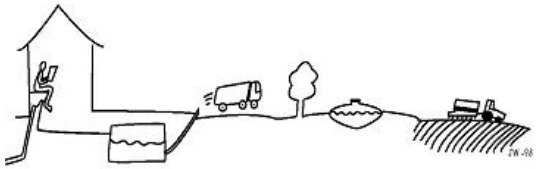

Swedish Farmer's Attitudes to Use of Digestion Residues and Source-Diverted Urine

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Introduction

FARMER's ATTITUDES TOWARDS USE OF:

- Digestion residues
- Source-diverted urine

Fertilizer (liquid) from production of biogas. Substrates used for biogas production include e.g. slaughterhouse residues, agricultural residues, source diverted organic household waste, farm yard manure etc.

Fertilizer (liquid) from source-diverting sanitation systems.

Biogas plant. Photo: Swedish Waste Association (RVF)

Urine storage. Photo: VERNA Ecology

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Method

- Digestion residues
  - Interviews with
    - six farmers utilizing digestion residues from six different biogas plants (**NOT** using sewage sludge as substrate) in Sweden
    - One food industry representative
- Source-diverted urine
  - Compilation of Swedish experiences of agricultural urine reuse

- Areas covered
  - Practical experiences of reuse
  - Yield
  - Knowledge gaps
  - Quality control issues
  - Challenges and success factors

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Practical experiences

Said about the digestion residue odor: *"It has a quite distictive, but not too oppressive scent that differs significantly from the ordinary manure scents"*

- Well functioning dialogue between farmer and entrepreneur important
- Uncovered storage at farm – risk of ammonia losses and dilution (rain)

- Urine
  - Important to avoid dilution
    - Risk of soil compaction
  - Odor during spreading, but subsides relatively quickly.

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Yield

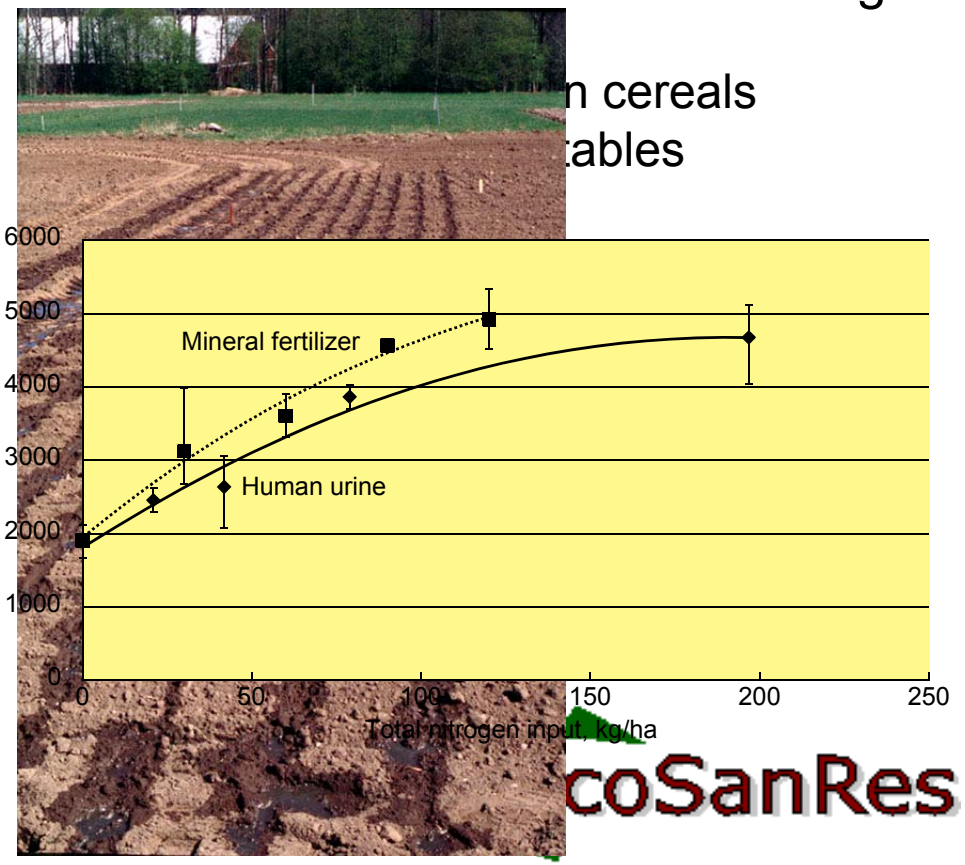
- Digestion residue
  - Considered more efficient than farm yard manure
  - Still, underestimation of N efficiency when applying digestion residues
  - More weather dependent than chemical fertilizers
  - Various crops
    - Cereals, rape seeds, leys, vegetables, potatoes
  - Choice of crop depends on
    - Time of amendment
    - Rainfall and other weather conditions

Said about digestion residues amendment and weather: *"It's fabulous if you do get 10 – 15 mm of rain after the amendment"*

– Best used for N-demanding

n cereals

tables



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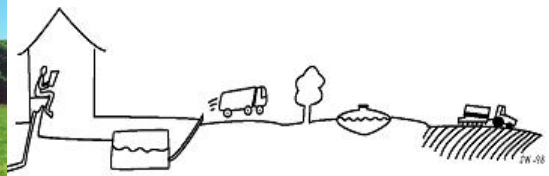
Knowledge gaps

- Digestion residues
  - N release dynamics
  - Ways to increase the period during which the digestion residues can be spread
  - On-site production of biogas
- Urine
  - Minimization of dilution of urine during collection and storage
  - Organization of collection, transport and storage
  - Medical residues needs to be addressed



Contracts and organization of reuse

- Digestion residues
  - Contract lengths 1 – 5 years
    - It is recommended to use contract lengths matching crop rotation
  - Willingness to pay for digestion residues is low
    - Two of six plants charge for the digestion residues
    - Willingness to pay might increase if digestion residues are allowed as fertilizer in EU organic farming regulation

- Urine
  - Who is municipally responsible for urine use system in Sweden, solid waste department or wastewater department or the individual houseowner?
    - Different municipalities have different policies
  - Willingness to pay for urine is low
    - Willingness to pay might increase if urine is allowed as fertilizer in EU organic farming regulation

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Quality control issues

- Digestion residues
  - Four of six interviewees receive quality certified digestion residues
  - Certification:
    - Quality label (content, handling etc)
    - Distinguish digestion residues from sewage sludge
    - Deemed paramount for use both among farmers, food industry and biogas plant representatives
- Urine
  - Certification should be possible also for urine
  - Agreement on agricultural use of both urine and digestion residues between food industry trade organization and relevant stakeholders is prepared this spring
  - The regulation for sludge use is under revision and will most probably include also urine

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Challenges and success factors

- Digestion residues
  - Success factors
    - Positive attitude among farmers
    - Certification system
    - Establishment of trade forum for increased coordination
  - Challenges
    - Low willingness to pay
    - Storage
- Urine
  - Success factors
    - Positive attitude among farmers
    - Small-scale business opportunities for farmers in connection with urine use systems' organization
  - Challenges
    - Low willingness to pay

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Conclusions

- Digestion residues and urine are highly efficient N fertilizers
- Establishment of quality control systems is extremely important in the Swedish context
- Low willingness to pay among farmers for digestion residues and urine
- Could change if digestion residues and urine are allowed in EU organic farming
- Identification of demand-increasing factors for both digestion residues and urine is important
- Knowledge gaps: e.g. N release dynamics for digestion residues, clarity on municipal responsibility issues for urine and development of robust municipal systems for urine use

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Thanks for your attention!

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