# Less Favoured Area payments– impacts on the environment, a German perspective

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**Abstract**: In the European Union, the support of Less Favoured Areas (LFA) has a long tradition as a part of the Common Agricultural Policy (CAP). Above all, it is the objective of the subsidies to maintain the agricultural production in LFAs, but also to consider the environmental aspects in LFAs and its funding schemes. Investigations of the latter are subject of this article. After having discussed the theoretical possibilities to influence environmental impacts by the funding scheme, several analyses are compiled and complemented by own calculations. The research has shown that agricultural practices within Less Favoured Areas are more environmentally friendly than in other areas. Environmentally friendly in this regard means e.g. a lower use of fertilisers and pesticides, but also a higher participation rate in agri-environmental measures. In addition, the crop structures of farms are analysed, e.g. the share of maize and wheat in farms inside and outside the LFAs. While the results presented in this paper relate mainly to Germany, the information on the European level is also taken into consideration. Finally, based on these investigations, recommendations for the revision of the funding programmes following 2013 are given.

**Key words**: agricultural policy, ecology, funding schemes, Germany, land use

In the European Union, the support of Less Favoured Areas (LFA) has a long tradition as a part of the Common Agricultural Policy (CAP) (Tietz 2007). Nearly all EU countries subsidise such areas (Figure 1). In the EU-27, more than half of the total utilized agricultural area (UAA) (54%) has been classified as the LFA (European Union 2011). Less Favoured Areas are characterised by comparatively poor natural conditions for agricultural production. This can result from the poor soil quality, or, in the mountainous areas, from the prevailing altitude and slope. The applied criteria for designation for most EU countries can be found in the report of the IEEP (2006). In general, there are three types of LFAs; the mountainous areas and two types of "other" LFAs. While the re-designation of LFAs is still under progress, the current types correspond to the Articles 18, 19 and 20 of the Regulation EC 1257/99 (European Commission 1999). At present, the funding is implemented within the framework of the Programmes for the Development of Rural Areas 2007 to 2013 (European Commission 2005a).

Above all, it is the objective of the LFA payments to maintain the agricultural production in the Less Favoured Areas. In detail objectives, the funding schemes are to ensure the continued agricultural land use in order to contribute to the maintenance of a viable rural community, to maintain the countryside; and to maintain and promote sustainable farming systems (European Commission 2005a).

According to the EU regulations, the support of affected farms aims at significant impacts in mainly four areas (Figure 2). One such area is the income of farmers in the LFAs. Payments compensate them for lower incomes resulting from the natural disadvantages that may force them to abandon farming. For Germany, one study by Plankl et al. (2008) shows that the farms inside the LFAs receive a significant lower income than the farms outside the LFAs. The LFA payments contribute to offset the income differences. But for the majority of farms, the offset is incomplete. Explanations to the impact of LFA payments in the Czech Republic can be found in Stolbova and Hlavsa (2008) and Stolbova et al. (2010).

One more area of impact of the LFA payment is the continuous land use in LFAs. Results concerning the impact on land use differ between regions. For Europe, the information can be found in the report of the IEEP (2006). For Germany, more detailed results are compiled in Plankl et al. (2008).

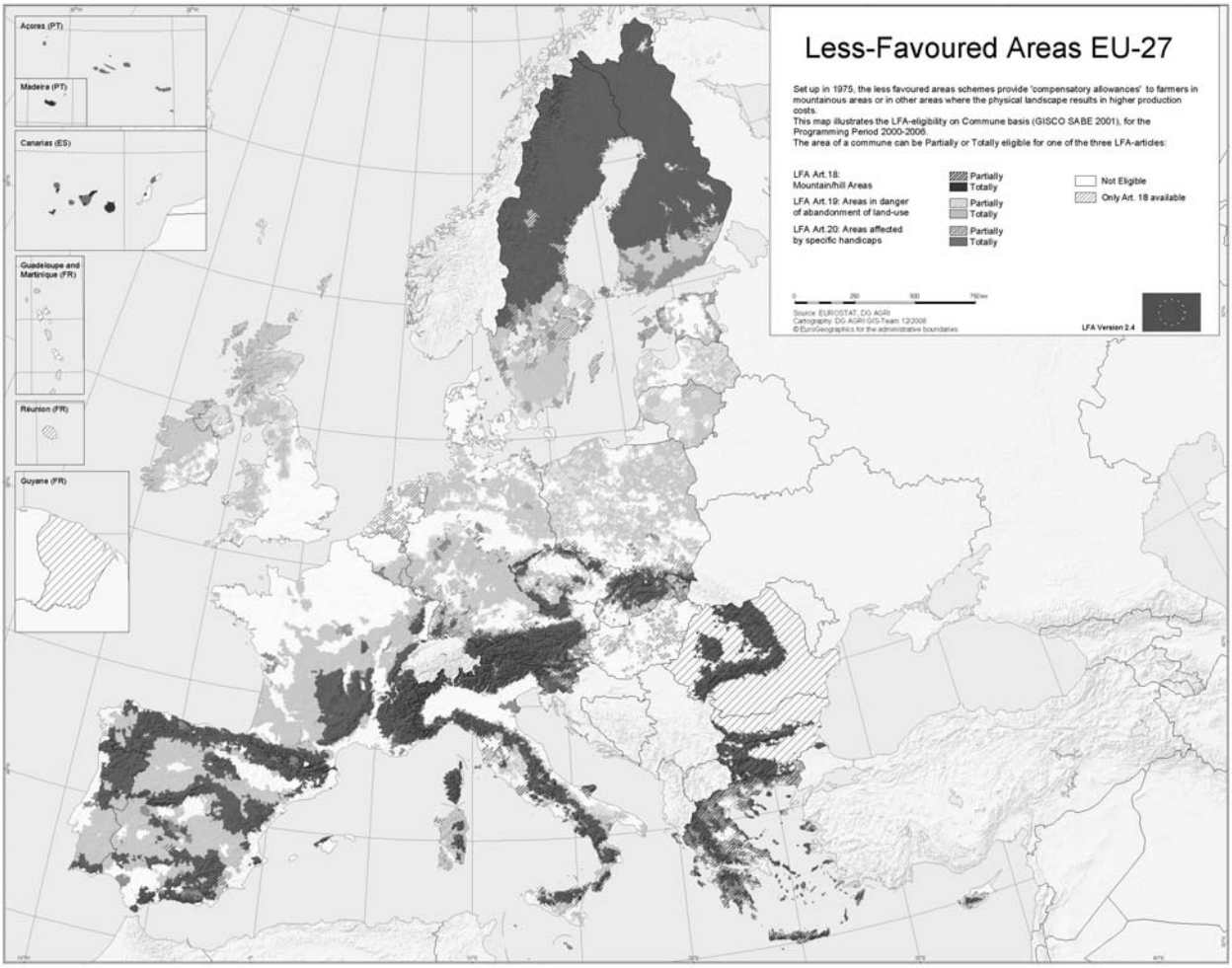


Figure 1. Map of Less Favoured Areas in Europe

Source: European Commission (2013).

Also the impacts of the LFA payments on the rural society have been investigated in-depth already in the paper of Rudow (2010). The main impact in this regard is e.g. the maintenance of employment in agriculture as well as the preservation of rural traditions in the countryside or the approval of the social activity of farmers in the village.

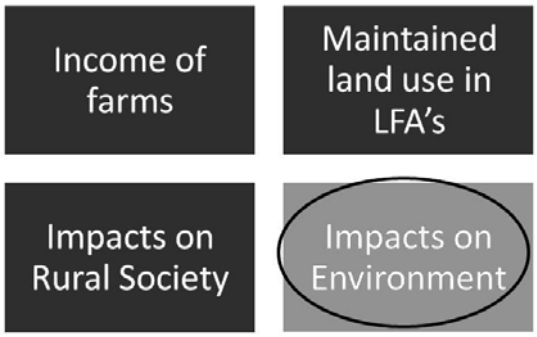


Figure 2. Areas of impact of the LFA payments

Source: own compilation

The prior target of this paper is, however, to investigate the environmental effects of the LFA payments in Less Favoured Areas as one aspect of the objective to maintain and promote sustainable farming systems. It is to examine how far the funding scheme regards the environmental aspects in LFAs and which impacts on the environment can be expected from the funding practice. The paper aims to give an overview of the situation in LFAs in Germany and tries to detect the potential problems in terms of ecology which could be relevant in the future funding period.

Following the Tinbergen-Model, that the number of instruments should not be less than the number of targets (see also Hüttermann and Tinbergen 1966), it could be doubtful, if the four targets of the measure can be reached by the LFA scheme efficiently. However, the EU regulation has taken up these objectives and the focus of this paper is the environmental one.

**Environmental issues in Less Favoured Areas**

Above and beyond, the Less Favoured Areas often contain, from an ecological point of view, particularly sensitive areas worthy of protection. One case study area in Allgäu, Germany (Region no. 9 in Figure 3) encompasses for example the alpine wetlands, moist areas, various other habitats, a particular diversity of the natural environment, e.g. in the terms of biodiversity and the landscape structure (Rudow and Pitsch 2008). Another case study in the area of Vogelsberg, Germany (Region no. 8 in Figure 3) showed that most parts of the study area, which are graded as valuable in terms of the species and the habitat protection, are located within the Less Favoured Areas (Daub 2008).

In their evaluation of LFA payments, the IEEP come to the conclusion, that in the terms of Less Favoured Areas the key objective has to be to continue maintaining of an appropriate type of agricultural management to counter the main threats of abandonment, marginalisation and intensification, which often lead to a loss of biodiversity and the landscape value (IEEP 2008).

**LFA payments: theoretical possibilities to take influence**

Agriculture has an impact on the environment, on soil, air, water, biodiversity, habitats and landscape. This impact is a result of farming systems and practices. Environmental impacts can be both positive and negative depending on the intensity of farming systems and the type of the farming management practices adopted. Factors such as grazing regimes, the type of livestock, the grassland management, crop varieties, the crop rotation and the use of pesticides and fertilisers are all important in determining whether agriculture has a positive or a negative impact on the natural condition in a specific area. This chapter studies the possible means of funding in Less Favoured Areas, and how far they are able to influence the impacts of agriculture on the environment.

***Cross compliance regulations***

In order to be eligible for the direct agricultural support payments, farmers have to, since 2005, meet the Cross Compliance requirements. The Cross Compliance involves complying with 19 European regulations known as the Statutory Management Requirements (SMRs) covering the environment, the animal and plant health, food safety and animal welfare. It also involves maintaining land in good agricultural and environmental condition. The Cross Compliance regulations do not contain specific provisions for Less Favoured Areas, but since farmers in Less Favoured areas in general receive the direct agricultural support payments, the Cross Compliance

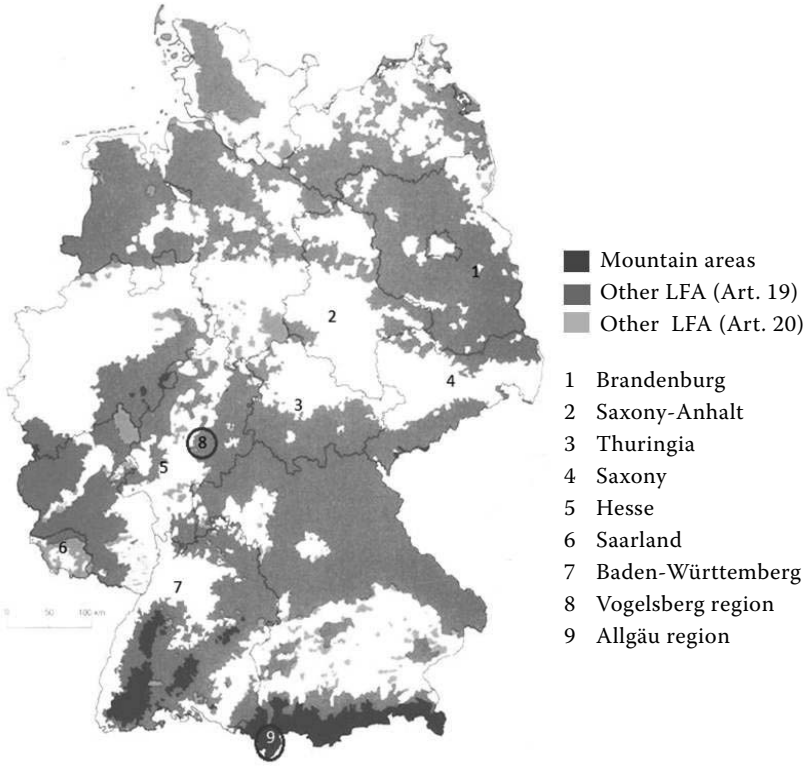


Figure 3. Map of LFAs in Germany and the regions investigated

requirements are also applied in Less Favoured Areas (European Commission 2011).

***Good farming practice***

Already since 2000, farmers have to comply with the Good Farming Practice (GFP), in order to receive the LFA Payments. This requirement was introduced under the Council Regulation 1257/99 (European Commission 1999). The regulation states that farmers receiving the LFA payments must "apply the usual good farming practice compatible with the need to safeguard the environment and maintain the countryside, in particular by sustainable farming". The GFP regulations are drawn up by the member states of the European Union; farmers have to undergo inspections to determine the compliance with these standards. As the standards of the GFP are different between the member states, their effectiveness in protecting the environment is also different. Main issues covered by the GFP regulations are the use of pesticides and fertilisers, soil management, pasture management, biodiversity and landscape.

***Funding scheme/Eligibility criteria***

A more specific possibility to influence environmental impacts through payments is the detailed provisions of funding programmes. Possible options are e.g. the configuration of the funding limits for certain agricultural practices, managements systems, the types of uses or crops etc. There is also the possibility to take influence if certain agricultural operations or processes or uses are excluded from receiving the LFA Payments.

This paper lists specific examples of grant configurations as observed in practice, regardless of whether there were provisions made under the consideration of various environmental aspects. In Germany, for instance, the so-called "intensive crops cultivation" is excluded from the LFA payment schemes. Although a farmer may cultivate such crops, he/she is unable to receive the LFA payments for the corresponding areas. This holds true for crops such as wheat, corn, sugar beet and permanent crops like fruit orchards and wine, but it also includes vegetables and ornamental plants (Plankl et al. 2004).

Table 1. Subsidies actually paid in Less Favoured Areas according to different types of land use in the selected German regions (Federal States) in 2006

| | LFA payments (€) | |
|---|---|---|
| | for grassland | for arable land |
| Hesse | 68 | 34 |
| Baden-Württemberg | 102 | 51 |
| Brandenburg | 53 | 27 |
| Saxony | 79 | 35 |

Source: Own compilation based on Plankl et al. (2008)

It is also possible to influence the farmers' behaviour through the LFA payments by promoting specific cultures. As an example, the LFA payments in Germany made for pastures and permanent grassland are double of those made for arable land (FMFACP 2012). For actual examples see Table 1. In that way, the LFA payments contribute to a reduction in the yield gap between these two uses and make it less economically attractive to convert grassland into arable land. Also some arable fodder crops (e.g. legumes, grass leys, rotational grass) are eligible for the same high payments as pastures and the permanent grassland (FMFACP 2012).

There is a similar principle in Austria, where farms keeping cattle, goat, sheep or horses receive higher LFA payments for the fodder areas than farms with no cattle. This is particularly important as the danger of under-grazing exists in remote regions of the mountainous area with the declining livestock (AMA 2012).

Also the fact whether the *land with direct payments but taken out from agricultural production* (so-called GAEC-areas) is eligible for the LFA payments or not can influence the ecological situation in the LFAs. Among environmental experts, the environmental benefit of such GAEC-areas is disputed. To a small degree, however, the GAEC-areas can positively influence biodiversity. However, problems arise if agricultural land is not cultivated anymore on a large scale. Nevertheless, in certain sensitive areas the continuation of agriculture can be the decisive factor for conserving biodiversity. Examples here are the plant communities that can only be preserved through grazing or repeated mowing. Anyhow, in Germany the GAEC areas (areas in good agricultural and ecological conditions) are not eligible for the LFA payments, whereas in Austria the GAEC-areas are also eligible for the LFA payments (FMFACP 2012 and AMA 2012).

***Impact of natural conditions***

It is also conceivable that the positive environmental impacts of agriculture in Less Favoured Areas are caused by the natural conditions in such areas. Examples are e.g. the reduced intensity of use due to poor soil, the reduced livestock numbers or more extensive agricultural practices such as grazing or

Table 2. Indicators measuring the environmental impact of the LFA payments

| Indicators relating to EC 1257/99 | Indicators relating to EC 1698/05 | Further indicators |
|---|---|---|
| Share of UAA under environmentally benign farming systems:<br>– of which used for organic farming<br>– of which used for integrated farming or integrated pest management<br>– of which used as pasture with less than 2 LU/ha (or a specified regional variant)<br><br>Share of UAA used for arable farming where the quantity of nitrogen applied (farm manure + synthetic) is less than 170 kg/ha per year<br><br>Share of UAA used for arable farming where the quantity of pesticides applied is less than a specified threshold | Areas under successful land management contributing to biodiversity and high nature value farming<br><br>Successful land management is defined as the successful completion of land management actions contributing to:<br><br>Improvement of biodiversity (protection of wildlife species or groups of species, maintain or reintroduce crop-combinations, safeguarding end angered animal breeds and plant varieties)<br><br>Avoidance of marginalization and land abandonment | Proportion of areas with agri-environmental measures<br><br>Grazing livestock units<br><br>Use of fertilisers and pesticides<br><br>Extensive grassland proportion of agriculturally used land in businesses that receive LFA payments<br><br>Indicators that measure the intensity of cultivation |

Source: Own compilation based on Deimer (2008), Hochberg (2008), Plankl et al (2008) and Plankl and Rudow (2008), FMAFEW (2010)

mowing by hand on steep slopes. Forgoing the draining of land and abandoning land consolidation can also lead to a reduced intensity of use in the Less Favoured Areas. How far these assumptions really apply, it will be examined mainly in the analyses of crop structures of farms inside the LFAs.

## MATERIAL AND METHODS

This paper examines in which way and to what extend the LFA payment fulfils its environmental objective according to the Regulation 1698/2005 (European Commission 2005a), which is to maintain and promote sustainable farming systems. To this end, a comparative analysis is conducted, which brings together the results of various studies and completes the picture with a new analysis. In the analysis, the indicators are used that are classified as relevant for the evaluation of the LFA payments by the European Commission. Further indicators are added that go beyond those of the Commission. In general, a with/without comparison is applied to find the differences between the Less Favoured Areas and the areas outside the LFAs. It is often supposed that the natural conditions in the less favoured areas lead to different management systems and economic strategies and thus also cause environmental effects different from those outside the LFAs, so that no actual effect of the measure can be seen. To examine this, not only a comparison between farms in the Less Favoured Areas and outside the Less Favoured Areas is made, but it shall also be investigated if there are differences between farms within the Less Favoured Areas with regard to the indicators measured. As it is supposed that the conditions within the Less Favoured Areas are approximately comparable, both as far as the natural conditions and the structure of the farms are concerned, the differences measured could then be attributed to the effects of the LFA payments.

For the calculations made, mainly the data of the German Farm Comparison Network[1] were used. These data offer various advantages. On the one hand, these data are representative with regard to the farm income, farm size, the type of production and area, and on the other hand, the number of farms included is very high (approx. 11 000 farms), so that by the mass statistical evaluations reliable results

[1]The German Farm Comparison Network is an important only representative source of microeconomic farm data for Germany and a part of the Farm Accounting Data Network (FADN).

should be achieved. As the data are carried out and checked by the German Federal Ministry of Food, Agriculture and Consumer Protection they can be considered as a reliable data source. For these analyses, the data represent the fiscal year 2009/ 2010 and are aggregated to different groups (farms inside LFAs, farms inside LFAs receiving LFA payments, farms inside LFAs receiving no LFA payments, farms outside LFAs, total farms with LFA payments and total farms without LFA payments).

Furthermore, knowledge is gained through interviews with environmental experts and case studies. Insights thus obtained are complemented by own considerations.

### Indicators used

When evaluating the Programmes for the Development of Rural Areas, also the environmental impacts of the LFA payments were investigated. To this end, the Commission provided a set of indicators that was to help understand the relevant effects on the environment. These indicators differ between the two programme phases of 2000–2006 and 2007–2013 (European Commission 2000 and European Commission 2005b), which can be seen in Table 2. In addition to the given indicators listed above, the evaluators of the LFA payments set additional indicators that were expected to indicate the environmental impacts of the LFA payments (Deimer 2008; Hochberg 2008, Plankl et al. 2008; Plankl and Rudow 2008; FMAFEW 2010). In the scope of this paper, only selected indicators can be looked at in detail in the Results and discussion.

## RESULTS AND DISCUSSION

### Analysis of indicators

#### *Indicators according to Regulation EC 1257/99*

Studies for the selected regions in Germany show that the share of land in the Less Favoured Areas that is cultivated in an environmentally friendly manner is indeed higher than in the non-Less Favoured Areas (Table 3) (Plankl et al. 2008). This finding is representative for nearly all German Federal States. There are, however, differences from region to region that are less favoured. This is due to, inter alia, the varying proportion of the grassland/pasture in such areas. In German LFAs, the share of grassland is about 28%, outside LFAs it is 13% (Plankl et al. 2008). Generally, environmentally friendly practices are more widespread in grassland areas.

Table 3. Share of the utilised agricultural area (UAA) under the environmental friendly farming inside and outside LFAs in the selected German regions (Federal States) in 2005

| | LFA | Outside LFA |
|---|---|---|
| Hesse | 35.1 | 11.6 |
| Saarland | 37.1 | 29.0 |
| Baden-Württemberg | 70.9 | 53.4 |
| Brandenburg | 44.5 | 18.7 |
| Saxony | 59.0 | 39.2 |
| Saxony-Anhalt | 48.9 | 35.8 |
| Thuringia | 58.5 | 20.8 |

Source: Own compilation based on Plankl et al. (2008)

Also when looking at the indicator "organic farming", it becomes evident that the share of farms that farm organically in the Less Favoured Areas is nearly double of that in the non-Less Favoured Areas. Also the proportion of the UAA that is farmed organically is considerably higher in the Less Favoured Areas than outside of such areas (Table 4).

Regarding integrated farming, there is no reliable data available in Germany that is divided into the Less Favoured Areas and non-Less Favoured Areas. In addition to that, integrated farming is applied more frequently in fruit and vegetable production and this rarely occurs in the Less Favoured Areas. Also, intensive cultures such as fruit and vegetables are not eligible for the LFA payments in Germany.

For the indicator "LU/ha on pastures", there is also no separate data available for Less Favoured Areas and areas outside LFAs. One reason for this is that the threshold of 2 LU/ha has to be adhered to in any case, according to the Council Directive 91/676/EEC of 12 December 1991 that is concerned with the protection of waters against pollution caused by nitrates from agricultural sources (European Commission

Table 4. Share of the UAA and farms under organic farming inside and outside LFAs in Germany in 2005

| | LFA | Outside LFA |
|---|---|---|
| Share of organic farms (%) | 4.5 | 2.6 |
| Share of UAA under organic farming (%) | 6.4 | 2.9 |

Source: Own compilation based on Plankl et al. (2008)

1991). Because of this Directive, it is assumed that the set limit is adhered to in all areas. As a special case, a study for identifying a 1.4 LU/ha regional threshold was undertaken in Baden-Wuerttemberg. It became evident that on approx. 25% of grassland areas in the Less Favoured Areas, the stock levels are below the 1.4 LU/ha limit. In the non-Less Favoured Areas, this percentage is only half as high, approximately (Plankl and Rudow 2008).

In terms of the indicator "Nitrogen applied less than 170 kg N per ha and year", there is again no nationwide data available for Germany, for both Less Favoured and non-Less Favoured Areas. Also for this indicator the Council Directive 91/676/EEC applies. It can therefore be assumed again that the set threshold is adhered to in all areas. A case study in Thuringia conducted by the Thuringian State Research Centre for Agriculture (Thüringer Landesanstalt für Landwirtschaft-TLL) analysed the applied nitrogen on arable land in Less Favoured Areas. It became evident that on more than two thirds of the arable land, the nitrogen applied is significantly less than 170 kg N per ha and year. The average amount was 128 kg N (Hochberg et al. 2008).

The use of pesticides is regulated in the Good Farming Practice and the Cross Compliance regulations (no danger to humans, fauna and ecosystem). Concerning this indicator, the data for Less Favoured Areas is only available from case studies. In Thuringia, it was found that on two thirds of the examined areas, pesticides are used to such a level that sustainable agricultural practices can be maintained, with a particular regard to the requirements of environmental conservation (Hochberg et al. 2008). In Saxony-Anhalt, a case study using a reference farm ascertained that the use of pesticides was well below the standard. As a special characteristic of the Less Favoured Areas, the studies identified that certain products (in particular herbicides) were not used. In addition, large areas, in particular grassland, were excluded from the use of pesticides (Deimer et al. 2008). In sum, therefore, it can be observed that, taken the various indicators, agricultural practices in the Less Favoured Areas are more environmentally friendly than in the non-Less Favoured Areas.

***Indicators according to Regulation 1698/05***

As a particular case for Less Favoured Areas and due to the currently being undertaken new designation, there is no data available for the indicators according to the Regulation 1689/05, as the indicators of the previous evaluation were continued.

***Other indicators***

In addition to the EU indicators, further indicators were used in order to measure the environmental impacts of the LFA payments. The results are summarised here. In Austria, for example, the evaluators identified the share of agricultural businesses that receive the LFA payments and also take part in agri-environmental measures. It became evident that this proportion is very high. In 2006, 90% of agricultural businesses receiving the LFA payments also took part in agri-environmental measures (FMAFEW 2010).

*Own analyses with data of the German farm comparison network (Testbetriebsnetz)*

In addition to the indicators already investigated by numerous studies, own calculations for further indicators were made. This way, for example the calculations for determining the intensity of agricultural production in Less Favoured Areas were made with the data of the German Farm Comparison Network. As an indicator, the monetary expenditure on fertilisers and pesticides was analysed both in the Less Favoured Areas and outside. It shows that higher expenditures of both products are incurred outside the LFAs, indicating a stronger use of such products (Table 5). Due to the large number of farms investigated, the price fluctuation between the regions can be taken as balanced. When comparing the expenditure on fertilisers and pesticides in different farm groups, also the structure of farms is important to consider. It becomes evident that inside the LFAs, the farms have a higher share of grassland and pastures which implies a presumably lower demand of pesticides and fertilisers due to the crop structures and this leads to lower costs, respectively. From other statistical sources, we know that also the farm structures differ between the LFAs and non-LFAs. Inside the LFAs, there is a higher share of milk producing and grazing livestock farms (more of 55% of farms) and a lower share of field crop farms (17% of farms), while outside the LFAs the share of both farm types is more balanced. Milk producing and grazing livestock farms and field crop farms have a share of nearly one third each there (see also Plankl et al. 2008). Therefore, it is very likely that the different natural conditions in the different areas resulting in different farm types affect the expenditures of farms on pesticides and fertilisers, too.

To lower the influence of the grassland share on the expenditure per ha UAA, also the expenditure of pesticides per ha arable land were analysed. The figures show that again outside the LFAs the expenditures for pesticides are higher (and input stronger)

than inside LFAs (Table 5). Inside the LFAs, again the farms with the LFA payments have lower expenditures per ha arable land than farms with no LFA payments. So the assumption that the intensity of the pesticide use per ha arable land inside and outside the LFAs is nearly the same and only the share of grassland makes a difference at the farm level cannot be confirmed. There is indeed a difference according to the fact whether the farms are inside or outside the LFAs and whether they receive the LFA payments or not. One reason for that can be the high share of milk producing and grazing livestock farms inside the LFAs and the fact that the horticulture and fruit producing farms are mostly not located inside the LFAs, or, in case they are, they grow products not eligible for the LFA payments.

Information about the capability of land and thus the potential intensity of production can also be gained from the German EMZ (in German: Ertragsmesszahl). The EMZ is a complex figure to express the soil potential and the estimated yield expectations of land. As it was to expect, the EMZ in farms inside the LFAs is in average lower than in the farms outside LFAs. That can also be taken as a clue for the influence of natural conditions on the costs (and input) of pesticides and fertilisers, as on the sites with poor natural conditions usually less intense production methods are applied, e.g. grazing systems.

Further, one could expect that the farm size also could have an influence on the expenditure of pesticides and fertilisers, namely the economies of scale. However, the effect of the farm size on the expenditure on pesticides and fertilisers will be presumably low, as the farms in the sample have in average nearly the same size (Table 5).

Also interesting is an inspection of the expenditures within the Less Favoured Areas. Here it can be found that the farms, which receive the LFA payments, obviously have a lower use of fertilisers and pesticides than the farms, which receive no LFA payments. This is also true for the use of pesticides per ha arable land. The reason for this could be that the so-called "intensive crops", e.g. maize, sugar beets, vegetable, if they occur inside the LFAs, are not eligible for the LFA payments.

Another indication of intensity of the agricultural production can be given by the livestock grazing density. From the data of the German Farm Comparison Network, the information on the number of livestock units per hectare of the fodder area (FA) can be determined. It shows that the number of livestock units on farms in the Less Favoured Areas, as it was to be expected, is smaller than on the farms outside the LFAs (Table 6). One reason for that are the natural conditions inside the LFAs which often do not tolerate a higher livestock density, especially for the livestock grazing systems. And other livestock systems such as pig and poultry keeping are mainly located outside the LFAs.

Differentiating within the Less Favoured Areas again between the farms with the LFA payments and without the LFA payments, it gets evident that the

Table 5. Expenditure of pesticides and fertiliser per ha area of different farm groups inside and outside LFAs and the context information

| | N | Expenditure for fertiliser in EUR/ha UAA | Expenditure for pesticides in EUR/ha UAA | Expenditure for pesticides in EUR/ha arable land | Share of grassland/pastures in all crops in % | Farm size in ha | EMZ* |
|---|---|---|---|---|---|---|---|
| Farms inside LFAs | 5 423 | 89.1 | 62.6 | 97.0 | 36.5 | 69.1 | 29 |
| Farms inside LFAs, LFA payments > 0 | 4 009 | 78.7 | 54.2 | 89.9 | 40.9 | 67.1 | 29 |
| Farms inside LFAs, LFA payments = 0 | 1 414 | 118.3 | 86.6 | 114.7 | 25.3 | 74.5 | 29 |
| Farms outside LFAs (total) | 5 827 | 139.6 | 120.9 | 142.5 | 15.9 | 67.3 | 34 |
| Farms with LFA payments (total) | 4 009 | 78.7 | 54.2 | 89.9 | 40.9 | 67.1 | 29 |
| Farms without LFA payment (total) | 7 241 | 134.8 | 113.2 | 136.8 | 18.0 | 68.8 | 34 |

*EMZ = "Ertragsmeßzahl" – index figure, measuring the yield potential of land

Source: Own calculations from the German Farm Comparison Network, Fiscal Year 2009/10

Table 6. Livestock units (LU) per ha fodder area (FA) in different farms groups inside and outside LFAs

| | N | LU/ha FA |
|---|---|---|
| Farms inside LFAs | 5 423 | 1.29 |
| Farms inside LFAs, LFA payments > 0 | 4 009 | 1.22 |
| Farms inside LFAs, LFA payments = 0 | 1 414 | 1.49 |
| Farms outside LFAs (total) | 5 827 | 1.55 |
| Farms with LFA payments (total) | 4 009 | 1.22 |
| Farms without LFA payments (total) | 7 241 | 1.53 |

Source: Own compilation based on the German Farm Comparison Network, Fiscal Year 2009/10.

farms receiving the LFA payments have once again a smaller number of livestock units (1.22 LU/ha FA to 1.49 LU/ha FA). In this respect, not only the worse natural conditions in the Less Favoured Areas seem to cause a decrease in the production intensity.

Summing up, the indicators calculated show a clear difference between the Less Favoured Areas and the not Less Favoured Areas. Not only agricultural environmental measures are applied more often in the Less Favoured Areas, also the other indicators reveal a lower intensity of agricultural production and thus presumably less harmful environmental influences from agriculture on the environment. Probably the fact is actually reflected by the results that the natural conditions in the Less Favoured Areas often do not allow more intensive farming systems. For example, this refers to the number of livestock units per hectare UAA or a lower use of pesticides due to a smaller share of arable land in the Less Favoured Areas. However, it shall also be taken into consideration that the intensities measured in the Less Favoured Areas are once again lower in farms receiving the LFA payments than in farms inside the LFAs not receiving any LFA payments. Supposing that the natural conditions within the Less Favoured Areas are similar, the measured differences between the indicators seem just to point to the influences other than natural ones as well, for example to the LFA funding scheme.

## Impacts due to the design of the funding scheme

As already outlined in the introduction, conditions attached to a funding scheme can influence the environmental impacts of agriculture. The Good Farming Practice and the Cross Compliance regulations are not only requirements for payments in Less Favoured Areas, but apply to all farmers. Because of this, the steering effect of both these measures in terms of the cultivation practices in the Less Favoured Areas is rather limited.

More influence can be expected due to the design of the LFA funding programme. Examples here are e.g. the exclusion of wheat and maize from funding as applied in Germany. The cultivation of wheat and maize is generally associated with high levels of fertilisers. In addition, the cultivation of maize encourages soil erosion due to the late germination. This and the fact that higher levels of pesticides are used can lead to a greater contamination of the ground water. Maize can also turn out to be problematic from the ecological point of view as it can be easily cultivated in monocultures with all known negative effects, e.g. the derogation of biodiversity and landscape values. By excluding maize and wheat from funding, the known negative impacts of their cultivation on areas receiving the LFA payments can be avoided.

Based on the data of the German Farm Comparison Network, it was therefore investigated how the crop structures differ from and between farms in the Less Favoured Areas and outside the Less Favoured Areas. Within the Less Favoured Areas, the farms were subdivided according to the fact of whether they receive the LFA payments or not.

The reason why farms inside the LFAs do not receive the LFA payments cannot be found out clearly within the existing data. One reason is, as already explained, that some main crops are not eligible for funding. Other reasons could be that the farms do not comply with other eligibility criteria, e.g. they are too small, they do not reach the minimum amount for the payout, they do not continue farming over five year or other reasons (see also Plankl et al. 2004, 2008).

Evaluating the data, the following has been revealed. The share of wheat in the Less Favoured Areas as a whole is considerably smaller than outside these areas (approx.13% compared with approx. 29%) (Table 7). Presumably, this can also be attributed to the fact that in many cases the bad natural conditions already described prevent the cultivation of wheat in the Less Favoured Areas.

It is also interesting to have a look at the proportion of maize cultivation in the Less Favoured Areas. The progress of breeding in recent years has led to the fact that bad natural conditions are not necessarily an obstacle to grow maize. For this reason, the share of the silage maize in all cultivated plants shall

be investigated as an example. The data shows that depending on the area type, the maize share in farms is ranging in average between approx. 8% and approx. 12% (Table 7). In average, the differences between farms in the Less Favoured Areas (9.01%) and such farms outside the Less Favoured Areas (8.34%) are comparatively little. More decisive seems to be the fact, whether the farms receive the LFA payments or not. So the maize share of farms inside the LFAs receiving the LFA payments is 7.73%, the maize share of farms inside the LFAs not receiving the LFA payments it is 12.28%. The results thus show that particularly in the Less Favoured Areas maize is grown, namely by farms which do not receive any LFA payments. That leads to the assumption that these farms apparently prefer to abstain from making use of the support by the LFA payments and produce maize, e.g. as their own forage, instead.

As already explained in the section dealing with eligibility criteria and the possible effects of the LFA payments, there apply higher rates of premium to certain agricultural fodder plants than to other use of arable farmland in Germany. As it is shown in Table 7, other arable fodder is actually grown to a comparatively larger amount inside the LFAs, particularly in farms receiving the LFA payments. For two reasons this can be considered to be positive for the environment. On the one hand, leguminous plants (as example for other arable fodder) help to fix nitrogen in the soil and improve the soil structure, and on the other hand, a more varied planting and cropping sequence is also regarded as positive for the agrarian biodiversity.

Altogether one can state that the analysis of indicators has shown that the cultivation structures differ between farms in the LFAs and outside the LFAs. Also in the Less Favoured Areas, they are different in farms receiving the LFA payments and in such not receiving the LFA payments. At the first sight, the provisions connected with the LFA funding scheme in Germany actually seem to have an influence on the way of the management of farms in the LFAs according to the expectations. For example farms receiving the LFA payments grow according to the eligibility criteria less wheat and maize and more other fodder on arable land, as could be shown.

Ultimately, however, the steering effect of the LFA payments cannot be clearly determined by the analyses made, because for the farmers´ cultivation decisions many other factors of influence are of importance, which cannot be definitely clarified by the data available. Decisive for unfolding of the steering effect of

Table 7. Share of crops in different farm groups inside and outside LFAs in per cent and the context information

| | Farms inside LFAs | | | Farms outside LFAs (total) | Farms with LFA payments (total) | Farms without LFA payments (total) |
|---|---|---|---|---|---|---|
| | | LFA payments > 0 | LFA payments = 0 | | | |
| Number of farms | 5 423 | 4 009 | 1 414 | 5 872 | 4 009 | 7 241 |
| Average farm size in ha | 69.1 | 67.1 | 74.5 | 67.3 | 67.1 | 68.8 |
| Wheat incl. durum wheat | 13.15 | 11.85 | 16.48 | 28.72 | 11.85 | 25.94 |
| Barley | 11.95 | 12.22 | 11.23 | 14.21 | 12.22 | 13.53 |
| Other cereals, corn | 12.79 | 11.45 | 16.24 | 9.08 | 11.45 | 10.69 |
| Oil seeds, legumes plants, fibre plants | 8.45 | 8.51 | 8.27 | 13.01 | 8.51 | 11.93 |
| Potatoes | 1.03 | 0.47 | 2.47 | 1.78 | 0.47 | 1.94 |
| Sugar beets | 0.98 | 0.46 | 2.34 | 4.05 | 0.46 | 3.66 |
| Silo maize | 9.01 | 7.73 | 12.28 | 8.34 | 7.73 | 9.22 |
| Other arable fodder | 4.93 | 5.42 | 3.67 | 3.54 | 5.42 | 3.57 |
| Energy plants, renewable primary products | 1.22 | 1.03 | 1.72 | 1.35 | 1.03 | 1.44 |
| Grassland and pastures | 36.48 | 40.86 | 25.30 | 15.92 | 40.86 | 18.07 |
| Total | 100 | 100 | 100 | 100 | 100 | 100 |

Source: Own calculations based on the German Farm Comparison Network, Fiscal Year 2009/10

the intervention is, however, the fact that the farms actually make use of this type of support. If this is not the case, because for example, farms prefer to do without such a support and therefore grow e.g. wheat and maize, the LFA payments cannot unfold any environmental steering effect either. For this reason, it could be interesting once again to think about an adequate amount of the premium, since the LFA payment obviously is also in competition with the prices, which can be realized in the market for the cultivated plants excluded from such support (particularly wheat and maize). This means, on the one hand, that the steering effect of the LFA payment is higher in the case of low producer prices, but it also means, on the other hand, that it will be declining in case of rising producer prices (in future). That should be taken into consideration when thinking about the LFA funding scheme in future. However, this should not mean that higher premiums are necessary for better ecological results in any case. For rearranging the funding scheme in future, other results, e.g. from the economic analyses, have to be regarded as well. As the measure has multiple goals, many aspects have to be considered for an overall assessment. This paper focuses, as mentioned above, on the ecological aspects of the LFA funding scheme. One interesting result of the analysis is also the fact that there is obviously an increased tendency of farms in the Less Favoured Areas to produce maize. This is especially remarkable, because of the fact that, on the one hand, as already described, just by cultivating these plants negative impacts on the environment are to be expected, and on the other hand, there often exist especially sensitive environmental conditions in the Less Favoured Areas. In this case, theoretically two possibilities could be imagined how the LFA payments can respond to this problem. One version would be, as described above, an improvement of the monetary competitiveness of the intervention; the other version would provide more strict eligibility rules in the LFA funding scheme. This way, for example, not only the areas on which intensive cultures are grown (e.g. wheat or maize) could be excluded from being eligible for the LFA payments (as already applied in Germany), but just the whole farm, if it grows such cultures. However, against this latter version, there would speak the fact that particularly livestock keeping farms would be faced with big economic challenges by this and it could thus have a counter-productive effect on the other goals of the LFA payments, particularly maintaining agricultural production in the LFAs. Moreover, as already described, the LFA payments can unfold their effect only there where they are actually applied. If excluding too many farms from such financial support, there will be only a few possibilities of influencing farms and their management systems towards agricultural practices regarding the sensitive environmental conditions in the LFAs.

In the course of this article, only such effects of the LFA payments are investigated, which are likely to be expected from the current funding scheme applied. The question as to whether or not other measures would be more appropriate for regarding the environmental situation in the Less Favoured Areas must be cleared up by further studies. Potentially, enhanced agri-environmental measures could better contribute to an improvement or an avoidance of the deterioration of the ecological situation in the LFAs in either way. Target issues of such measures should be particularly to preserve the biodiversity and habitats.

In general, it can be stated that the specific environmental situation of the Less Favoured Areas has practically not been taken into consideration as yet when designing the current LFA funding scheme.

## CONCLUSIONS

The foregoing analyses have shown that the environmental impact of agriculture is, measured by the above indicators, better in the Less Favoured Areas than outside such areas. Environmentally friendly practices are used to a larger extent there. Nevertheless, it is the question, whether it is the LFA payment that drives this development or whether it is the given natural conditions. Also because of the considerable overlap of the LFA payments with agri-environmental measures, it is difficult to clearly distinguish the effects of the LFA payments alone.

At the EU level, the steering effect of the payment is presumably in any case low, because there are no specific environmental conditions attached to the LFA payments. As already demonstrated, also the effect of the CC and GFP on agriculture in the Less Favoured Areas is rather limited.

One option for an improved steering of impacts consists in e.g. supplementary conditions or a more specific design of the funding system, as it is the case in Germany, for example. It can be assumed for instance that in order to maintain the grassland, an increased premium paid for the grassland use in comparison to the premium paid for arable crops will have a positive effect. Also higher premium rates for other arable fodder result in a wider cultivation of

these plants and for this reason, they lead to a positive effect for the soil and agricultural biodiversity.

To exclude land that is not cultivated anymore from the eligibility for the LFA payments can be another way to influence the impacts of agriculture to fit the specific requirements of Less Favoured Areas. The exclusion of such areas appears reasonable also from the economic point of view.

Another possibility of influencing the environmental effect of farming in the LFAs is the exclusion of certain crops from receiving the LFA payments. In Germany, as described, this mainly refers to maize and wheat. The evaluation of data has shown that the farms, which receive the LFA payments, have a comparatively little share of such crops. However, despite this obvious finding, the investigation also has revealed a tendency to still grow maize in the Less Favoured Areas. This is done by the farms which decide to forgo the LFA payments on these areas. One reason for that is presumably the fact that at present the cultivation of maize is also possible on low-yielding (less favoured) sites and this way the farms open up for themselves another self-produced forage source for their animals, or another source of income. This gives, however, a cause for concern, particularly when taking into consideration the environmental effect, because, as already described, negative environmental effects emanate from the maize production and there often exist especially sensitive environmental conditions in the Less Favoured Areas. In this respect, the development of the maize share in the Less Favoured Areas should be observed, so that appropriate measures can be taken, if necessary. This fact can also be relevant for other countries than Germany. Conceivable possibilities of the intervention when observing a rising maize share could be for example an adjustment of the payment rates of the LFA payments depending on the producer prices of the competing cultures, an improvement of the financial position of grown cultures with a more sound environmental effect and applying more strict sanctions to such unwelcome behaviour, respectively. Whether the latter would actually lead to an improvement of the environmental conditions is, however, doubtful.

In conclusion, it has to be said that this study is not sufficient to give precise recommendations on how to redesign the LFA payments. To be able to do so, as already mentioned, other factors besides the ecological requirements have to be taken into account, too, .e.g. the economic factors. Nevertheless, it is commended to give a greater consideration to the specific environmental concerns of the Less Favoured Areas when revising the funding programme for the new funding period.

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