

A specific recommendation concerning data gathering resulting from the above remarks is that during the design of the AEMs, economic (as well as the other) assessment of these should be born in mind. The development of a reliable data collection system is an essential part of the overall policy design.

General remarks

In a situation as complex as is the case of AEMs, policy makers and administrators tend to adopt measures which are easier to implement. Proposed innovative schemes that could be not easily monitored requiring complicated calculations for their design and assessment are not very popular.

This is the main argument for the usefulness of the calculation grids proposed through the specific project. The proposed methodological grid for the calculation of AE payments as well as the software will enable policy makers at all levels of administration to overcome the problem of complexity, increase their flexibility and thus allow them to adopt innovative measures.

Policies, in general, affect decisions of actors. Agricultural policy, part of which are the AEMs under examination, affect farmers' and land managers' decisions, which in turn concern land use and management practices (Bockstaller et al, 1997, Oñate et al., 2000, Girardin et al, 2000, Primdahl et al, 2003, Peschard et al, 2004). Therefore the agronomic hypothesis assumed in order to design AEMs, led to direct the emphasis towards farming practices as the main element for the calculation process. However, in some particular cases, where sufficient data existed and the difficulty to attribute the changes of economic components was great, the different approach used, the balance sheet approach allowed for a sufficiently good coverage of the range of varying needs.

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Annex 1. List of Agri-environmental measures in participant MS/ regions

Table A1. Agri-environmental programmes in participant MS/regions

MS/Region	Measure	Sub-measure
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 A1. Agri -environnemental programmes in participant MS/regions (cont.)

MS/Region	Measure	Sub-measure
		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 bio-technical 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 A1. Agri -environnemental programmes in participant MS/regions (cont.)

MS/Region	Measure	Sub-measure
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 A1. Agri-environmental programmes in participant MS/regions (cont.)

MS/Region	Measure	Sub-measure
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 horticultural 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 A1. Agri-environmental programmes in participant MS/regions (cont.)

MS/Region	Measure	Sub-measure
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 A1. Agri-environmental programmes in participant MS/regions (cont.)

MS/Region	Measure	Sub-measure
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 A1. Agrienvironnemental programmes in participant MS/regions (cont.)

MS/Region	Measure	Sub-measure
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

Annex 2. List of practices in Agri-environmental measures

Undertaking type	Sub-classification
Input use	
(pesticide)	Zero use
	Reduced use
	Restriction on type of product
	Restriction on method/timing of use
	Restriction on zone of application
	Use of infective thresholds
	Use of insect traps
	Requirement to use pesticide
(fertiliser)	Zero use
	Reduced use
	Restriction on type of product
	Restriction on method/timing of use
	Restriction on zone of application
	Manure use requirements
	Manure disposal restrictions
	Use of seaweed and other fertilisers
(lime)	Restrictions on use of lime
	Restrictions on method of use
(water)	Cessation of irrigation
	Reduction in irrigation
	Restriction on method of irrigation
	Watering requirement
	Watering restriction
(energy)	Restrictions on use of energy

Undertaking type	Sub-classification
Use of grassland and rough land	
	Stocking limits
	Grazing management specifications
	Removing stock for a few years
	Removing stock for seasons
	Restrictions on type of stock
	Specification of breed to be used
	Rearing farm breeds under threat
	Restrictions on supplementary feed
	Specification of method of feeding
	Prohibition of surface disturbance
	Seeding restrictions
	Seeding requirements
	Controlled burning of vegetation
	Prevention of burning
	Mechanical control of invasive plants
	Clearance of scrub and trees
	Hay production requirement
	Other vegetation production
	Grass cutting requirement
	Requirement for number of cuts
	Limitations on grass cutting dates
	Specification of grass cutting method
	Limitations on use of machinery
	Maintenance of old orchards
	Avoid abandonment

Undertaking type	Sub-classification
Cultivation of arable and permanent crops	
	Specification of crop type
	Specification of crop variety
	Saving seed of variety under threat
	Spacing seed drills
	Varying seeding rates
	Mulch seeding
	Limit use of growth regulators
	Undersowing cover crops (inc. grass)
	Scheduling of cultivation activities
	Ploughing restrictions
	Techniques to minimise erosion
	Perennial lay requirement
	Use rotation measures
	Harvesting limitations
	Retain stubble after harvest
	Allow weeds to grow after harvest
	Limitations on use of machinery
	Cultivation to avoid abandonment
	Cessation of arable use

Undertaking type	Sub-classification
Farm administration and planning	
	Identification of historical sites
	Identification of archaeological sites
	Identification of historical landscapes
	Identification of landscape features
	Monitoring of wild fauna
	Monitoring flora/vegetation condition
	Attain permissions for activities
	Map environmental aspects of farm
	Nutrient management planning
	Grassland management planning
	Other environmental farm planning
	Soil and other sampling
	Adherence to organic organisation
	Adherence to IP organisation
	Adherence to other organisation
	Record use of inputs
	Record other farm practices
	Requirement to attend training

Undertaking type	Sub-classification
Landscape conservation	
(whole fields)	Prevent topographical changes
	Use sloped land
	Maintain terracing
	Create new terracing
	Undertake works to cause flooding
	Raise water table
	Cause land to flood
	Cause seasonal flooding
	Prevent new drainage
	Reduce drainage efficiency
	Restrictions on works in soil or rocks
	Set-aside: creation of biotopes
	Set-aside: protection of water quality
	Set-aside: land management
	Maintain abandoned farmland
	Re-farm abandoned land
(field margins)	Create unsprayed strips
	Maintain unsprayed strips
	Create uncultivated/buffer strips
	Maintain uncultivated/buffer strips
	Create beetle banks
	Maintain beetle banks
	Create stone walls/fences
	Maintain stone walls/fences
	Create hedgerows
	Maintain hedgerows
	Create banks
	Maintain banks
	Create ponds, scrapes, pits
	Maintain ponds, scrapes, pits
	Create biotope zones
	Maintain biotope zones
(trees)	Regeneration of farm woodlands
	Maintain unused woodland
	Maintain farm woodlands
	Use grazing to maintain fire breaks
	Maintain single trees
	Pollarding and pruning
(other)	Other conservation activities

Annex 3. List of costs in Agri-environmental measures

Measure 214	
Cost Components	FADN Code (where applicable)
Total Inputs	SE270
Total specific costs	SE281
Seeds and plants	SE285
Fertilisers	SE295
Manure	
Chemical fertilisers	
Crop protection	SE300
Other crop specific costs	SE305
Soil/leaf/water analysis	
Feed for grazing livestock	SE310
Concentrated feedingstuffs for grazing livestock, purchased	F64
Coarse fodder for grazing livestock, purchased	F65
Feedingstuffs for grazing livestock, produced on the farm	F68
Feed for pigs & poultry	SE320
Other livestock specific costs	SE330
Veterinary fees	
Medicines	
Total farming overheads	SE336
Machinery & building current costs	SE340
Current upkeep of machinery and equipment	F61
Upkeep of land improvements and buildings	F78
Energy	SE345
Motor fuels and lubricants	F62
Contract work	SE350
Other direct inputs	SE356
Other farming overheads	F84
Wages paid	SE370
Opportunity cost of family work	
Rent paid	SE375
Interest paid	SE380
Land improvements	
Planting material	
Purchase of manure	
Purchase of chemical fertilisers	
Olive fly (*Dacus olea*) traps	
Purchase of fodder for animals	
Moisture meters	
Flow meters	
Variable machinery costs	
Other direct material costs	
Livestock depreciation	
Establishment of cover- and catchcrops	
Establishment of meadows	
Establishment and management of headlands	
Establishment and management of filter strips	
Establishment of temporary grasslands	
Preparation of throwaway crops	

Fencing	
Conversion costs	
Seed greening	
Irrigation	
Fertirrigation	
Spreading of manure	
Nutrient removal	
Manure treatment	
Management of phosphorus in livestock manure	
Soil analysis	
Leaf analysis	
Water analysis	
Manual weed control	
Tillage	
Removal of stumps	
Removal of rocks	
Ploughing	
Hoeing	
Plugging	
Harrowing	
Tedding	
Forage chopping	
Milling of straw	
Raking	
Mowing	
Alignment	
Haymaking hand	
Haymaking mechanized	
Rolling	
Collection	
Transportation	
Worming and haulage	
Storage costs	
Selection of sprouts	
Pruning	
Thinning	
Care of under tree area	
Care of area between rows	
Maintenance of temporary grassland	
Improvement of degraded pastures	
Repairing of terraces	
Management of road verges	
Maintenance of natural levees	
Maintenance of adequate water level	
Identification of biodiversity on farm	
Management of biological and landscape diversity	
Keeping the production environment clean	
Ecological improvement of the area	
Cutting to preserve the structure and the composition (e.g. on buffer zones)	
Removal of grass	
Additional costs for catchcrops	

Management efforts	
Operation costs	
Supervision of animals	
Veterinary services & medicines	
Additional farm management	
Residue monitoring	
Computer prognoses for pesticide application	
Annual technical inspection of pest control equipment	
Monitoring of farming practices	
Monitoring of cultivation	
Certification costs	
Supervision	
Cost for IP work group meeting	
Control board costs	
Environmental management plan	
Preparation of cultivation plan	
Cultivation plan software	
Pasture turnover plan	
Feeding plan	
Labour costs due to conversion	
Opportunity cost of family work	
Marketing costs	
Other direct costs and services	
Interest on tenant’s capital	