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Towards update of NH_3 mitigation costs

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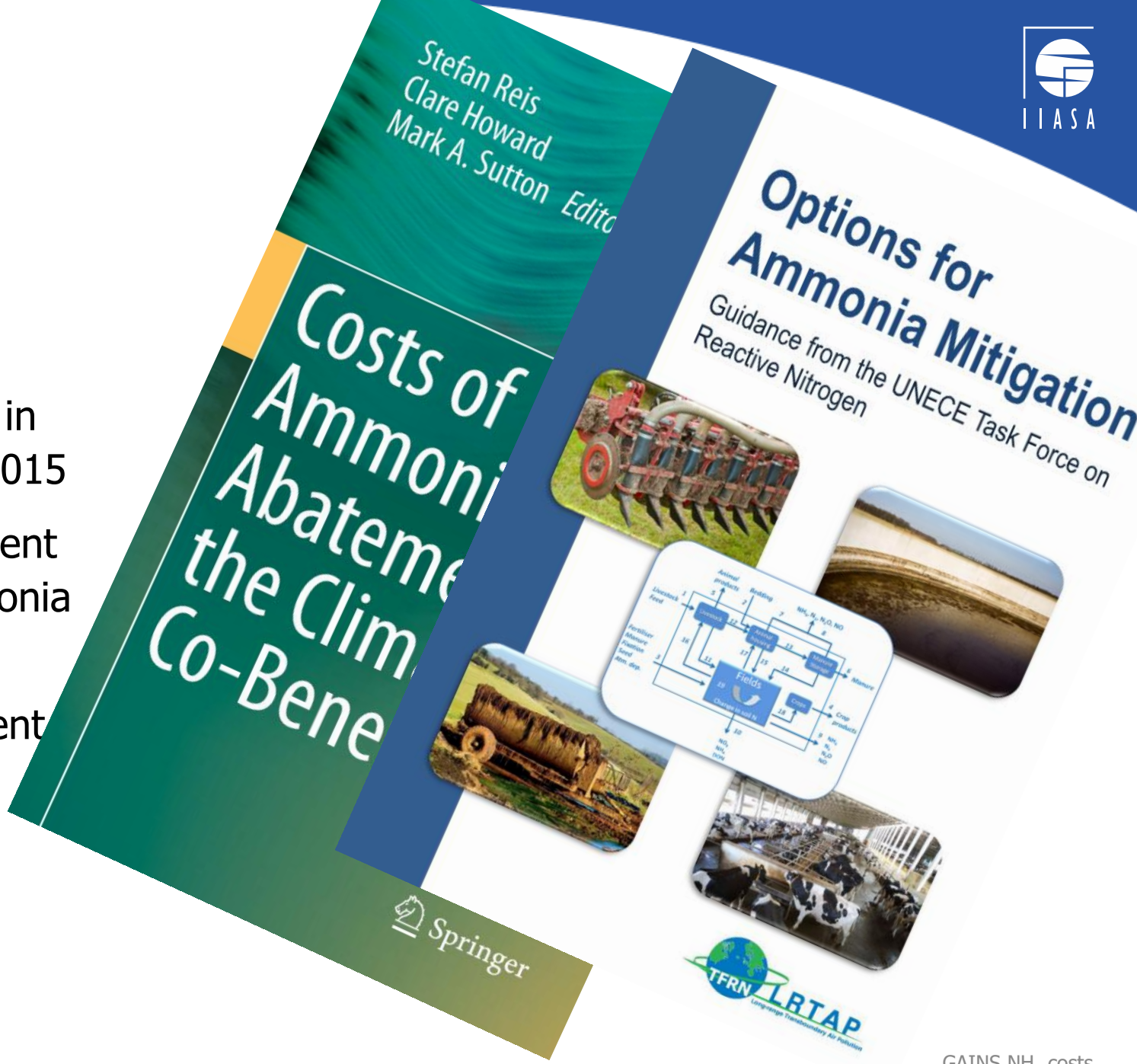
Overview

- Current implementation of costs
- TFRN activities
- Immediate improvements in GAINS
- Longer-term vision

Current work status

- Cost implementation in GAINS follows TFRN guidance
- Workshop in Paris 2010, implemented in GAINS around 2011, book published 2015
- (Largely) consistent with TFRN document Bittman et al., 2014, Options for Ammonia Mitigation
- Update of Ammonia Guidance Document (AGD) is in progress
- AGD will not contain updated cost information



TFRN/CIAM response to the needs of GP revision

- Taking stock of available cost information
  - Sparse information during work on new AGD
  - National reports (FR, IE, DK, DE)
  - Research reports and publications (such as MELS/Eranet, see Rychła et al., doi 10.1016/j.jenvman.2023.118678
  - Private consultancy and publications
- Data compilation for HoD meeting, Elsinore, and back-to-back TFRN meeting
- Quick updates in GAINS (on valuing mineral fertilizer savings)
- Update and revision of TFRN note to WGSR-64
  (Mark Sutton et al., Ammonia mitigation for economic and environmental benefits)
- Further GAINS updates planned

Cost elements

All costs presented per „activity unit“
(statistical entities: energy consumption; animal number; fertilizer consumption)

Control costs from the perspective of a social planner (without tax, subsidies)

Annualized costs

- Amortization of investments (investment, lifetime, interest)
- Operating costs (country specific)
  - Labour costs
  - Energy (electricity, gas prices)
  - Other
  - Revenues

Farm sizes (categories following Eurostat, no. of LU)

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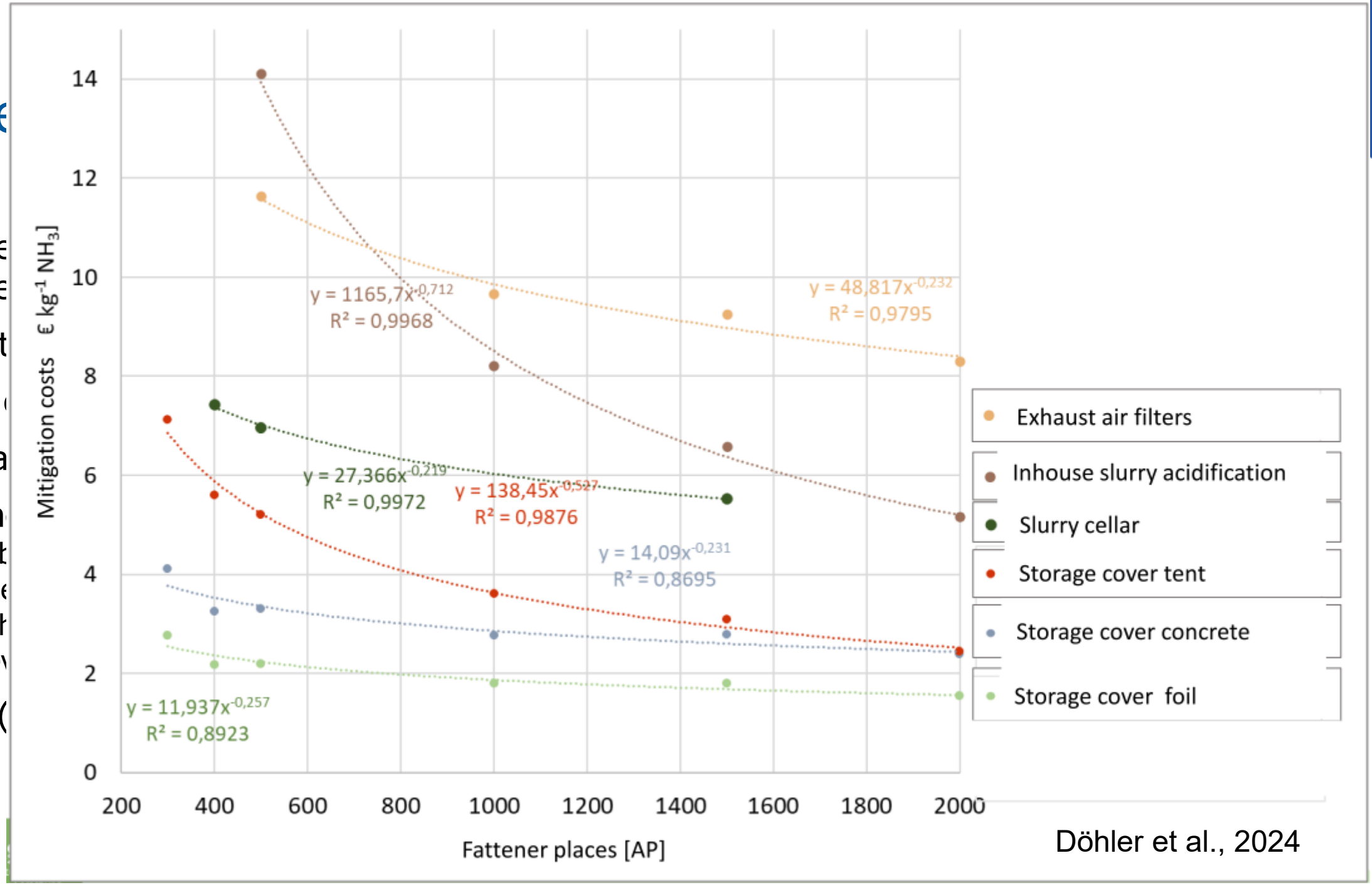
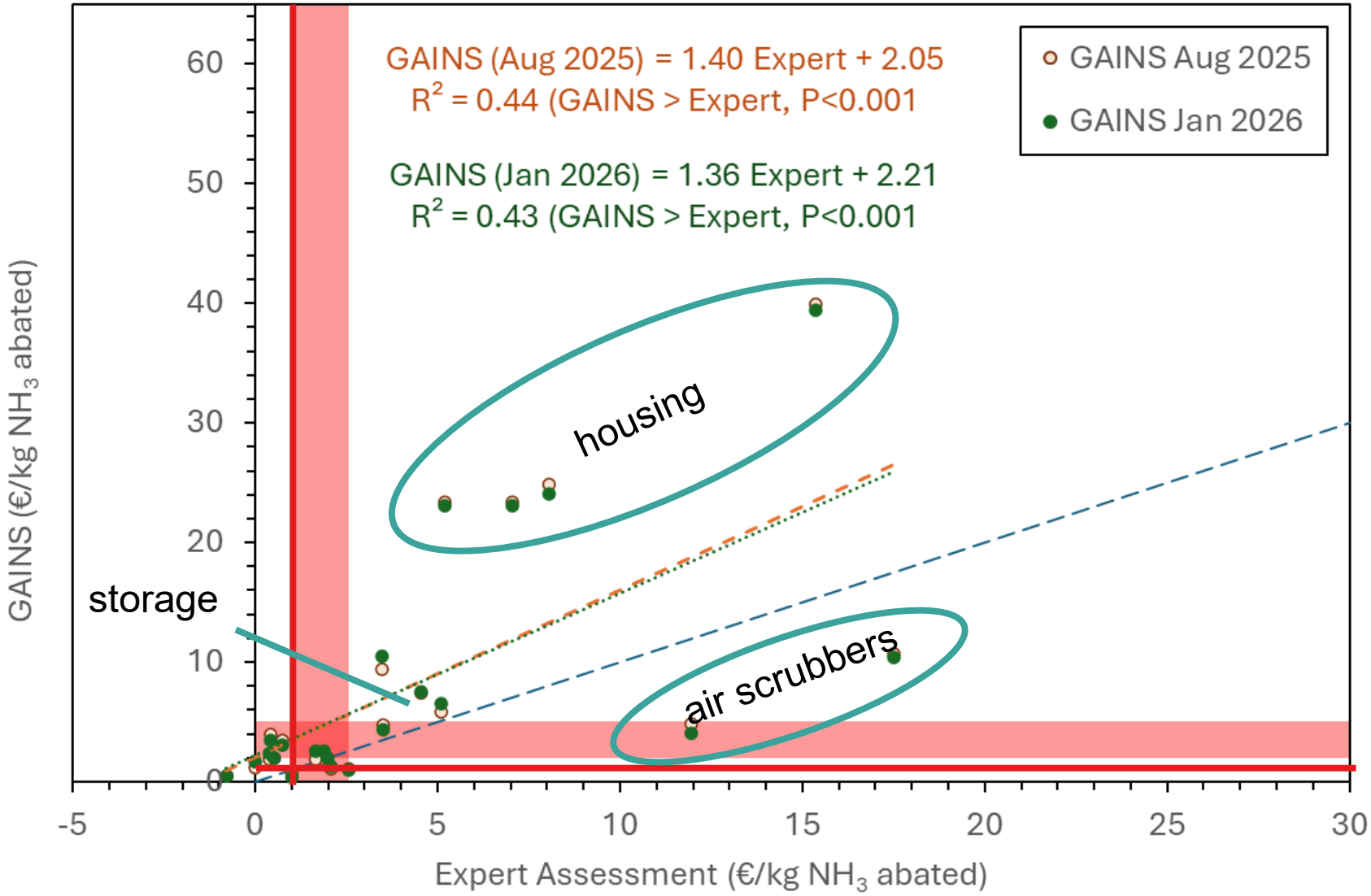
Farm sizes (

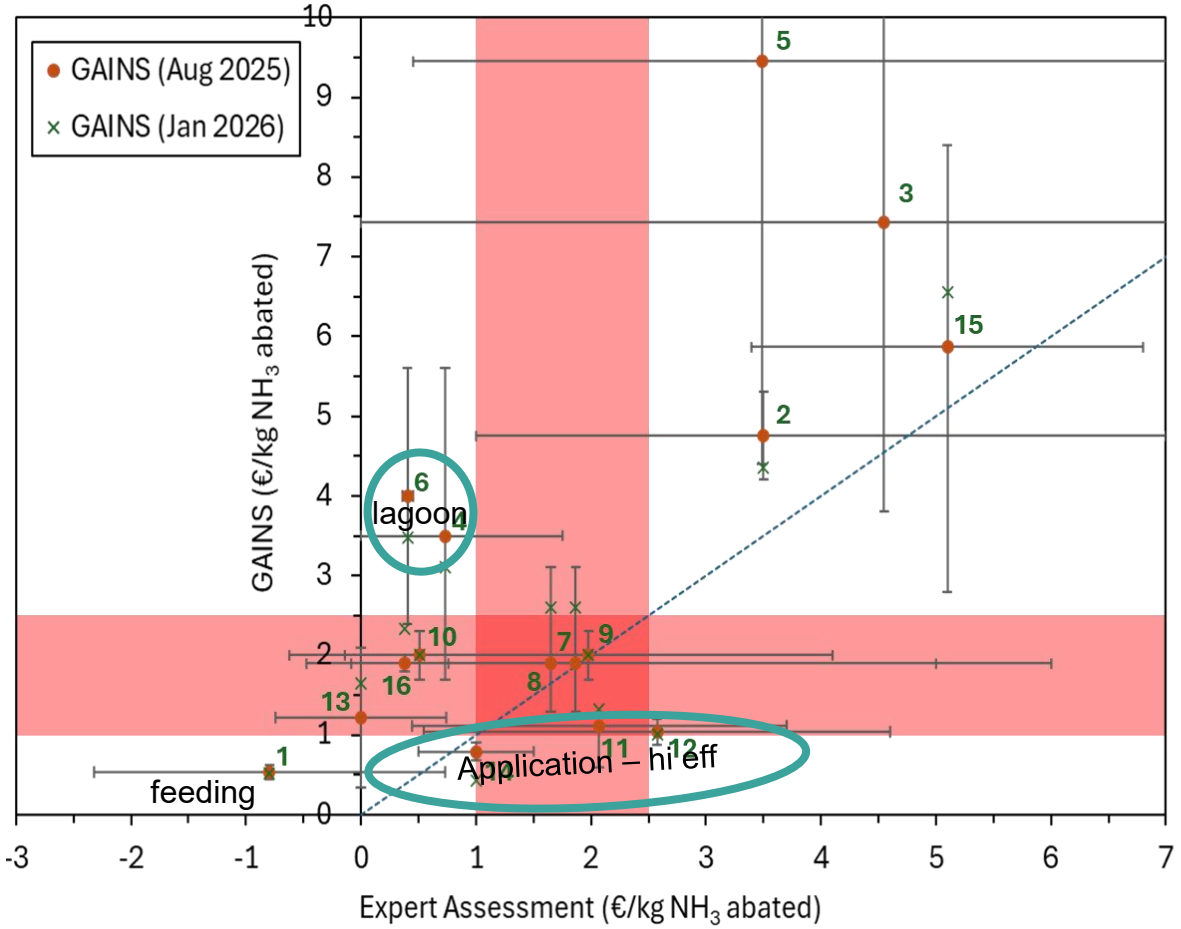


Döhler et al., 2024

Cost data comparison: GAINS vs. expert estimates



Cost data comparison: “low hanging fruits”



Measures

1. Livestock feeding (pigs)
2. Laying hens (manure belts)
3. Cattle manure storage (concr. store)
4. Cattle manure storage (lagoon)
5. Pig manure storage (concr. store)
6. Pig manure storage (lagoon)
7. Cattle manure applic (trailing hose)
8. Cattle manure applic (trailing shoe)
9. Pig manure applic (trailing hose)
10. Pig manure applic (trailing shoe)
11. Cattle manure applic (open slot injection)
12. Pig manure applic (open slot injection)
13. Manure applic (immediate ploughing)
14. Manure applic (incorp in 4 hours)
15. Manure applic (incorp in 24 hours)
16. Mineral fertilizer (urease inhibitor)

GAINS developments

Based on offline estimations, before implementation

- Full accounting of mineral N saving due to NH3 abatement (instead of half, as previously)
  Cost saving for optimized scenario D3/d/D/v6b over Europe 3% (can be >10% for some countries)
- Revised farm sizes, to account for growing farms in most countries since ~2010 (using 2030 projection)
  Cost saving between 5% (DE, pigs) and 50% (PL, cattle) for storage options
- New measures
  Manure acidification is a new category 1 ("recommended") option in the AGD. GAINS will be able to include in the next update (cost data is available), but no estimate can be given

Conclusions

- Though new Ammonia Guidance Document is available as a draft, no cost data are presented
- Updated representation of mineral fertilizer savings and increase in average farm size in GAINS, results in only limited reductions of costs)
- Available expert estimates indicate that GAINS costs for manure storage and housing measures are likely overestimated (air purification possibly underestimated) but quantification of impact on total costs is not yet possible
- Detailed evaluation of underlying assumptions and parameters in expert estimates is needed
- "Low hanging fruits" measures are (mostly) taken in the 'Health only' optimized scenario. Additional costs to achieve the 'Biodiversity targets' will be only marginally affected - even if assuming higher costs of mineral fertilizers
- Expensive measures (housing, air purification) determine the cost difference between health and biodiversity optimization