

TFRN October 2010

Sub-group on costs of spreading

# General considerations

There is background material, but costs may have changed, as well as techniques

→ values have to be reconsidered

How to do this?

How the national expertise can interact with GAINS modelling (IIASA)?

Moreover, GAINS approach must be clarified for experts; develop understanding between the two modellers communities.

# Tentative agenda

- Measures to be covered: slurries / solid manure / mineral fert.
2. What factors to include in costs/benefits and what is basic data to gather/compare?
  3. Comparisons with GAINS; can we explain the differences?
  4. Can we set a framework for further data collection/comparisons?
  5. Applicability considerations
  6. Side-effects: synergies/conflicts with GHG emissions

# Measures to be covered

Slurries (pigs, dairy, other cattle....):

- slot inject (grass, arable)
- deep inject (arable)
- trailing shoe (grass, arable)
- trailing hose (grass, arable)
- incorporation (arable) ? <4 h, 24h???

Solid manures (poultry, pigs, dairy, other cattle..)  
incorporation

Few discussion on mineral fertilizers

→ **How to classify information in terms of “efficiency” at national level?** (*GAINS lumps measures in low/high efficiency “groups”*)

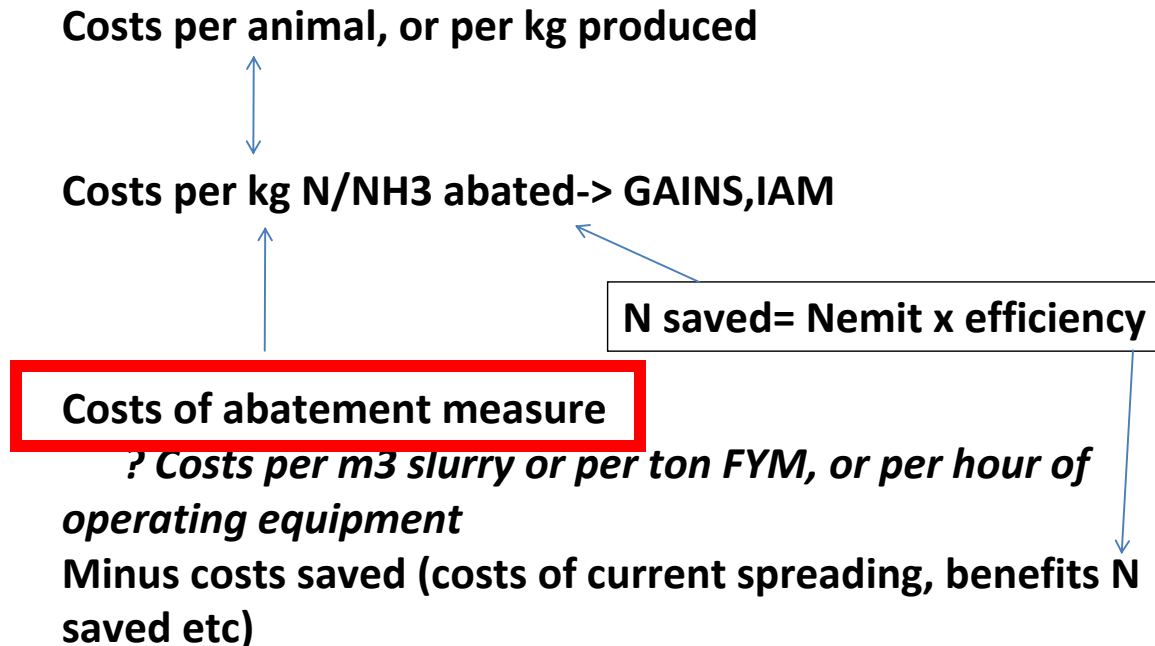
# What do we need to estimate/compare ?

How national expert could collaborate for comparing measures and comparing with IIASA estimates?

Costs: different people have different interests

→ different references, different units

→ need to bring these things together



# Costs of abatement measures

- discussion on the factors in costing specific techniques

- build a reference spreadsheet with default values and circulate it to the national experts → advice, adaptation

- range of variation between countries
- sensitivity *e.g.* to applied volumes, farm/contractor costs, uncertainty analysis

- need consistency when estimating cost for present and new techniques for calculation of additional costs

- explanation of the simplified approach in GAINS where curves has been matched to available data.

- the spreadsheet could be used to generate new data for reviewing and improving costs

# Additional benefits

Costs avoided from conventional spreading (if not taken into account to give cost difference already)

N saved → fertiliser costs avoided: illustration of potential cost savings to be added to the spreadsheet; fraction of N saved can be complex (conversion organic/mineral)

If cost of abatement techniques come down → the savings could lead to negative overall costs

(Odour, Silage taint)

Uniformity of application and consistency

(Side effects GHGs

Side effects NO<sub>3</sub> leaching ? Upper estimates on these?)

## Other considerations

- Costs to farmer or country (*e.g.* fuel tax)
- Contractor *vs* farm application; could depend on the farmer's time availability
- Equity issues
- Techniques should be improving and get cheaper
- Farm size: how it can be reflected in GAINS? (spreadsheet can help) now and in the future?
- Applicability data used by GAINS are very different according to countries
- National experts are interested to review applicability and efficiency data, because important for NECs



# Other techniques and side-effects

- timing of application
- mineral fertilizer : alternative application techniques
- urease inhibitor / nitrification inhibitor
- integration with GHG
- TFRN needs to follow developments of alternative techniques and related costs

## What is to be done? *(are there resources?)*

- Prepare the spreadsheet for national cost calculation of individual techniques
- Bring together data from different countries (by Christmas??) and others (*e.g.* COPA), to compare and feed in to IIASA development **[URGENT]**
- IIASA bring more information on the methodology and assumption + data use on the different countries (*e.g.* different abatement efficiencies).
- Follow new techniques development



**3. Comparisons with GAINS etc ; can we explain?**  
*(? UK costs lower than other countries)*

? amount used/ amount spread

NB additional costs

? Further clarification of cost calculations in GAINS ( e.g.table A9 in IIASA report) for deeper analysis

What needs to be done

### **3. Comparisons with GAINS etc ; can we explain?**

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## **Unit costs of operation**

**Tractor costs: capital-> annual interest (4%?) & depreciation  
+ annual maintenance costs (fixed +dependent on total  
hours used)**

*above x hours used for spreading/total hours used*

**+ labour costs/hr X hrs operated (including transport times  
and allowing for slower operation when spreading)**

**+ fuel costs (? include tax and NB CO2 emissions)**

**Equipment costs: capital-> annualised costs**

**+ maintenance costs allowing for hours used**

**? What else as well as total hours and hours used**

**e.g. field size, difficulty of terrain, transport distance/time to  
another farm etc; problems of small farms**

**4. Can we set a framework for further data collection/ comparisons; e.g. a spread-sheet for cost calculations with key data**

**What is the same for all countries and what differs**

**(GAINS labour rates, fertiliser costs etc...)**

## Example

**Cost per ton FYM = cost per hour / (ha per hour x ton per ha)**

**From Martin Ryan (2002)**

<b>poultry layers</b>	<b>15.5 t/ha</b>	<b>at 16 kgN/t</b>
<b>broilers</b>	<b>8.3 t/ha</b>	<b>at 30 kg N/t</b>
<b>pig manure</b>	<b>36 t/ha</b>	<b>at 7 kg N/t</b>
<b>cattle manure</b>	<b>41.5 t/ha</b>	<b>at 6 kg N/t</b>

**Similarly re slurry for cost/m<sup>3</sup> and cost per hr**

<b>cattle slurry</b>	<b>83 m<sup>3</sup>/ha</b>	<b>at 3 kg N/m<sup>3</sup></b>
<b>pig slurry</b>	<b>50 m<sup>3</sup>/ha</b>	<b>at 5 kg N/m<sup>3</sup></b>

**But NB spreading time is only part of total time**

**? Which is more fundamental to compare cost/hr or cost/ton and cost/m<sup>3</sup>**



## **5. Applicability considerations- farm size etc**

**NB costs for farmer higher than contractor costs  
(? *Suggestion regulate on equipment instead of farm size*)**

**Equity issues re applicability e.g. stony ground etc**

**Profit margins**

**Enforcement problems and costs?**

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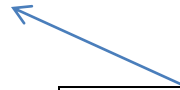
Costs per animal, or per kg produced



Costs per kg N/NH3 abated-> GAINS,IAM



$$\text{N saved} = \text{Nemit} \times \text{efficiency}$$



Costs of abatement measure

*? Costs per m3 slurry or per ton FYM, or per hour of operating equipment*

Minus costs saved (costs of current spreading, benefits N saved etc)



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