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**Nitrate pollution due to agriculture,
project report No.2: cross compliance of
agricultural and environmental policies**

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Project Report No.2:

Cross compliance of agricultural
and environmental policies

David Parsisson, Nick Hanley
and Clive L. Spash

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NITRATE POLLUTION DUE TO AGRICULTURE,
PROJECT REPORT NO. 2:

CROSS COMPLIANCE OF AGRICULTURAL
AND ENVIRONMENTAL POLICIES

by

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Preface

This report forms part of the project 'Standards on nitrate in the European Community: processes of change in policy instruments and agriculture'.

The project is a joint collaboration of the following institutions:

- 1) Landbouw-Economisch Instituut (LEI-IEA), Brussels, Belgium.
L. Lauwers.
- 2) Statens Jordbrugsøkonomiske Institut (SJI), Copenhagen, Denmark.
S. Rude, B.S. Frederiksen.
- 3) Bundesforschungsanstalt für Landwirtschaft, Institut für Betriebswirtschaft (FAL),
Baunschweig, Germany.
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- 4) Institut National de la Recherche Agronomique (INRA), Rennes, France.
P. Rainelli.
- 5) Landbouw-Economisch Instituut (LEI-DLO), The Hague, The Netherlands.
J. Post, F. Brouwer, P. Hellegers.
- 6) Economics Department, University of Stirling (STI), Scotland, United Kingdom.
N. Hanley, C. Spash and D. Parisson,.

The project is part funded by the Environment Programme (Area III, Socio-economic environmental research), Directorate-General for Science, Research and Development (DG XII), The European Commission, Brussels. This is under contract number EV5V-CT92-0155

The overall objective of the study is to identify:

- 1) Policy instruments that bring about reductions in nitrate levels in drinking water, such that standards on the quality of drinking water, agreed by the European Community, are met and that other water pollution problems relating to nitrates, such as eutrophication (nitrate limited) be minimised;
- and
- 2) Processes of change in the agricultural sector of the European Community in response to policies mentioned under item (1) above. Such adjustment processes in agriculture should enable realisation of the environmental standards regarding nitrate in water as formulated by the EC.

In order to realise the stated objectives the following key areas have been addressed:

- a) Quantification of mineral inputs to agriculture and the amount of mineral surpluses that result from the agricultural sector. Surpluses are quantified for the EC at the regional level. Distributional elements of mineral surpluses at farm level have also been identified. (Schleef and Kleinhanss, 1994).

- b) Review of national and EC nitrate policies in reducing the deterioration of the environment due to mineral surpluses. This review was undertaken for the following member states:
Belgium, Denmark, France, Germany, Italy, the Netherlands and the United Kingdom.
(Rude and Frederiksen, 1994).

- c) An examination of the primary and secondary effects of agri-environmental policies. The examination of the effects of cross-compliance for other agri-environmental policies. This incorporates an examination of the effects of CAP reform and the 'accompanying measures' as well as a selection of member state agri-environmental policies.

- d) Assessment of structural characteristics, farm management and input use of farms that are already close to meeting the standards of nitrate in drinking water. The aim is to provide an insight into the adjustment processes required to meet standards on nitrate leaching.

- e) An examination of the extent to which efficiency and/or effectiveness of environmental policies might be improved by the use of economic instruments.

- f) An identification of the processes of change in the agricultural sector. The primary aim is to assess the consequences of different policy instruments on farm income, factor intensity and production supply at farm and regional level. In addition impacts of structural change and induced technological innovations in the domain and application of mineral fertilisers and organic manure at the sectoral level are addressed.

The study will provide a thorough insight into the way the agricultural sector of the EU might respond to policies that aim to reduce nitrate leaching and to adjustments in market and price policies of the CAP. This examination focuses on the adjustment process in agriculture in order to meet the standards on nitrates, in a cost-efficient and environmentally-effective manner.

This report represents task C of the project 'Standards on nitrates in the European Community: Processes of change in policy instruments and agriculture.'

Summary

Developing and using the concept of 'cross compliance' this report provides an examination of the primary and secondary effects of agri-environmental policies. Cross-compliance is applied to a number of agri-environmental policies; CAP reform, the 'accompanying measures' of CAP reform and a selection of member state agri-environmental policies. The development of the concept of cross compliance provides a useful tool to perform evaluation on the effectiveness and efficiency of general policy instruments, but specifically policy scenarios designed to reduce nitrate pollution of groundwater due to agriculture and goes some way to help answer policy questions on which mechanism may achieve a wide range of performance criteria.

Cross-compliance can be applied at different levels of the policy and can be used to categorise policies into a number of sets according to specified criteria. CAP reform policies designed to control supply, although having positive environmental effects, are not as successful at achieving environmental objectives in comparison to the 'accompanying measures' elements of CAP reform. However a number of the policies from the accompanying measures package, for example the protection of rare breeds and the shelter planting, have very specific and narrow aims and so do not achieve large positive cross compliance for reductions in nitrate pollution. The analysis also deals with a number of other policies, some agricultural in basis, such as the Less Favoured Areas policy, which scored highly in achieving income redistribution to the targeted group but failed in achieving positive environmental effects.

A number of useful trends have been identified and these may be useful for formulating future agri-environmental policy in terms of achieving higher degrees of cross-compliance. It is recognised that this technique would be usefully expanded and that it warrants further investigation in order that a quantitative valuation of positive and negative cross-compliance could eventually be attached to each policy.

1. Introduction

The adoption by the European Communities, in 1991, of the directive concerned with *'the protection of water against pollution caused by nitrates from agricultural sources'* was due to the recognition of the detrimental effect, on health and the environment, that high emissions of nitrogen into water courses have. This being mainly because of the increased use of nitrogeous fertiliser by the agricultural sector. The regulation of nitrate pollution, through adoption of standards laid down in the Nitrates directive by national legislation, has introduced another policy into the existing set of agri-environmental policies.

This report recognises that agri-environmental policies have a number of aims and objectives across a wide spectrum of interest. With this in mind this report uses and develops the concept of 'cross-compliance' to provide a method of analysis to address the issue of multi-objective policies. A number of linkages exist between policies, so for instance, a number of agri-environmental policies will have differential effects on potential levels of nitrate leaching. The main objective of this report is to view the degree of interactions of agri-environmental polices with reference to a number of criteria.

The report is ordered in the following way, chapter two presents a number of methods to evaluate agri-environmental policies before adopting and defining the concept of cross compliance in order to proceed to establish the linkages between the multiple aims of the policies. Chapter three details the agri-environmental policies and sub divides them into three groups; the market and price reforms of the 1992 CAP Reform, the 'accompanying measues' package of the CAP Reform, and thirdly the major agri-environment policies in operation in each member state. This enables in chapter four to apply the concept of cross compliance to these policies in order to analyse the issue of multi-objective policies with special relevance to their differential effects on potential nitrate leaching. These results are presented in a matrix format, by member state. This then leads to a discussion of results and concluding remarks in section five.

2 Policy evaluation criteria

This section is structured as follows; first the concept of cross compliance is detailed in and then related to the central objective of the project namely that of determining whether a range of agri-environmental policies will either accentuate or alleviate the levels of nitrate pollution in the aquatic environment due to agricultural sources; second a number of alternative evaluation criteria are considered which have related importance as alternatives to cross compliance.

2.1 The concept of cross compliance

Recognising that agri-environmental policies have many objectives, classification of specific policies is possible through their primary and secondary objectives. If a policy has its primary objective related to a particular criteria and this helps in the achievement of some other criteria then positive cross-compliance occurs. If, however, the policy hinders the achievement of these other criteria then negative cross-compliance occurs. The primary aim of this report is to consider the 'complementary and offsetting' aspects of agri-environmental policy with special reference to nitrate pollution. We refer to this concept of complementarity and the degree of offsetting as '*cross compliance between objectives of policy*'.

In order to fulfil the objectives of this project a number of criteria were considered using the notion of cross compliance, these can be grouped under three main headings: macro economic effects, income distribution effects and a range of environmental effects which include nitrate pollution. An expanded explanation of these criteria are included in section 3 of this report, however it must be emphasised that the differential affect certain policies will have on the reduction of nitrate pollution is of particular relevance to this project, and this will be afforded greater weight in the analysis contained in section four of this report.

Each policy can thus be viewed in terms of its effectiveness in achieving the major objective and then categorised as having a positive or negative effect on nitrate pollution. For example, the UK's Environmentally Sensitive Areas scheme has as its major objective the enhancement of the conservation value of agricultural land, however it also has an effect on nitrate levels in some areas due to the changing of production patterns. Both the direction

and strength of linkages are important conceptually, thus we seek to distinguish between large and small positive or negative cross-compliance in what follows.

Our paper uses the concept of cross-compliance to consider the direction and degree of 'overlap' between agricultural and environmental policy in a wider context but with particular regard to nitrate pollution. It is recognised that notion of cross-compliance can be applied at different levels of policy. We summarise the sign and degree of cross-compliance across the policies under consideration in a qualitative manner. This information may usefully be presented in a matrix format. This approach is reported in section 4.2 for the 6 member states contributing to this project. This approach provides a useful analysis on the degree of cross-compliance. However, it is recognised that this technique would be usefully expanded and that it warrants further investigation in order that a quantitative valuation of positive and negative cross-compliance could eventually be attached to each policy.

2.2 Other criteria for policy evaluation

Evaluation of a variety of policies is possible using a number of different criteria. Two of these are considered in the following sections, these *alternative* criteria for policy evaluation are 'conservation effectiveness' and 'targeting'. These two concepts appear to be especially important when considering evaluation of agri-environmental policy across a number of member states.

2.2.1 The Concept of Conservation Effectiveness

The notion of conservation effectiveness in public policy is recognised as being difficult to assess because the heterogeneity of 'conservation interest' produces a number of different goals for the agencies involved (Colman et al 1992). A listing of criteria for assessing effectiveness of policy tools might be as follows;

- i capacity to protect and enhance the environment
- ii timeliness
- iii targetability
- iv monitorability
- v cost effectiveness

- vi political acceptability and transparency
- vii promotion of conservation mindedness

OECD (1991) choose a similar list of criteria in discussing the need to evaluate under which circumstances and alternative forms, economic instruments may take in achieving targets in environmental policy.

The effectiveness of conservation policy clearly depends on the specified goals of the policy. This brings into the debate the problem of goal conflict when there exists a wide number of agri-environmental policies. Under these conditions the notion of cross-compliance is useful and its use is advocated.

2.2.2 The Concept of Targeting

The adoption of the nitrates directive across member states will involve designation of Nitrate Vulnerable Zones (NVZs) (Rude and Frederiksen (1994) give a detailed description of the implementation of the nitrates directive). However the areas which are nitrate vulnerable will differ for each member state, for instance it seems likely that all of the agricultural area in the Netherlands, Germany, Luxembourg and Denmark will be designated NVZ, however in the UK only a relatively small percentage of the agricultural area in England and Wales, and only two small areas in Scotland is likely to be designated. This spatial differentiation of policies indicates a prioritisation of environmental objectives, whilst targeting of controls and regulations at specific areas or farmers (or the targeted group) will often involve compensation for restricting farming practices going beyond good agricultural practice, such as in Nitrate Sensitive Areas. The issue of targeting policies is addressed in full by Potter *et al* (1993).

Targeting of policies, it is often argued, provides a substitute for the reform of policy and structures causing environmental problems (Baldock *et al*,1990). As Potter *et al* (1993) point out, Environmentally Sensitive Areas (ESAs) in the Uplands of England and Wales operates in conjunction with Less Favoured Areas (LFA) policy which provides Hill Livestock Compensatory Allowance (HLCA) payments based on the intensity of stocking density: the

operation of the LFA policy, in this situation, is clearly an example of negative cross-compliance, since HLCA payments have encouraged an increase in stocking densities, which is at odds with the environmental objectives of the ESA scheme. In some situations agricultural policy has evolved into socio-structural policy such that income aids and other non market supports actually slow down structural change so that a 'farm survival policy' is in operation (Potter, 1990).

2.3 Efficiency and Effectiveness of Policy Instruments

The question of efficiency and effectiveness of different policy instruments assumes an importance when dealing with questions on which criteria are the policies to be judged (see for instance (OECD, 1991). Alternative mechanisms are usually divided into two groups; economic instruments and command and control regulations. Economists usually argue that market based method of pollution control is more likely to achieve objectives of pollution control and environmental protection than regulatory methods (Turner, 1993).

The underlying assumption for the EU when considering pollution control is the polluter pays principle (PPP). This is a well-established guiding force behind the regulation of polluters in the OECD. PPP has been adopted as part of environmental policy at both national and international level over the last 20 years. The principle is referred to in legislation such as the single European Act (1987), the Maastricht treaty (1992) and adopted by the Oslo and Paris conventions for the Prevention of Marine Pollution (1992). However agriculture has traditionally been exempt from discussion of the principle but is increasingly been drawn into the debate. Commonly cited reasons for agriculture's exclusion include the following scientific, socio-political and economic reasons;

- i physical identification of polluters is difficult,
- ii the link between production and pollution is not well defined,
- iii pollution is influenced by climatic variables,
- iv pollution effects occur over a long time horizon,
- v there are a large number of small production units,
- vi these farms will tend to bear the full economic cost of pollution as they have limited ability to pass on the costs to the consumer,

- vii the degree of inflexibility of production factors within agriculture especially land,
- viii the special status attributed to agriculture.

In addition there is a political judgement that has to be made in deciding when a certain level of activity becomes polluting.

Section four of this report provides preliminary analysis to investigate whether the concept of cross compliance will aid inquiry into the efficiency and effectiveness of agri-environmental policies using different mechanisms.

3 EU Agricultural and Environmental Policies

The recent environmental reforms of the CAP must be set in the context of changes in the support system for agricultural production within the European Community. Harvey (1992) details the historical development and pressures responsible for CAP Reform. Fundamentally the main change has been the *de-coupling* of income support from high output prices, replaced with lower output prices and compensation payments, based on arable area. In addition compulsory rotational and non-rotational set-aside requirements for productive land have been introduced.

This section is structured as follows; first a description of the CAP Reform with respect to arable reform then describing the price reforms in the livestock sector is presented. The cross compliance concept the authors believe, has an important role to play in the analysis of policies. The second section then proceeds to describe the 'accompanying measures' package of the CAP Reform agreement which contains a number of diverse agri-environmental policies for which the concept of cross compliance will be of great value. The final section then outlines a number of existing agricultural and environmental policies to which the notion of cross-compliance is important. Each of these is described, in order that in section four, these can be compared with the notion of cross compliance first outlined in section 2.1 and described in more detail in section 4.1. This will then allow a discussion on the degree of 'cross-compliance' occurring across policies.

3.1 Common Agricultural Policy Reform (1992)

In this section the three most important areas of change for the agricultural sector in the EU will be examined, namely changes to the cereals, beef and sheep sectors. The milk regime was left largely untouched and is therefore excluded from the discussion.

The CAP Reform had at the outset the following set of objectives.

- 1 To achieve a better balance of agricultural markets.
- 2 Increased competitiveness in European agriculture through substantial price reductions.
- 3 The encouragement of extensive methods of production, the reduction of agricultural surpluses and thus aiming to conserve the environment.
- 4 The redistribution of support to benefit the more vulnerable enterprises.

5 A continued employment for sufficiently high numbers of farmers whilst at the same time encouraging mobility of factors of production, especially allocation of land.

In order to achieve the stated Reform objectives the following measures were adopted from the 1992/93 marketing year and culminating in the 1995/96 marketing year;

- 1 A reduction in cereal prices to redress competitiveness of cereals used in animal feed
- 2 The adoption of more effective measures to manage supply especially new set-aside regulations. These are an essential precondition of entitlement to aid to compensate for the price reductions
- 3 Permanent compensatory aid due to lower prices in the cereals, oilseeds and beef sector.
- 4 The introduction of an agri-environment action programme aiming to encourage farmers to adopt less polluting and more environmental sensitive methods of production. In addition the provision of aid for countryside preservation and conservation of natural resources.
- 5 Financial incentives to farmers for afforestation of their holdings.
- 6 Voluntary early retirement schemes viewed as form of structural adjustment.

(CEC, 1993)

3.1.1 Arable sector reform

The reform in this sector comprises lower support prices for cereals with compensation payments for a land area set-aside from production for farms producing more than a specified tonnage of cereals. Compensation payments are EC arable area support payments and are based on the arable area cultivated in the 1991/92 harvest year. The price reductions started in July 1993 and will eventually total a 29 per cent price reduction in the guaranteed price. The phasing in period and the intermediary prices are detailed in Table 1.

Table 1. Arable crop CAP Reform price levels

(ECUs)	Marketing Years (ECU/ha)			
	1992/3	1993/4	1994/5	1995/6
Target price	155	130	120	110
Intervention price	139.5	117	108	100
Compensatory payment	0	25	35	45

Source: Agra-Europe (22.5.92) and Strutt and Parker 1992

The arable area payments scheme compensates for the reduction in prices by providing a payment (on a per hectare basis) and determined on regional a regional basis. Rotational set-aside at 15 percent and non-rotational set-aside at 18 percent for those producers with production levels greater than 92 tonnes. however land set-aside can be cultivated for non-food purposes.

Rotational set-aside figures for member countries are shown below in Table 2.

Table 2. Member states areas placed under rotational set-aside

Member State	Arable area ('000ha)	Total area of Cereals, Oilseeds and Protein crops ('000ha)	Rotational set-aside under arable area compensation payments ('000ha)
Belgium	762.1	326	19
Denmark	2 559.7	1 909	203
France	17 988.8	11 859	1 581
Germany	11 971.3	8 218	1 063
Greece	2 33.7	1 523	17
Ireland	1 029.0	359	24
Italy	9 015.8	5 429	207
Luxembourg	56.0	33	2
Netherlands	909.9	226	8
Portugal	2 905.8	833	70
Spain	15 511.8	8 978	909
United Kingdom	6 677.0	4 396	556
EC 12	67 780.0	44 087	4 659

Source: Rude and Frederiksen (1994), Hansard 15.2.93 and European Parliament (Questions H-1302/93) January 1994.

3.1.2 *Livestock reforms*

Beef and Veal

The main focus on reform in this sector is the reduction in output price compensated for by payment based on the number of livestock on the holding, but constrained by a maximum stocking density. The price reduction of 15 percent is phased in over three marketing years, with compensation premiums on beef gradually increased over the same period. This is combined with a maximum stocking density per forage hectare, set at 3.5 LU/ha (1993) and progressively reduced to 2LU/ha (1996). Table 3, below, details the levels of compensatory payments and stocking densities associated with reforms in the beef and veal sector.

The four compensation schemes in operation in the beef and veal sector are:

- 1 Premium scheme for male bovine animals in regions experiencing seasonal supply.

The compensation payments increase from 60 to 90 ECU over the transition stage and are payable twice during the animals life, at 10 and 22 months. This is combined with a ceiling of payments at 90 head of cattle per farm. In addition, a separate regional reference herd will be determined by each member state equal to the number of premia paid in either 1990, 1991 or 1992. Where this reference herd is exceeded the number of eligible animals per producer is reduced proportionately.

- 2 Suckler cow premium.

This scheme is limited per producer to the number of premia paid in either the 1990, 1991 or 1992 marketing years, this is determined by the individual member state. The compensatory payments increase over the transition period from 70 to 120 ECU. These payments are detailed in table one

- 3 Calf conversion premium.

A payment of 100ECU is made on each male dairy breed calf slaughtered before 10 days of age. The aim of this payment is to curb production of surplus beef.

- 4 Extensification premium.

As part of the de-coupling of output prices and income support an extra payment of 30 ECU/hd will be made if during the year the stocking density of a holding does not exceed 1.4

LU/ha with reference to male bovines and suckler cows.

In addition to the above schemes there will be a reduction in intervention buying of beef and veal from 750 000 tonnes in 1993 to 350 000 tonnes by 1997.

Table 3: Levels of premia payments, with transitional levels of payment, for the Beef Premium scheme and Suckler Cow Premium scheme.

	Beef Special Premium (ECU/hd)	Suckler Cow Premium (ECU/hd)	Stocking Density (LU/forage ha)
1993	60	70	3.5
1994	75	95	3
1995	90	120	2.5
1996	90	120	2.0

Source: Strutt and Parker, 1992.

Sheepmeat

Reforms of the sheepmeat regime concentrate on maximum headage ceiling for the annual ewe premium. This is payable on the first 1000 ewes per producer in LFAs and on 500 ewes in all other areas. Above these limits premium paid at a rate of 50 per cent. The individual limit per producer established is based on the number of ewes on which premia was paid in the 1991 marketing year.

3.2 The 'accompanying measures' of CAP Reform

This piece describes the three sections of CAP reform 'accompanying measures'. These consist of measures to deal with environment (2078/92), early retirement (2079/92) for farmers over 55, and with afforestation of agricultural land (2080/92). The environment package of the 'accompanying measures' has as a central strand of objectives the provision of the following elements:

- i) a combination of the reduction of agricultural production with beneficial effects on the environment;
- ii) environmental aid schemes throughout the EU;
- iii) environmentally beneficial, sustainable set-aside schemes;
- iv) contributions to agricultural incomes and rural development;
- v) establishment of zonal programmes to reflect environmental diversity;
- vi) education programmes for farmers in sustainable techniques.

These objectives underpin the voluntary five year programmes at national, regional and local level under which compensatory aid payments are available for those farmers undertaking:

- i) a substantial reduction in fertiliser use and/or plant protection products or the introduction and continuation of organic farming methods;
- ii) the use of farming methods beneficial to the environment and natural landscape to maintain the countryside and landscape, or protection of breeds in danger of extinction;
- iii) a change to extensive crop and livestock (sheep and cattle) production;
- iv) the upkeep of abandoned farmland or woodland for purposes of environmental protection;
- v) non-rotational set-aside for environmental reasons, especially the establishment of biotope reserves or natural parks for the protection of hydrological systems;
- vi) land management for public access and leisure activities.

3.3 National Agricultural and Environmental Policies

The agricultural and environmental policies in operation across the six member states participating in this project are described in the following section. This is included as illustrative of the types of policies to be considered in any analysis of cross-compliance which follows in section 4. It should be not be viewed as an exhaustive description of agri-environmental policies but illustrative of the nature of agri-environmental policies for which the concept of cross compliance will be applicable. In each of the following countries there follows a description of the policies in operation, this includes policies introduced under CAP Reform as often these have been introduced on the back of existing policy and so to separate them would be of great difficulty and for little reward.

3.3.1 *Belgium*

Belgium has no comprehensive agri-environment policies since there is no large land area is available for nature and landscape functions; and because of the intensive nature of agriculture in Belgium, where extensification type policies are viewed as a 'potential threat'. In the less intensive agricultural areas of Ardennen-Ardenne, Hoge Ardennen-Haute Ardenne, and Famenne, extensification policies are viewed as potential opportunities. Management agreements only exist as individually negotiated agreements between farmers and environmental pressure groups.

Substantial plans exist for restoring conservation value through the 'Green main structure' (Flemish region) and 'Landscape Parcs' (Walloon region). The Green main structure plan distinguishes between core, development and linkage areas. In these areas the linkage between agricultural policy and nitrate policy exists through restrictions in fertiliser use.

Environmentally Sensitive Areas

There is no elaborated ESA policy based on the EC structures regulation, although the concept has been adopted through integration with the 'accompanying measures' of the CAP reform agreement. This adoption of policies will be implemented along the political regions existing within Belgium. The Walloon region will establish one common programme while the Flemish

region will establish areas which already are delimited by other legislative designations. In the Wallon region a reconsideration of area designation plans will also include defining ESAs to be based on natural water resource considerations.

The major policy areas are concerned with;

- water mining areas and protection zones,
- protection areas for drinking water from surface water,
- nitrate sensitive areas,
- soils in ecological sensitive areas used for agriculture;

- i) nature reserves and woodlands
- ii) valleys and agricultural areas of great ecological value
- iii) areas related to the birds directive
- iv) nature development areas
- v) phosphate saturated soils

Management Agreements

The 'accompanying measures' will be integrated with ESA policy offering the possibility of management agreements. Agreements have recently been established for pilot projects in land reconstruction programmes.

Less Favoured Areas (LFAs)

The LFAs coincide with the agricultural areas of 'Ardennen-Ardenne' and 'Hoge Ardennen-Haute Ardenne' and 'Famenne'. The agricultural use is already extensive, typically 2 LU/ha where the average for the other areas of Belgium are some 40 percent greater. Therefore it seems likely that these farms will profit from the beef premiums and extensification payments associated with CAP reform.

3.3.2 Denmark

In Denmark implementation of the 'accompanying measures' element of CAP Reform has been based on existing, with some supplementary legislation. This should be seen as a result of the process of which the national nitrate and agri-environmental policy had been going through, starting with the *NPo-plan* of 1985 focusing on abatement of pollution of the aquatic environment by nitrogen, phosphorus and organic substances. A full description of Danish nitrate policies can be found in Rude and Frederiksen (1994).

For the purposes of the cross compliance analysis the policies under consideration are as follows:

- 1 Set-aside: rotational and non-rotational.
- 2 Reduction of nitrogen applications by 40 per cent. This is subsidised for a five year period, with the allowances of nitrogenous fertiliser set on a yearly basis.
- 3 Conversion to extensive grassland:
Two schemes exist dependent upon the period of time the land area is entered into extensive grassland use; on a 5 or 20 year agreement. For the 5 year option the grassland can be used for some agricultural production, whilst for the 20 year option the land is managed for wildlife habitats. Only farmers in designated areas are eligible to enter this scheme.
- 4 Farm woodland support scheme
Two schemes exist:
 - i) A Five year scheme to establish new woodlands
 - ii) Financial payments for improvements in existing woodland.
- 5 Support for hedge and shelter planting both individual and collectively
- 6 Financial support to organic farming
- 7 Support for management and re-establishment of natural amenities.
- 8 Compulsory obligation to have an autumn cover crop covering 65% of the arable land. This scheme attracts no subsidy.
- 9 Compulsory 2m filter strips along watercourses, again this attracts no compensatory payments.
- 10 Field margins, 12m in width, to be maintained without the use of pesticides. Only farmers in

designated areas are eligible to enter this scheme.

In addition the role of the planning system will be considered as it has an important impact of the regulation of agriculture. The regulations divide the country into urban zones, summer house areas and rural zones where most agricultural production is located. Regulation is applicable to the licensing of livestock production. If the livestock operation of more than 15 LU is within 50m of a dwelling or 100m from a urban or summerhouse area then a licence is required. In addition permission must be granted by the municipal council if production of pigs or poultry increases to greater than 250 LUs (Wulff, 1992).

3.3.3 France

In order to detail the 'accompanying measures' of CAP reform it will be useful to consider the specific measures at national, regional and local level.

National level

Agriculture's important role in shaping the rural landscape is recognised by French government actions in attempting a better integration of agricultural and environmental policy, so for example extensification payments are made in Less Favoured Areas to support livestock rearing. The aim is to maintain 4.6 m ha of grassland, and in 1993 this scheme had been entered into by some 123 000 farmers.

Regional level

At this level homogeneous zones are established with specific measures in each zone. The regional schemes are based on the following ideas:

- i) Protection of water catchments, surface waters and land erosion.

To protect areas where the quality of drinking water is affected by rising nitrate and pesticide levels using the following measures:

- a) 5 year scheme to switch land from arable to permanent grassland;
- b) reductions in fertiliser and pesticide use targeted at large arable farms with no livestock;
- c) non-rotational set-aside.

ii) Organic farming scheme.

iii) Extensification payments to encourage lower stocking densities on bovine and ovine farms.

iv) Rearing of threatened breeds.

Subsidy on bovine, ovine, caprine and asine breeds where there is a risk of rapid extinction.

v) Training programmes.

To implement environmentally friendly practices subsidies will be given for training programmes.

Local level

The measures at the local level are very similar to the environmental applications contained in article 19 of the structures directive. The two main aims are:

i) To adapt farming systems in areas rich in ecological interest in flora and fauna;

ii) Better management of extensive areas such as Less Favoured Areas where abandonment of the land threatens landscapes and habitats.

In France the general regulations of development do not directly apply to agriculture but affect the ways in which any form of pollution caused by agriculture is dealt with. Environmental protection including landscapes and the conflict between production and residential areas comes within the control of town planning law. The land use plan (POS-Plan d'Occupation des Sols) establishes general land use rules and allows for specialist activities. The main categories are urban sites and future urban sites, areas of natural beauty, agricultural land, sensitive areas and areas of special interest from an ecological or aesthetic view point.

Under Article 19 Directive (797/85), there is a general willingness to maintain intensive agricultural practices to aid France's balance of payments deficit. Under article 19 the following areas were identified as important in 1989:

i) sites with ecosystems of high value, mainly wetlands with rich fauna and flora;

- ii) disadvantaged areas where land abandonment threatens ecological diversity and landscape quality;
- iii) polluted ground or surface water in intense production regions;
- iv) woodland areas at high risk of forest fire.

Latterly only the first two classifications have been continued, but by 1993 the number of agreements amounted to 83 extending to some 240 00ha. The level of payments associated with the scheme reflect the expected environmental benefit clearly providing a degree of cross compliance.

3.3.4 Germany

Germany has an extensive array of agri-environmental policies, with EU legislation being implemented at the federal and länder level, whilst environmental protection and nature conservation are the responsibilities of the länder with the federal government setting the legal framework.

The following set of policies describe the broad variety of schemes in operation in Germany, with many of these existing before the accompanying measures of CAP Reform were adopted. The first two policies are of particular importance in terms of German nitrate policy, more detail of German nitrate policy is given in Rude and Frederiksen (1994).

i) Manure ordinances

These refer to the areas Schleswig-Holstein, Niedersachsen, Nordrhein-Westfalen, Bremen and Sachsen-Anhalt and are based either on the Waste Act or the Pollution Protection Act. With reference to liquid animal manure and poultry waste, specific dung units are defined by the number of animals, with maximum limits prescribed (dung units per hectare).

ii) Protected water collection areas

The nitrate limit of 50mg nitrate per litre of drinking water established under the EC drinking water directive (80/778) was adopted by the Drinking Water Ordinance. Under the Water Resource Management act the regional authorities established 'protected water collection areas'. Within these areas restrictions on agricultural production are imposed, if the restrictions impose measures that

go beyond 'good agricultural practice' then compensation is paid for profits foregone.

The measures from the EC directive 2078/92 will be introduced as the responsibility of the Länder in Germany, in addition the German federal government will introduce as the 'Principles for the support of a market and habitat orientated agriculture'. For the purpose of providing relevant groupings for cross-compliance analysis the following groups of policy measures will be considered:

iii) *Accompanying measures of CAP Reform*

The introduction of the measures contained in EC directive 2078/92 will be the responsibility of the Länder with the federal government introducing the 'principles for the support of a market and habitat orientated agriculture'. In the New Länder farmers can participate in schemes consistent with directive 2078/92 on a voluntary basis. For the purposes of cross compliance analysis the policy measures are summarised into broadly defined groups; some of the measures presented below are applied to the whole territory while others are restricted to several länder or regions. The groups of policy measures are as follows;

- 1 Cessation of chemical fertilisers and pesticides on the whole farm. The main objectives for organic farming are to reduce supply and enhance the environment (this set of policies will be described in the matrix (table 8) as *organic farming*).
- 2 Renunciation or decrease of pesticide use and / or renunciation / decrease in fertiliser applications (mineral and / or organic) on selected farm areas (*Reduced input use on selected farms*).
- 3 *Stocking density limits for cattle and sheep.*
- 4a Adoption of production techniques measures for arable farming and permanent cropping aimed at supply reduction (*Supply reduction through adoption of production techniques*).
- 4b Adoption of production techniques measures for arable farming and permanent cropping aimed at environmental and resource protection (*Environmental and resource protection through adoption of production techniques*).

- 5 Adoption of restrictions in production techniques for grassland use. This would include such measures as imposing the maximum number of grass cuts from a meadow or the imposition of cutting dates (*Nature protection by production techniques in grassland use*).
- 6 Set-aside policy aimed at environmental protection, namely the preservation of threatened habitats for certain species (*set-aside*).
- 7 Maintenance and service of man-made landscapes, and protection of endangered livestock species (*Man made landscape schemes*).

iv) CAP reform set-aside (*CAP reform set-aside*).

From 1994 German farmers will face three options

- i) six year rotational set-aside with 15% of the cereal and oilseed area
- ii) three year rotational set-aside with 20% of the cereal and oilseed area
- iii) five year non-rotational set-aside with 20% of the cereal and oilseed area.

3.3.5 *The Netherlands*

The following section describes the details the important agri-environment policy in operation in the Netherlands which concentrates on the operation of management agreements. Proposals under the 'accompanying measures' are contained within two programmes; the first deals with management agreements in sensitive areas, the second with a number of policies whose general outline is covered in section 3.2. The rest of this section initially deals with the history of the management agreements which emphasises the importance of these as a management tool, before examining the outline details of the second programme of agri-environmental policies.

In the Netherlands management plans have been in operation since 1975. Centred on agricultural land with a high nature and countryside characteristics, regions are identified as being vulnerable to environmental effects. In 1991 some 198 regions had been designated as being vulnerable and these extended to some 70,538 ha.

By 1989 management agreements with some 2137 farmers, covered an area 13,109ha. By 1993 this area had increased to 27,363 with the aim that by 1998 the area covered by agreement should total 100,000ha.

Management agreements can be classified as follows;

- i) passive,
- ii) buffer,
- iii) botanical,
- iv) field margin,
- v) arable land,
- vi) meadow bird,
- vii) meadow bird/botanical,
- viii) bird/buffer,
- ix) winter visitor.

Several packages have been established with compensation rates dependent upon the package chosen and these rates may vary according to soil type. The emphasis of Dutch policy is on arable land and pasture, with the principal objectives of agri-environmental policy relating to wildlife habitats and agricultural landscape.

The second programme of Dutch policies to fulfill the requirements of regulation 2978/92 contains the following elements:

- i) conversion to organic farming;
- ii) maintenance of organic farming;
- iii) public access on national footpaths;
- iv) training courses;
- v) promotion of local breeds;
- vi) training courses by non-governmental organisations;
- vii) demonstration projects;
- viii) leisure activities;
- ix) conversion to and maintenance of organic farming with respect to animal production.

3.3.6 *United Kingdom*

The following groups of policies are described in this section; first the policies introduction through the accompanying measures package paying special attention to the nitrate sensitive areas policy, second policies concerned with measures introduced to maintain farming populations and traditional farming measures, and thirdly policies physically covering small areas of the total land area but providing an example of policies designed to encourage environmental and conservation values.

The 'accompanying measures' package

The implementation of the accompanying measures package contains 7 elements;

1 The Nitrate Sensitive Areas (NSA) Scheme

This scheme is a revised and relaunched version of the pilot NSA scheme in operation, in England, since 1990. Initial results from the pilot Nitrate Sensitive Areas scheme detailing take up rates and changes in agricultural practice are contained in MAFF(c), 1993. The UK nitrate policy is described in more detail in Rude and Frederiksen (1994). The scheme is a voluntary one, attempting to change farming practices and so reduce nitrate leaching. Table 4 lists the payment levels available through the scheme. The band of payments reflect the differential in gross margins and yields between geographical areas. The map in Appendix B illustrates the geographical distribution of the two tranches of NSA designation.

The new NSA scheme will become operational in 1994 operating for five year agreement periods, it will enter land into one of three categories:

i) Basic Scheme.

Two options are available under this arable low nitrogen scheme;

a) Restricted Rotation.

This option restricts the use of Nitrogen fertiliser to 150kg/ha and prohibits the production of vegetables and brassicas.

b) Normal Rotation.

This option allows for any crop to be cultivated with normal levels of fertiliser application for

one of the five growing seasons .

For both options the use of farm yard manure is permissible and will contribute to the specified nitrogen limits.

Table 4: The NSA Scheme: Levels of payment.

Option	Upper Band (£/ha)	Lower Band (£/ha)
Basic A	105	80
Basic B	65	65
Premium Arable A	550	450
Premium Arable B	590	490
Premium Arable C	520	420
Premium Arable D	440	340
Premium Grass	250	250

source: MAFF (b) 1993.

ii) Premium Arable scheme

This scheme encourages the switching of land from arable to extensive grassland production with graduated management prescriptions. Four options are available;

- a) Arable reversion with no fertiliser applications or grazing.
- b) Arable reversion as for (i) but with native grass species.
- c) Arable reversion with no fertiliser applications but with limited grazing allowed.
- d) Arable reversion with fertiliser and grazing restrictions.

iii) Premium Grass Scheme

This scheme encourages the conversion from an intensive to extensive use of grassland.

2 Habitat Improvement scheme

The scheme is designed to remove selected areas of land from agricultural production for a period of twenty years and manage it in an environmentally beneficial way. The options for habitat creation areas are as follows;

- i) The creation of intertidal habitats.
- ii) Establishment or enhancement of water fringe habitats alongside lakes and water courses
- iii) Management of valuable habitats established under the Five year set-aside scheme

3 The creation of six new ESAs in England and Wales, increasing the total to twenty-two in England and with six in Wales. Scotland will have an additional five ESAs.

4 The provision of new voluntary access opportunities within ESAs, targeted on land suitable for new or significantly increased access. Access payments would be available, based on 10m wide access strips across fields and reflecting the increased level of costs. In addition, 80 per cent capital grants will be available for investments for items such as stiles and footbridges.

5 The establishment of a new Moorland Scheme to improve the condition of heather and moorland vegetation, and wildlife habitats by reducing the number of grazing livestock, especially sheep. The scheme will also be available to sheep producers in LFAs farming on heather moorland outside ESAs.

6 The establishment of a Countryside Access Scheme to encourage public access on set-aside land. This would be non-rotational set-aside land under the Arable Area Payments Scheme and would be made on land that was of particular interest or attractiveness. This scheme is a development of the Countryside Premium Scheme.

7 A new Organic Aid Scheme available throughout England. Its aim will be to encourage organic farming for the benefit of the environment. Farmers will be required to farm in accordance with the standards of the UK Register of Organic Food Standards (UKROFS).

Set-aside

The first set-aside scheme was first introduced in 1988 as a voluntary scheme for arable crops,

modified in 1990 when a 'grazing fallow option' was introduced along with the requirement to maintain 'environmental' features such as stone walls, hedges, ponds. The grazing fallow option allowed farmers to graze livestock on set-aside land provided the number of livestock kept had not increased overall.

Rotational and Non-rotational set-aside - 1992 scheme

This scheme formed a central part in the 1992 CAP reform agreement. Under this scheme compensation on all set-aside is paid in full. Two types of set-aside exist, rotational and non-rotational under the Arable Area Payments Scheme. Rotational set-aside must account for 15 per cent of the area of COP crops (Cereals, Oilseeds and Protein) with small producers having no obligation to set-aside. Small producers are defined as those producing less than 92 tonnes or roughly 20 hectares (at regional average yields).

Non-rotational set-aside will be available after the 1993 harvest, at a rate of 20 per cent, although UK farmers will only have to set-aside 18 percent of the arable land under a concession won during negotiations. Cultivation of non-food crops will be permitted, in addition there a number of environmental protection precautions included these are;

- i) To avoid the risk of nitrate leaching (and erosion) fallow land must have a cover crop.
- ii) Weed control on fallow land must be by cutting rather than with herbicides.
- iii) 'Environmental features' (eg hedges, stone walls, ponds and areas of rough grazing, moorland and heath) must be maintained.
- iv) Fallow set-aside may be strips of land around headlands to help create wildlife habitats.

Environmentally Sensitive Areas

Environmentally Sensitive Areas (ESAs) are first described in article 19.1 of the EC Structures Regulation (EEC/797/85) which outlines payments 'in order to contribute towards the introduction or continued use of production practices compatible with the requirements of conserving the natural habitat and ensuring an adequate income for farmers.'

The ESA policy involves making annual payments to farmers who agree to undertake a prescribed

form of environmentally beneficial management, reflecting the character of each area. ESAs in Scotland also have landscape enhancement as an objective. The menu style approach allows management prescriptions and incentives to remain simple, with payments at a standard rate per hectare in each area (Baldock (1990), Potter (1993)). This tier one prescription requires low intensity grassland management with controls over nitrogen fertiliser, herbicide and pesticide applications. The enforced stocking densities often require little or no changes to the current farming system. The diverse and complex landscape types and habitats demanded a second, and often a third tier, associated with additional restrictions on farming practice. Tier two prescriptions require actions to enhance the landscape and produce 'environmental goods'. Third tier prescriptions have been specific to individual ESAs, normally requiring some remedial work, such as in the South Downs ESA where farmers reinstate ploughed up grassland.

Since the concept of ESAs was introduced in 1986, there has been a continual extension of areas designated. The total number of ESAs in England amounts to 22, extending to 832 000 hectares, with annual expenditure estimated to be £43million by 1995/96 (MAFF (a) (1993)). In Scotland the number of ESAs total 10, extending to approx 1.6million hectares.

Research is currently appraising the socio-economic value of the ESA designations. Willis et al (1993) performed an evaluation of two of the original round of designations, namely the South Downs ESA and the Somerset levels and Moors ESA. The evaluation is concerned with the benefits provided by the ESA prescription compared to a situation without the benefits from the designation. The benefits are perceived to be:

- i Improvement in the ecological diversity through extensification of land use and the operation of positive management schemes.
- ii Further ecological benefits from management and maintenance of field boundaries and habitats containing diverse species.
- iii Enhancement of landscapes through the following methods:
 - a) direct benefits from the implemented management prescriptions.
 - b) protection of otherwise threatened features such as those of archaeological interest

iv A number of indirect benefits arising because of changes in agricultural practice. The extensification of production, prescribed in the management agreements, leads to areas of grassland, with a reduction in the levels of fertiliser application, and the production of flower rich grazing pasture, because of the restrictions on cutting days for straw. Reductions in the levels of intensification will have implications for cross compliance where the ESA is in an area of high nitrate concentrations in the groundwater. The set-aside policy incorporated in the CAP Reform will also have some effect.

Less Favoured Areas Policy

An EC perspective to Less Favoured Areas (LFAs) Policy can be gained from Bertrand and Hulot (1990). In the UK LFA policy was introduced in 1975, with further Disadvantaged Areas (DAs) added in 1985, with the former areas being uprated to Severely Disadvantaged Areas (SDAs).

The 1975 directive under which the LFAs were created defines LFAs by the following criteria:

- i) Land of limited agricultural potential, defined as;
 - a) rough grazing area greater than 49 percent of the combined permanent and rough grazing
 - b) average livestock densities below 0.78 LUs per forage hectare
 - c) farm rents not exceeding 48 percent of the national average
- ii) Low economic results for farming
- iii) Low population density, less than 36 inhabitants per square kilometre
- iv) Dependence on farming with at least 19 per cent of the total working population engaged in agriculture

In 1984 regulation 169/84 enlarged the area covered by LFA policy. The Disadvantaged Area criteria were based primarily on those described above but with lower thresh-holds enabling farms holdings with specific problems to receive compensation payments. The criteria were extended to cover the economic situation of the farm and income of the farm owner and were dependent upon the farm employing 'ecologically sound production methods' (Elbersen 1993). The various

regulations relating to LFAs were established in regulation 2328/91.

The conflict of support in LFAs through incentives linked to livestock numbers and resulting in negative environmental effects because of overgrazing, has been long recognised (RSPB (a)1991). Recommendations for policy reform have included the replacement of the production orientated support with area payments, fully integrated with environmental goals. These headage payments have contributed to the negative environmental effects associated with agricultural policy.

Countryside Premium Scheme

The Countryside Premium Scheme was an experimental scheme, established in 1991, covering 7 counties in East Anglia¹. The central aim was positive land management for environmental benefits, for land entered into MAFF's 5 year set-aside scheme. The scheme provided a number of management prescriptions for typical land and habitat types, these were:

- i) wooded margins
- ii) meadowland
- iii) wildlife fallow
- iv) Brent geese pasture
- v) habitat restoration.

The scheme was entered into by 250 farmers. At present the transitional nature of the agri-environmental CAP reform package means the future is uncertain for the participating farmers, but it seems likely they will be transferred into a habitat recreation option (personal communication, Countryside Commission). In their appraisal of the scheme Ewins and Roberts (1992) argue that maximisation of environmental benefits for a given public investment is dependent upon the ability to choose location and the nature and amount of land entered into schemes.

¹ Bedfordshire, Cambridgeshire, Essex, Hertfordshire, Norfolk, Northamptonshire and Suffolk.

Countryside Stewardship Scheme

The Countryside Stewardship Scheme (CSS) was initiated at the UK Governments' request, in response to *This Common inheritance*. The aim of the scheme, is to conserve, manage and recreate landscapes. Launched in 1991, it operates in England only, with close links with English Nature and English Heritage. The general principles of the scheme include;

- i Targeting key areas, but not solely confining the policy to specially designated areas.
- ii Landscapes viewing.
- iii Wildlife, historical and access objectives with the integration of improved landscape and habitat management.
- iv Greater public access and maintaining a public rights of way.

Under the scheme agreements run for a 10 year period. The targeted landscapes were divided into seven categories of distinct landscape: Chalk and limestone grassland, lowland heath, waterside landscapes, coastal areas, uplands, historic landscapes, and old meadows and pastures.

The distinct qualities of the landscapes were created by traditional management practices. The CSS encourages positive management to sustain or return these practices through addressing the combined elements of landscape, wildlife, history and access.

Provision of Sites of Special Scientific Interest under the Wildlife and Countryside Act 1981 and 1985

This involves the protection of sites of nature conservation through their designation as SSSIs and their protection through Nature Conservation Orders, Limestone Pavement Orders, and most importantly though Management Agreements. In 1991 there were 5,671 SSSIs extending to an area of 1,778,474 ha designated by reason of their flora, fauna, geological or physiological features (NCC, 1991). These agreements allow the State, through the conservation agencies (English Nature and Scottish Natural Heritage) to pay farmers compensation for financial losses incurred if farmers agree to refrain from a list of 'potentially damaging operations' (PDOs). These PDOs, such as ploughing up of ancient meadows, are damaging to the conservation of the site. Farmers are thus paid not to produce environmental bads. However, as Spash and Simpson (1993)

point out, the act has led to undesirable consequences for conservation, due partly to budgetary restrictions on the agencies and partly due to moral hazard problems.

Farm Woodland Premium Scheme

This scheme replacing the pilot Farm Woodland Scheme aims to encourage the planting of trees on farmland to enhance the environment and as a productive alternative land use. Farmers apply to the Forestry Commission for grants establishing trees under the Woodland Grant Scheme. They are then eligible for the Better Land Supplement and Community Land Supplement. Annual applications are made to the Agriculture Departments for payment under the Farm Woodland Premium Scheme. The levels of annual payments available under the scheme are paid over a period of 15 years for woodland containing more than 50 per cent by area, of broadleaved trees, and over 10 years for woodlands containing less than 50 per cent of broadleaved trees.

4 Cross-compliance across agri-environmental policies

With the description of agri-environmental policies for the participating member states in the previous section, we now move on to use the concept of cross compliance in analysing the likely effects of each policy on a number of criteria. The rest of this section is structured as follows: first an explanation of the notion of cross-compliance across agri-environmental policies will be presented; then the degree of cross-compliance will be presented across the six member states participating in this project namely; Belgium, Denmark, France, Germany, the Netherlands, and the United Kingdom. This analysis will provide a method of determining the 'cross-compliance between objectives of agricultural and environmental policy' and will allow the degree of complementarity or off-setting which exists between policies to be investigated and formalised. The following policy objectives are to be considered:

Macro level effects:

The introduction or reform of policy may be concerned with a macro level consideration such as reducing the total budgetary cost of a policy or reducing total production. For the purposes of this project we will concern ourselves as to whether the policy in question aims to control supply at the member state level as opposed to the EC level. Thus in the following sections we will be concerned with policies that reduce agricultural output for the member state as a secondary effect.

Income distributional effects:

This criterion is concerned with policies which may result in a redistribution of farm income for those farms participating in the scheme under consideration. As it would be difficult to distinguish and say anything precise about policy measures and income re-distribution outside the farm sector this will not be examined here.

Environmental effects:

The third set of criteria are concerned with the effects of policies over a range of environmental effects these have been selected as:

- i) Nitrate Pollution; This in effect refers to whether as a secondary effect the policy will have any effect on the capacity for nitrate leaching from the agricultural enterprise.
- ii) Air Pollution; this will concentrate on the degree to which the policy has

as a secondary effect on ammonia evaporation.

- iii) Pesticides use; this criteria is concerned as to whether the policy as a secondary effect will lead to a change in the use of pesticides when implemented.
- iv) Wildlife habitats; this objective is concerned as to whether the policy will have a significant effect on the environment as so affect the availability and quality of wildlife habitats.

4.1 An explanation of cross-compliance

The 'complementary and offsetting' aspects of agri-environmental policy with special reference to nitrate pollution are specifically considered. We refer to this concept of complementarity and the degree of offsetting as '*cross compliance between objectives of policy*'. Recognising that agri-environmental policies have many objectives, classification of specific policies is possible through their primary and secondary objectives. If a policy with a primary objective related to some particular criteria helps in fulfilling some other criteria then positive cross compliance occurs. If, however the policy hinders the fulfilment of these other criteria then negative cross-compliance occurs.

For each policy the principle objective is identified and viewed in terms of its effectiveness in achieving secondary objectives, especially with focus on the effect on nitrate pollution. This we then categorise as having a positive or negative effect on nitrate pollution. For example, the Environmentally Sensitive Areas scheme has as its major objective the enhancement of the conservation value of agricultural land, however it also has an affect on nitrate levels in some areas due to the changing of production patterns. Both the direction and strength of linkages are important conceptually, thus we seek to distinguish between large and small positive or negative cross-compliance in what follows.

It is recognised that notion of cross-compliance can be applied at different levels of the specific policy. We summarise the degree and sign of cross-compliance across the policies under consideration. This information may usefully be presented in a matrix format. This approach provides a useful starting point for analysis on the degree of cross-compliance. It is recognised that this technique can be usefully expanded and warrants further investigation in order that a

valuation may be eventually attached to each policy. Until this is possible a qualitative approach were the analysis in each table that follows in section 4.2 will employ the following notation:

- P Principle objective of the scheme
- + small positive cross compliance effect
- ++ large positive cross compliance effect
- small negative cross compliance effect
- large negative cross compliance effect
- 0 no cross compliance effect

So for instance the policy of non-rotational set-aside, adopted as part of the CAP reform has as it's primary aim the control output and so will control supply, this will then be assigned the 'P'. The effect on farm income will depend upon the levels of set-aside payments against profits foregone for the productive capacity of the land set-aside. If the compensatory payments are greater than the profit foregone then this is termed positive cross compliance in terms of the objective of farm income. If the payments are less than the profit forgone then negative cross compliance occurs.

For the environmental criteria the following analysis follows; in terms of nitrate leaching the long term nature of the set-aside and its change in land use to an extensive system means the potential for nitrate leaching is greatly reduced so giving a large positive cross compliance effect for this policy. In terms of ammonia evaporation less application of organic and mineral nitrogenous fertiliser produces a small positive cross compliance effect. For pesticides there will be a large positive cross compliance effect as no pesticides will be applied on non-rotational set-aside, and because of the long time period involved with this policy there will be a large positive cross compliance effect for wildlife habitats.

4.2 Qualitative assessment of cross compliance across selected member states

This section develops the concept of cross-compliance as outlined in the previous section and characterises the relevant policies in terms of the notion of cross-compliance for each of the agri-environmental policies described in section 3.3. This analysis is presented for each of the member states participating in this project, namely Belgium, Denmark, France, Germany, the Netherlands and the United Kingdom. For each of these countries a matrix is presented which details the agri-environmental policies and the associated degree of cross compliance, following this matrix there follows an explanation of the reasoning followed in order to arrive at the direction and relative magnitude of cross compliance attached.

4.2.1 Belgium.

Table 5: Qualitative assessment of cross-compliance in Belgium for selected agri-environmental policies.

Policy	Member State	Income distribution	Environmental Effects			
			Supply control	Farm income	Nitrate pollution	Air pollution
CAP Reform	P	²	+	0	+	0/+
Accompanying measures	+	-	+	0	+	+
Management agreements	0	0	++	+	+	+

² will depend upon profit foregone

Licence policy	0	-	+	+	+	0
Manure laws	0/+	0/-/--	P	+	0	0
'Green' development plans	+	-	+	0	+	+

Key

- P Principle objective of the scheme
- + small positive effect
- ++ large positive effect
- small negative effect
- large negative effect
- 0 no effect

Assumptions made in table 5:

1) CAP Reform

- i) CAP Reform expected to lower farm income, estimates of between 25-50% decrease in income for the arable sector.
- ii) Some reduction in the use of fertilisers as price ratios alter.
- iii) a reduction in the use of pesticides through cost reduction.
- iv) wildlife habitats will either be enhanced under non-rotational set-aside or not altered under rotational set-aside. This depends upon the management practices of the set-aside.

2) Accompanying measures

Partial compensation for the reduction in farm income experienced under CAP reform will be made available through extensification payments.

3) Management agreements

These are of little importance in Belgium and so will have little impact on macro features.

4) *Manure Laws*

- i) Changed costings at the farm level in combination with severe licence policy constraints will result in control of supply.
- ii) Income effects depend upon farm structure and will vary between 0-50% of labour income

5) *Licence policy*

The income effects are negative due to constraints imposed at the farm level.

Whilst environmental control is likely to be enhanced due to greater control of point source pollution.

6) *Green main structure / Landscape Parks*

- i) the farm income effects depend upon the levels of payment. It seems unlikely that the income decrease will be fully compensated.

- ii) positive environmental effects are the primary objectives for this policy.

4.2.2 *Denmark.*

Table 6: Qualitative assessment of cross compliance in Denmark for selected agri-environmental policies.

Policy	Member State	Income distribution	Environmental Effects			
			Supply control	Farm income	Nitrate pollution	Air pollution
Set-aside:						
rotational	P	³	+	+	+	0/+
non-rotational	P		++	+	++	++

³ The effect will depend upon profit foregone

Reduced N applications	+	³	P	+	0/+	0
Extensive grassland	+	³	P	+	++	+
Organic farming ⁴	+	+	+	0/+	++	+
Hedge and shelter ⁴ planting	0 / +	0 / +	0	0	0	++
Farm Woodland support ⁴	+	³	+	0	+	+
Filter strips ⁴	+	-	+	+	0	+
Set-aside of field margins ⁴	+	+ ³	0	0	P	+
Management reestablishment of natural amenities ⁴	+	³	0 / +	+	+	++
Green fields in the autumn	+ / -	-	P	0	- / 0	+
Planning Permission	+/-	-	+	+	+	0

⁴ The objectives of the scheme are either not specified or are multi-objective

Key

P	Principle objective of the scheme
+	small positive effect
++	large positive effect
-	small negative effect
--	large negative effect
0	no effect

Explanation of the assumptions made in table 6 :

Set-aside: rotational	Supply	Objective of policy is supply reduction.
non-rotational	Income	Depends upon profit foregone.
	Environment	Less use of nitrogen fertiliser and pesticide, more undisturbed land for wildlife.
Reduced nitrogen applications	Supply	Less use of fertiliser will reduce output.
	Income	Depends upon profit foregone.
	Environment	Objective is to reduce nitrate pollution, with only a small effect on the use of pesticides and wildlife.
Extensive grassland	Supply	More grassland will reduce production.
	Income	Depends upon profit foregone.
	Environment	Objective is to reduce nitrate pollution, less pesticides are used on grassland, provision of a diverse ecosystem to enhance wildlife.
Organic farming	Supply	Less productive per hectare.
	Income	Positive contribution through compensation payments.

	Environment	Some reduction in nitrate pollution, no use of pesticides and large contribution to the enhancement of wildlife.
Support for hedge and shelter planting	Supply Income Environment	Possible small increase in production. Small positive effect. Small effect on nitrate and pesticide pollution, some positive effect on wildlife.
Farm woodland support	Supply Income Environment	Production reduced as land is no longer used for agriculture. Depends upon profit foregone. Reduces the use of nitrate and pesticides and enhances wildlife.
Filter strips	Supply Income Environment	Decrease in agricultural area Decrease in income as there is no compensation Main objective is to reduce nitrate pollution.
Set-aside of field margins (headlands)	Supply Income Environment	Reduction in production. Will depend upon profit foregone in comparison to the compensation paid. Small effects on nitrate pollution, with the main objective being the abatement of pesticides, and providing wildlife corridors to enhance quality of wildlife
Support for management and reestablishment of natural amenities	Supply Income Environment	Production is reduced as land is removed from production Depends upon income foregone Reduction in agricultural area reduces nitrate and pesticide use, re-

Green fields in autumn (cover crops)	Supply	establishment of natural amenities increases wildlife habitats. Difficult to identify.
	Income	No compensation suggests decrease in income.
	Environment	Decrease in nitrate pollution. Small increase in use of pesticides to keep down weeds. Small positive effect on wildlife as will provide winter forage.
Planning regulation	Supply	Depends on permission being granted.
	Income	Increase in cost of fulfilling regulations.
	Environment	Greater control of point source pollution.

4.2.3 *France.*

Table 7: Qualitative assessment of cross compliance in France for selected agri-environmental policies.

Policy	Member State	Income distribution	Environmental Effects			
			Supply control	Farm income	Nitrate pollution	Air pollution
LFA	++	P	-	0	0	- -
Water catchment protection	0	0/-/--	+	+	0	0
set-aside: rotational	P	⁵	+	+	+	0/+
non-rotational	P	⁵	++	+	++	++
Organic farming	+	-/0/+ ⁶	++	+	++	+
Lower livestock stocking density	+	0/+/>++	+	+	0	0

⁵ The effect will depend upon profit foregone

⁶ since participation is voluntary it is assumed farmers will not participate if there are expected income losses.

Rare breed protection	+	0/+/>++	+	0	+	+
Provisions under article 19	+	++	+	0	+	P

Key

- P Principle objective of the scheme
- + small positive effect
- ++ large positive effect
- small negative effect
- large negative effect
- 0 no effect

Explanation of the assumptions made in table 7:

LFAs	Supply	Support payments increase livestock numbers.
	Income	Principal aim of the policy
	Environmental	Higher stocking densities result in damage to conservation values. Higher sheep numbers implies higher demand for grass/silage production which implies higher (or at least no decrease) in N applications.
Protected Water Collection Areas	Supply	Some room for reduction due to extensification.
	Income	Effect on income level and distribution differ across regions.
	Environmental	Reduction in nitrate and pesticide pollution due to effects of ground water protection.

Set-aside: rotational, non rotational	Supply	Objective of policy is supply reduction.
	Income	Depends upon profit foregone.
	Environment	Less use of nitrogen fertiliser and pesticide, more undisturbed land
Organic farming	Supply	Cessation of fertiliser use cuts output.
	Income	Negative income redistribution effect due to payment of subsidies
	Environmental	Cessation of use of fertilisers and pesticides reduces air pollution in stocking density is reduced.
Lower Livestock stocking density	Supply	Reduction in supply due to increased incentive for extensification of production.
	Income	Assumes positive income outcome.
	Environmental	Lower livestock density per hectare leads to reduction effects in nitrate and air pollution.
Rare breed protection	Supply	Small reduction in supply.
	Income	Assumes positive income outcome.
	Environmental	Preservation of species is primary objective of scheme. Some reduction in nitrate and pesticides pollution because of set-aside.
Provisions under article 19	Supply	Reduces output.
	Income	Payments in excess of the value of reduced output.
	Environmental	Encourages extensive grassland production.

4.2.4 Germany.

Table 8: Qualitative assessment of cross compliance in Germany for selected agri-environmental policies.

Policy	Member State	Income distribution	Environmental Effects			
			Nitrate pollution	Air pollution	Pesticides	Wildlife habitats
Manure Ordinances	0	0/-/- ⁷	+	+	0	0
Protected Water Collection Areas	+	0/- ⁸	++	0	+	0
Organic farming	+	-/0/+ ⁹	++	+	++	+
Reduced input use on selected farms	+	0/+/ ¹⁰	+	+	+	0
Stocking density limits for cattle and sheep	+	0/+/ ¹⁰	+	+	0	0

⁷ losses will occur to farmers since manure ordinances are compulsory with no compensation payments. The magnitude of the loss depends upon farm type, livestock stocking density and the costs associated with the necessary adjustment.

⁸ depends upon whether compensation is paid and if so at what level.

⁹ since participation is voluntary it is assumed farmers will not participate if there are expected income losses. Empirical results show that taking part in the 1989/90 extensification program has led to income losses for specialist pig producers (Schulze Pals L., 1993.).

¹⁰ Since participation of the scheme is voluntary it is assumed that farmers will not participate unless they expect a net positive outcome

Supply reduction through adoption of production techniques	+	0/+/>++ ¹⁰	0	0	0	0
Environmental and resource protection through new production techniques	0	0/+/>++ ¹⁰	0	0	0	+
Nature protection through production techniques in grassland use	+	0/+/>++ ¹⁰	+	0	0	++
Set-aside	+	0/+/>++ ¹⁰	++	0	++	++
Man made landscape scheme	0/-	0/+/>++ ¹⁰	0/+	0	0/+	0/+
CAP reform set-aside	+	+/>0/-	+	0	+	+

Due to the method of presentation of policies into groups of measures, the qualitative assessment of policies has not identified the principle objective of the policy group.

Key

- P Principle objective of the scheme
- + small positive effect
- ++ large positive effect
- small negative effect
- large negative effect
- 0 no effect

Explanation of the assumptions made in table 8:

Policy	Criteria	Explanation
Manure ordinances	Supply	No supply reduction from the regional perspective, since farmers can redistribute unused dung units from other farms
	Income	Decreases in income if farms run up against the dung limits.
	Environmental	Reduction in nitrate and ammonia pollution by reducing dung unit intensity per ha., possible pollution due to manure spreading at the wrong time of the year.
Protected Water Collection Areas	Supply	Some room for reduction due to extensification.
	Income	Effect on income levels differ across Länder
	Environmental	Reduction in nitrate and pesticide pollution due to ground water protection.
Organic farming	Supply	Cessation of input use cuts output.
	Income	see footnote 9.
	Environmental	Cessation of use of fertilisers and pesticides reduces air pollution if stocking density is reduced.
Reduced input use on selected farms	Supply	Reduction in supply due to increased incentive for extensification of production.
	Income	Participation only occurs if positive income result.

	Environmental	Reduction of nitrogen and pesticide use.
Stocking density limits	Supply	Reduction in supply due to increased incentive for extensification of production.
	Income	Participation only occurs if positive income result.
	Environmental	Lower livestock density per hectare leads to reduction in nitrate and air pollution.
Supply reduction through adoption of production techniques	Supply	Objective of policy is supply reduction.
	Income	Participation only occurs if positive result
	Environmental effect	No effect .
Environmental and resource protection production techniques	Supply	No effect.
	Income	Participation only occurs if positive by income result
	Environmental	Objective of policy is increase in the quality of arable farming wildlife and habitats.
Nature protection by production techniques grassland use	Supply	Reduction in supply due to increased extensification of production.
	Income	Participation only occurs if positive for income result
	Environmental	Positive impacts on wildlife as mowing of grass is prohibited before early summer.
Set-aside	Supply	Small reduction in supply.
	Income	Participation only occurs if positive

		income result.
	Environmental effect	Peservation of species is primary objective of scheme. Some reduction in nitrate and pesticides pollution because of set-aside.
Man made landscape scheme	Supply	Small increase in production as scheme increases incentive to keep marginal plots in production.
	Income	Participation only occurs if positive income result.
	Environmental	Small positive impact by preventing intensification.
CAP Reform set-aside	Supply	Supply reduction due to land take out of production.
	Income	Depends upon individual farms position relative to the regional yields.
	Environmental	Larger positive impacts on non-rotational set aside.

4.2.5 *The Netherlands*

Table 9: Qualitative assessment of crosscompliance in the Netherlands for selected agri-environmental policies.

Policy	Member State	Income distribution	Environmental Effects			
			Supply control	Farm income	Nitrate pollution	Air pollution
CAP Reform	P	¹¹	+	0	+	0/+
accompanying measures	+	-	+	0	+	+
management agreements	+	+	+	+	+	P
Organic farming	P	-/0/+ ¹²	++	+	++	+
Promotion of local breeds	+	0/+/>++	++	0	++	++
Access in	0	+	0	0	0	-

Key P Principle objective of the scheme
 + small positive effect
 ++ large positive effect
 - small negative effect
 - - large negative effect
 0 no effect

¹¹ will depend upon profit foregone

¹² since participation is voluntary it is assumed farmers will not participate if there are expected income losses.

Explanation of the assumptions made in table 9:

CAP Reform	Supply	Objective is supply reduction
	Income	Depends upon levels of compensation and profit foregone
	Environmental	Reduction in the use of fertilisers as price ratios alter. Reduction in the use of pesticides through cost reduction. Wildlife habitats will either be enhanced under non-rotational set-aside or not altered under rotational set-aside. This depends upon the management practices of the set-aside.
Accompanying measures	Supply	Reduces output
	Income	Partial compensation for the reduction in farm income experienced under CAP reform will be made available through extensification payments
	Environmental	Extensification of production causes environmental gains
Management agreements	Supply	Removes land from production.
	Income	No effect as compensation rates depend upon package implemented
	Environmental	Main focus on the conservation of nature and landscape. This is likely to have positive effect on the reduction of water and air pollution from nitrates and pesticides.

Organic farming	Supply	Cessation of fertiliser use cuts output.
	Income	Negative income redistribution effect due to payment of subsidies.
	Environmental	Cessation of use of fertilisers and pesticides reduces air pollution if stocking density is reduced.
Promotion of local breeds	Supply	Small reduction in supply.
	Income	Assumes positive income outcome.
	Environmental	Preservation of species is primary. Some reduction in nitrate and pesticides pollution because of set-aside.
Access	Supply	No effect.
	Income	Payments made for access arrangements.
	Environmental	Access may lead to increased pressure on the environment.

4.2.6 United Kingdom

Table 10: Qualitative assessment of cross compliance in the United Kingdom for selected agri-environmental policies.

Criteria	Member State	Income distribution	Environmental Effects			
			Nitrate pollution	Air pollution	Pesticides	Wildlife habitats
Nitrate Sensitive Area scheme	++	0/+/++ ¹³	P	+	+	+
E S A	+	++	+	0	+	P
Set-aside: rotational	P	¹⁴	0/+	+	+	0
non-rotational	P	¹⁵	++	+	++	++
Habitat creation	+	+ ¹⁶	++	+	+	P
Moorland extensification scheme	+	+ ¹⁷	+	0	0	P

¹³ Effect likely to be positive if farmers are operating at their economic optimum

¹⁴ the effect will depend upon the comparison of set-aside payments with profits foregone.

¹⁵ the effect will depend upon the comparison of set-aside payments with profits foregone.

¹⁶ payment details not yet finalised although likely to be based on income foregone.

¹⁷ payment details not yet finalised but likely to be based on headage payment foregone.

Organic farming aid scheme	+	0	++	0/+	++	+
Access in ESAs	0	+	0	0	0	-
Countryside Premium Scheme	+	0 ¹⁸	+	0	0	P
Wildlife & Countryside Act	+	+	+	0	+	P
Farm Woodland Premium Scheme	++	0 ¹⁹	+	0	+	P
LFAs	++	P	-	0	0	--

Key

- P Principle objective of the scheme
- + small positive effect
- ++ large positive effect
- small negative effect
- large negative effect
- 0 no effect

¹⁸ dependent upon the level of payment

¹⁹ dependent upon the level of payment

Explanation of the assumptions made in table 10:

ESAs	Supply	Reduces output under tiers 2&3 of the policy.
	Income	Payments in excess of the value of reduced output.
	Environmental effects	Encourages extensive grassland production.
Set-aside	Wildlife	Few benefits because of short term nature of scheme.
	Environmental	Short leys may create leaching when ploughed up. Larger positive impacts for non-rotational.
NSA scheme	Supply	Reduction of N applications cuts output.
	Income	Payments represent average profits foregone, farmers should therefore be fully compensated.
	Environmental	Intensive to extensive grassland.
Habitat recreation	Supply	Removes land from production.
	Income	Payments scheme not known.
	Environmental	Recreating low intensity traditional systems.
Moorland	Supply	Reduction in sheep numbers.
	Income	Depends on payments scheme, although likely to be compensated for by loss of income.
	Environmental	Reduces fodder production.
Organic farming	Supply	Production not so intensive.
	Income	Payments are compensatory.
	Environmental	Lower fertiliser applications may encourage botanical diversity. If lower stocking rates and correctly timed organic fertiliser applications are made positive outcome.

Access in ESA	Supply	Already in ESA scheme.
	Income	Payments made for access arrangements.
	Environmental	Access may lead to trampling etc.
CPS	Supply	Less intensive production.
	Income	Dependent upon the level of payment.
	Environmental	Less intensive production.
W&C Act	Supply	Avoids PDOs so less intensification.
	Income	Individually negotiated agreements have almost certainly increased incomes.
	Environmental	May prevent ploughing up of grassland/meadows.
FWPS	Supply	Exchange agricultural output for tree production.
	Environmental	After rush due to ploughing to establish trees, steady state δ lower leaching associated with woodland.
LFAs	Supply	Support payments increase livestock numbers.
	Income	Principal objective of the policy.
	Environmental	Higher stocking densities result in damage to conservation values. Higher sheep numbers implies higher demand for grass/silage production which implies higher (or at least no decrease) in N applications.

Discussion and concluding remarks

This paper has defined the concept of cross compliance as the 'secondary level linkages between objectives of agricultural and environmental policy' and used the concept of cross compliance to consider the direction and degree of 'overlap' between agricultural and environmental policy. This has been performed over a wide number of policies using a set of criteria of importance in a wider context, but which in this paper have paid particular regard to environmental criteria and nitrate pollution specifically.

The set of criteria were chosen to represent three main areas; macro level considerations focusing on supply control of agricultural production, farm income distribution and environmental effects. The environmental criteria were considered under four sub-headings: nitrate pollution, as to whether as a secondary effect the policy will have any effect on the capacity for nitrate leaching from the agricultural enterprise; secondly air pollution, giving consideration to whether the policy has a secondary effect on ammonia evaporation; thirdly pesticide use, concerned whether the policy, as a secondary effect, will lead to a change in the use of pesticides and finally whether the policy would have a significant effect on wildlife habitats with regard to the availability and quality of habitats.

The primary objective of each policy are noted with each policy then viewed in terms of its effectiveness in achieving the secondary aims and objectives. These secondary effects are then categorised as having a positive or negative effect on Nitrate pollution. Both the direction and strength of linkages are important conceptually, thus we have distinguished between large and small, positive or negative cross compliance.

In chapter three an outline of a number of EU agricultural and environmental policies is made. These can be divided into three sub groups: market and price orientated policies of CAP reform in the arable and livestock sectors; the 'accompanying measures' associated with CAP Reform, of which there are many policies contained within a smaller number of key elements, and finally a number agricultural and environmental policies already in operation. In chapter four the application

of cross compliance to these distinct groups of policies is made. Using this central theme it is possible to go some way to distinguish the degree to which policy achieves the secondary effect of reduction in nitrate leaching arising because of agricultural activity.

Under the market orientated CAP Reform measures the primary objective of supply reduction is foreseen to be achieved and with the adoption of set-aside producing positive environmental effects, with the longer term non-rotational producing large benefits in terms of environmental criteria especially reduction in nitrate pollution. Reform in the livestock sector, through lower output prices and the encouragement of lower stocking densities, enables supply to be controlled and large positive benefits in terms of reduction in nitrate pollution.

The application of cross compliance to the provision of accompanying measures under CAP reform establishes two sub groups: one allows large positive contributions in reductions of nitrate pollution, such as the provision of organic farming; the other produces little or no effect in most of the selected environmental criteria. An example of this later type of measure being the management of land for public access and leisure activities. In the example of provision of access opportunities in ESAs in the UK there will be a small benefit in farm income with little or no positive environmental gain. Where the potential gain is greatest for alleviation of nitrate pollution is in the operation of the Nitrate Sensitive Areas scheme, this is the primary aim of the policy and farmers receive compensation for farming beyond good agricultural practice in order to minimise potential nitrate leaching. In addition imposing constraints on agricultural activity leads to the farmers producing at less than the economic optimum resulting in supply control.

The recent adoption of these two groups of measures makes it difficult to say anything *ex ante* concerning questions of income distribution, however groupings will emerge over time whether it be within or across farm types, regions or member states.

The last group of policies are those which have been in place for a period of time and thus pre-date the *de-coupling* of farm support from agricultural production. In terms of cross compliance

policies such as the Environmentally Sensitive Areas (ESAs) and Less Favoured Areas (LFAs) produce differential signals. ESAs encourage the preservation of wildlife habitats and provide net income gains to farmers, the positive effect on nitrate pollution arises because of the extensification of production. The LFA scheme' primary aim of support to farm incomes encouraged a degree of intensification and thus contributed to an increased risk of nitrate pollution.

It is recognised that cross-compliance is being applied at different levels of policy. For instance it has been possible to categorise policies into a number of sets according to the original criteria specified. A number of policies achieved low positive weightings for macro effects but achieved high positive weightings for environment effects, for instance the CAP reform policies designed to control supply although having positive environmental effects are not as successful at achieving environmental objectives as the 'accompanying measures' elements of CAP reform. The analysis has also dealt with a number of other agricultural and environmental policies, such as the Less Favoured Areas policy which achieves income redistribution to the targeted group but generally failed in achieving positive environmental effects.

It is recognised that notion of cross-compliance can be applied at different levels of policy. We have summarised the sign and degree of cross-compliance across the policies under consideration. This approach has provided a useful analysis to establish the degree of cross-compliance between agri-environmental policies in member states participating in this study.

A number of useful trends have been identified and these may be useful for formulating future agri-environmental policy in terms of achieving higher degrees of cross-compliance. However, it is recognised that this technique would be usefully expanded and that it warrants further investigation in order that a quantitative valuation of positive and negative cross-compliance could eventually be attached to each policy.

References

- Agra-Europe. Various issues.
- Baldock D., Cox G., Lowe P., and Winter M. (1990). Environmentally Sensitive Areas: Incrementalism or Reform? *Journal of Rural Studies*, Vol. 6, No. 2, pp. 143-162.
- Bertrand J.M., Hulot J.M. (1990). *Farms in Mountainous and Less Favoured Areas of the Community*. Commission of the European Communities, Brussels.
- Colman D., Crabtree B., Froud J., and O'Carroll L, (1992). *Comparative Effectiveness of Conservation Mechanisms*. Department of Agricultural Economics, Faculty of Economic and Social Studies, University of Manchester.
- Commission of the European Communities.(1993). *The Agricultural Situation in the Community 1992*. CEC, Brussels.
- Elbersen B.S. (1993). 'In search of an evaluation method for EC agricultural policy in the Less Favoured Areas.' Internal note 412, Landbouw-Economisch Instituut (LEI-DLO), Den Haag, Netherlands.
- Ewins A., Roberts B. (1992). The Countryside Premium Scheme for Set-aside Land. In Clarke J., (Ed.). *Set-aside*. British Crop Protection Monograph 50, pp. 229-234.
- Harvey D.R. (1992). 'GATT, The CAP Reforms and the Future of British Agriculture.' Paper presented to the Agricultural Society, The University of Newcastle upon Tyne, October 1992.
- MAFF (a) (1993). Press Release. 'Agriculture and England's Environment.' 100/93, 26 March 1993.
- MAFF (b) (1993). *Solving the Nitrate Problem: Progress in Research and Development*. HMSO.
- MAFF (c) (1993). *Pilot Nitrate Sensitive Areas scheme: Report on the first three years*. MAFF, London.
- Organisation of Economic Co-operation and Development (1991). *Environmental Policy: How to apply economic instruments*. OECD, Paris.
- Potter C., (1990). Conservation under a European Farm Survival Policy. *Journal of Rural Studies*, Vol 6, No. 1, pp. 1-7.
- Potter C., Cook H., and Norman C., (1993). The Targeting of Rural Environmental Policies: an Assessment of Agri-environmental Schemes in the UK. *Journal of Environmental Planning*

and Management, Vol 36, No. 2, pp. 199-216.

- R.S.P.B. (a) (1991). 'Environmental Aspects of Support for Hill Farming-Comments prepared by the R.S.P.B.' RSPB, Sandy, Bedfordshire
- R.S.P.B. (b) (1991). 'A Future for Environmentally Sensitive Farming-RSPB Submission to the UK Review of Environmentally Sensitive Areas 1991'. RSPB, Sandy, Bedfordshire
- Rude S., Frederiksen B.S. (1994). 'National and EC Nitrate Policies - agricultural aspects for 7 EC countries'. Report 77, Statens Jordbrugokonomiske Institut, Denmark.
- Schleef K-H., Kleinhanss W. (1994). 'Mineral Balances in Agriculture in the European Union Part I: the Regional Level'. Institute of Farm Economics, Federal Agricultural Research Centre (FAL), Braunschweig, Germany.
- Schulze Pal L. (1993). 'Regional und betrieblich differenzierte Untersuchungen über Akzeptanz, Motivation und wirtschaftliche Folgen einer Umstellung auf ökologischen Landbau im Rahmen des Extensivierungsprogrammes.' Arbeitsbericht 2/93 aus dem Institut für Betriebswirtschaft der Bundesforschungsanstalt für Landwirtschaft Braunschweig-Völkenrode (FAL), Braunschweig, Germany.
- Spash C.L., Simpson I.A. (1992). 'Protecting Sites of Special Scientific Interest: Intrinsic and Utilitarian Values'. Discussion Paper 13/92, Department of Economics, University of Stirling.
- Strutt and Parker (1992). 'CAP Reform - an explanatory guide'. Strutt and Parker Agents.
- Turner R.K. (1993). 'Economic incentive instruments: an overview.' CSERGE conference paper, December 1993.
- Willis K., Garrod G., Saunders C., Whitby M., (1993). 'Assessing Methodologies to Value the Benefits of Environmentally Sensitive Areas'. Working Paper 39, CCU, Newcastle upon Tyne.
- Wulff H. (1992). Agrarian Land Law in Denmark. In Grossman M.R., Brussward W. (ed.) *Agrarian Land Law in the Western World*. CAB International, Wallingford.

Appendix A: Acronyms and Abbreviations used in this report

AEP	Annual Ewe Premium
BSP	Beef Special Premium
CPS	Countryside Premium Scheme (Countryside Commission)
CSS	Countryside Stewardship Scheme (Countryside Commission)
DA	Disadvantaged Area
ESAs	Environmentally Sensitive Areas
HLCAs	Hill Livestock Compensatory Allowances
LFAs	Less Favoured Areas
LPAs	Local Planning Authorities
LU	Livestock Unit
MAs	Management Agreements
NPAs	National Park Authorities
NSAs	Nitrate Sensitive Areas
SCP	Suckler Cow Premium
SDA	Severely Disadvantaged Area
SNH	Scottish Natural Heritage
SSSIs	Sites of Special Scientific Interest
PDO	Potentially Damaging Operation
W&CAct	Wildlife and Countryside Act 1981 (and 1985)

Appendix B: Nitrate Sensitive Areas in England and Wales

