Conference Programme

8.45 am	**Registration**
9.30 am	**Welcome Address** Professor Gerry Boyle, Director, Teagasc
SESSION 1	
	Chair: Pat O'Keefe, Deputy Editor, Irish Farmers' Journal
9.45 am	**Key Note Address**
	Sustainability in Farming: A European Perspective Mairead McGuinness, MEP
10.30am	**Achieving Food Harvest 2020: An Environmental Perspective** Pat Murphy, Head of Environment Knowledge Transfer, Teagasc
	Discussion
11.30 am	**Networking Break with Tea & Coffee**
SESSION 2	
	Chair: Pat Minnock, President, Agricultural Consultants Association
11.50 am	**Nutrient Management at the Catchment Scale: Lessons from Ireland and the European Union** Professor Phil Jordan, Agricultural Catchments Programme, Teagasc
12.10 pm	**EU Water Framework Directive in the context of an expanding agriculture - an EPA View** Donal Daly, Hydrometric & Groundwater Section, EPA
	Discussion
1pm	**Lunch**
SESSION 3	
	Chair: Oliver Burke, Regional Manager, Teagasc Roscommon/Longford
2.00 pm	**Research Updates**
	Sediment Loss and Soil Conservation Daire O'hUllachain Research Officer, Teagasc
	Land drainage research at Solohead Research Farm Pat Tuohy, PhD Student, Teagasc/UCD
	The Importance of Soil Testing Edel Kelly, PhD Student, Teagasc/DCU
	N and P balances on dairy farms Elena Mihailescu, PhD Student, Teagasc/DCU
	Soil Specific N Advice –Utilising Our Soil Nitrogen Resources Noleen McDonald – PhD Student, Teagasc/UCD
2.45 pm	**New Land Drainage and Reclamation Regulations** Bill Callanan, Senior Inspector, Department of Agriculture Food and Marine
3.15 pm	**AEOS and REPS 4 Update** Jack Nolan, Agricultural Inspector, Department of Agriculture Food and Marine
4.00 pm	**Close of Conference**

Contents

Sustainability in Farming: A European Perspective

Mairead McGuinness MEP

The EU 2020 strategy – backed by the European Parliament and the European Council now underpins all EU policies.

The strategy calls for a new kind of growth – smart, sustainable and inclusive - to be achieved by improving skill levels and (life-long) education, boosting research and innovation, more use of smart networks and the digital economy, modernising industry and greater energy and resource efficiency.

The EU 2020 strategy for Sustainable growth has at its core, building a more competitive low-carbon economy that makes efficient, sustainable use of resources; protecting the environment, reducing emissions and preventing biodiversity loss; developing new green technologies and production methods and helping consumers make well informed choices.

A series of flagship initiatives outline how the EU intends to achieve these objectives.

A resource efficient Europe

The flagship of significance for agriculture is – 'A Resource Efficient Europe' – with 16 separate initiatives undertaken throughout this year including proposals to reform the Common Agriculture Policy (CAP), a communication on biodiversity policy and strategy and an action plan towards a sustainable bio-based economy by 2020.

The EU 2020 strategy seeks to address concerns about the unsustainable use of resources. The emphasis for the future is on sustainable production and consumption.

The natural resources which are under pressure include fuels, minerals and metals as well as soil, water, air, biomass and ecosystems.

The global population is expected to grow by 30% to around 9 billion by 2050, if current trends continue – putting ever increasing pressure on resources.

People in developing and emerging economies will aspire to the standards and consumption levels enjoyed by those of us in the developed world – but the resources will not be there to sustain such demand if we continue with our present production and consumption patterns.

For agriculture, this focus on resource efficiency will help to ensure that the agriculture of the future is strong and sustainable. Farmers will increasingly be required to adopt and maintain farming systems and practices that are particularly favourable to environmental and climate objectives.

Already cross-compliance – which links CAP support payments to meeting the requirements of many environmental directives, is already in place.

The proposed reform of the CAP post 2014 will intensify the integration of environmental requirements for farmers, with 'greening' of first pillar payments requiring all farmers to do more for the environment.

The greening proposals call for the retention of soil carbon and grassland habitat associated with permanent pasture, the delivery of water and habitat protection by the establishment

of ecological focus areas and improvement of the resilience of soil and ecosystems to address EU biodiversity and climate change objectives.

The Water framework directive will come under the remit of cross compliance, with clear obligations for farmers.

There are six EU wide priorities for rural development support including fostering knowledge transfer and innovation in agriculture, forestry and rural areas; enhancing competitiveness of agriculture and enhancing farm viability; promoting food chain organization and risk management; restoring, preserving and enhancing ecosystems dependent on agriculture and forestry; promoting resource efficiency and supporting the shift towards a low-carbon and climate-resilient economy in the agriculture, food and forestry sectors; promoting social inclusion, poverty reduction and economic development in rural areas

'Mistakes of the past'

EU Agriculture Commissioner, Dacian Ciolos, has described his proposals to reform the CAP as a new partnership between Europe and its farmers.

He described the agriculture of the past where farmers were encouraged to engage in unlimited production, paying no heed to the prevailing conditions in ecosystems or the fragility of natural resources as 'a mistake' - one that the EU cannot afford to repeat.

The CAP of the future seeks to link direct payments to additional compulsory environmental measures

The Commission wants to encourage farmers to consider long-term competitiveness in their daily work using sustainable agricultural production practices.

The new 'greening' practices proposed in the reforms will, according to the Commission, secure the aim of long-term food security.

In his speech launching the reform proposals, Commissioner Ciolos spoke about the importance of a strip of woodland to protect the soil against erosion by water and wind. This woodland is not lost to food production but serves to maintain food security by preserving even more land than is needed to form this protective strip.

The CAP of the future seeks to link direct payments to additional compulsory environmental measures - crop diversification, permanent pasture areas and preserving biodiversity reserves and landscape features) – in order to will encourage better management of natural resources.

Under the proposals, 30pc of payments will be linked to undertaking agricultural practises beneficial for the climate and the environment.

(a) to have three different crops on their arable land where the arable land of the farmer covers more than 3 hectares and is not entirely used for grass production (sown or natural), entirely left fallow or entirely cultivated with crops under water or a significant part of the year;

(b) to maintain existing permanent grassland on their holding; and

(c) to have ecological focus area on their agricultural area.

European Innovation Partnerships

In Pillar 11 of the CAP, the Commission sets out its vision for new European Innovation Partnerships. The aim of the new EIP instrument is to improve agricultural productivity and sustainability through research, knowledge transfer and promoting cooperation and innovation.

The Commission believes that putting this concept into practice will allow us to produce more with less, to reconcile the environmental and economic interests and make the agricultural sector more competitive and sustainable.

Additional research funding post 2014 is envisaged as is a revamp of farm advisory services – which differ in their focus and effectiveness across the 27 EU member states.

Under the EIP for agricultural productivity and sustainability, the objective is to forge better links between research and farming practice and encourage the wider use of available innovation measures.

The EIPs require the coming together of farmers, researchers, advisors and businesses involved in agriculture and the food sector. It is also expected that NGO's will be involved in what is still an idea in the early stages of development.

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Achieving Food Harvest 2020 - An Environmental Perspective

Pat Murphy, Head of Environment Knowledge Transfer, Teagasc

Introduction

Irish agriculture is entering a new era, with removal of quota and CAP reform. For first time in a generation, there is scope for growth, driven by global increase in demand for food. The strong performance of the industry in the last couple of years allied with the buy-in from all parts of the industry to this blue-print have put the industry on a trajectory towards meeting the objectives set out in Food Harvest 2020.

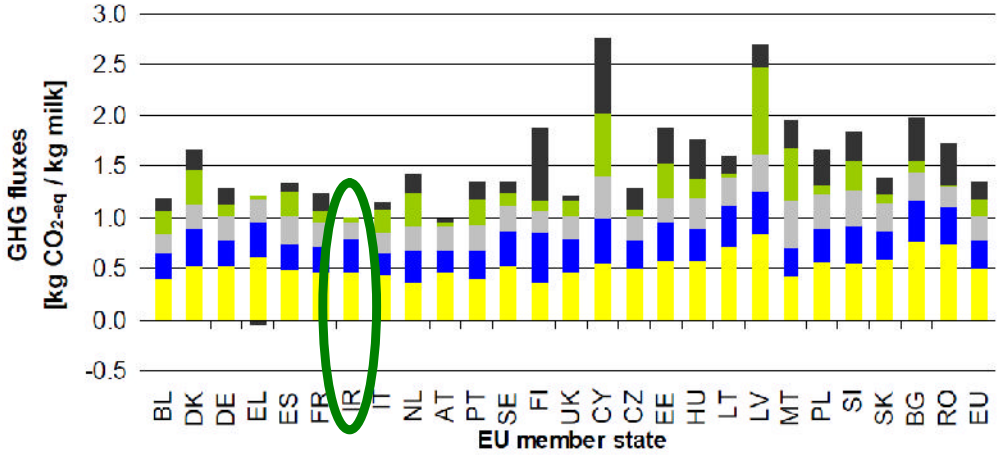
The subtitle of the Food Harvest 2020 Report is "**Smart Green Growth**". Food Harvest gives a profoundly new role to the concept of environmental sustainability which is now put centre-stage as a key-pillar of the strategy to deliver growth, and added value to Irish produce. And there is good reason for this:- internationally, sustainability is now a key element of competitiveness and consumer expectations, and Ireland is in a very good starting position to capitalise on our green credentials.

Improving environmental sustainability presents both a challenge and opportunity in the context of achieving FH2020 targets. This paper will discuss these risks and opportunities and outline some of the actions required to deliver a successful outcome.

Starting Position

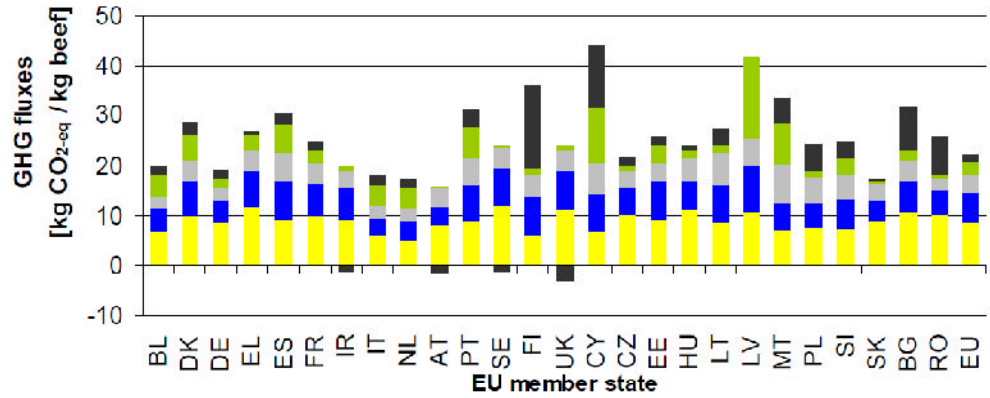
Ireland has an international reputation as a producer of "green", environmentally sustainable food. This is supported by data on key environmental concerns. In relation to the carbon footprint of Irish produce, an independent study commissioned by the European Commission concluded that Irish milk has the second lowest Carbon footprint in the EU (Figure 1) and Irish beef has the fifth lowest. (Figure 2).

Figure 1 Dairy Green House Gas (GHG) Emissions in EU



Source: http://ec.europa.eu/agriculture/analysis/external/livestock-gas/full_text_en.pdf

Figure 2 Beef Green House Gas (GHG) Emissions in EU



Source: http://ec.europa.eu/agriculture/analysis/external/livestock-gas/full_text_en.pdf

In relation to water quality, Ireland is in a good starting position. While our efforts to improve water quality are a major ongoing challenge, a report by the European Commission shows that the trophic status of our surface waters compares favourably with other EU member states with our proportion of Oligotrophic waters is fourth highest in the EU.

The Challenges

While we are in a good starting position in terms of substantiating our green credentials, it is important to recognise that the environmental targets are becoming more stringent and more challenging and that Ireland has a huge distance to travel our targets.

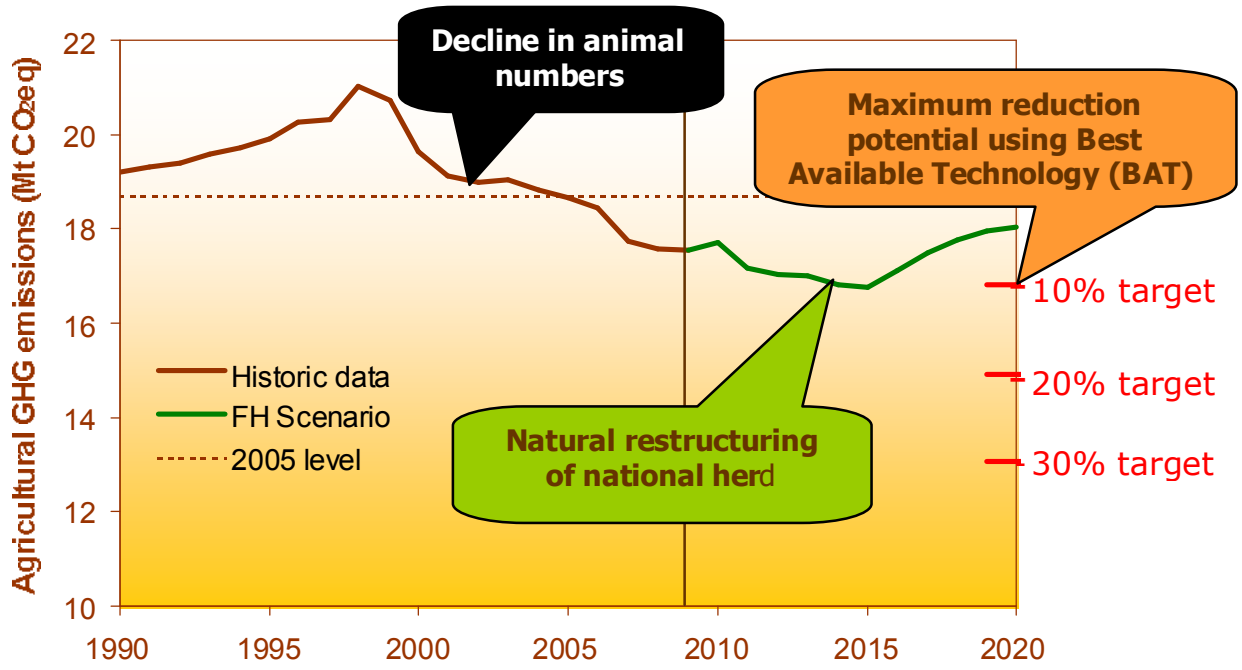
On GHG

Agricultural GHG emissions have fallen consistently since 1998, mainly due to a decline in animal numbers. However, projections from Teagasc's Rural Economic Research Centre suggest that the Food Harvest targets will result in stabilisation, and ultimately an increase in GHG emissions. This increase will be moderated by the expected natural restructuring of the composition of the national herd, where increases in certain livestock categories are expected to be offset partly by declines in other.

Nevertheless, a small increase, or even stabilisation of agricultural GHG emissions is unlikely to be considered satisfactory at policy level, as the national and indeed international commitment is to reduce GHG emissions. The scale of the expected reductions for the agricultural sector is yet unclear, and may range from 0% to 30%, the latter being the expected overall reduction for the non-ETS sector which includes agriculture. In Teagasc's recent submission to the previous draft Climate Bill, we collated all our data, knowledge and expertise on mitigation options for agriculture, and demonstrated that current Best Available Technologies (BAT) can realistically deliver 10%-15% reductions in the carbon footprint of Irish produce, corresponding roughly to a 10% reduction in sectoral emissions compared to 2008. (Figure 3)

Whatever the reduction targets will be for agriculture, they will be very challenging to achieve.

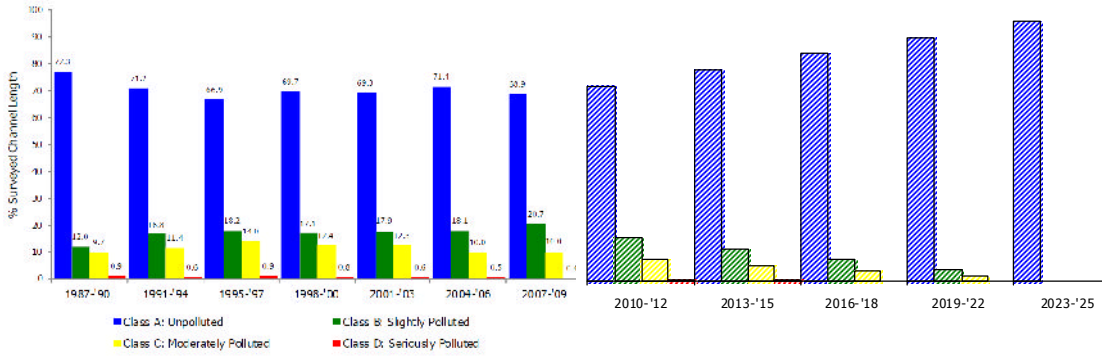
Figure 3 Historic and projected Agricultural GHG emissions



On Water Quality

Similarly, challenging targets lie ahead for water quality. While Ireland is in a good starting position compared to our neighbours in Europe, the European policy objectives are to restore all water bodies to "good status" by 2015, and maintain water bodies of "high status". Ireland has managed to halt the decline water quality that was evident in the late eighties and early nineties, but significant improvement is required. Furthermore, research in Teagasc has shown unequivocally that the ambitious timelines set under the Water Framework Directive were unrealistic and unachievable. We demonstrated that – even with optimum nutrient management being implemented as part of the Nitrates Directive – that legacy issues in relation to excess soil fertility will delay this recovery by at least one or two cycles of the Water Framework Directive. The fact that this has now been recognised in the amended River Basin District Management Plans is welcome.

Figure 4 – Classification of Irish Waterbodies – Historic and requirements to meet Nitrates Directive Target



Meeting this very steep water quality challenge is not solely the responsibility of agriculture. It is the combined responsibility of all sectors, including agriculture, forestry, waste water treatment plants (WWTP), rural dwellers with septic tanks, and industry.

For Biodiversity

Anecdotal evidence suggests that Ireland is in a good starting position in terms of the wealth of biodiversity on this island. Approximately 14% of our land area has been designated as NATURA2000 sites, which provides protection to biodiversity, including farmland biodiversity. However, the overall trends in terms of protecting biodiversity are negative. A report produced by the National Parks and Wildlife Service shows that the future prospects for the majority of our habitats are not positive. Ireland along with the rest of Europe has failed to meet the objective of "halting biodiversity loss" by 2010.

For Soils

There is even less clarity on the status of the quality of our soils, or on the policy context that we are working in, in respect to soils. EU negotiations on the proposed Soil Framework Directive – aimed at reducing threats to soil quality appear to have ground to a halt. A limited regulatory framework exists under GAEC including the requirement of 2% organic carbon in tillage soils.

Soils play a crucial role in defining productivity, in regulating water quality and greenhouse gases, and in supporting biodiversity. To use a biblical quote "The stone the builders rejected has become the corner stone":- Soil science, neglected for many years has taken centre stage once again. We are trying to understand differences between soils in this respect, and manage the soils to support the delivery of our environmental objectives.

Environmental Risks to Achieving Food Harvest 2020

In setting out to develop each of the sectoral plans a key question on risk was addressed. What could prevent the achievement of FH2020 objectives. A similar approach is relevant across all sectors in relation to the environment. In this paper some of these risks are outlined and possible mediation strategies are considered. A detailed analysis of some of the key risks is set out in Table 1. Two Environmental risks stand out as posing a serious threat, either one of which has the potential to undermine the achievement of FH2020 objectives:-

- Failure to achieve water quality improvements
- Failure to meet targets for the reduction of Agricultural GHG's

An important, and often forgotten, part of risk assessment is the assessment of positive risks or opportunity. Irelands green image presents such an opportunity. However, we cannot take for granted our ability to maintain and capitalise on that image. The environmental sustainability of our food products is becoming a key issue in international markets in relation to differentiation of product and in access to market. Major food buyers are increasingly insisting of evidence of achievement of minimum standards across a broad range of sustainability criteria. Initially the main focus is on carbon footprint. It is evident that the market will become an important player in the setting of environmental standards

Conclusions

Ireland's environmental status relative to our EU partners is relatively good and supports the green image of Irish food. Environmental concerns, however, pose significant risks to the achievement of the Targets set out in FH2020. These risks need to be carefully managed over the next few years by farmers, advisers/consultants, researchers and policy makers to prevent failure. Maintaining and capitalising on our green credentials requires that we can verify high levels of achievement across a broad range of sustainability criteria.

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Table 1 : Assessment of Environmental Risks to Achieving Food Harvest 2020			
Risk	**Impact**	**Mitigation By**	**Mitigation Actions**
Failure to meet targets for improvement of water quality	• Imposition of more stringent national regulation • Supplementary measures in non compliant catchments • Loss of derogation Leading to **Failure to meet FH2020 Targets**	Farmers	• Continued Improvements in Nutrient Management • Continued reduction in point source pollution • Involvement in local efforts to improve own catchment water quality based on understanding of local problems
		Knowledge Transfer	• Better Integration of environmental and technical advice • More usable / understandable nutrient advice • Focus on improved farmer education and awareness • Improved dissemination of emerging Research

		Research	• Continue work of Agricultural Catchments Programme
			  • Sources & Pathways
			  • Behaviour & Co-operation
			• Nutrient requirements, efficiency and risk
			• Research on sedimentation

		Policy Makers	• Balance of "Carrot and Stick" • Development of better understanding among farmers • Develop co-operative approach on a local basis • Targeting to achieve specific objectives

RISK Failure to meet targets for the reduction of Agricultural GHGs	• Financial – Purchase of Carbon Credits
	• Production Limits
	• Barriers to entry
	• Loss of markets and reputation on international markets
	
	Leading to
	
	Failure to meet FH2020 Targets And/or Loss of income
		Farmers	• Mitigate where possible
			• Improvements in efficiency through adoption of best practice
			  • EBI, Grazing season, Grass utilisation
			  • Slurry and Chemical Fertiliser Management
			  • Energy Efficiency
			• Land use – Sequestration and Forestry

		Knowledge Transfer	• Supporting efficiency improvement →
			  • Improving Carbon efficiency – GHG per kg output (Meat/ Kg MS / Grain etc)
			• Leadership Role
			  • Integrating GHG message into advice – an extra incentive
			  • Education and awareness

		Research	• Input to National Inventory (NI) • Identifying and quantifying mitigation strategies → Recognition in NI • Supporting policy formation
		Policy Makers	• International:- How do we count carbon – Carbon Leakage • Targets – General and Agricultural • Clear Support for mitigation measures

Risk Reduced soil Fertility	• Loss of Production
	• Inefficient use of nutrients
	
	Leading to
	
	Increased difficulty in meeting meet FH2020 Targets
		Farmers	• Effective Nutrient Management
			  • Test Soils
			  • Get pH sorted
			  • Use organic fertiliser effectively
			  • Use chemical fertiliser to improve fertility and output
			• Stay within statutory limits & reduce environmental impact

		Knowledge Transfer	• Improve farmers knowledge and understanding of Nutrient Management
			• Promote Best Practice
			  • Soil Analysis → NMP
			  • Improve ability to align statutory and agronomic
			• Maximise value of scarce resource

		Research	• Provide Scientific basis for Improved nutrient advice
			  • Soil Type
			  • Risk
			  • Production Levels
			• Improve nutrient efficiency
			• Contribute to policy

		Policy Makers	• Flexibility in regulation to ensure balance between environmental and agronomic objectives
RISK Failure to Halt Biodiversity Loss	• Loss of Environmental Resource • Damage to Green Image • Increased regulation – National and Local Leading to **Increased difficulty in meeting meet FH2020 Targets**		• Contribute by improving bio-diversity where possible on farm • Take up of Agri-Environmental Schemes
			• Education of farmers on importance of biodiversity and on ways to enhance habitats • Support take up of Agri-Environmental Schemes • Promote bio-diversity practice adoption
			• Identification of Bio-diversity priorities • Providing baseline information • Identifying effective & cost efficient strategies • Evaluation of impacts
			• Move to Implement on Bio-diversity Action Plan • Targeted approach to specific problems • Effective incentivisation to maintain / improve habitats • Support for research on improving bio-diversity

Nutrient Management at the Catchment Scale: Lessons from Ireland and the European Union

Phil Jordan, Agricultural Catchments Programme, Teagasc.

In the European Union, the Water Framework Directive is the overarching legislation for managing water resources and each pressure has both mitigation and monitoring Directives to improve or maintain water resources. For example, the Urban Waste Water Treatment Directive for sewage management; the Bathing Waters Directive for management of recreational waters, and so on. The Nitrates Directive is the programme of measures devised to mitigate agricultural nutrient losses from land to water and is ratified into member state legislation according to vulnerable zones or whole territory approaches. In Ireland, a whole territory approach has been adopted, largely due to the risk of phosphorus loss from agricultural land, and the Nitrates Directive National Action Programme curtails the magnitude and timing of nutrient management and associated activities that minimise nutrient mobilisation. These policies are a negotiated end-point between the needs of intensive agricultural production and water resource protection and there have been several iterations since the designation in 2003 and the first Action Programme in 2006. Evaluations of these polices are undertaken at several scales and include national soil inventories, farm facilities surveys, water body chemical and biological monitoring and more focussed agricultural catchment biophysical and socio-economic monitoring. The latter is encompassed in the Agricultural Catchments Programme operated by Teagasc from 2008 to 2015 in six agricultural catchments across a soil and landuse gradient. This programme is evaluating the suite of measures in the Action Programme and establishing how catchment source pressure are linked to the water quality metrics that are being used to support Water Framework Directive reporting.

Nutrient management has never been so important

The challenge for supporting sustainable intensive agriculture has never been greater as Ireland seeks to increase production in certain sectors and also realise water resource management obligations. Grant aided farm facilities upgrades via the first Action Programme coupled with the need for intensive enterprises to optimise nutrient management due to increasing costs and constraints provides a foundation for growth. In national terms, soil inventories indicate a decrease from high soil phosphorus indices but which can be maintained (at high levels) in some soils due to lengthy periods of decline from legacy management. At smaller catchment scales, the riskier catchments, in terms of nutrient loss, appear to be more aligned with transport limitation due to soil hydrology rather than source limitation due to soil fertility and this is likely to exercise policy makers in future iterations of the Action Programme. A starting point to identifying spatial constraints to further

intensification while curtailing, for example, phosphorus loss, maybe to identify which portions or parcels of land are more susceptible to fast runoff pathways.

Furthermore, untangling the relative impacts of multiple point and diffuse nutrient sources on flowing and standing water bodies in catchments remains a challenge for policy evaluation and a review of monitoring metrics will no doubt be required. For example, despite low annual loads, rural point sources remain a long-standing pressure to low flow water quality and relatively unquantified with regard to agricultural pressures at the same low flows. It is becoming increasingly recognised that these low flows are key to ensuring good to high water quality status in rivers. While agricultural diffuse nutrient losses related to rainfall and runoff can still be the highest in terms of annual load, variation caused by the number of flood events in any year and no tangible metric for monitoring trajectory of change specific to agricultural impacts in water bodies are issues. However, as evidence of water improvements accrue as recorded from national inventories in rivers, lakes, groundwaters and estuaries, it will be extremely important for agricultural nutrient use inventories to show how it is a part of this story.

As the Irish agricultural landscape changes in terms of nutrient use efficiency, expedited by the rising cost of inorganic fertilizers and the requirement to intensify production in certain sectors, deeper investigations into the residual impact of legacy issues will be important. How long these persist for and where in the landscape they are will be key questions. There will also be a need to question expectations in terms of the least worst residual nutrient losses from agricultural systems, as nutrient loss trajectories become further realized but are modified by extreme weather patterns and runoff. There may be, for example, certain instances where society deems these still too high for certain sensitive water bodies and these are likely to be areas where policy decisions can be focused to provided extra support.

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Some Implications of Implementing the EU Water Framework Directive for Developing Agriculture – an EPA View

Donal Daly, Office of Environmental Assessment, EPA

Introduction

This paper outlines some issues considered relevant to the Conference. Information on integrated constructed wetlands (ICWs) is given in an Addendum.

Issues

1 The Water Framework Directive (WFD)

- The WFD and the associated (daughter) Groundwater Directive are over-arching Directives that encompass the requirements of other Directives, such as the Nitrates Directive, and, in certain circumstances, they set more stringent requirements.
- The WFD gives ecosystems a legal entitlement to a sustainable share of adequate quality water.
- The EC are likely enforce the requirements of legislation through European Court Judgements.
- Also, drinking water standards must be achieved.
- "Sustainability" is a core underlying concept of EU environmental policy; linking with this is likely to give a competitive advantage.

2 The Existing Water Quality Context[1]

2.1 Groundwater

- 8% area polluted when only nitrogen (N) & phosphorus (P) considered, and assuming the only issue for N is drinking water quality.
- >50% of private wells in many areas have one or more *E. coli* at some time during their use.
- 30% of wells/springs in the EPA national network had >100 *E. coli*/100ml at some time.
- Reductions in phosphate and nitrate concentrations have occurred in recent years – see data compiled from EPA national monitoring network in the Figures below.

2.2 Rivers

- 30% river channel polluted.
- Main pollutants: MRP, NO_3, BOD and NH_3.
- Main causes as indicated by polluted sites: 47% due to agriculture; 39% due to WWTPs.
- OSWTSs can cause local problems where soakage is inadequate or too rapid.

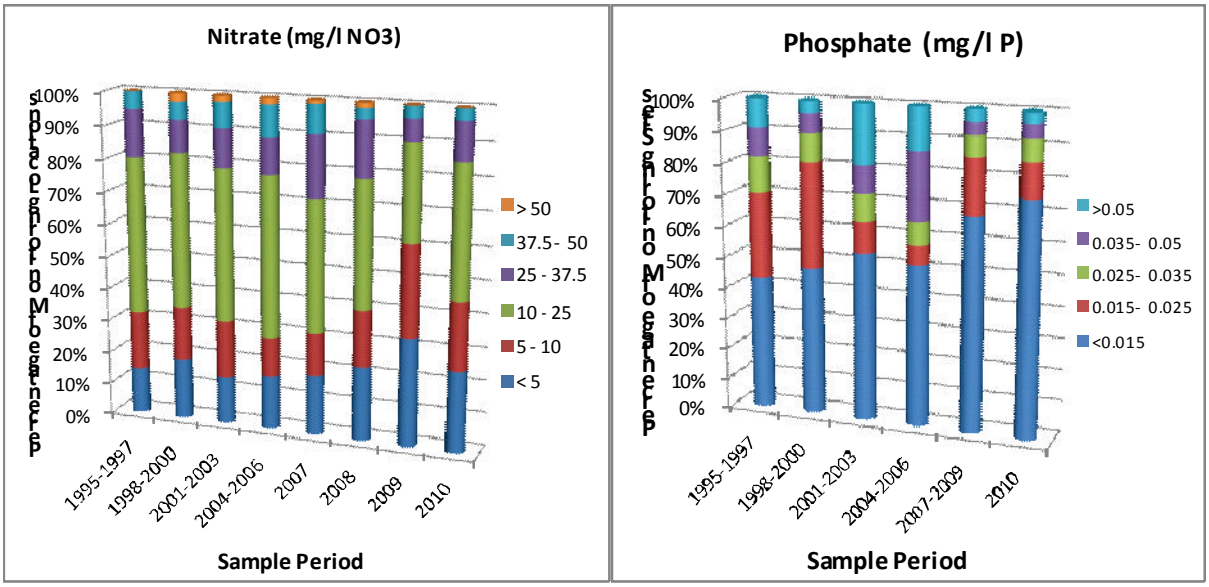
2.3 Lakes

- 65% of lake area polluted.
- Main pollutant: P.

[1] This summary is based on an evaluation of data from the EPA national monitoring networks. Further details are given in "Water Quality in Ireland 2007-2009", which can be accessed on www.epa.ie .

2.4 Estuarine and Coastal Waters

- 15% area polluted.
- Main pollutants: MRP & NO_3.
- Main causes: agriculture (78% N load; 26% P load) & WWTPs (10% N & 32% P loads).



Phosphate and Nitrate

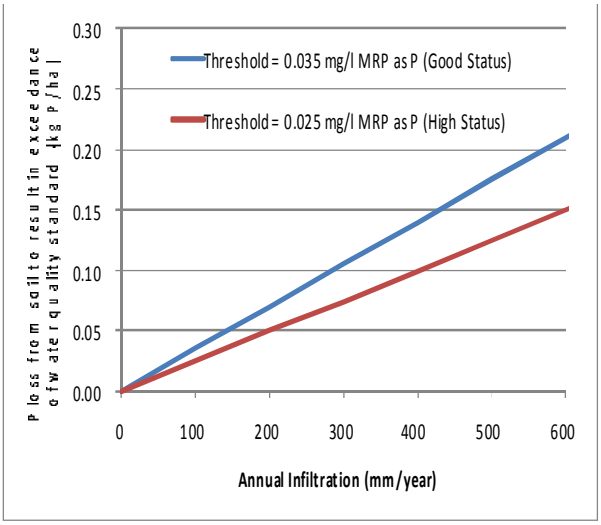
2.5 How Much Is Required To Cause Pollution? Answer: Very little!

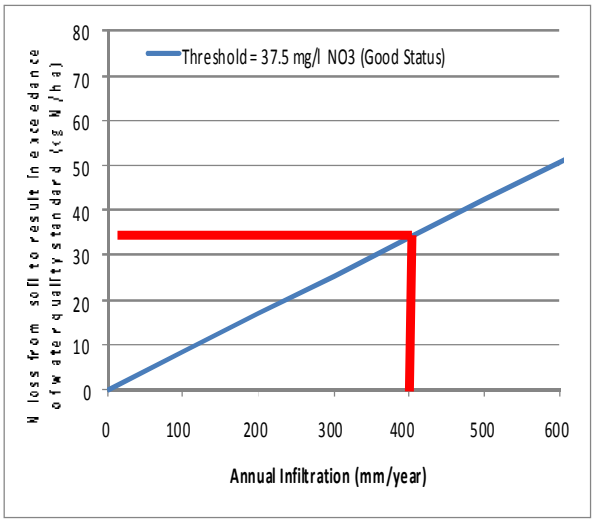
1 kg P when present as PO_4 will pollute **29,000,000 litres** (29 Ml) of water (or 6.4 million gallons) as the environmental quality standard (EQS) (as a mean in surface water) and threshold value (as a mean in groundwater) is 0.035 mg P/l.

Phosphate: an issue for surface water ecology and **not** drinking water.

2.6 Nitrate in Water - Not Just a Drinking Water Issue

- Drinking water MAC = 50 mg/l as NO_3 (11.3 mg/l as N).
- WFD Threshold Value (TV) (mean) = 37.5 mg/l (8.5 mg/l as N).
- Coastal waters EQS = 2.6 mg/l Dissolved Inorganic Nitrogen as N (12 mg/l as NO_3).
- Based on EPA monitoring and current research, it is probable that mean nitrate concentrations <37.5 mg/l can cause ecological impacts on surface water.





The Figures above illustrate that in an area with 400 mm effective rainfall – typical of the south midlands – a loss of 33 kg N/ha (a small proportion of total N application) would bring the average nitrate concentrations in groundwater above the TV of 37.5 mg/l (above this temporary exceedances of the drinking water limit (50 mg/l) are likely).

3 The Future Challenges

3.1 Challenge: Food Harvest 2020

- A benefit to the economic well being of the country.
- A challenge for environmental management, both for water quality and greenhouse gas emissions.

3.2 Challenge: Maintaining Existing Water Quality

- Must **maintain** current 'high' and 'good' status water bodies; critical that this is achieved.

3.3 Challenge: Restoring 'Polluted' Water Bodies

- Must **restore** 'less than good' status water bodies.
- No deterioration/upward trends.
- WFD deadlines 2015, 2021 & 2028 (2021 and 2028 are 'extended deadlines' based on the lag time required for reduction in nutrient levels in the soil and subsoil).
- The lag time for recovery gives leeway, but progress must be made in the meantime.

3.4 Challenge: Minimising Point Source Pollution

- Water has a certain capacity to accept nutrients without causing pollution. This capacity should not be used up by small point source discharges, such as soiled water from farmyards or effluent from single house on-site wastewater treatment systems (OSWTSs).

3.5 Focussing on the Main Threats from Farming

- Faeces and urine from grazing animals and inorganic fertilizers are the main sources of nutrients in water, not landspreading of organic fertilizers from dairy and beef farms, provided the landspreading is undertaken in compliance with the GAP Regulations.
- Concentration of non-land based farming activities, such as mushroom production and pig rearing, in areas susceptible to run-off of nutrients, can result in the generation of too much fertilizer for use in these areas.

- There is increasing scientific evidence that wash-off of sediment into streams is a significant pollution source in some areas.

3.6 Challenge: WFD Programmes of Measures

- Additional regulatory measures under the legislation may be needed to help achieve satisfactory outcomes. For instance, measures may need to take into account that some areas are more susceptible to nutrient losses than others and/or are more sensitive to nutrient inputs, thereby requiring a risk-based approach to implementation of measures.
- Animals in streams are likely to be causing disproportionate problems.
- Increased buffer zones and use of riparian zones may be required.
- The outcomes of research projects, for instance the Agricultural Catchments Programme and the EPA-funded 'Pathways Project' will help enable: a) a greater understanding of the impacts of farming; and b) use of practical measures for successful catchment management and sustainable agriculture.

4 Final Message – Agreement on the Issues and Working Together to Achieve Successful Outcomes

Farming is the main source of nutrients in water (although not the only one). There are areas in Ireland where a reduction in nutrient losses to water is required to enable restoration of water bodies to good status. In other areas, increased losses will cause deterioration in water quality. Therefore, if the objectives of Food Harvest 2020 are to be achieved in parallel with the WFD objectives, control of nutrient losses is essential. This requires the following:

- Acceptance of this among farmers, researchers and farming media.
- Greater awareness of environmental protection among farmers – minor changes in practices could make significant improvements. The key is minimising 'leakage' of nutrients from the soil, farmyards and OSWTSs – this has to be a primary focus.
- Use of supplementary measures such as increased buffer zones, riparian zones and preventing cattle entering streams.
- Effective catchment management.

In summary, this country needs to:

1. Maintain good water quality and restore poor water quality.
2. Increase agricultural output.
3. Achieve sustainable agricultural production.

EPA is working with and looks forward to continued co-operation with DAFM, DECLG, Teagasc, Bord Bia, etc, in the environmental appraisals of the Food Harvest scenarios.

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New Land Drainage and Reclamation Regulations

Bill Callanan, Department of Agriculture, Food and the Marine

Background.

The Environmental Impact Assessment (EIA) Directive was first introduced in 1985 (*Council Directive 85/337/EEC of 27 June 1985 on the assessment of the effects of certain public and private projects on the environment*) and amended in 1997. The primary objective of the EIA Directive is to ensure that projects, which are likely to have significant effects on the environment, are subject to an assessment by a control authority of their likely impacts before permission is granted to proceed.

4.1 The approach adopted in the Directive is that EIA is mandatory for all projects listed in Annex I of the Directive (e.g. crude oil refineries) on the basis that these project classes will always have significant environmental effects.

4.2 In the case of projects listed in Annex II of the Directive, Member States must determine on a case-by-case basis or on the basis of thresholds or other criteria (such as site sensitivity), or a combination of both approaches, whether or not a project should be subject to EIA.

On the 6 February 2006 the EU Commission brought an action against Ireland in the European Court of Justice (Case ref no. C-66/06). The action related to three categories of projects listed at Annex II Section 1 sub-sections -

(a) restructuring of rural land holdings,

(b) the use of uncultivated land or semi-natural areas for intensive agriculture, and

(c) water management projects for agriculture, including irrigation and land drainage

Prior to the recent changes in the legislation the aforementioned activities were controlled under the Planning and Development Regulations, 2001 with a planning application and environmental impact assessment being required where the area affected exceeded 100 hectares in the case of projects under (a) and (b) and in the case of water management projects for agriculture, including irrigation and land drainage projects, where the catchment area involved was greater than 1,000 hectares or where more than 20 hectares of wetland was affected.

The European Court of Justice (ECJ) issued a judgement against Ireland on the 20th November 2008. The Court found that Ireland should ensure that it did not rely solely on size thresholds to determine if an EIA is required but that provision for taking the nature, location and cumulative effects of projects into consideration should be assured to ensure the obligations under the EIA Directive are fully met.

The European Commission, on 1 June 2011, formally lodged an application with the ECJ to initiate second proceedings against Ireland for failing to implement the ECJ ruling. The Commission requested the ECJ to impose a lump sum fine of approximately €4,000 per day from Nov 2008 until a second Court ruling and a daily penalty payment of more than €33,000 per day for every day thereafter that Ireland is non-compliant.

Regulations were introduced on the 8th September to address the ECJ ruling. These are the European Communities (Environmental Impact Assessment) (Agriculture) Regulations 2011

and the Planning and Development (Amendment) (No. 2) Regulations 2011 the latter dealing amongst other things with the drainage of wetlands.

European Communities (Environmental Impact Assessment) (Agriculture) Regulations 2011

The main features of the new Regulations are as follows:

Where a person wishes to undertake any of the activities covered by the Regulations and the proposed works exceed the size threshold for screening set out in table 1 that person must make an application to DAFM for screening giving details of the works. Likewise where the proposed activities do not exceed the size thresholds but the works may have a significant effect on the environment a screening application to DAFM is necessary.

If the proposed activity is to be undertaken within a European site (e.g. SAC or SPA) or an NHA or nature area (e.g. proposed NHA or nature reserve) or the activity may damage a national monument screening by DAFM may also be necessary.

DAFM will screen the application and will let the applicant know whether he/she can proceed with the intended work or whether he/she needs to apply for consent (which application must be accompanied by an Environmental Impact Statement or Natura Impact Statement).

Consent is required where more than 15ha of land is being drained.

There will be no application fee involved for screening applications and DAFM will require only basic information from the applicant. Completed application forms should be sent to EIA Section, DAFM, Johnstown Castle. Screening will be a relatively straightforward process and each application will be adjudicated upon on a case by case basis in a timely manner by, taking into account the relevant criteria outlined in the Directive (e.g. cumulation with other activities). A turn-around time for applications of six weeks is envisaged. The screening process should not be seen as an impediment to development. If proposed works do not have a significant adverse effect on the environment, then there is no reason why they cannot proceed.

Prohibition notices can be served if DAFM considers that the person has started work on a project that involves the activities covered by the Regulations without applying to DAFM for screening or consent as appropriate, or if he/she failed to adhere to a condition of a consent decision. A prohibition notice will require that work is stopped immediately.

Reinstatement notices can be served if DAFM considers that work has been carried out without the necessary screening or consent. Reinstatement notices may require that land is reinstated to its previous condition – or some mitigating works undertaken. It is an offence to contravene a prohibition notice or a reinstatement notice.

Penalties can be imposed by the courts for those convicted of breaching these Regulations. Penalties could range from a maximum of €5,000 for a summary conviction (District Court) up to a maximum of €250,000 for a conviction on indictment (Circuit Court or higher).

An applicant may appeal a screening decision made by DAFM (internal DAFM review procedure will apply).

Table1; Thresholds for screening applications

Type of on-farm Activity		Screening Required
Restructuring of rural land holdings	Length of field boundary to be removed	Above 500 metres
	Re-contouring (within farm-holding)	Above 2 hectares
	Area of lands to be restructured by removal of field boundaries	Above 5 hectares
Commencing to use uncultivated land or semi-natural areas for intensive agriculture		Above 5 hectares
Land drainage works on lands used for agriculture		Above 15 hectares

If the proposed works exceed the thresholds for mandatory environmental impact assessment (see table 2) or DAFM following screening considers that the works are likely to have a significant effect, work may not proceed without DAFM consent.

If consent is needed, a further application must be made to DAFM, which must be accompanied by an environmental impact statement (or Natura impact statement as appropriate).

Public consultation and consultation with prescribed bodies is provided for in the legislation in cases of application for consent. A consent decision made by DAFM can be referred (by applicant or other person with sufficient interest in the matter or consultation body) to the High Court for review. There will also be an internal DAFM review procedure.

Table 2; Thresholds for consent applications

Type of on-farm Activity		Consent Required Mandatory Environmental Impact Assessment
Restructuring of rural land holdings	Length of field boundary to be removed	Above 4 kilometres
	Re-contouring (within farm-holding)	Above 5 hectares
	Area of lands to be restructured by removal of field boundaries	Above 50 hectares
Commencing to use uncultivated land or semi-natural areas for intensive agriculture		Above 50 hectares
Land drainage works on lands used for agriculture		Above 50 hectares

Planning and Development Regulations 2011

Drainage or reclamation of wetlands is controlled under the Planning and Development (Amendment) (No. 2) Regulations 2011 and the European Communities (Amendment to

Planning and Development) Regulations 2011 which Regulations are implemented by the Local Authorities. Permission is required where the area impacted by the works exceeds 0.1 hectares or the works may have a significant effect on the environment.

Where the development proposed to be carried out is below the threshold for a planning application, it is a matter for the person who proposes to carry out the development to make an assessment as to whether the development is likely to have a significant effect on the environment. If the development would have a significant adverse effect on the environment it is not exempt from the requirement to obtain planning permission.

If a person proposes to drain or reclaim a wetland where the area impacted by the works exceeds 2 hectares the planning application will have to be accompanied by an Environmental Impact Statement.

Guidance documents

A public consultation on a draft *Guide for farmers* and *Guidance for Planning Authorities* finished on the 21st October 2011. Fourteen submissions were received concerning the guide for farmers. These documents will be revised to take account of the submissions made. It is hoped to distribute a copy of the *Guide for farmers* to every farmer in the country. Any person carrying out an activity covered by the Regulations must have regard to the information in the guidance document. Contact details will be provided by DAFM for all EIA related matters.

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AEOS and REPS Update

Jack Nolan, Department of Agriculture Food and the Marine

Agri-environmental schemes - General

Irish agriculture is predominantly extensive and grass-based. Tillage occupies some 10 per cent of utilisable agricultural area (UAA); most of the remainder is devoted to cattle and sheep farming. Seventy five per cent of UAA is currently categorised as disadvantaged, and 77 per cent of farmers qualify for less favoured areas (LFAs) payments. Traditional farming practices have produced a landscape that is rich in biodiversity but recent trends and developments, particularly the decoupling of direct payments from production, threaten to cause a decline in farming activity with an accompanying loss of biodiversity. The OECD in its *Environmental Performance Review of Ireland 2009* has identified a number of problems and has recommended specifically that Ireland *"improve the match between spending on agri-environmental measures and ecological needs, e.g. by placing more emphasis on measures in or near Natura 2000 sites"*.

Objectives of AEOS

The objectives of AEOS are to meet the challenges of conserving and promoting biodiversity, encouraging water management and water quality measures and combating climate change. In line with the commitments under the UN Convention on Biological Diversity, the EU's Strategy for Halting the Loss of Biodiversity and ongoing work on Ireland's second National Biodiversity Plan, the primary focus of the 2010 Scheme was biodiversity conservation.

AEOS has an increased emphasis on a proactive approach to biodiversity, water management and climate change objectives

The secondary focus of the Scheme was water management (including measures to improve water quality). This choice of priorities takes into account the fact that substantial measures have already been taken to limit the threat to water quality from farming. In 2006, Ireland introduced Regulations37 giving effect to Council Directive 91/676/EEC of 12 December 1991 concerning the protection of waters against pollution caused by nitrates from agricultural sources.

A programme of investment in farm waste management, partly grant-aided by some €1.2 billion in national funds, has resulted in the construction of some 5.8 million cubic metres of additional waste storage since 2006. Recognising the requirement under the Water Framework Directive to achieve "good quality water status" by 2015 and the part that farmers can play in achieving that objective, the Scheme promotes actions that contribute to the quality of our waters.

The third chosen priority was climate change. The Scheme includes actions that will offer some reduction in greenhouse gas emissions from tillage farming and raise awareness of the issue amongst farmers. Ireland has promoted agri-environmental farming in the form of the Rural Environmental Protection Scheme (REPS) since its inception in 1994. AEOS builds upon the gains made in conservation management under REPS, and specifically targets

Natura 2000 sites and areas whose landscape and biodiversity have resulted from traditional farming methods. Such areas are an essential component of the EU's internal policy on biodiversity protection. The scheme was open to all farmers, with priority being given to those whose holdings are in areas of greatest importance in terms of biodiversity and water quality.

This scheme builds on the success of REPS with an increased emphasis on a proactive approach to biodiversity, water management and climate change objectives.

Entry Requirements:

(1) Habitats of highest importance

Prospective applicants whose farms included one of the following habitats ranked highest in the environmental profiling which constituted the screening process for entry to the scheme.

- Natura habitat
- Non-Natura Commonage

Successful applicants with these habitats are required to manage them in accordance with a Sustainable Management Plan. Plans are assessed to ensure that they are of an acceptable standard and appropriate to the particular habitat. It was open to these applicants to choose one or more additional options, either 'biodiversity', 'water quality' or 'climate change' provided they were relevant to the environmental profile of the farm in question.

(2) Other Habitats

To achieve a wider geographical spread of participants, farms with habitats not included in category (1) were allowed to choose 2 or more options. Preference would have been given to those meeting an identified environmental need, for example:

- Situation in an area of concern in terms of water quality
- Situation in a non-designated area where bird species are at risk
- Choice of a genetic resource measure
- Presence of non-designated Species Rich Grasslands

Farmers were required to choose a relevant option aligned to the need being addressed, as well as a complementary option or options.

Structure of the Scheme:

Payments are for actions going beyond the baseline of GAEC and cross compliance; this baseline will apply to the whole farm. The applicant was invited to select actions appropriate to his/her environmental profile, with the possibility of choosing one or more additional options which must have specific relevance to the holding in question.

Where the relevant mandatory standards or requirements established pursuant to Articles 5 and 6 of Regulation (EC) No 73/2009 and its Annexes, the minimum requirements for fertiliser and plant protection product use and other relevant mandatory requirements established by national legislation are amended, the agri-environment contract shall be adjusted to take account of any such legislative changes. If the beneficiary does not accept such adjustment, the commitment shall expire and reimbursement shall not be required.

Sediment Loss and Soil Conservation: Measurement of sediment flux in rivers and benefits of enhancement measures

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Introduction

Although a natural phenomenon, excessive mass transfer of sediment in rivers may have environmental and economic impacts. Fine sediment inputs are crucial to sustain a good ecological diversity in river systems, however, at higher magnitudes and during certain seasons, they are considered to degrade aquatic habitats. Siltation of fines in coarse river gravels can cause local deoxygenation and result in the degradation of important habitat types supporting native salmonid and Freshwater Pearl Mussel populations (protected under the Habitats directive). The impact may manifest from source to sea and have consequences for many years following immediate impacts.

The mass transfer of sediment fines in most Irish catchments can be associated with a high particulate phosphorus load lost in high-energy runoff events due to erosion of soil surfaces, or the enrichment of fines from other sources (such as banks) of soluble P that has been lost in overland flow due to dissolution, or both mechanisms.

The aim of this study is to assess sediment flux, provenance and mitigation options over a land-use gradient. The project will use data from the Teagasc Agricultural Catchments Programme (ACP), which is operating hydrometric stations within catchments ranging from permeable to impermeable soil type, and from grassland to arable land use.

Proposed methodologies

The project will be divided into two sub-projects.

Sediment Flux and Provenance

This sub-project will measure the instantaneous and cumulative sediment transfers in the rivers of three catchments using a surrogate turbidity method. The project will provide the most parsimonious method of relating turbidity to suspended sediment flux by linear and multiple linear regression methods. Datasets will be analysed to provide metrics related to concentration, areal flux and magnitude frequency curves for comparison between catchments.

The project will use a sediment fingerprinting approach (i.e. chemical, radiometric and magnetic) to determine the provenance (source) of the sediment and to quantify the relative contribution from upstream sources on the basis of hillslopes versus channel banks or according to land use patterns.

Benefits and Cost Effectiveness of mitigation measures for sediment loss.

This sub-project will establish the cost-effectiveness of potential mitigation measures aimed at reducing sediment loss from agriculture to water, for a range of catchments and farming systems. The research will build on the data generated from the Sediment Flux and Provenance sub-project, and will involve a combination of literature studies, GIS, spatial

analysis and economic assessments, as well as face-to-face interviews and workshops with farmers and other stakeholders.

Expected benefits

This project will:

- Develop a method for measuring and comparing sediment flux in a number of catchments.
- Use sediment provenance to correlate sediment source on the landscape to sediment within the river and therefore deduce the source of the sediment and the relative amount of sediment from each source.
- Identify potential mitigation measures for sediment loss from agriculture and other land uses such as forestry and peatlands.

The studies will assess sources of sediment and mitigation options

- Evaluate the applicability and quantify the cost-effectiveness of these potential mitigation measures to a range of agricultural systems and environments in Ireland.
- Construct a validated model highlighting the sources and flow of sediment within a catchment.

A full scope of quantity and source of flux, coupled with appropriate, cost-effective, practical mitigation measures will be identified over the course of this project.

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Improving the profitability of milk production on wet soils

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Effective artificial drainage can be used to increase the productivity and length of grazing season on heavy wet soils, while having a significant effect on nutrient losses and gaseous emissions. High rainfall on soils with impeded drainage results in surface pugging and poaching damage and compaction by grazing livestock. This leads to lower grass yields and a curtailed grazing season with a resulting loss of income for the farmer. Soils with slow drainage characteristics (gley soils) comprise 21% of soils in Ireland (Gardiner & Radford, 1980), while a recent study indicated that the principle limitation on the length of the grazing season on Irish dairy farms is soil conditions (Creighton et al, 2011). The overall objective of the study is to examine ways of improving the profitability of milk production on wet soils by lessening pugging/poaching soil damage and examining ways of relieving soil wetness.

The project will quantify the impacts of a number of artificial drainage techniques

At Solohead Research Farm over the last 10 years, annual rainfall has ranged between 796 mm and 1336 mm. The average length of the grazing season was 255 days between 2003 and 2006 when average annual rainfall was 963 mm (Humphreys et al., 2009) compared with 232 days between 2007 and 2009 when average annual rainfall was 1173 mm (Humphreys et al., 2010). The shorter grazing season in the wet years was due to the need to keep cows indoors to avoid pugging damage and by lower pasture production. Mulqueen (1985) showed increases in pasture yield of up to 31% where the water table level was lowered from the ground surface compared with saturated plots. Drainage treatments in gley soils, principally soil disruption techniques (mole drains, gravel moles and sub-soiling), have been implemented with varying degrees of success (Burke et al., 1974; Galvin, 1983, 1986; Mulqueen, 1998; Robinson et al, 1987). While drain design and performance have been evaluated, the current objective of correlating soil wetness and physical properties and grass growth response has not been investigated under Irish field conditions.

The drainage experiment will quantify the impacts of a number of artificial drainage techniques compared with no intervention in relieving soil compaction and wetness and consequent impact on pasture production, nutrient losses (N and P) and emissions of nitrous oxide and methane from the soil.

In August 2010 the site was profiled and an open collection drain was installed. The area to be drained was divided into four blocks, each roughly 60m wide and 120m long. Each block was sub-divided into four plots each 14m wide and 120m long. One of four treatments was imposed: (i) no intervention, (ii) mole ploughing carried out in January 2011 (iii) mole

ploughing carried out in July 2011 and (iv) gravel mole ploughing carried out in July 2011. In this experiment a range of soil conditions will be established by the treatments imposed and by depth of groundwater along the gradient in each experimental plot. Drainage plots are surrounded by an isolation ditch which will hydrologically isolate the plots from their surrounds. Collection gullies have been established at the edges of all plots which will feed into an overland flow collection channel and subsequently the overland flow collection point at the end of each plot.

Measurements will be undertaken at four locations in each of the drainage plots (based on position up-gradient from the collector drain) in order to allow for the measurement with variation of groundwater and soil moisture content. Measurements of soil physical parameters, soil water characteristics, surface damage, herbage response and gaseous emissions will be taken at these locations throughout the duration of the study. Each artificial drainage system is monitored continuously for runoff (field surface) and drainage flow volumes (at 45-60 cm depth) while nutrient losses during base-flow and rainfall events will also be measured.

Burke, W., Mulqueen, J. and Butler, P. 1974. Aspects of the hydrology of a gley on a drumlin. Irish Journal of Agricultural Research 13:215-229.

Creighton, P., Kennedy, E., Shalloo, L., Boland, T.M., and O' Donovan, M. (2011) A survey analysis of grassland dairy farming in Ireland, investigating grassland management, technology adoption and sward renewal. Grass and Forage Science 66:251-264

Galvin, L.F. 1983. The drainage of impermeable soils in high rainfall areas. Irish Journal of Agricultural Research 22: 161-187.

Galvin, L.F. 1986. Impermeable soils require stable channels and good crack formation for effective drainage. In: 'Hydraulic Design in Water Resources Engineering: Land Drainage' (ed. K.V.H. Smith and D.W. Rycroft), Springer Ver lag, Berlin, pages 413-422.

Gardiner M, Radford J (1980) Soil Associations of Ireland and their Land Use Potential. Soil Survey Bulletin No. 36, An Foras Taluntais, Dublin, Ireland.

Humphreys J. Casey I.A. and Laidlaw A.S. (2009) Comparison of milk production from clover-based and fertilizer N-based grassland on a clay loam soil under moist temperate climatic conditions. *Irish Journal of Agricultural and Food Research*, 71-89.

Humphreys, J., Keogh, B. Phelan, P., and Casey, I.A. (2010) Post grazing height and productivity of white clover-based systems of dairy production. Grassland Science in Euorpe, Proceedings of the 23rd General Meeting of the European Grassland Federation. Kiel, Germany. 15, p. 958.

Mulqueen, J. (1985). Effects of saturation on pasture production on a clay loam pseudogley soil. In: "Agricultural Water Management" (Editors: A.L.M. Van Wijk and J. Wesseling) EEC, pages 85-93.

Mulqueen, J. (1998). Depth, Spacing and Length of Mole Drains with Applications to Afforestatiion. Irish Journal of Agricultural Research 37: 39-49.

Robinson, M., Mulqueen J. and Burke, W. 1987. On flows from a clay soil - seasonal changes and the effect of mole drainage. Journal of Hydrology 91: 339-350

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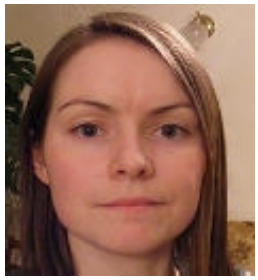
The Importance of Soil Testing



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Soil is the foundation for almost all land uses (Herrick 2000). It is a vital non-renewable natural resource which requires sustainable management to ensure the production of food and fibre, nutrient retention and forms an essential component of the water cycle in the future (Creamer, et al. 2010). Knowledge of the soil is an essential element in maintaining soil quality and sustainable soil management.

Qualitative interviews with farmers will give insight into decision making

Against the backdrop of EU legislation[2] and recent analysis of Irish soil quality, this analysis investigates the farm and farmer characteristics associated with soil testing among Irish farmers using a probit analysis. Nationally almost 70% of farmers test their soil (NFS 2009). Research carried out by Stan Lalor[3] shows approximately 50% of soil samples taken by Teagasc 2007-2010 have low fertility (Hynes 2011). The index for available potassium and phosphorous in soil ranges from 1-4[4]. To optimise grass growth it is necessary to have the macro nutrients[5] available for plant growth at index level 3. Stan Lalors' work shows only 28% of soil tested in the dairy sector in 2010 at that optimum. Furthermore a recent study shows the average Ph of Irish grassland mineral soil at 5.4 while the target Ph is recommended to reach 6.2 (Tunney, et al. 2010). Soil testing allows for optimum decisions to be made about critical input costs determining the nutrient status and PH of the soil (Gallagher and Herlihy 1963). Land management practices such as nutrient management and grassland management are specifically focused on utilizing land as a resource. The challenge is achieving targets of the Teagasc 2020 report, given the abolition of EU quota in 2015, with minimal environmental impacts. The efficient use of resources in agriculture is an area where improvements can be made, with the production and efficient use of grass as a vital resource.

[2] Water Frameworks Directive (WFD; Official Journal of the European Community, 2000) and the Nitrates Directive (European Council, 1991)
[3] Research Officer, Teagasc Johnstown Castle
[4] Developed by Teagasc's Johnstown Castle through extensive studies carried out (Schulte 2006).
[5] Nitrogen (N),, Potassium (K) and Phosphorus (P)

Methodology

The empirical analysis is based on data from the national farm survey (NFS). The NFS, carried out annually by the surveys department of Teagasc[6] is reflective of the national position. The probit model allows for the exploration of how explanatory variables, in this case various farm and farmer characteristics, affect the probability of an event occurring (Long and Freese 2006). The event in this case is soil testing. The overarching theoretical framework used for the soil testing analysis is the farm management literature and the evolutionary theory of the firm. The value added of this work will be realised in the qualitative interviews which will give insight into decision making and build on the quantitative work here in establishing how soil test results are used on the farm.

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Nitrogen and Phosphorus use on dairy farms

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The Nitrates directive regulations were implemented in August 2006 in Ireland under Statutory Instrument (SI) 378. These regulations limit the stocking densities and curtail the use of N and P on farms. The objective of this study was to examine N and P balances and use efficiencies on dairy farms following the implementation of the nitrates regulations (SI 378, 2006; SI 101, 2009; SI 610, 2010).

Results indicate that there have been substantial improvements in N and P use efficiencies on dairy farms following the implementation of the Nitrates Regulations in 2006

Farm-gate N and P balances on twenty-one intensive dairy farms in the south of Ireland were evaluated in 2010. The stocking rate was equivalent to 183 kg/ha (s.d. 31.6) of organic N. Fertiliser N was the most important N input, accounting for 76% of total N imports onto farms. The mean farm-gate N surplus (imports – exports) was 196 kg N/ha (s.d. 62.6) and N use efficiency was 28%. Fertiliser P accounted for 36% of the total P imports onto farms. P balances ranged between -11.2 and 33.2 kg/ha and P use efficiency was 89%.

In comparison with earlier studies conducted in the mid-1990's (Mounsey *et al.*, 1998) and between 2003 and 2006 (Treacy *et al.*, 2008), stocking density in the present study was lower; 183 kg/ha compared with 219 kg N/ha (Mounsey *et al.*, 1998) and 202 kg/ha (Treacy *et al.*, 2008). The mean N surplus in the present study (196 kg/ha) was lower than found by Treacy *et al.* (2008) (244 kg N/ha) and Mounsey *et al* (1998) (304 kg N/ha). N use efficiency in the present study (28%) was substantially higher than Treacy *et al* (2008) (19.5%) and Mounsey *et al.* (1998) (17%).

P balances in the current study were similar to Treacy *et al.* (2008) (range: -9.4 and 33.2 kg P/ha) and Mounsey *et al.* (1998) (range: -9 and 42 kg P/ha). P use efficiency in the present study was significantly higher than found by Treacy *et al.* (2008) (71%) and Mounsey *et al.* (1998) (40%).

Although stocking densities in the present study were lower than in previous studies, dairy livestock in the present study were 72% of total livestock on farms, which is substantially higher than previous studies (approximately 64%). The results indicate that there have been substantial improvements in N and P use efficiencies on dairy farms following the implementation of the Nitrates Regulations in 2006.

References

Mounsey, J., Sheehy, J., Carton, O.T. and O'Toole, P. 1998. *Nutrient management planning on Irish dairy farms*. End of project report, ARMIS 4347, Teagasc, Dublin.

S.I. (Statutory Instrument) No. 378 of 2006. European Communities (Good Agricultural Practice for Protection of Waters) Regulations 2006, The Stationary Office, Dublin, 49 pages.

S.I. (Statutory Instrument) No. 101 of 2009. European Communities (Good Agricultural Practice for Protection of Waters) Regulations 2009, The Stationary Office, Dublin, 49 pages.

S.I. (Statutory Instrument) No. 610 of 2010. European Communities (Good Agricultural Practice for Protection of Waters) Regulations 2010, The Stationary Office, Dublin, 49 pages.

Treacy M., Humphreys J., Mc Namara K., Browne R., and Watson C.J. *Farm-gate nitrogen balances on intensive dairy farms in the south west of Ireland.* IJAFR 47: 105-117.

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Soil Specific N Advice –Utilising Our Soil Nitrogen Resources

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Introduction

In a time of expanding agricultural production under the Governments Food Harvest 2020 targets, maintaining the sustainability of our livestock and crop production systems is important for the long term viability of farming and for a healthy environment. In all farm production systems nitrogen (N) fertiliser is an important and costly input. The EU Nitrates Directive under the umbrella of the Water Framework Directive constrains N fertiliser use in our farming systems with the objective of achieving good water quality status in our rivers and lakes. These constraints also mean that N use efficiency must be maximised in order to maintain and/or increase levels of farm production.

It is therefore important that Irish farms tap into the often under-utilised N resource stored in the soil. Soil N recovery in grass of between 74 to 212 kg N ha^{-1} yr^{-1} has been recorded in Ireland. To facilitate better utilisation of these resources, soil specific N advice is needed, to guide N fertiliser and slurry application rates on farms in order to maximise soil and fertiliser N recovery. This new N advice will deliver benefits to both the farmer, in terms of reduced N fertiliser input costs and efficient production, and to the environment, in terms of lower N losses and associated negative environmental effects on the environment. Teagasc has initiated research which aims to develop this new soil specific N advice.

Current nitrogen recommendations for grassland enterprises

Currently the system for prescribing N fertiliser input requirements differs from that of other major nutrients (i.e. P and K) as it is not based on a soil test. Current N fertiliser applications rates are determined by matching N fertiliser inputs to grass demand for grazing and silage. The grass demand is estimated from the farm production intensity i.e. stocking rates (LU ha^{-1}), and N fertiliser application rates are further moderated by deducting manure inputs to the soil and accounting for grazing season length. Since its introduction this N recommendation system has improved the N efficiency of Irish grassland, however it does not fully acknowledge the differences between soil types in terms of their capacity to supply N through mineralisation processes. Soil N mineralisation is primarily a biological processes where microbes breakdown organic matter to release N in the soil. A reliable, repeatable and economically viable soil-N test capable of measuring the soils N supply potential would provide the basis for further improvements in N fertiliser efficiency on farms.

Soil N tests

Scientists and agronomists around the world have strived to develop a competent soil N test for many years, primarily with the aim of identifying the different soil N pools that are available for plant uptake in the soil. However, due to the dynamic nature of N in the soil under humid conditions it has been difficult to predict seasonal N supply with a single test. Soil N tests can be defined into two categories; biological and chemical tests.

Biological N testing methods measure biological N release in the soil under constant temperature and moisture conditions for a defined period. These soil N tests correlate well with soil N supply and are considered to be accurate and reliable (i.e. aerobic or anaerobic incubations). However, these biological tests are not practical for routine analysis as they are time consuming with incubations lasting from 7 to 210 days.

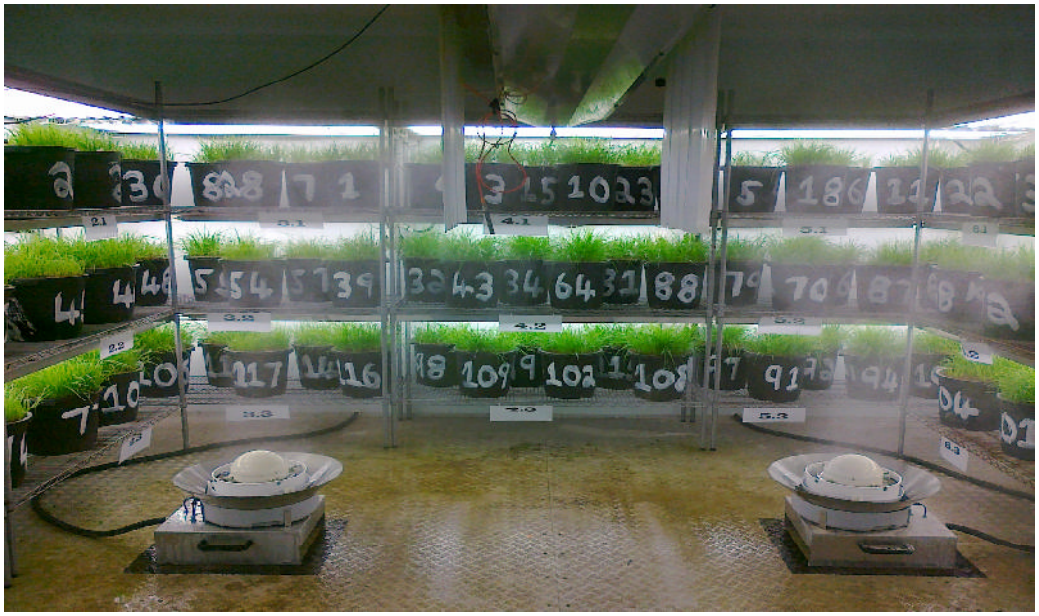
Chemical N testing methods can be divided into two groups; those that measure soil mineral N levels directly (i.e. a snapshot of current N levels in the soil) and, those that extract and measure organic soil N pools, mimicking the actions of biological activity. Chemical N tests are more rapid, i.e. 1-3 days, but their reliability to predict soil N supply has been questionable. This in part was due to their inability to accurately quantify seasonal soil N supply and to mimic the actions of the biological N mineralisation processes in the soil.

To date there has been no adaptation of soil N tests for routine soil analysis in Ireland. However, as the understanding of the biological N processes in the soil increases, more improved soil N testing techniques are being developed.

Developing soil N tests for Irish soils

In a recent study six of the most promising chemical N test methods were evaluated for predicting the N mineralisation potential for a range of Irish soil types. At thirty five sites across the island of Ireland soils were collected according to standard agronomic practice (10 cm depth). These sites were selected to represent the main areas and types of grassland farming and the soil types present. The six chemical N tests and a standard biological test (7-day anaerobic incubation test, AI-7) were applied to each of these soils.

These Irish soils exhibited a large range in soil N mineralisation levels yielding beetween 92 to 403 mg kg^{-1} NH_4^+-N (Figure 1). This shows that the N supply potential across these soil types was significantly different and demonstrates the need to manage N fertiliser inputs according to the soil N supply potential. The soil N tests were then evaluated for their ability to predict soil N supply potential by investigating the relationships between each of the chemical N tests and the AI-7 test. Table 1 shows that the Illinois soil N test (ISNT) had the strongest relationship with AI-7 (highest r^2) and hence was the best predictor of soil N supply through N mineralisation. All other chemical soil N tests had weak or no relationships with AI-7 and therefore could not predict soil N supply under Irish conditions.



Soil microcosm experiment at the controlled environment research facility at Teagasc, Johnstown Castle in Co Wexford

Soil N supply for grass growth

A soil microcosm experiment was established to compare grass growth on 30 of these different soil types. Soils were collected and potted with adequate quantities of key macronutrients (i.e. P, K, S) included and seeded with ryegrass *(Lolium perenne L.).* No N fertiliser was added to these soils. Four replications of each soil type were placed into a controlled environment facility, where the temperature was fixed at 15°C, humidity at 80%, soil water content maintained at 65% field capacity, and day-length at 16 hours light per day. By controlling the influences of the environment (temperature, moisture and light) a relative comparison of the differences between soil types could be made. Three grass harvests from each pot were taken at 5 weeks growth intervals and the DM yield and total N recovery were measured. The soils were also sampled at each harvest time and analysed using the soil N tests mentioned previously.

Following 5 weeks growth, grass DM yield ranged from 1.27 to 2.84 t ha^{-1} over the 30 soil types (Figure 2). This large range in grass yield was explained by the levels of NH_4-N measured in the soils which ranged from 11 to 153 mg kg^{-1}(Figure 3). Some soil types supplied more N than was needed to produce maximum yield (>110 kg ha^{-1} NH_4-N). The NH_4-N present in these soils was released through N mineralisation processes and shows that N mineralisation can contribute considerable N for grass uptake, producing very high yields on some soil types in the absence of chemical N fertiliser inputs. This shows that less N fertiliser is needed to produce similar levels of grass growth on high N supply soils verses low N supply soils.

Future objectives of this research

The research conducted to date shows that large variability in soil N supply potential exists within Irish soil types. A soil N test has been identified that can differentiate between the different mineral soil types and predict their soil N supply potential. N supplied by the soil contributes to grass growth, and can produce maximum grass yields on high N supply soils.

The next step is to validate this work at field and farm scale. This will ensure that the soil N test is robust and can accurately predict soil N supply under field conditions. In addition the temporal pattern of soil N release needs to be assessed for these different soil types. Knowledge of the soil N release over the season is important to identify periods of the year

when soil N release may be lagging behind grass N demand e.g. early in the growing season when soils are cooler. During these periods more N fertiliser would need to be applied.

The overall objective of this work is to update the current N advice on farms with new soil specific N recommendations. It is hoped that these new soil specific N recommendations will aid farmers to increase N use efficiency, reduce N fertiliser costs and protect production levels on their farms. This in turn will have positive knock-on effects in terms of reduced N losses, thus protecting the environment

Table 1: Coefficient of determination (r^2) for the regression analysis of 7-day anaerobic incubation test (AI-7) vs. the six chemical N tests;

Chemical N test	Regression with AI-7 r^2
ISNT	0.68
UV 260nm	0.38
UV 210nm	0.31
Hot 2M KCl	0.24
Acid Oxidation	0.02
Cold 2M KCl	0.00

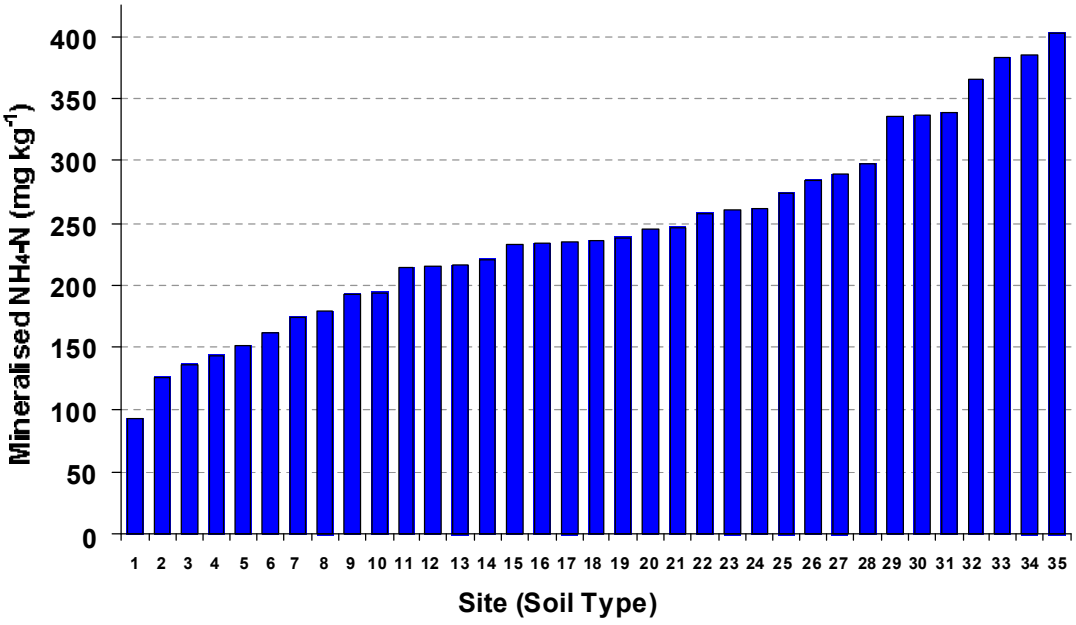


Figure 1. Levels of mineralised NH_4^+-N (mg kg^{-1}) using 7-day anaerobic incubation test for 35 mineral soil types

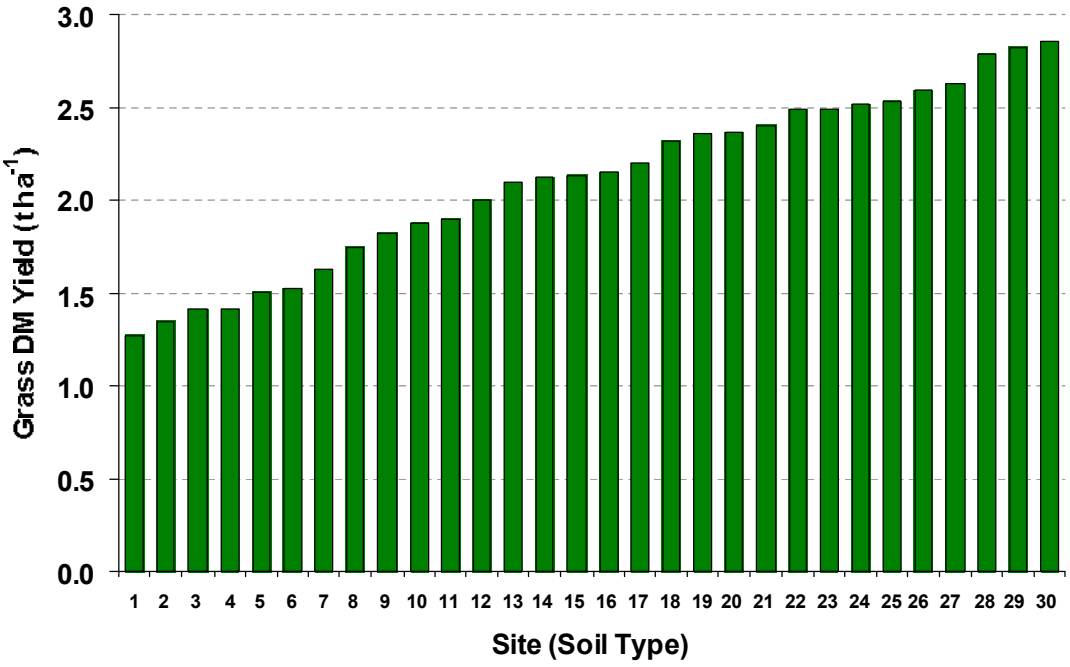


Figure 1. Grass DM yield (t ha^{-1}) for 30 mineral soil types over a 5 week growth period under controlled environmental conditions.

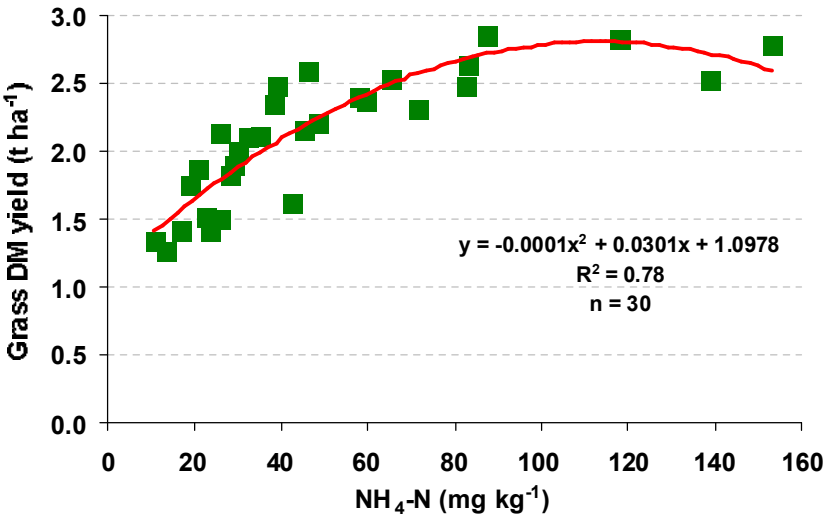


Figure 3. Grass DM yield (t ha^{-1}) versus NH_4-N (mg kg^{-1}) for 30 soil types

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APPENDIX 1

Article in the GSI Groundwater Newsletter, Issue 49, July 2011

Integrated Constructed Wetlands (ICWs) – DEHLG Guidance Document Now Launched

By Donal Daly, EPA

Natural Attenuation

Can 'nature' attenuate pollutants and protect water from the impact of human activities? The answer is 'yes and no'! The challenge is in knowing, with reasonable confidence, the circumstances in which natural attenuation (as an alternative to construction and technology-based engineering solutions) will work satisfactorily. There are examples of false hopes; for instance, in Britain in the late 1970s and early 1980s, 'dilute and disperse' landfill sites were thought to be a relatively low cost (compared to engineered containment sites) and effective means of disposing of domestic refuse. By the late 1980s, it was realised that while some pollutants were attenuated, many trace organics, such as solvents, weren't. On the other hand, the realisation that the subsoils (Quaternary sediments) that overlie our bedrock in Ireland provides a protecting, filtering layer over groundwater by various physical, chemical and biological processes has led to the 'groundwater vulnerability concept' developed by the GSI and the subsequent mapping and use of these maps in groundwater protection schemes. Recent research by Teagasc/TCD is showing the role of denitrification in subsoils in reducing the amount of nitrate leached to groundwater. Further research on the role of bedrock in causing denitrification, and the ability to delineate areas where denitrification is likely, will enable mitigation measures to be focussed on the problematical areas.

ICWs – Another 'Natural' Solution

Most, if not all, readers of this Newsletter will be familiar with the role of 'reed beds' in treating pollutants, particularly wastewater from houses. However, recent research (Gill, et al., 2009)[7] has shown that while horizontal flow subsurface reed beds are effective in reducing organic, suspended solids and bacteriological loads, they were far less effective in removing nutrients and bacteriophages. So, while they may have a role, they are by no means a complete solution. However, an Irish version of the 'constructed wetland' concept has been developed by DEHLG and Waterford County Council staff. This is called the 'Integrated Constructed Wetland' (ICW) concept. While I am not an expert on constructed wetlands, it appears to me that ICWs are an Irish-developed solution to treating wastewater that is more effective than 'reed beds' and can be as effective, and in some circumstances more effective, than conventional mechanical waste water treatment plants. While there are a number of provisos attached to this view, which are given below, on balance we now have in Ireland a solution to the treatment of domestic wastewater, farmyard soiled water and road runoff that can be effective and has other environmental benefits.

What are ICWs?

The ICW concept is based upon the free surface-flow of water/wastewater through a series of sequential linked shallow ponds that have been vegetated with a range of plant species. The footprint of these ponds is much larger than that used for similar hydraulic loadings in 'reed bed' systems. There is a long retention time in the ponds, which aids the deposition of suspended matter and reduction of B.O.D., nitrogen and phosphorus, facilitated by the

[7] Gill, L., Ó Luanaigh, N., Patel, T., Misstear, B. and Johnston, P. 2009. On-site wastewater treatment: investigation of rapid percolating sibsoils, reed beds and effluent distribution. Synthesis Report (200—MS-15).Environmental Protection Agency. Available at: www.epa.ie

action of specific plants. In addition to the pollutant reduction potential, they create new wetland habitats.

The Glaslough, County Monaghan, ICW, located in the grounds of the Castle Leslie Hotel, is a good example of a recently installed ICW. Four ponds cover an area of 3.25 ha and the ICW is designed to treat wastewater from up to 1,750 people.

Guidance on ICWs

In November 2010, the Department of Environment, Heritage and Local Government published "Integrated Constructed Wetlands : Guidance Document for Farmyard Soiled Water and Domestic Wastewater Applications", which can be downloaded from the following link:
http://www.environ.ie/en/Publications/Environment/Water/FileDownLoad,24931,en.pdf
This 122 page Guidance document provides general details on ICWs, summarises the advantages and disadvantages with them, gives the site assessment requirements and gives relevant information on the regulatory process, ICW design, ICW construction and operation, maintenance and monitoring. The Department of Agriculture, Fisheries and Food will be publishing "Minimum Specification for Integrated Constructed Wetlands, and Ancillary Works" in the near future (expected in June); this will be the legal minimum standard for ICWs used for treating farmyard soiled water.

Constraints

ICWs, while a major breakthrough, are not a 'silver bullet' that will resolve the treatment of wastewater. I am aware from discussions with colleagues in the EPA that unsatisfactory results have arisen in circumstances where the requirements of the new DEHLG Guidance were not followed, particularly with regard to pond sizes, and site selection, design and operation. Care must be taken to deal with the following issues:

- ICWs are not suitable, in my view, for wastewaters with a high nutrient loading, e.g. wastewater with ammonium concentrations >100 mg/l.
- They are not suitable in all locations, e.g., inner protection area of public water supplies.
- In order that there is minimal pollution of groundwater, where a geomembrane is not used, there must be a minimum of 1.0 m of subsoil beneath the ponds, with the upper 0.5 m having a permeability no higher than $1x10^{-8}$ m/s, with slightly greater thicknesses above karstified and sand/gravel aquifers.
- The ICW provides a significant reduction in phosphorus (P), whereby the P is contained in the ponds. Consequently, after a number of years, this phosphorus must be removed. Obviously, this P, on the one hand, is a valuable resource, but it has to be stored and used with care.
- High ammonium concentrations are usually present in the underlying groundwater. However, while this is a hazard that must be considered, it will not be a significant issue except where the permeability of the underlying subsoil is at or close to the limit of $1x10^{-8}$ m/s and there are ammonium sensitive waters nearby or there is a link to a receiving water body. Where the permeability is lower than this, the ammonium loading will be too low to cause any problems.
- Discharge licences to receiving waters are required from the relevant competent authority prior to construction and discharge.

Conclusions

We now have in Ireland a form of constructed wetland that can be effective in treating pollutants in wastewater in a sustainable manner and that has the additional benefit that it creates new wetlands. However, they must be located in suitable areas following a site suitability assessment, be installed and maintained properly, and be in compliance with the appropriate authorisation (such as wastewater discharge licence or authorisation,

IPPC/Waste licence, Water Pollution Act licence) to a suitable receiving water. The DEHLG Guidance Document is a welcome step forward and provides the information required to facilitate the use of ICWs in an effective and sustainable manner.

The Groundwater Newsletters are available at: www.gsi.ie

REGULATIONS

COMMISSION REGULATION (EU) No 65/2011

of 27 January 2011

laying down detailed rules for the implementation of Council Regulation (EC) No 1698/2005, as regards the implementation of control procedures as well as cross-compliance in respect of rural development support measures

THE EUROPEAN COMMISSION,

Having regard to the Treaty on the Functioning of the European Union,

Having regard to Council Regulation (EC) No 1698/2005 of 20 September 2005 on support for rural development by the European Agricultural Fund for Rural Development (EAFRD) [1], and in particular Article 51(4), Article 74(4) and Article 91 thereof,

Whereas:

(1) Commission Regulation (EC) No 1122/2009 of 30 November 2009 laying down detailed rules for the implementation of Council Regulation (EC) No 73/2009 as regards cross-compliance, modulation and the integrated administration and control system, under the direct support schemes for farmers provided for in that Regulation, as well as for the implementation of Council Regulation (EC) No 1234/2007 as regards cross-compliance under the support scheme provided for the wine sector [2] repealed and replaced Commission Regulation (EC) No 796/2004 of 21 April 2004 laying down detailed rules for the implementation of cross-compliance, modulation and the integrated administration and control system provided for in Council Regulations (EC) No 1782/2003 and (EC) No 73/2009, as well as for the implementation of cross-compliance provided for in Council Regulation (EC) No 479/2008 [3].

(2) Commission Regulation (EC) No 1975/2006 of 7 December 2006, laying down detailed rules for the implementation of Council Regulation (EC) No 1698/2005, as regards the implementation of control procedures as well as cross-compliance in respect of rural development support measures [4], contains many cross-references to the administration and control rules set out in the repealed Regulation (EC) No 796/2004. Account should be taken of the modifications made to those administration and control rules by Regulation (EC) No 1122/2009, while the principles established by Regulation (EC) No 1975/2006 should be respected. In addition, to ensure coherence, clarity and simplification, certain provisions of Regulation (EC) No 1975/2006 should be amended in order to limit the references to Regulation (EC) 1122/2009 to the minimum necessary. It is therefore appropriate to repeal and replace Regulation (EC) No 1975/2006.

(3) Member States should establish a control system that ensures that all necessary checks are carried out for effective verification of compliance with the terms under which aid is granted. All the eligibility criteria established by legislation of the Union or national legislation or the rural development programmes should be able to be controlled according to a set of verifiable indicators.

(4) Experience shows that the integrated administration and control system (hereinafter referred to as IACS) provided for in Chapter 4 of Title II of Council Regulation (EC) 73/2009 of 19 January 2009 establishing common rules for direct support schemes for farmers under the common agricultural policy and establishing certain support schemes for farmers, amending Regulations (EC) No 1290/2005, (EC) No 247/2006, (EC) No 378/2007 and repealing Regulation (EC) No 1782/2003 [5], has proven to be an effective and efficient means for the implementation of direct payment schemes. Therefore, as far as the area and animal-related measures under Axis 2 in Section 2 of Chapter I of Title IV of Regulation (EC) No 1698/2005 are concerned, the administration and control rules, as well as the related provisions concerning reductions and exclusions in cases of false declarations, should follow the principles set out in the IACS, in particular in Regulation (EC) No 1122/2009.

(5) However, for certain support measures set out under Axis 2 and for equivalent support under Axis 4 provided for in Sections 2 and 4, respectively, of Chapter I of Title IV of Regulation (EC) No 1698/2005, the administration and control rules need to be adapted

[1] OJ L 277, 21.10.2005, p. 1.
[2] OJ L 316, 2.12.2009, p. 65.
[3] OJ L 141, 30.4.2004, p. 18.
[4] OJ L 368, 23.12.2006, p. 74.
[5] OJ L 30, 31.1.2009, p. 16.

to their particular characteristics. The same applies to the support measures under Axes 1 and 3 provided for in Sections 1 and 3, respectively, of the same Chapter and equivalent support under Axis 4. Special provisions therefore need to be established for those support measures.

(6) In order to ensure that all national administrations are able to organise efficient, integrated control of all areas for which payment is claimed under Axis 2 and under the area-related aid schemes covered by Regulation (EC) No 1122/2009, payment claims for area-related measures under Axis 2 should be submitted within the same deadline as the single application provided for in Chapter I of Title II of Part II of that Regulation.

(7) In order to ensure the deterrent effect of control, payments should, as a general rule, not be made before the eligibility checks have been completed. However, it is appropriate to allow payments up to a certain level after the completion of administrative checks. In fixing that level, account should be taken of the risk of overpayment.

(8) The control rules provided for in this Regulation should take into account the special characteristics of the measures concerned under Axis 2. For the sake of clarity, particular rules should therefore be established.

(9) Member States may use evidence received from other services, bodies or organisations to verify compliance with eligibility criteria. However, they should have assurance that the service, body or organisation is operating to a standard sufficient to control compliance with the eligibility criteria.

(10) Experience has shown that it is necessary to clarify certain provisions, especially as regards determination of the number of hectares and animals as well as reductions, exclusions and recoveries.

(11) In accordance with Article 50a of Regulation (EC) No 1698/2005, payments under certain of the measures provided for in that Regulation have been made subject to observance of cross-compliance requirements as provided for in Chapter 1 of Title II of Regulation (EC) No 73/2009. It is therefore appropriate to align the rules governing cross-compliance with those contained in Regulations (EC) No 73/2009 and (EC) No 1122/2009.

(12) Experience has shown that specific control provisions are needed for certain specific support measures.

(13) *Ex-post* checks of investment operations should be undertaken to verify compliance with Article 72(1) of Regulation (EC) No 1698/2005. The basis and the contents of those checks should be specified.

(14) To allow the Commission to meet its obligations for the management of the measures, Member States should report to the Commission on the number of checks undertaken and their results.

(15) Certain general control principles should be established, covering the right of the Commission to carry out checks.

(16) Member States should ensure that the paying agencies referred to in Article 6 of Council Regulation (EC) No 1290/2005 of 21 June 2005 on the financing of the common agricultural policy [1] have sufficient information on checks carried out by other services or bodies in order to fulfil their duties under that Regulation.

(17) In order to avoid accounting problems which could occur if for the calendar year 2011 different control procedures had to be applied, this Regulation should apply from 1 January 2011.

(18) The measures provided for in this Regulation are in accordance with the opinion of the Rural Development Committee,

HAS ADOPTED THIS REGULATION:

PART I

SCOPE AND GENERAL PROVISIONS

Article 1

Scope

This Regulation lays down the detailed rules for the implementation of control procedures as well as cross-compliance in respect of the co-financed rural development support measures established pursuant to Regulation (EC) No 1698/2005.

Article 2

Definitions

For the purposes of this Regulation:

(a) 'Application for support' means an application for support or to enter a scheme under Regulation (EC) No 1698/2005;

(b) 'Payment claim' means an application by a beneficiary for payment by the national authorities;

[1] OJ L 209, 11.8.2005, p. 1.

(c) 'Other declaration' means any declaration or document, other than those referred to in points (a) and (b), which has to be submitted or kept by a beneficiary or a third party in order to comply with specific requirements of certain rural development measures.

Article 3

Applications for support, payment claims and other declarations

1. The Member States shall provide for appropriate procedures for the submission of applications for support.

2. For measures with multiannual commitments, the beneficiary shall submit an annual payment claim.

However, Member States may dispense with annual physical payment claims if they introduce effective alternative procedures to carry out the administrative checks provided for in Article 11 or 24 as appropriate.

3. An application for support, payment claim or other declaration may be totally or partially withdrawn at any time. Evidence of such withdrawal shall be recorded by the competent authority.

If the competent authority has already informed the beneficiary of irregularities in the documents referred to in the first subparagraph or if the competent authority has given notice to the beneficiary of its intention to carry out an on-the-spot check, which subsequently reveals irregularities, withdrawals shall not be authorised in respect of the parts affected by the irregularities.

Withdrawals referred to in the first subparagraph shall put beneficiaries in the position they were before submission of the documents in question or part of them.

4. Applications for support, payment claims and other declarations may be adjusted at any time after their submission in cases of obvious errors recognised by the competent authority.

Article 4

General principles of control

1. Member States shall establish a control system that ensures that all necessary checks are carried out for effective verification of compliance with the terms under which support is granted.

2. Without prejudice to specific provisions in this Regulation, Member States shall ensure that all the eligibility criteria established by Union or national legislation or by the rural development programmes can be checked according to a set of verifiable indicators to be established by the Member States.

3. Member States shall ensure that a unique identification system applies with regard to all applications for support, payment claims and other declarations submitted by the same beneficiary. This identification shall be compatible with the system referred to in Article 15(1)(f) of Regulation (EC) No 73/2009 for recording the identity of each farmer.

4. Where appropriate, on-the-spot checks provided for in Articles 12, 20 and 25 of this Regulation and other checks provided for in Union rules regarding agricultural subsidies shall be carried out at the same time.

5. The results of the checks under Articles 11, 12, 24 and 25 shall be assessed to establish whether any problems encountered could in general entail a risk for other similar operations, beneficiaries or other bodies. The assessment shall also identify the causes of such situations, any further examination which may be required and the necessary corrective and preventive action.

6. Applications for support, payment claims and other declarations shall be rejected if beneficiaries or their representatives prevent checks from being carried out. Any amounts already paid for that operation shall be recovered taking into account the criteria set out in Article 18(2) of this Regulation.

7. Without prejudice to Article 20(4) of this Regulation, and provided that the purpose of control is not jeopardised, on-the-spot checks may be announced. The announcement shall be strictly limited to the minimum time necessary and shall not exceed 14 days. However, for on-the-spot checks concerning animal-related measures, the announcement shall, except in duly justified cases, not exceed 48 hours.

8. Without prejudice to specific provisions, no payments shall be made to beneficiaries for whom it is established that they artificially created the conditions required for obtaining such payments with a view to obtaining an advantage contrary to the objectives of the support scheme.

9. The reductions or exclusions under this Regulation shall be without prejudice to additional penalties pursuant to other provisions of Union or national law.

Article 5

Recovery of undue payments

1. If undue payment is made, the beneficiary shall repay the amount in question plus interest calculated in accordance with paragraph 2.

2. Interest shall be calculated for the period elapsing between the notification to the beneficiary of the repayment obligation and the effective repayment or deduction of the amount to be repaid.

The rate of interest applicable shall be calculated in accordance with national law but shall not be lower than the interest rate applicable for the recovery of amounts under national provisions.

3. The repayment obligation referred to in paragraph 1 shall not apply if the payment was made by error of the competent authority or of another authority and if the error could not reasonably have been detected by the beneficiary.

However, where the error relates to factual elements relevant for the calculation of the payment concerned, the first subparagraph shall only apply if the decision to recover was not communicated within 12 months of the payment.

PART II

ADMINISTRATION AND CONTROL RULES

TITLE I

RURAL DEVELOPMENT SUPPORT FOR CERTAIN MEASURES UNDER AXIS 2 AND AXIS 4

CHAPTER I

General provisions

Article 6

Scope and definitions

1. This Title shall apply to:

(a) support granted in accordance with Article 36 of Regulation (EC) No 1698/2005;

(b) support granted in accordance with Article 63(a) of Regulation (EC) No 1698/2005 with regard to operations coming under measures defined under Axis 2.

However, this Title shall not apply to measures referred to in Article 36(a)(vi) and (b)(vi) and (vii) and in Article 39(5) of Regulation (EC) No 1698/2005 as well as to measures under Article 36(b)(i), (ii) and (iii) of that Regulation as far as the establishment cost is concerned.

2. For the purposes of this Title, the following definitions apply:

(a) 'area-related measure' means measures or sub-measures for which support is based on the size of the area declared;

(b) 'animal-related measure' means measures or sub-measures for which support is based on the number of animals declared.

(c) 'area determined' means the area of plots or parcels for which aid is claimed, as identified in accordance with Article 11 and Article 15(2), (3) and (4) of this Regulation.

(d) 'animals determined' means the number of animals identified in accordance with Article 11 and Article 15(5) of this Regulation.

Article 7

Applicable rules

1. Article 2, second subparagraph, points (1), (10) and (20), Article 6(1), Article 10(2), Articles 12, 14, 16, 20, second subparagraph of Article 25(1), Articles 73, 74 and 82 of Regulation (EC) No 1122/2009 shall apply *mutatis mutandis* for the purpose of this Title. However, for the measures referred to in Articles 36(b)(iii), (iv) and (v) of Regulation (EC) No 1698/2005, the Member States may establish appropriate alternative systems to uniquely identify the land subject to support.

2. For the purpose of this Title, the references in Regulation (EC) No 1122/2009 to 'farmers' shall be construed as references to 'beneficiaries'.

Article 8

Payment claims

1. For all commitments starting or contracts entering into force after 1 January 2007, payment claims under area-related measures shall be submitted in accordance with the deadlines set out in Article 11(2) of Regulation (EC) No 1122/2009. However, Member States may decide to apply this provision only as from the claim year 2008.

2. If a Member State applies Article 3(2), second subparagraph, of this Regulation, then the payment claim shall be deemed to be submitted in accordance with the deadlines set out in Article 11(2) of Regulation (EC) No 1122/2009.

3. Articles 22 and 23 of Regulation (EC) No 1122/2009 shall apply *mutatis mutandis* to payment claims under this Title. In addition to the information referred to in Article 12(1)(d) of that Regulation, the payment claim shall also contain the information set out in that provision with regard to non-agricultural land for which support is being claimed.

Article 9

Payments

1. No payment for any measure or set of operations falling within the scope of this Title shall be made before the checks of that measure or set of operations with regard to eligibility criteria, as referred to in Section I of Chapter II, have been finalised.

However, Member States may decide, taking into account the risk of overpayment, to pay up to 75 % of the aid after completion of the administrative checks provided for in Article 11. The percentage of payment shall be the same for all beneficiaries of the measure or set of operations.

2. With regard to cross-compliance checks provided for in Section II of Chapter II, where such checks cannot be completed before payment, any undue payments shall be recovered in accordance with Article 5.

CHAPTER II

Control, reductions and exclusions

Article 10

General principles

1. Member States shall make use of the integrated administration and control system provided for in Chapter 4 of Title II of Regulation (EC) No 73/2009 (hereinafter referred to as IACS).

2. Verification of compliance with the eligibility criteria shall consist of administrative and on-the-spot checks.

3. Observance of cross-compliance requirements shall be verified through on-the-spot checks and, where appropriate, through administrative checks.

4. During the period covered by a commitment, parcels for which support is being granted may not be exchanged except in cases specifically provided for in the rural development programme.

Section I

Compliance with the eligibility criteria, commitments and linked obligations

Subsection I

Control

Article 11

Administrative checks

1. Administrative checks shall be undertaken on all applications for support, payment claims and other declarations required to be submitted by a beneficiary or a third party, and shall cover all elements that it is possible and appropriate to control by administrative means. The procedures shall ensure the recording of control work undertaken, the results of the verification and the measures taken in respect of discrepancies.

2. The administrative checks shall include cross-checks wherever possible and appropriate, inter alia with data from the IACS. These cross-checks shall apply at least to parcels and livestock covered by a support measure in order to avoid any undue payments of aid.

3. Compliance with long-term commitments shall be checked.

4. Indications of irregularities resulting from cross-checks shall be followed up by any other appropriate administrative procedure, and, where necessary, by an on-the-spot check.

5. Where applicable, administrative checks on eligibility shall take into account the results of verifications carried out by other services, bodies or organisations involved in the control of agricultural subsidies.

Article 12

On-the-spot checks

1. The total number of on-the-spot checks on payment claims presented during each calendar year shall cover at least 5 % of all beneficiaries falling within the scope of this Title. However, for the measure set out in Article 36(a)(iv) of Regulation (EC) No 1698/2005 the 5 % rate shall be achieved at measure level.

Applicants found not to be eligible after administrative checks shall not form part of the minimum number of beneficiaries checked in accordance with the first subparagraph.

2. Where on-the-spot checks reveal significant irregularities for a given measure or in a region or part of a region, the competent authority shall appropriately increase the number of on-the-spot checks during the current year and shall appropriately increase the percentage of beneficiaries to be checked on-the-spot in the following year.

3. The control samples of on-the-spot checks to be carried out pursuant to paragraph 1 of this Article shall be selected in accordance with Article 31 of Regulation (EC) No 1122/2009. As a result of the risk analysis referred to in that Article, the Member States may select specific measures of the beneficiaries for the on-the-spot check.

4. For the beneficiaries of any multiannual measures involving payments exceeding five years, the Member States may decide, after the fifth year of payment, to check at least 2,5 % of those beneficiaries.

Beneficiaries checked under the first subparagraph of this paragraph shall not be taken into account for the purpose of the first subparagraph of paragraph 1.

Article 13

Control report

On-the-spot checks under this Subsection shall be the subject of a control report to be established in accordance with Article 32 of Regulation (EC) No 1122/2009.

Article 14

General principles concerning on-the-spot checks

1. On-the-spot checks shall be spread over the year on the basis of an analysis of the risks presented by the different commitments under each rural development measure.

2. On-the-spot checks of measures selected for the check as referred to in Article 12(3) of this Regulation shall cover all the commitments and obligations of a beneficiary which can be checked at the time of the visit.

Article 15

Elements of the on-the-spot checks and determination of areas

1. The Member States shall determine criteria and control methods that allow the control of the different commitments and obligations of the beneficiary to satisfy the requirements of Article 48(1) of Commission Regulation (EC) No 1974/2006 [1].

2. Where the Member States provide that particular elements of an on-the-spot check may be carried out on the basis of a sample, that sample shall guarantee a reliable and representative level of control. Member States shall establish the criteria for the selection of the sample. If the checks on that sample reveal irregularities, the extent and scope of the sample shall be extended appropriately.

3. With regard to the control of area-related measures, the on-the-spot checks shall cover all agricultural parcels and non-agricultural land for which support is being claimed.

4. Nevertheless, the actual determination of the size of areas for an on-the-spot check may be limited to a sample of at least 50 % of the areas, provided that the sample guarantees a reliable and representative level of control in respect of area checked and support claimed. If the checks on that sample reveal irregularities, the extent and scope of the sample shall be extended appropriately.

5. Determination of areas and remote sensing shall be carried out in accordance with Article 34(1) to (5) and Article 35 of Regulation (EC) No 1122/2009.

However, for the measures set out in Articles 36(b)(iii), (iv) and (v) of Regulation (EC) No 1698/2005, the Member States may define appropriate tolerances, which shall in no case be greater than twice the tolerances set out in Article 34(1) of Regulation (EC) No 1122/2009.

6. With regard to the control of animal-related measures, the on-the-spot checks shall be carried out in accordance with Article 42 of Regulation (EC) No 1122/2009.

Subsection II

Reductions and exclusions

Article 16

Reductions and exclusions in relation to the size of area

1. If, for a given year, a beneficiary does not declare all the agricultural areas, and the difference between the overall agricultural area declared in the payment claim on the one hand and the area declared plus the overall area of the agricultural parcels not declared, on the other, is more than 3 % of the area declared, the overall amount of aid under area-related measures payable to that beneficiary for that year shall be reduced by up to 3 % depending on the seriousness of the omission.

The first subparagraph shall not apply where all the agricultural areas concerned have been declared to the competent authorities in the framework of:

(a) the integrated system referred to in Article 15 of Regulation (EC) No 73/2009; or

(b) other administration and control systems that guarantee compatibility with the integrated system in accordance with Article 26 of that Regulation.

2. For the purpose of this Article, areas declared by a beneficiary which receive the same rate of aid under a certain area-related measure shall be considered as forming one crop group. Where degressive aid amounts are used, the average of these amounts in relation to the respective areas declared shall be taken into account.

3. If the area determined for a crop group is found to be greater than that declared in the payment claim, the area declared shall be used for the calculation of the aid.

If the area declared in the payment claim exceeds the area determined for that crop group, the aid shall be calculated on the basis of the area determined for that crop group.

However, where the difference between the total area determined and the total area declared in the payment claim for a measure is less than or equal to 0,1 hectare, the area determined shall be considered equal to the area declared. For this calculation, only over-declarations of areas at crop group level shall be taken into account.

The third subparagraph shall not apply where the difference represents more than 20 % of the total area declared for payments.

If a maximum limit or a ceiling has been set for the area eligible for support, the number of hectares declared in the payment claim shall be reduced to the limit or ceiling.

4. If the same area serves as the basis for a payment claim under more than one area-related measure, that area shall be taken into account separately for each of the measures.

5. In the case referred to in the second subparagraph of paragraph 3, the aid shall be calculated on the basis of the area determined reduced by twice the difference found if that difference is more than either 3 % or two hectares, but not more than 20 % of the area determined.

If the difference is more than 20 % of the area determined, no aid shall be granted for the crop group concerned.

[1] OJ L 368, 23.12.2006, p. 15.

If the difference is more than 50 %, the beneficiary shall be excluded once again from receiving aid up to the difference between the area declared in the payment claim and the area determined.

6. If the differences between the area declared in the payment claim and the area determined, as referred to in the second subparagraph of paragraph 3, result from over-declarations committed intentionally, the aid to which the beneficiary would have been entitled pursuant to that subparagraph shall not be granted for the calendar year in question under the area-related measure concerned where that difference is more than 0,5 % of the area determined or more than one hectare.

If the difference is more than 20 % of the area determined, the beneficiary shall be excluded once again from receiving aid, up to an amount equal to the amount corresponding to the difference between the area declared and the area determined.

7. The amount resulting from the exclusions provided for in the third subparagraph of paragraph 5 and in the second subparagraph of paragraph 6 of this Article shall be offset in accordance with Article 5b of Commission Regulation (EC) No 885/2006 [1]. If the amount cannot be fully offset in accordance with that Article in the course of the three calendar years following the calendar year of the finding, the outstanding balance shall be cancelled.

Article 17

Reductions and exclusions in relation to the number of animals

1. For the purpose of this Article, bovine animals and ovine and caprine animals shall each be treated separately.

Concerning animals other than those referred to in the first subparagraph, the Member State shall fix an appropriate system of reductions and exclusions.

2. If an individual limit or individual ceiling is applicable, the number of animals declared in the payment claim shall be reduced to the limit or ceiling set for the beneficiary concerned.

In no case may aid be granted for a number of animals greater than that declared in the payment claim.

If the number of animals declared in the payment claim exceeds the number of animals determined as a result of administrative or on-the-spot checks, the aid shall be calculated on the basis of the number of animals determined.

3. A bovine animal which has lost one of the two ear tags shall be deemed to belong to the animals determined provided that it is clearly and individually identified by the other elements of the system for the identification and registration of bovine animals.

In the case of irregularities involving incorrect entries in the register of bovine animals or the animal passports, the bovine animal concerned shall only be deemed not to belong to the animals determined if the errors are found in at least two checks within a period of 24 months. In all other cases the animal concerned shall be deemed not to belong to the animals determined after the first finding.

Article 3(4) of this Regulation shall apply to entries in, and notifications to, the system for the identification and registration of bovine animals.

4. In the case referred to in the third subparagraph of paragraph 2, the total amount of aid to which the beneficiary is entitled under the measure shall be reduced by the percentage to be established in accordance with paragraph 6, if no more than three animals are found with irregularities.

5. If more than three animals are found with irregularities, the total amount of aid to which the beneficiary is entitled under the measure shall be reduced by:

(a) the percentage to be established in accordance with paragraph 6, if that percentage is not more than 10 %;

(b) twice the percentage to be established in accordance with paragraph 6, if that percentage is more than 10 % but not more than 20 %.

If that percentage is more than 20 %, no aid shall be granted for the measure concerned.

If that percentage is more than 50 %, the beneficiary shall be excluded once again from receiving aid up to an amount corresponding to the difference between the number of animals declared and the number of animals determined in accordance with the third subparagraph of paragraph 2. The amount resulting from the exclusion shall be offset in accordance with Article 5b of Regulation (EC) No 885/2006. If the amount cannot be fully offset in accordance with that Article in the course of the three calendar years following the calendar year of the finding, the outstanding balance shall be cancelled.

6. In order to establish the percentages referred to in paragraphs 4 and 5, the number of animals found with irregularities shall be divided by the number of animals determined.

In case of application of the second subparagraph of Article 16(3) of Regulation (EC) No 1122/2009, potentially eligible animals found not to be correctly identified or registered in the system for identification and registration of bovine animals shall count as animals found with irregularities.

7. If the difference between the number of animals declared and that determined in accordance with the third subparagraph of paragraph 2 results from irregularities committed intentionally no aid shall be granted for the measure concerned.

[1] OJ L 171, 23.6.2006, p. 90.

If the percentage established in accordance with paragraph 6 is more than 20 %, the beneficiary shall be excluded once again from receiving aid up to an amount corresponding to the difference between the number of animals declared and the number of animals determined in accordance with the third subparagraph of paragraph 2. The amount resulting from the exclusion shall be offset in accordance with Article 5b of Regulation (EC) No 885/2006. If the amount cannot be fully offset in the course of three calendar years following the calendar year of the finding, the outstanding balance shall be cancelled.

Article 18

Reductions and exclusions in the case of non-compliance with other eligibility criteria, commitments and linked obligations

1. The aid claimed shall be reduced or refused where the following obligations and criteria are not met:

(a) for the measures referred to in Article 36(a)(iv) and (v) as well in (b)(v) of Regulation (EC) No 1698/2005, the relevant mandatory standards as well as minimum requirements for fertiliser and plant protection product use, other relevant mandatory requirements as referred to in Articles 39(3), 40(2) and 47(1) of Regulation (EC) No 1698/2005, and commitments that go beyond such standards and requirements; or

(b) eligibility criteria other than those related to the size of area or number of animals declared.

In case of multiannual commitments, aid reductions, exclusions and recoveries shall also apply to the amounts already paid in the previous years for that commitment.

2. The Member State shall recover and/or refuse the support or determine the amount of the reduction of the aid, in particular on the basis of the severity, extent and permanent nature of the non-compliance found.

The severity of the non-compliance shall depend, in particular, on the importance of the consequences of the non-compliance, taking into account the objectives of the criteria that were not met.

The extent of the non-compliance shall depend, in particular, on its effect on the operation as a whole.

Whether the non-compliance is of a permanent nature shall depend, in particular, on the length of time for which the effect lasts or the possibility of terminating this effect by reasonable means.

3. If the non-compliance results from irregularities committed intentionally, the beneficiary shall be excluded from the measure in question both for the calendar year of finding and for the following calendar year.

Section II

Cross-compliance

Subsection I

Control

Article 19

General rules

1. Without prejudice to Article 51(3) of Regulation (EC) No 1698/2005, 'cross-compliance' shall mean compliance with the statutory management requirements and the good agricultural and environmental condition referred to in the first subparagraph of Article 50a(1) of that Regulation and the minimum requirements for fertiliser and plant protection product use referred to in the second subparagraph of Article 51(1) of that Regulation.

2. Article 22 of Regulation (EC) No 73/2009 and Article 2, second paragraph, points (2) and (32) to (37), Articles 8, 47, 48, 49, Article 50 with the exception of the first subparagraph of paragraph 1, Article 51(1), (2) and (3), Articles 52, 53, 54, Article 70(3), (4), (6) and (7), and Articles 71 and 72 of Regulation (EC) No 1122/2009 shall apply *mutatis mutandis* with regard to cross-compliance.

3. For calculating the reduction referred to in Article 21 of this Regulation, the minimum requirements for the use of fertilisers and plant protection products as referred to in Article 39(3) of Regulation (EC) No 1698/2005 shall be considered to relate to the area of the environment and the area of public, animal and plant health, respectively, as laid down in Article 5(1) of Regulation (EC) No 73/2009. Both minimum requirements shall be considered to be an 'act' within the meaning of Article 2, second paragraph, point (33), of Regulation (EC) No 1122/2009.

Article 20

On-the-spot checks

1. As regards the requirements and standards for which it is responsible, the competent control authority shall carry out on-the-spot checks on at least 1 % of all beneficiaries submitting payment claims under Article 36(a)(i) to (v) and (b)(i), (iv) and (v) of Regulation (EC) No 1698/2005.

2. The samples of beneficiaries to be checked in accordance with paragraph 1 may be selected either from the sample of beneficiaries which were already selected pursuant to Article 12 of this Regulation, and to whom the relevant requirements or standards apply, or from the full population of beneficiaries submitting payment claims under Article 36(a)(i) to (v) and (b)(i), (iv) and (v) of Regulation (EC) No 1698/2005 and who are obliged to meet the respective requirements or standards.

3. A combination of the procedures set out in paragraph 2 may be used where such a combination increases the effectiveness of the control system.

4. Where the acts and standards relevant to cross-compliance require the on-the-spot checks to be unannounced, the same requirement shall also apply to the on-the-spot checks of cross-compliance.

Subsection II

Reductions and exclusions

Article 21

Reductions and exclusions

Without prejudice to Article 51(2) of Regulation (EC) No 1698/2005, if a case of non-compliance is determined, the reductions and exclusions referred to in Article 19(2) of this Regulation shall be applied to the overall amount of aid under Article 36(a)(i) to (v) and (b)(i), (iv) and (v) of Regulation (EC) No 1698/2005 that has been, or is to be, granted to the beneficiary concerned following payment claims that the beneficiary has submitted or will submit in the course of the calendar year of the finding.

Section III

Order of reductions

Article 22

Order of reductions

Where several reductions are applicable; they shall be applied in the following order:

— first in accordance with Article 16(5) and (6) and with Article 17(4) and (5) of this Regulation,

— then in accordance with Article 18 of this Regulation,

— then for late submission in accordance with Article 23 of Regulation (EC) No 1122/2009,

— then in accordance with Article 16(1) of this Regulation,

— then in accordance with Article 21 of this Regulation,

— finally, in accordance with Article 16(7) and 17(7) of this Regulation.

TITLE II

RURAL DEVELOPMENT SUPPORT UNDER AXIS 1 AND AXIS 3 AND CERTAIN MEASURES UNDER AXIS 2 AND AXIS 4

CHAPTER I

Introductory provisions

Article 23

Scope

This Title shall apply to expenditure pursuant to Regulation (EC) No 1698/2005 not covered by Title I of this Regulation.

CHAPTER II

Control, reductions and exclusions

Section I

Control

Subsection I

General provisions

Article 24

Administrative checks

1. Administrative checks shall be carried out on all applications for support, payment claims or other declarations required to be submitted by a beneficiary or a third party, and shall cover all elements that it is possible and appropriate to control by administrative means. The procedures shall require recording of the control work undertaken, the results of the verification and the measures taken in the event of discrepancies.

2. Administrative checks on applications for support shall in particular include verification of:

(a) the eligibility of the operation for which support is requested;

(b) compliance with the selection criteria set out in the rural development programme;

(c) compliance of the operation for which support is requested with applicable national and Union rules on, in particular, and where relevant, public procurement, State aid and other appropriate obligatory standards established by national legislation or established in the rural development programme;

(d) the reasonableness of the costs submitted, which shall be evaluated using a suitable evaluation system, such as reference costs, a comparison of different offers or an evaluation committee;

(e) the reliability of the applicant, with reference to any previous co-financed operations undertaken since 2000.

3. Administrative checks on payment claims shall include in particular, and where appropriate for the claim in question, verification of:

(a) the delivery of the products and services co-financed;

(b) the reality of expenditure claimed;

(c) the completed operation compared with the operation for which the application for support was submitted and granted.

4. Administrative checks on investment operations shall include at least one visit to the operation supported or the investment site to verify the realisation of the investment.

However, Member States may decide not to carry out such visits for duly justified reasons, such as the following:

(a) the operation is included in the sample for an on-the-spot check to be carried out in accordance with Article 25;

(b) the operation in question is a small investment;

(c) the Member State considers that the risk that the conditions for receiving aid are not met is low, or that the risk that the investment has not been realised is low.

The decision referred to in the second subparagraph and its justification shall be recorded.

5. Administrative checks shall include procedures to avoid irregular double financing with other Union or national schemes and with other programming periods. Where financing from other sources exists, those checks shall ensure that the total aid received does not breach the maximum permissible aid ceilings.

6. Payments by beneficiaries shall be supported by invoices and documents proving payment. Where this cannot be done, payments shall be supported by documents of equivalent probative value.

Article 25

On-the-spot checks

1. Member States shall organise on-the-spot checks on approved operations using an appropriate sampling basis. These checks shall, as far as is possible, be carried out before the final payment is made for an operation.

2. The expenditure covered by on-the-spot checks shall represent at least 4 % of the expenditure referred to in Article 23 which is financed by the European Agricultural Fund for Rural Development (EAFRD) and which is to be paid by the paying agency each calendar year. Only checks carried out until the end of the year in question shall be taken into consideration.

Over the whole programming period, the expenditure covered shall represent at least 5 % of the expenditure financed by the EAFRD.

3. The sample of approved operations to be checked in accordance with paragraph 1 shall take into account in particular:

(a) the need to check an appropriate mix of types and sizes of operations;

(b) any risk factors identified following national or Union checks;

(c) the need to maintain a balance between the axes and measures;

(d) the need to select randomly between 20 % and 25 % of expenditure.

4. The inspectors undertaking the on-the-spot check shall not have been involved in administrative checks of the same operation.

Article 26

Content of on-the-spot checks

1. Through the on-the-spot checks, the Member States shall endeavour to verify:

(a) that the payment claims submitted by the beneficiary are supported by accounting or other documents, including, where necessary, a check on the accuracy of the data in the payment claim on the basis of data or commercial documents held by third parties;

(b) for an adequate number of expenditure items, that the nature and the timing of the relevant expenditure comply with Union provisions and correspond to the approved specifications of the operation and the works actually executed or services actually delivered;

(c) that the use or intended use of the operation is consistent with the use described in the application for support;

(d) that the publicly funded operations have been implemented in accordance with Union rules and policies, especially the rules on public tendering and relevant mandatory standards established by national legislation or established in the rural development programme.

2. On-the-spot checks of payment claims selected for the check as referred to in Article 25(3) of this Regulation shall cover all the commitments and obligations of a beneficiary which can be checked at the time of the visit.

3. Except in exceptional circumstances, duly recorded and explained by the national authorities, on-the-spot checks shall include a visit to the operation or, if the operation is intangible, to the operation promoter.

4. Only checks meeting the full requirements of this Article may be counted towards achievement of the control rate set out in Article 25(2).

Article 27

Control report

1. Every on-the-spot check and *ex-post* check under this Section shall be the subject of a control report which makes it possible to review the details of the checks carried out. The report shall indicate in particular:

(a) the measures and applications checked;

(b) the persons present;

(c) whether notice was given to the beneficiary of the visit and, if so, the period of advance notification;

(d) the results of the checks and, where applicable, any particular observations;

(e) any further control measures to be carried out.

2. The beneficiary shall be given the opportunity to sign the report to attest the beneficiary's presence at the check and to add observations. Where irregularities are found, the beneficiary shall receive a copy of the control report.

Subsection II

Supplementary control provisions for specific measures

Article 28

Young farmers

For the measure provided for in Article 22(1) of Regulation (EC) No 1698/2005, the Member States shall verify compliance with the business plan according to Article 13(3) of Regulation (EC) No 1974/2006 by administrative checks and, on a sample basis, by on-the-spot checks.

Article 28a

Early retirement

For the measure provided for in Article 23 of Regulation (EC) No 1698/2005, Member States shall verify compliance with the requirements in Article 23(2)(b) and in Article 23(3) of that Regulation after transfer of the farm. Member States may dispense with on-the-spot checks after the first payment of support, provided that administrative checks, including appropriate cross-checks, in particular with the information contained in the electronic database referred to in Article 16 of Regulation (EC) No 73/2009, provide the necessary assurance of the legality and regularity of payments.

Article 28b

Support for food quality schemes recognised by Member States

For the measure provided for in Article 32 of Regulation (EC) No 1698/2005, paying agencies may, where appropriate, make use of evidence received from other services, bodies or organisations to verify compliance with eligibility criteria. However, they shall ensure that they have assurance that the service, body or organisation is operating to a standard sufficient to control compliance with the eligibility criteria.

Article 28c

Semi-subsistence farming

For the measure provided for in Article 34 of Regulation (EC) No 1698/2005, the Member States shall verify progress in respect of the business plan according to paragraph 2 of that Article by administrative checks and, on a sample basis, by on-the-spot checks.

Article 28d

Producer groups

For the measure provided for in Article 35 of Regulation (EC) No 1698/2005, the Member States shall recognise the producer group after verifying compliance of the group with the criteria set out in paragraph 1 of that Article and with the national rules. After recognition, continuous compliance with the recognition criteria shall be verified at least once during the five-year period through an on-the-spot check.

Article 28e

Holdings undergoing restructuring

For the measure provided for in Article 35a of Regulation (EC) No 1698/2005, the Member States shall assess progress in respect of the business plan according to paragraph 2 of that Article by administrative checks and, on a sample basis, by on-the-spot checks.

Article 28f

Leader

1. The Member States shall implement an appropriate system for supervision of local action groups.

2. In the case of expenditure incurred under Article 63(a) and (b) of Regulation (EC) No 1698/2005, Member States may delegate the carrying out of the administrative checks referred to in Article 24 of this Regulation to local action groups by a formal act. However, the Member States shall remain responsible for verifying that those local action groups have the administrative and control capacity to undertake that work.

In case of delegation referred to in the first subparagraph, the Member States shall carry out regular controls of the operations of the local action groups, including bookkeeping checks and repetition of administrative checks on a sample basis.

The Member States shall also carry out on-the-spot checks as referred to in Article 26 of this Regulation. In the sample of approved operations to be checked on-the-spot in accordance with Article 25(1) of this Regulation, expenditure concerning Leader shall at least have the same percentage it has in the expenditure referred to in Article 23 of this Regulation.

3. In the case of expenditure incurred under Article 63(c) of Regulation (EC) No 1698/2005, the checks shall be carried out by persons independent of the local action group concerned.

Article 28g

Subsidies on interest rates

In the case of expenditure incurred under Article 49 of Regulation (EC) No 1974/2006, administrative checks and on-the-spot checks shall be carried out with reference to the beneficiary and depending on the realisation of the operation concerned. The risk analysis in accordance with Article 25(3)(b) of this Regulation shall cover, at least once, the operation concerned on the basis of the discounted value of the subsidy.

Furthermore, the Member States shall ensure, via administrative checks and, if necessary, via *in-situ* visits to the intermediate financial institutions and at the beneficiary, that the payments to the intermediate financial institutions are in conformity with Union legislation and with the agreement concluded between the Member State's paying agency and the intermediate financial institution as laid down in Article 49 of Regulation (EC) No 1974/2006.

Article 28h

Other financial engineering actions

In the case of expenditure incurred under Article 50 of Regulation (EC) No 1974/2006, the Member States shall ensure, via administrative checks and, if necessary, via *in-situ* visits to the funds or their sponsors, that the conditions laid down in Articles 51 and 52 of that Regulation are complied with. They shall especially verify the correct usage of the funds and the closure at the end of the programming period.

Subsection III

***Ex-post* checks**

Article 29

***Ex-post* checks**

1. *Ex-post* checks shall be carried out on investment operations to verify the respect of commitments pursuant to Article 72(1) of Regulation (EC) No 1698/2005 or detailed in the rural development programme.

2. The *ex-post* checks shall cover in each calendar year at least 1 % of EAFRD expenditure for investment operations that are still subject to commitment as referred to in paragraph 1 and for which the final payment has been made from the EAFRD. Only checks carried out until the end of the year in question shall be taken into consideration.

3. The sample for operations to be checked in accordance with paragraph 1 shall be based on an analysis of the risks and financial impact of different operations, groups of operations or measures. Part of the sample shall be selected randomly.

Section II

Reductions and exclusions

Article 30

Reductions and exclusions

1. Payments shall be calculated on the basis of what is found to be eligible during the administrative checks.

The Member State shall examine the payment claim received from the beneficiary, and establish the amounts that are eligible for support. It shall establish:

(a) the amount that is payable to the beneficiary based solely on the payment claim;

(b) the amount that is payable to the beneficiary after an examination of the eligibility of the payment claim.

If the amount established pursuant to point (a) exceeds the amount established pursuant to point (b) by more than 3 %, a reduction shall be applied to the amount established pursuant to point (b). The amount of the reduction shall be the difference between those two amounts.

However, no reduction shall be applied if the beneficiary can demonstrate that he/she is not at fault for the inclusion of the ineligible amount.

2. Where a beneficiary is found to have intentionally made a false declaration, the operation in question shall be excluded from support from the EAFRD and any amounts already paid for that operation shall be recovered. Moreover, the beneficiary shall be excluded from receiving support under the same measure for the calendar year of finding and for the following calendar year.

3. The reductions and exclusions referred to in paragraphs 1 and 2 shall be applied *mutatis mutandis* to non-eligible expenditure identified during checks under Articles 25 and 29.

PART III

FINAL PROVISIONS

Article 31

Reporting

Member States shall send to the Commission by 15 July of each year a report:

(a) covering the results of the checks on payment claims submitted under Title I during the previous calendar year and relating, in particular, to the following points:

(i) the number of payment claims for each measure, the total amount checked for these claims, as well as the total area and total number of animals covered by checks under Articles 11, 12 and 20;

(ii) for area-related support, the total area broken down by individual aid scheme;

(iii) for animal-related measures, the total number of animals broken down by individual aid scheme;

(iv) the result of the checks carried out, indicating the reductions and exclusions applied pursuant to Articles 16, 17, 18 and 21;

(b) covering the checks and the results of the checks on payment claims carried out pursuant to Articles 24 and 25 for payments made during the previous calendar year;

(c) covering the checks and the results of the checks carried out pursuant to Articles 28 and 29 during the previous calendar year.

Article 32

Control by the Commission

Article 27(2) of Regulation (EC) No 73/2009 shall apply to support paid under Regulation (EC) No 1698/2005.

Article 33

Reporting of checks to the paying agencies

1. Where checks are not carried out by the responsible paying agency, the Member State shall ensure that sufficient information on the checks carried out and their results is received by that paying agency. It is for the paying agency to define its needs for information. The information may be a report on every check carried out or, if appropriate, be in the form of a summary report.

2. A sufficient audit trail shall be maintained. An indicative description of the requirements of a satisfactory audit trail is given in the Annex I.

3. The paying agency shall have the right to verify the quality of checks carried out by other bodies, and to receive all other information it needs for the performance of its functions.

Article 34

Repeal

1. Regulation (EC) No 1975/2006 is repealed with effect from 1 January 2011.

However, it shall continue to apply in respect of payment claims submitted before 1 January 2011.

2. References to Regulation (EC) No 1975/2006 shall be construed as references to this Regulation and shall be read in accordance with the correlation table in Annex II to this Regulation.

Article 35

Entry into force

This Regulation shall enter into force on the first day following that of its publication in the *Official Journal of the European Union*.

It shall apply from 1 January 2011.

This Regulation shall be binding in its entirety and directly applicable in all Member States.

Done at Brussels, 27 January 2011.

For the Commission
The President
José Manuel BARROSO

ANNEX I

Indicative description of information requirements for a sufficient audit trail

A sufficient audit trail, as referred to in Article 33(2), is present when, for a given assistance:

(a) it allows for reconciliation between the overall amounts declared to the Commission and the invoices, accounting and other supporting documents held by the paying agency or other service for all the operations supported by the EAFRD;

(b) it allows for verification of the payment of the public expenditure to the beneficiary;

(c) it allows for verification of the application of selection criteria to the operations financed by the EAFRD;

(d) it contains, as far as appropriate, the financial plan, reports of activities, documents relating to the granting of support, documents relative to public tendering procedures and reports relating to any checks carried out.

ANNEX II

Correlation table

Regulation (EC) No 1975/2006	This Regulation
Article 1	Article 1
Article 2	Article 4(3), (6), (7) and (9), Article 5, Article 7(1)
Article 3	Article 2
Article 4	Article 3
Article 5	Article 4(2), (4) and (8)
Article 6	Article 6
Article 7	Article 7(1), Article 8(3), Article 16(1)
Article 8(3)	Article 7(1), Article 8(3)
Article 9	Article 9
Article 10(1) and (2)	Article 4(1)
Article 10(3) to (6)	Article 10(1) to (4)
Article 11	Article 11
Article 12(1), (3) and (4)	Article 12(1), (3) and (4)
Article 12(2)	Article 12(2) and Article 15(3)
Article 13	Article 13
Article 14	Article 14
Article 15	Article 15
Article 16(1)	Article 16(2) and (3)
Article 16(2)	Article 16(5)
Article 16(4)	—
Article 16(5) and (6)	Article 16(6) and (7), respectively
Article 17(1)	Article 17(2) and (3)
Article 17(2)	Article 17(4), (5) and (6)
Article 17(3)	Article 17(5) and (7)
Article 17(4)	Article 17(1)
Article 18	Article 18
Article 19(1)	Article 19(1)
Article 19(2)	Article 19(2)
Article 20(1)	Article 20(1)
Article 20(2)	Article 19(2)
Article 21(1)	Article 19(2)

Regulation (EC) No 1975/2006	This Regulation
Article 21(2) and (3)	Article 20(2)
Article 21(4)	Article 20(3)
Article 22	Article 19(2)
Article 23(1), first subparagraph	Article 21
Article 23(1), second and third subparagraphs	Article 19(2)
Article 23(2)	Article 19(3)
Article 24	Article 22
Article 25	Article 23
Article 26(1), (2), (3) and (4)	Article 24(1), (2), (3) and (4), respectively
Article 26(5)	Article 24(6)
Article 26(6)	Article 24(5)
Article 26(7)	Article 28b
Article 27(1), (2) and (3)	Article 25
Article 27(4)	Article 4(5)
Article 28	Article 26
Article 28a	Article 27
Article 29	Article 28a and 28c
Article 30(1) and (2)	Article 29(1)
Article 30(3)	Article 29(2)
Article 30(4), first subparagraph	Article 29(3)
Article 30(4), second subparagraph	—
Article 31(1), first, second and third subparagraphs	Article 30(1), first, second and third subparagraphs, respectively
Article 31(1), fourth subparagraph	Article 30(3)
Article 31(2)	Article 30(2)
Article 32	Article 28f(3)
Article 33	Article 28f(2)
Article 34(a)	Article 31(a)
Article 34(b) and (c)	Article 31(b)
Article 34(d)	Article 31(c)
Article 35	Article 32
Article 36(1)	Article 19(2)
Article 36(2), (3) and (4)	Article 33(1), (2) and (3)
Article 37	Article 35

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