N-deposition:
Impact from Agriculture

Nitrogen Deposition and the Nature Directives

Veerle Verguts
Gaseous losses from Agriculture

- Agriculture: production of crops, meat, milk, eggs, ...
- Input of nutrients (N, P, ...) required
- Not all nutrients are ‘recycled’ efficiently

➤ losses of nutrients in some part of the production cycle are inevitable
Gaseous losses from Agriculture

Emissions to

- Water
  - Nitrates
  - Phosphates
- Air
  - Ammonia ($\text{NH}_3$)
  - Nitrous oxide ($\text{N}_2\text{O}$)
  - Methane ($\text{CH}_4$)
  - Nitrogen gas ($\text{N}_2$)
  - odour-components ...
NH₃ emissions

- Emissions ceiling NH₃ - 2010
  - Belgium: 74 kton NH₃
  - Flanders: 45 kton NH₃

- NH₃ emission (Flanders) in 2010: 43.6 kton NH₃
- Agriculture is main source (93%)
Evolution of NH$_3$ emission - Flanders
NH₃ agriculture - 1990

NH₃ agriculture 1990

- housing: 33%
- mineral fertilizer: 3%
- grazing: 5%
- external storage: 0.1%
- manure application: 59%
Manure application

- 59% of total NH$_3$ emission in 1990
- Spreading of slurry (splash plate - no incorporation)
  - 70% of NH$_4^+$-N is lost within 36 hours as NH$_3$

- Since 1991 - Manure Decree - 1$^{st}$ Manure Action Plan
  - Closed period
  - Manure incorporation within 24 hours on arable land

- Since 2000 - 2$^{nd}$ Manure Action Plan
  - Arable land (bare)
    - Slurry incorporation within 4 hours or spreading during rain/irrigation
  - Grassland and cropped arable land
    - Injection
    - Trailing hoses
Manure application

- Since 2003
  - Application during rain/irrigation not allowed anymore (not efficient)

- Since 2007 - 3rd Manure Action Plan
  - Arable land
    - Incorporation within 2 hours + injection
  - Grassland (specific techniques - improved equipment)
    - Sod-injection, Coulter-slit, Trailing-hoses

- Of course also ... decreasing manure inputs over the years
NH₃ agriculture - 2010

- Housing: 57%
- Mineral fertilizer: 7%
- Manure processing: 1%
- External storage: 0.2%
- Manure application: 29%
- Grazing: 6%
Manure storage (0.2%)
- All external slurry storage has to be covered
- Solid manure: no covering obligation

Mineral fertilizer (7%)
- (slight) decrease of use

Grazing - cattle (6%)
- 8% of the N-excreted during grazing is emitted as NH₃
- Slight increasing tendency to house cattle
Manure processing (1%)

- Manure processing (33.7 mio kg N in 2010)
  - Since 2000 mandatory for some farmers
  - 2007: possibility to keep more animals if manure is processed
  - Strong increase in manure processing

- Effect on emission:
  - Reduction because of non-application of the processed manure
  - Emission because of the processing
  - Net emission reduction
Housing

- 33% of total NH$_3$ emission in 1990
- 57% of total NH$_3$ emission in 2010 (higher relative share)

Since 2004
- Low NH$_3$ housing becomes mandatory for all NEW stables
  - Pigs
  - Poultry

- Low emission housing = ± 50% NH$_3$ emission reduction compared to traditional housing
- SLOW process (investment cycle)
NH3 reduction -

- Decreasing number of animals since 1997
  → Since 2010 increasing number of pigs and poultry

- Decreasing of N inputs by changed pig and poultry feed
Conclusions

- the relative share of stable emissions augments

- the lowest hanging fruits have been picked:
  - more improved application??
  - Improving feed conversion?
  - More manure processing?

- Only higher hanging fruits
  - Reduced housing emissions?
  - Lower number of animals?