Agri-environment Measures

Overview on General Principles, Types of Measures, and Application

European Commission

Directorate General for Agriculture and Rural Development

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1 Introduction

1.1 Aim of the report

This report is based on the agri-environment sections of a selection of mid-term Rural Development reports by Member States/regions[1], a selection of literature in the field, and informal contacts with experts. It aims to give an early overview on agri-environmental measures applied in the 2000-2006 Rural Development programming period. There were limitations on what could be achieved, not least because the information contained in many of the mid-term reports on uptake and impacts is limited. A comprehensive picture of the effectiveness and efficiency of agri-environmental measures will be available from the evaluation study on agri-environmental measures for which work has started in the beginning of 2005.

The report starts by providing some background on agri-environment measures, describes the sort of commitments they involve, examines some obstacles to effective measures, and then gives an account of the information available on environmental impacts of measures. It then looks briefly at the question of efficiency of measures. Finally, it enumerates key points arising out of past experience which were taken into account in preparing the Rural Development reform package of July 2004.

1.2 What are agri-environmental measures?

Agri-environment measures are designed to encourage farmers to protect and enhance the environment on their farmland. It provides for ***payments to farmers in return for a service*** – that of carrying out agri-environmental commitments that involve more than the application of usual good farming practice. Farmers sign a contract with the administration and are paid for the additional cost of implementing such commitments and for any losses of income (e.g. due to reduced production) which the commitments entail. Agri-environment payments are co-financed by the EU and the Member States with a contribution from the Community budget of 85 % in Objective 1 areas and 60 % in others..

Agri-environment measures may be ***designed at national, regional or local level*** so that they can be adapted to the particular farming systems and environmental conditions, which vary greatly throughout the EU. This makes agri-environment a potentially precise tool for achieving environmental goals.

Agri-environmental measures are diverse, but broadly speaking, one could say that each measure has at least one of ***two broad objectives: reducing environmental risks***

[1] Included were: Belgium, Denmark, some German regional programmes, Spain, France, Ireland, Italy, Luxembourg, the Netherlands, Austria, Portugal, Sweden and some UK programmes. The others (Finland, Greece and the remaining German and UK programmes) had to be excluded because of limitations on time and linguistic resources.

associated with modern farming on the one hand, and ***preserving nature and cultivated landscapes*** on the other hand.

How these two objectives are expressed in measures depends on the area in question. For instance, in areas with intensive agricultural production measures are often focused on reducing environmental risks (e.g. reducing fertiliser or pesticide inputs, planting winter cover to reduce nitrate leaching etc), but there may also be measures designed to protect nature (e.g. the leaving of winter stubbles in intensive arable areas to provide food for birds). By contrast, in more extensive farming areas, the main environmental risk is generally linked to land abandonment, resulting from the abandonment of labour-intensive traditional farming practices important for the preservation of nature. In such areas measures tend to focus on continuing or re-introducing traditional farming practices with a view to nature protection (e.g. mowing grass rather than grazing it; maintaining hedgerows, etc). But in extensive areas there may also be measures designed to reduce environmental risks e.g. limits on fertiliser applications to grassland. Irrespective of area, there are clearly many measures which will have positive impacts both in reducing environmental risks with respect to soil and water and in protecting nature e.g. maintenance of hedges.

Agri-environment commitments have to go ***beyond usual Good Farming Practice (GFP).*** Usual Good Farming Practice is defined as encompassing mandatory legal requirements and a level of environmental care that a reasonable farmer is expected to apply anyway. They are compiled in Codes which Regions draw up and submit to the Commission with their Rural Development Plans. This means that a farmer can only be paid, for instance, for environmental commitments that go *beyond* statutory requirements defined in his regional Code of GFP. More broadly, in application of the Polluter Pays Principle[2], a farmer may not normally be paid to conform with environmental legislation in place.

2 Background to agri-environment measures

2.1 Development of agri-environment measures over time

Agri-environment measures began in a few Member States in the 1980s on their own initiative, and was taken up by the European Community in 1985 in Article 19 of the Agricultural Structures Regulation[3], but remained optional for Member States. In 1992 it was introduced for all Member States as an "accompanying measure" to the Common Agricultural Policy (CAP) reform. It became the subject of a dedicated Regulation[4], and Member States were required to introduce agri-environment measures "throughout their territory". In 1999, the provisions of the Agri-environment Regulation were incorporated

[2] Article 130R of the Treaty.

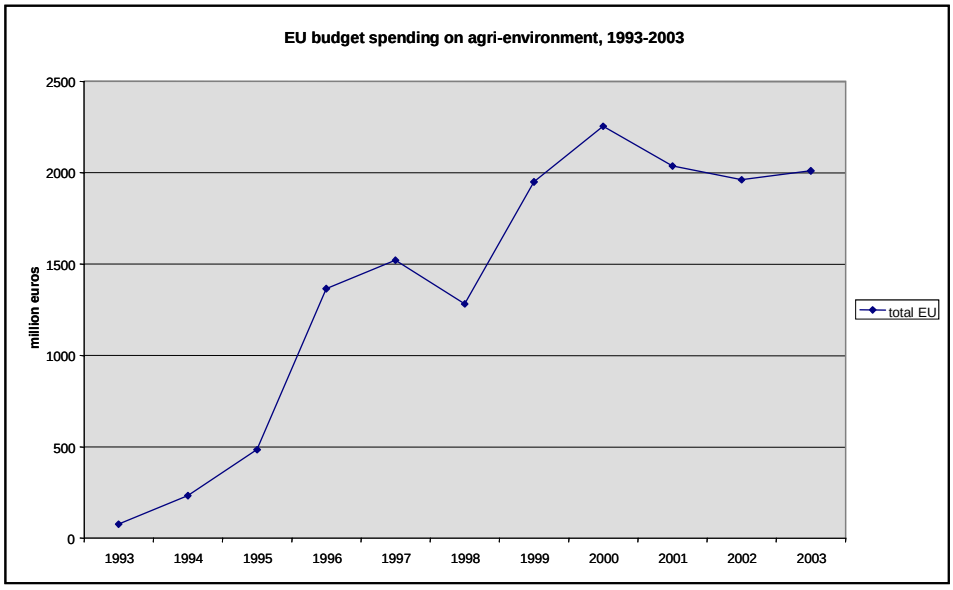
[3] Council Regulation (EEC) No 797/85 of 12 March 1985 on improving the efficiency of agricultural structures, OJ L 093, 30.3.1985, pp 1-18.

[4] Council Regulation (EEC) No 2078/92 of 30 June 1992 on agricultural production methods compatible with the requirements of the protection of the environment and maintenance of the countryside, OJ L 215/85 30.6.1992.

into the Rural Development Regulation[5] as part of the "Agenda 2000" CAP reform. The aim of their incorporation was to help achieve coherence within Rural Development Plans.

Spending on agri-environment has progressed rapidly. **Figure 1** shows the evolution of Community budgetary spending on agri-environment since 1993. The total spending on agri-environment is in fact significantly higher as Member States have to add their cofinancing part of 15 % in Objective 1 areas and 40 % in others. In addition, some Member States also choose to pay for state-aided agri-environment measures. The slight dip in Figure 1 after the year 2000 is due to a rather slow start in some Member States' new agri-environment programmes under the Rural Development Regulation (1257/99).

Figure 1: Trends of Community expenditure on agri-environment (1993-2003)

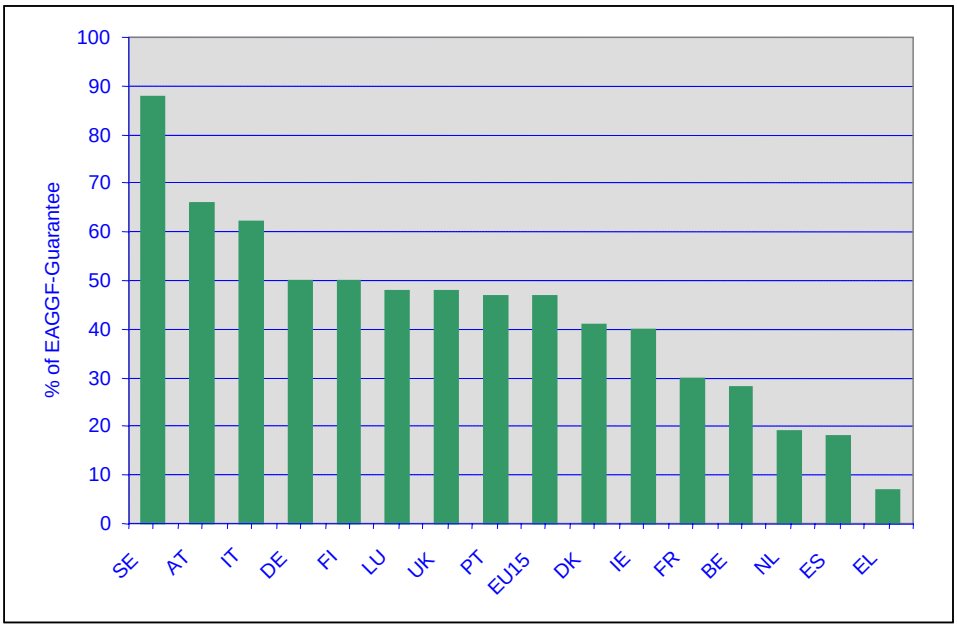


Source: EAGGF Guarantee section, budget execution.

Figure 2 below shows the share of expenditure in agri-environment in the total rural development budget. The role of AEMs payments varies considerably from one Member State to another. For instance, in Sweden, Austria and Italy, expenditure for the AEMs is much higher than the Community average, ie. 50% of EAGGF Guarantee expenses, while Belgium, Spain, the Netherlands and Greece hardly reach 30%.

[5] Council Regulation (EEC) No 1257/99 of 17 May 1999 on support for rural development from the European Agricultural Guidance and guarantee fund (EAGGF), OJ L 160, 26.6.1999.

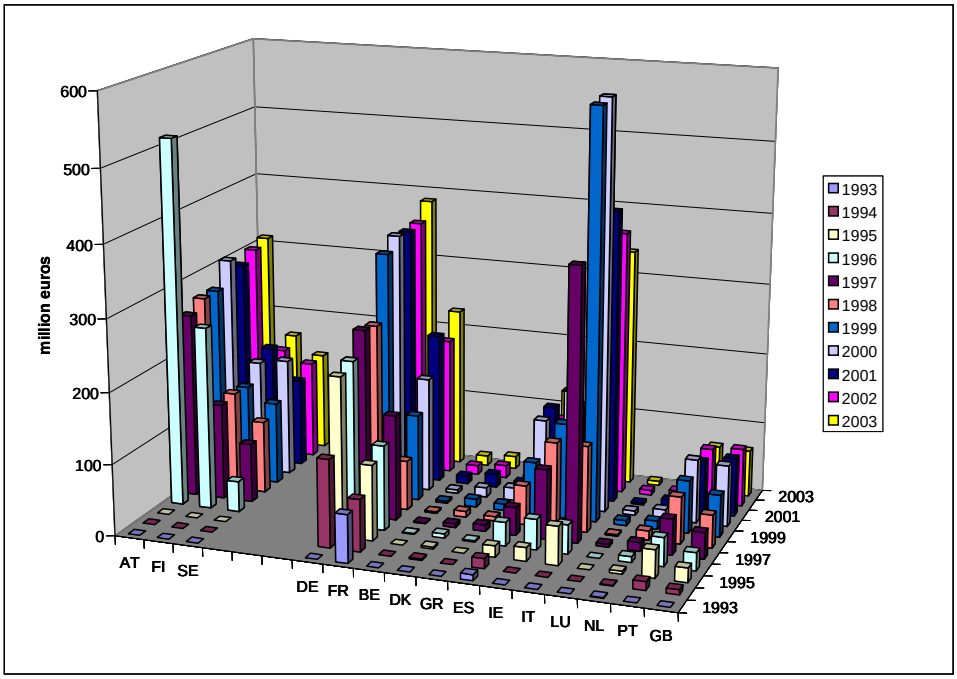
Figure 2 - Share of agri-environmental measures in rural development expenditure (EAGGF-Guarantee section) - average 2000-2003



Source: EAGGF Guarantee section, budget execution.

Because agri-environment started in some Member States earlier than others, and because it is a flexible instrument allowing a wide degree of choice to Member States and Regions, uptake was uneven between Member States for many years as shown in **Figure 3**.

Figure 3: Agri-environmental EU expenditure 1993-2003 by Member State

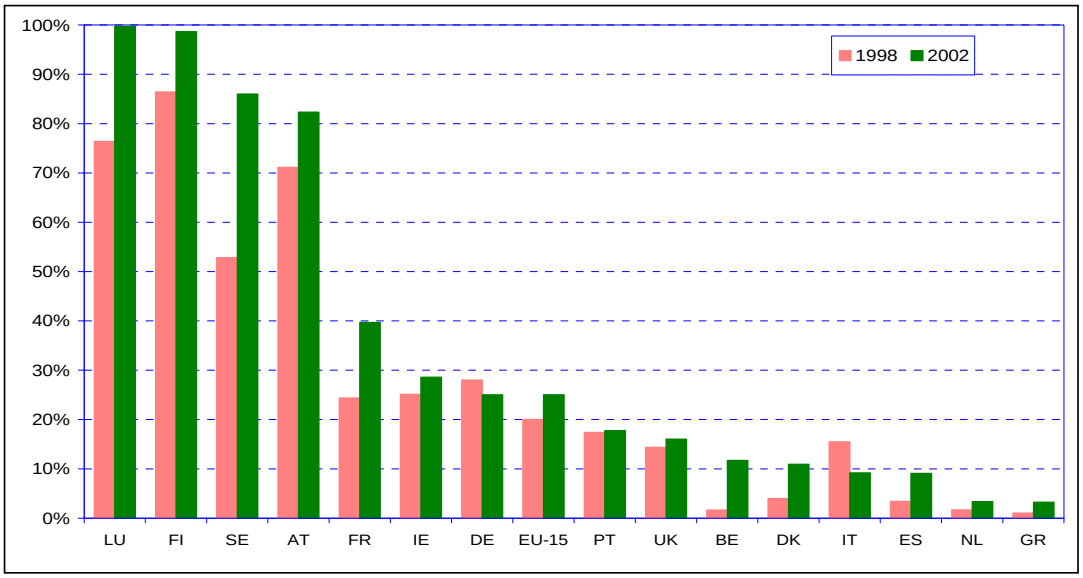


Source: EAGGF Guarantee section, budget execution

To a significant extent these differences remain and are not accountable for exclusively by differing sizes of agricultural area, number of farmers, or needs, but also reflect differing attitudes to agri-environment. It needs to be borne in mind that some Member States' spending appears particularly low because their own contribution to spending, which is not included in this Figure 3, is significantly higher than those of other Member States.

In the last few years there has been a noticeable increase in the area of land covered by agri-environmental contracts in most Member States. Figure 4 shows trends in the share of agricultural land enrolled in agri-environment measures as a proportion of total utilised agricultural area (UAA), from 1998 to 2002. The total area now covered by agri-environment contracts in the 15 older Member States is about 25% of the UAA.

Figure 4: Trends in share of agricultural land enrolled in agri-environment measures in total UAA[6] 1998-2002



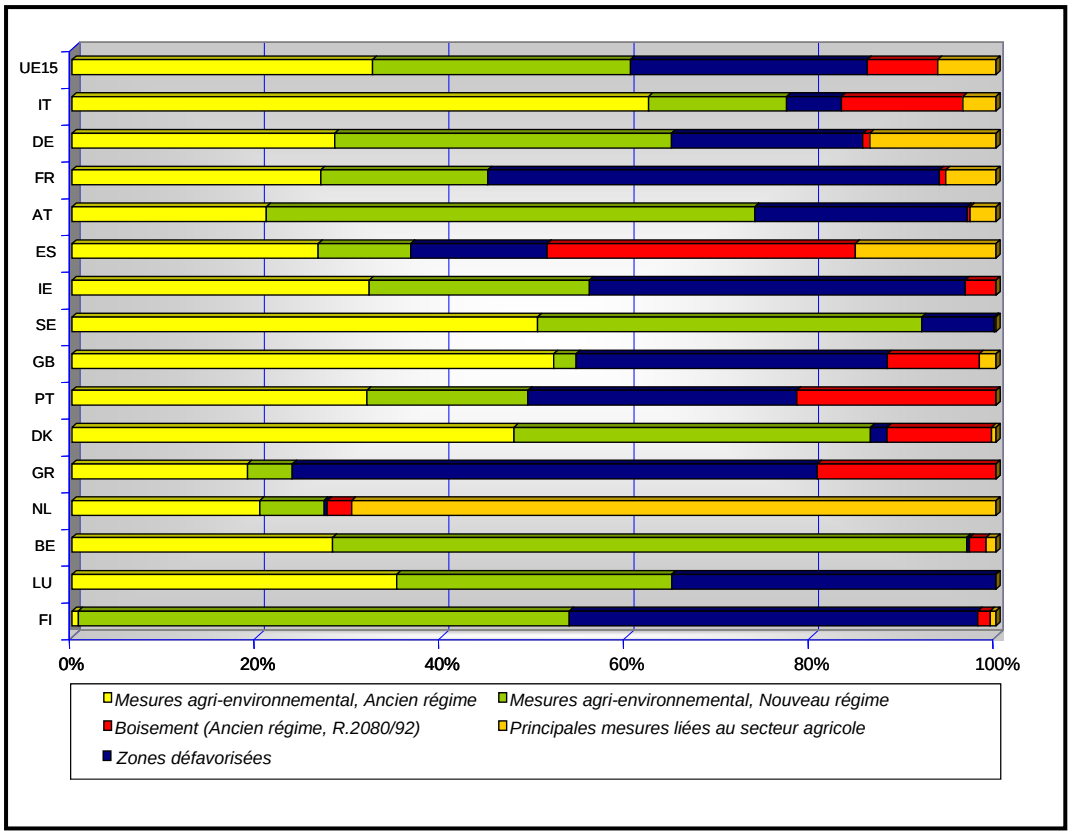
Source: DG Agriculture, Common indicators for monitoring of implementation of Rural Development Programmes 2001, 2002. Note: The figures includes agri-environmental contracts under the predecessor Regulation (EC) 2078/1992 and contracts signed in 2000-2003 under the current Regulation (EC) 1257/1999.

From its early days as an optional measure, agri-environment has developed into a key part of Rural Development Policy, being now the only compulsory measure for Member States in the Rural Development Plans.

Figure 5 shows the share of the main important rural development measures in total expenditure (EAGGF Guarantee section) in the "old" MS[7]. On average in the period, the share of existing agri-environmental schemes (Regulation 2078/92) is still important, due to the general difficulty to phase in these agreements and implementing the new programmes. **Figure 6** shows the planned allocation of Rural Development Regulation spending by Member States from 2000-2006.[8]

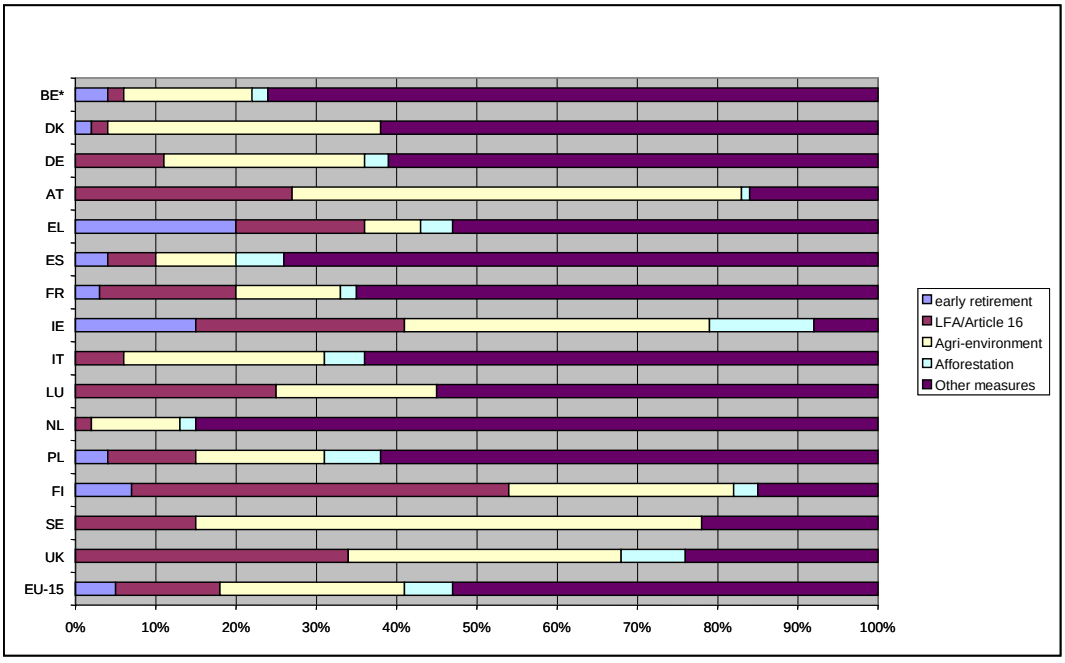
[6] Utilised Agricultural Area
[7] The figures for Flanders were not available.
[8] The figures for Flanders were not available.

Figure 5: Share of expenditure of the 5 more important rural development measures (EAGGF-Gurantee section) 2000-2003



Source: Working document Rural development based on EAGGF Guarantee section budget execution 2000-03.

Figure 6: Planned allocation of RDR spending in Member States, 2000-2006



2.2 Basic principles of agri-environment measures

Agri-environment measures follow a number of basic principles. Many of these principles are essential to the policy achieving its environmental objectives:

a) Agri-environment is optional for farmers, who may choose to sign a contract to carry out one or more measures designed to provide an environmental service. This **optional nature** tends to promote **constructive cooperation and a positive attitude to the environment on the part of farmers**, in which respect it has an advantage over statutory environmental obligations.

b) Agri-environment is a site-specific policy: measures can be tailored to different agronomic and environmental circumstances, which allows for a wide variation in both these parameters throughout the EU and within each Member State. In reflection of their diverse environmental needs, Member States and Regions have chosen to implement the policy in very diverse ways. This **site-specificity enables** agri-environment to be, at best, **a highly refined tool for environmental integration,** able to achieve certain environmental results which are not possible for other instruments. For example, Less Favoured Area (LFA) payments can help avoid environmentally damaging land abandonment, but their requirements are generally defined on a wider geographical scale than those in agri-environmental schemes and their primary objective is not environmental, so their environmental impact is less focused. Similarly, the respect by farmers of Codes of Good Farming Practice certainly has a positive environmental effect, but the environmental requirements, by definition, do not go as far as those for agri-environment measures.

c) The diversity of measures and environmental situations, and the long lead-in time for some of the environmental effects to be perceivable, requires a **structured and long-term approach to monitoring and evaluation.**

d) Agri-environmental contracts compete economically with the most profitable land use, so **payment levels** have to be set sufficiently high to attract farmers to join schemes while avoiding over-compensation. This requires a calculation of appropriate payment levels by Member States.

e) Agri-environment payments may only be made for actions farmers undertake **above the reference level of mandatory requirements** as currently defined by codes of "good farming practice" (GFP)[9]. This ensures the respect of the Polluter Pays Principle which requires that private actors have to bear the costs of rectifying or avoiding damage to the environment.

f) Member States have a wide degree of discretion in how to implement agri-environment measures. This means that wider **contextual and institutional issues** as well as **attitudes** have a great influence on agri-environment measures' uptake and their environmental effectiveness. For instance, **uptake** can be affected by the historical levels of agri-environment in the Member State, the attitude to agri-environment at every level, the knowledge base on agri-environment, the budget available (both the EU contribution and money available for co-financing), and the payment levels for farmers

[9] See end of Section 1.2 above.

selected by the Member State in drawing up its measures[10]. The **environmental effectiveness** of the measures is affected by contextual and institutional factors such as the quality of the scientific basis chosen for the measures, the extent to which the measures are suited to the area in which they are applied, the professional advice farmers receive on how to apply the measures, and the care with which farmers follow this advice. (**Annexed** is a logic diagram which shows the main relationships between these various contextual or institutional factors and the uptake and effectiveness of agri-environment measures).

g) 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.

2.3 Programming

Agri-environment measures are established by Member States or Regions and submitted to the Commission for approval as part of their Rural Development Plans. Sometimes, however, new measures or amendments are submitted during the programming period. The proposed measures are examined in detail by the Commission services to check their conformity with the Regulation. Where necessary, discussions take place between the Commission services and the Member State/Region to see how the measures can be improved. The proposals are then put for an opinion to the Committee on Agricultural Structures and Rural Development (STAR), which is a Committee of Member States' representatives, chaired by the Commission. Once the opinion given by the STAR committee is positive, and following the Commission approval, the measures can be implemented.

Member States and Regions set up agri-environment *programmes* and these are often subdivided into different s*chemes*. Each programme or scheme is made up of a series of *measures*. Programmes/schemes come in many different forms. One of the main differences has been described as "broad brush versus deep and narrow" schemes (sometimes known also as "light green versus dark green" schemes). "Broad brush or light green" schemes tend to include a large number of farmers, cover a wide area, make relatively modest demands on farmers' practices, and pay correspondingly little for the environmental service provided. "Deep and narrow or dark green" schemes tend to be targeted on site-specific environmental issues, therefore include fewer farmers, make more substantial demands on the farmers, and pay correspondingly more for the environmental service provided. Some programmes include both types of scheme, to meet different environmental objectives. Some schemes include both types of measure e.g. by having a low level of requirement for entry to the scheme, but including additional, more demanding measures for farmers who are able and willing to offer more (or higher level) environmental services.

Under the Rural Development Regulation, Member States and Regions are obliged to submit mid-term evaluation reports on their Rural Development Plans by the end of 2003. The

[10] Payment levels can vary substantially from one Member State to another for a range of reasons including differences between sites and the fact that not all Member States pay the full amount of income foregone and costs incurred. Moreover, in the Annex to the Rural Development Regulation, there are maximum ceilings for types of agri-environment payment. In some cases, these ceilings can result in payments below actual costs.

Commission issued guidance including a series of Common Evaluation Questions (see Annex 2). Most of the reports were received by that date with some reports arriving in the first quarter of 2004. A fuller (external) synthesis of the mid-term reports is to be undertaken, but preliminary reading of a considerable number of these reports, supported by an examination of a number of other evaluations, provide the information and analysis set out below.

3 Measures and their objectives:

Impacts of agri-environment measures are complex to analyse. The classical approach to evaluation would be to relate each measure to its environmental impacts, and then to draw some more general conclusions about the impacts of the measures as a whole. This is often not possible as there is insufficient empirical material (including monitoring data) available to relate each measure to the environmental situation observed. It is particularly difficult to isolate the effect of agri-environmental measures from those of the many other drivers that influence environmental outcomes.

What can be done, however, is to provide an account of Member States' and Regions' findings about impacts of a selection of their measures, and draw some more general, if tentative, conclusions on the basis of that. This account of impacts is set out on the basis of impact type – preservation of biodiversity and water quality etc. – rather than on the basis of measure type. This is a logical approach because it is the environmental impacts which are the ultimate objective of the measures.

In order to facilitate understanding about the diversity of agri-environment measures included in the Rural Development Plans, a list of the main categories of measures is set out below. With each category is a brief description of the sort of environmental impact one might expect such measures to have. The real impact might vary from measure to measure, both because of differences in each measure's focus and design, and because of differing local conditions where the measure is applied.

After the section on categories of measures and their expected impacts, the report discusses obstacles to effective agri-environment measures. It then moves on to list actual impacts found to date by type of impact (e.g. on preservation water quality and biodiversity etc).

Below, only the main expected impacts are listed, in order of importance. The relative importance can depend on the detail of the measure in question. Some measures can also have additional minor impacts which are not listed.

3.1 Measures related to productive land management

a) Input reduction: This category of measures includes reductions in fertilisers and plant protection products. When it is part of an "integrated farming" approach, it can also be combined with crop rotation measures. Input use reduction results also from other measures e.g. organic farming. Expected impacts include: securing water quality; enhanced biodiversity and soil quality.

b) Organic farming: This is a clearly defined and controlled approach to farming which incorporates a wider range of measures e.g. input reduction, rotation, extensification of livestock. Expected impacts include: enhanced soil quality, preserving water quality, and biodiversity enhancement.

c) Extensification of livestock: This can be expected to have positive effects on water quality, soil quality, biodiversity, and landscape preservation.

d) Conversion of arable land to grassland and rotation measures: Conversion of arable land to grassland can have positive effects on water quality, water quantity, soil quality, biodiversity and landscape. The impacts of rotation measures are very varied, but if drawn up with clear environmental objectives they can have positive effects on soil quality, water quantity, water quality, biodiversity and landscapes.

e) Undersowing and cover crops, strips (e.g. farmed buffer strips) and preventing erosion and fire: Undersowing and cover crops can have positive impacts on water quality, soil quality and biodiversity. Field strips can be positive for biodiversity, and water quality; they can also help prevent soil erosion. Various other measures can be used to prevent erosion and help prevent forest fires.

f) Actions in areas of special biodiversity/nature interest: Measures to promote biodiversity in such areas are many and diverse and include e.g. postponing mowing dates to protect nests, the establishment of buffer strips, and input reduction. There may be secondary positive effects on water quality and quantity.

g) Genetic diversity: This measure type concerns the rearing of rare local breeds indigenous to the area and in danger of being lost to farming and the preservation of plant genetic resources naturally adapted to the local and regional conditions and under threat of genetic erosion. The intended impact is on genetic diversity but there can be positive impacts on landscape as well.

h) Maintenance of existing sustainable and extensive systems: Many diverse measures cover this objective. The positive impacts which can be expected are on biodiversity, landscape, and in certain cases water and soil quality.

i) Farmed landscape: This measure refers to maintaining farming systems which lead, as a side effect, to characteristic landscapes. Such measures generally have positive impacts on biodiversity. This reflects the fact that much farmland biodiversity is dependent on features which are essential to the particular style of farming in that area, which features also give rise to the traditional landscape.

j) Water use reduction measures: these are designed to preserve water resources by reducing irrigation and/or reducing water loss from the soil e.g. by growing ground cover.

3.2 Measures related to non-productive land management

a) Set aside: Set-aside managed for environmental purposes could be expected to have positive impacts on biodiversity, water quality and soil erosion. Measures include both large areas of set-aside and small ones such as uncultivated field strips. It is worth noting that set-aside, in order to have positive environmental effects, must be implemented according to site-specific circumstances and often needs to be combined with appropriate management (simple abandonment can cause environmental problems.)

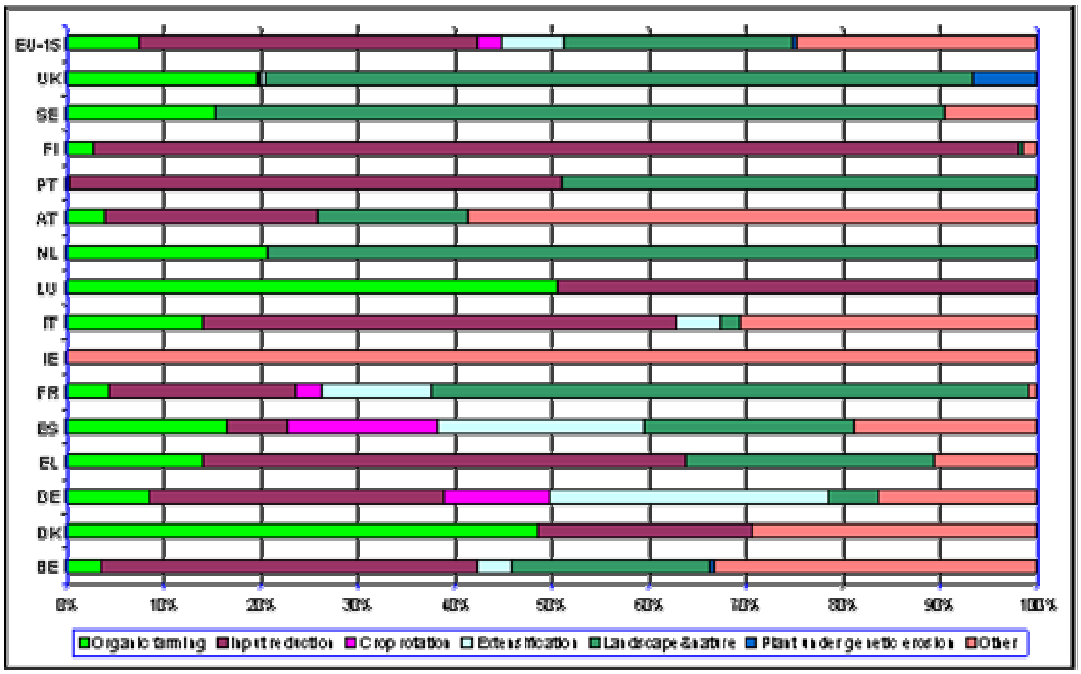
b) Upkeep of abandoned farm land and woodland: This can be expected to be positive for biodiversity by continuing to provide habitats for farming-dependent species of plants and animals, and it will be positive for the landscape. It may also help avoid fires, and this in turn is positive for biodiversity and soil erosion.

c) Maintenance of the countryside and landscape features: This category seeks to protect landscape features such as linear features (hedges, stone walls) and point features (isolated trees, ponds etc.) These measures will very often have positive impacts not only on landscape, but also on biodiversity.

d) Public access: These measures seek to provide access for the public to agricultural land of environmental interest.

Figure 5 shows the breakdown of agri-environmental area by type of agreement. In 2002, the most important types concern the reduction of inputs (including integrated farming) and biodiversity and landscape enhancement, which represent 26% and 15% respectively across the EU-15. 40% of the area under agri-environmental measures is classified in the category "other", including horizontal measures covering wider environmental issues.

Figure 7: Breakdown of area under agri-environment measures by type of action (2002)



Source: DG Agriculture.

4 Impacts of agri-environmental measures

Four general comments can be made by way of introduction to the information in the mid-term reports:

i) Monitoring or other data set do not provide a sufficient basis for a comprehensive account of the impact of agri-environment measures. In many cases impact can only be

derived by referring to results of research projects and studies related to specific issues and areas and then extrapolating the overall impact from up-take figures. Whereas such an approach does not take into account specific circumstances of regions and the application of measures, it provides a reasonable estimated. In any case, there is sufficient material available to be used in an exemplifying way and for illustrative purposes.

ii) Most regions/Member States appear to have made a serious effort to go through the evaluation questions, and to show which of their agri-environmental measures can be *expected* to have an impact on the various environmental items listed (soil quality, water quality, water quantity, biodiversity - including species diversity, habitats and genetic diversity - and landscape). However, in some cases the evaluators have doubts about whether the monitoring is advancing as it should be.

iii) There is quite a lot of information on uptake in the mid-term reports. Uptake figures are a legitimate way of estimating environmental effects provided there is a clear scientific basis for relating the measure to the impact; to use evaluation terminology, output can be a useful proxy for impact. However, it is not always possible to aggregate uptake figures (e.g. when a farmer subscribes to several measures on the same piece of land), or to allocate clear area data to individual measures.

iv) The mid-term reports provide relatively few results from measuring environmental impacts on the ground. This is to some extent to be expected since measures covered are at the most three years in place and many environmental effects are unlikely to be measurable so soon. Some Member States have used existing studies on the relationship between earlier measures and environmental impacts to predict impacts, and, with relatively few exceptions, this is the closest we get to impact measurement in the mid-term reports.

4.1 Soil and Water

4.1.1 Soil quality

There are agri-environmental measures whose objective is to prevent soil erosion, or improve soil quality in all Member States. Some examples are set out below.

To date there are few studies based on the period from 2000 which have measured environmental impacts of such measures on the ground. Exceptions include Piemonte (IT), where research carried out for the Region by the “Istituto per le piante de legno e l’ambiente” shows that measures to plant hedges have had a significant impact on soil erosion. In Austria, it has been shown that direct sowing techniques in maize production have resulted in a 40% reduction in soil erosion (from 70 to 16/t/ha/a).

In Umbria (IT), organic farming techniques have been found to reduce soil erosion on average by 6,8 ton/ha/a. Conversion of arable to grassland is estimated to have resulted in a reduction of 30/ton/ha/a. Many of the measures in Niedersachsen (DE) are designed to have positive impacts on soil quality and erosion, particularly the use of green cover, arable set-aside, and reversion of arable land to grassland (nearly 30,000 has under these measures). Improved soil quality has also been noted on arable land farmed organically. In Bavaria (DE), the vast majority of farmed land is under the agri-environment programme, many of whose measures

are designed to prevent soil erosion. In Flanders (BE), calculations based on detailed scientific knowledge indicate that green cover of the soil reduces soil erosion by at least 50%. Extrapolating from detailed figures for two communes, the mid-term report estimates that, during the period 1999-2002, green cover measures in Flanders will have prevented the erosion of 1 million tonnes of soil.

All Member States also have input reduction measures for pesticides and chemical fertilisers, which have a positive impact on soil contamination. In Piemonte (IT), a combination of soil analysis and modeling have been used to calculate the impact of farming on soil on farms with agri-environment measures and control farms using only Good Farming Practice. This showed considerable reductions of polluting substances in soil for the main crop types analysed. Tables **2** shows that the levels of Nitrogen, Phosphorus and Potassium were generally substantially lower on farms with agreements for vines, rice and maize

Table: Fertilisers in soil: participating farms (AE) and non participating farms (GFP)

	N AE	N GFP	N Diff. %	P AE	P GFP	P Diff.%	K AE	K GFP	K Diff. %
vines	11,64	24,82	-53%	8,9	15,95	-44%	25,62	36,32	-29%
rice	41,17	91,54	-55%	11,75	11,32	+4%	73,9	121,43	-39%
maize	144,74	267,28	-46%	38,3	70,81	-46%	95,48	162,94	-41%

4.1.2 Water quality

There are many agri-environmental measures whose objective is, wholly or partly, to improve or protect water quality e.g. measures to reduce the use of pesticides and fertilisers. Some other measures also have a positive impact on water quality, e.g. measures to reduce soil erosion.

To date, there are no studies based on the period from 2000 which show actual environmental impacts of such measures. It must be borne in mind that impacts on water quality can take a long time to show: in the case of some underground aquifers impacts can take up to 40 years to be visible. However, a number of regions have carried out well-founded extrapolations. For instance, Umbria (IT) has based calculations of the impact of N reduction measures on the evaluation of the programme in the period 1994-98. On this basis, it calculates that, with an average reduction of 54 kg/N/ha/a, the present N-reduction measure has an annual impact for the period 2000-03 of between 2,6 million and 3,1 million kg/N/a. Austria has figures from 1992 to the present day which show an increase in waters with almost no contamination (from 81% to 87% - 1998-2001).

Some of the studies on soil erosion and contamination mentioned above would also indicate expected positive effects on water quality.

4.1.3 Water quantity

There is a number of agri-environmental measures whose objective is to preserve water resources e.g. in France, Spain and Italy.

Uptake figures are a useful proxy for environmental impacts in the case of water quantity measures, provided compliance is controlled and measures are applied in areas where water quantity is a priority issue. Uptake figures from the mid-term reports, however, suggest relatively low farmer interest to date. This would indicate a rather limited overall environmental impact for these schemes, despite the real need for such measures and the availability of contracts for farmers. Low farmer interest might be explained by the fact that many of the measures designed to save water call for substantial changes in farming practices. For instance, in Umbria (Italy), there was very little uptake of measures involving conversion of arable to grassland, with a view to reducing water use. However, there was rather more success with a measure that required reduced water use on existing crops.

The earlier Spanish measures were revised in the RDR to be more exacting on water use. The measures involve a change in crop type and a maximum amount of water use per hectare (verified by water meters). So far, the new measure has only been implemented in Castilla La Mancha, and only in 2003, so data is limited. However, the mid-term evaluation mentions findings from a similar measure under the Agri-environment Regulation: attitudes of farmers were slow to change – many persisted to regard water as a private rather than a public good, and had no clear notion of the value of the environment; the positive impact of the measure on water levels and the related environment was reported to be reduced by the continuing use of illegal boreholes. The evaluators call for a more strategic approach to protecting water resources, of which agri-environment would be a part.

4.2 Biodiversity

4.2.1 Species diversity

There are many agri-environment measures throughout the EU whose objective is to enhance biodiversity. Measuring biodiversity impacts can be particularly complex and costly (see beginning of section 3**).** A number of impacts have been measured, however (including measurements relating to earlier similar/identical schemes).

In England (UK) under the Countryside Stewardship Scheme (CSS) there is evidence of a positive effect on biodiversity, for birds in particular. For instance, cirl bunting populations increased by 82% on land where CSS agreements were targeted at managing the habitat. There are 795 special projects in CSS, some of which specifically target individual species.

In Denmark, the Varde Addel demonstration project has resulted in the return of the corncrake and an increased diversity of grass species; and floral diversity has increased in the environmentally sensitive areas in Mandø and Bornholm.

There is evidence in Ireland from sample surveys that the agri-environment scheme (REPS) has contributed to improved species richness and diversity of both flora and fauna, particularly on field margins and in hedgerows. There is evidence that shows an improvement in bird numbers and diversity. In certain designated areas there is targeting of Red List bird species in REPS through specific actions. There is some experience with hen-harrier protection through REPS.

In Portugal a detailed evaluation of the Zonal Programme of Castro Verde (PZCV) is available in the report. Its biodiversity evaluation considers effects on bird diversity using a survey of indicator species and calculating specific bird richness. While it is too early for results from the present programming period, previous evaluations suggested positive effects.

The Wallonian (BE) RDP has been running for less than three years, but already some positive impacts on floral diversity and wildlife quality of the "late and very late mowing" measure in meadows have been found in surveys (e.g. of plant species in meadows) carried out by an inter-university research group in applied biology (GIREA, Groupement Interuniversitaire de Recherches en Ecologie Appliquée).

In Niedersachsen (DE) the measure on extensive cultivation to provide nutrition for Nordic birds on grassland and arable land has shown positive results: surveys show that birds that over-winter in Nierdersachsen have tended to choose the assisted areas.

In Austria a survey indicates a positive link between the agri-environment measures and bird diversity.

In Italy (Piemonte), biodiversity in agri-environment areas has been measured indirectly by counting the number of birds nesting in artificial nests in these areas. The artificial nests are designed to encourage birds to return to these areas, with a view to attacking insects. Input reduction measures have been shown there to result in increased nesting. Research has also shown that, in rice fields using integrated production methods, the presence of certain useful insects including the dragonfly has increased. These are useful to fight against other insects which damage the crop. In maize fields in the same region, integrated production has resulted in an increase in birds, useful insects, and spiders.

In Rheinland-Pfalz (DE) there is evidence in field margins of significant increases in floral diversity since 1998.

In the UK, there has been sufficient botanical monitoring to establish that Environmentally Sensitive Areas have been successful in maintaining wildlife value on agreement land but there has been little monitoring of non-agreement land to provide a counterfactual.

Decreasing chemical inputs is known to be beneficial for the conservation of fauna and flora. The effects of herbicides on flora are well demonstrated. Decrease in flora as a result of herbicide use has an impact on the abundance and diversity of invertebrate communities. In turn this has an impact on bird communities. Application of some fungicides and insecticides have direct effects on the abundance and diversity of vertebrates and invertebrates. However, the efficiency of input reduction measures depends on local conditions. For this reason the conservation value of the measure depends heavily on the type of plant communities present and on the situation of species that constitute them.

In Ireland there are grounds for asserting that the REPS measures since 2000 have had positive impacts on soil and water quality but a longer timeframe is required to arrive at firm conclusions in relation to species diversity. In Northern Ireland the average input reduction due to scheme participation is between 30-40 %. The survey suggests a link between input reduction through the scheme and increased wildlife.

Some reports on agri-environment start from the point of view of the specific environment needing protecting, rather than from the point of view of the measures in place. For instance, a

report by Birdlife Italy praised the role of the Italian agri-environment programmes in protecting nature, but emphasised that the prescriptions of the measures needed refining with specific species in mind. For example, the Birdlife report pointed out that times of mowing grass and allowing animal grazing are relevant for bird nesting times, and argued that these should be more precisely accommodated in the measures, and that farmers should be paid for any increase in costs. The evaluators considered that long-term set-aside measures were a significant support for biodiversity in intensive areas. They reiterated that land abandonment is a problem in hill landscapes, where the continuation of extensive pastoral systems is essential for the survival of many bird species; the agri-environment measures designed to prevent land abandonment and support traditional pastoral systems play a key role here.

The Netherlands provides data on species diversity which is not specifically related to agri-environmental programmes but which covers amphibians, birds, reptiles, bats and various land mammals. Data on plant species were not available at the time the report was submitted. This data suggests that some species are on the increase and others on the decrease. From this limited account, it is not possible to deduce the impact of the Netherlands agri-environment programme, nor indeed to assess the overall ecological health of the rural areas, as a lot would depend on which species are increasing and which decreasing. That said, it is clear that the agri-environment programme which reduces pesticide and fertiliser inputs is a step in the right direction for biodiversity protection in the Netherlands as all the species in question are sensitive higher concentrations of these products in water.

There is a continuing debate in the Netherlands about the impact of its agri-environment programme on biodiversity. More recent work suggests that the agri-environment measures are helpful, but not always sufficient in the light of pressures on the environment[11].

4.2.2 Habitats

There are many agri-environment measures designed to protect and improve habitats. Measures of impacts relating to habitat protection will often concern species diversity rather than habitats per se. As a result of this, much of the monitoring information on habitats themselves (rather than on species diversity) is in the form of outputs rather than impacts. Some examples of habitat measures and their relation to environmentally valuable areas are given below. Where available, the impacts on species diversity are also given.

In Sweden, bird species including the grey goose and the skylark have increased in wetlands which have been restored with the help of agri-environmental payments.

In Wallonia there are measures concerning headlands and strips of extensive meadows, the maintenance of hedges, extensive old fruit trees, and ponds; and measures involving very late mowing and conservation in wetlands. All these are designed to contribute to the conservation of habitats with high natural value on arable lands and to the development of the ecological network.

In Portugal agri-environment measures have a particular importance in Natura 2000 areas: 39% of all the agri-environment area is within Natura 2000 areas. There is a recognized relationship between the management of these areas and their floristic and faunistic diversity.

[11] See for instance Kleijn, Berendse et al, in Nature, 2002; the NL Ministry of Agriculture's reply; and a follow-up study by Willems, Breeuwer et al of Wageningen University, 2004.

However, a scientific evaluation to affirm that agri-environment contributes to the conservation of High Nature Value (HNV) farmlands compared to control areas has not yet been carried out.

In Northern Ireland (UK) traditionally managed hay meadows are considered HNV. There are specific conservation measures against encroachment within the new Environmentally Sensitive Area (ESA) scheme for controlling scrub, rhododendron, and bracken, but low uptake to date would make any impact so far insignificant. Habitat management in favour of particular species exists for the breeding wader, winter feeding and chough option on around 2000 hectares.

In England (UK) the total area of HNV farmland habitats located within Natura 2000 areas are calculated from the agri-environmental spatial database overlaid with the Natura 2000 boundaries. In the case of the ESA and Countryside Stewardship (CSS) schemes 14% and 22% respectively of agreements lie within Natura 2000 areas. English HNV habitats covered by the CSS which target specified species include lowland heathland (heather based dwarf gorses, and cross leaved heath plant communities with associated specialist animal communities) and inter-tidal habitats (salt marsh vegetated shingle ridges, saline lagoons and mud flats with associated specialist animal communities).

In Ireland one of the key actions under REPS is the maintenance of farm and field boundaries. In particular, the functions of field margins and hedgerows as important habitats for flora and fauna have been identified in research. One research study concluded that on grassland farms the collective species richness of all REPS grassland field margins was higher than that of non-REPS field margins. Another research study has established a positive link between bird species richness and hedgerow quality on REPS farms.

In Northern Ireland (UK), in relation to ecological infrastructure, the ESA baselines were surveyed in 1995 and a resurvey is scheduled for 2005. The Northern Ireland Countryside Survey in 2000 recorded overall declines in ecological boundaries – an example of one of many pressures which agri-environment is designed to help alleviate.

There are a number of different types of measure designed to improve or protect wetlands. None since 2000 provide actual measurements of impacts. However, some provide proxy information. For example, to get a picture of wetland conservation through agri-environment assisted farming in Northern Ireland (UK) survey data have been used to give an estimate of the number of participants and hectares involved in land adjacent to lakes, and buffer zones beside lakes and rivers.

In Wallonia (BE) the measure called “conservation measures in wetlands” provides for the maintenance of farming in wet meadows with very late mowing or very late extensive grazing. This also contributes to the long-term conservation of fauna and wild flora through the maintenance of an ecological network. In Navarra (ES) the agri-environment measure for erosion control plays a role in protecting Ramsar wetland zones.

4.2.3 Genetic diversity

These measures are often quite modest in size, but some nonetheless play a significant part in protecting rare breeds and rare plant varieties. Various examples are set out below.

In Portugal the number of endangered breeds represent about 10% of total livestock units. 11 breeds of cattle, 8 sheep, 3 goat and 2 pig breeds are supported by a specific agri-environmental measure. For cattle, the measure covers a significant proportion of national breeds.

In Germany there are a number of measures relating to the genetic diversity. For instance, in Niedersachsen nearly 7000 endangered animals are supported, of which over 1800 are on EU or international lists of endangered breeds. There is also support for rare plant varieties.

In Austria there has been a significant increase in support for rare breeds of livestock and plants in recent years. Farms protecting plant varieties increased to 1,300 in 2002, covering an area of over 6000 ha. The number of endangered animals supported is now over 18,000.

In Piemonte (IT) there is a significant programme covering several breeds of cattle, goats and sheep, and a total of over 39,000 animals.

Low uptake seems to be a problem in several countries for these measures. For instance, in Navarra (ES) there are two animal breeds supported (1 cattle and 1 equine) but the performance of the scheme seems to be very weak (only a quarter of the programming target is likely to be reached by 2006). In Wallonia (BE) there are two genetic diversity conservation agri-environment measures covering both crop varieties and animal breeds but low farmer interest means the success is very limited. In Luxembourg the measure for the conservation of local endangered breeds targets the Ardennes draught horse, but there were only 8 agreements and 29 animals in 2002. In Ireland there are three animal species (2 cattle and 1 equine) on the FAO List of Endangered Species that are protected under agri-environment. However, interest in the measure seems on the decline (fewer than 80 animals currently).

4.3 Landscapes

There are many agri-environmental measures that refer to the objective of protecting and enhance landscapes. There are close links between landscape measures and habitats as features promoted under the landscape header, such as hedge rows, terraces, isolated trees, ponds etc. are valuable habitats for many species.

Measures to do with linear or point features (such as hedges, terraces, isolated trees, ponds etc) are relatively easy to monitor in that they can be readily quantified. For instance, in the Netherlands in 2002, agri-environment contracts included numerous traditional features such as 16 ha of duck ponds, 448 other ponds, woodland for cover, reed beds on water margins, 22,000 pollarded trees, nearly 10,000 tall trees, rings of trees etc. In Luxembourg a methodology for assessing habitat diversity by measuring the number and length of landscape elements using photography is mentioned in the mid-term evaluation.

Compared to such linear or point landscape features, many other types of measure to preserve or enhance landscapes are more complex to monitor and evaluate. Some regions, however, have answered the landscape questions with by quoting uptake figures rather than attempting any more complex measurement of impact. The report of Bolzano (IT) explains how a long network of footpaths allows the public to enjoy the landscape. It enumerates the measures which contribute to the coherence of the landscape (e.g. permanent pastures, vines often with terraces on steep slopes), and those which contribute to differentiation (e.g. local varieties of cereal, and specific habitat measures).

Except in cases where a landscape type has been categorised at a national or international level, much of the analysis has to refer to the particular landscape objectives of the local programme. For instance, in some cases coherence of the landscape may be the goal; in others, diversity – usually a diversity quite specific to the region; and sometimes both coherence and diversity can play a role together. For instance, in Niedersachsen (DE) the habitats measure was considered positive from a landscape point of view, as it helped maintain cultural identity, against a background of increasingly intensive and uniform agricultural use of land (i.e. it helped maintain a welcome, traditional diversity).

Where landscapes have been categorised by an outside body, the assessment can be easier. For instance, the middle Rhine Valley in Rheinland-Pfalz (DE) was classed as a World Heritage Site by UNESCO. The agri-environment programme contributes to maintaining the traditional landscape in this area.

4.4 Other environmentally relevant issues

In their mid-term evaluations, some Member States quite rightly asked additional questions going beyond the Common Evaluation Questions proposed by the Commission. For instance, France asked questions on air quality. (The impacts found were limited.)

A number of secondary positive environmental effects of agri-environment programmes were noted in reports:

a) Measures had a positive attitudinal and educational impact on farmers joining an agri-environment scheme.

b) Measures increased the agri-environmental knowledge base in the Member States and change the attitudes of those whose job is to train farmers.

d) Good Farming Practice was perceived as a useful way of educating farmers about environmental practices (e.g. Spain). In addition, farmers were obliged to conform with codes of GFP on the whole farm, even if only part of the farm is included in a scheme. They were made aware of environmental directives etc applying on their farm (e.g. Ireland).

Some reports (e.g. France) rightly examine not only the expected impacts of measures themselves but the expected overall impact in view of uptake, targeting or dispersion etc. The point is made that for certain types of measure (e.g. measures referring to water quality) more targeting may be desirable if effects are to be significant.

5 Premia calculation

The calculation of premia is based on cost incurred and income foregone by the farmer for participating in the agri-environmental measure. In duly justified circumstances, an incentive payment of up to 20% may be paid. There are in particular two issues relating to the calculation of payment levels that were taken up in evaluation studies.

The first issue is that premia calculations normally take into account only variable costs or income forgone resulting from the participation in agri-environmental programmes. Some evaluators argue that such an application of the present system is not always adequate. For

instance, in areas under threat of abandonment, the issue of ensuring land management is not one of an extra effort by a farmer who would be anyway farming in an area concerned, but one where the very existence of farming activities is in question. This implies that premia calculations would have to be based on taking into account for the full costs of environmentally desirable land management. With premia, thus reflecting both fixed costs and variable costs, they would be considerably higher than existing ones that cover marginal costs or marginal income forgone, only.

The second issue is the question of the budgetary implication of payment levels based on regional averages. Many Member States and regions have schemes covering a fairly large geographical area, and payment rates which do not vary. This has the advantage of simplicity and low administrative costs, but has the disadvantage of creating infra-marginal producer rents. Therefore, some evaluators raised the issue whether it could be more cost-effective, in certain circumstances, to differentiate payment levels, for instance through auctioning systems.

With respect to this latter, an approach has been pursued in the England Countryside Stewardship Scheme to ask farmers to submit a list of environmental assets on their farm and environmental services they can offer, so that the administration can choose the best value-for-money options. This also enables the administration to target particular environmental features it considers are high priority. Such an approach can be expected to target environmental objectives very efficiently, and could therefore make substantial public savings provided it is used on "darker green" schemes where the higher administrative costs need not form too high a proportion of the overall cost of the scheme. An economic study of agri-environment schemes in the UK found that the Country Stewardship Scheme was a cost-effective way to achieve specific environmental objectives even taking into account higher administrative costs.

6 Key conclusion from evaluation reports and other studies

The follow key points came out of the mid-term reports and other material examined:

i) Key features of agri-environment measures:

- The flexibility of agri-environment measures enables it to meet certain environmental needs which cannot be met by other means. The great diversity of its implementation shows that it is able to respond to very diverse situations on the ground.

- A regional/local level for measure design (when used) makes it easier to meet environmental needs with precision. Member States can introduce agri-environment schemes at the appropriate level, and ensure that they are responsive to local conditions.

- The optional, contractual nature of agri-environment measures makes it an instrument with a high level of acceptance among farmers, and a correspondingly high level of compliance.

- Agri-environment measures serve an educational role in that its existence improves environmental awareness among farmers; they can also help to maintain/regain acceptance for farming among the general public.

- The compulsory nature of agri-environment has helped to ensure a wide application of agri-environment measures throughout the Community. This will also be important in coming years in new Member States who have no tradition of agri-environment, and limited resources with competing demands.

- Agri-environment payments can yield good results in combination with Less Favoured Area payments in particular with respect to fight land abandonment and marginalisation, which is usually environmentally damaging.

- Agri-environmental measures are not meant to solve pollution problems that are normally subject to mandatory standards.

ii) Implications for a successful application of agri-environment measures:

- Agri-environment programmes are demanding as regards the establishment of administrative structures that are suited to managing the complexity of the programme and communicating requirements clearly to farmers. This requires particular efforts in all administrations with responsibilities for agri-environment, not least in the new Member States.

- Because agri-environment measures are very diverse, and because the monitoring of certain environmental effects is intrinsically complex, monitoring and evaluation of agri-environmental measures require a structured and long-term approach. Progress has been made on monitoring and evaluation since 2000 but further effort is needed.

- More work could usefully be done on the efficiency of measures, including an analysis of best practices. New approaches might be explored aimed at achieving better value for money (e.g. differentiating payment levels; tender procedures for the delivery of environmental services).

- In the case of national agri-environmental programmes, proper consultation of regional and local actors and stakeholders is important during programme design and implementation, as well as flexibility in the application of national programmes to local conditions. Introducing regional (rather than national) programmes is another way to ensure sufficient attention is paid to regional and local environmental needs.

- With a view to reinforcing a more strategic approach towards agri-environmental measures, a clearer definition of environmental objectives in programmes will be essential.

- Problems were identified in certain new Member States where fragmented land ownership and short-term rental contracts are excluding many farmers from participating in agri-environmental schemes. One of the solutions brought into the debate was a let-out clause from the five-year minimum contract rule. The appropriateness of this suggestion remains to be analyzed.

- Providing agri-environment services can serve as an interesting income opportunity for farmers engaged in this field.

Context and Drivers of Effectiveness and Efficiency of Agri-environment Measures