KNOWLEDGE ON THE STATUS OF NUTRIENT BOOKKEEPING IN THE BALTIC SEA COUNTRIES

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Legal Background

- **Countrywide ordinances**
  - A ban on spreading more phosphorus with animal manure than is removed with the crop at harvest. The limit is **22 kg** phosphorus per hectare.

- **Additional regional regulations**
  - A ban on spreading animal manure during November – February
  - At least half the arable land in southern Sweden must be covered with vegetation during winter to capture the nutrients in the soil.

Legal Background

- Storage facilities for animal manure must have a capacity of at least 6-10 months of storage depending on animal species and number of animals

- Manure spread in the field must be tilled under within four hours in southern Sweden in order to decrease ammonia losses.

- In the NVZ the development of fertilization plans is obligatory for nitrogen fertilization.
Parties involved

- **Authorities**
  - Swedish Board of Agriculture
  - Swedish Environmental Protection Agency
  - Swedish Agency for Marine and Water Management
  - County Administrative Boards
  - Municipalities

- **Professional association**
  - Advisory consultants
  - Federation of Swedish Farmers

- **NGOs**
  - Swedish Society for Nature Conservation
  - WWF

30 years of work on

- 1980s: Regulations on storage capacity for manure
- 1985: Government decision on a remedial programme for nutrient losses
- 1990: Regulations on plant-covered soil in winter
- 1994: stricter demands for buffer zones when spraying
- 1994: Regulations on timing of manure spreading
- 1995: Regulations on covering manure storage facilities
- 1996: Regulations on rapid incorporation of manure
- 1997: Start of Safe Crop Protection

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LRF: Water quality management in agriculture

**Methods**

- Bookkeeping methods for fertilization plans
- Balancing methods
  - Farm gate nutrient balance
  - Field balances
  - Considered input and output
    - Incoming: animals, fodder, seed, fertilisers, bought manure, biogas slurry, waste products, sewage, N-fix, atm deposition
    - Outgoing: animals, animal products, dead animals, sold manure, sold fodder, yields
    - Within system: own fodder, live weight increase, own manure
    - Hidden – soil organic matter balance
Farm gate balance

Implementation

- Advisory services
  - Guidelines for fertilizing and liming
  - “Focus on Nutrients”
- Implementation
  - 5000 farm advisory visits / year
  - 46% of all advisory visits are nutrient balance calculations
- Control
  - Counselling tool
- Consequences
  - No regulation
Assessment of effectiveness

- Assessed parameters
  - Surplus - kg and kg/ha
  - Efficiency - Out / In - %
  - Other key values related to production and economy
  - Empirical equation for calculating leaching
  - Inefficient use of nutrients not only indicates a risk of losses, but also represents a substantial financial loss for the farmer.

Changes

Advisory services for nutrient utilisation.
Advancing nutrient balances

- Advantages of the current system
  - Relatively simple to do and relatively accurate
  - Knowledge: flows and amounts in circulation
  - Best way to measure phosphorous (and K)
  - Actions can be discussed
  - Can be made yearly, trends can be analysed

- Potential need of improvement and difficulties
  - More focus on phosphorous
  - Better knowledge of surplus variations and relations to N- and P-leaching

A permit fee system for nitrogen and phosphorus

- Swedish EPA
  - Providing agriculture with emissions caps requires considerable research and development work in order to find a method with which to determine how to formulate the emissions cap and which consequences such a regulation could have
  - (EPA Report 6345, 2010)

- Federation of Swedish Farmers
  - On farm level the data quality and the model prediction have uncertainties, which are not small enough to be of any practical use in a cap and trade system. No existent model can calculate diffuse nutrient leakages from agricultural land with transparent and requested confidence
Summary

- Nutrient balance, a good tool to observe trends and efficiency in production of milk, animals and crops
- Voluntarily
- Input figures are too uncertain for using nutrient balances as mandatory regulation tools.
- Surplus in a nutrient balance is not = N- and P-losses to water
- “Focus on nutrients” result in better farm economy and decreased nutrition leakage to the Baltic sea