

Agriculture and Atmospheric Nitrogen

Liam Kinsella



Department of
**Agriculture,
Fisheries and Food**
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Topics

Ammonia

- Sources in agriculture
- Impacts
- Emissions and trends
- Mitigation
- Future issues

- Nitrous Oxide

- Sources
- Emissions and Trends
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- Research



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Ammonia: Sources and Impacts

- Sources in Agriculture
 - Fertilisers
 - Animal Housing
 - Manure storage
 - Manure Deposited at Pasture
 - Land Spreading of manures
- Impacts
 - Transboundary Gas
 - Main direct impacts occur in Ireland
 - Eutrophication of ecosystems – main impact
 - Acidification
 - Particulate matter formation
 - Source of Nitrous Oxide?



Breakdown By Category (source EPA 2005 Draft Inventory)

Livestock Category	Emissions	% of total
Cattle	89.07	80.9
Pigs	6.82	6.26
Sheep	4.66	4.24
Poultry	2.55	2.32
Conserved grass & Maize	6.48	5.96
Tillage	0.55	0.5
Total	110	100

Breakdown By Activity (source EPA 2005 Draft Inventory)

	Emissions Kt	%
Grazing	9.9	9.0
Housing	34.6	31.5
Storage	6.2	5.7
Landspreading	49.3	44.8
Yard	3.0	2.7
Fertiliser	7.06	6.4
	110	100

Emissions and Trends

	2000	2010	2020
Emissions/ projection Kt	119	102*	105*
Target Kt		116	87**??

* Source EPA

** Modelled using CL based on 2005 data submission

Mitigation

- Landspreading – cheapest approach
 - End of Chain
 - Largest single source
 - Move to earlier spreading
 - Trailing shoe or Trailing hose
 - ~33% spread in spring: 50% possible
 - Would give emissions reduction of ~30% from landspreading
- Housing – expensive options
 - Minimise space per animal – consistent with animal welfare
 - Air scrubbers for pig and poultry housing
 - Retrofitting difficult and expensive due to age of housing stock
 - Housing modifications- Air-flow control?
 - Outwintering pads with drainage of liquid?
 - Plant trees near buildings?



Mitigation cont'd

- Storage
 - Cover stores
 - In practice most slurry stored under animals
 - Allow crust to develop
- Grazing
 - No measures available yet
- Animal dietary changes
 - Reduce protein intake
 - Feed additives
 - In practice only applicable to pigs and poultry
- Fertiliser
 - Large emissions from urea (EF ~ 23% in grassland)
 - Ban on urea?? – other negative implications
 - Advice to farmers – e.g like blight warning
 - Require: Research and Decision Support tools



Mitigation contd

- Urease Inhibitors
 - Good results in NI and UK
 - Efficacy with manure?
 - Use in housing?
- Mitigation summary
 - Better management of inputs
 - Better use of slurry and manure
 - Reduce period for animal housing
 - More research required to improve options
- Impacts of changes in legislation
 - Nitrates
 - Animal welfare



Future Issues

- Inventory development
 - Research to provide Irish Specific EF
 - Farm facilities surveys to determine changes in:
 - Housing period/Slurry storage
 - Spreading date/Spreading management
- Projections
 - Need to include changes in management
- Gothenburg and NEC Review
 - New targets
 - Farm level measures
 - TFRN
 - Revision of Annex IX
- Ammonia Monitoring
 - Assessment of damage
 - Need to focus reductions on sensitive ecosystems
- Research

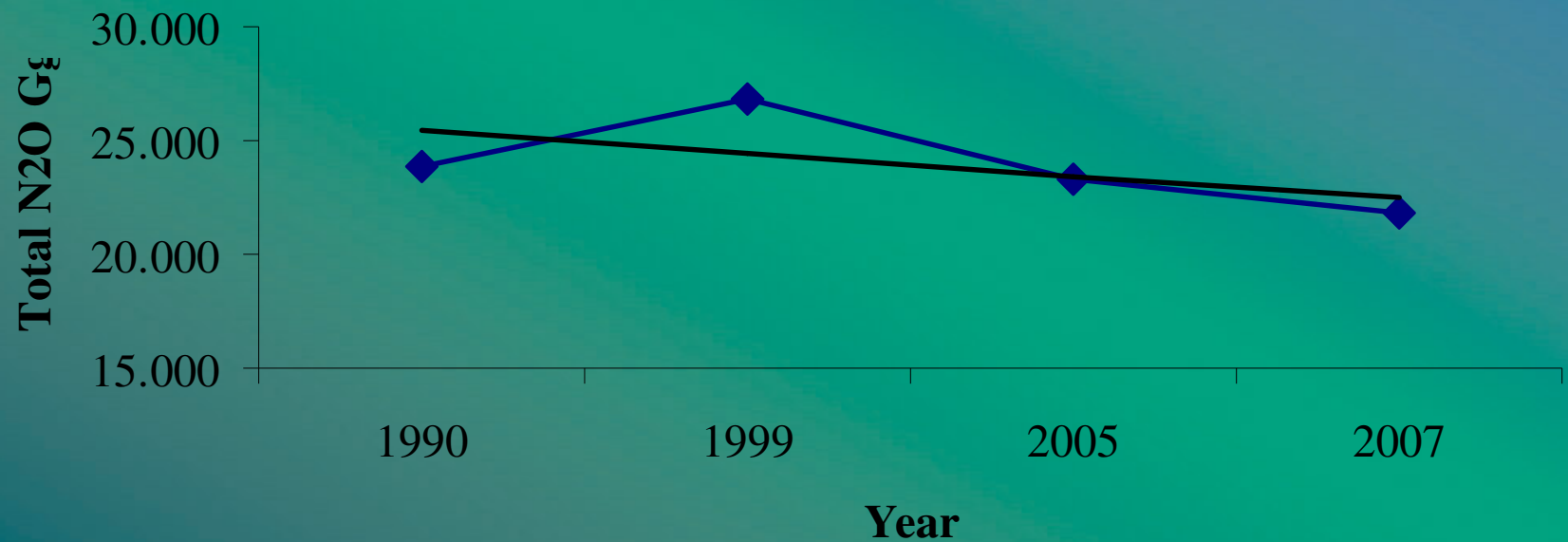


Nitrous Oxide - Greenhouse Gas

	N2O Tonnes	%
Slurry System	173.7	0.80
Solid System	1,063.6	4.89
Pasture System	8,646.0	39.72
Fertiliser	6,219.7	28.57
Soils	1,482.0	6.81
N-Fixing Crops	8.6	0.04
N2O-Crop Residue	201.2	0.92
N2O due to NH3 volatilisation	1,333.5	6.13
N2O from Leaching	2,640.4	12.13
Total	21,768.6	100.00

Trend – graph to be improved (source: from EPA)

N2O Trend



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Mitigation

- Reduce fertiliser input
 - Improve efficiency
 - Replace fertiliser with BFN
 - Improve use of N in Manure – land spread only
- Use Nitrification inhibitors
 - Good results in New Zealand
 - Variable results in Ireland
 - Reduced effectiveness with CAN (NH_4NO_3 +lime)
 - Current application system is expensive
 - Require new approaches to application
 - Or targeted use: high SR on high emitting soils
- Increase use of urea
 - Combined with urease inhibitor
 - Tradeoff with Ammonia
- Reduced leaching



Future Issues

- GHG targets
- Market issue – GHG intensity of food production
- Inventory
 - Using Default EF
 - Require research to identify Country Specific EF
 - Important for targeting mitigation strategies
 - Updated Farm Facilities survey



DAFF Funded Research projects

07 536	Reducing Nitrogen excretion, Ammonia and Nitrous oxide Emissions from dairy, beef and pig farms: Evaluating a whole farm approach
07 519	Maximising the efficiency of slurry-N and urea-N utilisation by grassland using nitrification and urease inhibitors as a strategy for environmental protection
07 545	Biodegradable Hydrogel Materials for delivery of Nitrification and Urease Inhibitors
05 208	Efficient & reliable utilisation of nutrients in animal manures
05 211	An evaluation of strategies to control ammonia emissions from the land spreading of cattle slurry & cattle wintering facilities
07 528	Greenhouse gas mitigation options for tillage farmers
07 516	Quantification of the potential of white clover to lower GHG emissions from Irish grassland-based production
06 383	Subsoil and groundwater denitrification
06 372	Nitrous oxide from Irish agricultural grasslands: emissions and future trends

Thanks



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