Emissions of methane, nitrous oxide and ammonia from production, storage and transport of manure

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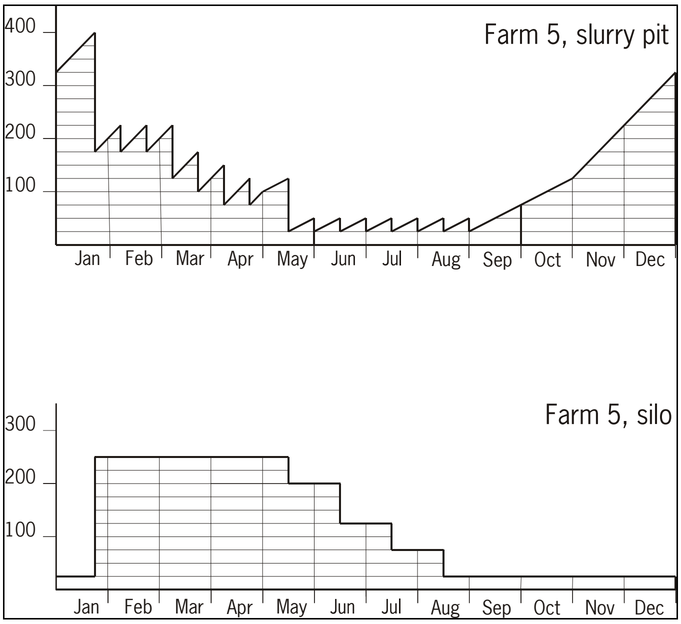
Goal

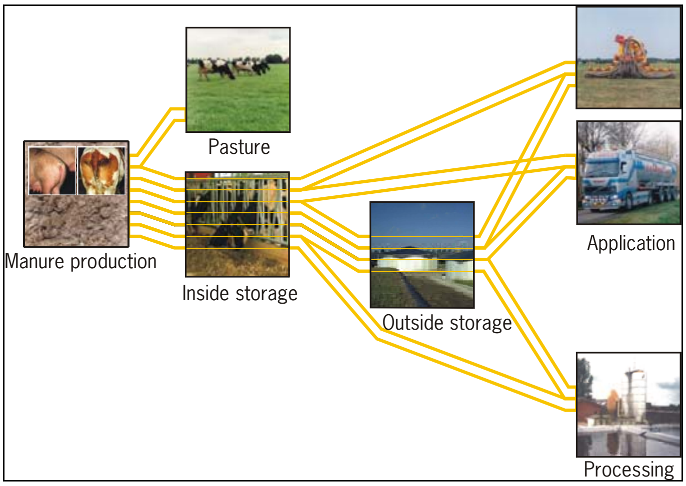
Give insight into the emissions of non-CO_2 greenhouse gases and ammonia in the manure logistics chain from excretion to application of and into the possibilities of emission reduction.
A considerable part of the emissions of methane and nitrous oxide are from Dutch livestock farming, as well as more than 90% of the ammonia emissions.

Dynamic methane emission model

The methane emissions from a slurry pit depend on the manure production in the stalls, the storage time, the temperature and so on. A simulation model calculates the emission and emission factors, taking these circumstances into account.



The amount of manure in storage in the slurry pit (above) and the silo (below) during a year



Schematic view of the tube model for the manure logistics

Optimisation model REM

The emissions from the manure logistics depend on the use of possibilities for storage, application and processing. The mathematical model REM (Reduction of Emissions from Manure) calculates the minimal greenhouse gas emissions, taking into account upper limits for the ammonia emission and for the costs.

Results

The REM model has been used for six scenarios:

1. base scenario
2. alternative base scenario
3. optimised scenario
4. biogas scenario (at most 50%)
5. biogas scenario (at most 10%)
6. processing scenario

The calculated greenhouse gas emissions increase when improved emission factors are being used. Reduction of emission is possible by adapted manure management or by application of biogas on farm level.

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