Cross Compliance Assessment Tool

CROSS-COMPLIANCE ASSESSMENT TOOL

Policy-oriented research:
Scientific support to policies SSP

Specific Targeted Research Project (STREP)

Deliverable(s): 2.6/2.7:

Report describing the operationalisation of the second selection of indicators into impacts of Cross Compliance and the implementation in the final analytical tool.

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Executive summary

Introduction
The general aim of this report is to explain how the impacts of (cross compliance) standards is translated into indicators.The main focus is on the assessment that will be part of the second prototype of the CCAT-evaluation tool. In the following first it is indicated which extensions will be made as part of developing prototype II, which also will be the final tool. This will be done in comparison with the first prototype. Subsequently, the main results as those are obtained with the first prototype will be discussed. Together with the proposed extensions, these findings prepare an agenda for tool improvement, which is the subject of the final part of this executive summary.

New measures and indicators taken into account in prototype II of CCAT-tool
As compared to the prototype I version of the tool, in the final version a number of new measures as well as new indicators will be taken into account. As regards the SMRs, these are:

- Sewage Sludge Directive
- Groundwater Directive
- Birds Directive
- Habitat Directive

Moreover some measure are now dealt with in a more extensive way. With respect to the Nitrate Directive, in the new version of the tool the maximum manure application and the growing of winter crops are analysed in a more elaborate way. The same holds with respect to the GAECs, where the minimum coverage of arable land, and the impact of soil management (tillage-no-tillage) are further and more detailed way addressed.

The second prototype of the tool, not only considers more measures, but also takes into account an enlarged set of indicators. New indicators that are added are:

- gross metal balances for Cd, Pb, Cu Zn, Ni, Cr and Hg in MITERRA and an evaluation of the effects of CC measures related to the Nitrate Directive, Sewage sludge Directive and Groundwater Directive;
- Gross total greenhouse gas emissions from agriculture in kg. CO_2 equivalents
- metamodels of DNDC predicting the effects of CC measures related to the Nitrate Directive on the N balance, N leaching and N_2O emissions;
- metamodels of EPIC predicting the effects of CC measures related to the Nitrate Directive on N leaching, runoff of N in solid particles and erosion and of GAECs on erosion.

Inititally it was planned to also include the leaching of phosphorous and heavy metals into the tool. However, this aim has been skipped due to problems with data availability.

Results from scenario analysis with prototype I
Prototype I, which consists of a limited number of measures and indicators, was used to run four different scenario's, with as a main distinction the degree of compliance

with the measures that were already modeled (e.g. Nitrate Directive, Identification and Registration Directive). The main results were as follows:

- Already in the reference situation the agricultural sector has to cover cost of 4.3 billion € each year related to measures that are also part of CC. These represent about 2% of the total production cost.
- In order to become fully compliant an additional 1.5 billion € will have to be spent in the future.
- The major part of the identified costs relate to the Nitrate Directive (3.5 billion €). Animal Registration accounts for approximately 800 million €. Further dividing in sub regulation shows that major costs are related to improvement and extension of manure storage. More storing facilities are needed to avoid application during winter and wet periods.
- When comparing the change in NH_3 emission, N_2O emission, N surplus and N leaching for the EU27 for the different compliance scenarios to zero compliance, the largest decrease occurs for N leaching, for which the Nitrate Directive is intended.
- The Nitrate Directive has positive influences on other emissions and the N surplus, mainly because of a decrease of the N input. For the 2005 baseline compliance the N leaching is about 3.2% lower, but with full compliance it could be up to 5%.
- As regards the spatial distribution of the nitrate concentration in groundwater in the 2005 baseline in several regions with intensive livestock, e.g. The Netherlands, the health limit of 50 mg NO_3/liter, as set by the WHO, is exceeded. Also some regions in southern Europe with low precipitation surpluses have NO_3 concentrations that are too high.
- As regards the NH_3 emission and the N lost by surface runoff livestock intensive regions (The Netherlands, Bretagne, Northern Italy) have the highest NH_3 emission, while N lost by surface runoff turns out to be more related with the environmental conditions.
- At the level of subrequirements (or individual measures) balanced fertilization, i.e. tuning the amounts of applied N fertilizer and manure to the crop N demand, is by far the measure with the highest reduction in emissions, N surplus and N leaching. Appropriate application techniques, e.g. split applications, and limitation of fertilizer application in winter and wet periods are also effective measures to decrease N leaching.
- With respect to biodiversity calculated livestock intensity indicators are important. The overall comparison of the score of the indicators per scenario show only very small changes.
- The overall picture seems to go more in the direction of extensification rather then towards intensification. Low intensity farms increase clearly in most regions of France and UK. In contrast Germany shows a clear tendency toward intensification as does The Netherlands, Belgium and Denmark. Southern, Central and Eastern Europe show a very mixed change towards both intensification and extensification.
- The obtained results of potential effectiveness on biodiversity and landscape of aggregated GAECs and SMRs shows that potential effectiveness, although always positive, varies strongly among regions. This is especially caused by

differences in the way national and regional authorities have defined SMR and GAEC obligations in their implementation of CC.

It should be realized that in a number of respects the obtained results are rather provisional. Further checks will be made on used cost estimates, as well as some parameter settings. The results of Prototype I of the CCAT tool were discussed with the endusers. Their comments and suggestions will be taken into account in the final version of the tool.

Improvements planned for prototype II of CCAT tool
The improvements in the CCAT tool are partly related to the extension of the tool. Since these follow directly from the extensions as described above, they don't need a further separate discussion.

The other part of the improvements of the tool relate to issues that were already accounted for in prototype I of the CCAT tool, but that were felt to be in need for revision or a more elaborated treatment.

- As regards the Nitrate Directive, where now a more detailed analysis with respect to the impact of cover crops is made.
- An improved and extended assessment of impacts induced by changes in land use and manure application on biodiversity is made. Also the potential spill-over effects from N-fertilization are improved upon.
- With respect to the GAECs the issues of erosion, soil condition and N leaching are modeled in a more detailed way, be it only for a limited number of crops. Separate models (DNDC and EPIC) are used for this, and via derived meta-models their results are integrated in the MITERRA part of the CCAT-tool.
- Assessment of impacts on habitat quality is strongly improved by including effects of changes in management caused by implementation of the Nitrates, Sewage Sludge and Groundwater Directives and changes in cropping shares and livestock numbers as predicted by CAPRI from all SMRs and GAECs for which cost shifts can be estimated and which are processed further by Miterra into environmental effects. The habitat quality indicators will only take into account those indicators regarded as the most influential in relation to changes in biodiversity caused by agriculture in Europe, i.e. emissions of ammonia, and the nitrogen surplus (leaching and runoff of nitrates).

Because no information is currently available about observed improvements in compliance (for example as induced by the cross-compliance enforcement mechanism), improvements in compliance will be analyzed scenario-wise by specifying different rates of improvements as compared to the base year 2005. The set of scenario's as used for prototype I simulations will be also adhered to for the analysis that will be done with prototype II. However, since also a userinterface is added to the CCAT tool, endusers of the tool have significant degrees of freedom to run their own policy (change) experiments.

1 Introduction

1.1 Introduction

This deliverable is a combination of 2 deliverables:

- D2.6: Report describing the operationalisation of the second selection of indicators into impact indicators for the implementation of these in the final version of the analytical tool.
- D2.7: Report describing the design of the analytical tool (final tool) specifying further improvements of the tool as compared to the first prototype and the additional functionalities.

In addition, there is a strong link between this deliverable and D5.3 (Technical design of final analytical tool). While in D5.3 the emphasis is on the technical implementation of the whole process of assessment, presentation of results and general functionalities of the integrated assessment tool, in this deliverable the focus is on the scientific and analytical approach of assessing effects of Cross Compliance (CC) obligations. Regular reference will therefore be made in this report to D5.3 and vice versa to avoid overlap and repitition.

This deliverable will also build strongly on former deliverables (D2.1/2.2, D2.3, D2.5, D4.1.1, D4.2.1, D4.3.1 and D4.4.1 all available at: http://www.ccat.nl/UK/) in which the whole assessment approach and operationalisation of impact indicators in Prototype 1 (PT1) is described. Since the final CCAT tool will be an extension of PT1, many assessment approaches and components already described in these former deliverables will remain valid. Repetitions of descriptions will then be avoided and regular reference will be made to these.

The indicators for assessing the effects of CC obligations have already been identified for the different impact fields in deliverable 2.1/2.2 of this project (Jongeneel et al., 2007). These impact fields include agricultural markets, producer's income, land use, soil, water, air, climate, biodiversity and landscapes, as well as animal welfare and public health In this report for a selection of SMRs and GAECs, not yet included in PT1 assessments, it will be further explained how their potential effect on a selection of most relevant impact fields will be assessed. We will focus only on those SMRs and GAECs which can also be translated in effect indicators with the models, knowledge and data available to this project. It is assessed whether and how (a selection of) SMRs and GAECs may cause changes in a farming practice or lead to a change in land use and whether and how this effect can be measured and translated in one of the effect indicators already selected in Deliverable 2.1 and 2.2 (Jongeneel et al., 2007). The proper linkage between farm behavioural response to price and cost changes (as captured by the economic CAPRI model) and the potential impacts this creates on land use, environment, biodiversity, landscape, animal welfare and public health, etc. (as captured partly by the environmental MITERRA model, EPIC and DNDC and other more expert based assessments) will be an important point of attention.

In this report we will only describe those assessments which can be further improved (as compared to PT1 assessments) and will be additionally incorporated in the final Cross Compliance Assessment Tool. This integrated assessment tool is planned to be finalized by October 2009 and to be presented to end-users by December 2009.

In contrast to PT1, where assessments were done only at Nuts 2 level for the EU-wide territory, the final assessment tool will also include some assessments done at more detailed spatial levels in a selection of EU-regions. Moreover, more detailed information additionally collected from EU-wide sources and collected in case studies will be used as input in assessments performed in this final tool.

In the next section first a general description of the additional assessments and improvements in the final CCAT tool is given as compared to PT1 assessments. Special attention is given to the selection of additional SMRs and GAECs for which impact assessment approaches will be developed and/or further improved and a short summary is then given of which additional impact fields and indicators will be covered per CC obligation. The third section of this chapter discusses the general compliance level scenarios to be implemented in the final tool to be used in all impact assessments. In the chapters that follow assessment approaches per impact field are then described.

1.2 Focus and scope of assessment

The final CCAT tool will include impact assessments of practically all SMRs and GAECs, while prototype 1 only considered 5 SMRs and the effects of most GAECs were only assessed in relation to biodiversity and landscape impacts. SMRs that will receive less attention in the whole assessment of impacts are related to the animal and human health obligations.

The final CCAT tool is basically an extended version of prototype 1, where we will extend the assessment for practically all SMRs and GAECs in relation to practically all impact fields that can be assessed with the tools and knowledge available in the project. It is the aim to estimate costs for all SMR and GAEC sub-obligations. These costs are the main input for the economic assessments with the CAPRI model. CAPRI then calculates effects on markets, farmers income and also on land use (cropping shares) and livestock population size and composition. Since the cropping shares and livestock numbers are then taken as input for further assessments with the environmental models and for the post-model knowledge based assessments of impacts on land use, biodiversity and landscape, practically all impact fields will be covered. The only impact fields that will not be assessed EU wide are for animal welfare and public health. These fields will only be assessed in a more profound way in an Austrian case study.

Except for the animal welfare and public health, assessments will be delivered at the NUTS2 level and will cover the whole EU-27. However, some environmental assessments performed by DNDC and EPIC models will also do assessments at a more spatially detailed level which is the homogenous Spatial mapping Unit (HSMU) level and a 1* 1 grid level respectively. For further explanation of this see Chapter 3 of this deliverable and Deliverable 4.2.3.

Table 1.1. Scope and assessments in relation to standards and impacts fields in Prototype 1 and 2

SMRs and GAECs	**Prototype 1**		**Final tool**	
	Assessment level	***Impact field***	***Assessment level***	***Impact field***
SMRs			**SMRs**	
Nitrates Directive	NUTS2	MWABLL_U	NUTS2, HSMU and grid (1*1km) for selection of regions and indicators	MWABLSL_U
Wild birds Directive	NUTS2	BL	NUTS2	MLB
Habitats Directive	NUTS2	BL	NUTS2	MLB
Sewage Sludge Directive	NO		NUTS2	MSLBL_U
Ground Water Directive	NO		NUTS2	MSLBL_U
Animal Registration Directive	NUTS2	ML_U	NUTS2, case study Austria	All**
Bovine, Ovine and Caprine Animal Registration Regulation	NUTS2	ML_U	NUTS2, case study Austria	All**
Plant Protection Product Directive	NO		NUTS2, case study Austria	All **
Hormones Directive	NO		Case study Austria*, NUTS0	A_WP*
Food Law Regulation	NO		Case study Austria*, NUTS0	A_WP*
Regulation (EC) 999/2001 on prevention, control and eradication transmissible spongiform encephalopathies	NO		Case study Austria*	A_WP*
Foot-and-Mouth Disease Regulation	NO		Case study Austria*	A_WP*
Calves directive	NO		Case study Austria*	A_WP*
Pigs Directive	NO		Case study Austria*	A_WP*
Animal welfare Directive	NO		Case study Austria*	A_WP*
Regulations on the hygiene of foodstuffs and food of animal origin	NO		Case study Austria*, NUTS0	A_WP*

Regulation on requirements for feed hygiene	NO			Case study Austria*, NUTS0	A_WP*
GAECs				**GAECs**	
Soil erosion-minimum coverage	NUTS2	BL		NUTS2, HSMU and grid (1*1km) for selection of regions and indicators	MWASBLL_U**
Soil erosion-minimum land management	NUTS2	BL		NUTS2, HSMU for selection of regions and indicators	MWASBLL_U**
Soil erosion-retain terraces	NUTS2	BL		NUTS2	MWASBLL_U**
Soil organic matter-standards for crop rotation	NUTS2	BL		NUTS2, HSMU for selection of regions and indicators	MWASBLL_U**
Soil organic matter-appropriate stubble management	NUTS2	BL		NUTS2, HSMU for selection of regions and indicators	MWASBLL_U**
Soil organic matter-appropriate machinery use	NO			NUTS2, HSMU for selection of regions and indicators	MWASBLL_U**
Minimum level of maintenance-minimum livestock stocking density and appropriate regimes	NO			NUTS2, HSMU for selection of regions and indicators	MWASBLL_U**
Minimum level of maintenance-Protection of permanent grassland	NUTS2	BL		NUTS2, HSMU for selection of regions and indicators	MWASBLL_U**
Minimum level of maintenance-retention of landscape features	NUTS2	BL		NUTS2, HSMU for selection of regions and indicators	MWASBLL_U**
Minimum level of maintenance-Avoiding the encroachment of unwanted vegetation	NUTS2	BL		NUTS2, HSMU for selection of regions and indicators	MWASBLL_U**
Minimum level of maintenance-Maintenance of olive groves	NUTS2	BL		NUTS2, HSMU for selection of regions and indicators	MWASBLL_U**

M=market & producer income; W=water quality; A=air and climate; B=biodiversity; L=landscape; S=soil quality; A_W=animal welfare, P=public health, L_U=land use.

* Still to be decided. If good cost estimates can be made for all EU regions, CAPRI can make assessment of Market, producer income and land use effects. This can then be used as input for further Miterra and knowledge based assessments for all other impact fields.

** Many impact fields are only assessed indirectly: CAPRI makes an assessment of impacts on cropping shares and livestock numbers and these are used as input for further assessment in Miterra and knowledge based assessments for all environmental, land use, landscape and biodiverisity impacts.

As for assessments of impacts on animal welfare and public health EU wide information is practically absent which implies that these can only be done in a more profound way for a case study.

Case studies will also be used for collection of detailed information on compliance levels in different regions and for different types of farms and CC obligations. EU wide compliance information is practically not available as became clear from inventories performed in the first 2 years of the CCAT project especially for estimating the compliance level in 2005 (the first year of CC implementation in the EU-15 which is taken as the baseline year against which further changes in CC compliance levels can be compared (see also next Section)

1.3 Scenarios of compliance and baseline

In PT1 (PT1) the assessment of the environmental and economic impacts of implementation of 5 Statutory management Requirements (SMRs) at different compliance levels was done. The SMR sub-obligations included in this assessment are given in Table 1.2. For the assessment of the impacts on landscape and biodiversity the effectiveness assessment also included GAECs standards.

Table 1.2 SMRs and sub-obligations per SMR assessed in PT1

SMR	**Sub-obligation**	**Description**
SMR04		Nitrate Directive
	SMR0401	Balanced N-fertilizer application
	SMR0402	Maximum manure N application standard of 170 kg N per ha (except where a derogation applies) (in Nitrate vulnerable zones) Art. 5 + Annex 3
	SMR0403	No fertilizer and manure application in winter and wet periods Art. 5 + Art 4 + Annex 3 + Annex IIA
	SMR0404	Limitation to fertilizer application on steeply sloping grounds Art 5 + Art 4 + Annex IIA
	SMR0405	Rules on fertilisers holding on field and farm (incl. capacity and constructions of storage vessels) and measures to prevent run-off and seepage into the groundwater and surface water (incl. silage effluents) Art. 5 + Art 4 + Annex 3 + Annex IIA
	SMR0406	Appropriate fertilizer and manure application techniques, including split application of N Art 5 + Art 4 + Annex IIA
	SMR0407	Prevention of leaching to water courses, riparian zones, buffer zones Art 5 + Art 4 + Annex IIA
	SMR0408	Growing winter crops (maintain vegetation cover during rainy periods) Art 5 + Art 4 + Annex IIB
SMR06		Identification and registration of animals
SMR07		Framework for the identification and registration of animals
SMR08		Identification and registration of bovine animals regarding the labelling of beef & beef products

SMR08a		Animal identification and registration - sheep and goats

Effects of the additional implementation of the 5 SMRs (Table 1.2) was assessed by varying the level of compliance with these in scenarios. There were 6 compliance scenarios included in PT1:

- Baseline compliance in 2005 (differs per Nuts 2 region)
- 50% gap closure (halve way between 2005 baseline and 100% compliance)
- 0% compliance
- 50% compliance
- 75% compliance
- 100% compliance

In order to implement these scenarios in the model calculations a translation was necessary of the 6 compliance scenarios to number of farms, animals (per type) and/or hectares compliant and non-compliant per Nuts 2 and related costs of compliance. The latter estimates were especially needed as input for the economic impact assessment with the CAPRI model. The translation both to levels of compliance and costs turned out to be a very complicated process and two main problems were encountered.

Firstly, it turned out to be very difficult to find reliable data on the 2005 compliance levels per CC obligation. The information available came from 2 studies recently performed: The FW6 Cross-compliance project (http://www.cross-compliance-fp6.eu/) and the study by the Alliance Environment prepared for DG-Agriculture (http://ec.europa.eu/agriculture/eval/reports/cross_compliance/full_text_en.pdf). But these studies, only provide estimates at member state level, they lack detail with respect to the specific sub-obligations belonging to the SMRs and only provide (reliable) data for a selection of SMRs and GAECs. Since the impact of compliance to CC obligations is likely to vary between different locations (depending on type of farming, area designated as a Nitrate Vulnerable Zone or Natura 2000 area, etc), still a further desaggregation of these estimates was needed. This was done for the SMRs listed in Table 1.2, as these were the SMRs for which best national estimates were available in the 2 studies, and a complicated method was developed to translate these to Nuts 2 estimates at the level of farms, animal numbers and hectares of UAA. How this was exactly done is extensively discussed in Deliverable 3.2.2.

Secondly, a 0% compliance rate can not easily be translated in a compliance and non-compliance share for all SMRs and GAECs as in many cases farmers already comply with certain obligations without needing to take any additional action (or were not really affected, for example because of their free choice for a non-intensive production system). Moreover, when standards are pre-existing and enforced for already some time, this will affect the current degree of compliance and create an initial degree of compliance which is far beyond zero. Most likely it is therefore simply impossible to enforce a zero degree of compliance as no data are available on such a theoretical situation. This problem was particularly valid for the Nitrate Directive. With this obligation a part of the farm population will be automatically compliant without needing to take any specific action or make any additional costs. This applies to farms that have a nitrate surplus lower then the maximum of 170 kg nitrate per hectare and to farms not located in a Nitrate Vulnarable zone (NVZ). The

assessment of impacts should therefore not relate to the whole farming population, but only to that part of the population that is located in a NVZ and that has to actively do something to become compliant. After all we are interested in assessing the effect of additional compliance in terms of costs and specific farm management measures with potential effect on environment, landscape and biodiversity. A method was then developed to estimate the size of the farm population (and related animal population and Utilised Agricultural Area (UAA)) that is not 'naturally' complying. An full explanation of this method is extensively discussed in Deliverable 3.2.2.

For the final prototype we will continue working with the scenario approaches as applied in PT1. It will be considered whether some additional scenario situations will be introduced on top of the 6 scenarios. The new scenarios may not only address variations in compliance levels (also aimed at getting at some points a better insight in sensitivity of the analysis), but might also provide a variation in the way certain CC obligations are formulated (e.g. variations in size of buffer zones applied). The scenario effects will not only relate to direct effects expected according to variation in compliance levels, but will also vary according to short and long term effect. This will not only require specifications in terms of levels of compliance, but also in relation to time periods within which compliance levels change and effects become apparent as compared to a baseline development. It is still open to what extent the additional scenario's will be presented as prespecified scenario's in the final CCAT tool

Lack of data on baseline compliance levels (e.g. 2005 and 2008) for all SMRs and GAECs will need to be addressed as much as possible to provide the right input data for the final CCAT tool. A final effort will be made to improve on the compliance data by doing some case studies for a selection of EU countries (given the reources and moment in time only a limited effort can be made) With this information we expect that we will be able to significantly improve the present compliance level estimates (used in PT1 for the baseline year 2005) and for a new baseline year 2008 (for new MS) to be included in final tool. However, we also need to be realistic. For some SMRs and GAECs (sub) obligations no data will be obtained and these will then we excluded from impact assessments involving changes in effects as compared to a baseline year (e.g. 2005 or 2008). Changes in theoretical levels of compliance (e.g. 0%, 50%, 75%) can of course always be used as input in our impact assessments. For a further explanation of how the collection of this additional information is organised and which case studies will be involved see Deliverable 3.5.

The calculation methods already developed for translation of national compliance level estimates to farms, animal numbers, hectares of UAA at regional levels are discussed in deliverable 3.2.2. This deliverable also provides an extensive description of the new scenario specifications to be used for the assessments in the final CCAT tool.

1.4 Structure of this report

Chapter 2 focuses on the economic impact fields, Chapter 3 on the environmental, Chapter 4 on the impacts on land use, landscape and biodiversity and Chapter 5 on

the animal welfare and public health effects of CC. These chapters are all build up according to the same structure: they start with a general introduction, followed by a summary of the assessment approach and evaluation of results in PT1, followed by a detailed description of what additional improvements and new impact assessments will be incorporated in the final tool and how this will exactly be done. The last part will describe in detail the link between the CC obligations to impact indicators through implementation of improved and (new) models, knowledge and input data.

In Chapter 6 a summary is then given of the evaluation of the PT1 demonstration to the end-users and their comments, wishes and requirements to be taken into account for finalisation of the final analytical tool. The final Chapter 7 presents main conclusions especially in relation to how the end-user requirements will be addressed in finalisation of the final CCAT tool.

2 Assessing effects of CC on producer's income and agricultural markets

2.1 Introduction

In assessing the impact of cross compliance standards on the economic impact field, for prototype I a set on indicators was developed, as presented in Table 2.1 (see also Deliverable D2.3). As regards prototype II there is felt no need to revise, or change the set of indicators. The only extension that has to be made with respect to the economic impact analysis is that additional standards (or subrequirements) are taken into account. Each of these has to be assessed with respect to its net costs (see section 2.3 for a further discussion).

Table 2.1 Candidate indicators for assessing the effects of CC on agricultural markets and farmer's income

No.	**Name of framework / Indicator**	**Level of measurement**			**Unit**
		Product-level	**Farm- level**	**Sector-level**	
1	Gross Margin	X			Euro
2	Land price		X	X	% change
3	Production of main agricultural Products	X	X	X	Tons
4	Land Allocation		X	X	Ha %
5	Export/Import Ratio of Main Agricultural Products	X		X	%
6	Budgetary expenditure			X	Euro
7	Agricultural Income		X	X	Euro
8	Costs of controlling CC	?	?	X	Euro
9	Welfare changes related to agricultural production			X	Change in Euro

10	Short-run viability of an enterprise		X	X	Proportion
11	Long-run viability of an enterprise		X	X	Proportion
12	Costs of compliance	X	X	X	Euro
13	Competitiveness: profitability		X		Euro
14	Competitiveness: change market share			X	Percentage change
15	Competitiveness: DRI and SCB indicators			X	Index

Source: adjusted from Table 4.6 of Deliverable D2.3.

The remainder of this chapter is structured as followed. Section 2.2 discusses the main results from the economic assessment as obtained from the application of prototype I of the CCAT tool. Section 2.3 discusses the additional improvements made to prototype I that are made to obtain the final tool. As indicated before this will refer mainly to how to account for the net costs associated with added standards rather than on newly added economic impact indicators. With respect to the latter no further extension was felt necessary.

2.2 Summary of the economic assessment approach in PT1 and evaluation of results

In the first prototype of the economic impact tool, the evaluation of CC is limited to the Nitrate Directive and the Identification and Registration Directive. The tool relies on the CAPRI-MITERRA model chain. Although Prototype I takes into account also other standards, it was only for the standards mentioned (and their associated subrequirements) that the economic impacts were calculated. As is described in Deliverable 3.2.3 a refined calculation system was developed which linked standard requirements to costs of compliance and degree of compliance.

An overview on economic effects as calculated by the Prototype I CCAT tool is provided in Tables 2.2, 2.3 and 2.4. Only aggregated numbers are presented, although they could be further decomposed into Nuts 2 level and by sector. Results are only presented for three cases (“zero compliance”, the 2005 reference level of compliance and full compliance) rather than for the compete set of scenario’s that was evaluated. Table 2.1 gives information on income details for the agricultural sector in EU27, comparing the reference situation in 2005 with hypothetical scenarios of full and zero compliance. Already in the reference situation the agricultural sector has to cover cost of 4.3 billion € each year related to measures that are also part of CC. These represent about 2% of the total production cost. In order to become fully compliant an additional 1.5 billion € will have to be spent in the future. The CCAT tool allows to

analyze details on cost implications in various ways. Following results per directive, production activity and region are presented.

Table 2.2: Agricultural Income in EU27

		Zero Compliance	Reference 2005	Full compliance
Agricultural Income	[Mio €]	167647	165094	163814
	[% diff]		-1.5%	-2.3%
Premiums	[Mio €]	37548	37496	37487
Total Output Value	[Mio €]	348179	348467	348866
	[% diff]		0.1%	0.2%
Total Input Value	[Mio €]	218081	220870	222540
	[% diff]		1.3%	2.0%
of which related to CC	[Mio €]		4376	5873

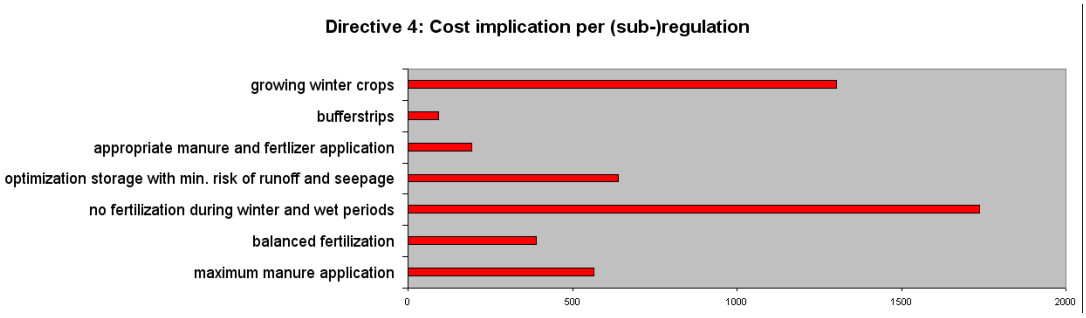
Source: Own calculations

The numbers presented under the heading "zero compliance" of Table 2.3 indicate by how much the costs could be reduced if farmers would not face the obligatory standards. Implicitly this gives a costs estimate of the costs that were made already in the past to reach the 2005 Reference level (see second column of Table 2.3). As Table 5.2 shows the major part of the identified costs relate to the Nitrate Directive (3.5 billion €). Animal Registration accounts for approximately 800 million €. Further dividing in sub regulation shows that major costs are related to improvement and extension of manure storage. More storing facilities are needed to avoid application during winter and wet periods.

Table 2.3: Cost implications of CC measures

Cost of compliance in Agriculture (EU27)

	Zero Compliance			Reference 2005			Full Compliance		
	Total [Mio €]	Directive 4: Nitrate [Mio €]	Directive 6: animal registration [Mio €]	Total [Mio €]	Directive 4: Nitrate [Mio €]	Directive 6: animal registration [Mio €]	Total [Mio €]	Directive 4: Nitrate [Mio €]	Directive 6: animal registration [Mio €]
Total cost of compliance				4285	3485	800	5760	4924	836
Additional cost of compliance	-4376	-3560	-816	0	0		1496	1458	39



Source: Own calculations

Agricultural production activities are unequally affected by the considered standards (see Table 2.4). For most activities additional spending will only lower income by up to 3.5%. Mayor cost have to be covered by pigs and poultry farms. These activities face increasing production cost of 5 – 15% of the income. At the same time the contribution of premium payments to the income is expected to be low or negligible (depending on degree of specialization). Consequently the sanctioning system of CC alone is not a strong incentive for specialized pig and poultry to comply with the directives. Nonetheless the estimated degree of compliance in these farm types does not differ significantly from other farm types. This reveals that other mechanisms, e.g. national controls or federal certification schemes, enforce compliance.

Table 2.4 Cost implications desaggregated at sector level

Results for Full Compliance Scenario

		Income	Premium	average cost of compliance	additional cost of compliance	marginal cost of compliance
Cereals	€/ha	375.41	279.53	13.06	3.26	40.55
	% of income		74.5%	3.5%	0.9%	10.8%
Other arable crops	€/ha	1390.24	220.84	28.45	11.72	77.5
	% of income		15.9%	2.0%	0.8%	5.6%
Vegetables and Permanent crops	€/ha	3901.78	253.4	13.36	3.12	62.95
	% of income		6.5%	0.3%	0.1%	1.6%
Fodder activities	€/ha	1)	69.65	4.3	1.3	29.58
	% of income		1)	1)	1)	1)
Set aside and fallow land	€/ha	25.86	93.35	0.23	0.03	2.11
	% of income		361.0%	0.9%	0.1%	8.2%
Dairy Cows	€/ha	995.71	35.07	31.95	10.47	157.33
	% of income		3.5%	3.2%	1.1%	15.8%
Male adult cattle	€/ha	275.38	151.75	9.52	3.38	49.73
	% of income		55.1%	3.5%	1.2%	18.1%
Pork	€/ha	37.57	0.09	3.16	0.8	8.36
	% of income		0.2%	8.4%	2.1%	22.3%
Pig Breeding	€/ha	125.83	2.49	17.83	4.98	52.76
	% of income		2.0%	14.2%	4.0%	41.9%
Poultry fattening	€/ha	541.59	2.18	36.97	11.89	159.99
	% of income		0.4%	6.8%	2.2%	29.5%

1) not applicable - only used on farm / no trade

Source: own calculations.

Regional heterogeneity of cost implication can be analyzed at the Nuts2 level. All regions have to cover additional cost to be compliant with the directives. However this differs among regions depending on the production systems.

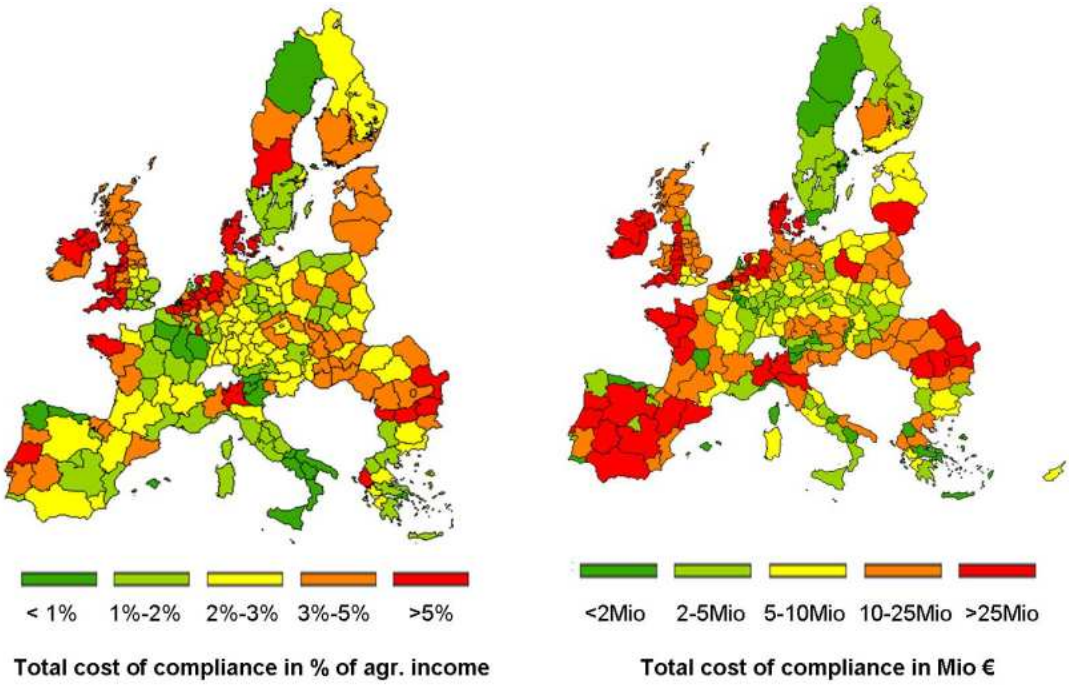


Figure 2.1 Regional distribution of costs of compliance

The findings can be summarized as follows:

- Overall income decreases
- Increasing market prices can partially compensate additional cost
- Directive 4 (Nitrate) accounts for major cost effects (especially manure storage and transport)
- Intensive (land independent) animal production systems have to cover significant cost
- Cost of compliance are in the range of premium cuts in case of violation

2.3 Additional improvements and new approaches to assessing the economic impacts of CC in the final CCAT tool

Opposite to prototype1, the final tool will consider cost related to further SMR and GAEC. Since the additional cost generally enter the economic model as aggregate cost per activity, the design of the economic model will be invariant. The most relevant step towards the final tool is the calculation of cost implications per activity for various SMR and GAEC.

The economic model considers cost for about 40 activities, 250 regions and 100 SMR and GAEC, leading to a maximum of about 1 million of cost factors that could enter

the model. It is probably impossible to specify specific numbers for that many cases. Hence our focus is to develop a framework that allows deriving specific cost coefficients by linking more general cost assumptions and expert rules to already available regional data. For example, some SMR and GAEC might suggest that the actual cost can be considered as fixed amount per farm (independent from the size and production activities). Since the number of farms per regions is known from the FSS data, one could easily calculate the cost per ha UAA in each region. Inn this example the definition one number together with number of farms allows to derive 250 regional values.

It is planned to design a structured table that supports and eases the calculation of regional cost factors. This table has to define for each SMR and GAEC:

- Affected agricultural activities.
- (aggregate) Region
- A “rule” for cost dis-aggregation
- A cost factor

The activities affected by are measure can generally be derived from the nature of the measure (e.g. arable crops, all UAA or animals). The declaration of a region allows to enter different cost factors for different regions (e,g, EU15 or new member states). About 10 different rules for disaggregation might be predefined, which are then referred to by a “flag” in the definition table. The cost factors are based purely on expert knowledge. More details are discussed in the following:

Regulation			Activities												
Text		Code	Cereals	other arable crops	permanet crops	Fodder production on arable land	Grassland	set aside and fallow	dairy cows	beef meat activies (fattening bulls, heifers + suckler cows)	calf raising activities	pigs	poultry	Sheep and goat	other activities
			enter YES (or "empty")												multiple entries allowed, seperate by comma
			CERE	ARAB	PERM	FODD	GRAS	SEFA	DCOW	BEFM	CALF	PIGS	POUL	SHGT	
Maximum manure N application standard of 170 kg N per ha (except where a derogation applies) (in Nitrate vulnerable zones) Art. 5 + Annex 3	DIR04	ME0404							YES	YES	YES	YES	YES	YES	
Limitation to fertilizer application on steeply sloping grounds Art 5 + Art 4 + Annex IIA	DIR04	ME0405	YES	YES	YES	YES									
Prevention of leaching to water courses, riparian zones, buffer zones Art 5 + Art 4 + Annex IIA	DIR04	ME0406	YES	YES	YES	YES									
Appropriate fertilizer and manure application techniques, including split application of N Art 5 + Art 4 + Annex IIA	DIR04	ME0407							YES	YES	YES	YES	YES	YES	
Appropriate fertilizer and manure application techniques, including split application of N Art 5 + Art 4 + Annex IIA	DIR04	ME0407	YES	YES	YES	YES	YES	YES							
Growing winter crops (maintain vegetation cover during rainy periods) Art 5 + Art 4 + Annex IIB	DIR04	ME0408		YES											MAIF, MAIZ
Growing winter crops (maintain vegetation cover during rainy periods) Art 5 + Art 4 + Annex IIB	DIR04	ME0408						YES							

Figure 2.2 Selection of activities affected by measures

In order to ease the selection of activities affected by a certain measure the user can select from predefined groups (see figure 2.2). Additionally, single activities covered by the CAPRI model can be selected. The selection of activities is based on the interpretation of the legal text.

Regulation			Region	Disaggregation Rule	cost calculation	
Text		Code	Region Code	Item Codes	cost conversion factor	explenation and motivation
			multiple entries allowed, seperate by comma	uniqeu entry	real number use "eps" for real "0"	
Maximum manure N application standard of 170 kg N per ha (except where a derogation applies) (in Nitrate vulnerable zones) Art. 5 + Annex 3	DIR04	ME0404	EU27	MANN	0,42	transport of manure for 25km, cost 10ct per t*km, scaled to kg manure (-> /6 -> 6kg N per ton of manure)
Maximum manure N application standard of 170 kg N per ha (except where a derogation applies) (in Nitrate vulnerable zones) Art. 5 + Annex 3	DIR04	ME0404	NL41, BL25, BI21, NL23, NL22, NL21, BL24, NL31, DEA3, BL22, NL12, DE94	MANN	1,25	transport of manure for 25km, cost 10ct per t*km, scaled to kg manure (-> /6 -> 6kg N per ton of manure)
Limitation to fertilizer application on steeply sloping grounds Art 5 + Art 4 + Annex IIA	DIR04	ME0405	EU27	LEVL	0	we assume no additional cost since application of fertilizer is not generally forbidden, wouls apply to all crops receiving fertilizer (not SEFA). Requires to some extend improved application technique which are covered by ME0407
Prevention of leaching to water courses, riparian zones, buffer zones Art 5 + Art 4 + Annex IIA	DIR04	ME0406	EU27	TOOU	0,5	in many coutries reduced intensity of farming next to water. effects total output of arable crops -> related cost are the loss in production output decreases by 0.5% (1% of area effectet, 50% decline in yield)
Appropriate fertilizer and manure application techniques, including split application of N Art 5 + Art 4 + Annex IIA	DIR04	ME0407	EU27	MANN	0,06	Cost for manure application 4€/m3 -> increases by 10% -> convert to kg N (/6) is asigned to animals
Appropriate fertilizer and manure application techniques, including split application of N Art 5 + Art 4 + Annex IIA	DIR04	ME0407	EU27	NMIN	0,01	Cost for mineralapplication 10ct/kg -> increases by 10% -> 1ct
Growing winter crops (maintain vegetation cover during rainy periods) Art 5 + Art 4 + Annex IIB	DIR04	ME0408	EU27	LEVL	50	cost for additional tilliung and seed: 100 EUR (ad hoc) benefits of improving soil: 50 EUR (ad hoc) assign cost to groups of crops which are typically seeded in spring or fallow (we select ARAB and SEFA)
Growing winter crops (maintain vegetation cover during rainy periods) Art 5 + Art 4 + Annex IIB	DIR04	ME0408	EU27	LEVL	10	fallow and set aside only after 5 years

Figure 2.3: Definition of regions, disaggregation rule and conversion factors.

The cost factors can be declared at the level of EU aggregates, member states or nuts2 regions. Often a definition at EU27 level is sufficient, since further calculations a based on regional data. when appropriate, divergent cost factors can be declared at a lower regional resolution, e.g. it is known that certain regions in BL, DE and NL need to transport manure over longer distance than usual. (see Figure 2.3). When no definition is made at the nuts level, the national definition is applied. When no definition is made at the national, the EU aggregates are applied.

CODE	Related Regionla Data		Disaggregation Rule	
	Decription	unit	Description	st conversion fac
LEVL	fixed value per ha or head	ha or head	assumes a unique value per ha or head in all regions	absolute value in € per ha or head
FARM	amount per Farms (independent of size)	number	Calculatates total cost per regions depending on number of farms. Cost per activity are derived dividing by ha (or LU) of the affected activities	absolute value in € per farm
MANN	Nitrogen in manure kg per head	kg	Multiplies cost factor with exretion factor of aninmals taken from the regional CAPRI data base	€ per kg exretion
MANP	Phospate in manure kg per head	kg		
MANK	Potassium in manure kg per head	kg		
NMIN	"N from mineral fertilizer in kg/ha"	kg	Multiplies cost factor with applied fertilizer or manure rates taken from the regional CAPRI data base	€ per kg applied fertilizer
NMAN	"N at tail applied per kg/ha"	kg		
PMAN	"P2O5 at tail applied per kg/ha"	kg		
PMIN	"P2O5 from mineral fertilizer in kg/ha"	kg		
KMAN	"K2O at tail applied per kg/ha"	kg		
KMIN	"K2O from mineral fertilizer in kg/ha"	kg		
DEPM	Fixed capital consumption equipment	€	Multiplies cost factor with cost of depreciation taken from the regional CAPRI data base	fraction
DEPB	Fixed capital consumption buildings	€		
DEPO	Depreciation others	€		
TOOU	Total output	€	Multiplies cost factor with value taken from the regional CAPRI data base	fraction
TOIN	Total intermdiate input	€		
GVAP	Gross value added at producer prices	€		
GVAB	Gross value added at basic prices	€		
MGVA	Gross value added at producer prices plus CAP premiums	€		
PRME	premium paid to activity	€		
SEED	Seed	€	Multiplies cost factor with value taken from the regional CAPRI data base	fraction
PLAP	Plant protection	€		
FERT	Fertilizer cost	€		
REPM	Maintenance materials	€	Multiplies cost factor with value taken from the regional CAPRI data base	fraction
REPB	Maintenance buildings	€		
ELEC	Electricity	€		
EGAS	Heating gas and oil	€		
EFUL	Fuels	€		
ELUB	Lubricants	€		
WATR	Water balance or deficit	€		
INPO	Other inputs	€		
SERI	Services input	€		
WAGE	Compensation of employees	€	Multiplies cost factor with value taken from the regional CAPRI data base	fraction
TAXO	Other taxes on production	€		
SUBO	Other subsisides on production	€		
NVAF	Factor income	€		
OPES	Operating surplus	€		
RENT	Rents and other real estate rental charges to be paid	€	Multiplies cost factor with value taken from the regional CAPRI data base	fraction
INTP	Interest paid	€		
LABT	total labour	h	Multiplies cost factor labour input taken from the regional CAPRI data base	€ per h labour input
LABF	family labour	h		

Figure 2.4: Predefined disaggregation rules and cost related conversion factors.

An overview on predefined rules and their related cost factors allowing to calculate regional cost implications is given in Figure 2.4. The related regional values stem from the farm structure survey (FSS) and the CAPRI regional data base. The approximations for each measure are first derived from literature or expert knowledge and then translated to a meaningful cost conversion factor in the context of the selected disaggregation rule. When measures do not enforce higher standards than the

so called “best practice” a cost factor of 0 will be appropriate. Measures which cause negligible cost (e.g. registration of a farm) can be omitted (cost factor 0).

3 Assessing effects of CC on water, soil, air and climate

3.1 Introduction

In assessing the impacts of cross compliance measures on air-, soil-, and water quality, the following choice was made regarding the environmental indicators that we aim to address in the final analytical tool (see also Deliverable D2.3 and D 4.2.1):

- Atmospheric emission of ammonia and green house gases (air quality and climate).
- Soil erosion (physical soil quality).
- Gross balance (input minus net uptake), which is a measure for soil accumulation or release of carbon (organic matter), phosphorous and heavy metals (chemical soil quality).
- Leaching and runoff of nitrogen (water quality).

In deliverable 2.3 and 4.2, we also mentioned that the leaching of phosphorus and heavy metals would possibly be included but this aim has been skipped, since the data to make such an assessment are not available. The various indicators that will be addressed are delivered with the models MITERRA Europe, DNDC and EPIC. The indicators that will be assessed with the models DNDC and EPIC, that are only part of the final CCAT tool, slightly changed and are ultimately as follows:

DNDC: N balance, N leaching and N_2O emissions

EPIC: N leaching, N runoff and erosion

An overview of the indicators that are part of the prototype and those aimed at in the final CCAT tool are given in Table 3.1, with an overview of the models involved and the SMRs and GAECs that are evaluated. More information of the approach used in the prototype and the additional work foreseen for the final tool is given in Sections 3.2 and 3.3.

Table 3.1 Selection of environmental indicators, models used to assess these indicators in response to CC measures and spatial resolution of calculation and presentation.

Directive	impact	Indicator and units	Model used	Prototype	Final tool
Nitrate Directive and GAECs	Air/ climate	Total atmospheric emissions of ammonia (NH_3) from agriculture in kg NH_3-N/ha/yr [1]	MITERRA Europe	X	X[4]
Nitrate Directive		Emissions of methane by agriculture in kg CH_4/ha/yr	MITERRA Europe	X	X[4]
Nitrate Directive and GAECs		Emissions of nitrous oxide by agriculture in kg N_2O-N/ha/yr	MITERRA Europe	X	X [4]
Nitrate Directive and GAECs		Gross total GHG emission from agriculture in kg CO_2 equivalents	MITERRA Europe		X[4]
GAECs	Physical soil quality	Soil erosion by water in m^3 soil/ha/yr [2]	EPIC		X
Nitrate Directive and GAECs	Chemical soil quality	Gross carbon balance in kg C/ha/yr and change in top soil organic carbon content in g/kg	MITERRA Europe (Ext) EPIC	X	X
Nitrate Directive		Gross nitrogen balance in kg N/ha/yr	MITERRA Europe DNDC	X (only MITERRA)	X (both models)
Nitrate Directive,		Gross phosphorous balance in kg P/ha/yr	MITERRA Europe	X	X
Nitrate Directive Sewage sludge Directive Groundwater Directive		Gross metal balance for Cd, Cu, Pb and Zn in g /ha/yr	MITERRA Europe (Ext)		X
Nitrate Directive and GAECs	Ground water quality	Nitrate leaching to ground water in kg N/ha/yr and concentrations in leaching water in mg/l [3]	MITERRA Europe DNDC, EPIC	X (only MITERRA)	X (all models) [4]
Nitrate Directive and GAECs	Surface water quality	Nitrogen runoff to surface water from agriculture in kg N/ha/yr and concentrations in runoff water in mg/l [3]	MITERRA Europe EPIC	X (only MITERRA)	X (both models) [4]

[1]The IRENA indicator gives "Contribution of agriculture to atmospheric emissions of ammonia (NH_3)"

[2] The IRENA indicator gives "Annual soil erosion risk by water" and "Area and share of agricultural land affected by water erosion"

[3]The IRENA indicator gives "Share of nitrates in ground and surface water derived from agriculture"

4 The assessment of the impact of GAECs on N fluxes by MITERRA is only included in the final tool.

3.2 Summary of the environmental assessment approach in prototype 1 and its results

Environmental assessment approach in prototype 1

In the first prototype of the environmental impact tool, the evaluation of CC measures is limited to the Nitrates Directive and to the use of the CAPRI-MITERRA model chain. This means that for prototype 1 all nitrogen, phosphate and carbon balances are calculated and only emissions and concentrations of nitrogen in water and GHG and ammonia emission to air will be calculated. The calculations of CC effects on metal and phosphate balances are postponed to prototype 2. The same applies to the calculation of erosion effects and effects on soil organic carbon content of CC.

A summary of the environmental assessment approach in the prototype is shown in the schematic overview of the interaction between MITERRA Europe and CAPRI within the CCAT prototype as presented in Figure 3.1.

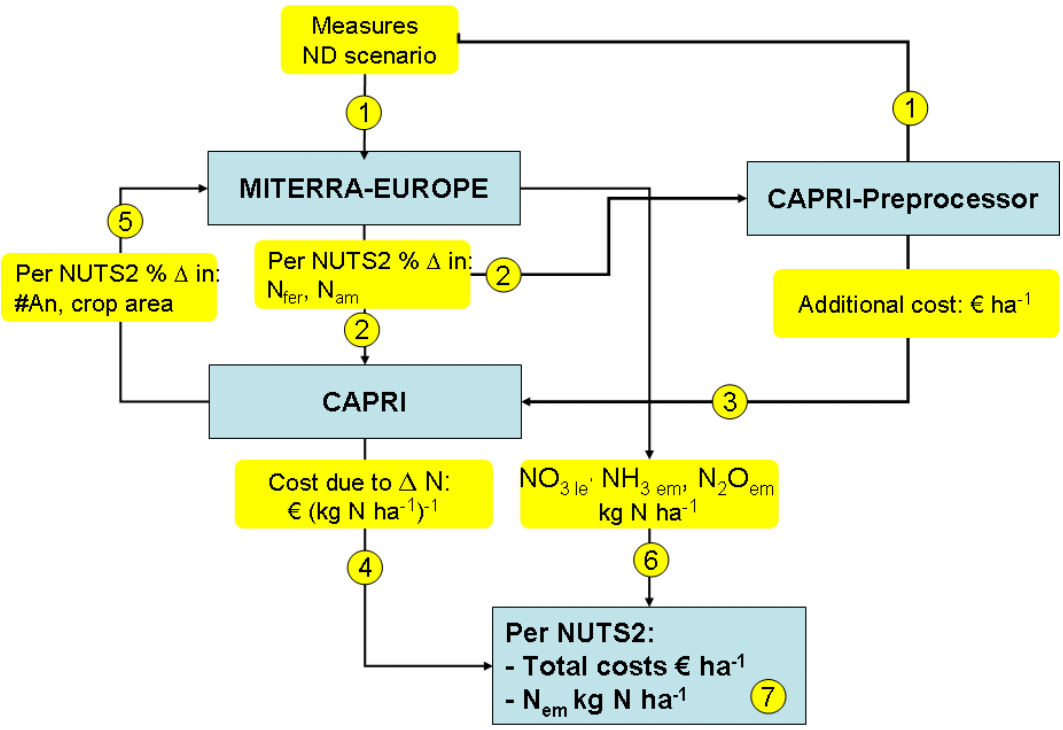


Figure 3.1 Schematic presentation of the interaction between MITERRA Europe and CAPRI

Scenarios are defined, i.e. which measures are implemented at which degree of compliance (number 1 in Figure 3.1). The degree of compliance is assigned to the NUTS2 regions for which the measure is assumed to be applicable. This is then parameterized in terms of changes of model parameters and/or model inputs. The degree of compliance implies the fraction of the utilised agricultural area or farm animal share of a NUTS2 region for which the measure is applicable. Based on the selected scenario and degree of compliance, the changes in fertilizer use and manure

use in %-change as compared to the reference year is derived for all NUTS 2 regions and disaggregated at specific activity levels (number 2 in Figure 3.1). These results are then used in the CAPRI_Pre-Processor that calculates all the additional costs related to the applied measures (number 3 in Figure 3.1). Given the percentage cost increases as estimated in the pre-model calculation tool, CAPRI calculates the economic effects and changes in agricultural structure (change in animal numbers and in crop area per crop type; number 4 and 5 in Figure 3.1). These are given to MITERRA-Europe, which calculates the various N fluxes, including NH_3 and N_2O emissions and nitrate leaching in kg N per ha agricultural land (number 6 in Figure 3.1). For further details of the approach, we refer to Deliverable 4.2.1 (de Vries et al., 2008).

Summary of main results of environmental impact assessment in prototype 1

In prototype 1 of the CCAT tool the impacts of the Nitrate Directive on the environmental indicators was assessed. There were six compliance scenarios included in the CCAT tool for which the environmental indicators were calculated:

- Baseline compliance in 2005 (differs per Nuts 2 region)
- 50% gap closure (halve way between 2005 baseline and 100% compliance)
- 0% compliance
- 50% compliance
- 75% compliance
- 100% compliance

In the figures below some first results of the impact assessment for the Nitrate Directive are shown. Figure 3.2 the change in NH_3 emission, N_2O emission, N surplus and N leaching for the EU27 for the different compliance scenarios compared to zero compliance. The largest decrease occurs for N leaching, for which the Nitrate Directive is intended. However, the figure also shows that the Nitrate Directive has positive influences on other emissions and the N surplus, mainly because of a decrease of the N input. For the 2005 baseline compliance the N leaching is about 3.2% lower, but with full compliance it could be up to 5%.

In Figure 3.3 the spatial distribution of the nitrate concentration in groundwater is given for the 2005 baseline. In several regions with intensive livestock, e.g. The Netherlands, the health limit of 50 mg NO_3/liter, as set by the WHO, is exceeded. Also some regions in southern Europe with low precipitation surpluses have NO_3 concentrations that are too high. The other map of Figure 3.3 shows the relative decrease in NO_3 concentration compared to zero compliance.

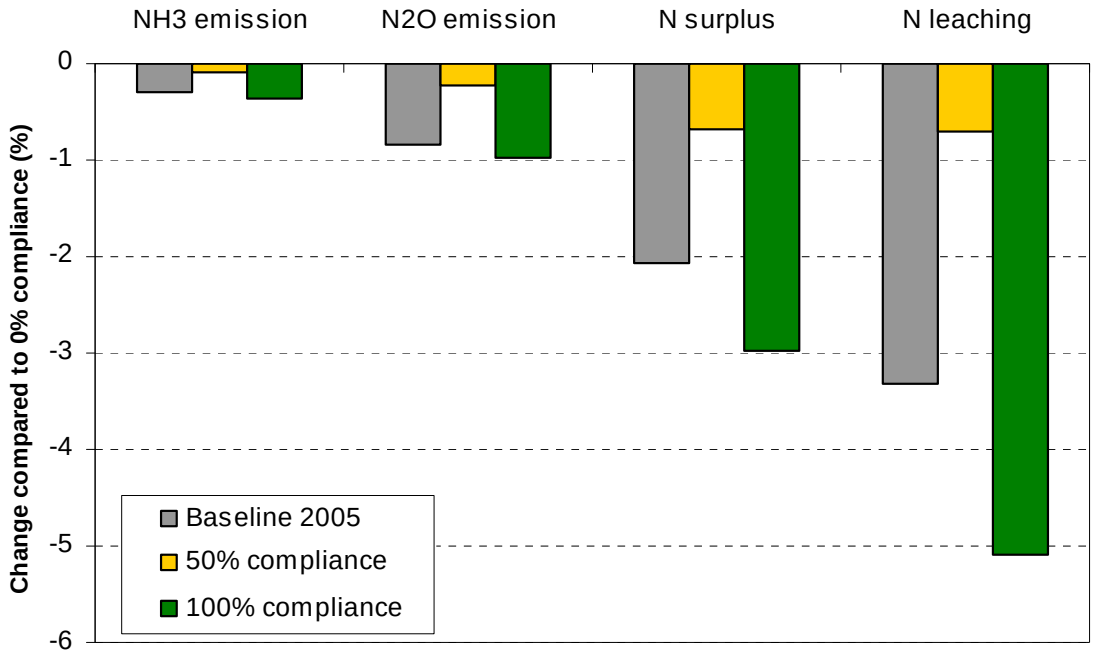


Figure 3.2. Change in NH_3 emission, N_2O emission, N surplus and N leaching compared to zero compliance for the EU27

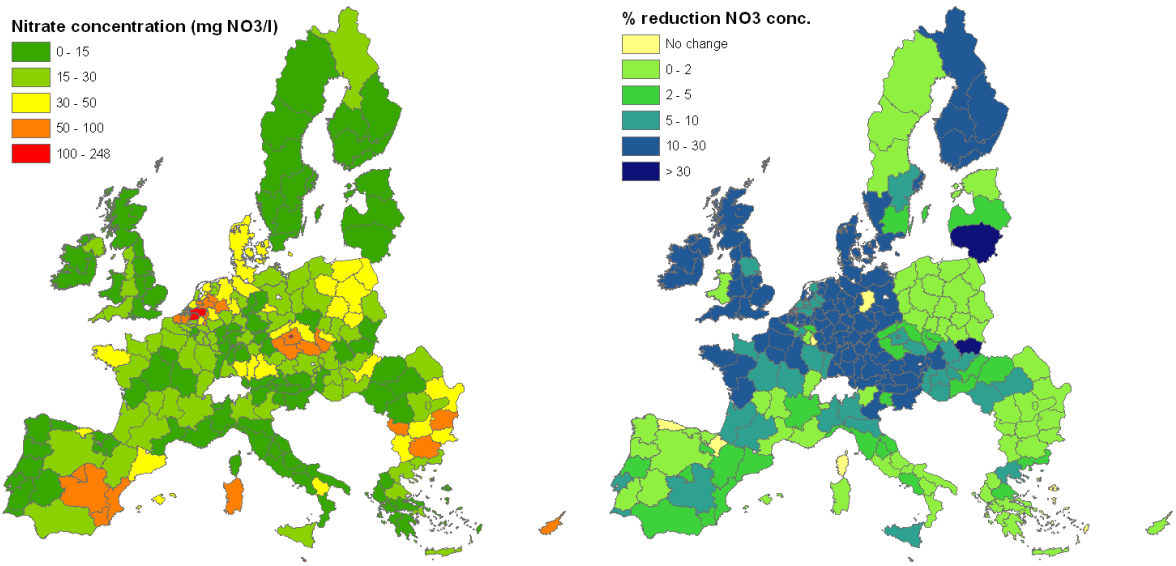


Figure 3.3. Nitrate concentration in groundwater for the NUTS2 regions in Europe (left) and the reduction of the NO_3 concentration due to the Nitrate Directive compared to zero compliance (right)

Besides the NO_3 concentration in groundwater also the spatial distribution of the other environmental indicators is included in the CCAT tool. In Figure 3.4 the NH_3 emission and the N lost by surface runoff are shown as example. Livestock intensive

regions (The Netherlands, Bretagne, Northern Italy) have the highest NH_3 emission, while N lost by surface runoff is more related with the environmental conditions.

Besides the complete package of measures for the Nitrate Directive (except balanced fertilization), we also assessed the impact of individual measures on the environmental indicators. Figure 3.5 shows the results of the individual measures assuming full compliance for the EU27. Balanced fertilization, i.e. tuning the amounts of applied N fertilizer and manure to the crop N demand, is by far the measure with the highest reduction in emissions, N surplus and N leaching. Appropriate application techniques, e.g. split applications, and limitation of fertilizer application in winter and wet periods are also effective measures to decrease N leaching.

NH_3 emission **N lost by surface runoff**

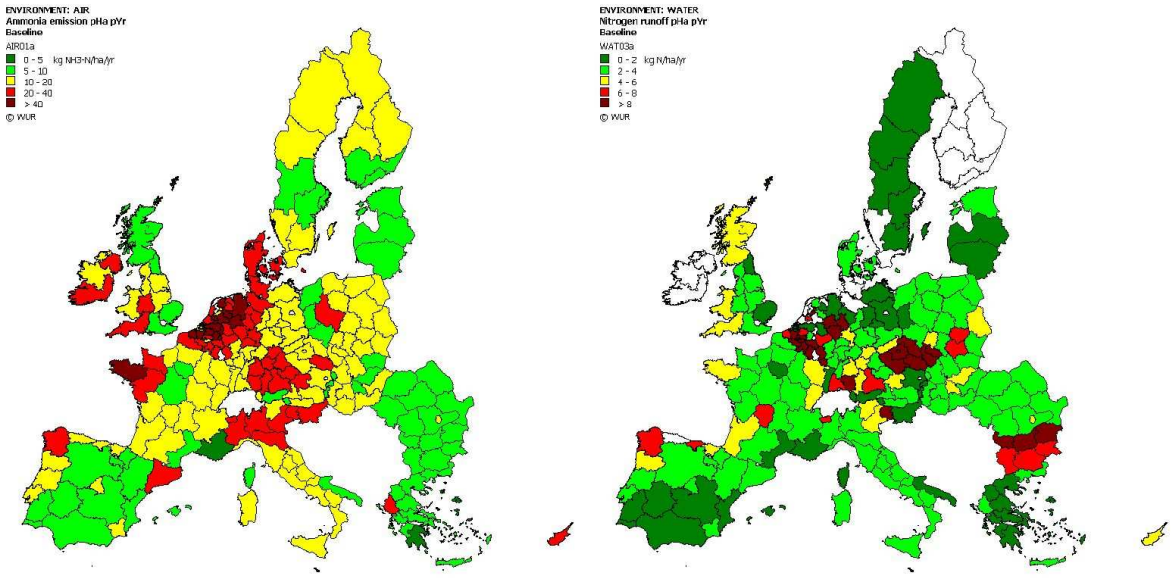


Figure 3.4. NH_3 emission (left) and N lost by surface runoff (right) per NUTS2 region

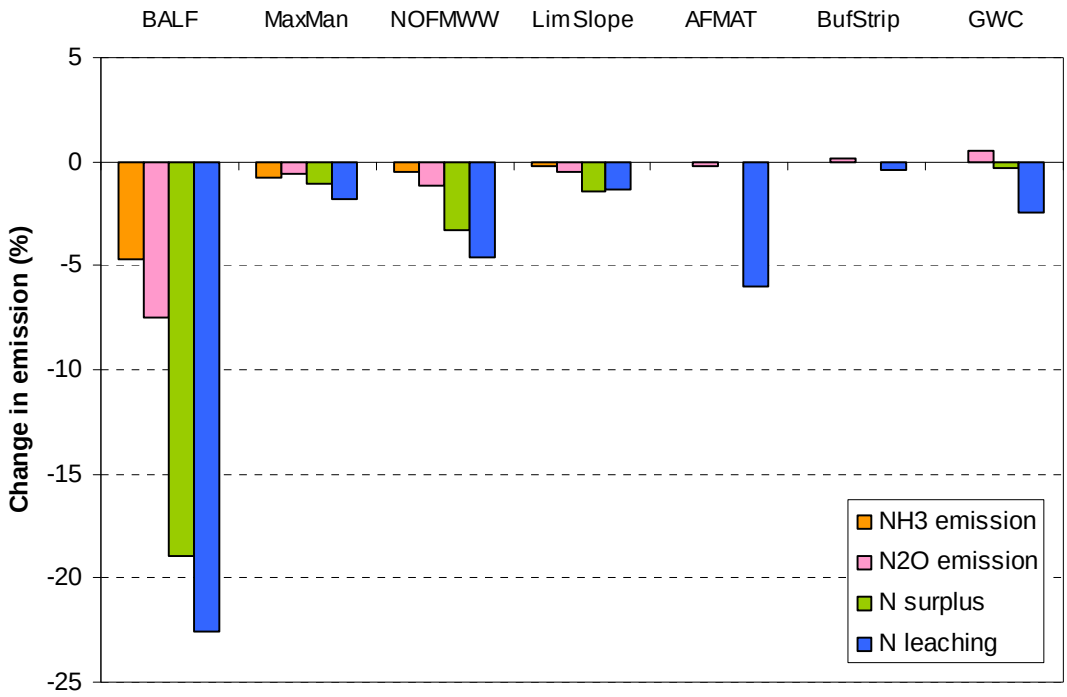


Figure 3.5. Impact of individual measures for full compliance on the environmental indicators (BALF=Balanced N fertilization, MaxMan=Maximum manure application, NOFMWW=Limitation of fertilizer application in winter and wet periods, LimSlope=Limitation of fertilizer application on sloping grounds, AFMAT= Appropriate application techniques, BufStrip=Buffer zones, GWC=Growing winter crops)

3.3 Additional improvements and new approaches to assessing the environmental impacts of CC in the final CCAT tool

The major additions in the final CCAT tool are the inclusion of (see also Table 3.1):

- gross metal balances for Cd, Pb, Cu Zn, Ni, Cr and Hg in MITERRA and an evaluation of the effects of CC measures related to the Nitrate Directive, Sewage sludge Directive and Groundwater Directive;
- metamodels of DNDC predicting the effects of CC measures related to the Nitrate Directive on the N balance, N leaching and N_2O emissions;
- metamodels of EPIC predicting the effects of CC measures related to the Nitrate Directive on N leaching, runoff of N in solid particles and erosion and of GAECs on erosion.

Each topic is discussed in further detail below. The selected measures in SMRs and GAECs, including the way in which effect indicators will be calculated with one or more models in the final CCAT tool, are presented in annexes 2 and 4 of the report on the Environmental Impact Tool (De Vries et al., 2008).

Assessment of the metal balance

In this context, we have to define whether we will make a farm or field-scale balance, with the difference being illustrated in Fig. 3.1. Farm scale balances consider the inputs to and outputs from the farm, thus neglecting the internal flow through the uptake in grass (in case of animal husbandry) followed by the production of manure that is applied on the farm. The input to a farm includes products that are bought, such as fertilizer, animal manure, feed (concentrates) medicines, roughage etc (see Fig.3.1 which shows only the major inputs). The input to the field, however, only includes fertilizer, animal manure (brought to the farm and produced internally) and biosolids, such as compost and sewage sludge, together with atmospheric deposition. On arable land there is no difference with respect to net uptake in a field scale balance and output in a farm scale balance. On grassland, however, the output (or net uptake) in a farm scale balance includes the net removal in milk and meat, whereas it includes the above ground removal of grass in a field-scale balance (see Figure 3.1). In CCAT, we will use MITERRA to make a field scale balance for the heavy metals Cd, Pb, Cu Zn, Ni, Cr, and Hg, distinguishing between:

- Inputs by fertilizer, animal manure, biosolids (sewage sludge and compost) and atmospheric deposition.
- Crop removal in arable land and above ground removal of grass in grassland

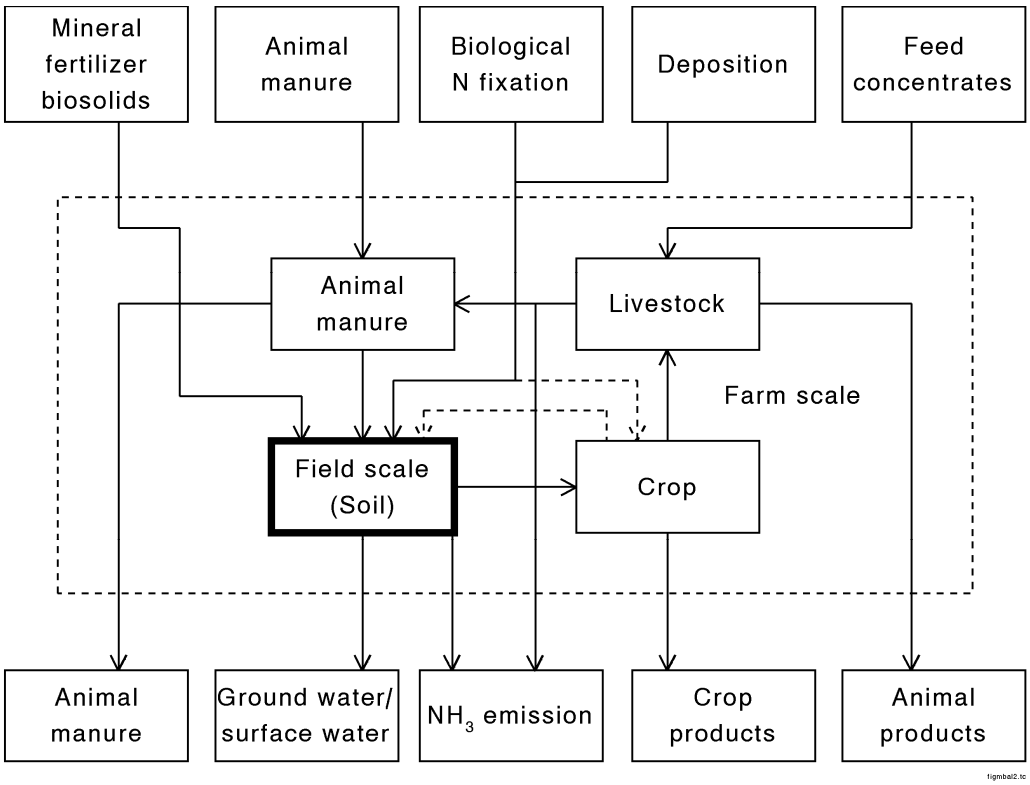


Figure 3.2. Inputs, internal flows and outputs of heavy metals illustrating the difference between a farm scale and a field scale metal balance.

The data that need to be assessed to make a proper metal balance are:

- Application rates of fertilizer (already in prototype) and the metal contents in these fertilizers per country (work for final CCAT tool).
- Application rates of animal manure (already in prototype) and the metal contents in the various manure types per country (work for final CCAT tool).
- Application rates of biosolids and the metal contents in these biosolids per country with a focus on sewage sludge (work for final CCAT tool). This will also include the P and N contents in biosololids to make the balance of N and P more complete.
- Atmospheric deposition of metals per NUTS region, based on EMEP model results (work for final CCAT tool).

Crop yields (already in prototype) and the metal contents in major crops considered in CAPRI-MITERRA (mostly likely values independent of country (work for final CCAT tool).

The approach used for the metamodel of DNDC-EU

Metamodelling involves selecting a statistical approximation to reduce the running time and memory consumption of the detailed DNDC-EUROPE model, often considered as a black-box by no expert users. A metamodel allows a better concept exploration and an optimum selection of predictors. At the beginning 3 different statistical approaches were applied to represent the DNDC-EUROPE input–output relationships:

- Neural Network: implemented in R computing environment based on “nnet” package and PNNET model. The Neural Networks are parallel computational models composed of densely interconnected adaptive processing units, called neurons, which learn by example. We developed a Multi-layer perceptron.
- Random Forest: implemented in R computing environment based on “randomForest” package. Random Forest is an aggregation of binary regression trees, a statistical method for regression function estimation, and a learning method, called baggin.
- Support Vector Machine: implemented in R computing environment with a Gaussian Kernel. Support Vector Machine has proven to be a powerful methodology for learning from empirical data.

All these statistical techniques are well designed for complex and non-linear systems. Among the large number of DNDC_outputs, we only focused on the selected CCAT environmental indicators, i.e. N surplus (defined as soil N input – net N removal), N_2O emission and N leaching (Fig. 3.3). We run the metamodels to estimate the indicators according to the statistical approximation we are using. We decided to adopt the Random Forest approach after a comparison between the different models’ performances (for further details see the Deliverable 4.2.3: Derivation of DNDC metamodels to evaluate the impact of cross compliance measures on nitrogen N surplus, N leaching, N2O emissions at EU25 scale).

Fig3.3: Framework of the DNDC-EU meta-modeling approach. The screening out of original DNDC inputs is performed by using the Importance Random Forest function. At last the selected statistical approximation of DNDC is based on Random Forest method. The studied outputs are N surplus, N_2O emissions and N leaching.

At the beginning the simulations through Europe-DNDC have been carried out at HSMU level. Afterward we had to upscale to CCAT-NUTS level to integrate our metamodel into the final platform. The aggregation of HSMU values have been carried out by means of a weighted area algorithm taking into account both the input and output data on the whole NUTS agricultural land covered by the studied crops.

In this contribution we only present the results for corn and barley crops. To reduce the time and memory consumption, also considering the number of scenarios (8) and the length of the period (1990-99) to simulate, we decided to select a representative sample subset among the entire EU25 agricultural lands. More details about the DNDC-EU metamodel to be included in the CAPRI-MITERRA simulation platform is provided in Deliverable (report) 4.2.3.1.

The DNDC metamodels predict N surplus, N leaching and N_2O emissions using a range of predictors as shown in Table 3.2. A description of SMRs and GAECs evaluated by the DNDC metamodels is given in Table 3.3

Table 3.2` Predictors used in the DNDC meta-models for N surplus, N leaching, and N_2O emissions

Predictor	N surplus	N leaching	N_2O emissions
Annual N Fertilizer rate (kg ha^{-1} yr^{-1})	x	x	x
N manure application rate (kg ha^{-1} yr^{-1})	x	x	x
N fixation (kg ha^{-1} yr^{-1})	x	x	x
N in residue (kg ha^{-1} yr^{-1})	x	x	x
Soil Bulk density (g cm^{-3})	(x)	x	x
Soil Organic Carbon in topsoil (mass fraction)	(x)	x	x
Soil pH (topsoil)	x	x	x
N concentration in rain (ppm)	x	x	x
Soil clay content (fraction)	x	x	x
Annual precipitation (mm yr^{-1})	x	x	x
Yearly Mean temperature (^oC)	x	x	x

Table 3.3 Description of scenarios and measures related to SMRs and GAECs evaluated by the DNDC metamodels

SMR	Name	Description	DNDC scenario and parameterisation
SMR2	Maximum manure N application standard	The amount of applied N in manure and excreted during grazing may not exceed 170 kg N per ha in a region. Excess manure is transported or processed.	Comparison of S1: Corn Reference Scenario[1] with S3: Corn Max manure Scenario[2] Comparison of S6: Barley Reference scenario[1] with S8: Barley Max manure scenario[2]
SMR3	Limitation to N application in winter and wet period	If manure is applied during the growing season in stead of the winter, the availability and effectiveness of manure N for crops increases.	Comparison of S1: Corn Reference Scenario with S5: Corn Splitting Scenario[5]
SMR8	Growing winter crops	Growing catch crops will result in i) less N leaching below rooting zone, ii) less surface runoff, and iii) less requirement of fertilizer N in the following year.	Comparison of S1: Corn Reference Scenario with S4: Corn Catch crop Scenario[3]
GAEC	Name	Standards	DNDCD scenario and parameterisation
GM3	Minimum coverage-arable land	Vegetative cover between agricultural crops, which is then ploughed into the soil, also termed as catch crops, green manure and winter crops.	Comparison of S1: Corn Reference Scenario with S4: Corn Catch crop Scenario[3] Actually equal to SMR8
GM4	Tillage method	Zero tillage	Comparison of S1: Corn Reference Scenario with S2: Corn No tillage Scenario[4] Comparison of S6: Barley Reference Scenario with S7: Barley No tillage Scenario[4].

[1] The baseline scenario includes only a corn or barley monoculture, with one tillage application and a tillage depth of 20cm

[2] This scenario limits the N in manure spreading to 170 kg N/ha y^{-1} (with few exceptions), compared to the reference scenario.

[3] Catch crops scenario includes two cycles of corn-catch crop system which lasts 5years (2 years of corn + 3 years of alfalfa). Corn like baseline, alfalfa without tillage and fertilizer application

[4] The no tillage scenario differs from the reference scenario because of the absence of tillage

[5] The splitting scenario splits the S1 fertilizer and manure amendment at sowing date, to 2 applications at sowing date and at the beginning of winter.

The approach used for the meta-models of EPIC

EPIC predicts N leaching, N runoff and Erosion, using regression meta-models or look up tables as described in van der Velde et al., (2009). The predictors used in the various regression models are given in Table 1. With respect to the type of metamodels that have been derived from EPIC model simulations, a distinction is made between EPIC model outputs that can be simulated using CAPRI-MITERRA outputs as predictor values and those that cannot be evaluated based on such outputs

Table 3.2 Predictors used in the EPIC meta-models for N leaching, N runoff and Erosion

Predictor	N leaching	N runoff	Erosion
Fertiliser N use (kg ha^{-1})	x	x	
Slope (degrees)		x	x
Organic matter content of the topsoil (0-30 cm) (%)	x		
annual precipitation (mm yr^{-1})	x	x	x
annual percolation (mm yr^{-1})	x		
Mean maximum temperature (^{o}C)	x		
Maximum soil moisture content of the topsoil(-)	x		
Soil hydraulic conductivity of the top soil (mm hr^{-1})	x	x	x

For EPIC outputs that are dependent on N fertiliser use rates, CAPRI-MITERRA estimates of these rates can subsequently be used as input in EPIC metamodels. This holds for for nitrate leaching and organic nitrogen in solid particles transported with runoff for which regression relations have been derived using fertiliser use and other environmental characteristics, such as slope and average rainfall as input (see Table 3.2). Regression models for these outputs are applied for all SMRs involving a change in N input.

Erosion, however, is not related to N input and can thus not be related to CAPRI-MITERRA outputs, while it is an important EPIC result in relation to cover cropping and no-till practices (GAEC issues). For these practices specific look-up tables have

been derived from EPIC simulations for selected crops. More specifically look-up tables operating at NUTS2 level have been derived for all measures that can not be evaluated with CAPRI-MITERRA, i.e. for (i) Erosion for all GAEC measures (no till and cover crop) and (ii) N runoff and N leaching for the GAEC measure no-till (although no till is evaluated by CAPRI-MITERRA, it does not lead to a change in N input). The EPIC runs included a comparison of:

Cover crop or no cover crop:

- E1 Baseline run with no cover crop for irrigated and non-irrigated maize
- E2 As E1 with clover as a cover/N fixing crop.

Tillage or no tillage:

- E3 Baseline run with conventional till practices in barley with
- E4 As E3 but with no-till practices

From the model calculations with the runs E1-E4, the percentage change associated with a change in agricultural practices (tillage versus no tillage and cover crop versus no cover crop) at NUTS2 level was averaged for the three main model outputs, i.e. erosion, N runoff and N leaching. These numbers can than directly be implemented to generate output in the CAPRI-MITERRA platform.

In summary, the approach for the use of EPIC meta-models is such that:

- SMRs in the Nitrate Directive that that imply a change in the N input by N fertilizer + N manure, as simulated by CAPRI-MITERRA, will directly be evaluated by *multiple linear regressions* based on EPIC simulations for N leaching and N runoff. Results of MITERRA for these outputs can be compared to those by EPIC, but the latter results are limited to maize and barley.
- GAEC measures in terms of inclusion of a cover crop or zero tillage is implemented through the use of the look-tables in terms of a percentage change compared to base line, and these results are superimposed on the MITERRA output (in case of N leaching and N runoff) or directly as a change independent of MITERRA output (erosion).

4 Assessing effects of CC on land use, landscape and biodiversity

4.1 Introduction

In prototype 1 the following assessments were done in relation to effects on biodiversity and landscape:

1) Assessments of impacts induced by predicted land use and livestock changes as a consequence of implementation of the Nitrates and Animal registration Directives;
2) An expert qualitative estimate of the effectiveness of standards for biodiversity and landscape;

The expert qualitative estimate of the effectiveness of standards concentrated on the Birds and Habitats Directives and the Nitrates Directive and most GAECs. A summary of the main results of these prototype 1 assessments is given in Section 3 of this Chapter.

For the other impact assessments only the effects of the standards addressed by the CAPRI prototype 1 assessment were taken into account. These only included the effects of the Nitrates and the Animal Registration Directives. A summary of the main results of these is given in Section 2 of this Chapter.

For the final CCAT assessment tool it is planned to do the following assessments:

1) A more extensive assessment of impacts induced by predicted land use and livestock changes will be applied. This extension of the assessment builds on the CAPRI predictions in land use and livestock changes. For the final CCAT tool CAPRI assessments will take a much broader range of costs into account caused by implementation of all SMRs and GAECs for which costs can be estimated. The joint costs will lead to changes in land use (cropping shares) and livestock composition and numbers. How these changes are translated further into pressure indicators for landscape and biodiversity is discussed in the second and third section of this chapter.

2) A wider and improved expert qualitative estimation of the effectiveness of standards for biodiversity and landscape. In the first prototype this was done for a selection of SMRs (only in old Member States) and for most GAECs. For the final CCAT tool, effectiveness will also be assessed for the Sewage Sludge, Groundwater and Plant protection product Directives and will also cover the new Member States.

3) An impact assessment on habitat quality derived from environmental indicators assessed by the Miterra model of a selection of joint SMR obligations. This assessment requires a post model processing of Miterra output in order to come to

a categorization of changes in environmental quality. The details of these post model assessments are discussed further in the third section of this Chapter.

4.2 Summary of main impacts of standards on land use and livestock intensity as assessed in PT1

4.2.1 Calculation of changes in crop and livestock intensity caused by changes in compliance with nitrates and animal registration Directives

For CCAT prototype 1, post-model calculation rules have been developed to calculate a set of indicators showing the changes in intensive and extensive land use and livestock (in absolute and relative figures) per region. This is a post model calculation as it uses the modeled output of the CAPRI model as input for the calculation of these intensity indicators. Changes in intensity are calculated by taking CAPRI assessment results for different levels of Cross Compliance implementation levels. There are 6 compliance scenarios included in the CAPRI model for which also livestock and land use intensity indicators were calculated:

- Baseline compliance in 2005 (differs per Nuts 2 region)
- 50% gap closure (halve way between 2005 baseline and 100% compliance)
- 0% compliance
- 50% compliance
- 75% compliance
- 100% compliance

As regards CCAT-tool prototype I, the compliance scenarios used only included compliance levels for the combination of the Nitrate Directive (SMR 04) and the 4 Animal registration Directives (SMR 06, 07, 08 and 08a) (see Chapter 2, Table 2.1).

Calculation of livestock intensity indicators

The livestock intensity per region is calculated by categorizing each livestock type (pigs, poultry, dairy cows, other cattle, sheep and goats) in an intensive or extensive group and adding up the total intensive LU and the total extensive LU. Pigs and poultry are categorized automatically in an intensive class. For the categorization of the ruminant animal types a more complex calculation scheme is followed as described below.

To assess which part of the livestock units (LU) in a region is intensive or extensive, the following rules and calculation steps were taken:

1. Pig and poultry were automatically classified as intensive in all regions.
2. For cattle, sheep and goats a classification in intensive and extensive categories was made by adding up all livestock units of dairy, other cattle, sheep and goats

and dividing this number by the fodder area[1]. Both the livestock numbers per category and the 4 fodder categories are included in the CAPRI-Coco database and their area may vary under influence of implementation of CC measures. The division of LU by area of fodder land delivers a stocking density per hectare. To decide whether this density classifies the ruminants in an intensive and extensive category whose thresholds are determined according to precipitation levels determining grassland productivity (see Table 4.1)

Table 4.1. Categorization of stocking densities in extensive, medium intensive and intensive categories

Class	Precipitation	SD-Extensive (=1)	SD-Medium (=2)	SD-Intensive (=3)
1	< 400mm	<0.5 LU/ha	0.5-0.65 LU/ha	>0.65 LU/ha
2	400-600mm	<1 LU/ha	1-1.3 LU/ha	>1.3 LU/ha
3	600-800mm	<1.5 LU/ha	1.5-1.95 LU/ha	>1.95 LU/ha
4	>800mm	<2 LU/ha	2-2.6 LU/ha	>2.6 LU/ha

Source: Own elaboration on the basis of Spanish Rural Development Program[2].

3. Calculation of intensity index according to energy intake from concentrate feed and maize (**CFM-index**). Since several ruminant animals held in landless systems obtain most of their energy intake from concentrate feeding or maize, an additional index to determine the number of intensive ruminants had to be calculated, which is the relative share of energy intake per type of ruminant, estimated to come from concentrate feed and maize (**CFM index**). The CFM data are specified per ruminant livestock category in the CAPRI-COCO database, which is referred to the year 2004 and is a weighted average according to number of LU. To categorize the different ruminant livestock categories in intensive and extensive according to this CFM index the thresholds in Table 4.2 were taken.

Table 4.2.Thresholds taken to calculate the sub-indicator on Concentrate Feed and Maize in-take (CFM-index)

Intensity:	Extensive (=1)	Medium intensive (=2)	Intensive (=3)
Weighted EU average CFM-index per NUTS2 region	Below lower 30% level of EU 2004 average	Above lower 30% level and below upper 30% levels of EU 2004 average	Above the upper 30% level of EU 2004 average

[1] Fodder area used for ruminants includes 4 categories of land: Grassland (GRAS), Other fodder crops (OFAR), fodder maize (MAIF), root crops used for fodder (ROOF).
[2] Order of 20 August 2007, Department of Agriculture of Castilla-La Mancha, on the implementation of cross compliance of direct payments and certain rural development measures under the Common Agricultural Policy in the Region of Castilla-La Mancha (Spain).

4. Now that both sub-intensity indexes have been calculated, the SD index and the CFM index, need to be combined into one indicator. In underneath Table 4.3 it is specified how different combinations of intensity levels are categorized into one intensity class per ruminant animal type.

Table 4.3. Classification of the combination of the SD index and the CFM index into one intensity class

	CFM-extensive	CFM-Medium int.	CFM-intensive
SD-extensive	E	E	I
SD-medium intensive	E	E	I
SD-intensive	I	I	I

I= Intensive; E= Extensive

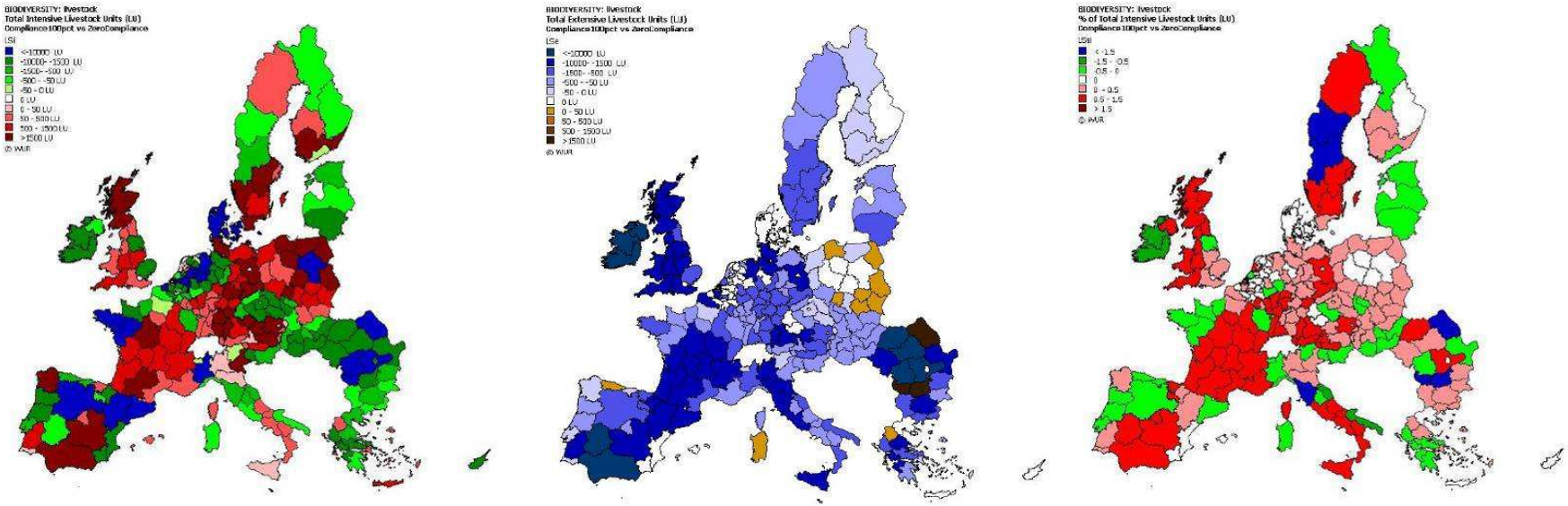
5. In this step a calculation was made of the final livestock intensity indicators. For this, all intensive and all extensive LU both from the ruminant livestock types and from the pigs and poultry categories were combined and absolute numbers of intensive and extensive livestock units per compliance scenario were calculated.

In order to illustrate the type of results and interpretative arguments that CCAT will provide, and although the CCAT database is still being completed, a summary of the preliminary results of the changes in these indicators between scenarios are shown in the following. We need to remark that these results or their interpretation are not really meaningful, since the regional implementation of some measures in certain member states is still being included in the CCAT database.

Results of livestock intensity indicators

Comparison of the score of the indicators between the different scenario assessed by CCAT (baseline year 2005, 0%, 25%, 50%, 75% and 100% compliance, and 50% gap closure)show only very small changes. Therefore only the results for the largest scenario gap between 0% compliance and 100% compliance are presented underneath in 3 maps and discussed.

Figure 4.1. Changes in intensive and extensive livestock categories under influence of changes in compliance with Nitrate and Animal registration Directives. The first 2 maps show the absolute changes in extensive and intensive livestock units and the last map shows the relative change in intensive livestock unit shares for the scenario gap between 0% and 100% compliance. The overall picture is that extensive livestock units decrease in most of the regions while for the intensive livestock numbers we see a much more mixed picture of gains and losses. Where both intensive and extensive livestock numbers decrease at the same time there is an overall loss in livestock. This happens more in the new Member States then in the old ones. In terms of relative changes, we see very small differences, practically not exceeding a 0.25% change (positive or negative) in any category (intensive or extensive) in absolute figures and not more than 1.5% change in intensive livestock shares. In spite of this it can be concluded that increases in intensive livestock shares seems to happen in more regions then increases in extensive livestock shares. This is certainly the case for Germany, UK, France, Southern Sweden, Southern Spain and Southern Italy and Poland and Czech Republic. Overall however it can be concluded that changes in livestock numbers and shares are still very small and final conclusions on the effects of implementation of SMR and GAEC obligations will need to be made in the final CCAT assessment when effects of all obligations together are assessed by CAPRI.



Calculation of land use intensity indicators

The crop intensity per region is calculated by categorizing the main crops in an intensive or extensive group according to 4 linked intensity indices. Data per crop on these indices are obtained from the Capri-Coco database for 2004. To calculate the final intensity of land use per region the crops are categorized in an intensive and an extensive group according to a combined score on the 4 intensity indices. The area of all intensive and all extensive crops is then added-up and related to the total UAA in a region to calculate the final aggregate indicators.

To assess which part of the crops and their related area in a region is intensive or extensive, the following steps were taken:

1. Selection of crops to be included in the assessment.
   Since the CAPRI-Coco database does not provide equally reliable data on the 4 proposed intensity indices for all type of crops, a selection had to be made (see Table 4.4). The selection excluded aggregate crop classes, but resulted in inclusion of at least 90% of the cropping area in most of EU regions. The crops included and excluded are listed in Table 4 and their selection was mainly based on the quality assessment of the input data for the calculation of the intensity indices for these crops included in Capri-Coco database. For some crops concessions were made as to quality because of their regional or overall importance in terms of UAA shares (e.g. apples, citrus, grass, olives, fodder maize, other fodder and other root crops).

Table 4.4. Crops in the Capri-Coco database included and excluded in the intensity classification

Accro-nym	**Explanation**	**Selected crops**	**wide spread + good statistical data**	**regional important + good statistical data**	**wide spread + weak statistical data**	**regional important + weak statistical data**	**no meaningful statistical data**
APPL	Apple, pears and peaches	X					
BARL	Barley	X					
CITR	Citrus	X					
DWHE	Durum wheat	X					
FALL	Fallow land						
FLOW	Flowers and ornamental plants						
GRAE	Extensive grass and grazings						
GRAI	Intensive grass and grazings						
GRAS	Grass and grazings	X					
MAIF	Fodder maize	X					
MAIZ	Grain maize	X					
NONF	Set aside non-food production (Rapeseed)	X					
NURS	Nursery plants						

OATS	Oats	X					
OCER	Other cereals	X					
OCRO	Other final crop products						
OFAR	Other fodder on arable land	X					
OFRU	Other fresh fruits						
OIND	Other industrial crops						
OLIV	Olives	X					
OOIL	Other oilseeds						
OSET	Obligatory set-aside						
OVEG	Other vegetables						
PARI	Padi Rice	X					
POTA	Potatoes	X					
PULS	Pulses	X					
RAPE	Rape seed	X					
ROOF	Other root crops	X					
RYEM	Rye and meslin	X					
SETA	Set aside, idling						
SOYA	Soya beans	X					
SUGB	Sugar beet	X					
SUNF	Sunflower	X					
SWHE	Soft wheat	X					
TABO	Table olives	X					
TAGR	Table grapes	X					
TEXT	Textile crops						
TOBA	Raw Tobacco						
TOMA	Tomatoes						
TWIN	Table wine	X					
VSET	Voluntary set-aside						

On the selection of crops, calculations were applied to derive four intensity indices according to which crop area could be classified as extensive, medium intensive or intensive. They included 3 input-related indicators as input dosages directly reflect the intensity of cropping. The last indicator is related to output, i.e. yield level.

2. <u>Classification of crops per region according to four crop intensity indices</u>
   For each crop the weighted average intensity at EU level is calculated based on the data taken from the Capri-Coco database. These figures refer to the situation in 2004. In order to classify this crop into an extensive, medium intensive or intensive category the following calculation steps are taken:

   I. Calculation of the weighted (by crop area) EU average level of crop protection products spending (CPS-index) per crop (€/ha).
   II. Calculation of the weighted (by crop area) EU average level of N-manure application per crop (NMA-index) per crop.

III. Calculation of the weighted (by crop area) EU average level of N-mineral fertilizer application per crop (NMI-index) per crop.
IV. Calculation of the weighted (by crop area) EU average yield level (Yield-index) per crop.
V. Classification of the crops per index per Nuts region in an extensive, medium intensive and intensive class. This classification has to be based on the calculated intensity for the four indices in step I. The thresholds used to classify are shown in Table 4.5 underneath.

The next step is to classify the crops per index per NUTS 2 region in an extensive, medium intensive and intensive class. This classification has to be based on the calculated intensity for the 4 indices in step I. The thresholds used to classify are shown in Table 4.5 underneath.

Table 4.5. Threshold values per index used to classify crops into extensive, medium intensive and intensive classes

Intensity:	Extensive (=1)	Medium intensive (=2)	Intensive (=3)
Weighted EU average CPS-index per crop per region	Below lower 30% level of EU 2004 average	Above lower 30% level and below upper 30% levels of EU 2004 average	Above the upper 30% level of EU 2004 average
Weighted EU average NMA-index per crop per region	Below lower 30% level of EU 2004 average	Above lower 30% level and below upper 30% levels of EU 2004 average	Above the upper 30% level of EU 2004 average
Weighted EU average NMI-index per crop per region	Below lower 30% level of EU 2004 average	Above lower 30% level and below upper 30% levels of EU 2004 average	Above the upper 30% level of EU 2004 average
Weighted EU average Yield-index per crop per region	Below lower 30% level of EU 2004 average	Above lower 30% level and below upper 30% levels of EU 2004 average	Above the upper 30% level of EU 2004 average

The 30% lower and upper limits should always refer to the EU average calculated for the Capri-Coco data in 2004. So if changes between scenarios are calculated, the absolute reference situation is always the 2004 intensity levels. So changes between, e.g., scenario 0% and 100% compliance, are calculated by relating the calculated intensity levels in both scenarios to the 2004 EU wide intensity level.

3. <u>Classification of crops per region according to the input intensity combined index.</u>
For the integration of the 3 indexes (CPS, NMA, NMI indices) into one combined indicator, N-Manure and N-Mineral kilograms are firstly added up and then combined with the CPS index. The following separate steps are followed:

I. Add up N-manure + N-mineral (KgN/ha) per crop per region.

II. Classify the combination of N-manure and N-mineral in 3 intensity classes, using the 30% below and upper threshold values of the EU weighted EU average limits.

III. Combine this indicator with the CPS-intensity classes as indicated in Table 4.6 into a combined final intensity indicator:

Table 4.6. Combination of the three input-related indices

	N-manure+mineral-extensive	N-manure+mineral-medium	N-manure+mineral-intensive
CPS-extensive	E	M	I
CPS-Medium	M	M	I
CPS-Intensive	I	I	I

4. In the final step a calculation was made of the final extensive, medium intensive and intensive cropped area share for the 5 intensity indices per region. The types of intensity area shares per region were calculated by adding up all areas of crops classified as extensive, medium intensive and intensive according to the 5 intensity indices and dividing this by the total cropped area per region. This then resulted in 15 final indicators which were presented as mapped output per region and were compared between scenarios. A summary of the results is given underneath.

Results of land use intensity indicators

As above, in order to illustrate the type of results and interpretative arguments that CCAT will provide, and although the CCAT database is still being completed, a summary of the preliminary results of the changes in indicators between scenarios are shown in the following. We need to remark that these results or their interpretation are not really meaningful, since the regional implementation of some measures in certain member states is still being included in the CCAT database.

Like with the livestock intensity indicators, comparison of the score of the land use intensity indicators between the different scenario assessed by CCAT (baseline year 2005, 0%, 25%, 50%, 75% and 100% compliance, and 50% gap closure) showed only very small changes. Therefore again only the results for the largest scenario gap, between 0% compliance and 100% compliance, are discussed further and presented in maps.

Figure 4.2. Crop intensity based on the weighted (by crop area) EU average level of protection products spendings (CPS-index) per crop. Intensity classes, based on crop protection spending, shift very slightly (Map 2). But the overall picture seems to go more in the direction of extensification, more regions show a slight but increasing shift in the low and medium intensive group, then towards intensification. Low intensity farms increase clearly in most regions of France and UK. Germany shows a clear tendency toward intensification as does The Netherlands, Belgium and Denmark. Southern, Central and Eastern Europe show a very mixed change towards both intensification and extensification.

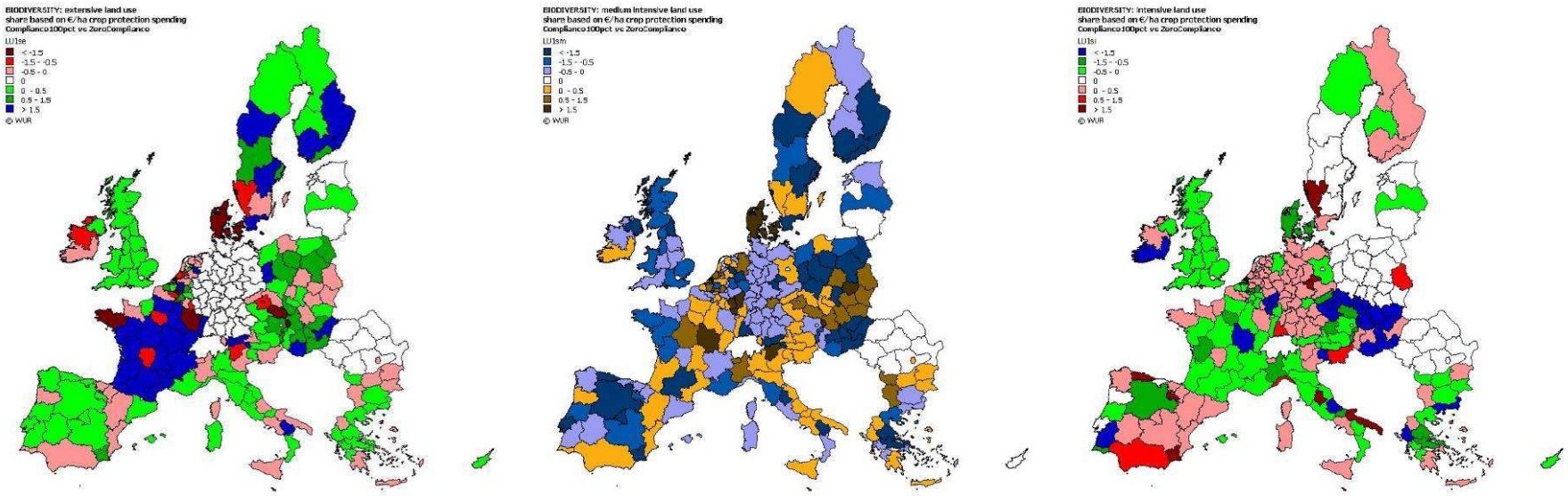


Figure 4.3a. Crop intensity based on the weighted (by crop area) EU average level of N-manure application per crop (NMA-index). Shifts in intensity of land use based on nitrogen application from manure and mineral applications are difficult to interpret (see also Figure 4.3b). There is practically no country showing a clear tendency towards intensification or extensification. Some very weak observation could be that in some western European countries (e.g. France, Netherlands, UK), there is an overall shift towards lower Nitrogen application, especially in terms of fertilizer application leading to some extensification tendency. In CEEC it seems like Nitrogen applications, especially in manure, are having some intensification effects.

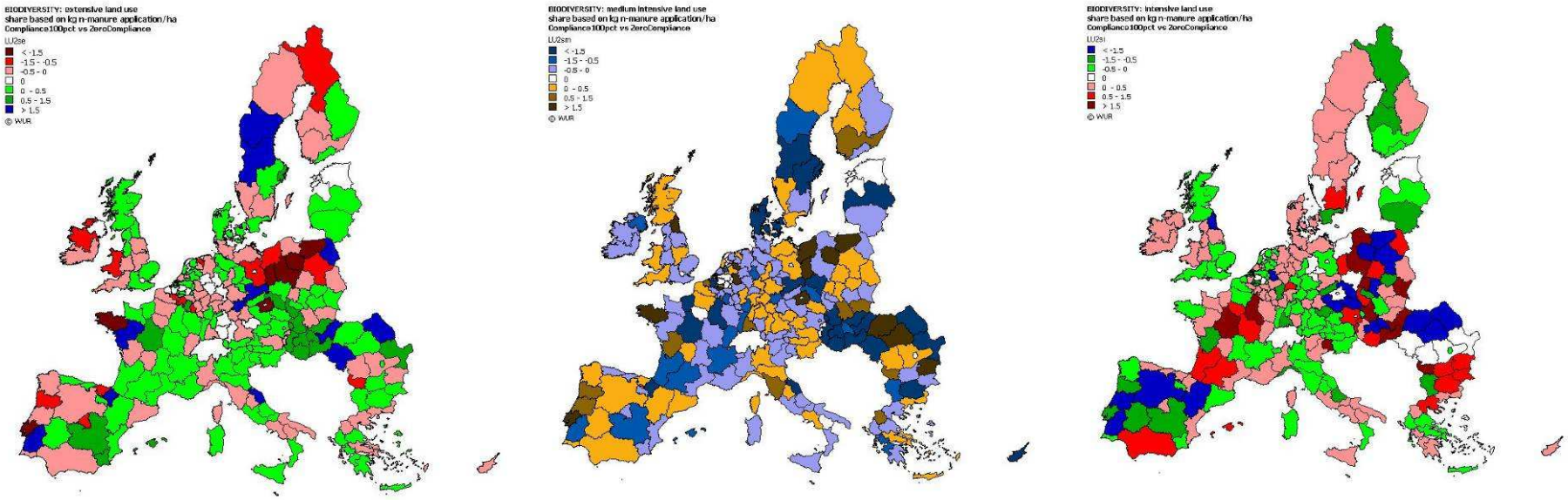


Figure 4.3b. Crop intensity based on the weighted (by crop area) EU average level of N-mineral fertilizer application per crop (NMI-index).

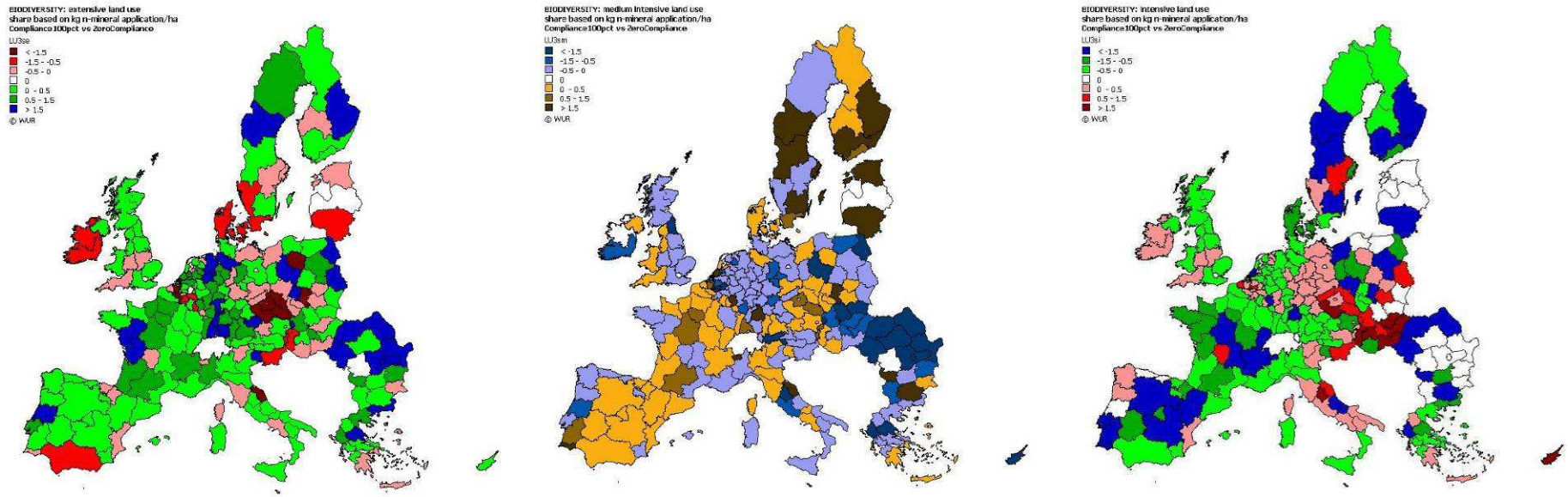


Figure 4.4. Crop intensity based on the weighted (by crop area) EU average yield level (Yield-index) per crop. Changes in land use intensity based on yield levels are again not very conclusive. Shifts are extremely small like with the other indicators. In Spain and France there seems to be a stronger tendency towards increases in the extensive and medium intensive directions, but in countries like Ireland, The Netherlands, Belgium, Germany, increases in the index are observed although they are very small and occur more often in the medium intensive and intensive classes. Most CEEC countries do not show shifts towards higher intensity, but an extensification tendency is not detected either.

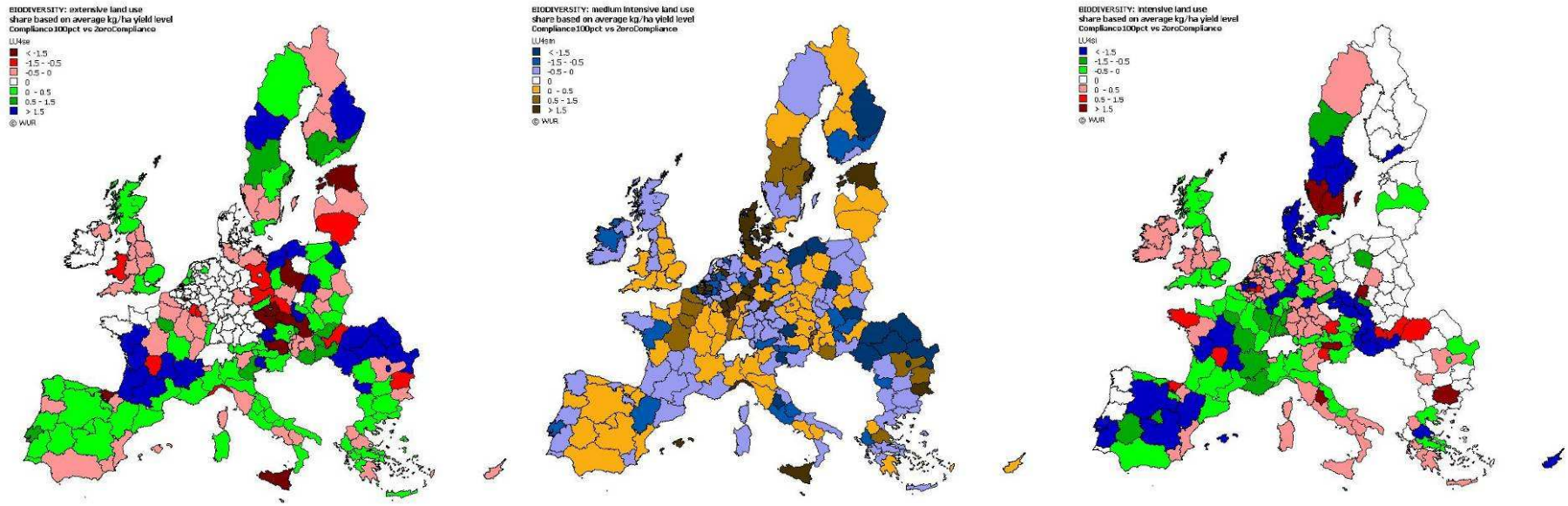
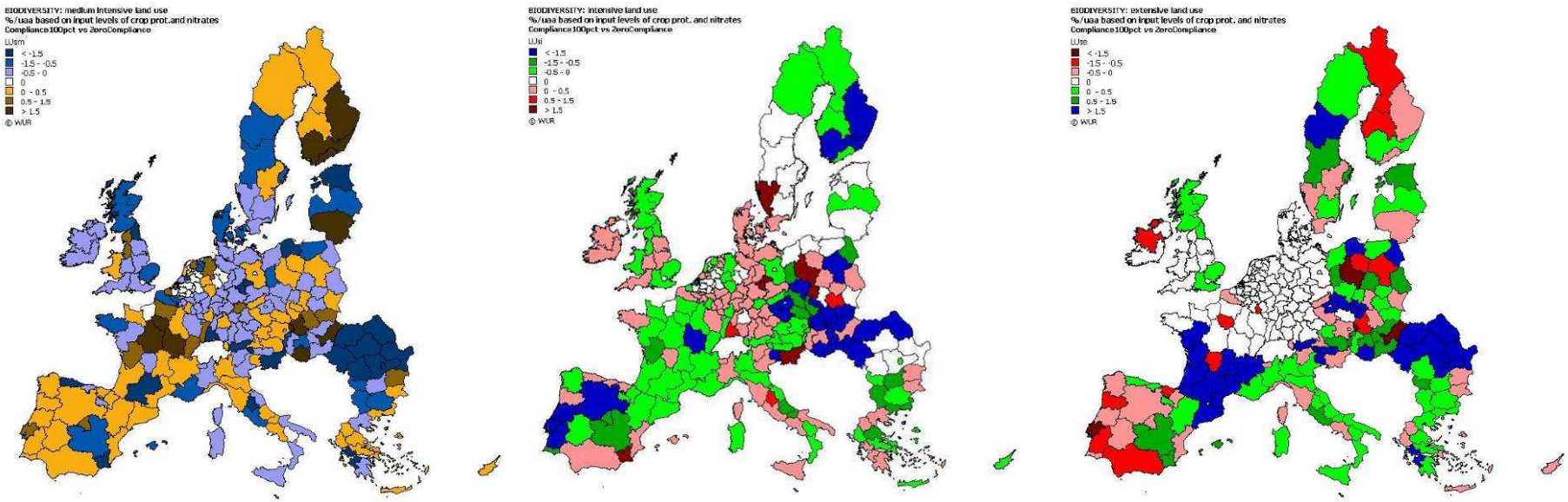


Figure 4.5. Crop intensity based on the combined weighted (by crop area) EU average input levels (Crop protection spendings and input levels of nitrates). Shown is the combined effects of input-related indicators on shifts in land use intensity and they confirm again that shifts are very small. In some countries they lead to some more conclusive tendencies. In Spain, Portugal, Finland, Czech and Slovak republics for example the winner seems to be in the medium intensity class. The exception in Spain is in the regions of Andalucia and Comunidad Valenciana where the intensive class seems to be the net gainer. In France the shift in most regions is towards the extensive and medium intensive classes. Ireland shows a clear tendency towards intensification. All other countries show a very mixed situation. Overall it can be concluded that like in livestock intensity analysis, shifts in intensity classes of land use are still very small and final conclusions on the effects of implementation of SMR and GAEC obligations will need to be made in the final CCAT tool when effects of all obligations together are assessed by CAPRI. Effects of individual SMRs and GAECs are clearly not large. It is most probable that the whole package of obligations will make the difference.



4.3 Summary of main assessment results in PT1 in relation to potential effectiveness of SMR and GAEC obligations for biodiversity and landscape

In prototype 1 the effectiveness of obligations stemming from GAECs and selected SMRs on biodiversity and landscape was estimated on the basis of expert knowledge. This analysis was focused on those SMRs and GAECs targeting the preservation of landscapes and biodiversity (Birds and Habitats Directives, and GAECs targeted on habitat/landscape preservation, including e.g. measures against soil erosion), and SMRs targeting the preservation of habitat quality (Nitrates Directive)

4.3.1 Method

The assessment is performed in the following steps: a) Collection of concrete CC obligations promulgated by Member States or regions; b) Identification and qualitative assessment of the potential effects of each obligation, and c) Aggregation of potential effects.

a) Collection of concrete CC obligations promulgated by Member States or regions.

Concrete CC obligations promulgated by Member States, or regions when the implementation of agricultural policies is decentralised, were collected for the old Member States. The analysis focused on the review of 793 SMRs obligations stemming from the Birds, Habitats and Nitrates Directives**,** categorized in 17 distinct 'measures', and 424 GAECs obligations grouped under 5 distinct issues (see Table 4.6).

Table 4.6. SMRs measures and GAECs issues used in the analysis.

SMRs Measures	
	Birds Directive
	ME0101 Appropriate measures to maintain the population of all species naturally occurring birds (eggs, nests and habitats) in the wild state of the EU territory, including the creation of protected areas, the management of habitats inside and outside protected areas, creation of biotopes and re-establishment of destroyed biotopes.
	ME0102 Special conservation measures concerning habitats of species of Annex I, and regularly occurring migratory species: classification of special protection areas with particular attention to the protection of wetlands; avoidance of pollution and deterioration of habitats in and outside the protection areas.
	ME0103 Prohibition of deliberate killing or capture by any method; of destruction, or removal of their nests and eggs; of disturbance during breeding and rearing seasons (all bird species naturally occurring in the wild).
	Nitrates Directive
	ME0401 Rules relating to periods when the application of certain types of fertilizer is prohibited (incl. winter and wet periods)
	ME0402 Rules on fertilizers holding on field and farm (incl. capacity and constructions of storage vessels) and measures to prevent run-off and seepage into the groundwater and surface water (incl. silage effluents)
	ME0403 Limitations to fertilizer application, including rules of crop specific application.
	ME0404 Maximum manure N application standard of 170 kg N per ha (except where a derogation applies) (in Nitrate

	vulnerable zones)
	ME0405 Limitation to fertilizer application on steeply sloping grounds
	ME0406 Prevention of leaching to water courses, riparian zones, buffer zones
	ME0407 Appropriate fertilizer and manure application techniques, including split application of N
	ME0408 Growing winter crops (maintain vegetation cover during rainy periods)
	ME0409 Land use management, including the use of crop rotation systems and the proportion of the land area devoted to permanent crops
	ME0410 Establishment of fertilizer plans and the keeping of records on fertilizer use.
	ME0411 Prevention of water pollution from run-off and the downward movement beyond the reach of crop roots in irrigation systems
	ME0412 General rules for Nitrate Vulnerable Zones (incl. distance to watercourses, farm practices, climatic conditions etc.)
	Habitat Directive
	ME0501 For special areas of conservation: measures relating to the ecological requirements of natural habitat types (Annex I) and the species (Annex II) present on the sites, and measures to avoid the deterioration and disturbance of natural habitats.
	ME0502 Prohibition of deliberate destruction, collection as well as keeping and transport of plant species listed in Annex IV(b).
GAECs issues	
	GAEC01 Soil erosion
	GAEC02 Soil organic matter
	GAEC03 Soil structure
	GAEC04 Minimum level of maintenance
	GAEC05 Additional farmers obligations

b) Identification and qualitative assessment of the potential effects of each obligation.

For the identification of potential effects, we considered both, direct effects on species and/or habitats listed in the Birds and Habitat directives, and indirect effects on biodiversity and landscape through changes in the structural and/or functional characteristics of the agro-ecosystems. The potential effect of each obligation was categorised in one out of four semi quantitative classes (0, 1, 2 or 3) and applied to the impact fields on biodiversity and landscape separately (see Table 4.7).

Table 4.7 Identification and qualitative assessment of the potential effectiveness of each obligation.

BD	L	Obligation characteristics
3	0	Obligations containing elements directly targeting the maintenance or survival of animal or plant species, and habitats listed in the Directives.
2	2	Obligations containing elements affecting habitat structure and landscape structural elements
1	1	Obligations containing elements affecting non-structural characteristics of the habitat for species (i.e. pollution, erosion, water abstraction)
2	1	Other management prescriptions, e.g. stocking regimes, stubble management or time limits for harvesting, packaging, or grubbing of hedges.
1	0	Other management prescriptions, e.g. minimum height of cut or restrictions on treated seeds.
0	0	Obligations without effects on biodiversity and landscape.

00	00	Obligations which effects cannot be assessed.
X	X	Obligations not in force

An aggregated value was assigned to obligations that combine different elements (e.g. at the same time referring to species protection and structural elements).

The single obligations effectiveness values were aggregated for each NUTS2 region and the effect of the inclusion of each directive and of each measure within each directive was analysed separately as well as per GAEC issue.

Finally, the aggregated effect of the whole measures (GAECs and SMRs) was aggregated and analysed as the CC effect on biodiversity and landscape.

4.3.2 Results and further work for the final tool.

Results of potential effectiveness on biodiversity and landscape of aggregated GAECs and SMRs, and the different levels of aggregation, are presented and commented in accompanying maps.

Looking at these maps it can be seen that potential effectiveness, although always positive, varies strongly among regions. This is especially caused by differences in the way national and regional authorities have defined SMR and GAEC obligations in their implementation of CC.

These differences deserve further analysis and discussion, however, as to whether they reflect varying environmental conditions and farming types and/or varying political willingness to seriously tackle with the existing agri-environmental issues at hand.

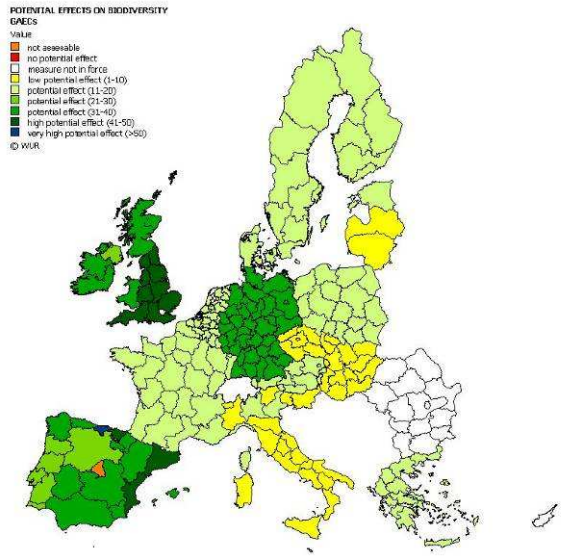
Overall, the proposed method seems useful to explore patterns of potential effectiveness of CC on biodiversity and landscape in the EU at regional level.

It is envisaged for the final tool to include in the assessment the other SMRs prescriptions that are expected to have an effect on biodiversity and landscape, such as Sewage Sludge, Groundwater and Plant Protection Directives, and to complete the assessment including the rest of EU-27 countries.

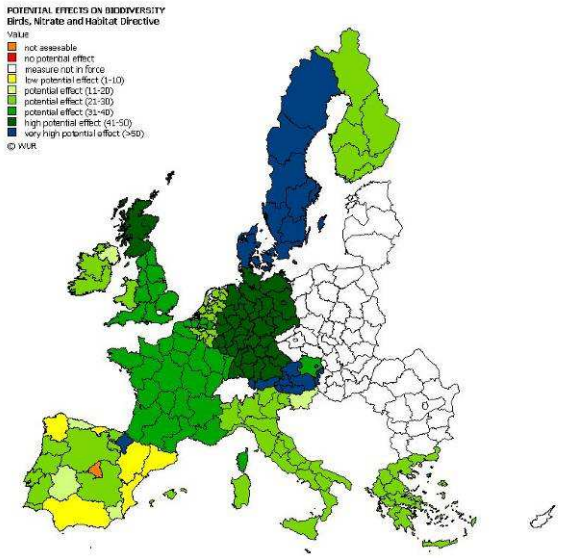
Figure 4.6. Aggregated effects of GAECs and SMRs on biodiversity and landscape. This figure shows the results of the effectiveness on biodiversity and landscape of aggregated GAECs and SMRs. GAECs potential effects on biodiversity are higher in most regions of Spain, United Kingdom and Germany, having lower potential effect in the rest of EU regions. SMRs potential effects on biodiversity are higher in central and northern Europe and the United Kingdom than in Mediterranean countries. GAECs potential effects on landscape are generally low, with the exception of some Spanish and UK regions. SMRs effects on landscape are generally low, with the exception of some countries, such as Denmark, Hungary, and the region of Navarra in Spain.

1. Effects on biodiversity.

GAECs

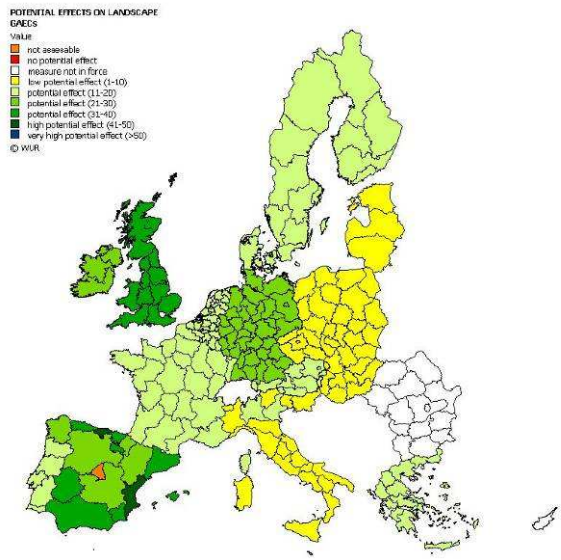


SMRs



2. Effects on Landscape.

GAECs



SMRs

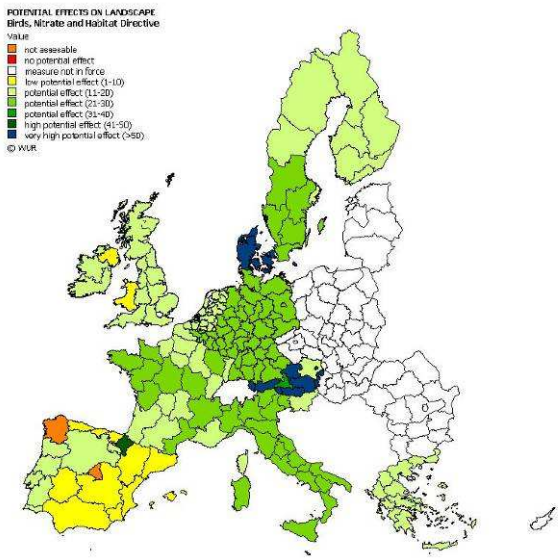
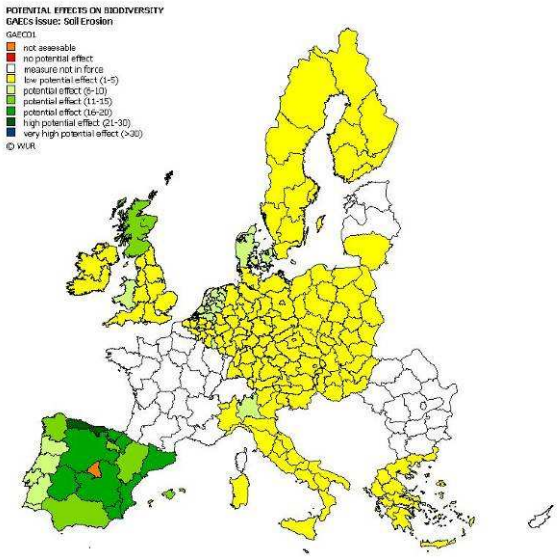
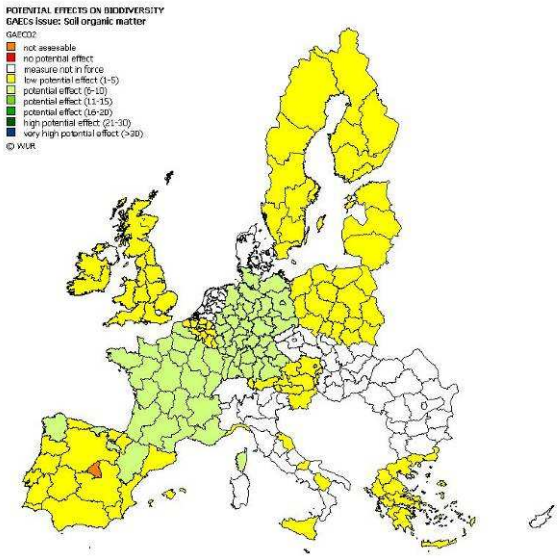


Figure 4.7. GAECs effects on biodiversity disaggregated at issue level. This figure shows the GAECs effects on biodiversity, disaggregated at issue level for issues 1to 4. Potential effects of *soil erosion* obligations are especially important for most Spanish regions and Scotland, having lower potential effect in the rest of EU regions. Potential effects of *soil organic matter* and *soil structure* obligations are generally low. Obligations related to *Minimum level of maintenance* have the higher potential effect on biodiversity, mainly in Ireland, England, and the Spanish regions of Cantabria and Comunidad Valenciana.

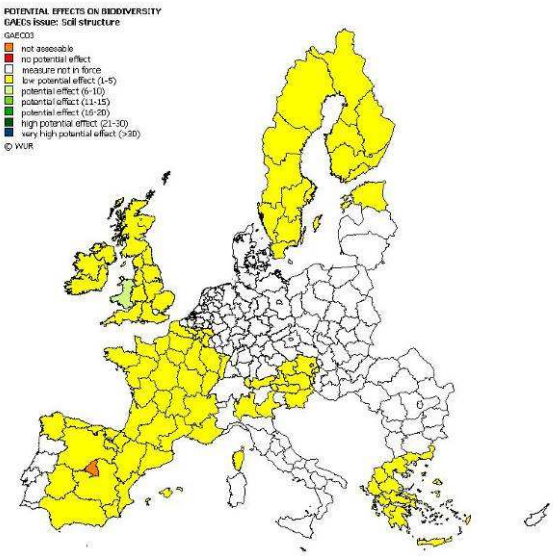
Soil erosion



Soil organic matter



Soil structure



Minimum level of maintenance

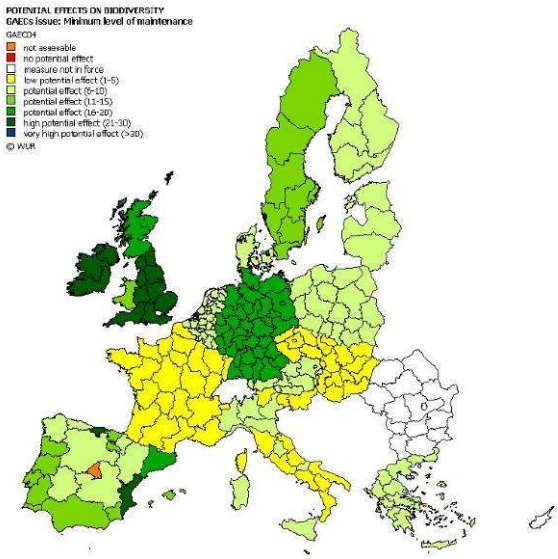
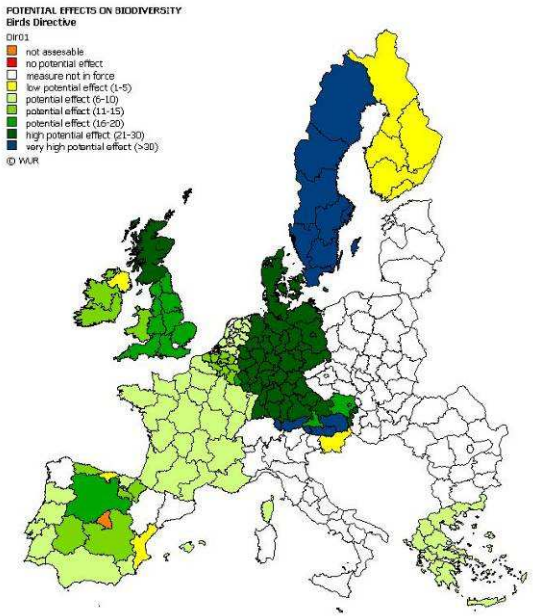
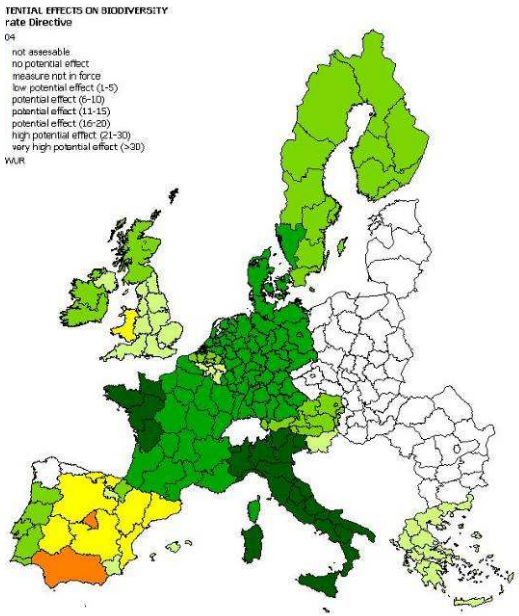


Figure 4.8. SMRs effects on biodiversity disaggregated at directive level. Figure 4.8 shows the contribution of each of the three analysed Directives to the potential effect of SMRs on biodiversity. The effects of the Birds Directive are of especial importance in some countries, such as Norway and Hungary, and have low potential in the Mediterranean countries. The effects of the Nitrates Directive on biodiversity are especially high in Italy and west France, and are generally high in the whole EU, with the exception of the Spanish regions. The effects of the Habitat Directive obligations on biodiversity are generally lower, with the exception of Hungary and the Spanish region of Navarra.

Birds Directive



Nitrates Directive



Habitat Directive

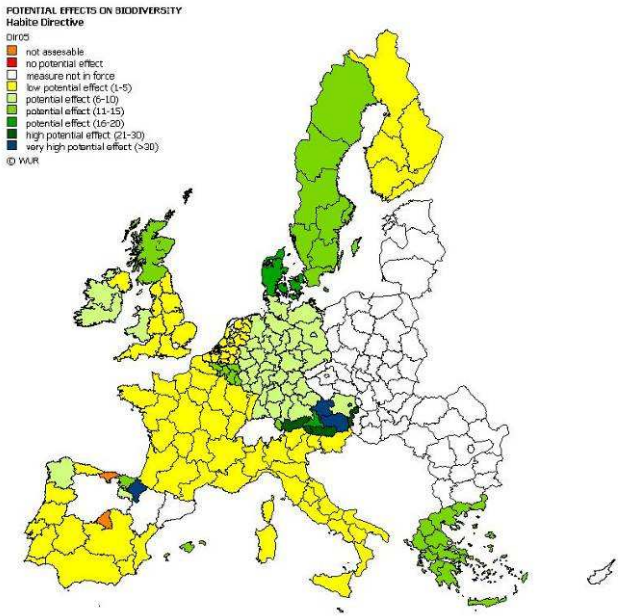
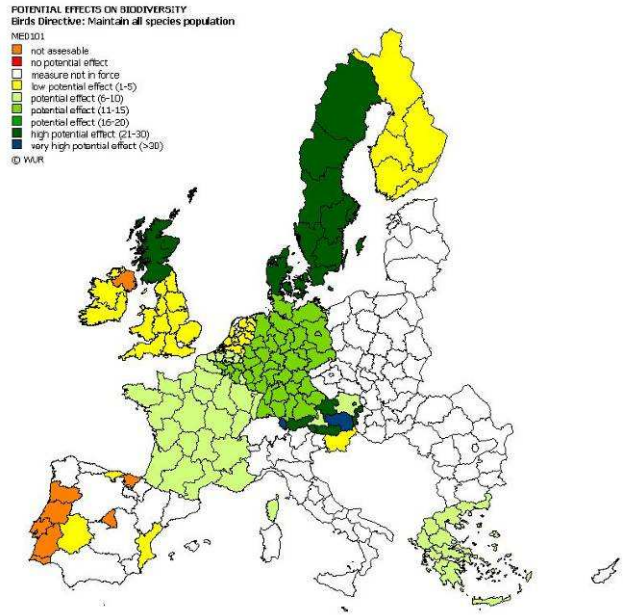
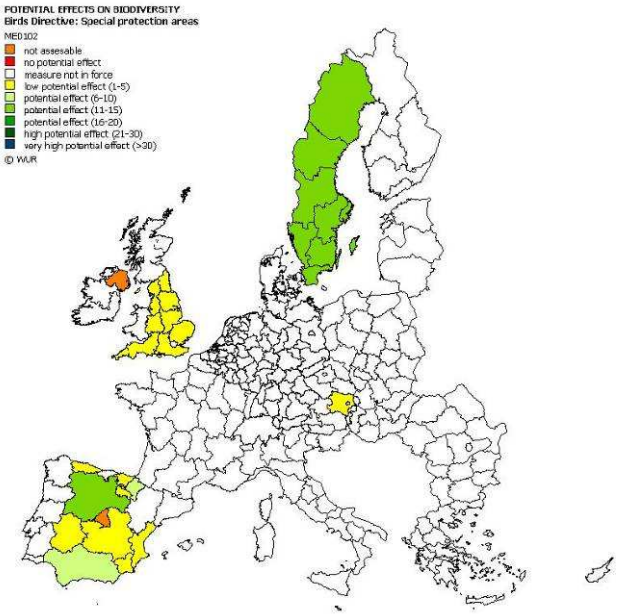


Figure 4.9. SMRs effects on biodiversity disaggregated at measure level for Birds Directive. This figure shows the effects on biodiversity of the three measures stemming from the Birds Directive in each EU region or country. The measure with higher potential effect is that related to the *maintenance of species populations*; however it is not in force in most Spanish regions or in Italy. The measure *Special protection areas* is in force only in some Spanish regions, northern Ireland, England and Sweden, and in general its potential effect on biodiversity is low. *Prohibiting killing/disturbance* implementation is also limited and has low effect on biodiversity.

Maintain all species population



Special protection areas



Prohibiting killing/disturbing

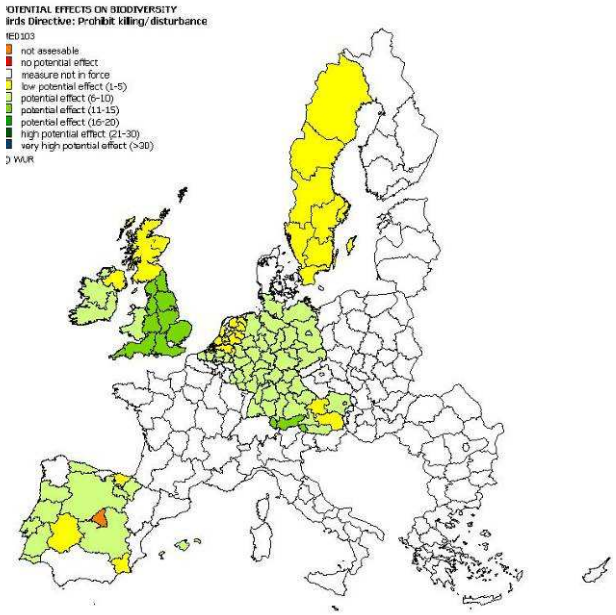
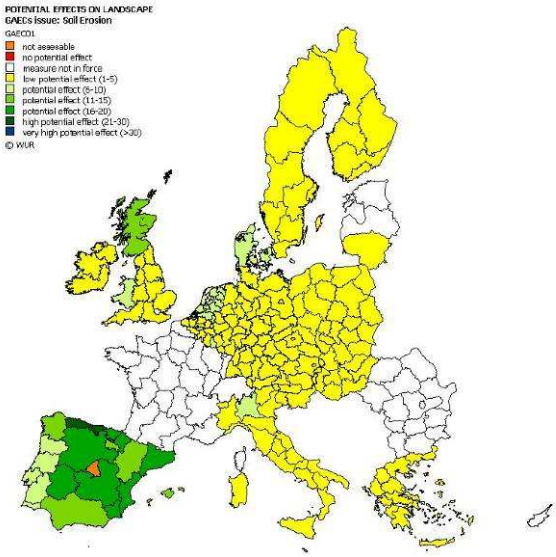
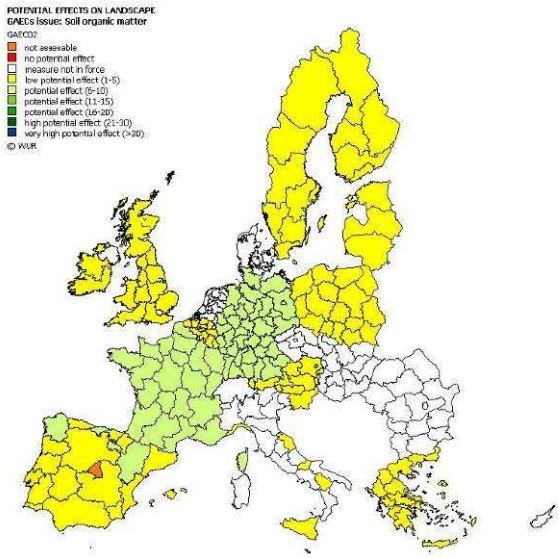


Figure 4.10. GAECs effects on landscape disaggregated at issue level. This figure shows the contribution of these four issues to the GAECs effect on landscape. *Soil erosion* issue has a high effect in the Spanish regions, mainly in Asturias and Cantabria, and in Scotland. Both *Soil organic matter* and *Soil structure* issues have low effect on landscape. The main effects on landscape are derived from the *Minimum level of maintenance* issue, with especial importance in Ireland, England, and the Spanish regions of Cantabria and Comunidad Valenciana.

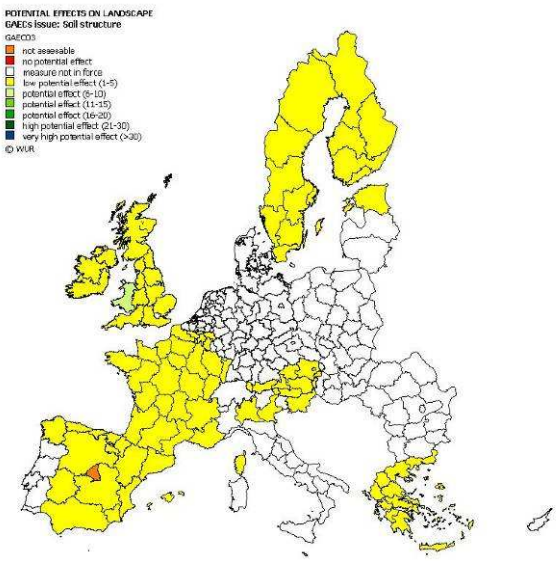
Soil erosion



Soil organic matter



Soil structure



Minimum level of maintenance

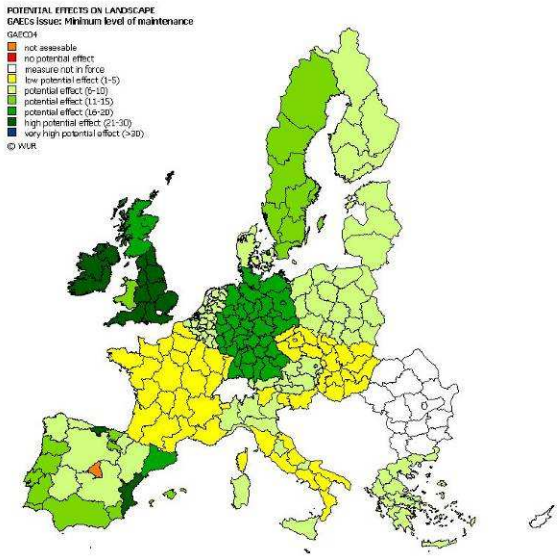
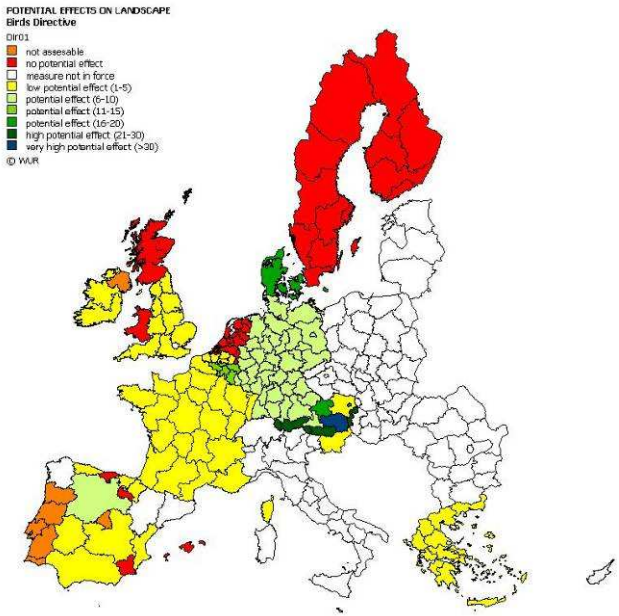
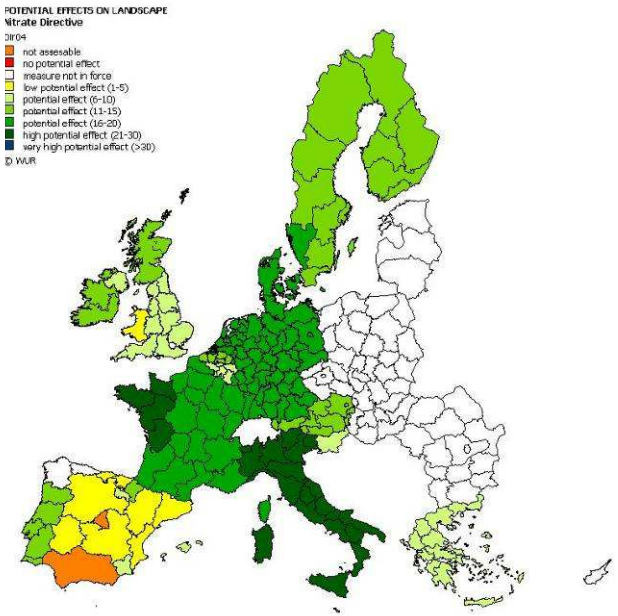


Figure 4.11. SMRs effects on landscape disaggregated at directive level. This figure shows the effectiveness of standards of the three analysed Directives on landscape, highlighting the differences among European regions. Where measures have been implemented, the Birds Directive has generally low or no potential effect, with the exception of Hungary and Denmark. The Nitrates Directive has the highest potential effect, mainly in Italy and west France, while in most Spanish regions and Wales its potential effectiveness is lower. The Habitat Directive has in general low potential effect on landscape. In fact, the obligations formulated under this Directive in some Spanish regions, France, The Netherlands, Hungary and Wales, have no potential effect on landscape, and those from Portugal, England, north Ireland, and the Spanish regions of Galicia, Extremadura, Cantabria and Madrid are not assessable.

Birds Directive



Nitrate Directive



Habitat Directive

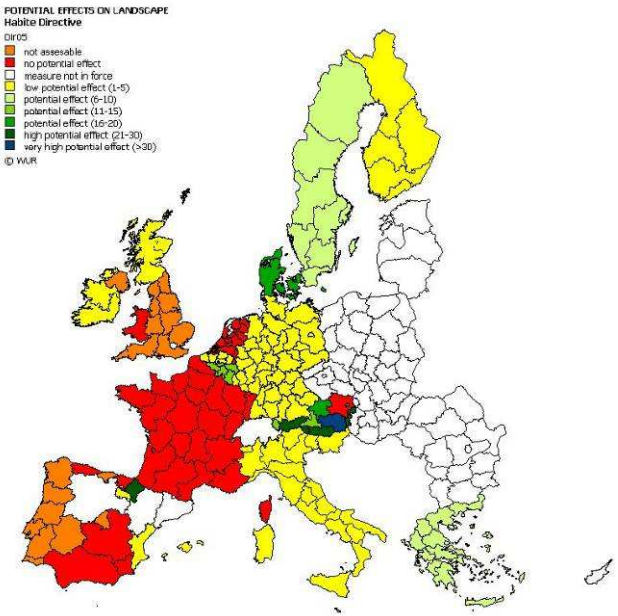
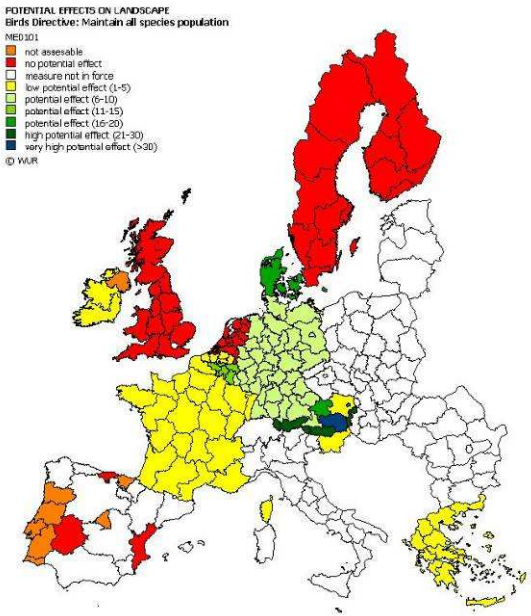
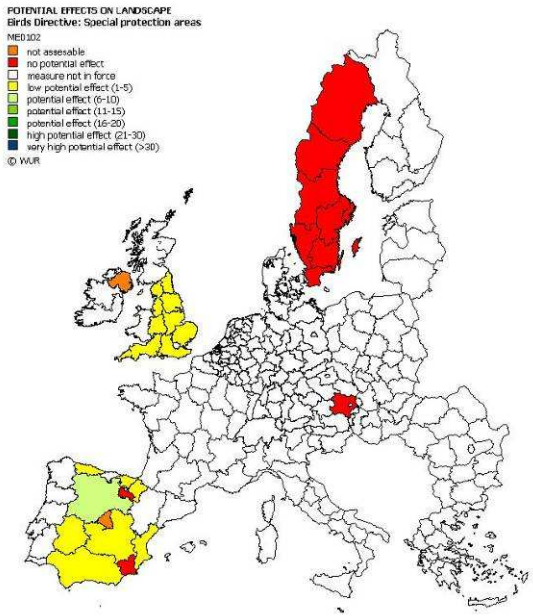


Figure 4.12. SMRs effects on landscape disaggregated at measure level for Birds Directive. This figure represents the potential effects on landscape derived from each of the three measures under the Birds Directive. More important effects are derived from the measure *Maintain all species population* in Ireland, Greece and central Europe countries, and from the measure *Special Protection Areas* in England and some Spanish regions. *Prohibiting killing/disturbing* measure has no effect on landscape.

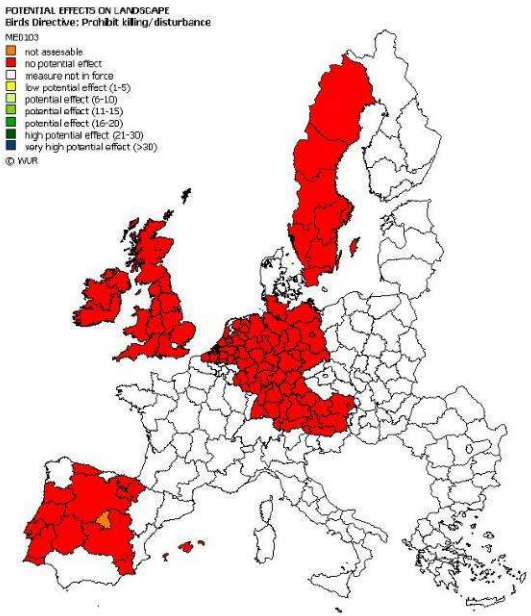
Maintain all species population



Special protection areas



Prohibiting killing/disturbing



4.4 Additional improvements and new approaches to assessing the impacts of standards land use, landscape and biodiversity in the final CCAT tool

I. Assessing changes in livestock and land use intensity
For the final CCAT tool the assessment of changes in livestock and land use intensity will be further elaborated. The main improvement of this assessment will however come from the extended CAPRI assessment which is the main input for this post model assessment. As discussed in the former, for PT1 this analysis was only relating to changes in livestock and cropping shares caused by 5 SMRs relating to the Nitrates Directive and the Animal registration Directives. For the final assessment CAPRI will provide changes caused by practically all SMRs and GAECs together as integrated under the Cross Compliance policy. This extension of the assessment builds on the CAPRI predictions in land use and livestock changes. For the final CCAT tool CAPRI assessments will take a much broader range of costs into account caused by implementation of all SMRs and GAECs for which costs can be estimated, with the exception of the animal and public health related SMRs (see also Chapter 1 and 2) but these are expected to have practically no effect anyway on cropping shares or animal numbers and composition. In comparison to Prototype 1 this means that in addition to the Nitrates and Animal registration Directives all costs related to implementation of the Sewage sludge, Plant Protection Products, Food Law and Calves, Pigs and Animal welfare Directives will be taken into account together with all costs related to GAECs. The joint costs will lead to changes in land use (cropping shares) and livestock composition and numbers.

The methodology for the final assessment will not be different from the approach already described in Section 2 of this Chapter. The only difference will be however that larger shifts in livestock numbers and cropping shares can now be expected to come from the CAPRI assessment and this will potentially lead to more conclusive results in terms of intensity changes.

II. A wider and improved expert qualitative estimation of the effectiveness of standards for biodiversity and landscape.
In the first prototype this was done for a selection of SMRs (only in old Member States)_and most GAECs. For the final CCAT tool the effectiveness will also be assessed for the Sewage Sludge and Plant protection product Directive and will also cover the new Member States.

III. Assessing the effects on habitat quality

Overall approach

This assessment will be newly introduced in the final CCAT assessment tool. It includes a post model impact assessment taking the changes in environmental impacts as predicted by the Miterra model as input. Assessments involved in this part therefore only relate to the selection of CC measures that Miterra covers in the final CCAT tool. These will include effects of changes in management caused by implementation of the Nitrates, Sewage Sludge and Groundwater Directives and changes in cropping shares and livestock numbers as predicted by CAPRI from all SMRs and GAECs for which cost shifts can be estimated and which are processed further by Miterra into environmental effects.

Specific emission changes provided by Miterra are referring to emissions of ammonia, nitrous oxide and methane, phosphorous balance (surplus), nitrogen balance (surplus), leaching and runoff of nitrates, nitrate concentration in groundwater and changes in soil organic carbon stock on top-soil. However the habitat quality indicators will only take into account those indicators regarded as the most influential in relation to changes in biodiversity caused by agriculture in Europe, i.e. emissions of ammonia, and the nitrogen surplus (leaching and runoff of nitrates) (see key studies in which the main environmental problems in EU agriculture are discussed (e.g. EEA, 1999; EEA, 2004; Jørgensen and Schelde, 2001; Boatman *et al*., 1999 etc):

The EEA (2007) report documents the achievements of the first phase (2005–2007) of the *Streamlining European 2010 Biodiversity Indicators* (SEBI 2010) project on the development of indicators to monitor progress towards, and help achieve, the European target to halt the loss of biodiversity by 2010. Among the 26 indicators proposed by the SEBI 2010 process, two of them are relevant in the context of CCAT: *Critical load exceedance for nitrogen* and *Agriculture: nitrogen balance.*

In the CCAT context, the following indicators and fields of impact will be adopted:

- NH_3 emissions, with related impact on N deposition, affecting plant species diversity of terrestrial ecosystems.
- N surplus, with related impact on N inputs to surface water, affecting aquatic ecosystems through N induced eutrophication.
- N surplus, with related impact on soil biodiversity.

The effects of nitrogen on habitat quality: an overview

Reactive nitrogen lost in the air, water and soils increases every year dominated by agricultural activities and by fossil fuel energy consumption (Galloway et al 2008).

Most studies on the effects of excessive nitrogen on biodiversity have been developed in terrestrial ecosystems, mainly considering plant species and soil biodiversity, and in aquatic ecosystems. The main effects found in the literature are discussed below.

a) Impacts on plant species

Ammonia (NH_3) is volatilized from intensive agricultural systems and it is deposited rapidly within the first few kilometres from its source, but also converted in the atmosphere to fine particle NH_4^+ aerosols that are transported over long distances before its deposition, and constitute a regional scale problem (Krupa, 2003).

N deposition has clearly increased in many natural and semi-natural ecosystems across the EU (Bobbink, 2008), often on undisturbed ecosystems naturally adapted to very low N inputs and N availability (Nordin et al., 2009) where additional N inputs can cause substantial changes in biogeochemistry and species composition (Sutton et al., 2009). N deposition causes loss of sensitive species by favouring a few nitrogen tolerant species over less tolerant ones. These effects are likely to be quite important in Natura 2000 sites, particularly in Special Protection Areas due to its proximity to agricultural sources (Bealey et al., 2009).

High variations in sensitivity to atmospheric nitrogen deposition have been identified among ecosystems. Bobbink et al. (2003) and De Vries et al. (2007) present a summary of the main effects caused by an N excess on the different ecosystems:

A. Forest habitats

- Reduction of sporocarp production and reduction of belowground species composition in Mycorrhizae
- Change in species composition, increase of nitrophilous species; increase in susceptibility to parasites (insects, fungi, and virus) in Ground vegetation.
- Increase of algae and decrease of lichens.

B. Grasslands and tall forb habitats

- Increase of mineralization, nitrification and N leaching, increase of tall grasses, decrease of diversity in Sub-atlantic semi-dry calcareous grassland.
- Increase in nitrophilous graminoids, decline of typical species in Non-mediterranean dry acid and neutral closed grassland.
- Decrease in lichens, increase in biomass and increase of succession in Inland dune grasslands.
- Increase of tall grasses and decrease of diversity in Low and medium altitude hay meadows
- Increase in nitrophilous graminoids and changes in diversity in Mountain hay meadows, Moist and wet oligotrophic grasslands and Alpine and subalpine grasslands.
- Effects on bryophytes and lichens in Moss and lichen dominated mountain summits.

C. Heathland habitats

- Decrease of heather dominance, transition heather to grass, decline in lichens and mosses in Northern wet heaths.
- Transition heather to grass, and decline in lichens in Dry heaths
- Decline in lichens, mosses and evergreen shrubs in Arctic, alpine and subalpine scrub habitats

D. Coastal habitat

- Increase of biomass, increase of N leaching in Shifting coastal dunes

- Increase in tall grasses, decrease of prostrate plants and increase of N leaching in Coastal stable dune grasslands.
- Increase in plant production, increased N leaching, and accelerated succession in Coastal dune heaths
- Increase in biomass and tall graminoids in Moist to wet dune slacks

E. Mire, bog and fen habitats

- Change in species composition and N saturation of Spagnum in Raised and blanket bogs.
- Increase of sedges and vascular plant, and negative effects on peat mosses in Poor fens
- Increase in tall graminoids, decrease of diversity, and decrease of characteristic mosses in Rich fens.
- Increase in vascular plants, decrease of bryophytes in Mountain rich fens.

Although important knowledge gaps persist, some studies have highlighted that N deposition also affects the fauna composition. For butterfly species in north Europe, a negative effect has been detected of increased soil nitrogen levels, resulting from active fertilization of pastures and/or atmospheric N deposition (Ockinger et al 2006). Elevated ammonium deposition in the Netherlands is credited with leading to a decreased nesting success in the Great tit (*Parus major*), due to egg shell thinning (Graveland et al 1994) induced by soil acidification. On the other hand, the higher nutrient value in vegetation favoured by increased N availability makes vegetation more attractive to herbivores (Adams 2003), as shown by some studies such as Throop & Lerdau (2004) on insect herbivores.

In order to assess the relationship between N deposition and biodiversity one may use a state indicator in terms of the number of species since elevated N deposition leads to loss of species richness in a wide range of habitats (Jones et al., 2004; Stevens et al., 2004), because nitrophilic species will be favoured while other species may be displaced. However, one has to be aware of different responses to a N increase found among biotic species. On extremely nutrient-poor soils species richness may increase as a result of N enrichment, because of invasion by exotic species (Bobbink et al., 1998). Therefore the simplest approach is to adopt *N deposition* as a pressure indicator, making use of the generally correct interpretation that plant species diversity decreases with an increase in N deposition, although the effect on plant species changes is variable depending on the species/ecosystem/region considered.

A more elaborated approach to evaluate the effects of N deposition on biodiversity is that based on the *Critical load exceedance* indicator, used in the context of SEBI project also as a pressure indicator. A critical load is defined as a quantitative estimate of an exposure to one or more pollutants (in this case nitrogen) above which significant harmful effects on specified sensitive elements of the environment occur according to present knowledge (EEA., 2007). To describe the sensitivity of the different ecosystems, N Critical loads are empirically established for different habitat types in Europe (according to the EUNIS classification; see http://eunis.eea.europa.eu/habitats-code-browser.jsp), but not for all of them (Bobbink et al., 2003). In this sense, additional research or data collection is still required for ecosystems such as steppe grasslands, Mediterranean vegetation types, wet-swamp forests, different types of mire and fens, several coastal habitats and high altitude

systems (de Vries et al., 2007). Trying to overcome this shortage, Critical loads and Critical loads exceedance have been produced on the basis of expert estimates and dynamic models as to cover the entire EU, although reliability of these estimates is lower than that of empirically sounded values (CCE., 2007). Moreover, the causal relationship between the level of exceedance over Critical loads and the consequent change in number of species is not satisfactorily quantified up to now. Bobbink (2008) found hardly any or no data available to clarify this relationship for most EUNIS habitat classes.

Therefore, as to CCAT, the indicator *N Critical load exceedance* could be used in the best case as a pressure indicator on biodiversity, including a qualitative assessment in terms of establishing the critical load as a threshold above which "the higher the exceedance the worse the effect on biodiversity". The simplest approach would be to adopt the *N deposition* indicator as a pressure indicator, as described above.

b) Aquatic ecosystems

The enrichment in nitrogen in water systems impairs the water quality of rivers, lakes, aquifers and coastal and marine waters, and contributes to the phenomenon of eutrophication of surface water (Durand et al., in prep; Grizetti et al., in prep). Eutrophication causes many negative effects on the aquatic ecosystem, including impacts on biodiversity (for extensive review see Carpenter et al. 1998; Smith, 2003; Smith and Schindler, 2009). Among others, impacts are related to:

- Increased biomass of phytoplankton, and macrophyte vegetation
- Shifts to bloom-forming algal species that might be toxic or inedible
- Increased biomass of benthic and epiphytic algae
- Changes in species composition and macrophyte vegetation
- Decline in coral reef health and loss of coral reef communities
- Increased incidence of fish kills
- Reduction in species diversity
- Reduction in harvestable fish and shellfish biomass

Eutrophication is the result of nutrient enrichment in the aquatic system, but the severity of the phenomenon largely depends on the specific regional characteristics, climate, morphology, water residence time, nutrients ratio, tropic web status, and generally on the ecosystem resilience. Therefore, similar nutrient loads may produce different effects in reason of the regional sensitivities. Similarly, the impacts are related not only to nitrogen loads, but rather to its specific synergies with the availability of other elements, such as carbon, phosphorus and silica, which may act as limiting elements of the potential rate of primary production (Howarth, 1988; Billen and Garnier, 2007). Nevertheless, nitrogen (and phosphorous) concentrations in surface waters, being a major driving force of the problems, can be used as proxy to evaluate the risk for water eutrophication (Phillips et al., 2008).

Two approaches are considered here to establish a critical level of nitrogen to use in the CCAT context:

1. Camargo and Alonso (2006) performed an extensive study on the ecological and toxicological effects of inorganic nitrogen pollution in aquatic ecosystems. According to these authors, total nitrogen levels lower than 0.5-1.0 mg/L might prevent aquatic ecosystems from developing eutrophication and acidification.

2. Grizetti et al (in press) proposed a three-level categorization of potential risk of eutrophication from N contribution: Low (< 0.5mg/L), Medium (0.5-1.5mg/L) and High (>1.5mg/L). Most European area is classified as *High level of nitrogen* according to these authors.

An important limitation of both approaches is that the proposed limits do not apply for ecosystems naturally rich in nitrogen or clearly limited by phosphorus availability. Limited P availability in lakes is mainly found in northern latitude areas, low population density areas, or mountainous regions, while in Western and Central Europe most lakes are relatively rich in phosphorus, and an intermediate level is found in most lakes of Baltic States, Poland and Spain (EEA 1999). As to CCAT, *N surplus* will be used as a pressure indicator for biodiversity in aquatic ecosystems, but leaving the interpretation of detected changes in terms of effects on biodiversity on the side of the user A more detailed approach is to adopt the threshold categories for N surface water by Grizetti et al (in press) and use MITERRA output on N concentrations in runoff to be compared with those.

c) Soil biodiversity

Soil organisms play a key role in soil fertility, sustaining key ecosystem services for society (Wall, 2004). Bacteria and fungi are the primary decomposers of dead organic matter such as plant residues and manure, and they release mineral nutrients (mineralization) which are essential for plant growth. Microbes are consumed by microbivores such as protozoa, nematodes and mites. Microbivores, in turn, are eaten by bigger predatory soil fauna. Consumption by soil fauna, including earthworms, stimulates microbial activity. All these links in the soil food web contribute to mineralization and nutrient cycling. Changes in bacteria and fungi will also affect the soil fauna via the bacterial and fungal channels in the soil food web (for a review, see BioScience 2000). Evidently, aboveground biota is intimately linked to belowground pool of species and their activity (Wardle et al 2004).

Nitrogen input affects the biodiversity of soil organisms in both agricultural and natural soils. Soil microorganisms, especially fungi, saprotrophic decomposers as well as mycorrhizal fungi, and N fixing bacteria are reduced by N fertilization and high N availability (Johansson et al., 2004; De Vries et al., 2006). While soil microorganisms directly react to the availability of mineral N, soil macroorganisms such as protozoa, nematodes, enchytraeids, collembolas, insect larva or earthworms mostly react indirectly to such enrichment (Bardgett 2005). Thus, soil organisms play an important role in the supply as well as the retention of mineral nutrients, and are effected by fertilization. Effects of fertilization are due to organic carbon which is the main food for microbes, and by N availability. A lower C/N ratio and easily decomposable organic matter favour bacteria whereas a higher C/N ratio and more recalcitrant compounds favour fungi (Bardgett et al., 1999). Consequently, a reduction in chemical fertilizer use makes an agriculture soil more dependent on natural biological processes such as mineralization, N fixation and, thus, on soil

organisms. Organic fertilization with animal manure, compost and/or green manure feeds the decomposer food web which releases nutrients by mineralization. Instead of chemical fertilizers, crop rotation with legumes such as clover can be utilized where atmospheric N is fixed by Rhizobium bacteria living in symbiosis with the plant in root nodules. At lower levels of available mineral nutrients mycorrhizal fungi form a symbiosis with plant roots (cf. Velthof et al. in prep.).

Unfortunately no precise linkages have been established between N input on soil and consequent changes in the number or composition of soil species. Therefore, as to CCAT, the potential impact of N in soil biodiversity will be assessed by pressure indicators, such as *N fertilizer input* or *N surplus*. Interpretation of the ultimate effects that the changes in these indicators could have on biodiversity will be on the side of the user, dependant on the characteristics of each location.

CCAT Approach

Impacts produced by Cross Compliance implementation on plant species diversity, on aquatic ecosystems, and on soil biodiversity will be assessed in the CCAT project according to the methods described below.

a) Impacts on plant species diversity

Three different approaches, all of them based on pressure indicators, are defined below. Each approach is based on the assessment of the percentage change in an N indicator compared to the baseline year 2005 assessed by MITERRA in response to a set of CC measures for each NUTS2 region:

1. The simplest approach is a qualitative assessment by using the percentage change in the NH_3 emission.
2. A more elaborated approach is to assess changes in the total N deposition (with baseline data for the year 2005 being based on EMEP). This is done by:
   - Keeping the total NOx deposition constant
   - Changing the total NHx deposition by the percentage change in NH_3 emission assessed by MITERRA

   This approach assumes that a change in NHx emission is reflected by the same change in NHx deposition within a NUTS2 region. It will become more reliable when the NUTS2 region is larger.

The indicators obtained with both approaches 1 and 2 can be weighted by the Natura 2000 regional share (percentage over the total regional area), or differentiating between SCIs area, usually constituted by semi-natural ecosystems, and SPAs area, where agricultural land uses are more relevant.

3. The most elaborated approach is to assess changes in the area exceeding critical N loads by:
   - Assessing changes in total N deposition as described in approach 2
   - Comparing present N loads with critical N loads for the baseline year 2005 situation after including measures.

This approach is based on the same assumption as given under approach 2.

To obtain the NUTS2 regional indicator value, the area exceeding critical N load could be calculated considering all the ecosystems present in the region, or only those present in the Natura 2000 sites in the region or, as proposed for approaches 1 and 2, differentiating between SCIs and SPAs.

Approach 3 including the use of critical N loads provides the CCAT end user with a qualitative assessment based on the N sensitivity of the different ecosystems, in comparison to approaches 1 and 2, where the interpretation of changes in the indicator values relies totally on the end user side.

b) Impacts on aquatic organisms

Two different approaches based on pressure indicators on aquatic biodiversity, are defined below. Both approaches are based on the calculated percentage change in an N indicator compared to the baseline year 2005 in response to a set of measures for each NUTS2 region, on the basis of MITERRA calculations. The differences are related to the indicator used.

1. The simplest approach is to use the percentage change in the *N surplus.* This approach assumes that a change in N surplus is related to a comparable change in N concentration in surface water.

   The precise interpretation of the ultimate effects that the changes in this indicator could have on biodiversity will be on the side of the user, dependant on the characteristics of each location.

2. A more elaborated approach is to assess changes in the area exceeding critical N concentrations in surface water by assessing the *N concentration in total runoff* (both surface runoff and interflow) to surface water and comparing it to critical limits. *N concentration in total runoff* is calculated by adding the N flux by both surface runoff and interflow and dividing it by the sum of the related water fluxes. This approach assumes that the N concentration in runoff to surface water is comparable to the N concentration in surface water.

   To establish the critical levels to use in CCAT, two different categorizations in the basis of the available literature could be used (see Table 4.8):

Table 4.8. Nitrogen levels

Source	Low	Medium	High
Camargo and Alonso (2006)	<0.5 mg/L	0.5-1 mg/L	>1mg/L
Grizetti et al (in press)	<0.5 mg/L	0.5-1.5 mg/L	>1.5mg/L

Thresholds by Grizetti et al (in press) seem more appropriate for its use within CCAT, given that most European area classified as High level of nitrogen. The precise interpretation of the ultimate effects that the changes in this indicator could have on biodiversity will be on the side of the user, dependant on the characteristics of each location, particularly in regard to the phosphorous availability in aquatic ecosystems.

c) Impacts on soil biodiversity

Two different approaches based on pressure indicators on soil biodiversity are defined below. Both approaches are based on the calculated percentage change in an N indicator compared to the baseline year 2005 in response to a set of measures for each NUTS2 region, on the basis of MITERRA calculations. The differences are related to the indicator used:

1. Percentage change in N fertilizer input.
2. Percentage change in N surplus.

The second option includes information on nitrogen removed from the system, thus it would be the most advisable.

5 Assessing effects of CC on animal welfare and public health

5.1 Introduction

The field of animal welfare and public health is characterised by its lack of reliable data. The available types of information are in most cases very vague and after scrutiny examination it was concluded that they cannot be used as indicators for a direct assessment of the effects of CC. Therefore the decision has been made to conduct a field study in Austria to survey the relevant indicators on-farm. Additional to the assessment of farm indicators, the field study provides important insights into the farmer's perspective of implementation of specific SMRs in the field of animal welfare and public health and his motivations to comply (or not) with its obligations.

5.2 Case study assessments and interviews

In order to get access to more specific indicator data in the sensitive fields of animal welfare and public health a field study has been conducted in Austria. The field study was based on the following information collection approaches:

- **Interviews:** For the case study assessments the choice of the adequate interview type plays an important role. For this case study targeted and standardised interviews have been executed. These interviews were based on taylor-made questionnaires which referred to the different points of view and the specific knowledge of the interviewed persons
- **Direct observations (Animal Needs Index, degree of compliance):** The investigator made a site visit to gather data. The observations could be formal or casual activities, but the reliability of the observation was the main concern. Using at least two observers was one way to guard against this problem. Therefore most of the assessments have been executed by one research assistant and one student assistant from the University of Bonn and an additional veterinarian from the AREC Raumberg-Gumpenstein (Mag. Ewald Schröck).

To allow an assessment of a broad spectrum of different farms, the following farm types and numbers have been involved in the case study:

- **37 organic pig and/or cattle farms:** In these farms the Animal Needs Index was already been assessed by members of the AREC Raumberg-Gumpenstein in the year 2001. The contact details as well as the assessment results of the farms were provided to the CCAT group for further use by the Department of Animal Husbandry of. AREC Raumberg-Gumpenstein.

- **19 certified conventional pig and/or cattle farms:** The selected farms have been certified with the "Schirnhofer" quality scheme. This standard already covers the obligations of the Austrian "AMA-Gütesiegel" standard and nearly all CC obligations. All cattle farms that get certified by "Schirnhofer" are assessed by the Animal Needs Index (ANI). The contact details of the farms have been provided by the Styrian chamber of agriculture and the "Schirnhofer GmbH". Relevant ANIs have been provided by the "Schirnhofer GmbH"
- **1 non-certified conventional pig farm:** The farm is located in Styria. Its contact details were provided by the Department of Animal Husbandry of the AREC Raumberg-Gumpenstein.
- **8 non-certified conventional cattle farms:** The farms are located in Styria, Tyrol and Lower Austria. Their contact details were alsoprovided by the Styrian chamber of agriculture and the AREC Raumberg-Gumpenstein.

The farms that have been involved in the case study are distributed over Austria. Most of them are located in Styria because of the sphere of influence of the cooperation partners that provided the contact details for the assessments. The following table 5.2.1 describes the distribution of the farms that have been selected for the field study.

Table 5.2.1: Localisation of involved farms and cooperation partners

Federal state	Number of farms to be involved	Contact details provided by
Styria	34	AREC Raumberg-Gumpenstein; Agricultural Chamber of Styria; Schirnhofer Gmbh
Lower Austria	12	AREC Raumberg-Gumpenstein
Salzburg	9	AREC Raumberg-Gumpenstein
Upper Austria	4	AREC Raumberg-Gumpenstein
Tyrol	4	AREC Raumberg-Gumpenstein
Carinthia	2	AREC Raumberg-Gumpenstein

The selection of farms provided the basis of the development of interview and assessment documents, which include the relevant farm survey indicators. For the farm assessments and interviews the following documents have been used:

- **Checklists for CC animal welfare obligations in pig and cattle farming:** The checklists (given in Annex 1.2) match with self evaluation checklists for pig and cattle farms that are used for official CC controls in Austria and serve as a preparation for the farmers. They contain all CC-relevant animal welfare obligations for Austria and have been applied to assess the farmer's level of compliance. The checklists contain already reduction rates that assign to every single checkpoint of the checklist an official direct payment reduction rate. The direct payment reduction rates can be used as an indicator for the severity of the respective breaches in the area of farm animal welfare.
- **Checklists for CC obligations in the field of food and feed safety:** The checklists (given in Annex 1.3 of this report) have been used to assess the

level of compliance with the food and feed safety obligations of the CC system in Austria.

- **Checklists for CC obligations in the field of animal identification and registration:** The checklists (given in Annex 1.1) have been used to assess the level of compliance with the animal identification and registration obligations for pig and cattle farms.
- **Animal Needs Index assessment forms:** The assessment forms (given in Annex 1.4 of the report) have been used for the integrated on-farm assessments of the Animal Needs Index for pigs, cattle and calves.
- **Farm questionnaire:** The questionnaire given in Annex 1.7 has been used to assess the remaining types of information described in Annex 1.5 of this report.

5.3 Assessing effects of CC on animal welfare

5.3.1 Selected indicators for prototype 2

The assessment of CC effects on animal welfare can be based on the Degree of Compliance (DOC) results of the on-farm surveys in Austria. Together with the ANI framework, that covers most of the relevant farm and animal-referenced CC obligations with its indicators (given in Annex 1.4 and 1.5 of this report), and the national or regional shares of certified conventional or organic farms it enables an estimation of the regional or national standard of animal welfare. The indicators to be implemented in prototype 2 of the CCAT assessment tool are described in more detail in the following:

- **Degree of compliance (DOC):** As already mentioned, the DOC has been assessed with the help of farm checklists that cover all CC obligations the farmer has to comply with. For the animal welfare part the checklists given in Annex 1.2 of this report have been used to survey the DOC. Within the scope of the CC impact assessment the DOC serves as a data basis for the detection of compliant and non-compliant farms as well as the level of their compliance. By linking it to the ANI farm results it enables even an animal welfare estimation of non-compliant farms (depending on their level of compliance).
- **Certification grade of farms:** Like the DOC the certification grade of farms is used as a scenario indicator. It can be divided into the following specific types of information:
  - Regional/national numbers of participant farms in conventional certification schemes for pigs
  - Regional/national numbers of participant farms in conventional certification schemes for cattle
  - Regional/national numbers of participant farms in conventional certification schemes for pigs
  - Regional/national numbers of organic farms

- **ANI 35L for adult cattle, calves and feeding pigs:** The ANI 35L can be distinguished into three different rating schemes. One ANI for the assessment of adult cattle farms, one for the assessment of feeding pig farms and a more specific one to assess the animal welfare conditions of calves. All ANIs use a graded point system with which five main aspects ('areas of influence', 'categories') of the housing system are assessed. These main aspects can be divided into multiple sub-categories that enable an integrated assessment of nearly all CC obligations in the fields of farm animal welfare. The ANI is not designed to set up minimum standards in the area of farm animal welfare but it presupposes them. If those minimum requirements are not met by the housing system under assessment, then the calculated ANI-score is only valid if the deficiencies are removed within a reasonable period of time. A provisional ANI-score is awarded in the interim. The interim ANI is used to assess the animal welfare standard of non-compliant farms.

The following table 5.3.1.1 gives an overview of the legal acts in the field of farm animal welfare covered by the indicators in final CCAT tool:

Table 5.3.1.1: Coverage of animal welfare obligations by indicators in prototype 2

No.	Legal act	Reference area	Coverage of obligations by indicators in PT2		
			Scenario indicator: DOC	ANI 35L	Certification grade
12	Regulation (EC) No. 999/2001	Prevention of BSE	X		
13	Directive No. 85/511/EEC	Prevention of food and mouth disease	X		
14	Directive No. 92/119/EEC	Prevention of vesicular pig disease	X		
15	Directive No. 2000/75/EC	Prevention of blue tongue disease	X		
16	Directive No. 91/629/EEC	Protection of calves	X	X	X
17	Directive No. 91/630/EEC	Protection of pigs	X	X	X
18	Directive No. 98/58/EC	Protection of farm animals	X	X	X

Legend: X: Indicator covers all obligations of the legal act

5.3.2 Procedure

Principally the farms that have been assessed in Austria can be divided into two groups: farms that comply with the CC obligations, and those who do not. For the shares of farms that do fulfil all CC obligations, potential minimum Animal Needs Indexes will be calculated depending on their level of certification and the production conditions the farmer has to comply with. Whereas organic farmers e.g. have to adhere to special farm requirements regarding the housing system, conventional non-certified farmers only have to comply with the national regulations that in most cases imply all CC obligations. If we assume that all minimum requirements of those standards are observed we can calculate minimum Animal Needs Indexes based on

the specific production obligations of the respective farm certification scheme or in case of non-certified farms on the national CC obligation interpretations.

Depending on the certification level it would lead to a different Minimum ANI's for conventional, conventional farms with quality assurance systems (e.g. "Schirnhofer" in Austria or "QS" in Germany) and organic farms. According to the on-farm assessed "degree of compliance" (DOC) and the certification grade we can distinguish the minimum ANI for the following farm types:

- **Compliant organic farms (DOC = 100%):** Additional to the legal requirements the farmer has to fulfil the obligations of the respective organic certification scheme or standard.
- **Compliant conventional farms with quality assurance scheme (DOC = 100%):** Additional to the legal restraints the farmer has to comply with the obligations of the respective quality assurance scheme.
- **Compliant conventional non-certified farms (DOC = 100%):** The farmer only has to comply with the national / European regulations**.** In this case the ANI will be calculated on the basis of the observed CC obligation specifications.
- **Non-compliant farms (DOC < 100%):** Farms with different certification grades which do not comply with one or several CC obligations. In this case the ANI will be calculated on the basis of full compliance with all national and European regulations. In a second step the detected infringements will be transferred into potential ANI points that can be deducted from the basic ANI in the case of full compliance with obligations.

Because the ANI is an animal specific indicator (assessed for adult cattle, calves and feeding pigs) and the assessment of different cattle housing systems leads to significant differences in its results, the shares of compliant and non-compliant farm types will be distinguished into the following sub-categories:

- Cattle farms:
  - Calves: Cattle under the age of 6 months
  - Adult cattle (cattle with the minimum age of 6 months):
    - Tie-stalls
    - Loose housing
- Pig farms (pig fattening)

The potential ANI results that are calculated on the basis of compliance with minimum standards will be adjusted with the arithmetic average of the Austrian on-farm assessment results (available for the years 2001 and 2009 for organic farms). Considering the specific national interpretations of CC obligations, regional shares of organic livestock farming as well as shares of quality assurance systems in conventional livestock farming (over the last years). This procedure will enable a time-referenced and spatial estimation of minimum ANIs on NUTS 0 to NUTS 1 level.

The DOC that has been assessed by the Austrian case study will be used as baseline for the following evaluations. It will be linked with the arithmetic average of the on-farm ANI results. According to the DOC scenarios implemented in CCAT (DOC: 0%, (25%), 50%, 75%, 100%) the calculated minimum ANIs for the other regions will be adjusted.

The general procedure to assess the effects of CC in the field of animal welfare is illustrated in Annex 1.6.

Regarding this approach to assess the effects on CC on farm animal welfare there is urgent need to implement additional DOC data of other EU member states. The involvement of additional data would offer much more differentiated assessment possibilities for the respective member states and regions we focus on. If there is no supplemental DOC data of other member states available we should consider to conduct additional case studies in the field of animal welfare.

5.4 Assessing effects of CC on public health

5.4.1 Selected indicators for prototype 2

Whereas the assessment of CC effects on farm animal welfare can be based on the ANI indicator framework that covers most of the relevant farm and animal-referenced indicators, the CC impact assessment in the field of public health depends on the linkage between the DOC scenario indicator, that is used as an baseline, and the EFSA (European Food Safety Authority) indicators. A more detailed overview of the indicators to be implemented is given in Annex 1.5 of this report. For the area of public health the indicators can be described in the following:

- **DOC scenario indicator:** As the DOC in the field of animal welfare it provides the on-farm level of compliance with all public health obligations that can be used as data basis for the following impact assessment of CC. For the public health part the checklists given in Annex 1.3 of this report have been used to survey the DOC. In order to assess the level of compliance with animal identification and registration obligations the checklists of Annex 1.1 have been applied.
- **EFSA zoonosis indicators:** Zoonoses are infections and diseases that are transmissible from animals to humans. The infection can be acquired directly from animals, or through the ingestion of contaminated foodstuffs. The severity of these diseases in humans can vary from mild symptoms to life-threatening conditions. In order to prevent zoonoses from occurring, it is important to identify which animals and foodstuffs are the main sources of infections. For this purpose and to follow the developments on food safety in the European Union, information aimed at protecting human health is collected and analysed from all European Union Member States. (EFSA, 2009).
  The respective EU member states submitted data on animals, food, feed and food-borne outbreaks using a web-based zoonoses reporting system that is maintained by EFSA. All member states submitted national zoonoses reports for the year 2007 (in addition, reports were submitted by two non-member

states: Switzerland and Norway). For Bulgaria and Romania 2007 was the first year as reporting member states.

The EFSA indicators to be implemented in Prototype 2 can be divided into salmonella and campylobacter monitoring indicators for fresh meat as well as salmonella monitoring indicators for animals and feeding stuffs. Thus the national monitoring results prove that salmonella and campylobacter are the main source of zoonosis cases in the European Union the EFSA indicators will be used to assess the effects of CC on the standard of public health (EFSA, 2009). As "impact indicators" according to the EEA DPSIR indicator framework (SMEETS & WETERINGS, 1999) they will be linked to the DOC scenario indicator.

The following table 5.4.1 gives a more detailed description of the EFSA indicators to be implemented in final CCAT tool:

Table 5.4.1.1: Overview of EFSA indicators to be implemented in prototype 2

Indicator framework	Indicator	Indicator sub-category	Spatial level	Time availability	Coverage of MS	Dimension of indicators
EFSA zoonosis indicators	Salmonella in fresh meat	Salmonella in fresh pig meat	NUTS0	2000-2007	EU15-25	% of positive samples
		Salmonella in fresh bovine meat	NUTS0	2001-2007	EU15-25	% of positive samples
	Salmonella in animals	Salmonella in pigs Salmonella in cattle	NUTS0	2003-2007	EU15-25	% of positive samples
	Salmonella in feeding stuffs	Salmonella in feeding stuffs for pigs Salmonella in feeding stuffs for cattle	NUTS0	2001-2007	EU15-25	% of positive samples
	Campylobacter in fresh meat	Campylobacter in fresh pig meat Campylobacter in fresh bovine meat	NUTS0	2002-2007	EU15-25	% of positive samples

The following table 5.4.1.2 gives an overview of the legal acts in the field of public health (PH) as well as the area of animal registration and identification (ARI) covered by the indicators in prototype 2 of the tool:

Table 5.4.1.2: Coverage of PH and ARI obligations by indicators in final CCAT tool

No.	Legal act	Reference area	Coverage of obligations by indicators in PT2		
			Scenario indicator: DOC	EFSA	Certification grade

6	Directive No. 92/102/EEC	Identification & registration of animals	X		X
7	Regulation (EC) No. 2629/97	Identification & registration of cattle	X		X
8	Regulation (EC) No. 1760/2000	Identification & registration of cattle & labelling of beef	X		X
9	Directive No. 91/414/EEC	Usage of pesticides	X		X
10	Directive No. 96/22/EC	Usage of agents with hormonal impacts	X		X
11	Regulation (EC) No. 178/2002	Principles of food law	X	X	X
19	Regulation (EC) No. 852/2004	Food hygiene	X	X	X

Legend: X: Indicator covers all obligations of the legal act; *: The usage of pesticides and agents with hormonal impacts is strictly forbidden.

5.4.2 Procedure

To assess the effects of CC on public health the DOC scenario indicator that has been surveyed in the Austrian field study will be linked with the EFSA indicators described in table 5.4.1.1. Due to fact that the field study work has been finished in March 2009 and the analysis of the data could not be finalised yet, the concrete design of the functional connection of the indicators will be specified within a short term.

As already mentioned for the animal welfare part, there is urgent need to implement additional DOC data of other EU member states. The involvement of additional data would offer much more differentiated assessment possibilities for the respective member states and regions we focus on. If there is no supplemental DOC data of other member states available we should consider to conduct additional case studies in the field of public health.

6 PT1 evaluation by end-users and user requirements for final CCAT integrated assessment tool

6.1 Introduction

As the project has a strong policy focus, it is essential to involve policy makers and other stakeholders that will become the main users of the project results. Three end-users meetings have therefore been planned during the 3 year project period. The first was held in May 2007, the second was held on the 16th of April and the last one is planned in December of this year. The outcome of the second meeting is discussed here. At this meeting the results of the CCAT assessments until now were presented and the first prototype of the CCAT integrated assessment tool was demonstrated.

The main purpose of this second end-user meeting was to:

1) present the (intermediate) results of the project and to get feed-back on the usefulness of these results o

2) to collect what requirements the end-users still have for further improvement of the CCAT final integrated assessment.

A summary of the outcome of the end-users meeting relevant for further planning of work is reported in this chapter. The full minutes of this meeting can be found in Annex 3 of this report.

6.2 Evaluation of PT1 by end-users

The problem of getting detailed data on compliance levels was acknowledged by the end-users and it was therefore emphasised to be important that the CCAT tool leaves the possibility to end users to specify levels of compliance themselves when initialising an assessment. When discussing this issue the remark was made that the European Commission receives detailed data from the Member States on compliance rates. According to DG AGRI representatives this information could not be provided to CCAT, since it contains information that cannot not be made publicly available. Furthermore the EC leaves the decision to provide these data to the individual Member States. CCAT partners made clear too that the data collected from the Member States on compliance levels in 2005 within an DG-Agri evaluation project (conducted in 2007) was made available by the EC. This information was one of the main sources from where detailed compliance levels were estimated in this CCAT assessment.

Another issue brought up several times by the end-users is that CCAT should be careful when relating effects of SMR and GAECs completely to CC. Most of these SMRs were already in place before Cross Compliance was introduced in 2005. Cross Compliance is only an additional enforcement for SMRs. The CCAT integrated

assessment tool therefore assesses effects of the implementation of SMRs and also Good Agricultural and Environmental Condition standards (GAECs). The additional compliance with these SMRs (since 2005) is likely to be only partly (if at all) related to Cross Compliance and also influenced by other factors explaining the additional implementation with these SMRs. Moreover, even if CC induces some change in compliance, it still seems appropriate to relate the associated costs or other impacts to the standard rather than to CC (which is at best characterized as a partial enforcement mechanism) As for the GAECs the situation is slightly different as these have become introduced directly with CC, although also in relation to these obligations Good environmental conditions standards were already in place in some countries before 2005. In our project the distinction between assessing the effects of CC and the effects of a certain directive (e.g. the Nitrate Directive was already implemented in 1991) should be made. In principle it should also be acknowledged that assessing the effects of CC is practically not possible, since there is no solid basis on which the additional compliance level with SMRs caused by the implementation of CC can reliably be estimated.

End-users wondered what economic effects were exactly assessed in the economic modeling. The presented results only included the effect of cross compliance. In relation to this it was suggested that a follow-up project could also assess what other developments would neutralize the price/income effects.

Better attention should be paid to derogation levels for the Nitrate Directive per region. For the estimation of degree of cross compliance the 170 kg Nitrate/ha was taken as the level above infringements were expected. For the assessment with MITERRA derogation levels are taken into account (e.g. for NL 70% of the farmers applied for the derogation and 90% of the grassland is under derogation).

It was also discussed for whom the CCAT tool was developed and what exact results will be delivered by CCAT. The following products were aimed at to be delivered:

- A final report will be produced with (integrated) assessment results and conclusions. Afterwards the system is available but the simulated results and related conclusions are for the users own responsibility.
- The preliminary results already show the environmental effects seem to be more important then costs of implementation, e.g. balanced fertilization has a high environmental effect, while costs are rather low.
- The uniqueness of this project is the quantification and the regionalization of the assessments and not so much the impact assessment themselves.
- It was further underpinned that this is a research project, not a service contract, thus policymakers can chose later whether or not they want to use the results of CCAT.

Clarification was asked about the reference years used in our assessments. As for compliance levels CCAT always tries to assess effects of relative changes in compliance in comparison to the 2005 compliance situation. However, for new member states the reference year for CC implementation of SMRs is not 2005 but 2009. In order to make relative comparison of effects of implementation comparable over the whole EU comparison of effects between 0 compliance and higher levels are also offered by the CCAT tool.

For the modeling CAPRI uses input data based on 3 years averages, and it will take time to implement new Eurostat data. In the economic assessments 2004-2006 data are taken as input for CAPRI together with Compliance and costs data estimated for the situation in 2005 and maybe in later/new scenarios also for later years (if data become available).

End users emphasized that CCAT assessments are most interesting in relation to the GAEC obligations, since these are new, just recently introduced, and can be contributed directly to cross compliance. However, also for GAECs some pre-existing (national) legislation was already in place in some MS. Estimating the exact compliance and additional compliance level is therefore also a problem with GAECs.

6.3 Recommendations for improvements of integrated assessment tool by end-users

Data on additional compliance with SMRs and GAECs are very difficult to obtain, especially at the detailed level required in CCAT (per Nuts, per sub-obligation). The CCAT tool should therefore provide to supply initial estimates of the 2005 (baseline) compliance level, but it should be communicated very clearly that these are very rough estimates often based on very different and un-reliable sources in combination with own expert estimates. This is a main reason why assessment runs with the CCAT tool should leave enough opportunities to users to specify their own 2005 compliance levels for the whole EU or for selection of region(s) and (selection of) SMRs and GAECs at obligation and sub-obligation level.

It is advised by the end-users to indeed collect additional information on compliance levels:

1) by making an inventory on infringement cases in different SMR and GAEC obligations.
2) to also consider difference in fines on different obligations before and after 2005 (if data can be obtained).
3) By discussing compliance estimates and also assessment results of CCAT with controlling agencies

It should also be acknowledged that CCAT is NOT providing a tool with which the effects of CC are assessed, since there is no solid basis on which the additional compliance level with SMRs caused by the implementation of CC can reliably be estimated. But instead CCAT offers a tool with which effects of SMR and GAEC standards can be assessed in terms of impacts on agricultural markets, producer's income, consumer's welfare, land use, soil, water, air, climate, biodiversity and landscapes, as well as animal welfare can be assessed. So not the effects of Cross Compliance but only the effect of implementation of measures that have become conditional to payments of 1st and 2nd Pillar payments under the CAP.

Besides focussing the assessment of effects on the present implementation and compliance situation it was also recommended to make assessment of stricter

standards possible in the present CCAT tool. So room has to be given to 'alternative scenarios'.

It was recommended to not only focus the costs of the animal registration directive on the ear-tagging and loss but also on the tracing and administration costs. Furthermore the ear-tagging costs taken in the assessment were considered too high and needed further improvement.

It was advised by the end-users to make it possible to change cost estimates when initializing a new assessment with CCAT.

Overall it was therefore concluded that degree of compliance and cost of compliance are issues which are debatable, and therefore it would be good to make these parameters adjustable for users.

A training for using the CCAT system is planned at the end of the project (January 2010) and several end-users indicated they would be interested in participating. On the other hand it should by then also be made clear how access to the CCAT tool would be arranged and by whom it would be maintained and operated. It was recommended to place the CCAT tool at JRC in order to operate the system for users placed at the different EC-directorates.

Finally it was emphasized that CCAT is a research project and no "service contract". Therefore the focus should be more on the innovative scientific part than on further development of the tool.

7 Conclusions

7.1 Main improvements and requirements of final CCAT integrated assessment tool

The main improvements or additions to the final CCAT tool as compared to prototype 1 can be summed as follows:

1. All SMR and GAEC obligations will be assessed. This does not mean that for all these obligations all impact fields assessed in CCAT will also be covered, but the main impacts assessable will be covered at least, either at Nuts 2, National or case study level. The impact fields that will be assessed only at national and case study level are animal welfare and public health.
2. In prototype 1 the assessment of the environmental and economic impacts by CAPRI and MITERRA only covered effects of 5 Statutory management Requirements (SMRs) at different compliance levels. For the assessment of the impacts on landscape and biodiversity the effectiveness assessment also included GAEC standards. In the final CCAT tool CAPRI will cover practically all SMRs and GAECs for which cost estimates can be made in relation to their implementation at farm level. The MITERRA tool will assess the direct effects of changes in management because of implementation of the Nitrate, Sewage Sludge and Ground Water Directive and GAECs on soil quality and soil organic matter. Indirect assessment in Miterra will be made of all SMRs and GAECs assessed by CAPRI since Miterra takes the predicted changes in crops shares and livestock numbers as input for further assessment of environmental impacts.
3. The same applies also for the assessment of changes in land use intensity and habitat quality assessed as pressure indicators for landscape and biodiversity impacts fields. The post model assessment of these indicators takes the by CAPRI predicted changes in crop shares and livestock numbers as input. It means that for these biodiversity and landscape indicators, effects of all SMR and GAECs are assessed. In PT1 this was still limited to the Nitrate and Animal registration Directives.
4. As compared to prototype 1 the major improvements in the environmental assessment in the final CCAT tool are the inclusion of :
    - a gross metal balance for Cd, Pb, Cu Zn, Ni, Cr and Hg in MITERRA (not included yet in PT1)
    - a gross soil Carbon balance in Miterra (Not included yet in PT1)
    - an evaluation of the direct environmental effects in Miterra of changes in farm management of measures related to the

Sewage Sludge and Groundwater Directive and GEAC obligations related to soil quality. The assessment is added to the PT1 assessment of the Nitrate Directive already included.

- Assessment in Miterra of indirect effects (through shifts in cropping shares and livestock types and numbers) of all SMR and GAEC standards assessed by CAPRI on environmental indicators. In PT1 this was still limited to the Nitrate and Animal registration Directives.
- a metamodel of DNDC predicting the effects of CC measures related to the Nitrate Directive on the N balance, N leaching and N_2O emissions
- a metamodel of EPIC predicting the effects of CC measures related to the Nitrate Directive on N leaching, N runoff and erosion and of GAECs on soil erosion.

5. As compared to prototype 1 the major improvements in the assessment in the final CCAT tool of the land use, biodiversity and landscape impacts are the inclusion of :
    - A more extensive assessment of indirect effects (through shifts in cropping shares and livestock types and numbers) of all SMR and GAEC standards assessed by CAPRI on both land use and livestock intensity and habitat quality change. In PT1 this was still limited to the Nitrate and Animal registration Directives.
    - A wider and improved expert qualitative estimation of the effectiveness of standards for biodiversity and landscape. In the first prototype this was done for a selection of SMRs (only in old Member States)_and most GAECs. For the final CCAT tool the effectiveness will also be assessed for the Sewage Sludge and Plant protection product Directive and will also cover the new Member States.
    - An impact assessment on habitat quality derived from a selection of environmental indicators assessed by the Miterra model. This is a post model rating process involving the scoring of changes in environmental impacts from a biodiversity context.

6. Effects on animal welfare and public health will now be included in the final CCAT tool. They were not yet part of PT1. A detailed assessment is presented for only one case study situation (Austria) and more general assessment effects related mainly to implementation levels of SMRs relating to animal welfare and public health.
7. Finally two main improvements are foreseen in the way assessments are done by the CAPRI and Miterra models:
    - assessments will take both implementation and compliance levels into account. In PT1 it was assumed for the SMRs and GAECs were all implemented in the same way and scenario

situations determined the compliance levels for which effects were assessed. In the final tool a link is carefully established between the way every SMR and GAEC is implemented in terms of sub-obligations in every region. For that implementation level different scenario situations specified according to compliance levels are assessed.

- For the assessments in CAPRI costs for every SMR and GAEC obligation will be estimated per Nuts 2 region. This implies that differences in costs for implementation will be allowed for the same SMR or GAEC between regions.

8. Besides focussing the assessment of effects on the present implementation and compliance situation it was also recommended to make assessment of stricter standards possible in the present CCAT tool. Alternative scenarios will therefore be considered to be incorporated too.

9. Finally the end-users recommended to make it possible in the final CCAT tool that cost estimates can be changed when initializing a new assessment with CCAT. This facility will be provided. The same applies for the degree of compliance. Both factors are very difficult to get reliable estimates on while end-users often have access to very specific information on these issue for their own regions, country or specific obligation.

7.2 Main challenges

As already pointed to in the previous section, relative to the 1st version of the CCAT tool there are many issues for improvement and extension. The previous part did not discuss a lot on the software side. To create an operational tool requires further integration and linkages between the economic model (CAPRI) and the environmental-agronomic model (Miterra). Moreover, the user interface needs a lot of efforts, to develop a user friendly tool, which also will allow the user to change key parameters and run his own scenarios. Experience with CCAT prototype I showed that this can be successfully done, but also posed a number of future challenges (steps how to cope with this are discussed in Deliverable 2.7)

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Annexes

Annex 1 Animal Registration, Animal Welfare, Health, and Food Safety

1.1 Registration and identification checklists for CC obligations

1.1.1 Pig registration and identification checklist

Tierregistrierung Schweine (Animal Registration Directive 92/102/EEC & Regulations (EC) No.2629/97,1769/2000 & 21/2004)	**nicht erfüllt**	**erfüllt**
Registrierung:		
Registrierung des Betriebes beim VIS (Veterinärinformationssystem): Halter haben die Betriebsaufnahme innerhalb von 7 Tagen anzuzeigen		
Ab dem 1.1.2008 sind alle Verbringungen an die VIS zu melden		
Ohrmarken:		
Kennzeichnung durch **eine** Ohrmarke bei Verbringung zwischen landwirtschaftlichen Betrieben		
Kennzeichnung durch Tätowierstempel bei Verbringung zu Schlachthof		
Kennzeichnung mit Ohrmarke bis spätestens zum Verlassen des Betriebes		
Kennzeichnung mit Tätowierstempel spätestens 30 Tage vor Schlachtung		
Originalkennzeichnung importierter Schweine aus EU/EWG-Staaten muss erhalten bleiben.		
Originalkennzeichnung importierter Schweine aus Drittstaaten erhalten bleiben und zusätzlich eine Importmarke eingezogen werden		
Neukennzeichnung mittels Ersatzohrmarke nur bei neuerlicher Verbringung an landw. Betrieb. Bei Verbringung vom Verlustbetrieb an Schlachthof reicht Tätowierstempel, Ersatzmarke muss nicht eingezogen werden		
Verbringungen nur mit ordnungsgemäßer Kennzeichnung zulässig		
Ohrmarke und Transponder, Ohrmarke und Fesselband, Fesselband und Transponder auch gestattet als Kennzeichnung. Fesselband nur wenn Anbringung an Ohren nicht möglich (seit 1.1.08)		
Bestandsführung:		
Es ist ein aktuelles Bestandsregister zu führen		

Inhalt verpflichtend: Anzahl verbrachter Schweine, Meldeereignis, Ereignisdatum, Angaben zum Herkunfts- und Bestimmungsgebiet, Transporteur, zusätzliche Angaben bei Verbringung aus Dritt- oder EU/EWG-Staaten			
es besteht keine Formvorschrift (manuell oder elektronisch): Bestandteile können sein: Lieferscheine, Tiergesundheits- und Transportbescheinigungen, Bescheinigung für innergemeinschaftlichen Handel, Abholbestätigungen der Tierkörperbeseitigung oder Rechnungen mit ausreichenden Angaben			
Aufbewahrungsfrist: 3 Jahre ab Eintritt des Ereignisses			
Ab 1.1.08 sind alle Verbringungen an das VIS zu melden			

1.1.2 Cattle registration and identification checklist

Tierregistrierung Rinder (Animal Registration Directive 92/102/EEC & Regulations (EC) No.2629/97,1769/2000 & 21/2004)	**nicht erfüllt**	**erfüllt**
Registrierung:		
Meldung erfolgt an die zentrale Rinderdatenbank der AMA		
Jede Bestandsveränderung ist meldepflichtig (Geburt, Schlachtung etc)		
Meldung muss innerhalb von 7 Tagen in AMA-Rinderdatenbank eingegangen sein		
Ohrmarken:		
Jedes Tier ist zu kennzeichnen innerhalb der ersten 6 Monate		
Rinder, die nach 1.1.1998 geboren wurden, sind an beiden Ohren mit Ohrmarken zu kennzeichnen		
Rinder, die vor dem 1.1.1998 geboren wurden, sind mit mindestens einer Ohrmarke zu kennzeichnen		
Kennzeichnung muss innerhalb von 7 Tagen nach Geburt		
Verbringungen nur mit ordnungsgemäßer Kennzeichnung zulässig		
Tiere, die aus EU-Ländern importiert werden behalten Lebensnummer		
Tiere aus Drittländern unter Aufsicht des Amtstierarztes mit speziellen Ohrmarken gekennzeichnet		
Es gilt das Lebensnummernprinzip. Bei Ohrmarkenverlust ist Nummer direkt nachzubestellen. Die Ohrmarke wird nachproduziert und Tierhalter per Post zugeschickt		
Bestandsführung:		
Bestandsverzeichnis über alle gehaltenen Tiere		
Inhalt Bestandsverzeichnis: Ohrmarkennummer, Ohrmarkenersatz (seit 1.1.08), Anbringung elektronischer Kennzeichen und Fesselbänder, Geburtsdatum, Geschlecht, Rasse, Zu- und Abgangsdatum, Schlacht- und Verwendungsdatum, Vor-/Nachbesitzer, Almaufenthalt, Kontrollvermerke		
Bestandsverzeichnis ist nach AMA Muster bzw. elektronisch zu führen		

1.2 Checklists for CC obligations in the area of animal welfare

1.2.2 Checklist for animal welfare obligations in pig farming

Ergebnisse Auflageneinhaltung (CC) Schwein

Datum der Beurteilung: _____

Betriebsinhaber/Betriebsnummer:

_____

Verwendete Skala: [1: Auflagen gerade noch eingehalten; 2: Gute Auflageneinhaltung; 3: Sehr gute Auflageneinhaltung]

	Sauen		Eber		Ferkel		Jungsauen		Mast		Anm.	Kürz.
	Ja	Nein	Ja	Nein	Ja	Nein	Ja	Nein	Ja	Nein		
A ALLGEMEINE HALTUNGSVORSCHRIFTEN FÜR ALLE SCHWEINE												
1												3
2												3
3												1
4												3
5												3
6												1
B BODENBESCHAFFENHEIT – GRUNDLEGENDE ANFORDERUNGEN												
1												3
2												3
3												3
4												3

C BODENBESCHAFFENHEIT – BESONDERE ANFORDERUNGEN															Anm.	Kürz.
	Sauen		Eber		Saug-ferkel		Absetz-ferkel		Jung-sauen		Zucht-läufer		Mast			
	J	N	J	N	J	N	J	N	J	N	J	N	J	N		
1	**20**		**20**		**10**		**13**		**20**		**18**		**18**		ÜF -/13/20	3
	80		**80**		**50**		**50**		**80**		**80**		**80**			
2															ÜF -/13	
3																
4															ÜF -/13/20	

D BEWEGUNGSFREIHEIT	Sauen		Eber		Ferkel		Jungsauen		Mast		Anm.	Kürz.
	Ja	Nein	Ja	Nein	Ja	Nein	Ja	Nein	Ja	Nein		
1												3
E STALLKLIMA												
1												3
2												3
3												3
4												3
F LICHT												
1											ÜF 20	
2												1
G LÄRM												
1												1
2												1
H BESCHÄFTIGUNGSMATERIAL												

1															ÜF -/13	3

I ERNÄHRUNG

	Sauen		Eber		Saug-ferkel		Absetz-ferkel		Jung-sauen		Zucht-läufer		Mast		Anm.	Kürz.
	J	N	J	N	J	N	J	N	J	N	J	N	J	N		
1																3
2																1
3																3
4																3
5																3
6																3
7																
8																
9	**40**		**40**						**40**							
	Absetzferkel, Mastschweine und Zuchtläufer															
	-15 kg		-30 kg		-40 kg		-50 kg		-60 kg		-85 kg		-110 kg			
	12		**18**		**21**		**24**		**27**		**30**		**33**			

J BETREUUNG

	Sauen		Eber		Ferkel		Jungsauen		Mast		Anm.	Kürz.
	Ja	Nein	Ja	Nein	Ja	Nein	Ja	Nein	Ja	Nein		
1											ÜF 08	1
2												3
3												3
4												3
5												1
6												1
7											ÜF -/13	1
8												3

K EINGRIFFE

1												3
2												3
3												3
4												3
5												3
6												3
7												3
8												3
9												5

L GRUPPENHALTUNG

	Sauen				Jungsauen			Anm.	Kürz.
	Ja	Nein			Ja	Nein			
1								ÜF -/13	3
2	**2,50**				**1,85**				
	2,25				**1,65**				
	2,05				**1,50**				
3	**1,30**				**0,95**			ÜF -/13	
4								ÜF -/13	

M EINZELSTANDHALTUNG

1	**65**				**60**			ÜF 13/20	(5)
	190				**170**				

N	**HALTUNG IN ABFERKELBUCHTEN**								
	Sauen und Jungsauen							Anm.	Kürz.
	Saugferkel bis 10 kg				Saugferkel über 10 kg				
	Ja		Nein		Ja		Nein		
1									3
2									1
3	**4**				**5**			ÜF 13/20	
4								ÜF 13/20	
5									3
6									3
O	**ERNÄHRUNG**								
	Sauen				Jungsauen			Anm.	Kürz.
	Ja		Nein		Ja		Nein		
1									3
P	**BETREUUNG**								
1									3
2									1
3									1
Q	**LIEGENEST**								
					Saugferkel			Anm.	Kürz.
					Ja	Nein			
1									1
2									3
R	**ABSETZZEITPUNKT**								
1									1
2									1
S	**FERKELKÄFIGE**								
	Absetzferkel			Mast		Zuchtläufer		Anm.	Kürz.
	Ja		Nein	Ja	Nein	Ja	Nein		
1									
T	**PLATZBEDARF BEI GRUPPENHALTUNG**								
1									3
2	Absetzferkel, Mastschweine und Zuchtläufer								
	bis 20		**bis 30**	**bis 50**	**bis 85**	**bis 110**	**über 110**		
	0,20		**0,30**	**0,40**	**0,55**	**0,70**	**1,00**		
	J	N	J N	J N	J N	J N	J N		
U	**ZUSAMMENSTELLUNG VON GRUPPEN**								
1									1
2									1
3									3
V	**DOKUMENTATION**								
1									1
W	**EBERHALTUNG**								
				Eber				Anm.	Kürz.
				Ja	Nein				
1									
2									1
3									

Legende: **ÜF 08:** ÜF bis 01.01.2008; **ÜF 13:** ÜF bis 01.01.2013: **ÜF 20:** ÜF bis 01.01.2020; **ÜF -/13:** Je nach betriebsindividueller Situation keine ÜF oder ÜF bis 01.01.2013; **ÜF -/13/20:** Je nach betriebsindividueller Situation und Bundesland keine ÜF, ÜF bis 01.01.2013 oder bis 01.01.2020.

1.2.3 Checklist for animal welfare obligations in cattle farming

Ergebnisse Auflageneinhaltung (CC) Rind

Datum der Beurteilung: _____

Betriebsinhaber/Betriebsnummer:

_____

Verwendete Skala: [1: Auflagen gerade noch eingehalten; 2: Gute Auflageneinhaltung; 3: Sehr gute Auflageneinhaltung]

	Milchkühe		Jungvieh		Kälber		Mast-vieh		Mutterkühe & Kälber		Zuchtstiere		Anm.	Kürz.
	Ja	Nein	Ja	Nein	Ja	Nein	Ja	Nein	Ja	Nein	Ja	Nein		
A BODENBESCHAFFENHEIT														
1														3
2													ÜF -/12	3
3													ÜF 12/20	
4														1
5														3
6														3
7													ÜF-/12/20	
8													ÜF 12	
9														
10													ÜF 12	
11														
12													ÜF 12	
B BEWEGUNGSMÖGLICHKEIT & SOZIALKONTAKT														
1													ÜF 10/12	
2													ÜF -/12	(5)
3													ÜF 12	
4														
5													ÜF 12	(5)
6													ÜF 12/20	(5)
7													ÜF 12/20	
8														
9													ÜF 12/20	
10													ÜF 12/20	
11													ÜF 12/20	
12														
13														(5)
14														(5)
15														3
16														3
17														1
18														
19														
20														

21														
C LUFT, LICHT, LÄRM														
1														3 3
2														3 3
3														3 3
4														3 3
5													ÜF 20	
6														1 1
7														
	Milchkühe		Jungvieh		Kälber		Mast-vieh		Mutterkühe & Kälber		Zuchtstiere		Anm.	Kürz.
	Ja	Nein	Ja	Nein	Ja	Nein	Ja	Nein	Ja	Nein	Ja	Nein		
D TRÄNKE & FÜTTERUNG														
1													ÜF -/20	
2														3
3														1
4														3
5														3
6													ÜF 12	
7														
8													ÜF -/12	
9														3 3
10														1 1
11														3
12														3
13														3
14														3
15														3
E BETREUUNG														
1	Nein												ÜF 08	1
2	Nein													3
3														3 (5)
4														
5														
6a														
6b														
7														1
8	Nein													3
9														3
10	Nein													3 3
11														3 3
12														3
13	Nein													1
F EINGRIFFE														
1	Nein													3
2	Nein													3

3														3
4														3
5														5
6	Nein													6
G GANZJÄHRIGE HALTUNG IM FREIEN														
1														1
2														
3														
4														
5														
6	Nein													3

Legende: **ÜF 12:** ÜF bis 01.01.2012; **ÜF 20:** ÜF bis 01.01.2020; **ÜF -/12:** Je nach betriebsindividueller Situation keine ÜF oder ÜF bis 01.01.2012; **ÜF 12/20:** Je nach betriebsindividueller Situation und Bundesland ÜF bis 01.01.2012 oder 01.01.2020; **ÜF -/12/20:** Je nach betriebsindividueller Situation und Bundesland keine ÜF, ÜF bis 01.01.2012 oder 01.01.2020.

Bei unterstrichenen Fragen sind Nicht-Erfüllungen nur für Rinder ab 6 Monaten in das Bewertungsblatt einzutragen (Für Kälber entweder nicht oder bereits unter Punkt 1 geregelt)

1.3 Checklists for CC obligations in the area of public health

1.3.2 Checklist for food safety obligations

Kontrollbericht Lebensmittelsicherheit

(Art. 17, 18, 19 u. 20 VO (EG) Nr. 178/2002)

Name: _____ Betriebsnummer: _____

Anforderung Art. 17: Die Landwirte sorgen dafür, dass die Lebensmittel oder Futtermittel die Anforderungen des Lebensmittelrechts erfüllen, die für diese Tätigkeit gelten, und überprüfen die Einhaltung dieser Anforderungen.
Anforderung Art. 18: Die Rückverfolgbarkeit von Lebens- und Futtermitteln und von Tieren, die der Lebensmittelgewinnung dienen, ist von den Landwirten sicherzustellen.
Anforderung 19 und 20: Wenn ein Landwirt erkennt oder annehmen muss, dass er ein unsicheres Lebens- oder Futtermittel verkauft hat, nimmt er es unverzüglich vom Markt und informiert Abnehmer, Vorlieferanten, Behörden und Konsumenten.

Hinweis: Detailanforderungen, die zum Zeitpunkt der Kontrolle nicht kontrollierbar sind, sind durchzustreichen.

1. Teil tierische Produkte (Art. 17) **kontrollierbar**	□ ja	□ nein
Detailanforderung 1.1: Sauberkeit		
Sind die verwendeten Stallungen, Ausrüstungen, Transportkisten und Fahrzeuge – soweit in Verwendung und in Hinblick auf ihre Eignung für die jeweilige Tierart – sauber?	□ ja	□ nein
Detailanforderung 1.2: Kontamination		
Gibt es in den Stallungen keine lebensmittelrechtlich relevanten Verunreinigungen durch Schadnager bzw. sind ausreichende Bekämpfungsmaßnahmen gegen Schadnager vorhanden?	□ ja	□ nein
Wird eine Verunreinigung des Stalles durch getrennte Lagerung gefährlicher Stoffe und Abfälle verhindert?	□ ja	□ nein
Detailanforderung 1.3: Vorhandensein einschlägiger Analysen		
Wurden einschlägige Analysen durchgeführt?	□ ja	□ nein

Wenn ja: Liegen Aufzeichnungen für diese einschlägigen Analysen vor?	□ ja	□ nein

1a. Zusatzteil Milch (Art. 17) **kontrollierbar**	□ ja	□ nein
Detailanforderung 1a.0: Milchuntersuchungsergebnisse		
Belegen die Rohmilch-Untersuchungen der letzten 2 Monate, dass die Milch im Hinblick auf die Keimzahl, den Gehalt an somatischen Zellen und Rückstände von Antibiotika einwandfrei war? Anzahl und Zeitraum der kontrollierten Untersuchungsergebnisse : ……. Wenn Frage mit ja beantwortet wurde, ist die Kontrolle der Punkte 2a.1 bis 2a.3 nicht erforderlich.	□ ja	□ nein
Detailanforderung 1a.1: Hygiene		
Ist der allgemeine Gesundheitszustand der Tiere gut?	□ ja	□ nein
Ist der Tierbestand frei von Tuberkulose und Brucellose?	□ ja	□ nein
Werden Zitzen, Euter und angrenzende Körperteile vor Melkbeginn gereinigt?	□ ja	□ nein
Entsprechen Melkgeschirr, Milchtank/-behälter und Orte, an die die Milch nach dem Melken verbracht wird, den entsprechenden Hygienevorschriften?	□ ja	□ nein
Detailanforderung 1a.2: Kühlung		
Wird die Milch unverzüglich auf die geforderte Temperatur gekühlt?	□ ja	□ nein
Wenn nein: Wird die Milch innerhalb von 2 Stunden nach dem Melken verarbeitet und/oder liegt eine entsprechende Genehmigung für eine höhere Temperatur vor?	□ ja	□ nein
Detailanforderung 1a.3: Reinigung		
Werden geeignete Reinigungsmittel verwendet?	□ ja	□ nein
Wird geeignetes Wasser zum Reinigen der Oberflächen von Melkgeschirr und Milchtank/ Milchbehälter verwendet?	□ ja	□ nein

2. Rückverfolgbarkeit (Art. 18) **kontrollierbar**	□ ja	□ nein
Detailanforderung 2.1: Aufzeichnungen		
Sind Unterlagen über die Aus- und Eingänge vorhanden?	□ ja	□ nein
Wenn ja: Sind die Unterlagen frei von Mängel und plausibel?	□ ja	□ nein

3. Verantwortung für LM und FM (Art. 19 und 20) **kontrollierbar***	□ ja	□ nein
Detailanforderung 3.1: Rückholung/Abhilfemaßnahmen		
Wurden im Anlassfall unsichere Lebens- oder Futtermittel aus dem Markt genommen und geeignete Maßnahmen getroffen?	□ ja	□ nein
Detailanforderung 3.2: Information		
Wurden im Anlassfall Abnehmer, Vorlieferanten sowie die Behörden (Bezirksverwaltungsbehörde, Lebensmittelkontrolle, Bürgermeister,…) unverzüglich informiert?	□ ja	□ nein

Platz für Erläuterungen (bitte immer die entsprechende Nummer angeben)
……...
……...
……...
……...
……...
……...
……...
……...

1.3.3 Checklist for feed safety obligations

Kontrollbericht Futtermittelsicherheit

Futtermittelgesetz 1999/Tiermehlgesetz

Sichere Futtermittel (Art. 15 VO (EG) Nr. 178/2002)

Tiermehlverfütterung (Art. 7 VO (EG) Nr. 999/2002)

Name: _____ Betriebsnummer: _____
Betriebsadresse: _____
Datum: _____

Zutreffendes ankreuzen!

1. Verfütterung von Tiermehl und anderen verbotenen tierischen Proteinen?	□ ja	□ nein
2. Verfütterung von Fischmehl/Di-, Tricalciumphosphat/Blutprodukten?	□ ja	□ nein
Wenn Frage 2 mit „ja“ beantwortet: Ist der Betrieb berechtigt, Fischmehl/Di-, Tricalciumphosphat/Blutprodukte selbst zu mischen (Meldung/Registrierung erfolgt)?	□ ja	□ nein
Wenn Frage 2 mit „ja“ beantwortet: Hält Betrieb Wiederkäuer und andere landwirtschaftlichen Nicht-Wiederkäuer (gemischter Betrieb)?	□ ja	□ nein
Wenn Haltung von Wiederkäuern und anderen landwirtschaftlichen Nicht-Wiederkäuern:		
Getrennte Haltung von Wiederkäuern und Nicht-Wiederkäuern?	□ ja	□ nein
Getrennte Lagerung der Futtermittel?	□ ja	□ nein
Getrennte Mischanlage für Wiederkäuern und Nicht-Wiederkäuern vorhanden?	□ ja	□ nein
3. Augenscheinliche Kontamination der Futtermittel durch Pflanzenschutz-mittel, Düngemittel, Tierarzneimittel, Abfälle, gefährliche Stoffe, Schädlinge etc.?	□ ja	□ nein
Wenn Frage 3 mit „ja“ beantwortet: spezifizieren:		
4. Wurden Futtermittelzusatzstoffe verwendet?	□ ja	□ nein
Wenn Frage 4 mit „ja“ beantwortet: Wurden diese korrekt verwendet?	□ ja	□ nein

Platz für Erläuterungen (bitte immer die entsprechende Nummer angeben) Fragen 1 – 4 betreffen Art. 15 VO (EG) Nr. 178/2002 (Sichere Futtermittel), Fragen 1 und 2 betreffen Art. 7 VO (EG) Nr. 999/2002
……... ……... ……...

1.4 Animal Needs Index assessment forms

1.4.2 Animal Needs Index assessment form for adult cattle

	TGI 35L/1996 Rinder	
CCAT-Erhebung 2009	Betriebsnummer:	

Name des Betriebes:_____

1) Rasse: o Fleckvieh o Pinzgauer o Schwarzbunte o Braunvieh o _____

2) Tierzahl: _____ Stück o behornt o unbehornt 3) GVE (Ø max.): _____

4) Nutzungsrichtung: ○ Milchkühe ○ Mutterkühe ○ Jungvieh

5) Bewegungsmöglichkeit: o Auslauf _____ Tage ____ Std./Tag
o Weide _____ Tage ____ Std./Tag ○ Alpung _____ Tage

6) Stallform:

o Laufstall
Laufstallsystem: o Liegeboxenstall o Tretmiststall o Tieflaufstall
Liegefläche: o Hochbox o Tiefbox
Lauffläche: o Spaltenboden o Planbefestigt

o Anbindestall
Anbindesystem: o Kurzstand o Mittellangstand
Kuhtrainer: o ja o nein

7) Besonderheiten:
_____
_____

8) Festgestellte Mängel:
_____
_____

9) Gründe für Nichteinhaltung:
_____
_____

Datum: _____ Erhebungsperson: _____

TGI-Beurteilungstabellen nach TGI 35 L/1996: RIND

1. Bewegungsmöglichkeit (min. 0; max. 10,5 Punkte)

Spalte	a			b	c	d	e	f
	Laufstallsysteme				Anbindehaltung		separater Auslauf Freien	
	begehbare Gesamtbewegungsfläche [m²/GVE] 1)			Abliegen Aufstehen	Standmaße Standbe-grenzung vorne u. hinten	Spiel der Anbindg. in Längs- und Querrich-tung (cm)		
Punkte	Kühe enthornt	Kühe behornt	Jungvieh Mastvieh	2)	2)	3)	Tage/Jahr insgesamt 4)	Alpung, Weide Tage/Jahr 5)
3,0	≥ 8	≥ 9	≥ 6	bequem			≥ 270	
2,5	≥ 7	≥ 8	≥ 5				≥ 230	
2,0	≥ 6	≥ 7	≥ 4	mittel			≥ 180	
1,5	≥ 5	≥ 6	≥ 3				≥ 120	Alpung ≥ 120
1,0			≥ 2,5		bequem	≥ 60/40	≥ 50	≥ 50
0,5				behindert	mittel	≥ 40/30		≥ 30
0	< 5	< 6	< 2,5	sehr behindert	beengt	< 40/30		

b: Tiefstreu/Tretmist, keine Boxenartige Unterteilung => bequem
-kürzeste Richtung mind. 3m für bequem
- bei Jung- u. Mastrindern weniger
- behindert, wenn sich 25% größten Tiere beim Aufstehen/Abliegen schwer tun.
- dabei auf Verletzungen im Hüftbereich und Nacken achten
- Boxenlänge beachten
c: bequem wenn:
Krippensockel maximal 32 cm hoch
Standlänge 0,95*diagonale Körperlänge+30cm
Standbreite 0,9*Widerristhöhe
Bei einem Verstoß als mittel einzustufen
d: wenn Kuherzieher, dann 0 Punkte
f: Auslauftage auf Weide sind Gemäß Spalte e zu zählen und Punkte für Alpung gemäß f dazu zu geben.

2. Sozialkontakt (min. -1,0; max. 10 Punkte)

Spalte	a			b	c	d	e
	Laufstallsysteme begehbare Gesamtbewegungsfläche 1) in m²/GVE oder Anbindehaltung			Herdenstruktur bei Laufställen u. Anbindeställe	Nachzucht	separater Auslauf	
Punkte	Kühe enthornt	Kühe behornt	JV/MV 2)	3)	4)	Auslauf Tage/Jahr 5)	Alpung Weide Tage/Jahr 6)
3	≥ 8	≥ 8	≥ 6				
2,5	≥ 7	≥ 7	≥ 5			≥ 270	
2	≥ 6	≥ 6	≥ 4	Familienstruktur		≥ 230	
1,5	≥ 5		≥ 3	Herde ohne Stier		≥ 180	Alpung ≥ 120
1			≥ 2,5	stabile Alters- oder Leistungsgruppen	eig. Nachzucht u. mind. Sichtkontakt zur Herde	≥ 120	≥ 50
0,5	Anbindehaltung				eig. Nachzucht in getrenntem Stall	≥ 50	≥ 30
0	< 5	< 6	< 2,5	Anbindehaltung	teilweise Zukauf		
-0,5				häufige Um-plazierung i.d. Anbindehaltg. häufige Um-gruppierung in Laufstallgruppen	häufiger Zukauf u. Nachzucht in getr. Stall, u.od. häufige Integration einzel-ner Tiere in Lauf-stallgruppen		

b: Sozialkontakt wie in Mutterkuhherde ist optimal. Mutterkühe verschiedenen Alters und Jungvieh mit einem Altbullen
c: Befindet sich Jungvieh im Sommer auf Alm, im Winter aber im Stall mit Sichtkontakt, so ist dies Sichtkontakt gleichzusetzen.
d: gilt nur als Bewegungsfläche wenn mind. 5m²/GVE und 30 Tage Nutzung im Jahr oder 3m²/GVE und 24Std pro Tag verfügbar
6) Bei Weidehaltung oder Alpung werden d und e berücksichtigt

3. Bodenbeschaffenheit (min. -2,5; max. 8 Punkte)

Spalte	a	b	c	d	e	f
	Liegefläche 1)			Aktivitätsbe-reich, Gangflä-chen,Triebwege (bei Anbindeh.: nur wenn Aus-lauf) 2)	separater Auslauf 2) 3)	Alm Weide 4)
Punkte	Weichheit	Sauberkeit	Tritt-sicherheit			
2,5	≥ 6 cm Stroh					
2,0	3-6 cm Stroh; ≥ 6 cm Sand o.ä.					
1,5	Gummi weich, < 3 cm Stroh < 6 cm Sand				planbefestigt, sauber, griffig	
1,0	Holz, PVC, Gummi hart, Asphalt	sauber	griffig	griffig, technisch einwandfrei, klauenfreundlich	natürlicher Boden, trocken, fest	Almböden, oder steile Hänge
0,5	Beton, Kunst-stoff- oder Metallroste	mittel	mittel	mittel	mittel	ebene oder leicht ge-neigte Fl.
0	Beton-spalten gemäß ÖNORM L 5290	schmutzig	rutschig	rutschig, techni-sche Mängel, klauenbelastend	rutschig, tech-nische Mängel, klauenbelastend	
- 0,5	Beton-spalten technisch schlecht	sehr schmutzig	sehr rutschig	sehr rutschig und/oder schmutzig, arge Mängel	sehr rutschig und/oder schmutzig, arge Mängel, Morast	

1) In Mehrflächenbuchten gilt jener Buchtenbereich als Liegefläche, der von den Tieren während der Hauptruhezeit deutlich als Liegeplatz bevorzugt wird
2) Es gilt der Zustand des schlechtesten Bereichs, der von allen Tieren begangen werden muss.
3) Mind. 5m²/GVE und 30 Tage pro Jahr begehbar, oder 3m²/GVE und 24Std pro Tag nutzbar
4) Bei Weidehaltung oder Alpung werden e und f berücksichtigt

4. Licht, Luft und Lärm (min. -2,0; max. 9,5 Punkte)

Spalte	a	b	c	d	e	f
Punkte	Tageslicht im Stall	Luftqualität, Luftraten im Stall[1)]	Zugluft im Ruhebereich [2)]	techn. Lärm im Stall [3)]	separater Auslauf, Weide [4)]	
					Tage/ Jahr	∅ Stunden/ Tag [5)]
2,0	Offenfrontstall				≥ 230	≥ 8
1,5	sehr licht	Offenfront-stall oder optimale Luftqualität			≥ 180	≥ 6
1,0	licht	gute Luftqualität	ausge-schlossen	kein Lärm	≥ 120	≥ 4
0,5	mittel	ausreichend	gelegentlich	leichter Lärm	≥ 50	≥ 2
0	dunkel	schlecht	häufig	deutlicher Lärm		
- 0,5	sehr dunkel	sehr schlecht	immer	starker Lärm		

3) Lärmbelästigung durch dauernde Geräusche, besonders durch Lüftungsanlage
5) es gilt der auf 365 Tage bezogene Mittelwert zwischen Auslauftagen im Sommer und im Winter

5. Betreuungsintensität (min. -3,0; max. 8 Punkte)

Spalte	a	b	c	d	e	f	g
Punkte	Sauberkeit: Buchten, Futter- und Tränkeein-richtungen[1)]	Technischer Zustand der Stalleinrich-tungen [2)]	Zustand der Haut [3)]	Sauberkeit der Tiere	Zustand der Klauen [4)]	Techno-pathien [5)]	Tierge-sundheit [6)]
1,5					tadellos	keine	sehr gut
1,0	sauber	gut	gut		gut	wenig	gut
0,5	mittel	mittel	mittel	sauber	mittel	mittel	mittel
0	unzureichend	Mängel	unzureichend	mittel	unzureichend	häufig	schlecht
- 0,5	schmutzig	schlecht	schlecht	schmutzig	schlecht	sehr häufig	sehr schlecht

1) alle für die Tiergesundheit wichtigen Bereiche einschließlich Futter
2) Tränken, Buchtbegrenzungen, mechanische Einrichtungen, Lüftung etc
3) Gesundheitszustand der Haut und des Fells, Ektoparasiten etc.
4) Klauenlänge, Kronsaumschwellungen und –verletzungen, lose Klauenwand usw.
5) Vermeidbare haltungsbedingte Schäden und Verletzungen
6) Erkrankungen die über Haut-, Klauen-, Gelenks-, und Beinschäden hinausgehen. Fruchtbarkeit, Langlebigkeit.
Wenn dazu keine Unterlagen vorliegen, sollte der Bereich als Mittel bewertet werden

Summenblatt

Einfluß-bereiche	Spalten a	b	c	d	e	f	g	Punkte-summen
I Bewegungs-möglichkeit	Laufstallsystem		Anbindehaltung		Auslauf Tage/ Jahr	Weide Alm Tage/J.		
	Gesamt-bew.fläch.	Abliegen Aufstehen	Stand-maße	Spiel d. Anbindg.				
II Sozial-kontakt	Gesamt-bew.fläch.	Herden-struktur	Nach-zucht	Auslauf Tage/ Jahr	Weide Tage/ Jahr			
III Bodenbe-schaffenheit	Liegefläche			Aktivit-täts-bereich	Auslauf	Weide Alm		
	Weichheit	Sauberk.	Rutsch-sicherheit					
IV Licht u. Luft	Licht	Luftqual. Im Stall	Zugluft im Liege-bereich	Lärm	Auslauf Tage/ Jahr	Auslauf Std./Tag		
V Betreu-ungs-intensität	Sauberkeit im Stall	Zustand der Stall-einrich.	Zustand der Haut	Sauberkeit der Tiere	Zustand der Klau-en	Techno-pathien	Tier-gesund-heit	
Punktesummen - GESAMT = TGI = TGI/V ja ❒ nein ❒								

1.4.3 Animal Needs Index assessment form for calves

	TGI 35L/1996 Kälber	
CCAT-Erhebung 2009	Betriebsnummer:	

Name des Betriebes:_____

1) Rasse: o Fleckvieh o Pinzgauer o Schwarzbunte o Braunvieh
o _____

2) Tierzahl: _____ Stück o es wird enthornt o es wird nicht enthornt

3) Nutzungsrichtung: o Mast- o Mutterkuh- o Zuchtkälber
o _____

4) Bewegungsmöglichkeit: o Auslauf _____ Tage _____ Std./Tag
o Weide _____ Tage _____ Std./Tag
o Alpung _____ Tage

5) Stallform:
o Laufstall
Laufstallsystem: o Tretmiststall o Tieflaufstall o Liegeboxenstall
Liegefläche: o Hochbox o Tiefbox
Lauffläche: o Spaltenboden o Planbefestigt
o Anbindestall !!!
Ausführung (Kurzstand, Mittellangstand, am Gang angebunden, Kuhtrainer,…):
_____
_____

6) Besonderheiten:
_____
_____

7) Festgestellte Mängel:
_____
_____
_____

8) Gründe für die Nichteinhaltung:
_____
_____

Datum: _____ Erhebungsperson: _____

TGI-Beurteilungstabellen nach TGI 35 L/1996: KALB

Bewegungsmöglichkeit (min. -0,5; max. 10,5 Punkte)

Spalten	a				b	c	d	e	f
	Gruppen- und Boxenhaltung ohne Anbindung					Anbindehaltg	separater Auslauf ins Freie 3)		
	für die Tiere jederzeit zugängliche Gesamtbodenfläche einschließlich eines ganzjährig jederzeit zugänglichen Auslaufes [m²/Tier] 1)				Abliegen Auf-stehen 2)	Standmaße, -begrenzun-gen, Spiel der An-bindung 2)			
Punkte	bis 120 kg	bis 150 kg	bis 180 kg	bis 230 kg			Auslauf-größe [m²/ Tier] 4)	[%] der Tage/ Umtrieb (Tage/ Jahr) 5)	Weide [%] der Tage/Um-trieb 6)
3,0	≥ 1,9	≥ 2,2	≥ 2,5	≥ 2,9	bequem				
2,5	≥ 1,5	≥ 1,8	≥ 2,0	≥ 2,4				≥ 75 % (≥ 270 T)	
2,0	≥ 1,3	≥ 1,5	≥ 1,7	≥ 2,0	mittel	bequem		≥ 63 % (≥ 230 T)	
1,5	≥ 1,2	≥ 1,3	≥ 1,5	≥ 1,8				≥ 50 % (≥ 180 T)	
1,0	≥ 1,1	≥1,2	≥ 1,4	≥ 1,6		mittel	≥ 2,0	≥ 33 % (≥ 120 T)	≥ 33 %
0,5	≥ 1,00	≥ 1,15	≥ 1,29	≥ 1,52	behin-dert		≥ 1,5	≥ 17 % (60 T.)	≥ 17 %
0	≥ 0,94	≥ 1,10	≥ 1,23	≥ 1,45	sehr behind.	beengt	≥ 1,23		
- 0,5	< 0,94	< 1,10	< 1,23	< 1,45					

1)
2) bequem: Tiefstreu, Tretmist, Systeme ohne boxenartige Unterteilung der Liegeflächen, es sei denn, Bauliche Strukturen behindern Verhalten offensichtlich.
Behindert: wenn größere Tiere nur schwer aufstehen oder abliegen können. Technopathien im Bereich Hüfhöcker und Widerrist. (Boxenbreite weniger als 90% der Widerristhöhe)
Mittel: in allen anderen Fällen
3)eine vom Stallbereich separate Fläche (nicht Weide) mindestens 1Std täglich an mind. 35 Tage im Jahr zugänglich für alle Tiere
4)
5)
6) bei Weidehaltung werden Spalten d,e,f berücksichtigt

Sozialkontakt (min. -1,0; max. 9,5 Punkte)

Spalten	a				b	c	d	e
	Gruppen- und Einzelhaltung				Herdenstruktur bei Laufstall und Anbindehaltung 2)	Herkunft und Anlieferung der Kälber 3)	separater Auslauf [%] der Tage /Um-trieb (Tage/ Jahr)4)	Weide [%] der Tage/Um-trieb 6)
	für die Tiere jederzeit zugängliche Gesamtbodenfläche einschließlich eines ganzjährig jederzeit zugänglichen Auslaufes [m²/Tier] bzw. Einzelhaltung 1)							
Punkte	bis 120 kg	bis 150 kg	bis 180 kg	bis 230 kg				
3,0	≥ 1,9	≥ 2,2	≥ 2,5	≥ 2,9				
2,5	≥ 1,5	≥ 1,8	≥ 2,0	≥ 2,4			≥ 75 % (≥ 270 T.)	
2,0	≥ 1,3	≥ 1,5	≥ 1,7	≥ 2,0	Familienstruktur		≥ 63 % (≥ 230 T.)	
1,5	≥ 1,2	≥ 1,3	≥ 1,5	≥ 1,8	Herde ohne Stier		≥ 50 % (≥ 180 T.)	
1,0	≥ 1,1	≥1,2	≥ 1,4	≥ 1,6	stabile Altersgruppen	günstig	≥ 33 % (≥ 120 T.)	≥ 33 %
0,5	Anbinde-/ Einzelhaltung mit Sichtkontakt				Einzelhaltung mit Sichtkontakt	mittel	≥ 17 % (60 T.)	≥ 17 %
	≥ 1,00	≥ 1,15	≥ 1,29	≥ 1,52				
0	Anbinde-/ Einzelhaltung ohne Sichtkontakt				Einzelhaltung ohne Sichtkontakt	ungünstig		
	≥ 0,94	≥ 1,10	≥ 1,23	≥ 1,45				
- 0,5	< 0,94	< 1,10	< 1,23	< 1,45	häufige Umgruppierung			

a) bei Einzelhaltung (Boxen oder Iglus) können nur 0,5 bzw. 0 Punkte vergeben werden. 0,5 wenn ständiger Sichtkontakt möglich
b) Familienstruktur: alle Altersgruppen zusammen bis zum Absetzen mit einem Deckbullen.
Herde ohne Stier: geschlechtlich gemischter Familienbestand ohne Bullen,
auch bei Integration der Kälber in die Zuchtherde nach Trockenstehen der Mütter
c) günstig: geschlossener Betrieb, 100% eigene Nachzucht
mittel: teilweiser Kälberzukauf oder Neuzusammenstellung der Gruppen
ungünstig: Zukauf über Händler aus verschiedenen Betrieben
6) bei Weide werden d und e berücksichtigt

Bodenbeschaffenheit (min. -2,5; max. 8 Punkte)

Spalte	a	b	c	d	e	f
	Liegefläche 1)			Aktivitätsbe-reich, Gangflächen, Tri ebwege (bei Anbindeh.: nur wenn Auslauf) 2)	separater Auslauf 2) 3)	Weide 4)
Punkte	Weichheit.	Sauberkeit	Tritt-sicherheit			
2,5	≥ 6 cm Stroh					
2,0	3-6 cm Stroh; ≥ 6 cm Sand o.ä.					
1,5	Gummi weich, < 3 cm Stroh < 6 cm Sand				planbefestigt, sauber, griffig	
1,0	Holz, PVC, Gummi hart, Asphalt	sauber	griffig	griffig, technisch einwandfrei, klauenfreundlich	natürlicher Boden, trocken, fest	Almböden, oder steile Hänge
0,5	Beton, Kunststoff- oder Metallroste	mittel	mittel	mittel	mittel	ebene oder leicht geneigte Fl.
0	Beton-spalten gemäß ÖNORM L 5290	schmutzig	rutschig	rutschig, technische Mängel, klauenbelastend	rutschig, technische Mängel, klauenbelastend	
- 0,5	Beton-spalten technisch schlecht	sehr schmutzig	sehr rutschig	sehr rutschig und/oder schmutzig, arge Mängel	sehr rutschig und/oder schmutzig, arge Mängel, Morast	

1) im Mehrflächenbereich gilt jener Buchtenbereich als Liegefläche, der hauptsächlich als Liegeplatz genutzt wird
2)es gilt der schlechteste Bereich, der von Tieren begangen werden muss
3)nicht Weide! Muss mindestens 1 Std an 60 Tagen im Jahr zur Verfügung stehen. Ist Auslaufvorplatz überdacht, dann +0,5 Punkte Zuschlag
4) bei Weide werden e und f berücksichtigt

Licht, Luft und Lärm (min. -2,5; max. 8,5 Punkte)

Spalte	a	b	c	d	e	f
					Auslauf [4] oder Weide	
Punkte	Tageslicht im Stall	Luftqualität im Stall[1]	Zugluft im Ruhe-bereich	techn. Lärm im Stall[2]	Stunden pro Tag	Schattenspender und Windschutz [5]
2,0	Offenfrontstall					
1,5	sehr licht	Offenfrontstal l oder optimale Luftqualität			≥ 9	beides ausreichend
1,0	licht	gute Luftqualität	ausge-schlossen	kein Lärm	≥ 6	eines von beiden ausreichend
0,5	mittel	ausreichend	gelegentlich	leichter Lärm	≥ 3	beides aber zu wenig
0	dunkel	schlecht	häufig	deutlicher Lärm		eines aber zu wenig
- 0,5	sehr dunkel	sehr schlecht	immer	starker Lärm		keine

2) Lärm durch dauernde technische Geräusche, vor allem Lüftung
4) Auslauf bei Kälberiglu auch anzurechnen, wenn dieser mindestens 0,22*G^0,66 m²/Tier
5) Ausreichend für Schattenspender und Windschutz: 1,10m²/150kg Kalb im Hochsommer beschattete und gegen Wind gut geschützte Bodenfläche.
Als Grenzwert für „zu wenig“ gelten 50% der vorgenannten Werte

Betreuungsintensität (min. -3,0; max. 8 Punkte)

Spalte	a	b	c	d	e	f	g
Punkte	Sauberkeit: Buchten, Futter- und Tränkeein-richtungen	Technischer Zustand der Stalleinrich-tungen [1]	Durchschnitt-liche Kälber-verluste pro Jahr [%] [2]	Sauberkeit der Tiere	Zustand der Klauen und Gelenke, der Haut und Hautanhangs-organe [3]	Stallbuch-führung	Tierge-sundheit [4]
1,5					sehr gut		sehr gut
1,0	sauber	gut	≤ 2,5	sauber	gut	genau/ voll-ständig	gut
0,5	mittel	mittel	≤ 5,0	mittel	mittel	teilweise	mittel
0	schmutzig	Mängel	≤ 10,0	schmutzig	schlecht	nein	schlecht
- 0,5	sehr schmutzig	sehr schlecht	> 10,0	sehr schmutzig	sehr schlecht		sehr schlecht

1) Tränken, Buchtenbegrenzungen, mechanische Einrichtungen, Lüftung etc.
2)Durchschnitt von 3 Jahren. Beurteilung erfolgt nur in Betrieben mit mehr als 50 Kälbern pro Jahr
In kleineren Betrieben wird Spalte g entsprechend stärker gewichtet:
Sehr Gut=2,5
Gut=2
Mittel=1
3)Klauenlänge, Kronsaumschwellungen, Gelenkschwellungen, Lahmheiten, Be-schädigungen und Verletzungen an Körperoberfläche, Ektoparasiten
4) Häufikeit von Leistungseinbrüchen, Erkrankungen und Behandlungen

Summenblatt

Bereiche	Spalten							Sum-me
	a	b	c	d	e	f	g	
I Bewe-gungs-möglich-keit	Begehbare Fläche im Stall	Abliegen Aufstehen	Anbinde-haltung	Aus-lauf-größe	Auslauf-tage pro Jahr (Um-trieb)	Weide-tage		
II Sozial-kontakt	Begehbare Fläche im Stall	Herden-struktur	Herkunft und Anlie-ferung der Kälber	Auslauf-tage pro Umtrieb	Weide-tage pro Umtrieb			
III Boden-beschaf-fenheit	Liege-fläche: Weichheit	Liege-fläche: Sauber-keit	Liege-fläche: Tritt-sicherheit	Aktivi-täts- und Gang-flächen	separater Auslauf	Weide		
IV Licht und Luft	Licht im Stall	Luftquali-tät Luftraten	Zugluft	Lärm	Auslauf-stunden pro Tag	Schat-tenspen-der, Windsch utz		
V Betreu-ungsin-tensität	Sauberkeit im Stall	Zustand Stallein-richtung	Kälber-Verluste	Sauber-keit der Kälber	Zustand der Klau-en usw.	Stall-buch-führung	Tierge-sund-heit	
				Punktesumme-GESAMT = TGI = TGI/V ja ❒ nein ❒				

1.4.4 Animal Needs Index assessment form for feeding pigs

TGI 35L/1995 Mastschweine		
CCAT-Erhebung 2009	Betriebsnummer:	

Name des Betriebes:
_____

1) Tierzahl (gesamt): _____ Stück Endgewicht: _____ kg
2) Auslauftage: _____ Std/Tag: _____
3) Herkunft Ferkel: o eigene
o von Ferkelerzeuger (1 Betrieb)
o vom Ferkelring (mehrere Betriebe)
4) Buchtengröße (m²): _____ Tiere pro Bucht: _____ Stück
5) Stallform: o Vollspalten o Teilspalten o Eingestreut _____ o Andere _____
6) Liegefläche: o Stroh o Holz o Beton o Spalten o Andere _____
7) Anzahl geschlossener Seiten: ____
8) Besonderheiten:
_____
_____

9) Festgestellte Mängel:
_____
_____

10) Gründe für Nichteinhaltung:
_____
_____

Datum: _____ Erhebungsperson: _____

1. Bewegungsmöglichkeiten (min. -1,0; max. 9,5 Punkte):

Spalten	a				b	c	d	e	f
	für die Tiere jederzeit zugängliche Gesamtbodenfläche einschließlich eines ganzjährig jederzeit zugänglichen Auslaufes [m²/Tier] 1)				Beschäftigungsmöglichkeit im Stall 2)	Scheuermöglichkeiten 3)	separater Auslauf ins Freie 4)		
Punkte	bis 30 kg	bis 60 kg	bis 110 kg	bis 140 kg			Auslaufgröße [m²/Tier] 5)	[%] der Tage/ Umtrieb (Tage/ Jahr) 6)	Weide [%] der Vegetationsz., (T./J.) 7)
3,0	≥ 0,66	≥ 1,00	≥ 1,50	≥ 1,80					
2,5	≥ 0,58	≥ 0,87	≥ 1,33	≥ 1,56					
2,0	≥ 0,50	≥ 0,75	≥ 1,15	≥ 1,35	sehr gut				
1,5	≥ 0,45	≥ 0,65	≥ 1,00	≥ 1,18	gut			täglich	
1,0	≥ 0,40	≥ 0,57	≥ 0,87	≥ 1,02	befriedigend	Bürsten, schräge Kanten oder Pfosten	≥ 1,33	≥ 75 % (≥ 270 T)	≥ 75 % (135 T.)
0,5	≥ 0,35	≥ 0,50	≥ 0,75	≥ 0,88	gering	senkrechte Pfosten oder Kanten	≥ 0,87	≥ 50 % (≥ 180 T)	≥ 50 % (90 T.)
0	≥ 0,30	≥ 0,45	≥ 0,65	≥ 0,75	sehr gering		≥ 0,65	≥ 33 % (≥ 120 T)	≥ 33 % (60 T.)
- 0,5	< 0,30	< 0,45	< 0,65	< 0,75	keine				

2) Einstufung nach untenstehender Tabelle
4) muss mind. 2 Std täglich an mind. 120 Tagen im Jahr begehbar sein

Punkte	Material	Menge pro Tag [kg/ GVE 1)]	Struktur	Art der Vorlage	Einbringhäufigkeit
4	Stroh, Heu, Grünfutter, Grassoden, Kompost	≥ 5,0	Langstroh, Langheu, Gras dünneZweige	in Raufe	täglich frisch
3	Holzstücke, Knochen, tote Erde	≥ 2,5	gehäckseltes Stroh usw., Erde, grobe Holzstücke,	teilweise in Raufe, teilweise am Boden	alle zwei Tage
2	bewegliches Spielzeug aus Gummi o.ä.	≥ 1,0	fein gehäckselt,	am Boden	wöchentlich
1	fix montierte Ketten, o.ä.,	≥ 0,4	gemahlen; Sägespäne	fix montiert	seltener
0	keines	≥ 0,2	nichts	nichts	nichts

Punktesumme aus Tabelle 2	Beurteilung gemäß Blatt1, Spalte b	Bewertungspunkgte in Blatt 1
> 16	sehr gut	2,0
13 - 16	gut	1,5
10 - 12	befriedigend	1,0
7 - 9	gering	0,5
3 - 6	sehr gering	0
0 - 2	keine	- 0,5

2. Sozialkontakt (min. -2,0; max. 10 Punkte):

Spalten	a				b	c	d	e		f	g
	für die Tiere jederzeit zugängliche Gesamtbodenfläche einschließlich eines ganzjährig jederzeit zugänglichen Auslaufes [m²/Tier] 1)				Verfügbarkeit von Einrich-tungen 2)	Anlieferung der Jungtiere 2)	Anzahl dichter Seiten um die Liegefläche 3)	Herdenstruktur, bzw. Tiere pro Gruppe 4)		separater Auslauf ins Freie 5)	
Punkte	bis 30 kg	bis 60 kg	bis 110 kg	bis 140 kg				beide Geschl.	nur ein Geschl.	[%] der Tage/ Umtrieb (Tage/ Jahr) 6)	Durchgangsbreite z. Auslauf [cm/T] 7)
2,0	≥ 0,58	≥ 0,87	≥ 1,33	≥ 1,56	sehr gut						
1,5	≥ 0,45	≥ 0,65	≥ 1,00	≥ 1,18	gut			Familienhaltg		täglich	
1,0	≥ 0,40	≥ 0,57	≥ 0,87	≥ 1,02	befriedigend	günstig	≥ 3	≤ 15	≤ 10	≥ 75 % (≥270 T)	≥ 5; 6,5; 8
0,5	≥ 0,35	≥ 0,50	≥ 0,75	≥ 0,88	genügend	mitel	2	≤ 30	≤ 15	≥ 50 % (≥180 T)	≥ 4; 5; 6
0	≥ 0,30	≥ 0,45	≥ 0,65	≥ 0,75	schlecht	ungünstig	1	> 30	≤ 30	≥ 33 % (≥120 T)	≥ 3; 4; 5
- 0,5	< 0,30	< 0,45	< 0,65	< 0,75	sehr schlecht		0	≥ 60	> 30		

2) Tränke- und Futtereinrichtungen: Einstufung Siehe Tabelle zu Blatt 2
c) Anlieferung der Jungtiere:
günstig: geschlossener Betrieb ohne Gruppenvermischung
mittel: wie oben mit Gruppenvermischung oder Zukauf von einem Betrieb
ungünstig: andernfalls

3. Bodenbeschaffenheit (min. -2,5; max. 9 Punkte):

Spalte	a	b	c	d	e	f	g
Punkte	Anzahl unter-schiedl. Boden-arten 1)	Liegefläche 2) Verformbark. u. Wärmedämmg.	Sauberkeit	Tritt-sicherheit	Aktivitäts- und/oder Kotbereich 3)	separater Auslauf 4)	Suhle im Freien 5)
2,0		planbefestigt, vollflächig eingestreut ≥ 6 cm					
1,5		planbefestigt, vollflächig eingestreut ≥ 3 cm			griffig, trocken	planbefestigt, sauber, eingestreut	
1,0	≥ 3	planbefestigt gedämmt, oder eingestreut < 3 cm	planbefestigt sauber	planbefestigt griffig	griffig und feucht	planbefestigt, griffig, sauber	ja, aus-reichend
0,5	2	planbefestigt, ungedämmt, einstreulos	Vollspaltenboden planbefestigt mittel-sauber	planbefestigt mittel-griffig	Spaltenboden gut; planbefestigt mittel-griffig naß	Spaltenboden gut; planbefestigt, mittel-griffig, naß	ja, zu wenig
0	1	Kuststoff- oder Metallroste	schmutzig	rutschig	rutschig und/oder schmutzig	rutschig, schmutzig	
- 0,5		Beton-spalten	sehr schmutzig	sehr rutschig	Spaltenboden schlecht; sehr rutschig und/oder sehr schmutzig	Spaltenboden schlecht; tiefer Morast	

1) es zählt die jederzeit begehbare Fläche mit unterschiedlichen Bodenbereichen. Punktzahl richtet sich nach Anzahl unterschiedlicher Böden
3) kann zwischen Aktivitäts- und Mistbereich unterschieden werden sind die Flächen getrennt zu bewerten und ein Mittelwert zu bilden
4) eine vom Stallbereich getrennte Bewegungsfläche, wenn überdacht dann Zuschlag von 0,5 Punkten
5) ausreichend wenn Hälfte der Tiere gleichzeitig suhlen kann

4. Licht, Luft und Lärm (min. -2,5; max. 9 Punkte):

Spalte	a	b	c	d	e	f	g
						Auslauf 4) und Weide	
Punkte	Tageslicht im Stall	Luftqualität u. Luftraten im Stall 1)	Zugluft im Ruhe-bereich	Duschen im Stall 2)	techn. Lärm im Stall 3)	Stunden pro Tag	Schattenspender und/oder Suhle auf der Weide 5)
1,5	sehr licht und gleichmäßig ausgeleuchtet	optimal				≥ 8	Schattenspender und Suhle ausreichend
1,0	licht und gleich-mäßig ausgeleuchtet	gut	ausge-schlossen	ausreichend vorhanden	kein Lärm	≥ 6	Schattenspender oder Suhle ausreichend
0,5	mittel, ungleichmäßig	ausreichend	gelegent-lich	vorhanden zu wenig	leichter Lärm	≥ 4	Schatten und Suhle, zu wenig
0	dunkel, sehr ungleichmäßig	schlecht	häufig		deutlicher Lärm		Schatten oder Suhle, zu wenig
- ,0,5	sehr dunkel	sehr schlecht	immer		starker Lärm		keine

2) Ausreichend: ein Sprühkegel pro 10 Tiere
Zu wenig: 20 Tiere pro Sprühnippel
3) Lärm durch dauerhafte technische Geräusche

5. Betreuungsintensität (min. -3,0; max. 9 Punkte):

Spalte	a	b	c	d	e	f	g
Punkte	Sauberkeit: Buchten, Futter- und Tränkeein-richtungen	Technischer Zustand der Stalleinrich-tungen 1)	Verluste [%]	Zustand der Haut und Hautanhangs-organe 2)	Zustand der Klauen und Gelenke 3)	Stall-buch-führung	Tierge-sundheit 4)
1,5			≤ 0,5	sehr gut	sehr gut		sehr gut
1,0	sauber	gut	≤ 1	gut	gut	genau/ voll-ständig	gut
0,5	mittel	mittel	≤ 1,5	mittel	mittel	teil-weise	mittel
0	schmutzig	Mängel	≤ 2,0	schlecht	schlecht	nein	schlecht
- 0,5	sehr schmutzig	sehr schlecht	> 2,0	sehr schlecht	sehr schlecht		sehr schlecht

1) Tränken, Buchtenbe-grenzungen, Lüftung etc
2) Beschädigungen, Verletzungen der Tiere, Ektoparasiten
3) Klauenlänge, Kronsaumschwellungen, Verletzungen, Gelenkschwellungen
4) Häufigkeit von Leistungseinbrüchen, Erkrankungen und Behandlungen die nicht unter 2) und 3) fallen

Summenblatt

Einflussbereiche	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**Punktesumme**
I. Bewegungsmöglichkeit	Begehbare Fläche im Stall	Beschäftigungsmaterial	Scheuermöglichkt.	Auslaufgröße	Auslauftage/Jahr	Weidetage		
II. Sozialkontakt	Begehbare Fläche	Verfügbarkeit v. Einrichtungen	Anlieferg. Jungtiere *(ZS:Gruppenbildung)*	Anzahl dichter Seiten um Nest	Herdenstruktur, Gruppengröße	Auslauf Tage/Jahr (Umtriebe)	Durchgang zum Auslauf	
III. Bodenbeschaffenheit	Anzahl Bodenarten	Liegefläche: Weichheit, Dämmung	LF: Sauberkeit	LF: Trittsicherheit	Aktivitäts- u. Kotbereich	Auslauf	Suhle	
IV. Licht und Luft	Licht im Stall	Luftqualität Luftraten	Zugluft	Duschen	Lärm	Auslauf Std./Tag	Schattenspender, Suhle	
V. Betreuungsintensität	Sauberkeit im Stall	Zustand Stalleinrichtung	Verluste *(gilt nicht für ZS)*	Zustand der Haut	Zustand Klauen u. Gelenke	Stallbuchführung	Tiergesundheit	
						Gesamtpunkte		

1.5 Overview of indicators surveyed in the area of animal welfare

Ref. Area	Indicator framework	Indicator category	Indicator sub-category	Spatial level	Level of measure-ment	Data availability before CC	Data availability after CC	Kind of data	Source
Overall	Costs of compliance	Expected investment costs	-	NUTS 3	Farm level	-	2009	to be digitised	Interview
		Previous investment costs	-						
		Operating costs	Administration costs Control costs Operating costs						
		Scheme of gainful operation	Regular basis Sideline basis			No			
		Organisation	Legal form Production branches Main source of income			No			
	Farm conditions	Livestock	Mother cows Dairy cows Breeding bulls Feeding cattle Heifers Calves Feeding pigs Breeding sows Farrows	NUTS 3	Farm & animal	For 35 farms (2001)	2009	to be digitised	Interview
		Investments	Previous investments in animal husbandry Prospective investments in animal husbandry			No			
	Farmer's rejection of obligations	National regulations	Number of rejected regulations Grade of rejection	NUTS 3	Farm level	No	2009	to be digitised	Interview
		CC obligations	Number of rejected obligations Grade of rejection						
	Farmer's acquaintance of CC	Farmer's anticipated CC sanctions in case	One first-time infringement Several first-Time breaches of AW obligations	NUTS 3	Farm level	No	2009	to be digitised	Interview

	sanctions	of non-compliance	Several first-Time breaches of AW and PH obligations Repeated breaches within 3 years Deliberate infringements						
		Imposed CC sanctions	Reduction of direct payments National sanctions						
		Farmer's anticipated control frequency	-						
	Farmer's acquaintance of CC controls	Experience CC controls	Traceability Transparency Fairness Friendliness Cooperativeness Advice Sanctions	NUTS 3	Farm level	No	2009	to be digitised	Interview
	Farmer's risk aversion	Farmer's anticipated detection rate	Regular control CC control Control of certificate	NUTS 3	Farm level	No	2009	to be digitised	Interview
		Financial risk perception	-						
		Risk tolerance	-						
		General risk aversion	-						
		Farmer's rejection of obligations	Degree of compliance Interview results	NUTS 3	Farm level	No			Interview& assessment
	Farmer's acceptance of CC	Farmer's experiences with (CC) controls	Transparency Traceability Fairness Friendliness Cooperativeness Advice Sanctions	NUTS 3	Farm level	No	2009	to be digitised	Interview
Animal	Farmer's acquaintance	Farmer's compliance with	Degree of compliance	NUTS 3	Farm & animal level	No	2009	to be digitised	Interview & assessment

welfare	of obligations	national regulations	Interview results		Farm level				
		Acquaintance of CC obligations	Degree of compliance	NUTS 3	Farm & animal level				Interview & assessment
			Interview results	NUTS 3	Farm level				
	Housing systems	Claiming of transition periods for Housing systems	Adult cattle Calves Feeding pigs	NUTS 3	Farm level	For 35 farms (2001)	2009	to be digitised	Interview
		Reasons for claiming transition periods	Constructional problems Investment costs Personnel problems	NUTS 3	Farm level	No	2009	to be digitised	Interview
		Applied type of certification scheme	Certified organic farm (participation in association)	NUTS 3	Farm level				
			Codex farm Conventional & highly certified farms Conventional & moderately certified farms	NUTS 2 – NUTS 3	State to farm level	Yes	2009	to be digitised	Interview
	Membership in certification systems	Participation period	-	NUTS 3	Farm level	Yes	2009	to be digitised	Interview
		Control frequency	Depending on certification scheme	NUTS 0 - NUTS 2	State level	No	2009	to be digitised	Interview
			Depending on compliance	NUTS3	Farm level				
		Compliance with certification standards	-	NUTS 3	Farm level	Yes	2009	to be digitised	Interview
		Reasons for participation	-	NUTS 3	Farm level	No	2009	to be digitised	Interview
	Animal needs Index for cattle	Space allowance	Freestall barn: Accessible floor area Freestall barn: Lying down & rising Tie-stall: Dimensions of the stand Tie-stall: Length of the tie Run per day/year	NUTS 3	Farm & animal	For 29 farms (2001)	2009	to be digitised	Farm assessment

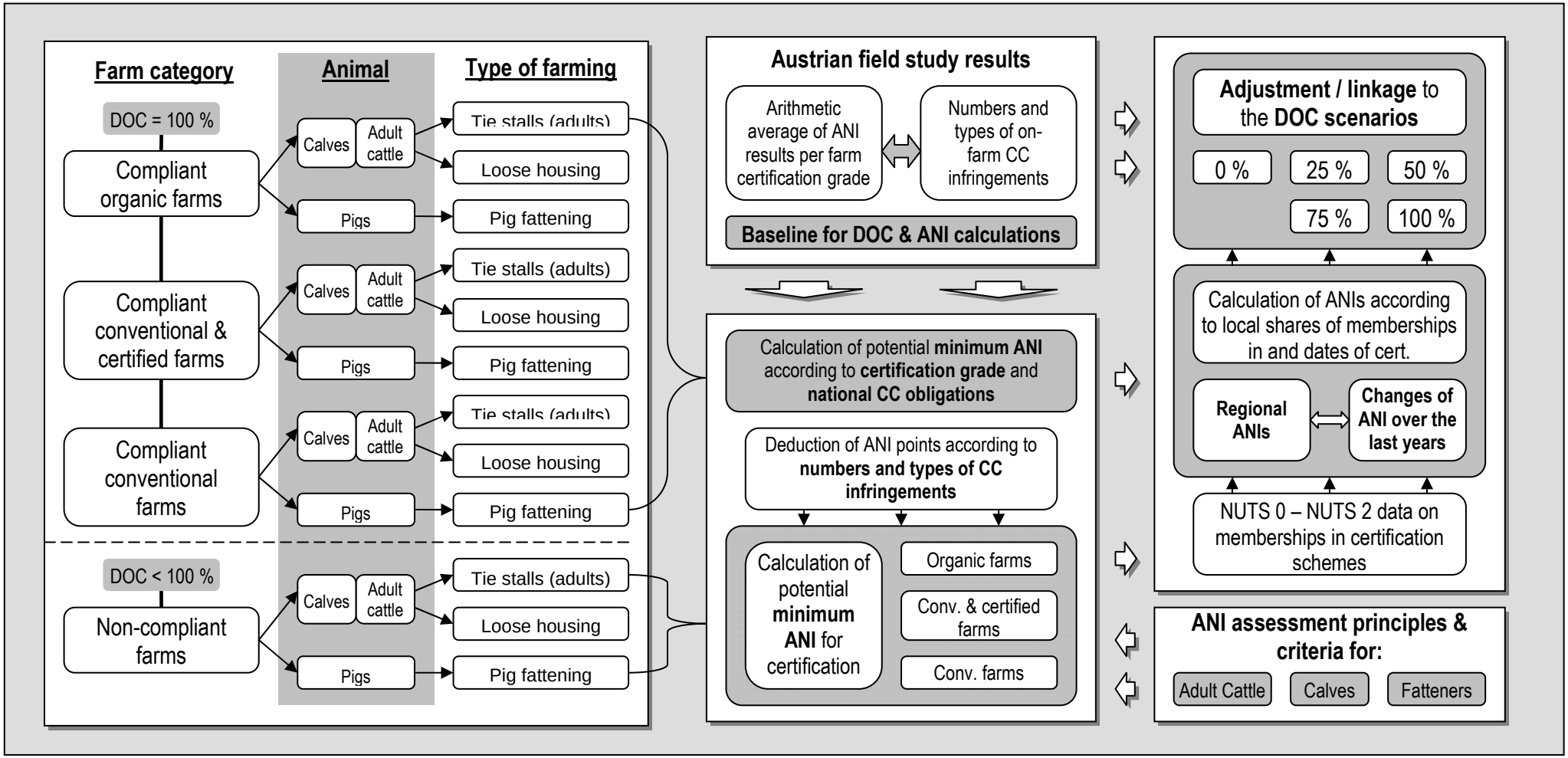
		Pasture days per year						
		Accessible floor area						
		Herd structure						
	Social contact	Breeding						
		Run per days/year						
		Pasture days per year						
		Softness of lying area						
		Cleanliness of lying area						
	Soil condition	Slipperiness of lying area						
		Drove alleyways						
		Separated run						
		Pasture						
		Light intensity in the stable						
		Air quality						
	Light and air in the stable	Infiltration intensity						
		Noise intensity						
		Run hours per day						
		Pasture						
		Cleanliness in the stable						
		Condition of equipment						
		Condition of the skin						
	Care	Cleanliness of the animals						
		Condition of the claws						
		Technopathies						
		Animal health						
Animal Needs Index for calves		Accessible floor area	NUTS 3	Farm & animal	For 10 farms (2001)	2009	to be digitised	Farm assessment
		Lying down & rising						
	Space allowance	Tie-stalls						
		Size of the run						
		Turnover						
		Pasture days						
		Accessible floor area						
		Herd structure						
	Social contact	Origin and delivery of calves						
		Turnover days						
		Pasture days per turnover						
	Soil condition	Softness of lying area						
		Cleanliness of lying area						
		Slipperiness of lying area						
		Drove alleyways						

		Separated run						
		Pasture						
		Light intensity in the stable						
		Air quality						
	Light and air in the stable	Infiltration intensity						
		Noise intensity						
		Run hours per day						
		Sun and wind protection						
		Cleanliness in the stable						
		Condition of equipment						
		Loss of calves						
	Care	Cleanliness of the calves						
		Condition of claws						
		Record keeping						
		Animal health						
Animal Needs Index for feeding pigs		Accessible floor area	NUTS 3	Farm & animal	For 10 farms (2001)	2009	to be digitised	Farm assessment
		Toys						
	Space allowance	Possibility of rubbing						
		Size of the run						
		Run days per year						
		Pasture days						
		Accessible floor area						
		Existence of equipment						
		Deliverance of piglets						
	Social contact	Condition of piglet stable						
		Herd structure						
		Run days per year						
		Access to the run						
		Number of soils						
		Softness of the lying area						
		Cleanliness of the lying area						
	Soil condition	Slipperiness of the lying area						
		Condition of the activity area						
		Run						
		Existence of wallow						
	Light and air in the stable	Light intensity in the stable						
		Air quality						
		Infiltration intensity						
		Existence of showers						
		Intensity of noise						

	Care	Run days per year Existence of wallow Cleanliness in the stable Condition of equipment Loss of animals Condition of the skin Condition of the claws Record keeping Animal health						
	Animal & farm Registration	Animal registration Animal marking Farm registration	NUTS 0 & NUTS 3	Member state level, farm & animal level	Yes (2005)		digital	
	Food safety	Cleanliness in farm Contamination of food Existing analyses Results milk analysis Hygiene of animals and equipment Cooling of milk Cleaning of milking equipment Record keeping Remedial actions Information in case of emergency	NUTS 3	Farm level	No		To be digitised	
Degree of compliance						2009		Farm assessment
	Feed safety	Contamination of feed Feeding of animal or fish meal Usage of feed additives	NUTS 3	Farm level	No		To be digitised	
	Animal welfare	Pigs Cattle Calves	NUTS 3	Farm & animal level	For 37 farms (2001)		To be digitised	
Additional indicators	Biologic yield	Milk yield Pigs: daily weight increase Cattle: daily weight increase	NUTS 3	Farm level	No	2009	To be digitised	Interview
	Loss of animals	Pigs Adult cattle						

Number of offspring	Calves Piglets per sow Calves per cow					
Veterinary costs 2008	-	NUTS 3	Farm level	No	2009	Interview

1.6 General procedure for the assessment of impacts of CC on farm animal welfare



1.7 Questionnaire for the farm interviews in Austria

Fragebogen Landwirte Österreich

Sämtliche eingeholten Daten werden anonymisiert und ausschließlich zu Forschungszwecken eingesetzt!

Allgemeine Angaben zur Person

1) Bitte nennen Sie Ihr Geschlecht!

[ ]a Männlich

[ ]b Weiblich

2) Wie alt sind Sie?

_____ Jahre

3) Bitte nennen Sie Ihren (höchsten) Schulabschluss!

[ ]a Hauptschulabschluss

[ ]b Realschulabschluss

[ ]c Abitur

[ ]d Sonstige

4) Bitte nennen Sie Ihren (höchsten) Ausbildungsabschluss als Landwirt!

[ ]a Lehre / Ausbildung

[ ]b Meister / staatlich geprüfter Landwirt

[ ]c (Fach)-Hochschulabschluss

[ ]d Sonstiges

5) Bitte nennen Sie Ihren (höchsten) außerlandwirtschaftlichen Ausbildungs-abschluss!

[ ]a Lehre / Ausbildung

[ ]b Meister

[ ]c (Fach)-Hochschulabschluss

[ ]d Sonstige

Allgemeine Angaben zum Betrieb

6) Welche Rechtsform hat Ihr Betrieb?

[ ]a Einzelunternehmen

[ ]b BGB-Gesellschaft (GbR)

[ ]c Kommanditgesellschaft (KG)

[ ]d GmbH

[ ]e GmbH & Co.KG

[ ]f Offene Gesellschaft (OG)

[ ]g Sonstige

7) Wird Ihr Betrieb im Haupt- oder Nebenerwerb bewirtschaftet? (Haupterwerb: Betrieb wird hauptberuflich bewirtschaftet wobei mehr als 50 % des Einkommens aus landwirtschaftlicher Arbeit erzielt wird)

[ ]a Haupterwerb

[ ]b Nebenerwerb

8) Welche Betriebszweige beinhaltet Ihr Landwirtschaftlicher Betrieb?

[ ]A Schweinemast

[ ]B Rindermast

[ ]C Kälbermast

[ ]D Rinderaufzucht

[ ]E Geflügelmast

[ ]F Ferkelproduktion

[ ]G Kälberproduktion

[ ]H Milchproduktion

[ ]I Eierproduktion

[ ]J Ackerbau

[ ]K Biogasproduktion

[ ]L Sonstige

9) Welcher Betriebszweig liefert den größten Einkommensbeitrag in Ihrem landwirtschaftlichen Betrieb?

Mehrfachnennungen möglich!

[ ]a Schweinemast

[ ]b Rindermast

[ ]c Rinderaufzucht

[ ]d Kälbermast

[ ]e Geflügelmast

[ ]f Ferkelproduktion

[ ]g Kälberproduktion

[ ]h Milchproduktion

[ ]i Eierproduktion

[ ]j Ackerbau

[ ]k Biogasproduktion

[ ]l Sonstige

10) Die von Ihrem Betrieb bewirtschafteten Flächen sind zum größten Teil...?

[ ]a Pachtflächen

[ ]b (Familien-) Eigentum

[ ]c Sonstige

11) Bitte geben Sie ihren Viehbestand an!

[ ]A Mutterkühe: ___

[ ]B Milchkühe: ___

[ ]C Mastrinder: ___

[ ]D Aufzuchtrinder: ___

[ ]E Kälber: ___

[ ]F Mastschweine: ___

[ ]G Zuchtsauen: ___

[ ]H Ferkel: ___

[ ]I Sonstige

12) Wie wird Ihr Betrieb im Tierhaltungsbereich bewirtschaftet?

Mehrfachnennungen bei kombinierter Tierhaltung möglich!

[ ]A Konventionell

[ ]B Konventionell mit Qualitätszertifikat

[ ]C Ökologisch / biologisch (zertifiziert)

[ ]D Sonstige

13) Welche Arbeitskräfte werden auf Ihrem Betrieb beschäftigt?

[ ]a Familien-AK

[ ]b Fremd-AK

[ ]c Beide

14) Falls Betrieb zertifiziert: Welche Zertifikate wurden durch Ihren Betrieb erworben? Wann wurde die Zertifizierung durchgeführt? Welchen Betriebsbereichen sind die Zertifikate zugeordnet?

[ ]A AMA-BIO:

[ ]B BIO-AUSTRIA:

[ ]C BIOLAND:

[ ]D DEMETER:

[ ]E NATURLAND:

[ ]F BIO-HOFMARKE:

[ ]G BK MOORBAD HARBACH:

[ ]H BL ENNSTAL:

[ ]I ORBI:

[ ]J QS:

[ ]K IKB:

[ ]L EUREPGAP:

[ ]M KT-FREILAND:

[ ]N AMA-GÜTESIEGEL:

[ ]O SCHIRNHOFER:

[ ]P Sonstige

15) Falls Betrieb zertifiziert: In welchen zeitlichen Abständen wird Ihr Betrieb auf das Zertifikat hin überprüft (auditiert)? Wie lange dauert eine Überprüfung durchschnittlich?

[ ]a Vierteljährlich: ...

[ ]b Halbjährlich: ...

[ ]c Jährlich: ...

[ ]d Alle 2 Jahre: ...

[ ]e Alle 3 Jahre: ...

[ ]f Sonstige

Allgemeine Vorstellung von "Cross Compliance"

16) Was verstehen Sie unter "Cross Compliance"?

_____

_____

_____

17) Inwieweit werden CC-Auflagen in Österreich durch nationale Gesetze bereits abgedeckt?

[ ]a Keine Abdeckung

[ ]b Kaum Abdeckung

[ ]c Weitgehende Abdeckung

[ ]d Vollständige Abdeckung

[ ]e Weiß nicht

18) Wie würden Sie ihren Kenntnisstand bezüglich des CC-Systems beschreiben?

[ ]-2 Keine Kenntnisse

[ ]-1 Kaum Kenntnisse

[ ]0 Durchschnittlicher Kenntnisstand

[ ]1 Guter Kenntnisstand

[ ]2 Sehr guter Kenntnisstand

19) Wie gut wurden Sie von behördlicher Seite über das CC-System informiert?

[ ]-2 Keine behördlichen Information

[ ]-1 Lückenhafte behördliche Information

[ ]0 Ausreichende behördliche Information

[ ]1 Gute behördliche Information

[ ]2 Sehr gute behördliche Information

20) Wurden Sie von behördlicher Seite hinsichtlich des CC-Systems und seiner Auflagen beraten bzw. wurde Ihnen persönliche Beratung angeboten?

[ ]a Ja

[ ]b Nein

21) Welche der folgenden Auflagen sind Ihrer Kenntnis nach CC-Auflagen?

Mehrfachnennungen möglich!

[ ]A Schweine: Der Lärmpegel im Stall darf nicht 85 dBA überschreiten

[ ]B Schweine: die mechanischen Lüftungsanlagen müssen täglich überprüft werden

[ ]C Schweine: Beim Kupieren darf höchstens die Hälfte des Schwanzes entfernt werden

[ ]D Schweine: Ab 40 Tieren muss eine Gesamtbodenfläche/Sau von 3,5 m² bestehen

[ ]E Schweine: Alle männliche Schweine dürfen grundsätzlich nur von einem Tierarzt kastriert werden

[ ]F Schweine: Vor dem Abstellen in Abferkelbuchten müssen Tiere sorgfältig gereinigt werden

[ ]G Schweine: Eber müssen andere Schweine hören, riechen und sehen können

[ ]H Rinder: Kälber werden nicht in Anbindehaltung gehalten

[ ]I Rinder: Betonspaltenböden haben eine Auftrittsbreite von mind. 40 mm

[ ]J Rinder: Der Tierbereich des Stalles weist über mind. 8h/Tag eine Lichtstärke von mind. 40 Lux auf

[ ]K Rinder: Die Tiere müssen bei tierärztlicher Untersuchung stets außerhalb des Laufstalls fixiert werden

[ ]L Rinder: Die Futterbarnsohle liegt mind. 10 cm über Standniveau

[ ]M Rinder: Alle Geräte die für das Wohlbefinden entscheidend sind, werden mind. 1 mal/Tag kontrolliert

[ ]N Rinder: Die tägliche Futterration der Kälber enthält genügend Jod

[ ]O LM- & FMS: Es müssen ausführliche Unterlagen über Aus- und Eingänge vorhanden sein

[ ]P LM- & FMS: Gelagerte Pflanzliche Produkte müssen frei von Schädlingen sein

[ ]Q LM- & FMS: Milch muss bei einer Temperatur von 10 ℃ gelagert werden

Themenbereich Nr. 1: Akzeptanz der Anreizsysteme

22) Inwieweit halten Sie die Einführung des CC-Systems für sinnvoll?

[ ]-2 Vollkommen unsinnig

[ ]-1 Weitgehend unsinnig

[ ]0

[ ]1 Weitgehend sinnvoll

[ ]2 Vollkommen sinnvoll

23) Falls unsinnig: Bitte geben Sie an warum Sie dem CC-System ablehnend gegenüber stehen? Inwieweit würden Sie folgenden Punkten zustimmen?

Bitte verwenden Sie folgende Bewertungsskala:

[0:Trifft überhaupt nicht zu; 1: Trifft weitestgehend nicht zu; 2: Trifft weitestgehend zu; 3: Trifft vollkommen zu]

[ ]A Mangelnde Transparenz

[ ]B Zu kompliziert

[ ]C Unnötige Erhöhung des Kontrollaufwandes

[ ]D Unnötige Erhöhung des Verwaltungsaufwandes

[ ]E Führt zu überflüssigen Doppelkontrollen

[ ]F Führt zu Kostensteigerung

[ ]G Unsinnigkeit einzelner CC-Auflagen

[ ]H Überprüfung von Selbstverständlichkeiten

[ ]I Unsinnigkeit von Kontrollmerkmalen

[ ]J Sonstige:

24) Inwieweit halten Sie die Einhaltung der CC-Auflagen folgender Bereiche für sinnvoll?

Bitte verwenden Sie folgende Bewertungsskala:

[-2: Vollkommen unsinnig; -1: Weitgehend unsinnig; 0: Weiß nicht; 1: Weitgehend sinnvoll; 2: Vollkommen sinnvoll]

[ ]A Rinderkennzeichnung & -registrierung

[ ]B Bodenbeschaffenheit (Rinder)

[ ]C Bewegungsmögl. & Sozialkontakt (Rinder)

[ ]D Luft, Licht und Lärm (Rinder)

[ ]E Tränke & Fütterung (Rinder)

[ ]F Betreuung (Rinder)

[ ]G Eingriffe (Rinder)

[ ]H Freilandhaltung (Rinder)

[ ]I Schweinekennzeichnung & -registrierung

[ ]J Allgemeine Haltungsvorschriften (Schweine)

[ ]K Bodenbeschaffenheit (Schweine)

[ ]L Bewegungsmögl. & Stall (Schweine)

[ ]M Luft, Licht & Lärm (Schweine)

[ ]N Beschäftigungsmaterial (Schweine)

[ ]O Fütterung und Fressplatzbreite (Schweine)

[ ]P Betreuung (Schweine)

[ ]Q Eingriffe (Schweine)

[ ]R Sauberkeit (LM- & FMS)

[ ]S Kontamination (LM- & FMS)

[ ]T Vorhandensein von Analysen (LM- & FMS)

[ ]U Milchuntersuchung (LM- & FMS)

[ ]V Hygiene Milchvieh (LM- & FMS)

[ ]W Milchkühlung (LM- & FMS)

[ ]X Reiniging Melkgeschirr (LM- & FMS)

[ ]Y Rückverfolgbarkeit (LM- & FMS)

[ ]Z Abhilfemaßnahmen (LM- & FMS)

[ ][Information LM-Kette (LM & FMS)

[ ]\ Registrierung Landwirt

Themenbereich Nr. 2: Integration der Anreizsysteme

25) Inwieweit halten Sie es für sinnvoll dass Zertifizierungsergebnisse im Rahmen von CC-Kontrollen herangezogen werden?

[ ]-2 Vollkommen sinnlos

[ ]-1 Weitgehend sinnlos

[ ]0 Weiß nicht

[ ]1 Weitgehend sinnvoll

[ ]2 Vollkommen Sinnvoll

26) Bitte begründen Sie Ihre Entscheidung!

_____

_____

_____

27) Falls zertifiziert: Inwieweit wären Sie dazu bereit Kontrollergebnisse der Zertifizierung bzw. Auditierung der amtlichen Kontrolle zur Verfügung zu stellen?

[ ]-1 Ich bin nicht dazu bereit

[ ]0 Weiß nicht

[ ]1 Ich bin dazu bereit

28) Inwieweit halten Sie die Ersetzung von CC-Kontrollen durch eine Teilnahme an Zertifizierungsstandards (z.B. AMA-Gütesiegel) für sinnvoll?

[ ]-2 Vollkommen sinnlos

[ ]-1 Weitgehend sinnlos

[ ]0 Weiß nicht

[ ]1 Weitgehend sinnvoll

[ ]2 Vollkommen sinnvoll

29) Bitte begründen Sie Ihre Einschätzung!

_____

_____

30) Inwieweit halten Sie die Ersetzung von CC-Kontrollen durch eine Teilnahme an Zertifizierungsstandards für umsetzbar?

[ ]-2 Nicht umsetzbar

[ ]-1 Kaum umsetzbar

[ ]0 Weiß nicht

[ ]1 Weitgehend umsetzbar

[ ]2 Vollkommen umsetzbar

Themenbereich Nr. 3: Kosten der Auflageneinhaltung

31) Wie aufwendig bzw. kostenintensiv war die Einhaltung folgender CC-Auflagen auf Ihrem Betrieb?

Bitte verwenden Sie folgende Beurteilungsskala:

[0: Kein Aufwand / selbstverständlich; 1: Geringer Aufwand; 2: Mittlerer Aufwand; 3: Hoher Aufwand]

[ ]A Rinderkennzeichnung & -registrierung

[ ]B Bodenbeschaffenheit (Rinder)

[ ]C Bewegungsmögl. & Sozialkontakt (Rinder)

[ ]D Luft, Licht und Lärm (Rinder)

[ ]E Tränke und Fütterung (Rinder)

[ ]F Betreuung (Rinder)

[ ]G Eingriffe (Rinder)

[ ]H Freilandhaltung (Rinder)

[ ]I Schweinekennzeichnung & -registrierung

[ ]J Allgemeine Haltungsvorschriften (Schweine)

[ ]K Bodenbeschaffenheit (Schweine)

[ ]L Bewegungsmögl. & Stall (Schweine)

[ ]M Luft, Licht & Lärm (Schweine)

[ ]N Beschäftigungsmaterial (Schweine)

[ ]O Fütterung und Fressplatzbreite (Schweine)

[ ]P Betreuung (Schweine)

[ ]Q Eingriffe (Schweine)

[ ]R Sauberkeit (LM- & FMS)

[ ]S Kontamination (LM- & FMS)

[ ]T Vorhandensein von Analysen (LM- FMS)

[ ]U Milchuntersuchung (LM- & FMS)

[ ]V Hygiene Milchvieh (LM- & FMS)

[ ]W Milchkühlung (LM- & FMS)

[ ]X Reinigung Melkgeschirr (LM- & FMS)

[ ]Y Rückverfolgbarkeit (LM- & FMS)

[ ]Z Abhilfemaßnahmen (LM- & FMS)

[ ][Information LM-Kette (LM- & FMS)

[ ]\ Registrierung Landwirt

[ ]] Sonstige

32) Wie hoch waren Ihre betrieblichen Investitionen im Bereich der Tierhaltung innerhalb der letzten 5 Jahre?

[ ]a 0 bis 10.000 €

[ ]b 10.000 - 25.000 €

[ ]c 25.000 - 50.000 €

[ ]d 50.000 - 75.000 €

[ ]e 75.000 - 100.000 €

[ ]f 100.000 - 150.000 €

[ ]g 150.000 - 250.000 €

[ ]h 250.000 - 500.000 €

[ ]i Über 500.000 €

33) Welcher Anteil der Investitionen war für die Sicherstellung gesetzlicher und Europäischer CC-Auflagen notwendig?

[ ]a 0 %

[ ]b 1 - 10 %

[ ]c 11 - 20 %

[ ]d 21 - 30 %

[ ]e 31 - 40 %

[ ]f 41 - 50 %

[ ]g 51 - 60 %

[ ]h 61 - 70 %

[ ]i 71 - 80 %

[ ]j 81 - 90 %

[ ]k 91 - 100 %

34) Welche betrieblichen Investitionen haben Sie im Tierhaltungsbereich getätigt um die Einhaltung der CC-Auflagen sicherzustellen? Wann haben Sie diese getätigt?

_____

_____

_____

35) Falls Betrieb zertifiziert: Welcher Anteil der Investitionen war für die Erfüllung von Zertifizierungsauflagen notwendig?

[ ]a 0 %

[ ]b 1 - 10 %

[ ]c 11 - 20 %

[ ]d 21 - 30 %

[ ]e 31 - 40 %

[ ]f 41 - 50 %

[ ]g 51 - 60 %

[ ]h 61 - 70 %

[ ]i 71 - 80 %

[ ]j 81 - 90 %

[ ]k 91 - 100%

36) Falls Betrieb zertifiziert: Welche betrieblichen Investitionen haben Sie im Tierhaltungsbereich getätigt um die Einhaltung der Zertifizierungsauflagen sicherzustellen? Wann haben Sie diese getätigt?

_____

_____

_____

37) Wie hoch werden Ihre betrieblichen Investitionen im Bereich der Tierhaltung voraussichtlich innerhalb der nächsten 3 Jahren sein?

[ ]a 0 - 10.000 €

[ ]b 10.000 - 25.000 €

[ ]c 25.000 - 50.000 €

[ ]d 50.000 - 75.000 €

[ ]e 75.000 - 100.000 €

[ ]f 100.000 - 150.000 €

[ ]g 150.000 - 250.000 €

[ ]h 250.000 - 500.000 €

[ ]i Über 500.000 €

38) Welcher Anteil der Investitionen wird voraussichtlich für die Sicherstellung gesetzlicher und Europäischer CC-Auflagen notwendig sein?

[ ]a 0 %

[ ]b 1 - 10 %

[ ]c 11 - 20 %

[ ]d 21 - 30 %

[ ]e 31 - 40 %

[ ]f 41 - 50 %

[ ]g 51 - 60 %

[ ]h 61 - 70 %

[ ]i 71 - 80 %

[ ]j 81 - 90 %

[ ]k 91 - 100 %

39) Welcher Anteil der Investitionen wird voraussichtlich für die Erfüllung von Zertifizierungsauflagen notwendig sein?

[ ]a 0 %

[ ]b 1 - 10 %

[ ]c 11 - 20 %

[ ]d 21 - 30 %

[ ]e 31 - 40 %

[ ]f 41 - 50 %

[ ]g 51 - 60 %

[ ]h 61 - 70 %

[ ]i 71 - 80 %

[ ]j 81 - 90 %

[ ]k 91 - 100 %

40) Inwieweit werden nach Abschluss der Investitionen die gesetzlichen sowie Europäischen Auflagen erfüllt sein?

[ ]-2 Keine Erfüllung der Auflagen

[ ]-1 Kaum Erfüllung der Auflagen

[ ]0

[ ]1 Weitgehende Erfüllung der Auflagen

[ ]2 Vollständige Erfüllung der Auflagen

41) Geben Sie bitte an um wie viel Prozent sich Ihr zeitlicher Verwaltungsaufwand (ausschließlich Kontrollaufwand) durch Einhaltung der CC-Auflagen (bzw. Auflagen des Bundestierschutzgesetzes von 2005, LM- und Verbraucherschutzgesetz von 2006) im Tierhaltungsbereich erhöht hat!

[ ]a Unverändert

[ ]b Weniger als 5 %

[ ]c 5 - 10 %

[ ]d 11 - 20 %

[ ]e 21 - 30 %

[ ]f 31 - 40 %

[ ]g 41 - 50 %

[ ]h Mehr als 50 %

[ ]i Sonstige

42) Falls Betrieb zertifiziert: Geben Sie bitte an um wie viel Prozent sich Ihr zeitlicher Verwaltungsaufwand durch Einhaltung der Zertifizierungsauflagen im Tierhaltungsbereich verändert hat!

[ ]a Gesunken um etwa ___ %

[ ]b Unverändert

[ ]c Um weniger als 5 % gestiegen

[ ]d Um 5 - 10 % gestiegen

[ ]e Um 11 - 20 % gestiegen

[ ]f Um 21 - 30 % gestiegen

[ ]g Um 31 - 40 % gestiegen

[ ]h Um 41 - 50 % gestiegen

[ ]i Um 51 - 60 % gestiegen

[ ]j Um mehr als 60 % gestiegen

[ ]k Sonstige

43) Falls Betrieb zertifiziert: Die Einhaltung welches Kontrollsystems verursacht im Tierhaltungsbereich den höheren Verwaltungsaufwand?

[ ]a CC-System

[ ]b Zertifizierungsstandard

[ ]c Gleicher Verwaltungsaufwand

44) Geben Sie bitte an um wie viel Prozent sich Ihr zeitlicher Kontrollaufwand im Tierhaltungsbereich durch Einführung des CC-Systems erhöht hat!

[ ]a Unverändert

[ ]b Weniger als 5 %

[ ]c 5 - 10 %

[ ]d 11 - 20 %

[ ]e 21 - 30 %

[ ]f 31 - 40 %

[ ]g Mehr als 40 %

[ ]h Sonstige

45) Falls Betrieb zertifiziert: Geben Sie bitte an um wieviel Prozent sich Ihr zeitlicher Kontrollaufwand im Tierhaltungsbereich durch Einhaltung der Zertifizierungsauflagen verändert hat!

[ ]a Gesunken um etwa ___ %

[ ]b Unverändert

[ ]c Um weniger als 5 % gestiegen

[ ]d Um 5 - 10 % gestiegen

[ ]e Um 11 - 20 % gestiegen

[ ]f Um 21- 30 % gestiegen

[ ]g Um 31 - 40 % gestiegen

[ ]h Um 41 - 50 % gestiegen

[ ]i Um 51 - 60 % gestiegen

[ ]j Um mehr als 60 % gestiegen

[ ]k Sonstige

Themenbereich Nr. 4: Kontrolle von Auflagen

46) Welche Kontrollrate der CC-Auflagen erwarten Sie?

[ ]a Alle 10 Jahre

[ ]b Alle 7 Jahre

[ ]c Alle 5 Jahre

[ ]d Alle 4 Jahre

[ ]e Alle 3 Jahre

[ ]f Alle 2 Jahre

[ ]g Jährlich

[ ]h Halbjährlich

[ ]i Vierteljährlich

[ ]j Sonstige

47) a) Wie oft wurde Ihr Betrieb in den letzten 5 Jahren durch die amtliche Kontrolle überprüft? b) Wie lange dauert eine Kontrolle im Durchschnitt?

_____ mal. Eine Kontrolle dauert im Durchschnitt _____ Minuten

48) a) Wie oft wurde Ihr Betrieb bereits einer CC-Kontrolle unterzogen? b) Wie lange dauert eine CC-Kontrolle im Durchschnitt?

_____ mal. Eine CC-Kontrolle dauert im Durchschnitt _____ Minuten

49) Falls Betrieb bereits einer CC-Kontrolle unterzogen wurde: In welchem Bereich wurde ein Verstoß gegen CC-Auflagen beanstandet?

[ ]A Kein Verstoß

[ ]B Bodenbeschaffenheit (Rinder)

[ ]C Bewegungsmögl. & Sozialkontakt (Rinder)

[ ]D Luft, Licht & Lärm (Rinder)

[ ]E Tränke & Fütterung (Rinder)

[ ]F Betreuung (Rinder)

[ ]G Eingriffe (Rinder)

[ ]H Freilandhaltung (Rinder)

[ ]I Allgemeine Haltungsvorschriften (Schweine)

[ ]J Bodenbeschaffenheit (Schweine)

[ ]K Bewegungsmögl. & Stall (Schweine)

[ ]L Luft, Licht & Lärm (Schweine)

[ ]M Beschäftigungsmaterial (Schweine)

[ ]N Fütterung und Fressplatzbreite (Schweine)

[ ]O Betreuung (Schweine)

[ ]P Eingriffe (Schweine)

[ ]Q Auflagen LM- und Futtermittelsicherheit

[ ]R Umwelt

[ ]S Flächenerhalt

[ ]T Sonstige

50) Im Falle von Beanstandungen: Die Einhaltung welcher konkreten CC-Auflagen wurde beanstandet?

_____

_____

_____

_____

51) Im Falle von Beanstandungen: Um wieviel Prozent wurden dadurch Ihre Direktzahlungen gekürzt?

[ ]a Keine Kürzung

[ ]b 1 %

[ ]c 2 %

[ ]d 3 %

[ ]e 4 %

[ ]f 5 %

[ ]g 10 %

[ ]h 15 %

[ ]i 25 %

[ ]j 100 %

[ ]k Sonstige

52) Falls Betrieb zertifiziert: Wurde die Einhaltung von Auflagen durch den Zertifizierungsstandard schon einmal beanstandet? Falls ja: welche Auflagen wurden beanstandet? Wie ist die Bestrafung ausgefallen?

_____

_____

_____

_____

Themenbereich Nr. 5: Einhaltungsanreiz der Systeme

53) Falls Betrieb zertifiziert: Die Einhaltung welcher Auflagen hat für Sie eine höhere Priorität?

[ ]a CC-Auflagen (Grundanforderungen an die Betriebsführung)

[ ]b Auflagen Zertifizierungsstandard

[ ]c Beide haben die gleiche Priorität

54) Bitte Begründen Sie Ihre Entscheidung!

_____

_____

_____

55) Die Einhaltung der Auflagen welches Kontrollsystems hat/hätte für Sie einen größeren finanziellen Anreiz?

[ ]a CC-System

[ ]b Zertifizierungsstandard

[ ]c Beide haben für mich den gleichen Einhaltungsanreiz

56) Gibt es CC-Auflagen die Sie bewusst nicht einhalten? Falls Ja: Welche?

[ ]a Nein

[ ]b Ja: _____

57) Falls ja: Nennen Sie bitte die Gründe für ihre bewusste Nichteinhaltung der CC-Auflagen!

[ ]A Prämienkürzung und Bußgeld ist geringer als Investitionssumme

[ ]B Unsinnigkeit einzelner Auflagen

[ ]C Nutzung der Übergangsfrist für bestimmte Auflagen

[ ]D Bauliche Umsetzungsschwierigkeiten

[ ]E Personelle Umsetzungsschwierigkeiten

[ ]F Sonstige

58) Warum halten Sie CC-Auflagen ein? Bitte geben Sie an inwieweit die folgenden Aspekte bei Ihrer Entscheidung berücksichtigt werden!

Bitte verwenden Sie die folgende Bewertungsskala:

[0: Spielt keine Rolle; 1: Spielt eine untergeordnete Rolle; 2: Spielt eine wichtige Rolle; 3: Spielt eine sehr wichtige Rolle]

[ ]A Verhinderung von Prämienkürzungen

[ ]B Verhinderung von Bußgeldern

[ ]C Bedenken hinsichtlich Tierschutz

[ ]D Bedenken hinsichtlich Verbraucherschutz

[ ]E Befürwortung des CC-Systems

[ ]F Überlappung mit Auflagen von ZS

[ ]G Sonstige

59) Falls Betrieb zertifiziert: Welche Gründe waren für Sie relevant um an einem Zertifizierungsstandard (ZS) teilzunehmen? Bitte bewerten Sie die Gründe gemäß Ihrer Wichtigkeit für Ihren Betrieb?

Bitte verwenden Sie folgende Bewertungsskala:

[0: Spielte keine Rolle; 1: Spielte eine untergeordnete Rolle; 2: Spielte eine wichtige Rolle; 3: Spielte eine sehr wichtige Rolle]

[ ]A Verbesserter Absatz

[ ]B Dokumentiertes Eigenkontrollsystem

[ ]C Teilnahme an Fortbildungsveranstaltungen

[ ]D Überprüfung der Produktqualität

[ ]E Mindeststandard über Produktionskette

[ ]F Bewerbung des Prüfzeichens

[ ]G Vertrauen in Zertifikat

[ ]H Reduzierte behördliche Kontrollrate

[ ]I Überlappung der CC-Auflagen mit ZS

[ ]J Gewinnerhöhung

[ ]K Verbesserung betrieblicher Abläufe

[ ]L Verbraucherschutzbedenken

[ ]M Tierschutzbedenken

[ ]N Biologische Lebensweise

[ ]O Sonstige

60) Falls zertifiziert: Inwieweit wurden Ihre Erwartungen an den Zertifizierungsstandard erfüllt?

Bitte verwenden Sie folgende Bewertungsskala:

[0: Erwartungen wurden nicht erfüllt; 1: Erwartungen wurden teilweise erfüllt; 2: Erwartungen wurden vollständig erfüllt]

[ ]A Verbesserter Absatz

[ ]B Dokumentiertes Eigenkontrollsystem

[ ]C Teilnahme an Fortbildungsveranstaltungen

[ ]D Überprüfung der Produktqualität

[ ]E Mindeststandard über Produktionskette

[ ]F Bewerbung des Prüfzeichens

[ ]G Vertrauen in Zertifikat

[ ]H Reduzierte behördliche Kontrollrate

[ ]I Überlappung der CC-Auflagen mit ZS

[ ]J Gewinnerhöhung

[ ]K Verbesserung betrieblicher Abläufe

[ ]L Verbraucherschutzaspekte

[ ]M Tierschutzaspekte

[ ]N Biologische Lebensweise

[ ]O Sonstige

61) Falls Betrieb zertifiziert: Um welchen Anteil hat sich ihr Einkommen durch die Teilnahme an einem Zertifizierungsstandard a) gesamtbetrieblich b) für einzelne zertifizierte Betriebsbereiche verändert?

[ ]A Gesamtbetrieblich: Einkommen hat sich um etwa ___ % [ ] erhöht [ ] verringert

[ ]B Einkommen hat sich in dem Betriebsbereich _____ um ___ % [ ] erhöht [ ] verringert

[ ]C Einkommen hat sich in dem Betriebsbereich _____ um ___ % [ ] erhöht [ ] verringert

[ ]D Einkommen hat sich in dem Betriebsbereich _____ um ___ % [ ] erhöht [ ] verringert

62) Falls Betrieb nicht zertifiziert: Um welchen Anteil hat sich ihr Einkommen durch die Nichtteilnahme an einem Zertifizierungsstandard a) gesamt-betrieblich b) für einzelne zertifizierte Betriebsbereiche verändert?

[ ]A Gesamtbetrieblich: Einkommen hat sich um etwa ___ % [ ] erhöht [ ] verringert

[ ]B Einkommen hat sich in dem Betriebsbereich _____ um ___ % [ ] erhöht [ ] verringert

[ ]C Einkommen hat sich in dem Betriebsbereich _____ um ___ % [ ] erhöht [ ] verringert

[ ]D Einkommen hat sich in dem Betriebsbereich _____ um ___ % [ ] erhöht [ ] verringert

63) Falls Betrieb zertifiziert: Inwieweit sind Sie mit Ihrer Teilnahme an dem Zertifizierungsstandard zufrieden?

[ ]1 Überhaupt nicht zufrieden

[ ]2 Weitgehend unzufrieden

[ ]3 Neutral

[ ]4 Weitgehend zufrieden

[ ]5 Vollkommen zufrieden

64) Falls Betrieb nicht zertifiziert: Inwieweit ziehen Sie in Betracht ihren Betrieb zertifizieren zu lassen (z.B. Bio-Zertifizierung)?

[ ]a Ich lehne die Teilnahme an ZS grundsätzlich ab

[ ]b Kommt wahrscheinlich nicht in Frage

[ ]c Kommt wahrscheinlich in Frage

[ ]d Ist in Planung

65) Falls Zertifizierung nicht in Frage kommt: Warum stehen Sie Zertifizierungsstandards ablehnend gegenüber?

[ ]A Zu hohe Investitionskosten

[ ]B Zu hohe Teilnahmekosten

[ ]C Unpassende Betriebsstruktur

[ ]D Mangelnde Transparenz

[ ]E Zu kompliziert

[ ]F Unsinnigkeit einzelner Auflagen

[ ]G Erhöhung des Kontrollaufwandes

[ ]H Erhöhung des Verwaltungsaufwandes

[ ]I Sonstige

66) Falls Zertifizierung in Frage kommt: Welche/s Zertifikat/e kommt/kommen für Ihren Betrieb in Frage?

[ ]A AMA-BIO

[ ]B BIO-AUSTRIA

[ ]C BIOLAND

[ ]D DEMETER

[ ]E NATURLAND

[ ]F BIO-HOFMARKE

[ ]G BK MOORBAD HARBACH

[ ]H BL ENNSTAL

[ ]I ORBI

[ ]J QS

[ ]K IKB

[ ]L EUREPGAP

[ ]M KT-FREILAND

[ ]N AMA-GÜTESIEGEL

[ ]O SCHIRNHOFER

[ ]P Sonstige

67) Falls Zertifizierung in Frage kommt: Warum spielen Sie mit dem Gedanken Ihren Betrieb zertifizieren zu lassen? Bitte bewerten Sie die Gründe gemäß ihrer Wichtigkeit für Ihren Betrieb!

Bitte verwenden Sie folgende Bewertungsskala:

[0: Spielt keine Rolle; 1: Spielt eine untergeordnete Rolle; 2: Spielt eine wichtige Rolle; 3: Spielt eine sehr wichtige Rolle]

[ ]A Verbesserter Absatz

[ ]B Dokumentiertes Eigenkontrollsystem

[ ]C Teilnahme an Fortbildungsveranstaltungen

[ ]D Überprüfung der Produktqualität

[ ]E Mindeststandards über Produktionskette

[ ]F Bewerbung des Prüfzeichens

[ ]G Vertrauen in Zertifikat

[ ]H Reduzierte behördliche Kontrollrate

[ ]I Überlappung von CC mit Auflagen ZS

[ ]J Gewinnerhöhung

[ ]K Verbesserung betrieblicher Abläufe

[ ]L Verbraucherschutzbedenken

[ ]M Tierschutzbedenken

[ ]N Biologische Lebensweise

[ ]O Sonstige

Themenbereich Nr. 6: Erwartete Aufdeckungswahrscheinlichkeit im Kontrollfall

68) Wie hoch schätzen Sie die Wahrscheinlichkeit ein dass ein Verstoß gegen CC-Auflagen bei der regulären Fachrechtskontrolle (durch Veterinärbehörde) aufgedeckt wird?

[ ]a 91 - 100 %

[ ]b 81 - 90 %

[ ]c 71 - 80 %

[ ]d 61 - 70 %

[ ]e 51 - 60 %

[ ]f 41 - 50 %

[ ]g 31 - 40 %

[ ]h 21 - 30 %

[ ]i 11 - 20 %

[ ]j 1 - 10 %

[ ]k 0 %

69) Wie hoch schätzen Sie die Wahrscheinlichkeit ein dass ein Verstoß gegen CC-Auflagen bei einer offiziellen CC-Kontrolle aufgedeckt wird?

[ ]a 91 - 100 %

[ ]b 81 - 90 %

[ ]c 71 - 80 %

[ ]d 61 - 70 %

[ ]e 51 - 60 %

[ ]f 41 - 50 %

[ ]g 31 - 40 %

[ ]h 21 - 30 %

[ ]i 11 - 20 %

[ ]j 1 - 10 %

[ ]k 0 %

70) Wie hoch schätzen Sie die Wahrscheinlichkeit ein dass ein Verstoß gegen Zertifizierungsauflagen bei der entsprechenden Kontrolle aufgedeckt wird?

[ ]a 91 - 100 %

[ ]b 81 - 90 %

[ ]c 71 - 80 %

[ ]d 61 - 70 %

[ ]e 51 - 60 %

[ ]f 41 - 50 %

[ ]g 31 - 40 %

[ ]h 21 - 30 %

[ ]i 11 - 20 %

[ ]j 1 - 10 %

[ ]k 0 %

Themenbereich Nr. 7: Erwartete Sanktionierung

71) Mit welchen Folgen rechnen Sie im Falle des Verstoßes gegen CC-Auflagen im Bereich der Tierhaltung bzw. Lebensmittelsicherheit im Allgemeinen? Bitte bewerten Sie diese gemäß Ihrer Schwere für Ihren Betrieb!

Bitte verwenden Sie folgende Bewertungsskala:

[0: Keine Abschreckung; 1: Geringfügige Abschreckung; 2: Hohe Abschreckung; 3: Sehr hohe Abschreckung]

[ ]A Kürzung von EU-Direktzahlungen

[ ]B Bestrafung wegen des Verstoßes gegen nationale Auflagen

[ ]C Erhöhte Häufigkeit von CC-Kontrollen

[ ]D Imageschaden

[ ]E Erhöhte Häufigkeit förderrechtlicher Kontrollen

[ ]F Mündliche Verwarnung

[ ]G Verstoß gegen Zertifizierungsauflagen: Erhöhte Auditierungshäufigkeit

[ ]H Sonstige

72) Mit welchen Folgen rechnen Sie im Falle des Verstoßes gegen Auflagen eines Zertifizierungsstandards im Allgemeinen? Bitte bewerten Sie diese gemäß der erwarteten Schwere für Ihren Betrieb!

Bitte verwenden Sie folgende Bewertungsskala:

[0: Keine Abschreckung; 1: Geringfügige Abschreckung; 2: Hohe Abschreckung; 3: Sehr hohe Abschreckung]

[ ]A Aufforderung zur Nachbesserung

[ ]B Kostenpflichtige Nachkontrollen

[ ]C Vertragsstrafen (z. B. zeitweiser Entzug des Prüfsiegels)

[ ]D Ausschluss aus dem System

[ ]E Sonstige

73) Die Sanktionen welches Kontrollsystems hätten für Ihren Betrieb schwerere Folgen? Bitte beziehen Sie Ihre Einschätzung auf die folgenden Fälle!

[1: Sanktionen CC-Auflagen; 2: Sanktionen Zertifizierungsauflagen; 3: Sanktionen gleich

hart]

[ ]a Einmaliger leichter Verstoß

[ ]b Einmaliger mittlerer Verstoß

[ ]c Einmaliger schwerer Verstoß

[ ]d Mehrere einmalige leichte Verstöße im Bereich des Tierschutzes und der LM- und FM-Sicherheit

[ ]e Mehrere einmalige mittlere Verstöße im Bereich des Tierschutzes und der LM- und FM-Sicherheit

[ ]f Mehrere einmalige schwere Verstöße im Bereich des Tierschutzes und der LM- und FM-Sicherheit

[ ]g Erneuter leichter Verstoß gegen gleiche Auflagen innerhalb von 3 Jahren

[ ]h Erneuter mittlerer Verstoß gegen gleiche Auflagen innerhalb von 3 Jahren

[ ]i Erneuter schwerer Verstoß gegen gleiche Auflagen innerhalb von 3 Jahren

74) Welche maximale Prämienkürzung erwarten Sie bei folgenden Fällen?

[ ]A Ein erstmaliger Verstoß gegen CC-Auflage im Bereich Tierschutz: .....

[ ]B Mehrere erstmaliger Verstöße im Bereich Tierschutz: .....

[ ]C Mehrere erstmalige Verstöße im Bereich Tierschutz und Lebensmittelsicherheit: .....

[ ]D Erneute fahrlässige Verstöße gegen CC-Auflagen innerhalb von 3 Jahren: .....

[ ]E Vorsätzliche/r Verstoß/Verstöße gegen eine CC-Auflage: .....

Themenbereich Nr. 8: Erwartete indirekte und soziale Bestrafung bei Verstößen

75) Welchen Stellenwert haben für Sie Bestrafungen indirekter oder sozialer Art im Falle des Verstoßes gegen Tierhaltungsauflagen?

Bitte verwenden Sie zur Bewertung folgende Zahlenwerte:

[0: Spielt keine Rolle; 1: Spielt eine untergeordnete Rolle ; 2: Spielt eine große Rolle; 3: Spielt eine sehr große Rolle]

[ ]A Imageschaden

[ ]B Erhöhte Kontrollrate

[ ]C Verbot der Tierhaltung

[ ]D Sonstige

Themenbereich Nr. 9: Individuelle Risikoaversion

76) Vermeiden Sie in der Regel Risiken oder sind Sie ein risikobereiter Mensch?

[ ]-2 Ich bin sehr risikoscheu

[ ]-1 Ich bin eher risikoscheu

[ ]0 Ich bin weder risikofreudig noch -scheu

[ ]1 Ich bin eher risikofreudig

[ ]2 Ich bin sehr risikofreudig

77) Welche der folgenden Möglichkeiten würden Sie wählen wenn Sie Gewinner einer Lotterie wären?

[ ]a Den Barpreis von 5000 €

[ ]b Die 50%-Chance auf 10.000 €

[ ]c Die 20%-Chance auf 25.000 €

[ ]d Die 2%-Chance auf 250.000 €

78) Ich betrachte riskante Situationen als Herausforderung

[ ]-2 Trifft gar nicht zu

[ ]-1 Trifft eher nicht / ein wenig zu

[ ]0

[ ]1 Trifft überwiegend / weitgehend zu

[ ]2 Trifft vollkommen zu

79) Für wie riskant schätzen Sie die folgenden Situationen ein? Für wie hoch schätzen Sie die Wahrscheinlichkeit ein Folgendes zu tun?

Bitte verwenden Sie für Frageteil a) folgende Bewertungsskala:

[0: Vollkommen unriskant; 1: Eher unriskant; 2: riskant; 3: Sehr riskant]

Bitte verwenden Sie für Frageteil b) folgende Bewertungsskala:

[0: Sehr gering; 1: Gering; 2: Hoch; 3: Sehr hoch]

[ ]A 10 % Ihres Jahreseinkommens in ein mäßig wachsendes Wertpapierdepot zu investieren: ___ / ___

[ ]B 5 % Ihres Jahreseinkommens in eine sehr spekulative Aktie zu investieren: ___ / ___

[ ]C 5 % Ihres Jahreseinkommens in eine konservative Aktie zu investieren: ___ / ___

[ ]D 10 % Ihres Jahreseinkommens in Staatsanleihen (Schatzbriefe) zu inverstieren: ___ / ___

[ ]E Ihr Tageseinkommen auf das Ergebnis eines Sport-Ereignisses setzen: ___ / ___

[ ]F Das Einkommen einer Woche im Casino setzen: ___ / ___

80) In finanziellen Dingen bin und bleibe ich risikobereit

[ ]-2 Trifft gar nicht zu

[ ]-1 Trifft eher nicht / ein wenig zu

[ ]0

[ ]1 Trifft überwiegend / weitgehend zu

[ ]2 Trifft vollkommen zu

81) Ich nehme gerne mal ein Risiko in Kauf, wenn es etwas zu gewinnen gibt

[ ]-2 Trifft gar nicht zu

[ ]-1 Trifft eher nicht / ein wenig zu

[ ]0

[ ]1 Trifft überwiegend / weitgehend zu

[ ]2 Trifft vollkommen zu

Themenbereich Nr. 10: Persönliche Erfahrungen

82) Welche Erfahrungen haben Sie mit der amtlichen Kontrolle hinsichtlich der folgenden Gesichtspunkte gemacht?

Bitte verwenden Sie folgende Bewertungsskala:

[-2: Sehr schlechte Erfahrungen; -1: Schlechte Erfahrungen; 0: Neutral; 1: Gute Erfahrungen; 2: Sehr gute Erfahrungen]

[ ]A Nachvollziehbarkeit

[ ]B Transparenz

[ ]C Gerechtheit

[ ]D Freundlichkeit

[ ]E Kooperationsbereitschaft

[ ]F Beratung

[ ]G Sanktionierung

[ ]H Sonstige

83) Welche Erfahrungen haben Sie im Allgemeinen mit EU-Recht gemacht?

[ ]-2 Sehr schlechte Erfahrungen

[ ]-1 Schlechte Erfahrungen

[ ]0 Weder gute noch schlechte Erfahrungen

[ ]1 Gute Erfahrungen

[ ]2 Sehr gute Erfahrungen

Themenbereich Nr. 11: Moralische Bedenken

84) Inwieweit spielen für Sie moralische Bedenken bei der Einhaltung von gesetzlichen Auflagen eine Rolle? Bitte bewerten Sie Ihren Einfluss hinsichtlich folgender Aspekte!

Bitte verwenden Sie folgende Bewertungsskala:

[0: Spielen keine Rolle; 1: Spielen eine untergeordnete Rolle; 2: Spielen eine große Rolle; 3: Spielen eine sehr große Rolle]

[ ]A Rechtskonformität

[ ]B Tierschutz

[ ]C Verbraucherschutz

[ ]D Sonstige

Themenbereich Nr. 12: Ergänzende Indikatoren

85) Welche durchschnittlichen biologischen Leistungen weisen Ihre Tiere auf?

[ ]A Milchkühe: Milchleistung: : ..... kg / Kuh und Jahr

[ ]B Mastschweine: Tägliche Zunahmen: ..... g / Schwein

[ ]C Färsen und Bullenmast: Tägliche Zunahmen: ..... g / Rind

[ ]D Sonstige

86) Welchen Anteil an Tierverlusten hatten Sie im Jahr 2008?

_____

87) Welchen Anteil an Nachkommen hatten Sie im Jahr 2008?

[ ]A Sauenhaltung: Abgesetzte Ferkel pro Sau und Jahr: .....

[ ]B Rinderhaltung: Abkalberate: ..... % der Kühe haben gekalbt

88) Wie hoch waren Ihre Tierarztkosten im Jahr 2008?

---

89) Wie ist das Jahr 2008 für Ihren Betrieb ausgefallen?

[ ]a Sehr schlechtes Jahr

[ ]b Schlechtes Jahr

[ ]c Durchschnittliches Jahr

[ ]d Gutes Jahr

[ ]e Sehr gutes Jahr

Annex 2 Tables on measures in CCAT by MITERRA, DNDC and EPIC

Table 2-1. Description of clustered measures/obligations related to the nitrate directive (ND) in MITERRA-Europe, with a linkage to DNDC and EPIC

SMR	Name	Description	MITERRA Parameterisation
ND	Nitrate directive		
SMR1	Balanced N fertilizer application	The amounts of applied N fertilizer and manure applied are tuned to the crop N demand, while taking into account the contributions from atmospheric deposition, mineralisation and biological N fixation.	N fertilizer is decreased with the difference between total supply of plant-available N (fertilizer + manure + grazing + N-fixation + N deposition + mineralisation) and N-demand ((N in harvested crop + N in crop residues) * uptake factor) until a minimum fertilizer application rate. When balanced N fertilization is still not accomplished the application rate of manure N is reduced and excess manure is processed and removed from agriculture.
SMR2	Maximum manure N application standard	The amount of applied N in manure and excreted during grazing may not exceed 170 kg N per ha in a region. Excess manure is transported or processed.	When manure N exceeds 170 kg N per ha, excess manure is divided over NUTS2 regions in the specific country. When there is still an excess the remaining manure is processed and removed from agriculture. However, some derogation to the limit of 170 kg N per ha apply (Velthof et al., 2007).
SMR3	Limitation to N application in winter and wet periods	If manure is applied during the growing season in stead of the winter, the availability and effectiveness of manure N for crops increases.	Reduction of N fertilizer with the amount of N from winter manure, assuming that 25% of the manure is applied in winter and that 50% of the N from this manure is plant-available when applied in spring.
SMR4	Limitation to N application on sloping grounds	The amounts of applied fertilizer and manure N are decreased on sloping land	N fertilizer and manure is reduced by 50% for steep slopes, 25% for intermediate slopes, 5% for slight slopes, and no reduction for flat areas.
SMR5 [1]	Manure storage with minimum risk on leaching	Manure and slurry storages without concrete floor and cover are converted into storages with concrete floor and with cover.	All liquid manure storages are assumed to have concrete floors, 50% of solid manure storages without concrete floor are converted to storages with concrete floor and 50% of solid manure storages without cover are converted into storages with cover.
SMR6 [1]	Appropriate application techniques	This measure leads to a higher efficiency of applied N and less leaching.	The leaching fraction is reduced by 10%.
SMR7 [1]	Buffer zones	Buffer zones are unfertilized zones near water courses, which decrease leaching and surface runoff of N to surface water.	In buffer zones (assumed width of 100 m) the leaching and surface runoff fractions are reduced by 50%.
SMR8	Growing winter crops	Growing catch crops will result in i) less N leaching below the rooting zone, ii) less surface	Measure can be applied in 15-25% of the agricultural area, leaching and surface runoff fractions are reduced by 25%, and fertilizer

	runoff, and iii) less requirement of fertilizer N in following year.	N application is reduced with 10-25 kg N for regions where N surplus > 100 kg N per ha.

[1] The measures SMR1-4 and SMR8 are included in EPIC and DNDC. In EPIC by a change in N inputs via MITERRA and EPIC meta-models for SMR1-SMR4 and a look up table for SMR8. In DNDC by meta-models for SMR2, 3 and 8 a change in N inputs via MITERRA and meta-models for SMR1and 4.

Table 2-2. Description of clustered measures/obligations related to Sewage Sludge Directive (SSD) and Groundwater Directive (GD) and GAECs in MITERRA-Europe

SSD/GD	Sewage Sludge Directive and Groundwater Directive		
SMR	**Name**	**Description**	**MITERRA Parameterisation**
SMR9 [2]	Limited Biosolid (Sewage sludge, compost etc) application	Biosolid (specifically sewage sludge) utilization is allowed only if the biosolid does not exceed the limit values of concentration of heavy metals and other parameters established by the law	Use the minimum value of estimated present metal concentrations and maximum concentrations in sewage sludge
GAEC			
GAEC1	Field greening - fallow and set-aside	Vegetative cover at land to protect soil from Erosion (GAEC issue 1), increase Soil organic matter (GAEC issue 2), and avoid bare fallow land as a minimum level of maintenance (GAEC issue 4)	N: Reduction of runoff and leaching fractions with 15% and increase in crop residues of 20 kg N on fallow and set-aside land. C: Increase in SOC on fallow and set-aside land, by increasing a coefficient for input crop production (FI) from Low to Medium or from Medium to High.
GAEC2	Crop rotation	Inclusion of different crop types in crop rotations, which can considerably increase soil organic matter (GAEC issue 2).	N: Reduction of fertilizer application with 5%, reduction of leaching and runoff fractions with 10%, and increase in crop residues N with 5%. C: Increase in SOC, by increasing a coefficient for input crop production (FI) from Low to Medium or from Medium to High.
GAEC3	Minimum coverage - arable land	Vegetative cover between agricultural crops, which is then ploughed into the soil, also termed as catch crops, green manure and winter crops, specifically aimed at reducing soil erosion (GAEC issue 3).	N: Reduction of runoff and leaching fractions with 25%, 25 kg less fertilizer N in areas with a N-surplus and increase in crop residues of 30 kg N. C: Increase in SOC, by increasing a coefficient for input crop production (FI) from Low to Medium or from Medium to High.
GAEC4	Tillage method	Reduced tillage or Zero tillage to increase soil organic matter (GAEC issue 2).	N: No effect for reduced tillage and 10% increase in N2O emission from crop residues for no tillage. C: Increase in SOC by changing a coefficient for management (FMG) from Full to either Reduced (reduced tillage) or NO (zero tillage).

[2] This measure also includes SMRs where sewage sludge is not allowed in particular areas, i.e. where soil

concentrations exceed limit values, since this information is not available on a European wide level.

Table 2-3. Description of the scenarios and measures in DNDC, related to the clustered measures/obligations in the nitrate directive and the clustered GAECs. Results by DNDC meta-models without any interaction with MITERRA

SMR	Name	Description	DNDC scenario and parameterisation
SMR2	Maximum manure N application standard	The amount of applied N in manure and excreted during grazing may not exceed 170 kg N per ha in a region. Excess manure is transported or processed.	Comparison of S5: Barley reference scenario with S7: Barley max manure scenario S7 This scenario limits the N in manure spreading to 170 kg N/ha y^{-1} (with few exceptions), compared to the reference scenario. (SMR04: restriction of organic manure application). Comparison of S1: Corn Reference Scenario with S3: Corn Max Manure scenario S3 This scenario limits the N in manure spreading to 170 kg N/ha y^{-1} (with few exceptions), compared to the reference scenario. (SMR04: restriction of organic manure application).
SMR3	Limitation to N application in winter and wet periods	If manure is applied during the growing season in stead of the winter, the availability and effectiveness of manure N for crops increases.	S1: Corn Reference Scenario (see reference scenarios)
SMR8	Growing winter crops	Growing catch crops will result in i) less N leaching below rooting zone, ii) less surface runoff, and iii) less requirement of fertilizer N in the following year.	Comparison of S1: Corn Reference Scenario with S4: Corn Catch crop scenario S4 In this scenario two cycles of corn-alfalfa cropping system are simulated: - a rotation between a yielding crop (corn) for 2 years - a catch crop (alfalfa) which lasts 3 years, because of its ability to fix N in the soil The corn crop receives both fertilizer (1) and manure (2) applications, and it is tilled at 20 cm depth. One manure spreading is applied without tillage on the catch crop. (GAECs: Surface protection; maintenance of Soil Organic Matter-standard for crop rotation).
GAEC	**Name**	**Standards**	**DNDCD scenario and parameterisation**
GAEC4	Tillage method	Zero tillage	Comparison of S1: Corn Reference Scenario with S2: Corn No tillage Scenario

	S2 The no tillage scenario differs from the reference scenario because of the absence of tillage application. This practice of turning the soil before planting buries crop residues, animal manure and troublesome weeds and also aerates and warms the soil. But it can also increase the soil vulnerability to erosion by wind and water. No till farming in contrast try to minimize soil disruption. (GAECs: surface protection). Comparison of S5: Barley reference scenario with S6: Barley not tillage scenario S6 The no tillage scenario differs from the reference scenario because of the absence of tillage application.
DNDC Reference scenarios	
	S1: Corn Reference Scenario This baseline scenario includes only a corn monoculture, with one tillage application and a tillage depth of 20cm. The simulated period is 10 years of no irrigated corn, without rotations or fallow, within the previously selected HSMUs. We apply both fertilizer (1) and manure (2) N inputs, per year. The second manure spreading includes the green manure. The fertilizer N input is set to 0 during the winter. Other N inputs are atmospheric deposition, biological fixation and root residue. S5: Barley reference scenario This baseline scenario includes only a barley monoculture, with one tillage application and a tillage depth of 20cm. The simulated period is 10 years of no irrigated corn, without rotations or fallow, within the previously selected HSMUs. We apply both fertilizer (1) and manure (2) N inputs, per year. Other N inputs are atmospheric deposition, biological fixation and root residue.

Table 2-4 Description of measures evaluated by EPIC (results in look up tables) related to the clustered measures/ obligations in the nitrate directive and the clustered GAECs

SMR	Name	Description	EPIC scenario and parameterisation
SMR8	Growing winter crops	Growing N fixing crops will result in i) less N leaching below rooting zone, ii) less surface runoff, and iii) less requirement of fertilizer N in the following year.	Comparison of: E1 Baseline run with no cover crop for irrigated and non-irrigated maize E2 As E1 with a cover/N fixing crop. We choose clover as a cover/N fixing crop.
GAEC	**Name**	**Standards**	**EPIC scenario and parameterisation**
GAEC3	Minimum coverage - arable land	Protect soil from erosion through a cover crop (GAEC issue 3).	Comparison of: E1 Baseline run with no cover crop for irrigated and non-irrigated maize E2 As E1 with a cover/N fixing crop. We choose clover as a cover/N fixing crop.
GAEC4	Tillage method	Zero tillage to reduce erosion (included in measures under issue soil organic matter (GAEC issue 2).	Comparison of: E3 Baseline run with conventional till practices in barley with E4 As E3 but with no-till practices

Annex 3 Minutes 2nd end-user meeting CCAT

Minutes
CCAT 2nd end-user meeting
16th of April 2009, Brussels

Present:

EC: Aymeric Berling, Noémie Beigbeder, Luisa Samarelli, Kai-Uwe Sprenger, Nikolaos-Erinis Panagiotopoulos, Maria Goergen Ezquerra, Marijke van Schagen

Member states representatives: Madli Karjatse, Bernard Dechambre, Jan-Gerrit Deelen, Leo Maier.

EC-project officer for CCAT: Danièle Tissot

CCAT partners: Foppe Bouma, Roel Jongeneel, Jan-Peter Lesschen, Juan Oñate, Markus Kempen and Berien Elbersen

Minutes

(All presentations held at the meeting are available at: http://www.ccat.nl/UK/)

The meeting was opened with a short introductory presentation explaining the objective and general approach of the CCAT project by Berien Elbersen (project coordinator). This was followed by the short presentation of the EC project officer for CCAT, Danièle Tissot, who gave an overview of the research projects financed already under the 6th and 7th Framework Programme targeting Cross Compliance and the role of the CCAT project in this list. In both presentations it was made clear that the main purpose of this second CCAT end-user meeting was:

1) to present the (intermediate) results of the project and get feed-back from stakeholders on the usefulness of these

2) to collect what requirements the end-users still have for further improvement of the CCAT final integrated assessment in the last 7 months of the project. This CCAT tool enables the assessment of effects of Statutory management requirements and Good Agricultural and Environmental condition obligations (integrated under the Cross Compliance policy) on agricultural income and markets, environment (mainly water and air), biodiversity and landscapes and animal welfare and public health.

After these 2 presentations 5 presentations were held discussing the approach of the CCAT assessments and the intermediate assessment results:

1) The CCAT approach to assessing CC impacts (Roel Jongeneel)

2) Overview of the contents of prototype 1 of the CCAT analytical tool (Berien Elbersen)

3) Results of the economic assessments (Markus Kempen)

4) Results environmental assessments (Jan-Peter Lesschen)
5) Results biodiversity and landscape assessments (Juan Oñate)

After these presentations the following questions and remarks were made:

- It was asked whether 'enforcement' was involved in our assessment. Answer; Not taken into account in the assessments until now.
- What was the source of the cost data for the animal registration Directive? The remark was made that the costs related to ear-tag loss used in the calculations were considered too high. Answer: the loss of ear techs but also other indicators like renew rate. But a generic approach with estimates for costs of animal movements was also used as an additional cost level. CCAT partners promised however to collect further information to underpin cost factors of the Animal Registration Directive.
- Which sources were used to estimate the compliance levels? EC should have more detailed data on compliance rates from the country reports. According to DG AGRI representatives this information could not be provided to CCAT, since it contains information that cannot not be made publicly availables. Furthermore the EC leaves the decision to provide these data to the individual Member States. CCAT partners made clear too that the data collected from the Member States on compliance levels in 2005 within an DG-Agri evaluation project (conducted in 2007) was made available by the EC. This information was one of the main sources from where detailed compliance levels were estimated in this CCAT assessment.
- It was mentioned several times that the CCAT project should be very careful in relating effects of the several Statutory Management Requirements (SMRs) directly to Cross Compliance. Most of these SMRs were already in place before Cross Compliance was introduced in 2005. Cross Compliance is only an additional enforcement for SMRs. The CCAT integrated assessment tool therefore assesses effects of the implementation of SMRs and also Good Agricultural and Environmental Condition stadards (GAECs). The additional compliance with these SMRs (since 2005) is likely to be only partly (if at all) related to Cross Compliance and also influenced by other factors explaining the additional implementation with these SMRs. As for the GAECs the situation is slightly different as these have become introduced directly with CC, although also in relation to these obligations Good environmental conditions standards were already in place in some countries before 2005. In our project the distinction between assessing the effects of cross compliance and the effects of a certain directive (e.g. the Nitrate Directive was already implemented in 1991) should be made. In principle it should also be acknowledged that assessing the effects of CC is practically not possible, since there is no solid basis on which the additional

compliance level with SMRs cauased by the implementation of CC can reliably be estimated.

– Why did CCAT not use data already collected on reduction rates based on sanctions? Answer: Because this information can only be collected from individual Member States and these data are still in the process of being collected.
– The suggestion was made to also consider difference in fines on ND before and after 2005.
- The problems with getting good data access on compliance levels was acknowledged by the end-users.
- CCAT should be careful when relating effects of SMR and GAECs completely to CC.
- Discussion of results of CCAT with controlling agencies should be very useful.
- There is an economic effects related to SMR obligations. But are other effects excluded that also affect this? Answer: now only the effect of cross compliance is taken into account, but it is also possible to simulate a scenario with the effects of other policies
- The suggestion was made that a follow-up project could also assess what other developments would neutralize the price/income effects.
- Would it be possible to simulate (e.g. 120% or 150% compliance) or stricter SMR and GAEC obligations? Answer: No not in a direct way since one cannot go beyond full compliance (100%). The way to cope with this would be to evaluate stricter standards. For example it would be possible to adjust or add specific measures, e.g. not 170 kg N/ha but 150 kg N/ha
- Could CCAT also assess stricter obligations (above present SMR and GAEC standards)? Yes, in principle the CCAT tool should be adapted in a fairly easy way to assess other more stricter measures.
- AR effect how exactly measured? Only related to ear-tag loss? Answer was yes. Remark: But tracing of livestock is also an important cost aspect.
- Why did we focus so strongly on the ear-tag loss? At present it is a very minor breach (not even an infringement).
- Eartagging was already legislation before CC, but since 2005 it may have increased.
- Are the different derogation levels for the Nitrate Directive taken into account and the amount of farmers who applied for the derogations when estimating the compliance levels? Answer: For the calculation of the degree of cross compliance the 170 kgN/ha was applied universally to all regions, so the answer is no. But for the assessment with MITERRA model this data is taken into account (e.g. for NL 70% of the farmers applied for the derogation and 90% of the grassland is under derogation
- How do we take into account the implementation in legislation? It could be useful to do a short inventory on infringement cases in this area.

After the discussion of the assessment results a break was held and then a demonstration was given of the prototype 1 of the Integrated assessment tool of CCAT (by Foppe Bouma).

After this demonstration the following questions and remarks were made:

- Can you put in your own scenario specifications? Answer: yes that is the aim for the final CCAT tool at least in relation to specifying a scenario in terms of compliance levels per SMR and GAEC.
- Can you change the cost estimations? Answer: Yes that is the aim for the final CCAT tool, although at this moment we are still not clear about the details of how this should be done. Overall it was concluded that degree of compliance and cost of compliance are issues which are debatable, and therefore it would be good to make these parameters adjustable for users
- What to do with data that is now still missing? Can it be added to the model easily? Yes in principle the framework has been designed in such a way that changing and adding input data can be done in a fairly easy way without requiring major technical changes.

– Are data and the system available?
    - Answer: The tool with input and output data (but without models) is already available and people can mail the coordinator to ask for it and they will get a memory stick (or CD) send to them.

– Is the system to be used by the EC or for member states?
    - Answer: The tool is available, but the level of usage should be specific for each user. The final CCAT tool should become available on the internet, and models will only run on the server.

– For whom is the tool meant?
    - A final report will be produced with our assessment and conclusions. Afterwards the system is available but the simulated results and related conclusions are for the users own responsibility
    - The preliminary results already show the environmental effects seem to be more important then costs of implementation, e.g. balanced fertilization has a high environmental effect, while costs are rather low.
    - The uniqueness of this project is the quantification and the regionalization of the assessments
    - It was further underpinned that this is a research project, not a service contract, thus policymakers can chose later whether or not they want to use the results of CCAT.

– DG-AGRI representatives stressed again that CCAT should be aware of difference between effects due to cross compliance and compliance due to Directive implementations. This should be clearly stated in any CCAT report. Answer: We are aware of it, but it will remain difficult to distinguish the different effects. Furthermore, some insight can be reached by case studies and interviews with farmers, because from the statistics it will not become clear.

– For new member states the reference year for CC implementation of SMRs is not 2005 but 2009. For Nitrate directive the year of implementation was 2004 in these countries (but not as part of CC).

– CAPRI uses 3 years averages, and it will take time to implement new Eurostat data. In the economic assessments 2004-2006 data are taken as input for CAPRI together with Compliance and costs data estimated for the situation in 2005 and maybe in later/new scenarios also for later years (if data become available).

– The GAEC part is most interesting, since this is new and can be contributed directly to cross compliance. However, also for GAECs some pre-existing

legislation was already in place in some MS. Estimating the exact compliance and additional compliance level is also a problem with GAECs.

– CCAT is a research project and no “service contract”. Therefore the focus should be more on the innovative scientific part than on further development of the tool.

- A training for using the CCAT system is planned at the end of the project (January 2010).