Case study: Irish Experiences of managing Nitrogen Pollution

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Ireland’s farming landscape

- Total number of farmers – 139,600
- Average farm size – 32.5 ha
- Total area farmed (000ha) – 4,536

- Grass based production system
- Long growing season
- Long grazing season

Figure 1.7 Utilisation of land, 2010

- Grassland 76%
- Rough Grazing 9%
- Commonage 8%
- Other crops, Fruit & Horticulture 2%
- Cereals 5%

Figure 1.12 Grassland, 2010

- Pasture 66%
- Silage 29%
- Hay 5%
Importance of grazed grass

- Grass €80/t DM
- Grass Silage €150/t DM
- Concentrates €265/t DM
Local Roots Global Reach

Food Wise 2025

A 10-year vision for the Irish agri-food industry
#FoodWise2025

**Strategy**

Increase the value of agri food exports by 85% to €19 billion

Increase value added to the sector by 70% to €13 billion

Increase the value of primary production by 65% to €10 billion

Deliver a further 23,000 jobs in the agri food sector by 2025
Nitrates Directive (91/676/EEC)
Map of Nitrates Vulnerable Zones
2012

NVZ status
- territory is designated as NVZ
- Member States applying an action programme to the whole national territory in line with Art. 3(5) of the Nitrates Directive
- non-EU countries

Co-funded by the European Union (FP7) project Nitrates Europe Data
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Nitrates Directive – Nitrates Action Programme

- Whole territory approach
  - GAP for the protection of water regulations
    - Managing the farmyard
    - Managing fertilisers and nutrients
    - Keeping records
  - 100% admin. check on livestock manure N limit
- Legally binding limits set for N and P
- N and P fertilisation rates in the Regulations cannot be exceeded
- Inter Departmental and agency co-operation
Types of Inspections

- 1350 – 1% of Basic Payment Scheme
- 325 – 5% of Nit. Derogation (6500)
- 1650 – by DAFM on behalf of LA’s
- 2000 – Local Authorities - new
- 1500 – Local Authorities – revisited
170 kg N limit - Overview

- 67,539 farms less than 85kg N/ha/yr - 2,280,648 ha
- 48,539 farms at 85kg N/ha/yr or greater - 1,955,952 ha land
- 6,300 farms over 170kg N/ha/yr
- Year 2014
  - 3.82% of the total number of holdings
  - 16.68% of the total number of grazing livestock units
  - 6.61% of the total net area of the country
Ireland's Derogation

- Derogation up to 250 kg N/ha/yr (“grazing livestock”)
- Applicable to holdings with at least 80% grass
- Annual application
- Comply with additional requirements
  - Fertilisation Plan
  - Fertilisation Accounts
  - Soil Testing (N and P)
  - Additional land management requirements
  - Additional monitoring and controls required
Prohibited application periods for fertilisers & storage capacity requirements

<table>
<thead>
<tr>
<th>Fertiliser type</th>
<th>Start date</th>
<th>Zone A</th>
<th>Zone B</th>
<th>Zone C</th>
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<tbody>
<tr>
<td>Chemical</td>
<td>15 Sept to</td>
<td>12 Jan</td>
<td>15 Jan</td>
<td>31 Jan</td>
</tr>
<tr>
<td>Organic</td>
<td>15 Oct to</td>
<td>12 Jan</td>
<td>15 Jan</td>
<td>31 Jan</td>
</tr>
<tr>
<td>Farmyard Manure</td>
<td>1 Nov to</td>
<td>12 Jan</td>
<td>15 Jan</td>
<td>31 Jan</td>
</tr>
<tr>
<td>Storage Capacity</td>
<td>weeks</td>
<td>16</td>
<td>18</td>
<td>20/22</td>
</tr>
</tbody>
</table>
Annual Grass Growth

(kg DM/ha/day)

Best Response to N
High Response to N
Poor Response to N
Ploughing

- Where arable land is ploughed between 1\textsuperscript{st} July – 1\textsuperscript{st} Dec a green cover must have emerged within 6 weeks of ploughing from a sown crop

- Where grassland is ploughed between 1\textsuperscript{st} July - 15\textsuperscript{th} Oct, a green cover must have emerged by 1\textsuperscript{st} Nov from a sown crop

- Grassland must not be ploughed between 16\textsuperscript{th} Oct - 30\textsuperscript{th} Nov
The percentage allocation of ammonia emissions between various agricultural activities for several EU countries.

- Irish agriculture is dominated by pastoral bovine livestock production, with approximately 90% of the utilisable agricultural area in Ireland comprised of permanent grassland. This dictates the farming system and also defines to a large extent the ammonia abatement practices available.

- Typically livestock in Ireland are fed a grass based diet (grazed grass and grass silage) and spend about 60% of their time on pasture. As a result N excreted on pasture accounts for 61% of total N excretion, compared to 8% for Denmark, 10.6% for Germany and 13.6% for the Netherlands.
Predicted ammonia emissions under FW 2025 scenarios, with and without ammonia abatement measures (WAM)
Supports

- Farm Waste Management Scheme (€2.1 billion invested), ongoing investment
- Farm Advisory System (FAS)
- Cross compliance and Local Authority inspections
- Agri-Environmental Schemes
  - REPS 4, AEOS 1, 2 & 3 & GLAS
  - Locally led agri environmental schemes
- FW2025 (building on Smart Green growth of FH2020)
  - FW Sustainability committee
- DAFM Water forum
Rural Development Programme
2014-2020

- Targeted Agricultural Modernisation Scheme II (TAMS II) to include:
  - Low-emissions slurry spreading (LESS) - Grant-aid support for the investment in mobile slurry tanks and umbilical systems with attached low emission spreading equipment such a trailing shoe, trailing hose.
  - To improve the recycling of organic fertiliser and to contribute to reduced emissions including NH3.
  - Agri-environmental option available under the Green, Low Carbon Agri-environmental Scheme (GLAS)

- Knowledge Transfer Programme
  - topics include reducing Nitrogen & NH3 loss
Breakdown of Nitrate Breaches

- Inadequate collection of Livestock Manure: 43%
- Inadequate management of storage facilities: 18%
- Structural defects in storage facilities: 16%
- Failure to minimise the creation of soiled water: 14%
- Landspreading of FYM during the prohibited period: 5%
- Other: 4%
170 and derogation issues

- 80% grass requirement
- Exporting slurry long distances
- Implications for the importer
- Significant penalties/year >170kg
Research
Agricultural Catchments Programme (ACP)

- Established under Nitrates Regulations (Art. 27) to evaluate effectiveness of Nitrates Regulations
- 6 agricultural catchments
- >300 participating farmers – full advisory service
- Funded significantly by DAFM
- Phase 1 (2008–2011); Phase 2 (2012-2015); Phase 3 (2016-2019)

Website link
- [http://www.teagasc.ie/agcatchments/](http://www.teagasc.ie/agcatchments/)
Online NMP and mapping

Legend

P_Index
1 (0-3mg/L)
2 (3.1-5mg/L)
3 (5.1-8mg/L)
4 (>8mg/L)
ACN – Research Highlights

- Nutrient use efficiency increasing
- Farm gate nutrient balances declining
- Decreasing % of excessively high P soils
- Reduced nutrient losses from agricultural land to water
- Water quality trends showing signs of recovery (lag times)
- Closed spreading period is effective in reducing nutrient losses
- Significant climate effect on losses
- Contact with an agricultural advisor OR advisor plus farmer discussion group has a positive effect on NMP adoption
- Potential for further efficiencies through improved policy integration and knowledge transfer

Underpins sustainability claims
Current ammonia abatement research

- Measurement and abatement of ammonia emissions from agriculture (2013)

- Sustainable nitrogen fertiliser use and disaggregated emissions of nitrogen (2011)
SHARP

- **Sustainable Healthy Agri Research Plan**
  - Collective effort among stakeholders, and research funders and bases to identify and develop research and innovation for sustainable food production

- **Sustainable Management of Natural Resources**
  - **High level objective**
    - Develop and support actions that contribute to sustainability such as meeting air quality targets under the NEC/ GP
  - **Priority research**
    - Integrated actions to reduce ammonia loss and improve N efficiency
EU Water Quality

The graph illustrates the percentage of sampling points across different countries in the EU where water quality measurements fall into specific nitrate concentration ranges:

- Green bars represent ≤ 25 mg nitrate per L.
- Yellow bars represent 25-40 mg nitrate per L.
- Orange bars represent 40-50 mg nitrate per L.
- Red bars represent ≥ 50 mg nitrate per L.

Each country is represented by a vertical bar, with the percentage of sampling points falling into each nitrate range indicated by the color segments.

The bars for each country are ordered from left to right, with the EU as a whole on the far right.
River Water Quality trends 1987-2011

- 13,188 km of river and stream channel assessed by EPA in 2007-2011 using a biological assessment method based on macro-invertebrates (‘Q-value’ quality rating system)
- Provides an overall representative picture of the state of Ireland’s larger rivers and streams
- 71 per cent of channel length classed as unpolluted
- Generally stable trend in the length of unpolluted channel
Average nitrate concentrations in groundwater

2012

- Average NO₃ concentration at all EPA groundwater monitoring stations < MAC for Drinking Water of 50 mg l⁻¹ NO₃
- Threshold value of 37.5 mg/l NO₃ used to assess groundwater chemical status
- < 37.5 at 98% of monitoring locations
- <25 mg/l NO₃ at 89% of monitoring locations
- Gradual reduction in the percentage of monitoring stations with average concentrations >25 mg/l NO₃
Trend towards reduced river nitrate levels

% of sites with average Nitrate <10 mg/l NO₃

% of sites

% of river monitoring locations with average P concentrations <0.05 mg l⁻¹ P (EPA, 2013)
Summary

- Significant improvements in NO3 concentration
- Many rivers stable and very low P conc.
- Progress made in reducing agricultural impacts on water quality
- Lag times
- Nutrient use efficiency increasing
Summary

- Grass based production systems
  - grass growth virtually all year round
- Whole territory Action Programme (N and P)
- Co-operation between agencies and Departments
- Water quality good and improving
- Further progress with ammonia strategies
- Review monitoring network for ammonia
Thank you