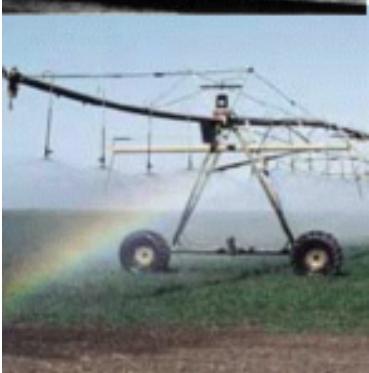


Atmospheric Ammonia: detecting emission changes and environmental impacts

Samantha Baker

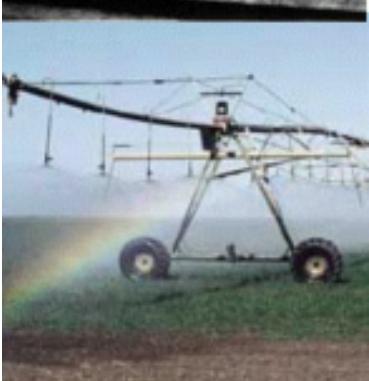
Air and Environment Quality Division,
Defra





Background

- Acidification
- Eutrophication
- Secondary particulate matter
- Transboundary and local impacts



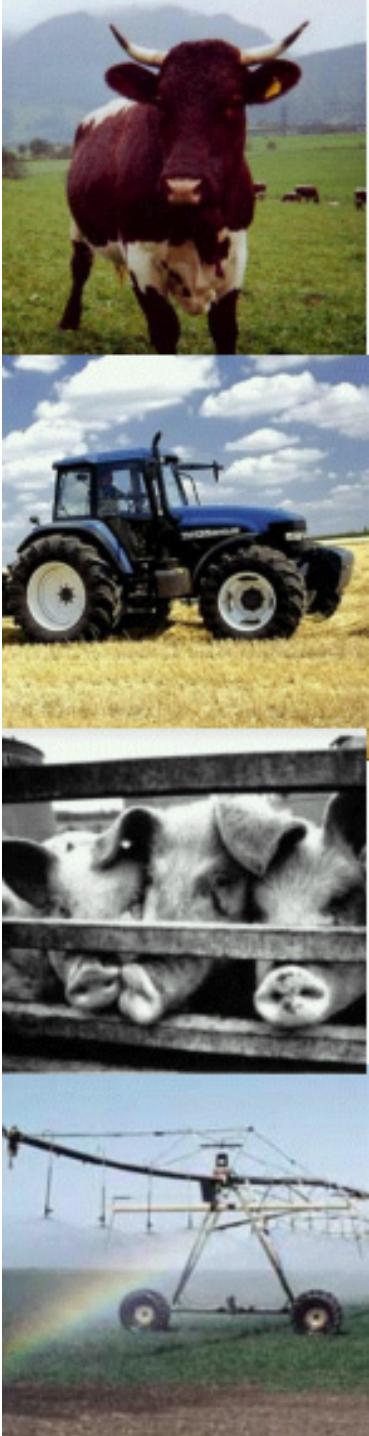
Challenges

- Diffuse source
- Difficult to quantify
- Difficult to control
- Biogeochemical cycle is complex

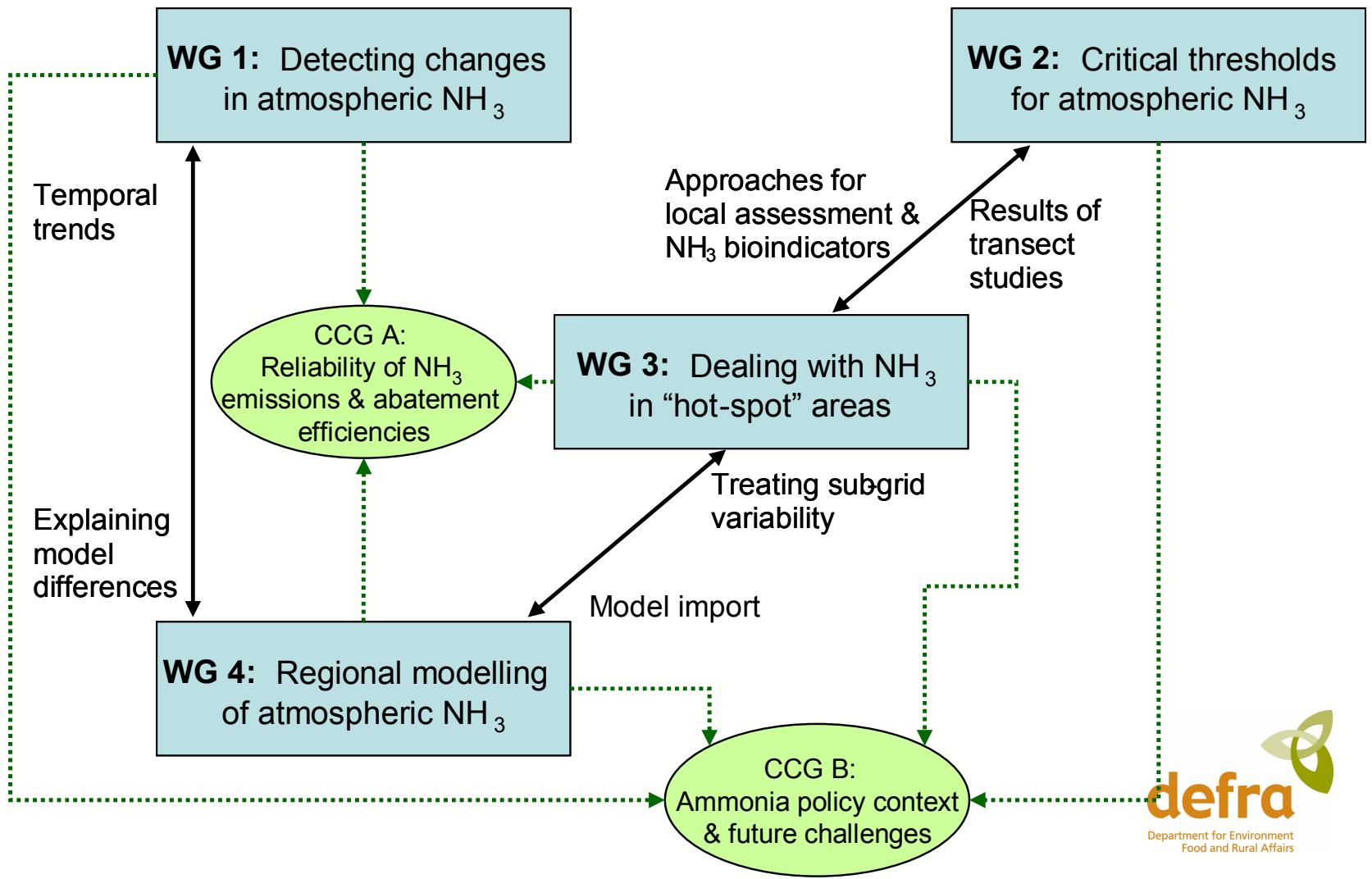


Current policy climate

- UN/ECE Gothenburg Protocol
- National Emissions Ceiling Directive
- Air Quality Framework Directive and Daughter Directives
- Integrated Pollution Prevention and Control Directive
- Other indirect legislation



Scope of workshop





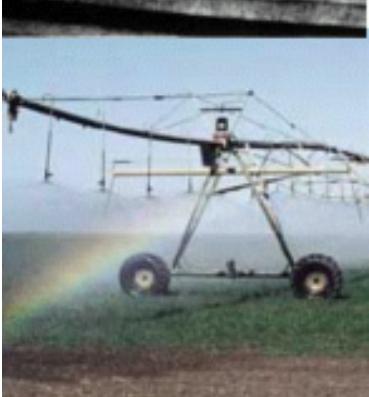
WG1

- Do existing critical thresholds for ammonia reflect current scientific understanding and, if not, what are suitable values according to current knowledge?



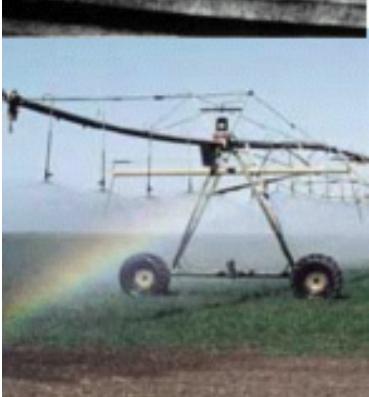
Conclusions

- There is a need to not rely solely on critical loads
- New critical levels have been defined based on scientific evidence
- Two critical levels have been defined based on different vegetation types
- Critical level is based on a long term average
- This will result in practical application which will be simpler to apply and more cost effective to regulate on a local level and NH₃ specific measures



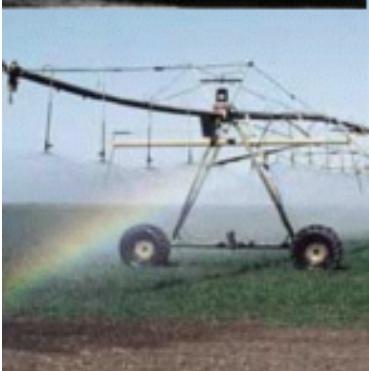
WG2

- To what extent can independent atmospheric measurements verify where regional changes in ammonia emissions have and have not occurred?



Conclusions

- Many conclusions from Bern workshop remain valid
- New knowledge has led to better understanding of emission / transport / deposition including ammonia gap
- Emission reduction policies shown to have been effective from atmospheric monitoring data
- Recognition of need for long term, international monitoring strategy
- Recognition of need for model intercomparison



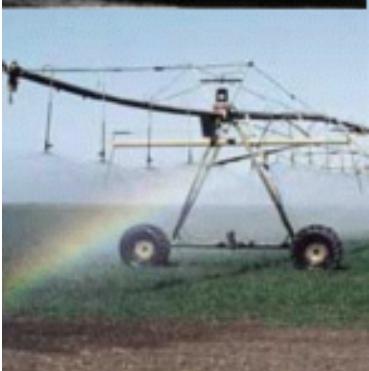
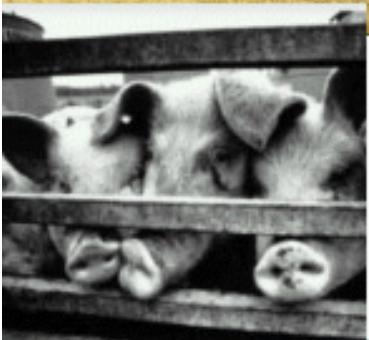
WG3

- How can transboundary air pollution assessment be downscaled to deal with ammonia hotspots in relation to operational modelling and monitoring?



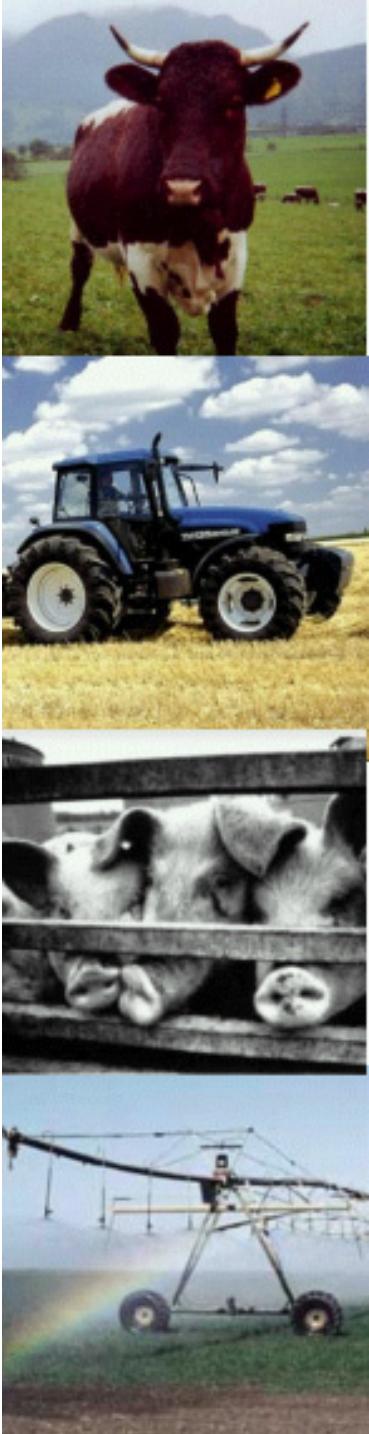
Conclusions

- Discussed issues of how deposition near hotspots is linked to transboundary air pollution
- Identified how landscape modelling could provide protection against hotspots and when linked with large scale models provide improved understanding
- Need to share country experiences
- Identified recommendations to improve modelling
 - better estimation of temporal and spatial emissions, focus on compensation point and surface resistance, reference cases to assess different models, improved background data
- Discussed monitoring assessment strategies



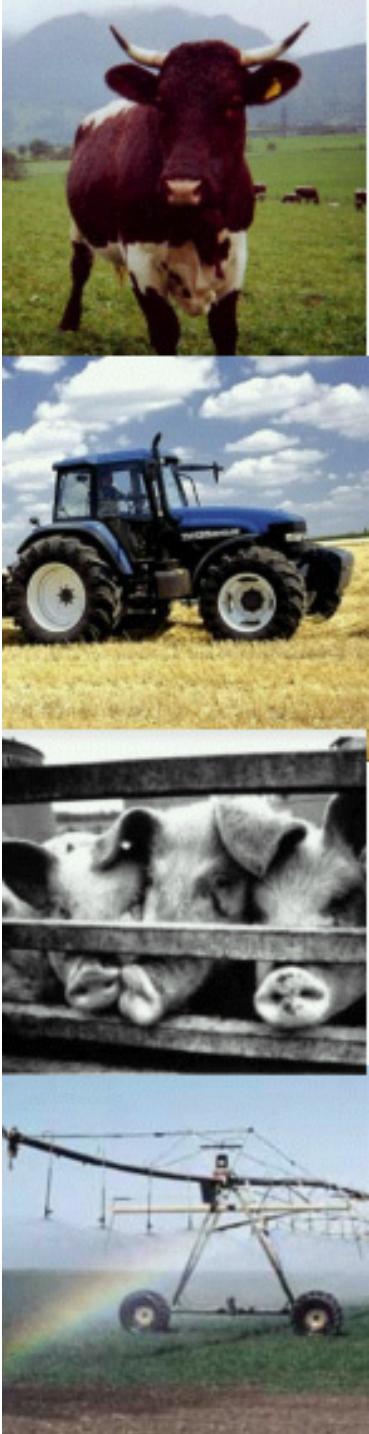
WG4

- What are the differences between mesoscale (regional) atmospheric transport and chemistry models in relation to their formulation and results for ammonia?



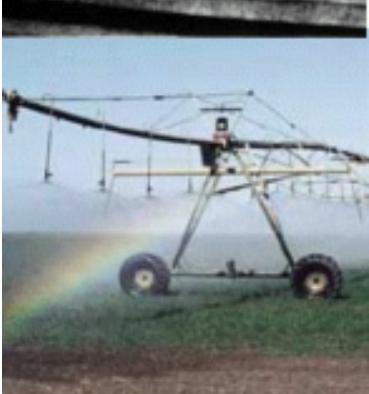
Conclusions

- Reviewed the parameterizations used in the models, highlighting specific areas of uncertainty – e.g. need to test bidirectional flux
- Discussed differences between the models and noted that nested approach was particularly effective for assessing local and long range impacts
- Recognised the need for model intercomparison especially with EMEP and highlighted need for improved monitoring to verify models



CCGA

- What are the reliability of ammonia emissions data and abatement efficiencies?



Conclusions

- Uncertainty is variable within emission inventories and there is a need for countries to focus on uncertainty analysis
- Activity data is the biggest uncertainty and there is a need to collaborate on an international scale to address this
- Work to improve emission factors is needed especially in E and S Europe
- Key mitigation methods are known and agreed
- Debate on benefits of soft approaches
- Continued need to focus on cost effectiveness and applicability of emerging technologies



CCGB

- What is the agricultural and environmental policy context and how can scientific understanding help address the future challenges to reduce the negative effects of ammonia?



Conclusions

- Need to consider direct and indirect legislation and links to other policy relevant areas
- Need to link legislation to eliminate loopholes
- Assess consequences of revised critical levels
- Highlighted reliability of cause / effect policy chain especially pollution swapping
- Explored strategy approaches
- Need linkage of scales including decisions on priorities
- Need to improve temporal and spatial concentration resolution of models
- Need to analyse reduction policies in multi effect, multi media and multi scale way



Were the objectives achieved?

- Focused on four specific issues of high priority for the Convention
 - ✓ to recommend up-to-date values for NH₃ critical levels
 - ✓ to assess whether observed trends in atmospheric NH₃ and NH₄⁺ match the expectations of emission mitigation policies
 - ✓ to identify best-practice for quantifying ammonia impacts in hot-spots
 - ✓ to review the status of different transboundary models of atmospheric NH_x
- Realised through bringing together international expertise on ammonia across themes of the Convention
- Will provide “Ammonia Science” underpinning for the UNECE Convention on LRTAP - feed into future policy climate



Thank you for your attention

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