The requirements for the diversification of crops and for permanent grasslands have minimal environmental benefits and should be withdrawn.

Ecological focus areas can result in clear environmental benefits but some of the individual measures and terms should be redesigned in order to increase effectiveness.

In order to make the ecological focus areas more environmentally efficient, the connections to other forms of support should be reconsidered.
Abstract

This report is part of the Environment Effects of the CAP project, which is an ongoing intergovernmental mandate for the Swedish Board of Agriculture, the Swedish Environmental Protection Agency, the Swedish National Heritage Board and the Swedish Agency for Marine and Water Management. The mission is to monitor and evaluate the environmental effects of the EU’s Common Agricultural Policy.

The report's main purpose is to develop proposals for improvements and simplifications of the greening of the CAP and to create a basis for decisions on improving environmental conditions in the new CAP reform which will be introduced after the year 2020. The report primarily refers to the conditions in Sweden.
Summary

The purpose of this study is to evaluate the environmental effects in Sweden of the greening policy of the CAP. The results of the study can be used in future CAP reforms after 2020. The analyses have been conducted by assessing the environmental effects, calculating the costs of the measures and evaluating the environmental benefits based upon the farmers applications from 2015. The study aims to promote decisions on more efficient environmental rules for the single payment scheme and provides some proposals for changes.

The requirements for crop diversification result in little environmental benefit and should be withdrawn

The crop diversification requirements have only marginal environmental benefit. Admittedly, the measures cover a large percentage of the arable land and affect many farmers but the actual area where a change of land use is really needed as a consequence of the rules is small; this is due to the fact that the majority of farmers already comply with the requirement to cultivate at least three different crops.

The same applies to the requirement for permanent grasslands

The requirement for permanent grasslands also has limited environmental effects in Sweden. This is because the requirement for conservation and re-establishment does not apply until five percent of the member state’s reference area of permanent grasslands has been converted. This inhibits the possibilities – particularly for those member states with large national reference areas – to quickly steer towards the desired environmental effect of preserving long-term grasslands.

The requirement for ecological focus areas provides the most environmental benefit

The requirement for ecological focus areas (EFAs) results in a greater extent of fallow land, nitrogen-fixing crops and non-cultivated field margins in Sweden. The change of land use of approximately 45,000 hectares of arable land constitutes an increased environmental benefit. These changes have primarily taken place in Sweden’s productive plain districts, where EFAs also provide the greatest environmental benefit.

The individual measures and terms for EFAs should be reshaped

The choice of measure for EFAs determines the extent of the potential environmental benefit. The ways in which the measures for EFAs are designed will decide how interesting they will be to farmers and, therefore, how much of a positive environmental effect can be achieved. In order to have greater control of the claimed EFA, the different forms of EFA (such as the different types of fallow land and non-cultivated field margins) can be given different weightings. These weightings should be adapted so as to provide greater environmental benefit by demanding larger areas of those individual measures with low environmental benefit.

The environmental efficiency of greening is minimal

If we disregard those greening requirements that Swedish agriculture already meets without the need for any changes to be implemented, we are left with an excess of environmental benefit – relative to costs – that can be valued at approximately SEK 15 per hectare. At the same time, the probable transaction costs of greening are expected to amount to SEK 15-20 per hectare. This means that the resulting environmental benefits and the total costs will effectively cancel each other out.
Support coupled to production should be reconsidered, but...

The coupling of direct support to production can, as in Sweden, have certain environmental advantages if it is directed towards more extensive production, such as grazing. In some countries, coupled support has been directed towards more intensive production, such as raising livestock in the stable. Directing the support in this way may lead to an increased density of livestock and greater environmental pressures.

Sweden’s position has been that the transfer of budgetary funds from single payment scheme to the rural development programme improves the accuracy of the policy with regard to environmental benefit. By using agri-environmental payments, we are much more able to direct the environmental measures than with greening or coupled support.

Several adjustments are required if greening is to be more environmentally efficient

The problem of having measures that are common to the entire EU means that, in certain cases, the measures may be directed at problems that only exist in some of the member states. This creates a need for exemptions. In many cases, exemptions are also justified with consideration to the meagre environmental benefit that these measures would otherwise have contributed. One example of this is those farms in Sweden that are located in biologically diverse forest districts where there is no need for EFAs. Member states have limited opportunities to impose more appropriate greening regulations and terms that will result in greater environmental benefits. Current greening regulations permit, for example, the use of mineral fertilisers and plant protection products in conjunction with all types of EFA.

Proposals in the study for changes to greening regulations after 2020

- Withdraw the crop diversification requirement. If retained, the requirement should be restricted to farms with at least 30 hectares of arable land and that are situated south of the 62nd parallel (north of the lake Vänern and the city of Gävle). This would result in an administrative simplification without reducing the overall environmental benefit.

- If the requirement for permanent grasslands is retained, it should be transformed into a separate environmental measure for ‘long-term grasslands’ within EFAs and to a cross-compliance requirement with a national reference area linked to grazing pastures and long-term grasslands.

- Develop the terms for ecological focus areas (EFAs). Areas of fallow land are important for biodiversity but the terms should be adjusted so as to ensure that no cultivation may take place on claimed EFA fallow land during the first half of the year and that the fallows must be covered with vegetation. It should also be possible to upgrade these areas to, for example, greenways – i.e., walking trails accessible to the public. The EFA type ‘under sown of crop’ can be withdrawn in Sweden and replaced with the EFA type ‘long-term grassland’.

- It should be possible to steer different types of EFA (such as fallow land, non-cultivated field margins, ‘long-term grasslands’, greenways, etc.) by means of differentiated and flexible weighting factors. In plain districts, non-cultivated field margins stand out as the type of EFA that should be given prominence alongside fallow lands and nitrogen-fixing crops.
Contents

Summary

Definitions of concepts used in the report .............................................. 1

1 Introduction ........................................................................................... 2
  1.1 Why we have produced this report ..................................................... 2
    1.1.1 Limitations ..................................................................................... 2
    1.1.2 Target audience ................................................................. 2
  1.2 How we have produced this report ..................................................... 3
  1.3 Directions for reading ................................................................. 4

2 How is greening applied? ................................................................. 5
  2.1 The CAP reform, 2014-2020 ................................................................. 5
  2.2 Compulsory forms of support .......................................................... 5
  2.3 Voluntary forms of support ............................................................. 6
  2.4 Distribution of the budget for direct payments .................................... 6
    2.4.1 Sweden has chosen to opt out of the schemes for extra ANC support and support for small farms ............................................. 7
    2.4.2 Germany has chosen to opt out of coupled support .............. 7
    2.4.3 Member states have moved funds to the rural development programme ............................................................... 8
  2.5 What are the rules for greening? ....................................................... 9
    2.5.1 Basic conditions and cross-compliance requirements .............. 11
    2.5.2 Greening versus the agri-environmental payments of the rural development programme .......................................................... 11
    2.5.3 General rules for exemptions in greening .............................. 11
    2.5.4 Location-specific rules for exemptions in greening .............. 12
    2.5.5 Alternative greening practices of which Sweden has opted out ....................................................................................... 13
  2.6 Member states' choices of greening requirements ............................ 14
    2.6.1 Member states' choices of individual EFA measures ............. 15
    2.6.2 The most popular individual EFA measures ......................... 15
    2.6.3 Choice of rules for permanent grasslands ............................. 16

3 Greening in Sweden ..........................................................................17
  3.1 The purpose of greening ................................................................. 17
  3.2 Implementation of greening in Sweden ............................................ 17
    3.2.1 The statistics for 2015 form the basis of the analyses ............. 19
    3.2.2 Changes that affect the results for 2016 ...................................... 19
    3.2.3 Analysis methodology for the three greening measures .......... 20
  3.3 Crop diversification ................................................................. 21
    3.3.1 Exempted farmers and land areas ........................................... 21
    3.3.2 The significance of the exemptions ......................................... 23
    3.3.3 The distribution of crops in 2015 compared with 2014 .......... 23
3.4 Permanent grasslands ................................................................................................27
  3.4.1 Reference areas for 2003 and 2015/16.....................................................27
  3.4.2 Farmers and the land areas affected .......................................................29
  3.4.3 The significance of exemptions and changes in preconditions ....30
3.5 Ecological focus areas.................................................................................................30
  3.5.1 Exempted farmers and land areas............................................................31
  3.5.2 Different individual measures for ecological focus areas ...............32
  3.5.3 The significance of the exemptions ........................................................34
3.6 What do farmers think of the ecological focus areas? ......................................35
  3.6.1 Questions about the farmers’ choices of ecological focus areas ..35

4 The costs and environmental benefits of greening in Sweden ......................................................38
  4.1 The result of greening in Sweden ..........................................................................38
  4.2 What are the costs for agriculture? .......................................................................40
    4.2.1 Estimated transaction costs ........................................................................40
    4.2.2 Estimated costs of measures ......................................................................41
  4.3 What are the environmental benefits? ..................................................................43
    4.3.1 Estimated environmental benefits ...........................................................44
  4.4 How environmentally efficient is the greening? ...............................................45

5 Conclusions and proposals ..............................................................................49
  5.1 Positives and negatives for the environment ....................................................49
  5.2 Proposals for changes of the greening .................................................................53
    5.2.1 A regional perspective and measures directed to the right place by means of cooperation .....................................................55

References...........................................................................................................56

Annexes ...............................................................................................................57
# Definitions of concepts used in the report

<table>
<thead>
<tr>
<th>Concept</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANC</td>
<td>Compensatory scheme: Areas with Natural Constraints (ANC). These support are made to farmers working in mountainous or equivalent areas, in non-mountainous areas with significant natural limitations, or in other areas that are affected by particular limitations.</td>
</tr>
<tr>
<td>DAWA</td>
<td>The Swedish Board of Agriculture’s repository of information containing all data concerning support, payments, areas of land, farmers, etc. related to the agricultural blocks (DAtaWArehouse).</td>
</tr>
<tr>
<td>NATURA 2000</td>
<td>Natura 2000 areas is a network of valuable natural areas within the European Union. The purpose is to protect habitats and environments, birds and those species that the EU countries have agreed to be of common interest.</td>
</tr>
<tr>
<td>SAM</td>
<td>The Swedish Board of Agriculture’s integrated database for applications for support. It contains the annual support applications made by all farmers, and shows support entitlements, direct payments, agri-environmental payments, etc.</td>
</tr>
<tr>
<td>GROSS MARGIN</td>
<td>The gross margin (GM) is the difference between the revenue (price x produced quantity) and the variable costs within the production segment. The gross margin constitutes the contribution by the production segment to the coverage of the company’s fixed costs and eventual profit.</td>
</tr>
<tr>
<td>ENVIRONMENTAL EFFICIENCY</td>
<td>The achievement of the minimum amount of environmental burden and/or maximum level of biodiversity from a fixed investment of resources. The cost of an environmental measure relative to its effect.</td>
</tr>
<tr>
<td>TRANSACTION COSTS</td>
<td>All costs that, among other things, are related to information about support. These are usually divided into costs for the acquiring or sharing of information, for signing agreements, for monitoring or for following-up. Costs relating to added time, equipment, etc. are also included.</td>
</tr>
<tr>
<td>CURRENCY EXCHANGE RATE</td>
<td>This study has used a reference exchange rate of 1.00 EURO = SEK 9.20. SEK signifies Swedish kronor.</td>
</tr>
</tbody>
</table>
1 Introduction

1.1 Why we have produced this report

The main purpose of this report is to develop proposals for the improvement and simplification of the greening policy, and to produce a foundation for more efficient environmental conditions in future direct income support (i.e., as part of the CAP after the year 2020). The material should be able to be used for evaluations and for possible changes to the support regulations, perhaps as early as in 2017/18. The focus of the report is to obtain the greatest possible environmental benefit from greening and the agricultural payment schemes while, at the same time, achieving a high level of cost-efficiency.

In this report, we assess the measurable environmental effects as well as calculating the implementation costs of greening and evaluating its environmental benefit. We analyse whether the type of land use that the farmers finally decided upon really proved to be as environmentally efficient as they had hoped or had been previously assumed.

Finally, we attempt to reach a conclusion about whether the negotiated obligatory measures and the optional individual terms within greening have had any significant effect on Sweden’s citizens and farmers, with regard to increased benefits to the environment and/or lower implementation costs.

1.1.1 Limitations

In this study, we concentrate on how Swedish farmers have acted in relation to the greening regulations, and we pay particular attention to analysing the greening requirement for ecological focus areas. With regard to the other support and regulations included in the 2013 CAP reform, we conduct only a brief review in order to highlight the effects they may have had for the orientation towards greening and for the possibilities of farmers to meet and comply with the final greening requirements.

The study also includes a limited comparison of some of the EU member states’ choices of individual requirements for their ecological focus areas. The member states profiled are those whose agriculture most closely resembles that of Sweden and who are also the strongest competitors in the market. An additional limitation is that, due to a lack of adequate base data, we only conduct a general analysis of the Swedish transaction and administrative costs of greening. We do not analyse the compliance levels and preconditions for checking and sanctions, nor the farmers’ perceptions of the supporting regulations or terms of greening.

1.1.2 Target audience

This report is part of a project that examines the environmental effects of the CAP and that will contribute to the bank of knowledge underpinning the decisions and implementation processes of agricultural policy. The study is primarily aimed at decision makers within government, centralised agencies, county administrative boards and the European Commission. The results and conclusions may also be of

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1 A greener CAP? Report 2012:13Eng
benefit to various interest groups, research and advisory organisations, and individual politicians and citizens involved in the intersection between agriculture and the environment.

1.2 How we have produced this report

In this report, we have made use of literature studies reviewing the CAP reform of 2014-2020. For the evaluation of greening, we have employed quantitative and qualitative analyses. To begin with, we have used data from the farmers’ applications (SAM 2015) for single farm payment and certain data from the following-up and checking of this income support. We have then used various agricultural statistics, such as land area and company statistics. We have also used Agriwise, which is a tool for economic analysis containing approximately 600 production segment calculations. We have also compiled data with value index prices for different environmental measures. We then used these parameters as the basis for various calculations and simple cost-benefit analyses. Finally, we have made use of agricultural questionnaires in order to learn about how and why Sweden’s farmers chose certain types of EFA measures.

Working group

The working group for this study has comprised Anna-Lena Carlsson, Swedish Environmental Protection Agency; Hans Nilsson, County Administrative Board of Skåne, Josefin Hjort, Swedish Agency for Marine and Water Management; David Ståhlberg, Swedish Board of Agriculture and Torben Söderberg, Swedish Board of Agriculture.

Anders Forsberg, Swedish Board of Agriculture; Lars Hansson, Swedish Board of Agriculture and Mathias Sandin-Lindqvist, Swedish Board of Agriculture have contributed as members of a reference group.
For the purposes of this study, Sweden has been divided into five agricultural areas with distinct preconditions
(The area to the north of the 62nd parallel corresponds to support areas 1-5)

Map 1 Division into different agricultural areas. Areas 1-12 are the support areas in the ANC compensatory scheme. A-E are also of significance for greening’s so-called forest exemption (for more information, see section 2.5.4 and Map 2).

1.3 Directions for reading

Chapter 2 can be read and understood in quite general terms, depending on the extent of the reader’s existing knowledge. Chapter 3 can be read according to what the reader deems to be of particular interest. Chapter 4 contains a cost-benefit analysis of greening. Chapter 5 contains the report’s conclusions, and certain proposals for appropriate changes to greening.
2 How is greening applied?

The European Commission’s objective is that direct payments should be realigned in order to enable greater redistribution and equalisation, as well as focusing on more targeted measures (environmental conditions). The former requires a levelling-out of the degree of payment both within and between the member states. Direct payments consist of three compulsory and three optional forms of support.

2.1 The CAP reform, 2014-2020

In December 2013, the EU defined its Regulation for Direct Payments\(^2\), which forms part of the CAP (Common Agricultural Policy). The rules are largely the same as those contained in the Commission’s proposal for reform from October 2011\(^3\).

The greening payment (hereafter referred to as greening) is intended as a specific, environmentally focused – but obligatory – component of the direct payments (basic payment + greening payment). Income support was formerly known as “single payment scheme” and is a form of support that is detached from production and paid directly to farmers. Income support shall now be granted in the form of a single farm payment per hectare. The new reform contains an increased focus on the inclusion of both climate-related and environmental issues, such as a clearer incorporation of the Natura 2000 areas.

The Commission’s objective for greening is that all farmers within the EU shall achieve environmental and climatic benefits. This can be done by means of better preservation of the soil and ecosystems as a result of the crop diversification (CD) requirement, by binding more carbon dioxide in the ground within grassland habitats that are associated with the permanent grasslands (PG) requirement, and by increasing the protection of water and habitats as a result of the ecological focus areas (EFA) requirement.

2.2 Compulsory forms of support

The EU’s Regulation for Direct Payments contains some forms of support that member states are obliged to introduce and some that are voluntary. The basic element is an income support (direct payments) which for the rest of this report will be referred to as basic payment.

By no later than 2020, the amounts of these payments must be more evenly distributed both between the member states and within the nations or regions. The granting of support is conditional on the use of land for agricultural activity and being an active farmer, in accordance with the rules established by the Commission for national minimum requirements.

Greening is a mandatory part of the direct payments – basic payment plus the greening payment = former ‘single farm payment’. The greening measures must be simple and general in nature, non-contractual and must constitute annual actions. In

\(^2\) Regulation (EU) No. 1307/2013 of the European Parliament and of the Council concerning the rules for direct payments to farmers

\(^3\) Legal proposals for the CAP after 2013.
the Regulation for Direct Payments, there is also a greater focus on the incorporation of both climate-related and environmental issues in the support.

To promote new activity and to strengthen competition within the EU’s agricultural sector, it is obligatory for member states to set up an annual payment to young farmers within the single payment scheme. This payment should be made for a maximum of five years to farmers who are no older than 40 years. The amount of support in Sweden is 25 % of the average value of all the support entitlement used by the farmer. In order to finance the payments to young farmers, member states may use a maximum of 2 % of the total annual budget for direct payments.

2.3 Voluntary forms of support

The European Commission gives member states the possibility to allocate funds from direct payments to a compensatory scheme (ANC support) for areas with natural constraints. Member states have the opportunity to assign up to 5 % of the direct payments budget to an additional compensatory scheme (extra ANC support). This support should not affect the ANC support that exists within the rural development programme (Pillar 2).

Member states also have the opportunity to use part of the direct payments budget for more specific support. One opportunity that has been made available to member states is the establishment of a simple support scheme for smallholders. Support for small farms is provided in the form of a lump sum which shall replace other forms of direct payments and which also has an associated simplified regulatory framework for farmers with small holdings.

A further opportunity available to member states is the granting of coupled support to certain sectors or regions, although only in clearly defined cases. Member states may transfer a maximum of between 8 % and, in some cases, 13 % of the direct payment scheme’s total budget to coupled support.

2.4 Distribution of the budget for direct payments

We have conducted a literature review of the member states’ cumulative choices of different forms of direct income support. The member states have made extensive use of the opportunity granted by the EU regulations to introduce coupled support. In total, 24 of the 27 member states have chosen coupled support, of which 20 have chosen to support the production of beef. This measure can have environmental benefits if, for example, the payment is steered in the direction of more extensive production, such as grazing on natural pastures or extensive grasslands. Sweden has introduced payment for cattle older than one year, which benefits grazing operations with heifers and bullocks. In many other cases, the coupled animal support can lead to more intensive production, such as confined livestock rearing and increased animal density, which leads to greater environmental pressures. It can also be difficult to establish the coupled support without distorting the competition in the market. Sweden has chosen to take advantage of the optional coupled support, meaning that

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4 See page 1, Definitions of concepts

5 The Swedish Board of Agriculture’s Regulation (SJVFS 2014:41) for Direct Payments.

6 Unpubl. PM, 2016. Model calculations of the EU’s Common Agricultural Policy.
the basic payment is down to 55% of the total direct payments budget. France is an example of a country that has been less orthodox and instead made maximum use of the voluntary support, which means that the basic support constitutes only 34% of the total direct payments budget.

2.4.1 Sweden has chosen to opt out of the schemes for extra ANC support and support for small farms

If Sweden’s total budget for direct payments for the years 2015-2020 was to be evenly distributed across the entire eligible area, it would amount to SEK 2,120 per hectare, per year. The basic payment plus the greening payment combined together would amount to SEK 1,810. These area-based payments must be completely levelled out and equalised across the entire country by the year 2020. The amount of support is roughly equivalent to the previous levels of single farm payments. Table 1 shows how much the direct payments for Sweden’s chosen forms of support would equate to if they were to be recalculated to represent one payment per hectare, per year.

Table 1. Sweden’s distribution of the direct payments budget, recalculated per hectare for the year 2020.

<table>
<thead>
<tr>
<th>Country</th>
<th>Basic payment</th>
<th>Greening payment</th>
<th>Young farmers</th>
<th>Extra ANC support</th>
<th>Small farms</th>
<th>Coupled support</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sweden</td>
<td>SEK 1,170</td>
<td>SEK 640</td>
<td>SEK 40</td>
<td>-</td>
<td>-</td>
<td>SEK 270</td>
</tr>
</tbody>
</table>

Source: Own calculations, 1.00 Euro = SEK 9.20.

Sweden has opted to not take advantage of the opportunity to make use of extra support for Areas with Natural Constraints (ANC) or for small farms within the single payment scheme. The reason to not implement ANC support is partly because no extended activity requirements can be coupled to the measure in the context of direct payment (which could exacerbate the problem of passively farmed land) and partly because some ANC support already exists within the rural development programme (Pillar 2). If the measure had been implemented, it would be used in combination with equivalent support forms within the rural development programme, and this could be perceived as being complex and difficult to understand for the farmers.

The reason that support for small farms was not introduced is that the simplification for the farmers was adjudged to be only marginal, as well as the potential for negative effects on the market for land and payment entitlements. In order to encourage a high level of accession, the level of support has to be set as high as possible, which runs the risk of reducing the incentive for structural development and may impair the accessibility of land for expanding businesses. Sweden has a relatively high minimum threshold for income support of four hectares, so the only ones who will be affected by the greening requirements are the smaller farms of between four and ten hectares, which may be required to maintain permanent grasslands. The area that would be affected is, however, minimal.

2.4.2 Germany has chosen to opt out of coupled support

The compulsory support, the greening payment (30%) and the support for young farmers (maximum 2%) can, at most, reduce the amount of basic payment to 68% of the member state’s total support budget (Table 2). If, however, a member state

uses the full extent of their direct payment budget – even for the voluntary forms of support – the amount of basic payment could be as low as 12.4 %, such as in the case of Malta which, thanks to the granting of an exemption, was permitted to devote 57 % as coupled support.

Table 2 shows how the EU member states with the most agricultural and food-related trade with Sweden have chosen to distribute their direct payment budgets between the available forms of direct income support.

Table 2. Chosen measures in direct payments for Sweden and those EU member states with which we have most agricultural and food-related trade. France and Belgium, as relatively close countries, are also included. Distribution as a percentage of the budget for the year 2018.

<table>
<thead>
<tr>
<th>Member state (EUR/ha)</th>
<th>Basic payment</th>
<th>Greening payment</th>
<th>Young farmers</th>
<th>Extra ANC support</th>
<th>Small farms</th>
<th>Coupled support</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sweden (230)</td>
<td>55.5</td>
<td>30.0</td>
<td>1.5</td>
<td></td>
<td></td>
<td>13.0</td>
</tr>
<tr>
<td>Denmark (335)</td>
<td>64.8</td>
<td>30.0</td>
<td>2.0</td>
<td>0.3</td>
<td>2.9</td>
<td></td>
</tr>
<tr>
<td>Germany (299)</td>
<td>62.0</td>
<td>30.0</td>
<td>1.0</td>
<td></td>
<td>7.0</td>
<td></td>
</tr>
<tr>
<td>Netherlands (410)</td>
<td>67.5</td>
<td>30.0</td>
<td>2.0</td>
<td></td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>Finland (230)</td>
<td>49.8</td>
<td>30.0</td>
<td>1.0</td>
<td></td>
<td>19.2</td>
<td></td>
</tr>
<tr>
<td>France (282)</td>
<td>34.0</td>
<td>30.0</td>
<td>1.0</td>
<td></td>
<td>20.0</td>
<td></td>
</tr>
<tr>
<td>Belgium (392)</td>
<td>57.0</td>
<td>30.0</td>
<td>2.0</td>
<td></td>
<td>11.0</td>
<td></td>
</tr>
</tbody>
</table>


Eleven member states have chosen a basic payment of more than 60 %, including Denmark, Germany, Netherlands, Ireland and Austria. At the same time, none of these member states have exploited the opportunity to receive extra ANC support (with the exception of Denmark) or the support for small farms (with the exception of Germany). Furthermore, certain member states have not devoted the maximum 2 % of the support to young farmers. However, the majority of these eleven member states have a limited percentage as coupled support. Eight member states have chosen to introduce voluntary support to small farms. Fourteen of the member states have chosen to introduce the maximum level of support (2 %) for young farmers. Finally, all member states except Germany have introduced some form of support coupled to production.

2.4.3 Member states have moved funds to the rural development programme

It has been possible for EU member states to redistribute their direct payments funds to other forms of support. For example, 15 % of the direct payment budget may be transferred to support the rural development programme. This transfer of budget funds does not need to be co-financed with national funding, which is the case for the rural development programme. In addition, 15-25 % of the EU budget for support for rural development may be transferred to direct income support.

The opportunity to reallocate the budget between single payment scheme and the rural development programme has been exploited by a total of fifteen member states. Ten of the member states have chosen to move budget money away from single payment scheme to the rural development programme, which is shown in Table 3.

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8 European Parliament, Study 2015
Table 3. The ten member states’ redistribution of budget funds to the rural development programme (Pillar 2) as both a percentage of the total direct payment budget (Pillar 1) and the total amount in EUR (millions).

<table>
<thead>
<tr>
<th>Country</th>
<th>Percentage of direct payment budget</th>
<th>Total amount in EUR (millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flanders (part of Belgium)</td>
<td>8.0</td>
<td>96</td>
</tr>
<tr>
<td>Denmark</td>
<td>6.4</td>
<td>287</td>
</tr>
<tr>
<td>Germany</td>
<td>4.5</td>
<td>1,143</td>
</tr>
<tr>
<td>Netherlands</td>
<td>4.2</td>
<td>158</td>
</tr>
<tr>
<td>Czech Republic</td>
<td>2.6</td>
<td>112</td>
</tr>
<tr>
<td>Estonia</td>
<td>13.4</td>
<td>97</td>
</tr>
<tr>
<td>Greece</td>
<td>5.0</td>
<td>498</td>
</tr>
<tr>
<td>France</td>
<td>3.3</td>
<td>1,248</td>
</tr>
<tr>
<td>Latvia</td>
<td>7.4</td>
<td>94</td>
</tr>
<tr>
<td>Romania</td>
<td>2.1</td>
<td>112</td>
</tr>
</tbody>
</table>

Source: European Parliament, Study 2015, rounded to the nearest million Euros.

Despite the fact that there is an overall net transfer of budget funds to rural development programmes within the EU, five of the member states have chosen to move budget funds from the rural development programme to direct income support (Croatia, Hungary, Malta, Poland and Slovakia). These five member states have also maximised (25 %) their transfers of the budget for rural development programmes to direct support. This has reduced the possibility of increased resources for agri-environmental payments and may be detrimental to measures for environmental improvement.

Sweden’s position has been that the transfer of budgetary funds from single payment schemes to the rural development programme improves the accuracy of the policy with regard to environmental benefit. This is because it involves increased opportunities to direct the money towards effective measures within the rural development programme. At the same time, direct payments plays an important role in the preservation of incomes within agriculture, thereby contributing to the improvement of the preconditions for the provision of collective utility. A maximum transfer (15 %) would mean a reduction of direct income support of approximately SEK 350 per hectare. With consideration to current conditions, Sweden has chosen not to take advantage of the opportunities provided by the regulations for the redistribution of direct payments.

2.5 What are the rules for greening?

We have conducted a literature review concerning the process for the development of new rules for direct payments and the rural development programme. The European Commission’s intention for the reform was to improve benefits to the environment by introducing additional environmental adaptation measures coupled to the basic payment and the greening payment. These measures are to be compulsory and applicable throughout the entire EU.

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Greening and the cross-compliance requirements constitute the threshold (baseline) for agri-environmental payments, thereby affecting what we are able to pay. For the proposed measures within greening, the support regulations must not be affected by nationally implemented cross-compliance requirements or affect agri-environmental payments. Cross-compliance requirements, greening measures and the different forms of support should be designed so that they interact with the agri-environmental payments and reinforce the positive environmental effects (Diagram 1).

Diagram 1. Illustration of types of EU support and requirement, their scope and environmental benefit.

The greening measures must apply to all agricultural land that is eligible for support. They must consist of simple, non-contractual and annual measures that go further than the implemented basic conditions for basic payment or cross-compliance requirements (2.5.1), and they must be linked to agricultural activities. Furthermore, the measures must be clearly distinguished from the agri-environmental payments (2.5.2) made over several years within the rural development programme. In order to clarify these conditions, the Commission has proposed greening measures that: (1) require the diversification of crops, (2) preserve permanent grasslands such as grass fields, fallow lands and grazing pastures, and (3) create ecological focus areas.

In the case of Sweden, for example, agri-environmental payments for catch crops and riparian strips were already in place where the support rules were in line with some of the greening requirements set by the Commission. Sweden chose therefore not to replace any agri-environmental payments with greening measures – the reason being that this would be very complicated. Only certain agri-environmental payments can be used and the rules must be based directly on the greening requirements. Agri-environmental payments (the greening measure) must also cover exactly the same area as in the greening requirements, and the costs of the greening environmental conditions must be discounted if agri-environmental payments are to be retained (2.5.5).
### 2.5.1 Basic conditions and cross-compliance requirements

Both the basic and greening payments are detached from production and have a minimum threshold for payment of four hectares of agricultural land on each individual farm. There is also a prohibition on the payment of support to certain companies whose main business is not agriculture. A holding of at least 36 hectares of eligible agricultural land by these companies – such as riding schools, recreational facilities, etc. – means that these companies may also receive basic and greening payments.

Direct income support are coupled with binding environmental requirements – there are currently ten overriding requirements that must be complied with. As a result of the new reform, some previous cross-compliance requirements have become obligatory support rules (basic conditions), such as the requirement for permanent grasslands (within greening) or the management requirement that has become an activity requirement for basic payment. The requirement for the granting of support is that the land is used for agricultural activity, in accordance with the rules established by the Commission for national minimum requirements. In Sweden's case, there is a requirement for the (at least) annual management or trimming of all the claimed eligible areas (there are some exemptions for certain areas with agri-environmental payments).

### 2.5.2 Greening versus the agri-environmental payments of the rural development programme

It should be possible to distinguish between the individual measures for greening and the different environmental measures of the rural development programme. Most obviously, this applies to the payments made to environmentally-friendly and climate-friendly agriculture. The purpose is to prevent double-funding, which is illegal. If, however, a member state has a corresponding environmental measure within its rural development programme which is included on the greening list of the council and the parliament, these may be interchangeable.

### 2.5.3 General rules for exemptions in greening

There are a number of general rules for exemptions in greening that apply to all member states. These rules must be complied with by each member state and are non-negotiable. There are, however, certain options available to the member states allowing them to determine the extent of the ban on a changed usage of land for grasslands (2.6.3).

**Exemption for organic production**

Organic farmers are exempted from the environmental requirements of the basic payment because of the recognised environmental benefits of organic farming systems. Organic farmers receive basic and greening payments for those areas of land that comply with the terms for EU-certified organic cultivation without having to meet the environmental requirements.

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10 Regulation (EU) No. 1306/2013 for financing, management and monitoring, Annex II.
Exemption for Natura 2000 areas
Farmers operating in Natura 2000 areas may be exempted from the greening requirements if the measures are not compatible with the land-management stipulations for the Natura 2000 area. Those farmers whose land includes a Natura 2000 area should be able to receive greening payment without having to follow all of the greening requirements. This exemption only applies to those greening requirements that conflict with the land-management requirements for the Natura 2000 area.

2.5.4 Location-specific rules for exemptions in greening
There are also some greening rules that are more specific to location. Entitlement to this exemption is determined by the farm’s location or its crop distribution.

Exemption from requirements for crop diversification and ecological focus areas with more than 75 percent of grassland
Farmers whose farmland is, to a considerable extent, covered with grassland, grazing pasture or land lying fallow are exempted from the requirements for crop diversification and ecological focus areas.

Exemption from crop diversification for areas north of the 62nd parallel (north of the lake Vänern and the city of Gävle)
All farms that, because of their geographical location (north of the 62nd parallel), find it difficult to meet the crop diversification requirements by introducing a third crop have been exempted from this requirement.

Exemption from ecological focus areas for heavily forested areas
Member states with large areas of forest may exempt farmers from the EFA requirement. This exemption applies in member states where more than 50 % of the land area is covered by forest and where the farm is located in an area that is eligible for ANC support. More than 50 % of the land area within this ANC area must be covered by forest, and the ratio of forested land to arable land must be greater than 3:1. Farms in such areas do not need to establish ecological focus areas (Map 2).
2.5.5 Alternative greening practices of which Sweden has opted out

In the following sections, we examine some additional possible alternatives to greening practices that have the potential for environmental benefit but that Sweden, for various reasons, has chosen to not adopt. In addition to the three agreed greening practices, other methods that comprise measures for either environmentally and climate-friendly agriculture or different certification systems may be used as alternative greening practices. Member states can decide whether to give farmers the opportunity to use these equivalent methods or only those environmental adaptation methods that have been established in the direct payments regulation11.

2.5.5.1 Equivalent methods

Methods can be adjudged to be equivalent if they have a positive impact on the environment and climate that is at least as great as the impact achieved by the three greening measures. These equivalent methods and the greening measures to which they must correspond are listed in an annex to the regulation. Certain payments for environmentally and climate-friendly agriculture (agri-environmental payments) in the rural development programme may be used as equivalent methods. These agri-environmental payments may not, however, be the subject of double financing. Member states must notify the Commission of the agri-environmental payments that they intend to apply as equivalent methods. Member states may also decide to limit the farmers’ opportunities to choose from among the alternative methods offered. A farmer may only use one or more of these methods if they fully replace the closely-related greening measure(s).

11 EU regulation 1307/2013
Five of the member states permit equivalent methods as a greening measure: France, Netherlands, Austria, Poland and the Republic of Ireland\(^\text{12}\). Portugal has also allowed one equivalent method instead of crop diversification\(^\text{13}\). Two member states have chosen specific certification programmes as an equivalent method – France as a replacement for crop diversification, and Netherlands as a replacement for ecological focus areas. France, for example, has introduced a certification programme for those farmers who only grow maize. The three other member states have introduced equivalent methods within the agri-environmental payments – the Republic of Ireland and Poland to replace crop diversification, and Austria to replace crop diversification and ecological focus areas.

### 2.5.5.2 Collective implementation

In order to produce contiguous ecological focus areas, which have a greater environmental benefit, there is the possibility for member states to implement greening measures at either a regional level or jointly at farm level. Farmers who live in close proximity to each other also have the possibility to combine forces and meet the requirements for ecological focus areas by means of collective implementation. Only the Netherlands and Poland have chosen to allow the possibility of collective implementation among a group of farmers. None of the member states has exploited the possibility of collective implementation on a regional level. The likely explanation for this is that this type of greening measure would involve very complicated administration for the state in question.

### 2.6 Member states’ choices of greening requirements

The choice of greening measures that are most important to the achievement of a country’s particular environmental objectives varies between the member states\(^\text{13}\). Therefore, at an EU level, it is necessary that both alternative measures and the opportunity for focusing are made available. The environmental benefits and the possible effects at an EU level that can be achieved with the different greening practices are shown, for example, in Diagram 9 (4.1).

Most of the member states allow the use of mineral fertilisers and plant protection products in conjunction with ecological focus areas – for example, for the EFA types of nitrogen-fixing crops or catch crops and green-covered land. In Sweden, we have allowed mineral fertilisers and plant protection products for the cultivation of the EFA types of nitrogen-fixing crops and under-sowing of grass crops (catch crops and green-covered land). Netherlands is the only country that has banned mineral fertiliser for EFAs with nitrogen-fixing crops. Germany has banned mineral fertilisers and plant protection products for EFAs with catch crops and green-covered land, while Netherlands has only banned pesticides for this type of EFA.

Some of the member states (Germany, France, Poland and Scotland) that were included in the survey have protected less than 100 % of their grassland areas within Natura 2000 areas. There are varying reasons for this. In Scotland, some semi-natural grazing pastures are maintained by means of periodic cultivation and have, therefore, been excluded. In France, two criteria have been used to identify pastures that are particularly worthy of protection.

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\(^{12}\) IEEP, 2015. Green direct payments: implementation choices of nine member states.  
\(^{13}\) Expert group meeting 19/2/2016
The first criterion is that only long-term extensive or earth-rich grasslands shall be protected, and the second is that only grasslands with high biodiversity values (rich in species) shall be protected. This means that grasslands that contain individual protection-worthy species but that are not considered to have levels of biodiversity that are worthy of protection are lacking the additional protection of the permanent grasslands measure. Sweden, for example, has chosen to only impose extra protection for those natural pastures within Natura 2000 areas that are eligible for direct payments.

2.6.1 Member states’ choices of individual EFA measures

The European Commission’s objective for ecological focus areas is to protect and improve the biodiversity on farms. Member states can choose from ten types of ecological focus area which they can then offer their farmers so that they can comply with their requirements for ecological focus areas (Table 4). If a member state chooses the landscape element, there will be a further nine possible alternative individual measures (e.g., non-cultivated field margins, which Sweden has chosen) in order to meet the requirement for ecological focus areas.

Table 4. Summary of the EU member states’ choices of measures (10) and alternative measures (9) in order to meet the requirements for ecological focus areas.

<table>
<thead>
<tr>
<th>Number of EFA types used</th>
<th>Number of member states (incl. Sweden)</th>
<th>Sweden</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-4</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>5-9</td>
<td>9</td>
<td>has chosen five types</td>
</tr>
<tr>
<td>&gt; 10</td>
<td>13</td>
<td></td>
</tr>
</tbody>
</table>

Source: European Commission, Europe’s wood pastures, November 2015.

For each type of measure, specific rules are set which must be complied with. For nitrogen-fixing crops, energy forests or for another individual measure involving vegetation, for example, each member state must choose which crops are permitted. Where, when and how the crops shall be grown, and whether mineral fertilisers or plant protection products may be used, is decided by each member state within some of the Commission’s established frameworks.

2.6.2 The most popular individual EFA measures

Within EU-28, the most popular EFA type is nitrogen-fixing crops, followed by EFA fallow land, landscape features, energy forests and green-covered land/catch crops (Table 5).

The reasons given for the limitations of available choices vary between the countries. The reason could, for example, be that:

- The proposed individual measure is already covered by cross-compliance requirements or other support measures, and the EFA measure is therefore considered to be redundant.
- The individual measure is not considered to result in any environmental improvement, either in general terms or in a national context.
- The individual measure is difficult to check and follow up – for example, certain landscape features have either not been mapped or would be too expensive to map.
Table 5. The EU’s 28 member states’ choices of individual measures for ecological focus areas.

<table>
<thead>
<tr>
<th>EFA types</th>
<th>Number of member states (incl. Sweden)</th>
<th>Sweden</th>
</tr>
</thead>
<tbody>
<tr>
<td>nitrogen-fixing crops</td>
<td>27</td>
<td>X</td>
</tr>
<tr>
<td>fallow land</td>
<td>26</td>
<td></td>
</tr>
<tr>
<td>landscape features (at least one)</td>
<td>23</td>
<td></td>
</tr>
<tr>
<td>short rotation coppice (willow)</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td>catch crops (under-sown grass)</td>
<td>20</td>
<td>X</td>
</tr>
<tr>
<td>buffer strips</td>
<td>19</td>
<td></td>
</tr>
<tr>
<td>afforestation</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>agro-forestry</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>forest margin strips</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>terraces</td>
<td>8</td>
<td></td>
</tr>
</tbody>
</table>

Source: European Commission, Europe’s wood pastures, November 2015.

2.6.3 Choice of rules for permanent grasslands

The objective of the permanent grasslands measure, as set by the European Commission, is to generate greater environmental benefits by:

- protecting endangered species
- maintaining high natural values
- reducing erosion
- increasing carbon binding

Almost all member states (23) have chosen the more flexible solution of national reference areas (3.4). Of the member states analysed, only France, Germany and the United Kingdom chose to introduce regional reference areas14, which involves the increased risk of sanctions. Member states are obliged to impose special requirements for grasslands that lie within the countries’ designated Natura 2000 areas. Member states also have an opportunity to impose additional rules for areas outside the Natura 2000 areas. For these areas that are used, ploughing or changing the land usage will be prohibited.

The proportion of grassland area in Natura 2000 with a prohibition against a change of land usage varies considerably between the member states (Table 6) – from 1 % in Estonia and Portugal to 100 % in ten of the member states as well as in three regions of the UK (England, Northern Ireland and Wales). Only the Czech Republic, Latvia, Luxembourg and Wales have chosen to impose special requirements for permanent grasslands outside of the Natura 2000 areas.

Table 6. Proportion of grassland in Natura 2000 areas with a ban on land-use change.

<table>
<thead>
<tr>
<th>Proportion of grassland in Natura 2000 areas</th>
<th>Number of member states (incl. Sweden)</th>
<th>Sweden</th>
</tr>
</thead>
<tbody>
<tr>
<td>all grassland</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>50-100 % grassland</td>
<td>5</td>
<td>X</td>
</tr>
<tr>
<td>less than 50 % grassland</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>no grassland</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

Source: European Commission, Europe’s wood pastures, November 2015.

14 IEEP, 2015. Green direct payments: implementation choices of nine member states.
3 Greening in Sweden

3.1 The purpose of greening

One of the purposes of the new Common Agricultural Policy is to improve environmental performance by the imposition of obligatory environmental requirements for direct payments. These conditions support agricultural practices that have a beneficial impact on the climate and the environment and that can be applied throughout the European Union. The practices should constitute simple, general, non-contractual and annual measures that go further than cross-compliance requirements and that are linked to agriculture – e.g., the diversification of crops, the maintenance of permanent grassland and the establishment of ecological focus areas. The EU regulation describes the following purposes:

A diversification of crops should be applied for increased environmental benefit, in particular for the improved quality of land. Permanent grasslands should be maintained in order to ensure an increased binding of carbon dioxide. Finally, areas with an ecological focus should be established, with the particular aim of increasing the biodiversity on farms.

The extent of the positive environmental impact will greatly depend upon how much the farmers need to adapt in order to meet the various greening requirements. Generally speaking, however, it is not entirely certain that changes to production will always result in a significant positive impact on the environment – or even a noticeable impact on the environment. Therefore, each change to production should be assessed on the basis of local circumstances and local impact.

3.2 Implementation of greening in Sweden

Because of the varying preconditions that exist within the member states, nationally supplemented rules have been developed in the EU’s regulation for direct payments and these may be used by the individual countries.

With regard to the Swedish implementation, the existence of certain differences in physical and climatic conditions between Sweden and most of the other member states has influenced which rules will apply to Swedish farmers. One of the problems has been the definition of agricultural land (Diagram 2). Sweden considers that all arable land, land that can easily be ploughed and all pastures being grazed (land not suitable for ploughing) constitute agricultural land and should, therefore, be eligible for direct payments. Sweden also considers that all arable land that can be – and often is – included in crop rotation constitutes arable land that is being used for crop rotation.

The view of the Commission, however, is that it is only arable land that is eligible for direct payments, and land for grazing which is less suitable for ploughing has been afforded special processing rules in the context of support. The Commission divides agricultural land into fields with rotation crops, fields with permanent crops and fields with permanent grasslands, whereas the natural pastures of the Swedish type are processed as permanent grasslands with special provisions. Grassland is considered to be permanent if the land has only been used for grasses and/or
herbaceous forage crops for the past five years. These diverging views have caused problems for Swedish farmers’ understanding of – and compliance with – Sweden’s greening regulations.

Diagram 2. Classification of Sweden’s agricultural land that is eligible for direct payments. Classification according to the respective definitions by Sweden and by the European Commission. (Schematic diagram showing percentages).


Differences in the physical and climatic conditions have made it possible for Sweden to introduce both a forest exemption and a climate exemption north of the 62nd parallel (Maps 1 and 2). Areas with a high proportion of forest have different conditions to landscapes dominated by plains. Where the dominant type of land is forest, it is the agriculture that contributes to the variation in the landscape. A continuation of agricultural activity is of great importance to the maintenance of biodiversity. The requirement to designate land as ecological focus areas in these landscapes is adjudged to have a non-desirable environmental effect because the requirements actually risk reducing the agricultural activity in the area. In areas with a certain ratio of forest to agricultural land, farmers do not therefore need to have an ecological focus area.

In the case of agriculture situated in areas covered by national support payments – i.e., areas north of the 62nd parallel and certain adjacent areas – these farms only have to cultivate two different crops in order to comply with the crop diversification greening requirement. This exemption arises from the fact that it is difficult to grow three different crops in these northern areas year after year while maintaining an economically viable agricultural business.

A further problem is the classification of the grass-covered area. In Sweden, there is a great variety of different names for, and types of, grass-covered land, including leys, pastures, mown meadows, semi-natural pastures, vegetated fallows, Alvar pastures, and so on. To classify these different grasslands as permanent grasslands or grasslands with crop rotation, or to completely exclude them from direct payments, has been a very challenging task. The classification of the grass-covered areas of land has also caused problems in Sweden due to late changes made to the rules and definitions. All changes in permanent grasslands directly affect the areas covered by the rules for the diversification of crops and ecological focus areas (3.2.2).
3.2.1 The statistics for 2015 form the basis of the analyses

The following table (Table 7) shows Sweden's total agricultural area and the number of farms in 2015. It shows different areas of production (forest district or plain district), whether the area lies to the north or south of the 62nd parallel (Map 1), and whether or not the area is covered by the forest exemption. To the north of the 62nd parallel, there is a reduced requirement for crop diversification. In areas with a forest exemption, there is no requirement at all for ecological focus areas.

Table 7. Agricultural land area and the number of farmers in 2015. Divided into production areas and greening exemptions for the 62nd parallel.

<table>
<thead>
<tr>
<th>Rural area</th>
<th>Area eligible for direct payments, hectares</th>
<th>Number of farmers</th>
<th>Greening area, hectares</th>
<th>Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forest districts north of the 62nd parallel</td>
<td>309,100</td>
<td>9,700</td>
<td>182,500</td>
<td>forest exemption</td>
</tr>
<tr>
<td>(Map 1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forest districts south of the 62nd parallel</td>
<td>689,600</td>
<td>17,800</td>
<td>380,300</td>
<td>forest exemption</td>
</tr>
<tr>
<td>Plain districts of Svealand</td>
<td>535,700</td>
<td>8,100</td>
<td>417,500</td>
<td>no forest exemption</td>
</tr>
<tr>
<td>Plain districts of northern Götaland</td>
<td>685,600</td>
<td>14,300</td>
<td>509,000</td>
<td>no forest exemption</td>
</tr>
<tr>
<td>Mixed-terrain districts and southern Götaland's</td>
<td>721,400</td>
<td>10,300</td>
<td>565,600</td>
<td>no forest exemption</td>
</tr>
<tr>
<td>plain districts</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sweden</td>
<td>2,941,400</td>
<td>60,200</td>
<td>2,054,900</td>
<td></td>
</tr>
</tbody>
</table>

Source: Own calculations, Swedish Board of Agriculture's DAWA and SAM databases 2015. Rounded to the nearest hundred.

The total area eligible for support in 2015 was 2,940,000 hectares. The land area with requirements for environmental conditions (greening) is – before all exemptions and other terms are counted – approximately 2,050,000 hectares (Table 7). The table also shows that the total number of farmers that applied for EU single farm payment in 2015 was 60,200 farmers. Two groups of farmers have, however, been excluded: those with less than four hectares of agricultural land (1,400 farmers) and those farmers with only certified organic production (660 farmers). The exclusion of these farmers corresponds to the discounting of approximately 32,000 hectares of agricultural land.

The land area of farms with certified organic production has increased between 2009 and 2014. In 2015, there is a total of approximately 4,800 farms (including the 660 mentioned above) which are entirely or partially connected to agri-environmental payments for organic production. The vast majority of these organic farmers will, in time, become fully certified and, therefore, exempted from all greening requirements. The majority of the remaining 55,000 farmers (equivalent to 92%) are likely to be affected by one or more of the greening requirements.

3.2.2 Changes that affect the results for 2016

During 2015, the European Commission issued new guidelines for permanent grasslands. One of the implications of these new guidelines is that the years for which an area of grassland has received agri-environmental payments will no longer
count towards the five-year period as the land must have grass-coverage to go from being classed as arable land (with crop rotation) to permanent grassland. This means that, if during any year grassland-based agri-environmental payments were made for this land area, this year will not be counted as part of the five years required for the arable land in question to be classed as permanent grassland.

Much more land will be classed as arable land (with crop rotation) in the SAM-applications for 2016. This means that ecological focus areas and the areas with requirements for crop diversification will increase. The increased requirement to designate land as ecological focus areas in forest districts and mixed-terrain districts threatens to reduce agricultural activity in these regions.

From 2015, arable land that has lain fallow for more than five years will be included when calculating the area of permanent grassland. Those years during which fallow land has been used as an ecological focus area in the SAM application will not, however, be counted towards the five-year requirement for that area of fallow land to be classed as permanent grassland.

These changes affect the areas covered by the requirements for the diversification of crops and ecological focus areas. At the same time, however, a large part of these additional areas will not be affected by the greening requirements – due, for example, to the high proportion of grassland areas on the farms and also with low thresholds for crop diversification. The overall environmental benefit is, therefore, not likely to be influenced greatly as a result of these changes (2.5.4).

Another change to, or clarification of, the guidelines for greening is that grazing pastures or mown meadows included in Natura 2000 areas may not be converted to any other form of land use, or cease to be managed, in the event of conflict with the provisions of the prevailing Natura 2000 area15. Should this occur before the land has ceased to be eligible for direct payment, sanctions may be imposed on the farmer’s greening payments.

The new agri-environmental payments (e.g., riparian strips) and changes to the boundaries for ANC support (areas with significant natural constraints), together with new rules within ANC support with payments for cereals, mean that there will be other preconditions and requirements when applying for greening for 2016. Some of the effects of the changes for 2016 include more profitable cereal cultivation in ANC areas, more ecological focus areas (EFAs) in areas with higher percentage of cattle, and more agri-environmental payments that will compete with the various EFA types, etc.

### 3.2.3 Analysis methodology for the three greening measures

For the purposes of analysis of the three greening measures, we have used SAM applications for the years 2014 and 2015. The application data shows us which of the alternatives for the compulsory measures were actually chosen by the farmers. We have:

- Constructed databases with a sort function for SAM applications for 2014 and 2015.

15 The Swedish Board of Agriculture’s Regulation (SJVFS 2014:41) for Direct Payments.
• Analysed the regulations for greening relative to the claimed areas in SAM 2015, and performed a comparison with the areas claimed for in SAM 2014.
• Calculated and scrutinised those exemptions and terms that Sweden has negotiated or argued in favour of.
• Assessed whether the implemented exemptions to regulations and terms made things easier for the farmers and/or resulted in compliance with greening measures being less costly.
• Conducted a survey investigating how and why the farmers chose certain EFA types.

3.3 Crop diversification

According to the European Commission, the diversification of crops should be applied in order to achieve increased environmental benefits – in particular for improved soil quality. The primary aim of implementing this measure is to ensure the improved conservation of soil and ecosystems. The effect of the low requirement threshold, however, is that almost all variants of crops – for example, all winter and spring variants – are counted as individual crops. In principle, this means that all variants of crops that are included in a crop rotation system, including grasslands and fallows, may be counted as separate crops.

The following terms and exemptions are those that we have used as a basis upon which to evaluate the crop diversification measure:

• All farms with less than 10 hectares of arable land have been excluded.
• At least two crops must be grown annually on farms with between 10 and 30 hectares of arable land. At least three crops must be grown annually on farms with more than 30 hectares of arable land.
• There may be a maximum of 75 % of the dominant crop, and a maximum of 95 % of two crops.
• On farms located to the north of the 62nd parallel, the terms is limited to two crops for farms with more than 10 hectares of arable land. None of the crops may cover more than 75 % of the farm’s arable land that is included in crop rotation.
• Farms with less than 30 hectares of arable land with an annual rotation of crops may be exempted from the requirement for crop diversification if more than 75 % of the farm’s entire arable land consists of grassland or fallow land.
• Farms where more than 75 % of the farm’s entire eligible agricultural land consists of grassland or permanent grassland. This exemption, however, only applies if the farm’s remaining area of arable land covers less than 30 hectares.

3.3.1 Exempted farmers and land areas

The exemption from the requirement for crop diversification for farmers with less than ten hectares of eligible arable land for direct payment means that, of an original total of 60,000 farmers, 35,000 farmers do not need to implement this measure (3.2.1). A further 9,000 farmers are exempted from this measure because at least 75 % of their arable land is devoted to grassland or fallow land (Table 8a). This leaves approximately 16,000 farmers (26 %) who have an annual requirement to cultivate two or three
crops on their eligible arable land. The environmental benefit of having at least two crops, which is a requirement on 5,000 farms (corresponding to approximately 155,000 hectares of land), is likely to be marginal (Table 8b). The benefit derived is particularly minimal as it is likely that the majority of these farmers either already meet the term to have two crops or have land that is predominantly covered in grass.

Table 8a. Farmers exempted from the crop diversification greening requirement in 2015, and the number of farmers with a requirement for at least two crops.

<table>
<thead>
<tr>
<th>Rural area</th>
<th>Ten (10) hectares Grassland exemption</th>
<th>Total exempted Number of farmers</th>
<th>Requirement for two crops Number of farmers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forest districts north of the 62nd parallel</td>
<td>6,700</td>
<td>8,500</td>
<td>1,000</td>
</tr>
<tr>
<td>Forest districts south of the 62nd parallel</td>
<td>11,800</td>
<td>14,900</td>
<td>800</td>
</tr>
<tr>
<td>Plain districts of Svealand</td>
<td>4,100</td>
<td>5,400</td>
<td>700</td>
</tr>
<tr>
<td>Plain districts of northern Götaland</td>
<td>8,300</td>
<td>10,300</td>
<td>1,400</td>
</tr>
<tr>
<td>Mixed-terrain districts and southern Götaland’s plain districts</td>
<td>4,300</td>
<td>5,200</td>
<td>1,300</td>
</tr>
<tr>
<td>Sweden</td>
<td>35,200</td>
<td>44,300</td>
<td>5,200</td>
</tr>
</tbody>
</table>

Source: Own calculations, Swedish Board of Agriculture's DAWA and SAM databases 2015. Rounded to the nearest hundred.

Table 8b. Arable land areas exempted from the crop diversification greening requirement in 2015, and the area of land with a requirement for at least two crops.

<table>
<thead>
<tr>
<th>Rural area</th>
<th>Arable land less than ten hectares Grassland exemption</th>
<th>Total exempted Number of hectares</th>
<th>Requirement for two crops Number of hectares</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forest districts north of the 62nd parallel</td>
<td>36,600</td>
<td>100,000</td>
<td>74,500</td>
</tr>
<tr>
<td>Forest districts south of the 62nd parallel</td>
<td>76,400</td>
<td>168,800</td>
<td>14,500</td>
</tr>
<tr>
<td>Plain districts of Svealand</td>
<td>47,600</td>
<td>91,300</td>
<td>13,600</td>
</tr>
<tr>
<td>Plain districts of northern Götaland</td>
<td>70,100</td>
<td>128,000</td>
<td>26,900</td>
</tr>
<tr>
<td>Mixed-terrain districts and southern Götaland’s plain districts</td>
<td>26,400</td>
<td>54,800</td>
<td>25,200</td>
</tr>
<tr>
<td>Sweden</td>
<td>257,100</td>
<td>542,900</td>
<td>154,700</td>
</tr>
</tbody>
</table>

Source: Own calculations, Swedish Board of Agriculture's DAWA and SAM databases 2015. Rounded to the nearest hundred.

16 See Section 4.3
3.3.2 The significance of the exemptions

The exemptions made have meant that considerably fewer farms need to meet the requirements associated with the crop diversification greening measure. A total of 540,000 hectares (37% of the land area) and 44,000 farms have been exempted from the requirement for crop diversification. If all of these land areas had been included in greening, it would only have caused additional work and costs for the farmers, with only marginal environmental benefits.

Without the exemption for grassland (corresponding to approximately 285,000 hectares) or the requirement for two crops (approximately 155,000 hectares), the costs to agriculture\(^{17}\) would probably have increased by around SEK 1 million and the environmental situation would have remained broadly unchanged. The environmental benefit derived from having at least two crops – a term applying to 5,000 farms covering a total of approximately 155,000 hectares of land – is likely to have been very marginal (Table 8b). The benefit derived is particularly minimal as it is likely that the majority of these farmers either already meet the requirement to have two crops or have land that is predominantly covered in grass.

3.3.3 The distribution of crops in 2015 compared with 2014

Despite the exemptions, there are still many farmers (with a relatively large proportion of arable land) who are subjected to the requirement to make changes to their crop distribution. This amounts to approximately 20% of farmers and more than 70% of the arable land eligible for direct payments. The amount of land that really needs to be changed and the number of farmers who really need to act is, however, much smaller, amounting to only 0.4% of the land area and 5% of the farmers. Of these, however, only one third – barely 2% – are in forest districts and these farm only 0.2% of the land area.

In total, farmers have switched crops on approximately 62,000 hectares of the eligible land between the years 2014 and 2015 (Table 9). This change does not solely depend upon the requirement to comply with the greening measure of crop diversification. If we assume that all farmers subjected to the requirement for three crops were forced to add 5% of their 1,360,000 hectares of arable land (Table 8b) to grow an additional crop, this figure would increase to 68,000 hectares. This amount of land is not particularly realistic either, as many farmers already either grow three crops, have fallow land or grow leguminous plants in order to meet the terms for the greening measure of ecological focus areas.

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\(^{17}\) See Section 4.2
Table 9. Changes in the distribution of crops in 2015 compared with 2014. The area of arable land is divided into production areas and accordance with the greening climate exemption for the 62nd parallel.

<table>
<thead>
<tr>
<th>Rural area</th>
<th>Spring cereals, hectares</th>
<th>Winter cereals, hectares</th>
<th>Legume plants, hectares</th>
<th>Spring rapeseed, hectares</th>
<th>Winter rapeseed, hectares</th>
<th>Grassland, hectares</th>
<th>Fallow, hectares</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forest districts north of the 62nd parallel (Map I)</td>
<td>-3,600</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-7,600</td>
<td>5,400</td>
</tr>
<tr>
<td>Forest districts south of the 62nd parallel</td>
<td>3,100</td>
<td>1,100</td>
<td>2,200</td>
<td>-600</td>
<td>-9,400</td>
<td>4,400</td>
<td></td>
</tr>
<tr>
<td>Plain districts of Svealand</td>
<td>-11,000</td>
<td>6,500</td>
<td>3,300</td>
<td>-4,400</td>
<td>2,300</td>
<td>-4,800</td>
<td>5,500</td>
</tr>
<tr>
<td>Plain districts of northern Götaland</td>
<td>-11,500</td>
<td>3,200</td>
<td>2,800</td>
<td>-4,100</td>
<td>3,200</td>
<td>-5,800</td>
<td>6,900</td>
</tr>
<tr>
<td>Mixed-terrain districts and southern Götaland’s plain districts</td>
<td>4,400</td>
<td>1,000</td>
<td>2,200</td>
<td>-1,100</td>
<td>2,800</td>
<td>-8,700</td>
<td>8,300</td>
</tr>
<tr>
<td>Sweden</td>
<td>-17,800</td>
<td>12,300</td>
<td>10,500</td>
<td>-10,100</td>
<td>8,300</td>
<td>-34,000</td>
<td>30,800</td>
</tr>
</tbody>
</table>

Source: Own calculations, Swedish Board of Agriculture’s SAM databases 2014 and 2015. Rounded to the nearest hundred.

Diagram 3. The major changes in crop distribution between the years 2014 and 2015.

Source: Own calculations, Swedish Board of Agriculture’s SAM databases 2014 and 2015.

The ecological focus area greening measure has resulted in an increase in the proportion of fallow land and the cultivation of leguminous plants (nitrogen-fixing crops) in 2015. Part of the change is also attributable to the near cessation of the cultivation of spring rapeseed. Each year, the distribution of land area devoted to, for example, winter and spring cereals is also affected by intra-annual variations (Diagram 3).
3.3.3.1 Farms and areas of arable land affected by the crop diversification measure in 2015.

We have used the SAM data from the growing season of 2014 in order to assess the number of holdings that would not have complied with the rules for crop diversification in 2015 and the number of hectares upon which these farmers would need to change crops (Table 10).

Table 10. Number of farms that would not have met with the rules in 2015 and the land area that would need a new crop.

<table>
<thead>
<tr>
<th>Rural area</th>
<th>Number of farms affected</th>
<th>Area affected, hectares</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forest districts north of the 62nd parallel (Map 1)</td>
<td>860</td>
<td>4,630</td>
</tr>
<tr>
<td>Forest districts south of the 62nd parallel</td>
<td>480</td>
<td>1,580</td>
</tr>
<tr>
<td>Plain districts of Svealand</td>
<td>440</td>
<td>1,840</td>
</tr>
<tr>
<td>Plain districts of northern Götaland</td>
<td>620</td>
<td>2,300</td>
</tr>
<tr>
<td>Mixed-terrain districts and southern Götaland's plain districts</td>
<td>430</td>
<td>1,350</td>
</tr>
<tr>
<td>Sweden</td>
<td>2,830</td>
<td>11,700</td>
</tr>
</tbody>
</table>

Source: Swedish Board of Agriculture’s SAM database 2014. Rounded to the nearest ten.

Barely 16,000 farmers (with approximately 1,500,000 hectares of land) are covered by the terms for the diversification of crops (3.3.1). The land area upon which the farmers would actually need to switch crops is 12,000 hectares, of which more than 6,000 hectares are located in either forest districts or in northern areas, where there is only a requirement for two crops. The remaining 6,000 hectares are located in plain districts (Table 10). In the plain districts, which comprise a total of 1,200,000 hectares of arable land, actions only need to be taken for 6,000 hectares (0.5 % of the area). Moreover, it is often the smaller farms (less than 30 hectares) that do not meet the requirement for diversification. If we base the analysis on applications for 2015, we see that the vast majority of farmers have been able to meet the requirements for crop diversification.

3.3.3.2 Crop distribution in the plain districts of Svealand is only marginally affected by greening

By looking at the distribution of crops in an area such as the plain districts of Svealand (which comprises approximately 450,000 hectares of arable land), we can get an idea of the extent of the change. Since 2014, there has been a requirement in this area for crop diversification involving at least three annual crops.
In Diagram 4, it is difficult to see any clear differences between 2014 and 2015. This is to be expected as the effects of such small changes – in the context of such a large area of land – will often be marginal. Those changes that are visible are likely to be more attributable to reasons other than the requirement for diversification.

The increase in the area with fallow land and the increased cultivation of leguminous plants is probably more attributable to the requirement for ecological focus areas, but is also as compensation for the reduced cultivation of spring oilseed plants. In turn, the reduction of oilseed plants probably depends on the prohibition in Sweden of certain seed treatment agents for spring oilseed plants. Other changes are likely to be the result of intra-annual variations (such as winter-sensitive crops) or for profitability reasons.
3.4 Permanent grasslands

In order to maintain the environmental benefits of permanent grasslands – in particular with regard to the binding of carbon dioxide – there is a requirement for a certain proportion of the entire area of arable land to be devoted to permanent grasslands. This regulation takes the form of either a national ban or a ban at farm level on a change in land use if this quota (reference area) decreases by more than 5%. In Sweden, the obligation to ensure that the proportion (reference area) does not decrease has been set at a national level. Prior to 2014, the quota (reference area) was a cross-compliance requirement, and the maximum permitted amount of reduction to the quota was then 10%.

For agricultural land featuring areas covered by the habitats directive (Natura 2000), including peat land and wetlands, the EU requires member states to designate environmentally sensitive permanent grasslands that need strict protection in order to fulfill the purposes of the directive. Member states may also designate additional sensitive areas that are not part of the Natura 2000 areas, including permanent grasslands with earth-rich soils. For these areas, farmers may not change their operations or plough the land. Sweden has chosen to not include any such additional sensitive areas.

The following terms and exemptions form the basis of our evaluation of the permanent grasslands measure:

• Reference area for 2015 on a national level.
• Agriculture on land that is eligible for basic payment, such as grazing pastures as well as five-year grasslands and fallow fields.
• Farms with grazing pastures in Natura 2000 areas.
• The reference quota must not decrease by more than 5%.
• Farmers with a Natura 2000 area of agricultural land (usually grazing pastures) can receive greening payment without having to follow all the greening rules. The exemption only applies to those requirements that conflict with the terms for the Natura 2000 area, and for this area alone.

Permanent grasslands are calculated as areas of grassland that, in 2012, were declared as grazing pastures, mown meadows and arable land either used for grassland farming or that have lain fallow for at least five consecutive years. The applicable reference area consists of the new permanent grasslands (five-year grasslands) declared up to 2015. The reference area that is discounted comprises those previously existing grasslands that no longer existed in 2015. The reference percentage (quota) is calculated as the area of permanent grassland divided by the area declared in the SAM application. The quota calculation is based on the conventional land areas. The ecological areas are not included in this calculation.

3.4.1 Reference areas for 2003 and 2015

In 2015, there was a total of 1,600,000 hectares of fallow and grass-covered agricultural land in Sweden eligible for direct payments. Of this area we estimate that 682,000 hectares may be classed as permanent grassland, in accordance with the rules of 2015. Of these 682,000 hectares, 303,000 hectares comprised grazing pastures and the remaining 379,000 hectares were long-term grasslands. The reference area
during the previous programme period of 2005 to 2013 was set at 564,000 hectares. Since the rules and the methodology of calculating the area of permanent grasslands have changed over the years, Sweden’s area of permanent grassland has fluctuated relatively strongly during the past ten years (Diagram 5).


3.4.1.1 The reference area in 2015

It has been difficult to determine Sweden’s reference area for 2015, partly because the detailed rules were not established until well into the year. A further difficulty has been that Sweden has not had a sufficiently sound basis upon which to determine the area of long-term grassland at a land-parcel level. For 2015, the total reference area has been calculated at approximately 680,000 hectares, of which approximately 380,000 hectares comprise long-term grassland. When calculating the quota, the buffer for long-term grasslands for 2015 is approximately 34,000 hectares. This calculated quota and reference area have subsequently been revised (Table 11).

3.4.1.2 Recalculation of the reference area during 2016

The new guidelines for the permanent grasslands greening measure for 2016 mean that if, since 2005, any agri-environmental payments have been made for grass-covered arable land, this area shall not be included in the five years required for the land to be counted as permanent grassland (3.4). More arable land subject to greening measures may, therefore, be included in the SAM applications for 2016, which means that the area with requirements for ecological focus areas and crop diversification will increase. The 2016 changes to the rules mean that the reference area for long-term grassland has also decreased (Table 16), which means that less than 400,000 hectares of grazing pasture and/or grassland will be covered by the measure for permanent grasslands after 2016.
Table 11. Changes for 2016 in the reference area for permanent grasslands (PG) and the land area subject to crop diversification (CD) and ecological focus areas (EFAs).

<table>
<thead>
<tr>
<th>Rural area</th>
<th>Number of farmers</th>
<th>PG grazing pasture, hectares</th>
<th>PG grassland, hectares</th>
<th>PG reference area, hectares</th>
<th>PG 5% requirement, hectares</th>
<th>Increased area EFA and CD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forest districts</td>
<td>18,500</td>
<td>121,700</td>
<td>49,300</td>
<td>171,000</td>
<td>8,600</td>
<td>121,400</td>
</tr>
<tr>
<td>Plain and mixed-terrain districts</td>
<td>21,400</td>
<td>181,600</td>
<td>46,400</td>
<td>228,000</td>
<td>11,400</td>
<td>115,000</td>
</tr>
<tr>
<td>Sweden</td>
<td>39,900</td>
<td>303,300</td>
<td>95,700</td>
<td>399,000</td>
<td>20,000</td>
<td>236,400</td>
</tr>
</tbody>
</table>

Source: Swedish Board of Agriculture’s SAM database 2015. Swedish Board of Agriculture’s website. Rounded to the nearest hundred.

3.4.2 Farmers and the land areas affected

The number of farmers affected by the requirement for permanent grassland will decrease from 45,000 to approximately 40,000 (Table 11). There is a decrease in the land area for long-term grassland from 380,000 hectares to approximately 96,000 hectares. After the changes in 2016, the minimum threshold for the requirement becomes approximately 20,000 hectares – 20% of the grassland classed as permanent grassland (excluding grazing pastures). The area eligible for the crop diversification measure also increases by approximately 240,000 hectares to a total of 1,750,000 hectares, which is equivalent to 85% of the arable area with greening requirements (Table 11). In addition to the farmers who do not have any permanent grassland at all, it is only those farmers with certified organic production that are not subject to a greening requirement to preserve their permanent grasslands.

Even so, approximately 40,000 farmers (67%) have agricultural land with long-term grasslands or grazing pastures. Approximately 6,000 of the farmers have only grazing pastures as permanent grassland. This means that the requirement for permanent grasslands is the greening measure that applies to the largest number of farmers. More than 2,000 of the farmers have grazing pastures in Natura 2000 areas – this land covers 46,000 hectares (Table 12).

In total, approximately 400,000 hectares of grazing pastures and long-term grasslands on individual farms in Sweden have been classed in 2016 as permanent grasslands, of which approximately 96,000 comprise non-grazing grasslands (Table 11).

Table 12. Areas of grazing land affected and the number of farmers covered by the greening requirement for permanent grasslands in 2016.

<table>
<thead>
<tr>
<th>Rural area</th>
<th>PG grazing pasture, hectares</th>
<th>N-2000 grazing pasture, hectares</th>
<th>Farmers with grazing pastures</th>
<th>Farmers with only grazing pastures</th>
<th>Farmers with N-2000 grazing pastures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forest districts</td>
<td>121,700</td>
<td>9,300</td>
<td>18,500</td>
<td>2,000</td>
<td>600</td>
</tr>
<tr>
<td>Plain and mixed-terrain districts</td>
<td>181,600</td>
<td>36,700</td>
<td>21,400</td>
<td>3,600</td>
<td>1,800</td>
</tr>
<tr>
<td>Sweden</td>
<td>303,300</td>
<td>46,000</td>
<td>39,900</td>
<td>5,600</td>
<td>2,400</td>
</tr>
</tbody>
</table>

Source: Own calculations, Swedish Board of Agriculture’s DAWA and SAM databases 2015. Rounded to the nearest hundred.
3.4.3 The significance of exemptions and changes in preconditions

Sweden has a large area of permanent grassland, which gives it a relatively large buffer zone before the lower limit of 5% might be reached, which would necessitate the implementation of the greening measure. The rest of this analysis will, therefore, be based upon the assumption that the measure only has a latent environmental benefit relative to cost. This is because the need to implement measures will only become applicable if Sweden’s farmers fall below the nationwide reference area by more than five per cent. In real terms, this means that the area of ‘permanent’ grassland must fall below 76,000 hectares (Table 11).

The exemptions from the requirements for permanent grasslands that have been made are partly exemptions for organic farming and partly exemptions for special land-management conditions in Natura 2000 areas. The effects of the years where agri-environmental payments have not been counted in the transition from temporary to permanent grassland (3.4.1) have also affected the outcome. The change in preconditions with a smaller reference area for permanent grasslands is expected to result in a reduced latent cost for agricultural measures, from SEK 46 million to 34 million (Diagram 11).

The conditions for support have also become more stringent for the land area of approximately 46,000 hectares that lies within Natura 2000 areas (3.4.2). Here, the farmers have an additional management requirement for those natural pastures with basic payment that also have requirements for management measures as part of Natura 2000. These management rules will, however, become a problem primarily for Sweden’s county administrative boards, which must maintain the current land use if a farmer ceases grazing operations in a Natura 2000 area.

3.5 Ecological focus areas

Areas with an ecological focus must consist of areas that have a direct impact on biodiversity, such as fallow land, landscape features, afforested areas and areas with short rotation coppice. Sweden has the following five types of EFA:

- Land lying fallow.
- Arable land with willow (short rotation coppice) cultivation.
- Areas with nitrogen-fixing crops.
- Areas with under-sowing of a grass crop in a main crop.
- Landscape features in the form of non-cultivated field margins on arable land.

Certain land areas with cultivated crops may be used as ecological focus areas, such as those with nitrogen-fixing crops, willow (short rotation coppice) and under-sown grass crops. Combined with the areas with the selected measures, member states must also use the conversion and weighting factors stated in an annex to the regulation when calculating the total amount of hectares that shall constitute the farms’ areas with an ecological focus (3.5.2).

Several exemptions have been introduced for the ecological focus areas requirement. For example, all farms with less than 15 hectares of arable land are exempted. If the farm occupies more than 15 hectares of eligible cultivated land, the farmer must ensure that 5% of this land area becomes an ecological focus area. Permanent crops
and permanent grasslands are counted from the farm’s land area. We have evaluated the ecological focus areas measure based upon the following terms and exemptions:

- All farms with more than 15 hectares of cultivated land.
- If the farmland consists of at least 75% grass and/or legume crops and/or fallow land, and more than 30 hectares of arable land still remain.
- If at least 75% of the farm’s arable land is permanent grassland, and more than 30 hectares of arable land still remain.
- All farms that do not have a forest exemption (2.5.4).

### 3.5.1 Exempted farmers and land areas

Of a total of 60,000 farmers, approximately 49,000 are exempted from the requirement for ecological focus areas (EFAs). For almost 40,000 of these, the exemption is granted because they have less than 15 hectares of arable land on which annual crops are grown (Table 13a). A likely outcome is that all of these small holdings will produce a sufficient variety of crops in the area without the need to introduce ecological focus areas.

Approximately 9,000 additional farmers have been granted an exemption from the requirement for ecological focus areas. More than 6,000 of these are exempted because their agricultural activities are in distinct forest districts, which alone constitutes a varied landscape. Finally, almost 3,000 farmers have been exempted because they have overwhelmingly (more than 75%) grassland and fallow land on their arable land – grassland and fallow land can often replace, or be considered equitable to, EFA fallows.

**Table 13a. Farmers exempted from the ecological focus area greening measure for 2015.**

<table>
<thead>
<tr>
<th>Rural area</th>
<th>15 hectares, number of farmers</th>
<th>Forest exemption, number of farmers</th>
<th>Grassland exemption, number of farmers</th>
<th>Total number of exempted farmers</th>
<th>30 hectares, number of farmers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forest districts north of the 62nd parallel (Map 1)</td>
<td>7,600</td>
<td>2,100</td>
<td>(10)</td>
<td>9,700</td>
<td>8,300</td>
</tr>
<tr>
<td>Forest districts south of the 62nd parallel</td>
<td>13,400</td>
<td>4,100</td>
<td>(140)</td>
<td>17,600</td>
<td>14,300</td>
</tr>
<tr>
<td>Plain districts of Svealand</td>
<td>4,600</td>
<td></td>
<td>800</td>
<td>5,400</td>
<td>5,600</td>
</tr>
<tr>
<td>Plain districts of northern Götaland</td>
<td>9,100</td>
<td></td>
<td>1,200</td>
<td>10,300</td>
<td>10,800</td>
</tr>
<tr>
<td>Mixed-terrain districts and southern Götaland’s plain districts</td>
<td>5,000</td>
<td></td>
<td>700</td>
<td>5,700</td>
<td>6,200</td>
</tr>
<tr>
<td>Sweden</td>
<td>39,700</td>
<td>6,200</td>
<td>2,800</td>
<td>48,700</td>
<td>45,200</td>
</tr>
</tbody>
</table>

*Source: Own calculations, Swedish Board of Agriculture’s DAWA and SAM databases 2015. Rounded to the nearest hundred.*
Table 13b. Land area in hectares excluded from the ecological focus area measure in 2015.

<table>
<thead>
<tr>
<th>Rural area</th>
<th>Arable land less than 15 hectares</th>
<th>Forest exemption, number of hectares</th>
<th>Grassland exemption, number of hectares</th>
<th>Total number of exempted hectares</th>
<th>Arable land less than 30 hectares</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forest districts north of the 62nd parallel (Map 1)</td>
<td>49,600</td>
<td>129,600</td>
<td>900</td>
<td>180,100</td>
<td>69,000</td>
</tr>
<tr>
<td>Forest districts south of the 62nd parallel</td>
<td>98,600</td>
<td>233,200</td>
<td>8,000</td>
<td>339,800</td>
<td>125,000</td>
</tr>
<tr>
<td>Plain districts of Svealand</td>
<td>54,900</td>
<td>33,900</td>
<td>88,800</td>
<td>125,000</td>
<td>81,000</td>
</tr>
<tr>
<td>Plain districts of northern Götaland</td>
<td>85,700</td>
<td>43,400</td>
<td>81,000</td>
<td>130,200</td>
<td>130,200</td>
</tr>
<tr>
<td>Mixed-terrain districts and southern Götaland's plain districts</td>
<td>35,900</td>
<td>25,000</td>
<td>60,900</td>
<td>96,500</td>
<td>64,500</td>
</tr>
<tr>
<td>Sweden</td>
<td>324,700</td>
<td>362,800</td>
<td>111,200</td>
<td>798,700</td>
<td>469,700</td>
</tr>
</tbody>
</table>

Source: Own calculations, Swedish Board of Agriculture’s DAWA and SAM databases 2015. Rounded to the nearest hundred.

There are approximately 12,500 farmers (21%) who are actually required to establish ecological focus areas on their arable land. This agricultural land is mostly located in distinct plain districts, and the average land area of these farms is 107 hectares. In total, an area amounting to 800,000 hectares (39% of the arable land area) is exempted (Table 13b). Approximately 470,000 hectares come from the exemptions for forested and grass-covered land.

It is likely that only a marginal environmental benefit will be obtained from this area of land, which is expected to correspond to approximately 39,000 hectares with ecological focus areas. The exemption for farms smaller than 15 hectares has meant that approximately 325,000 hectares of arable land have been exempted from EFA measures. This means that neither costs nor environmental benefits are significantly affected, but the additional work and costs associated with applying are likely to be reduced for these 39,000 farmers.

3.5.2 Different individual measures for ecological focus areas

How then have Sweden’s farmers used the available EFA types (3.5) to meet the requirement for ecological focus areas? There are five different individual measures. Farmers in different districts have applied for different EFA types. For two of the individual measures, no change of cultivation is likely to occur. Cultivation of willow (short rotation coppice) and the under sowing of crops are likely to make use of already established plantations and areas for which under sowing has already been planned. For fallow and nitrogen-fixing crops, the land areas may have increased in conjunction with the EFA requirement. The only individual measure that has been added as a result of the rules for ecological focus areas is that of non-cultivated field margins (Table 14).
Table 14. Applications for ecological focus areas (hectares) and the number of farms applying in 2015.

<table>
<thead>
<tr>
<th>Rural area</th>
<th>Claimed EFA area</th>
<th>EFA fallow</th>
<th>Non-cultivated field margin</th>
<th>Short rotation coppice</th>
<th>Under sowing of grass crop</th>
<th>Nitrogen-fixing crop</th>
<th>Number of farms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forest districts north of the 62nd parallel (Map 1)</td>
<td>900</td>
<td>200</td>
<td>0</td>
<td>(5)</td>
<td>700</td>
<td>0</td>
<td>100</td>
</tr>
<tr>
<td>Forest districts south of the 62nd parallel</td>
<td>9,800</td>
<td>3,900</td>
<td>100</td>
<td>300</td>
<td>4,000</td>
<td>1,500</td>
<td>700</td>
</tr>
<tr>
<td>Plain districts of Svealand</td>
<td>41,600</td>
<td>20,200</td>
<td>600</td>
<td>1,800</td>
<td>8,400</td>
<td>10,600</td>
<td>2,800</td>
</tr>
<tr>
<td>Plain districts of northern Götaland</td>
<td>49,800</td>
<td>16,800</td>
<td>500</td>
<td>500</td>
<td>15,900</td>
<td>16,100</td>
<td>4,100</td>
</tr>
<tr>
<td>Mixed-terrain districts and southern Götaland’s plain districts</td>
<td>58,600</td>
<td>12,100</td>
<td>3,000</td>
<td>900</td>
<td>25,100</td>
<td>17,500</td>
<td>4,800</td>
</tr>
<tr>
<td>Sweden</td>
<td>160,700</td>
<td>53,200</td>
<td>4,200</td>
<td>3,500</td>
<td>54,100</td>
<td>45,700</td>
<td>12,500</td>
</tr>
</tbody>
</table>

Source: Own calculations, Swedish Board of Agriculture’s DAWA and SAM databases 2015. Rounded to the nearest hundred.

After all exemptions have been granted, approximately 1,280,000 hectares of farmland on 12,500 farms will remain with eligibility for ecological focus areas. The accession level of 5% corresponds to 64,000 hectares of unweighted ecological focus area (Tables 14 and 15).

3.5.2.1 Weighted hectares of ecological focus areas

The requirement for ecological focus areas (EFAs) is 64,000 unweighted hectares, and this has meant that 160,000 hectares have been declared as EFAs (Table 15). This difference is due to the fact that the EFA types are given a weighting of between 0.3 and 1.5 according to the European Commission’s assessment of their environmental benefit.

The three largest declared areas are those with under sown grass crops (54,000 ha), fallow land (53,000 ha) and nitrogen-fixing crops (46,000 ha). Farmers have over-declared the EFA areas by almost 70%, presumably in order to include entire fields and to not need to take any risks. One reason may also be that, if the farmers have over-declared EFA fallow land, the counting of the period of dormancy for permanent grasslands is not triggered.
Table 15. The land areas acceded to ecological focus areas for 2015, before and after weighting, and the requirement for EFA.

<table>
<thead>
<tr>
<th>EFA</th>
<th>Non-cultivated field margin (*6)</th>
<th>Short rotation coppice</th>
<th>Under sowing of grass crop</th>
<th>Nitrogen-fixing crop</th>
<th>Total EFA</th>
<th>Requirement for EFA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land area before weighting, ha</td>
<td>53,200</td>
<td>4,200</td>
<td>3,500</td>
<td>54,100</td>
<td>45,700</td>
<td>160,700</td>
</tr>
<tr>
<td>Weighting</td>
<td>1.0</td>
<td>1.5</td>
<td>0.3</td>
<td>0.3</td>
<td>0.7</td>
<td>0.7</td>
</tr>
<tr>
<td>Land area after weighting, ha</td>
<td>53,200</td>
<td>6,200</td>
<td>1,100</td>
<td>16,200</td>
<td>32,000</td>
<td>108,700</td>
</tr>
</tbody>
</table>

Source: Own calculations, Swedish Board of Agriculture’s DAWA and SAM databases 2015. Rounded to the nearest hundred.

3.5.3 The significance of the exemptions

From 2015, many farms will escape the requirement to establish ecological focus areas (EFAs). In many cases, exemptions are justified with consideration to the meagre environmental benefit that these ecological focus areas would otherwise have contributed. This applies, for instance, to the forest exemption where farms located in forest districts do not need to establish ecological focus areas. Farms with lots of grass-covered land, grassland or fallow land are also exempted from the requirement to designate EFAs for the same reason – a conditional environmental measure that creates very limited environmental improvement for this type of land.

The exemptions made have meant that fewer farms need to meet the terms associated with the ecological focus area greening measure. In particular, farms with less than 15 hectares of land have been exempted. The forfeited agricultural costs resulting from these various exemptions correspond to a cost reduction of SEK 55 million, from SEK 238 million to 183 million per year (Diagram 11). It is more difficult to calculate the potential environmental benefit sacrificed, but this could be worth somewhere in the region of SEK 40-60 million (Diagram 13).

The increased cultivation of certain crops, and the changed crop distribution as a result of the requirement for ecological focus areas, is estimated to comprise approximately 40,000 hectares, of which fallows account for 30,000 hectares and nitrogen-fixing crops account for 10,000 hectares. The area with willow (short rotation coppice) is 3,500 hectares, but this area of crop was already in existence. The under sowing of grass crops is also something that doesn’t create any change in land usage because the farmers merely exploit existing cultivation measures. Farmers already comply with most of the EFA terms, and the costs and environmental benefits are already in existence.

The only additional areas with changed land use are the non-cultivated field margins, amounting to 4,200 hectares. Applications are made for the non-cultivated field margins per linear metre which, according to the support regulations, are then multiplied by six (linear metres *6). It is likely that most field margins are only one metre wide as current term allow a minimum width of 1 metre, which corresponds to 700 actual hectares. In total, the requirement for ecological focus areas (EFAs) has led to the establishment of approximately 45,000 hectares with EFAs of varying environmental benefit. More than 12,000 farmers have had to establish appropriate ecological focus areas – mostly in distinct plain districts where this measure has the most environmental benefit.
3.6 What do farmers think of the ecological focus areas?

3.6.1 Questions about the farmers’ choices of ecological focus areas

In order to learn how and why Sweden’s farmers selected certain types of EFA, we have engaged Landja to conduct a survey of farmers. Sveriges Lantbruk (Sweden’s Agriculture) is a postal survey that has been sent to 1,000 farmers every spring and autumn since 1973. The survey goes to people who operate agricultural properties with more than ten hectares of land.

Once Landja had filtered out the most obvious cases that cannot have an EFA (namely, those with a forest exemption) from all the responses, 312 farmers remained. A little more than 200 farmers were filtered out in this way. The response rate for the survey in the spring of 2016 was 60%.

The majority of the farmers with a requirement for ecological focus areas have chosen more than one type of EFA in order to be able to fulfil its commitment. In those areas without any exemptions from the ecological focus areas (forest exemptions), half of the farmers have not had to establish an EFA (small farms or farms with lots of grassland). Of those that do need to establish an EFA, approximately 30% have selected either nitrogen-fixing crops or the under sowing of grass crops. More than 10% of the farmers have chosen non-cultivated field margins.

Examples of the questions asked in the spring 2016 survey include:

*Have you set aside any of the following ecological focus areas (EFAs) on your farm? If so, indicate your main reason for choosing each EFA.*

The diagram below shows how farmers answered the question about the main reasons behind their choice of ecological focus area types.

![Diagram 6. The main reason why farmers choose a particular EFA type. Source: Sveriges Lantbruk, spring 2016. Questionnaire from Landja.](image-url)
If we look more closely at the likely reasons behind the choices for the four EFA types in Diagram 6 (above), we can see that farmers have primarily chosen fallow because they already have fallow land, meaning that they do not have to make major changes and the fallow land can be used in existing cultivation and crop rotation. Nitrogen-fixing crops have been chosen because this measure is considered to be a good alternative to introducing a new break crop, as well as giving a good gross margin.

For the individual measure of under sowing of a grass crop, 40 % of the farmers responded that they chose this measure because they either already have such an area or because it best fits in with the crop rotation system. Both responses indicate that they had already planned to cultivate grasses so the EFA requirement is unlikely to have affected the choice of cultivation for these farmers.

Preferences for non-cultivated field margins have been somewhat different. To a greater extent than the other EFA types, these have been considered to cost less to use, as well as providing the greatest gross margin and contributing the most to biodiversity. The risk of sanctions from checking does not appear to have influenced the decisions. The opportunity for increased biodiversity does not seem to have influenced the decisions, except possibly for non-cultivated field margins. Almost 40 % of the farmers state that they already had the area for cultivated field margins. This is probably due to the fact that, up until 2014, they received agri-environmental payments for riparian strips but were not able to apply in 2015. The payments were reintroduced in 2016. This may need to be investigated in more detail.

The overall results from the responses to the questions in the survey about greening are as follows:

- Two in three farmers responded that they have not set aside an EFA. Among those who have set aside ecological focus areas, fallow land is the most common form, although most have set aside several EFAs.
- Of those who stated fallow land as an EFA, half said that their main reason for doing so was that the land area already existed. Two in ten responded that fallow land fits in best with the crop rotation system.
- Of those who stated nitrogen-fixing crops as an EFA, half said that the main reason was that these fit in best with the crop rotation system. Three in ten state that they already had the land area.
- Of those who named under sowing of a grass crop as an EFA, four in ten said that the primary reason was because they already had the land area. Four in ten responded that it fits in best with the crop rotation system.
- Of those who named non-cultivated field margins as an EFA, four in ten said that the primary reason was because they already had the land area. Two in ten respondents said that this involves the least cost, in terms of both time and money.
- Fallow is the most common EFA, whilst non-cultivated field margins are least common. Most of those with EFAs have several types of ecological focus area.
- In all cases, the most common reasons for choosing a certain type of EFA were that the land area already existed and that the type in question was most suitable for the crop rotation system.
3.6.1.1 Under sowing of flowering herbs

Another question was asked in the Landja survey, aimed at those farmers who have chosen fallow or non-cultivated field margins as ecological focus areas (Diagram 7).

*Would you have selected this option even if there had been a term for under sowing with flowering herbs, such as clover?* The other EFA options and support regulations remain unchanged.

![Diagram 7](https://example.com/diagram.png)

Diagram 7. Farmers’ choices of fallow land or non-cultivated field margins even if there was a term for under sowing with flowering herbs.

*Source: Sveriges Lantbruk, spring 2016. Questionnaire from Landja.*

Relatively few farmers (124) have chosen fallow land or non-cultivated field margins. But of those with fallow or non-cultivated field margins, two in three responded that they would still have chosen these even if there had been a term for under sowing with flowering herbs.

3.6.1.2 Comparison of the questionnaire and SAM applications

There is broad correlation between the Landja survey and the collated application data from SAM 2015 regarding the number of farmers who applied and the extent to which different types of ecological focus areas were selected. The SAM applications provide more information about which EFAs have been required and applied for, while the survey concentrates more on the choices made by the individual farmers. This data can be analysed together with the detailed rules, terms and weightings that are provided with the various EFA types. The way in which the weightings and detailed rules are formed plays a large role in determining how interesting the different EFA types will be to farmers in different areas, which also impacts upon how well the environmental impact can be managed.
4 The costs and environmental benefits of greening in Sweden

It would be useful to be able to calculate the costs that result from the actions farmers must take in order to implement the greening measures (Table 16). Another cost item that is of interest is that of transaction costs. We have used a spreadsheet to attempt to calculate the costs to farmers, and have evaluated the environmental benefits generated according to the conditions of the greening measures implemented (Annexes 1 and 2). We have also compiled a few simple cost-benefit analyses in order to be able to clarify just how environmentally efficient greening either is or has the potential to be. We have based this upon the environmental objectives, or expected environmental effects, stated by the European Commission as the reason for introducing greening (3.1).

The costs can be calculated with regard to the differences in the farmers’ gross margins both before and after the measures taken when they have to implement and make adjustments to meet the greening requirements. It is more difficult to perform an assessment of the environmental benefits. By, for example, using previously developed calculations for the compensation levels of agri-environmental payments, we can gain an acceptable estimate of the political willingness to pay, and thereby, a general assessment and evaluation of environmental benefits. Better still are those instances where evaluation studies have been produced. A value for biodiversity has been developed for the performed cost-benefit analysis but, because biodiversity is difficult to evaluate, the values developed are considered to be ‘the best possible assessment’.

If we are to be able to assess the environmental efficiency of the different greening measures, it is also necessary to evaluate the environmental benefit (Table 17). It is a demanding task to set a price on the costs incurred and the environmental benefits that have been generated. It requires assumptions about the likely behaviour of farmers who are faced with different support requirements, and the extensive compilation of various environmental and price data. Although the assessment contains both uncertainties and estimates, it is a tool that gives an approximate idea of the effectiveness and potential of the greening measures.

4.1 The result of greening in Sweden

The ecological focus area (EFA) measure is that which generates the most and greatest environmental benefits. The measure for permanent grasslands (PG) also provides environmental benefits but to a lesser extent, and the impact of this measure in Sweden is also mostly latent (3.4.3). These overall environmental effects of greening are likely to be similar throughout the entire EU.

Significant differences in the underlying conditions need to be taken into consideration when calculating the total costs and environmental benefits. We have tried to account for these differences by, for example, dividing Sweden into five regions and using these regional differences as a basis for the evaluation of the environmental benefits and costs (Map 1 and Annex 2). Diagram 8 shows the distribution of the environmental benefits according to the measures, and the value of the individual environmental effects based on the changes in land usage for the greening areas claimed in Sweden in 2015.
Diagram 8. Evaluated environmental benefits per measure and year, based upon the change of land usage (changed cultivation and crop distribution) for the greening areas claimed in Sweden in 2015. (See section 4.3).

Depending on where the farmers work, their type of cultivation and the size of their operations, they may be required to comply with one, two or three of the greening requirements. Approximately 50,000 farmers (83% of all farmers) must implement a total of approximately 69,000 measures (Diagram 9). On average, each farmer has 1.4 commitments. The permanent grassland measure is that which affects the greatest number of farmers, even after the changes to the regulations have been taken into account (3.4.2). The extent of the costs of the measures and the value of the environmental benefits is very dependent on where the measures need to be implemented and which type of ecological focus area the farmers choose.

Diagram 9. Number of farmers implementing one or more greening measures, 2015.
Source: Own calculations. Rounded to the nearest thousand.
4.2 What are the costs for agriculture?

In the following section, the calculated values of the environmental benefit are compared to the costs incurred by the agricultural sector for complying with these greening measures. The costs used in the calculations are the expenses that farmers are expected to have in order to fulfil the greening commitment. The costs are calculated for two forest district regions and three plain district regions (Map 1). It is assumed that the farmers in each region always select the option that is most economically viable.

A. Estimated costs for crop diversification

The calculations are limited to the area of arable land with a crop rotation system of cultivation. Costs are calculated according to the area of crops (fields) in the region where farmers are required to change the ratio between the crops grown; the change is assumed to be between ‘the most economically viable and the next most viable crop’. In these calculations, the change is often between winter wheat and barley or between barley and oats (area * difference in the gross margin)18.

B. Estimated costs for permanent grasslands

The calculation is limited to grassland on arable land. Natural pastures lie in naturally-determined locations and are, therefore, not affected. For arable land, the requirement is for those grasslands – primarily pastures – that have been left for at least five years. Costs are calculated for 5% of the reference area that has been grass-covered for at least five years. The costs consist of the difference in the gross margin between an extensive grassland and a cereal mix comprising winter wheat/spring barley (area * difference in the gross margin).

C. Estimated costs for ecological focus areas

The calculation includes all non-organic crop rotation grasslands, and long-term grasslands are also excluded from the area of arable land. Five per cent (5%) of this remaining land area must be an ecological focus area. The costs are calculated for that area that has to be an ecological focus area (area * average of gross margins for all of the farm’s cultivation of rotation crops).

4.2.1 Estimated transaction costs

Costs concerning information related to direct payments are referred to as transaction costs. They tend to be divided into costs for the obtaining or distribution of information, the writing of contracts, and for monitoring, checking and following-up. Costs for time, equipment, etc. may also be included. Accordingly, the costs covered are somewhat more extensive than those that might ordinarily be classed as administration costs. The transaction costs of authorities (in this case the Swedish Board of Agriculture and County Administrative Boards) and the recipients of direct income support are accounted separately.

The costs of recipients of direct income support derive mainly from the obtaining of information and the process of applying for support. For farmers, they comprise both time spent and the cost of consultancy fees. Here, we equate the time and money spent by farmers with the amount of time invoiced by consultants for assisting with

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18 See Definitions of concepts used in the report, page 1.
the farmers’ applications for support. If we also make the assumption that the greening element accounts for 20% of this time, this means that the average cost will be approximately SEK 6 per hectare, per year. The transaction costs per hectare can, however, be considerably higher for those farmers who actually have one or more greening requirements for their eligible area of agricultural land.

The authorities’ costs primarily comprise the construction of the support schemes as well as providing information about, checking and following up the direct payments. The cost of launching the whole direct payment reform has been estimated at almost SEK 400 million. The annual cost for six years of single farm payment will amount to approximately SEK 70 million. If we assume that greening accounts for 20% of these costs, and the area eligible for direct income support is 2,941,000 hectares, the cost will amount to approximately SEK 9 per hectare, per year.

Further costs that must be included are the authorities’ annual administration costs for the greening payments, such as the provision of information, checking and following up. It is very difficult to estimate these costs. If the single payment scheme has been successfully designed, these costs are likely to be low – presumably no higher than SEK 5 per hectare. In total, the transaction costs of greening can be estimated at between SEK 15 and 20 per hectare, per year.

4.2.2 Estimated costs of measures

Diagram 10 shows the costs to agriculture per greening measure and as a total for Sweden based upon land use in 2015. Again, the lowest costs are those relating to the crop diversification measure.

The reason for these low costs is that the areas affected are both small and mainly located in regions with lower yields. Because the permanent grasslands measure probably does not need to be implemented in Sweden, these costs may be considered to be latent and are, therefore, highlighted in orange in the diagram.

The reason for the higher costs of ecological focus areas is that this measure has to be implemented at all farms with more than 15 hectares of arable land. Costs will also be higher for the land with the highest yields because these areas can have very high alternative gross margins (lost revenues).

The total cost of the three greening measures amounts to approximately SEK 219 million, including the latent cost of almost SEK 34 million for permanent grassland. This latent cost will only arise if Sweden, as a nation, falls below the nationally-set reference area (or the quota) by more than 5% (3.4). The highest costs of complying with the greening requirements apply to the measure for ecological focus areas.

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19 Estimates of direct payments-application times from the Rural Economy and Agricultural Society (Hushållningsrådet) and consultants from the Federation of Swedish Farmers (LRF)

20 The Swedish Board of Agriculture’s report 2016:10.

21 Estimates from the Swedish Board of Agriculture.
Diagram 10. Total costs of the greening measures for agriculture in 2015. The orange columns include the latent costs for permanent grasslands.

Source: Own calculations. In SEK millions.

If we extrapolate the unit cost of eligible area of agricultural land, the cost is SEK 62 per hectare (Diagram 11). The average cost of fulfilling all the requirements of greening is expected to be SEK 74 per hectare. In addition to this, there are transaction costs that are estimated at between SEK 15 and 20 per hectare (4.2.1).

Diagram 11. The costs for all greening measures for agriculture in 2015. The orange columns include the latent costs for permanent grasslands.

Source: Own calculations. Figures for each measure are stated in SEK per hectare.
4.3 What are the environmental benefits?

In order to get some idea of the extent of environmental efficiency, a simplified cost-benefit analysis has been performed. The analytical model used was designed in accordance with the following descriptions and with Tables 16 and 17.

**Measure**: The three greening measures: crop diversification, permanent grassland and ecological focus areas.

**Change**: The areas affected by each measure, measured in hectares.

**Scope**: The extent and ways in which production or land use has changed.

**Table 16.** Proportion of affected land areas and altered land use.

<table>
<thead>
<tr>
<th>Measure</th>
<th>Change</th>
<th>Scope</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>crop diversification</td>
<td>area %</td>
</tr>
<tr>
<td>B</td>
<td>permanent grassland</td>
<td>area %</td>
</tr>
<tr>
<td>C</td>
<td>ecological focus area</td>
<td>area %</td>
</tr>
<tr>
<td>TOTAL</td>
<td>greening measure</td>
<td>change %</td>
</tr>
</tbody>
</table>

Figures for the environmental benefit of the greening measures have been obtained by evaluating the benefits coupled to each measure in the EU Commission’s regulation.

**Environmental impact**: Expected dominant environmental impact of each measure.

**Index**: The parameter by which the environmental impact is assessed.

**Value**: Calculated value of the environmental benefit based upon evaluation studies, political willingness to pay, comparative environmental taxes, fees or calculation costs.

The environmental benefit arising from a reduced use of plant protection products is valued on the basis of an average gross margin (GM) per hectare of organic cultivation excluding organic support payments, compared with the results (GM) of conventional cultivation. This difference is then multiplied by the dose/ha of plant protection products used in conventional cultivation (Annexes 2 and 3). The value is likely to be a little low but provides a reasonable indication of the measure’s environmental benefit.

An additional value for biodiversity has been produced using the assessments of an expert panel which has compared and valued different types of soil and cultivation on the basis of an optimal diversity fallow\(^{22}\). The maximum value is set at SEK 6,200 per hectare for the optimal diversity fallow land, while the minimum value is SEK 620 per hectare for a vegetated fallow or catch crop, equivalent to 10 % of the maximum value (Annex 3).

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\(^{22}\) Hasund, et al. 2011.
### Table 17. Environmental values and indicators used. A, B and C from Table 16.

<table>
<thead>
<tr>
<th>Measure</th>
<th>Environmental impact via</th>
<th>Index</th>
<th>Price</th>
<th>Parameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABC</td>
<td>reduced nitrogen leaching</td>
<td>kg N/ha</td>
<td>SEK 32/kg</td>
<td>kg N/ha, (basic leaching 12 kg N/ha)</td>
</tr>
<tr>
<td>ABC</td>
<td>reduced phosphorus leaching</td>
<td>kg P/ha</td>
<td>SEK 1,050/kg</td>
<td>kg P/ha</td>
</tr>
<tr>
<td>B</td>
<td>reduced carbon dioxide emission</td>
<td>kg CO2/ha</td>
<td>SEK 0,25/kg</td>
<td>kg CO2 equiv./ha</td>
</tr>
<tr>
<td>BC</td>
<td>increased biodiversity</td>
<td>bm/ha</td>
<td>max SEK 6,200/bm</td>
<td>bm/ha</td>
</tr>
<tr>
<td>ABC</td>
<td>reduced use of plant protection products</td>
<td>doses/ha</td>
<td>SEK 490/dose</td>
<td>dose = kg active substance/ha</td>
</tr>
<tr>
<td>SUM</td>
<td>Environmental benefit</td>
<td>Total index</td>
<td>SEK/unit</td>
<td>Total environmental value of greening</td>
</tr>
</tbody>
</table>

Source: Own calculations. The amounts are at the 2015 price level, see Annex 3.

The environmental benefit derived from permanent grassland is usually only latent – the value is only actualised if the farmer changes the land use and the land begins to be cultivated more intensively.

#### 4.3.1 Estimated environmental benefits

Diagram 12 shows that the ecological focus area greening measure has the greatest intended environmental benefit based on the land use of 2015.

![Diagram 12](image)

Diagram 12. Estimated total environmental benefits of the greening measures for agriculture in 2015. The orange columns include the latent costs for permanent grassland. Source: Own calculations.

For the crop diversification measure, the analysis shows that the intended environmental benefit will be negligible. The measure that is the most difficult to assess is that of permanent grassland, since the final rules were only established at the beginning of 2015 and new preconditions will therefore apply for 2016.

The ecological focus area measure is that which contributes the most in terms of environmental benefits. The environmental benefit of EFAs can be valued at SEK
Crop diversification provides very little environmental benefit. The permanent grassland measure only has a beneficial effect on the environment when Sweden, as a nation, exceeds the quota for the set reference area. If all measures are implemented, the estimated value of the environmental benefit amounts to SEK 400 million.

The overall environmental benefit can be recalculated to give a total value of SEK 138/ha (Diagram 13). Of the total estimated value, SEK 110/ha derives from the ecological focus areas (EFAs), which constitutes almost 80% of the total environmental benefit. If we take another look at Diagram 9 we can see that 60% of the total environmental benefit is derived from the value of increased biodiversity.

### 4.4 How environmentally efficient is the greening?

If an environmental measure is cost-effective, it can often also be said to be environmentally efficient. As part of greening, the European Commission sets certain environmental conditions with which farmers must comply. The farmers have, to a large extent, often already met these conditions but, in certain cases, some degree of change is necessary. One of the objectives of greening has to be the achievement of as little environmental burden and/or as much biodiversity as possible as a result of a specific investment or use of resources. It is essential to identify measures that provide more environmental benefits than the previous land use, entailing costs or efforts for the farmers that are reasonable. If, however, the cost of implementing a greening measure is greater than the estimated environmental benefit, then the environmental efficiency has to be questioned.

The total cost for agriculture of implementing the greening measures – including that
of permanent grassland – amounts to approximately SEK 75 per hectare (Diagram 14). Overall, greening provides us with a net environmental benefit (benefit vs costs) of approximately SEK 65 per hectare (SEK 138 vs. SEK 74). For the entire area eligible for direct payments this corresponds to a surplus of approximately SEK 190 million.

**Diagram 14.** Estimated environmental efficiency of the CD, PG and EFA greening measures in 2015.
*Source: Own calculations. SEK per hectare, per year.*

If we assume a transaction cost of between SEK 15 and 20 per hectare (4.2.1), the cost to society is approximately SEK 90 per hectare, resulting in a net environmental benefit of approximately SEK 50 per hectare (Diagram 14). For the entire area of Sweden eligible for direct payments in 2015, this corresponds to a total surplus of approximately SEK 150 million. For all of Sweden’s greening measures, the value of the overall environmental benefit amounts to SEK 140 per hectare, per year. When we consider that greening payment corresponds to an annual payment of SEK 640 per hectare (2.4.1) this gives an efficiency of approximately 20 % (approximate outcome 0.2:1), calculated as the ratio of the value of the environmental benefit and the total amount of greening payments. This level of efficiency is considered to be low. In Diagram 15, we see that the total costs of the measures and the environmental benefits contain both latent values (3.4.3) and existing values (3.5.3).

For the purposes of comparison, we can look at the environmental efficiency of agri-environmental payments for grazing pastures. The maximum environmental benefit is estimated at SEK 6,200 per hectare (4.3) and the current payments correspond to SEK 2,800 per hectare, based upon the estimated average management costs (approximate outcome 2:1). Another agri-environmental payment is for reduced nitrogen leaching (catch crops), where the reduction in the leaching of plant nutrients can be valued at a maximum of SEK 1,200 per hectare in the areas most sensitive to leaching, and where the level of payments is set according to the estimated cost of the measure at SEK 1,100 (approximate outcome 1:1). There is, of course, great variation in the environmental efficiency of the different agri-environmental payments.

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and also in the extent to which they can be effectively directed. Agri-environmental payments are, however, often considerably more efficient than the greening measures – particularly if they are directed effectively and have differentiated levels of payments.

![Cost of greening measures](image1)

![Environmental benefits of greening](image2)

**Diagram 15.** New and latent (PG) and existing (EFA) costs and environmental benefits. CD = crop diversification, PG = permanent grassland, EFA = ecological focus area.  
*Source: Own calculations, Annexes 1 and 2. In SEK millions for 2015.*

For the permanent grassland measure, all costs and benefits can be considered to be latent (3.4.3). For ecological focus areas, approximately 75% of the costs and benefits are considered to be existing. Swedish agriculture already fulfils many of the requirements (3.5.3). Accordingly, the actual amount of annual change to the environment achieved by greening is likely to be small, which means that there is little overall improvement in environmental efficiency for the entirety of Sweden’s greening payments.
When we add together all the environmental benefits created by greening during 2015 and compare this with the resulting costs for farmers and agriculture (SEK 139 vs. SEK 75), we have a net environmental benefit of SEK 64 per hectare, per year (Diagram 16). If we exclude the latent and existing environmental benefits, we have a significantly lower net environmental benefit of SEK 13 per hectare, per year (SEK 27 vs. SEK 14). Diagram 17 shows the new costs and environmental benefits that greening has generated by regulating the ways in which Sweden’s farmers may use their land. The amounts are calculated as an annual average and distributed across the entire eligible area of agricultural land.

**Diagram 16.** Estimated total, latent and existing costs and benefits of greening.
*Source: Own calculations. In SEK per hectare of eligible area of agricultural land in 2015.*

**Diagram 17.** Costs and environmental benefits generated by altered land use as part of greening in 2015, including average annual transaction costs.
*Source: Own calculations. In SEK per hectare of eligible area of agricultural land in 2015.*
5 Conclusions and proposals

5.1 Positives and negatives for the environment

- Exemptions have hardly any effect on the environmental benefit

If, for example, the exemption for grassland or the easing of the crop diversification (two crops instead of three) had not been introduced, agricultural costs would have increased by SEK 1 million but the state of the environment would largely have remained unchanged (section 3.3.2).

The exemptions from the requirement for permanent grassland that were introduced (such as the exemptions for organic farming and for cultivated grassland for which agri-environmental payments had previously been paid) mean that the national threshold for the imposition of a greening measure has decreased from approximately 45,000 hectares to approximately 20,000 hectares. This reduced area corresponds to 20% of the cultivated grassland area that is classed as permanent grassland from 2016 (3.4.2). These exemptions mean that agriculture avoids a (latent) cost of approximately SEK 12 million per year. The potential environmental benefit lost (latent) is likely to be greater than the cost of the measure (Diagram 15).

In many cases, the exemptions for ecological focus areas (EFAs) outside the plain districts are justified on the basis of the meagre environmental improvement with which EFAs in these areas would have contributed. This applies, for instance, to the forest exemption, where farms located in forest districts do not need to establish EFAs (3.5.3). Farms with much grass-covered arable land or fallow land are also exempted from the requirement to designate EFAs for the same reason – a conditional environmental measure that creates very limited environmental improvement for this type of agricultural land.

Approximately 470,000 hectares of arable land primarily in forest districts is included in the exemptions for forested and grass-covered land. In all probability, the environmental benefit from EFAs in these districts (approximately 39,000 EFA hectares) would be marginal, according to the above rationale and in comparison with EFAs in plain districts. This means that the agricultural sector avoids having to pay a cost of approximately SEK 55 million per year. It is more difficult to calculate the potential environmental benefit lost, but this could be worth somewhere in the region of SEK 40-60 million, or 10% of the estimated total environmental benefit (3.5.3).

- Low-set requirements give low levels of environmental benefit and, thereby, result in no significant environmental efficiency

The environmental benefit is limited by greening’s current regulations and terms. This is particularly true when we consider the choices available to EU member states concerning the regulations and terms for the various individual measures (2.5 and 2.6). For example, the terms permit free use of mineral fertilisers and plant protection products in conjunction with ecological focus areas (such as for nitrogen-fixing crops sown and under sown grass crops). A non-cultivated field margin does not need to be either uncultivated or vegetated. This means that any positive impact on the environment will be small. In Sweden, we have only placed restrictions on
the cultivation of willow (short rotation coppice), which may only be fertilised and sprayed in the year of planting.

One of the criteria for permanent grasslands is that the area with long-term grassland must not decrease. Sweden has also introduced the rule that prohibits a change of land use for semi-natural grasslands within the Natura 2000 areas that are eligible for basic payment.

- **The crop diversification measure provides barely any environmental benefit**

Many farmers and a relatively large proportion of the arable land are, theoretically speaking, affected by the requirement to change the distribution of crops, even after the exemptions have been granted. This affects approximately 70% of the land eligible for basic payment and 20% of farmers. The area that practically speaking needs to be changed and the number of farmers actually required to act is, however, significantly smaller. This is because the majority of farmers already grow at least three crops. Only 5% of farmers actually need to change crops, and these changes apply to 0.5% of the area of land.

The requirement to annually grow at least two crops on farms with less than 30 hectares of arable land (and probably also the requirement to grow at least three crops on farms with less than 100 hectares) is a costly and inefficient way of attempting to improve the conservation of soil and ecosystems (3.3.3). This is particularly true if these smaller farms are located in an agricultural area (plain district) which also includes several large farms.

- **The permanent grassland measure has a very marginal environmental impact**

The requirement for permanent grassland only comes into force when 5% of the national reference area of long-term grassland is no longer grassland (3.4.3). This compromises the opportunity to quickly steer towards the desired environmental effect of preserving all long-term grasslands. It would have been preferable if the requirement and term for long dormancy only applied to pastures or semi-natural grasslands (i.e. not grassland on arable fields). The measure should, however, be complemented with an agri-environmental payment and separate requirements and terms for long-term grasslands on fields which apply regardless of whether the grassland has been left for at least three or five years. This would provide much simpler rules and support requirements as well as improved opportunities for steering and guidance.

The guidelines for the permanent grassland measure imposed in 2016 in Sweden mean that it is largely only grazing pastures that will continue to be included in the reference area for permanent grassland.

- **The ecological focus area measure has the greatest potential for major environmental benefit, but it is not fully exploited**

The changed and increased “biodiversity areas” resulting from the requirement for ecological focus areas is estimated to comprise approximately 40,000 hectares, of which follows account for 30,000 hectares and nitrogen-fixing crops account for 10,000 hectares (3.5.3). The area with willow (short rotation coppice) was already in existence. The under sowing of grass crops is also something that doesn’t create any change in land usage because the farmers merely exploit sowing areas for the grass production that already exists.
The only created ecological focus areas are the non-cultivated field margins. In all probability, there are only approximately 1,000 actual hectares with field margins (see page 34). In total, the EFA requirement has resulted in the formation of approximately 45,000 hectares of varying environmental benefits by means of a change in land use. Around 12,000 farmers have needed to take action in order to establish the appropriate EFAs. This has mostly occurred in the plain districts, where this measure also generates the greatest environmental benefit. The greatest potential environmental benefit, in terms of biodiversity (bio index 1.0), is provided by non-cultivated field margins with a width of at least 4 metres and that have been sown with flowering herbs (Annex 2).

- **The choice of individual measures within ecological focus areas has great importance for the environmental benefit**

Using the results of a survey, we can describe which choices the individual farmers have made from the possible EFA types (3.6). Of those farmers who need to designate EFAs, approximately 30% chose fallow land and 20% chose either nitrogen-fixing crops or the under sowing of grass crops. Around 10% chose non-cultivated field margins.

We can also see that farmers mainly chose fallow land because this is something they already had. The farmers avoid having to make significant changes and they can make use of the fallow land in the ongoing cultivation. The nitrogen-fixing crop has been used because it is considered to be the best alternative to a new break crop and it provides a good gross margin. The choice of non-cultivated field margins is connected to other considerations such as lower costs and/or a greater assigned greening area compared with other EFA types. The obvious connection to the environmental benefit in the form of biodiversity has also contributed to the farmers’ decisions to choose non-cultivated field margins.

Of those farmers with fallow or non-cultivated field margins, two in three responded that they would still have chosen this EFA type even if there had been a term for under sowing with flowering herbs.

- **There are major differences in the environmental efficiency of the greening measures and, when viewed as a whole, the net overall environmental efficiency is close to zero**

Certain conditions of greening which require a forced change in farming can be ineffective or even detrimental for the environment. The term to annually grow three crops for crop producing farms with less than 100 hectares of land often constitutes a costly and inefficient way of improving the conservation of soil and ecosystems (3.3.3).

The EFA measure is that requirement which generates the most and greatest environmental benefits. The measure for permanent grassland also provides environmental benefits, although to a lesser extent. Furthermore, it is likely that any positive environmental effects of this measure in Sweden will only be latent (4.4). Permanent grassland is otherwise the measure that affects the most farmers.

Looking at geographical location, the EFAs in plain districts represent the measure that gives the greatest positive environmental effects (4.1). The other measures
are, at best, marginally beneficial to the environment, regardless of whereabouts in Sweden they are implemented.

The study calculates the total value of the environmental benefit as being SEK 140 per hectare and year. When we consider that greening entails a yearly payment of SEK 640 per hectare, this resulting benefit seems quite small (22%). (4.4).

When we add together all the environmental benefits created by greening and compare this with the resulting costs for farmers, we have each year a net environmental benefit of SEK 64 per hectare. If we discount all the latent and existing environmental benefits and costs, we are still left with a net environmental benefit but this is considerably lower at SEK 10-15 (4.4). If we also include the estimated transaction costs (4.2.1), the net environmental efficiency will be close to zero.

• The production-coupled support can be positive for the environment, but it often has a negative impact

The EU member states have made extensive use of the opportunity granted by the EU regulation to introduce production-coupled support. For example, 20 of the 27 member states have chosen to support beef production. This measure can in some cases have environmental benefits if, for example, the payment is steered in the direction of more extensive production such as grazing on natural pastures or extensive grasslands (2.4). Sweden has introduced a livestock payment (for cattle older than one year) which, as with the livestock payments of a number of other member states, is directed towards extensive grazing operations. In some countries, the coupled livestock support has instead been directed towards more intensive production, which often leads to increased livestock density and a greater environmental burden.

• Changes in the permanent grassland measure and support for areas with natural constraints can have a positive impact on the environment

Changes in the permanent grassland greening measure (resulting in a smaller land area with long-term grasslands) and changes in the ANC support (with higher compensation for the cultivation of cereal crops) mean that farmers are faced with new preconditions in 2016 (3.2.2). The changes mean that more EFAs are required in ‘fertile’ agricultural areas in forest and mixed-terrain districts, as well as making cereal cultivation more profitable in ANC areas (3.4.1). These changes are likely to be beneficial to biodiversity.

• Greening to meet some environmental needs – but agri-environmental payments or cross-compliance for others

The European Commission gives member states the opportunity to replace certain greening measures with agri-environmental payments. Sweden, however, has chosen to not implement this. In Sweden, agri-environmental payments for catch crops and riparian strips, similar to some of the terms included by the European Commission in greening, had previously been established. One reason for Sweden’s approach is that the agri-environmental payments can be much more easily adapted to meet regional and national needs than the greening measures (2.4.3).

In order to be able to further increase environmental efficiency, we should also understand which environmental requirements are appropriate to which policy
instruments – such as, for example, different forms of support, cross-compliance requirements or strict legislation. The requirement of a national reference area for permanent grassland – which was previously a national cross-compliance requirement – has, as part of the new single payment scheme, become a compulsory requirement as part of greening payment. This has not, however, led to increased environmental benefits (although the risks for economic sanctions for individual farmers have increased).

5.2 Proposals for changes of the greening

Drawing upon the results of this study and the conclusions we have made from the material, the authors of this report can make some suggestions for how greening could be changed. Most of the proposals require changes in the EU regulation. We suggest that these changes should be done in time for the next CAP reform.

The requirements for the diversification of crops and for permanent grassland have probably also been of minimal environmental benefit on an EU-wide level and should, therefore, be withdrawn. The requirement for EFA is that which has resulted in the most obvious environmental impact, but the terms for this measure are in need of partial reform.

By transferring some of the terms from permanent grassland to EFA, we can gather all the environmental requirements and expected environmental effects in one greening measure. We also have the opportunity to influence and change the distribution of crops by utilising the individual EFA measures of fallow land and nitrogen-fixing crops. Varying the area weightings would enable improved steering and guidance.

• More exemptions to crop diversification, or withdraw this measure

If the crop diversification measure is to be retained, the hectare threshold for exemptions should be increased to at least 30 hectares. Moreover, all farms situated north of the 62nd parallel (northern Sweden in support areas 1 to 5) should be excluded from the requirements of crop diversification. The environmental benefit derived from having at least two crops – a term currently imposed on 5,000 farms covering a total of approximately 155,000 hectares of land – is likely to have been very marginal. The benefit derived is particularly minimal as it is likely that the majority of these farmers either already meet the requirement to have two crops or have land that is predominantly covered in grass in cultivation.

The proposed exemptions are likely to result in only a marginal reduction of environmental benefit. The environmental benefit derived from the remaining 10,000 farmers (with 1,360,000 hectares of farmland in predominantly plain districts) who are required to annually grow at least three crops will at least be measurable. The certainty of this benefit, however, is doubtful.

• Reform the requirements for permanent grassland, or withdraw this measure

The environmental efficiency of permanent grassland is weak due to the fact that the measure doesn’t come into force until at least 5 % of national reference area of permanent grassland has been lost due to cultivation or other thorough changes in land use. It would have been preferable if the term for long dormancy had only
applied to pastures or semi-natural grasslands. This term and requirement should be complemented with separate terms for cultivated grasslands.

Direct payments should have cross-compliance requirements tied to Natura 2000 areas and other semi-natural grasslands that dictate how these areas should be protected. Direct payments should also have a separate requirement in the form of a new individual measure for ‘long-term grasslands’ within EFAs. This term would mean that a certain percentage of permanent grassland on arable land can be chosen as EFAs, regardless of whether the grassland has been left for three or five years. This would be much easier for the farmers, as well as providing a more direct link between direct payments and the positive environmental effects.

• Develop the terms and requirements for ecological focus areas

Willow (short rotation coppice) is a crop that can be beneficial to biodiversity and is suitable as a separate EFA type, but the land area is unlikely to increase in size in the near future. Nitrogen-fixing crops represent important break crops in all agricultural districts and should be allowed to remain.

Fallows are important to biodiversity but the terms should be tightened up in order to ensure that no cultivation takes place on land claimed as an EFA and that the fallows are vegetated (Annex 2). It should also be possible to upgrade these areas to greenways (primarily in plain districts) – i.e., they should be accessible to the public. This would entail a requirement for a minimum contiguous length from start to finish (a minimum of, for example, 1,000 metres) on either the farmer’s own or neighbouring land, as well as that the area of land joins together other publicly accessible areas, such as walkways, riding tracks or roads. These fallows are also of benefit to the green infrastructure.

The under sowing of grass EFA type should be withdrawn. This should, as mentioned above, be replaced with long-term ‘permanent’ grassland on arable fields as a new type of EFA.

Flexible and differentiated area weightings should be used in order to steer the amount and distribution of fallow land, non-cultivated field margins, long-term grasslands, greenways, and other EFA types (3.5.2). For plain districts, non-cultivated field margins represent the EFA type that – alongside fallows and nitrogen-fixing crops – are most important in terms of environmental benefits. Their specific terms should, however, be adjusted so as to give more environmental benefit, and the area weightings should, as already stated, be reviewed.

Practically all of these proposed changes would require some rewriting of the rules and terms at the EU level. The authors of this report have also developed the following proposed terms that would enable non-cultivated field margins to achieve increased environmental efficiency:

• The width must be greater than one metre (e.g., 4 metres) in order to achieve better biodiversity effects and to make establishment and management easier.
• The area must either be sown or have remaining stubble. The constituent species may include different species of grass but must always include different flowering herbs.
• Specially shaped strips, such as beetle banks or hedges, shall give a higher area weighting.
• Selected measures in the form of squares of at least 4x4 m (to be used, for example, around drainage ditches) may be included and shall give a higher area weighting.
• Landscape elements connected to non-cultivated field margins or field strips shall also give a higher area weighting.

5.2.1 A regional perspective and measures directed to the right place by means of cooperation

A further proposal is to accommodate the possibility of favourable conditions for those farmers who opt for collective implementation (2.5.5). There is an opportunity for member states to implement the EFA measure either on a regional level or jointly on a farm level. Farmers who live in the same region should be given the opportunity to jointly implement the measure together in order to satisfy the requirement for EFAs. This would provide them with the possibility to take actions using a regional perspective and to direct the measures to those parts of the region which would produce the greatest environmental benefit. This should be rewarded with a beneficial area weighting. The environmental benefits generated must be considerable as this measure is likely to create significant legal, technical and monitoring challenges.
References


European Commission, 2015. The new greening architecture of the CAP.


IEEP, 2015. Green direct payments: implementation choices of nine member states and their environmental implications.


Annexes

Annex 1 Estimated costs (in Swedish)

Förgröningsstöd 2015

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<thead>
<tr>
<th>Diversifierad gröda</th>
<th>Jordbruksmark</th>
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<td>arealer med vaxtföljdsgrödor, mindre än 3 grödor</td>
<td>2 941 100</td>
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<td>andelen areal av en gröda som behöver bytas ut (arealen * skillnad korn och havre)</td>
<td>SUM kr/ha</td>
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<tr>
<td>skillnad korn och havre</td>
<td>1 2 3 4 5 SUM SUM kr/ha</td>
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<tr>
<td>area (arealen * skillnad genomsnitt spannmål och extensiv vall)</td>
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<td>skillnad genomsnitt spannmål extensiv vall</td>
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<td>area (arealen * efter grödfördelning/ärter)</td>
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<td>efter grödfördelning/ärter</td>
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### Annex 2 Valuation of environmental benefits (in Swedish)

#### 1. Diversifiering av grödor

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<th>SUM Sverige</th>
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<th>GNS 2</th>
<th>SS 3</th>
<th>GSK 4</th>
<th>NN 5</th>
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<td>1 350</td>
<td>2 300</td>
<td>1 840</td>
<td>1 580</td>
<td>4 630</td>
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- **kväveindex**
  - 1 164 800
  - 32
  - 36 400
  - 0
  - 2 300
  - 0
  - 6 320
  - 27 780
  - kg N/ha

- **fosforindex**
  - -0.01
  - -0.02
  - -0.02
  - -0.01
  - 0.01
  - kg P/ha

- **dosindex**
  - 0.40
  - 0.31
  - 0.28
  - 0.28
  - 0.33
  - dos/ha

- **växtskydd läckage**
  - 1 831 865
  - 490
  - 3 739
  - 540
  - 713
  - 515
  - 442
  - 1 528
  - kg/ha

- **växthusgasindex**
  - 1 100
  - 1 100
  - 1 100
  - 1 100
  - 1 100
  - kg/ha

- **CO2 utsläpp**
  - 12 870 000
  - 1 485 000
  - 2 530 000
  - 2 024 000
  - 1 738 000
  - 5 093 000

#### 2. Permanenta gräsmarker

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<th>GNS 2</th>
<th>SS 3</th>
<th>GSK 4</th>
<th>NN 5</th>
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<td>7 015</td>
<td>7 135</td>
<td>4 215</td>
<td>11 510</td>
<td>4 225</td>
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- **växthusgasindex**
  - 1 100
  - 1 100
  - 1 100
  - 1 100
  - 1 100
  - kg/ha

- **CO2 utsläpp**
  - 9 377 500
  - 0.25
  - 37 510 000
  - 7 716 500
  - 7 848 500
  - 4 636 500
  - 12 661 000
  - 4 647 500

- **kväveindex**
  - 23 299 680
  - 32
  - 728 115
  - 196 420
  - 199 780
  - 50 580
  - 184 160
  - 97 175
  - kg N/ha

- **försörjningsindex**
  - 0.10
  - 0.15
  - 0.16
  - 0.11
  - 0.29
  - kg P/ha

- **mångfoldindex**
  - 5 184 375
  - 1 050
  - 4 938
  - 702
  - 1 070
  - 674
  - 1 266
  - 1 225
  - mångfold/ha

- **mångfold index**
  - 0.10
  - 0.15
  - 0.16
  - 0.11
  - 0.29
  - mångfold/ha

- **växtskydd läckage**
  - 19 945 646
  - 490
  - 40 705
  - 10 593
  - 8 205
  - 4 468
  - 12 201
  - 5 239

#### 3. Ekologiska fokusarealer

**All areal 160 700**

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<td>49 800</td>
<td>41 600</td>
<td>9 800</td>
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- **kväveindex**
  - 36 521 600
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  - 1 141 300
  - 527 400
  - 398 400
  - 166 400
  - 39 200
  - 9 900
  - kg N/ha

- **försörjningsindex**
  - 7 833 000
  - 1 050
  - 7 460
  - 1 758
  - 2 988
  - 2 080
  - 490
  - 144
  - kg P/ha

- **mångfoldindex**
  - 76 389 040
  - 490
  - 155 896
  - 68 562
  - 44 322
  - 34 112
  - 8 036
  - 864
  - dos/ha

- **mångfold index**
  - 205 802 800
  - 6 200
  - 33 194
  - 14 064
  - 9 960
  - 7 904
  - 1 176
  - 90
  - mångfold/ha

- **växthusgasindex**
  - 0
  - 100
  - 100
  - 100
  - 100
  - 100
  - kg/ha

- **CO2 utsläpp**
  - 12 870 000
  - 1 485 000
  - 2 530 000
  - 2 024 000
  - 1 738 000
  - 5 093 000

### Sverige totalt

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<td>408 451 566</td>
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<td>Type of land</td>
<td>SEK/ha</td>
<td>Bio index</td>
</tr>
<tr>
<td>----------------------</td>
<td>--------</td>
<td>-----------</td>
</tr>
<tr>
<td>optimal fallow</td>
<td>6 200</td>
<td>1,00</td>
</tr>
<tr>
<td>undersown fallow</td>
<td>3 720</td>
<td>0,60</td>
</tr>
<tr>
<td>short-term undersown</td>
<td>3 100</td>
<td>0,50</td>
</tr>
<tr>
<td>unsown fallow</td>
<td>2 480</td>
<td>0,40</td>
</tr>
<tr>
<td>stubble fallow</td>
<td>1 860</td>
<td>0,30</td>
</tr>
<tr>
<td>cultivated fallow</td>
<td>620</td>
<td>0,10</td>
</tr>
<tr>
<td>willow</td>
<td>1 860</td>
<td>0,30</td>
</tr>
<tr>
<td>nitrogen-fixing</td>
<td>1 240</td>
<td>0,20</td>
</tr>
<tr>
<td>catch crop</td>
<td>620</td>
<td>0,10</td>
</tr>
</tbody>
</table>

Valuation for plain districts
Experts at the Swedish Board of Agriculture
Annex 3 Pricing of environmental benefits

Price of environmental hazardous emissions and leaching

<table>
<thead>
<tr>
<th>Substance (per hectare)</th>
<th>Price Database Swedish Board of Agriculture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitrogen</td>
<td>2015: 32 kg Nitrogen (SEK/kg)</td>
</tr>
<tr>
<td></td>
<td>2011: 31 kg Nitrogen (SEK/kg)</td>
</tr>
<tr>
<td></td>
<td>Range: (30 - 240)</td>
</tr>
<tr>
<td>Phosphorous</td>
<td>2015: 1 050 kg Phosphorous (SEK/kg)</td>
</tr>
<tr>
<td></td>
<td>2013: 1 030 kg Phosphorous (SEK/kg)</td>
</tr>
<tr>
<td></td>
<td>Range: (1025 - 1300)</td>
</tr>
<tr>
<td>Carbon Dioxide$_{eq}$</td>
<td>2015: 0,25 kg CO2$_{eq}$ (SEK/kg)</td>
</tr>
<tr>
<td></td>
<td>2009: 0,23 kg CO2$_{eq}$ (SEK/kg)</td>
</tr>
<tr>
<td></td>
<td>Range: (0,08 - 0,66)</td>
</tr>
<tr>
<td>Plant protection products</td>
<td>2015: 490 (SEK/ha/dose)</td>
</tr>
<tr>
<td>(SEK/ha/dose)</td>
<td>2010: 460 (SEK/ha/dose)</td>
</tr>
<tr>
<td></td>
<td>Range: (eco Gotland)</td>
</tr>
<tr>
<td>Biodiversity</td>
<td>2015: 6 200 BDI (SEK/ha)</td>
</tr>
<tr>
<td></td>
<td>2012: 6 000 BDI (SEK/ha)</td>
</tr>
<tr>
<td></td>
<td>Range: (600 - 6000)</td>
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</table>

Valuation of the removal of plant protection products  (in Swedish)

<table>
<thead>
<tr>
<th>Andel eko</th>
<th>Gröda</th>
<th>Normskörd kg/ha</th>
<th>TB2 kr/ha</th>
<th>TB2 kr/kg</th>
<th>TFI, dos/ha</th>
<th>Pris- skillnad, kr/kg</th>
<th>Utjämnad skillnad, kr</th>
<th>Kostnad kr/ hektar och dos</th>
<th>Andel kr/ha/dos</th>
</tr>
</thead>
<tbody>
<tr>
<td>Höst- vete</td>
<td>konv</td>
<td>6500</td>
<td>7 523</td>
<td>1,16</td>
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<tr>
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<td>eko</td>
<td>3800</td>
<td>6362</td>
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<td>0,52</td>
<td>3 359</td>
<td>1338</td>
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<td>168</td>
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<tr>
<td>Vår- korn</td>
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<td>5 559</td>
<td>1,21</td>
<td>1,46</td>
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<tr>
<td></td>
<td>eko</td>
<td>2600</td>
<td>4053</td>
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<td>0,35</td>
<td>1 612</td>
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<tr>
<td>Vall</td>
<td>konv</td>
<td>5500</td>
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<tr>
<td></td>
<td>eko</td>
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<td>5725</td>
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<tr>
<td>Årt</td>
<td>konv</td>
<td>3000</td>
<td>5 533</td>
<td>1,84</td>
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<tr>
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<td>5011</td>
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<td>1,50</td>
<td>4 489</td>
<td>3184</td>
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<td>224</td>
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<tr>
<td>Havre</td>
<td>konv</td>
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<td>5 073</td>
<td>1,15</td>
<td>1,13</td>
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<td>2800</td>
<td>3855</td>
<td>1,38</td>
<td>0,22</td>
<td>985</td>
<td>872</td>
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<td>49</td>
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</table>

Kostnad per hektar

<table>
<thead>
<tr>
<th>Andel kr/ha/dos</th>
<th>460</th>
</tr>
</thead>
</table>
This report can be ordered from

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