

Dutch integral approach to reduce emission of CH₄ and NH₃ from livestock

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Cooperation with many partners



Climate envelope Livestock

Projectleaders from Wageningen Research:

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40 Projects

9.5 Million Euro's per year

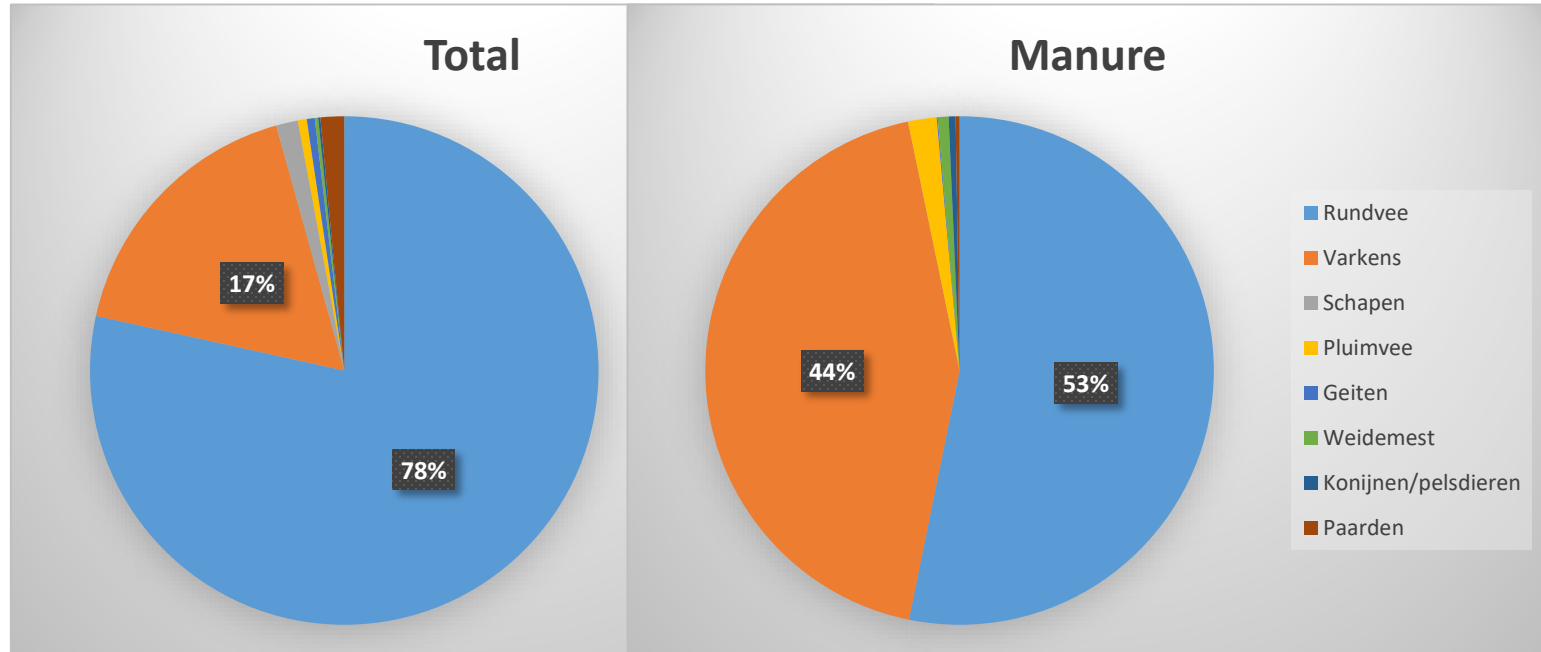
Policy for methane reduction 2030

- 6 Mton CO₂ eq of which 2.7 Mton from livestock and 3.3 Mton from forestry, green houses and soils
- **Ammonia:** reduction according to Dutch directives following NEC Directive
- *No trade-offs like N₂O, PM & animal welfare*

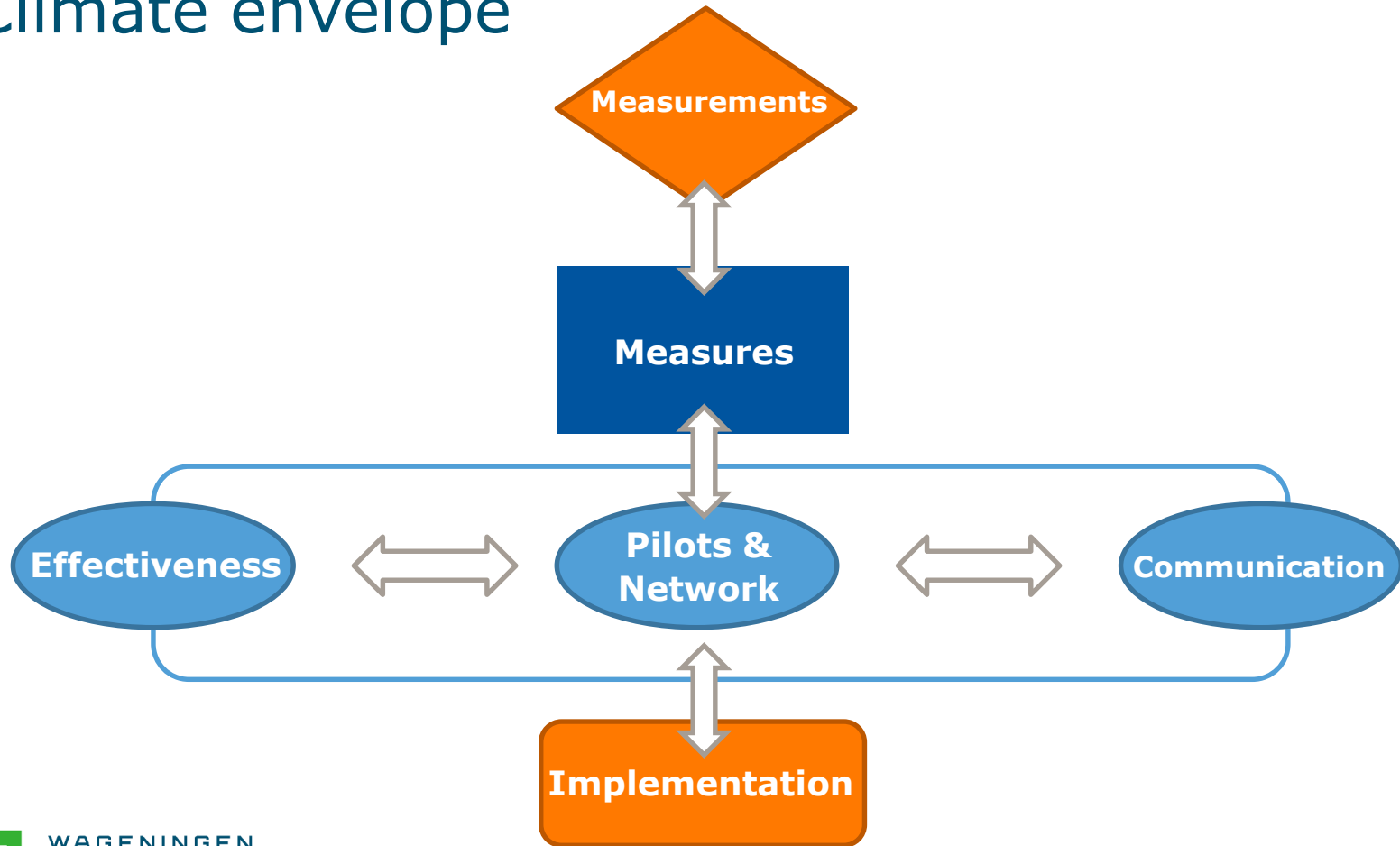


Climate envelope from Livestock: Methane

The Netherlands



Climate envelope



Climate Envelope

Three tracks

- 1. Animal track = enteric methane
 - Estimated reduction potential: 10-30%
- 2. Manure track = methane from manure storage
 - Estimated reduction potential: 30-90%
- 3. Implementation track

- Breeding
- Ration
 - Additives
 - Protein, starch, crude fibre (CH₄ and NH₃ not always synergetic, so find optimum)
 - Nature inclusive
 - Grasslandmanagement
- Microbiome
 - Nature
 - Nurture

- Removing manure frequently from housing icw storage treatment
 - Methane oxidation (Rik Maasdam)
 - Cooling
 - Additives
 - Aeration
 - Dilution
 - Covering storage
 - Digestion
- Combination of measures to reduce both CH₄ and NH₃

} Mainly NH₃

- Feasibility studies
 - Capture CH₄ from animal houses
 - Plasmatechnology
 - Drying manure

- **Removing manure frequently from housing icw storage treatment**
 - Methane oxidation (Rik Maasdam)
 - Cooling
 - Additives
 - Aeration
 - **Dilution**
 - **Covering storage**
 - **Digestion**
- Combination of measures to reduce both CH₄ and NH₃

} Mainly NH₃

a Case in Pig Housing

Karin Groenestein, Jan Schellekens en Yvo Goselink

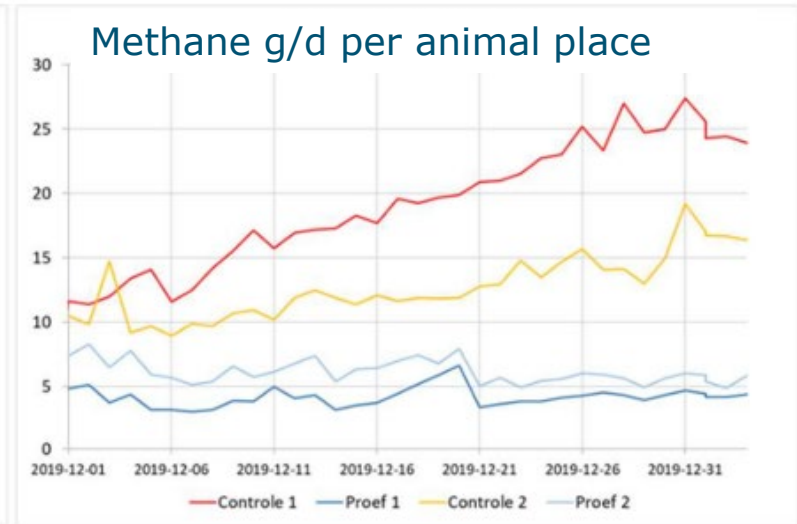
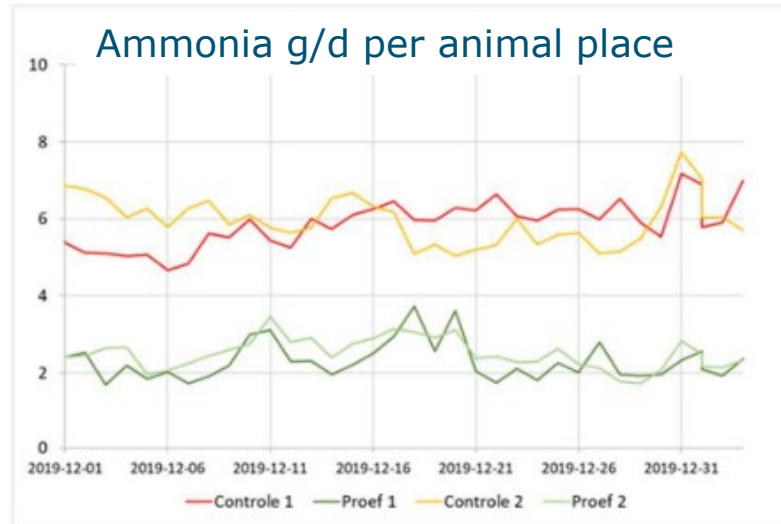
- Removing manure frequently from housing icw storage treatment
 - Flushing twice a week with low-ammonia solution
- Dilution
 - Separating manure in liquid and solid fraction
 - Stripping liquid fraction
 - Capturing NH₃ with air scrubber (RENURE)
- Covering
 - Storage of liquid and solid fraction shortly and covered
- (Digestion of solid fraction)

a Case in Pig Housing

- Fase 1: flushing liquid is water
- Fase 2: flushing liquid is stripped liquid fraction

A Case in Pig Housing

Results fase 1: flushing with water



a Case in Pig Housing

Results fase 1

NH3 reduction: 60%

CH4 reduction: 50-80%

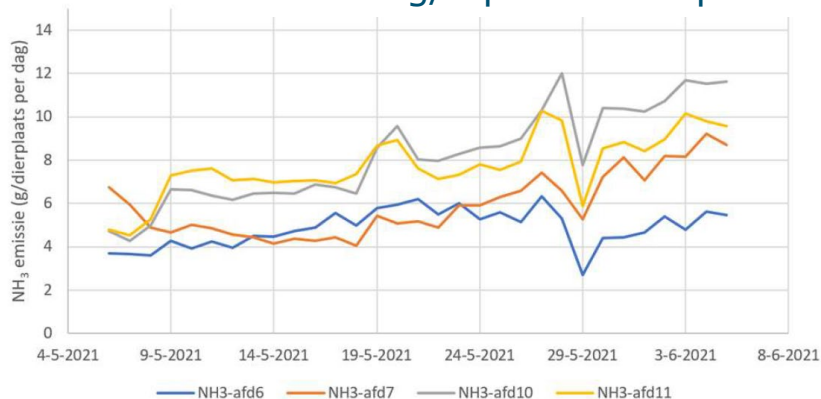
treatment: CH4 is at level of expected enteric production

Before treatment thorough cleaning of manure pit is necessary

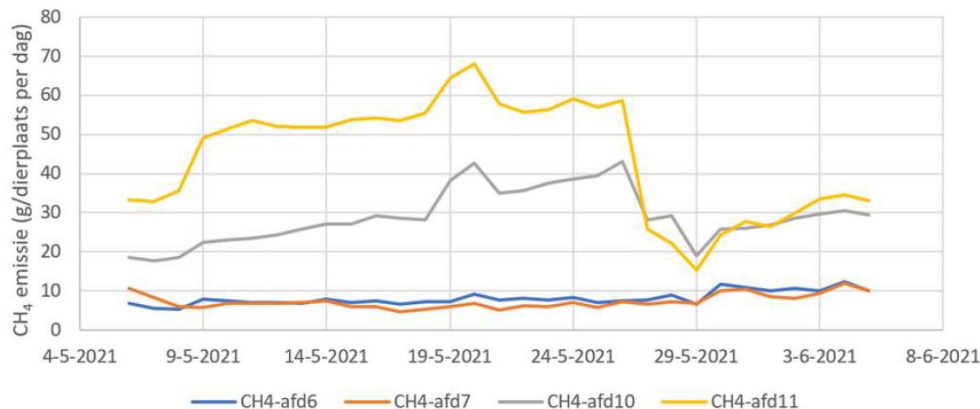
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Results fase 2: flushing with low-ammonia solution

Ammonia g/d per animal place



Methane g/d per animal place



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Results fase 2

NH3 reduction: 15%

CH4 reduction: 80%

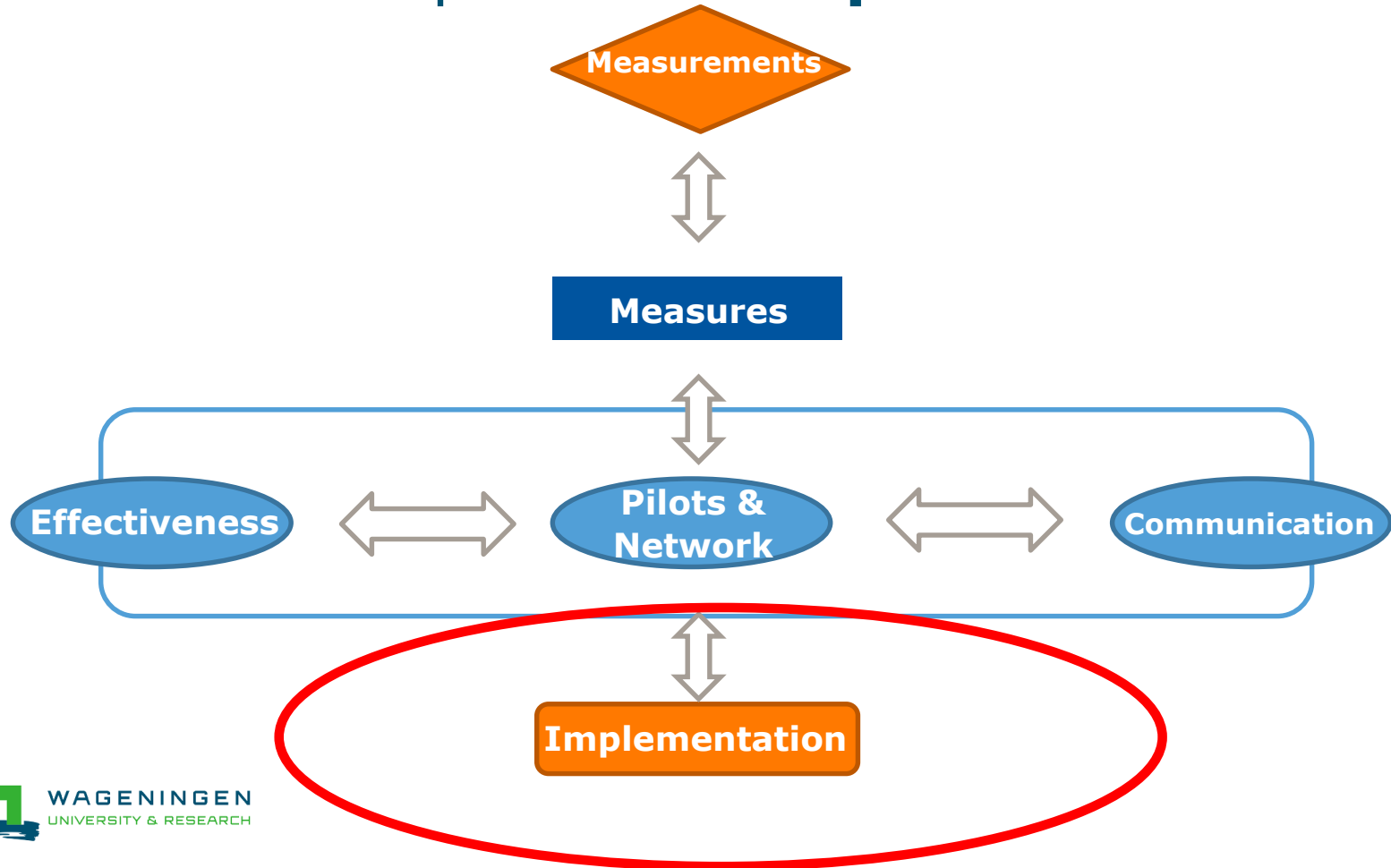
treatment: CH4 is at level of expected enteric production

a Case in Pig Housing

Conclusions:

- Removing diluted manure twice a week reduces NH_3 and CH_4 considerably
 - To reduce CH_4 emission from existing storages, cleaning is necessary
 - Making low-ammonia solution of liquid fraction demands more effort
- Optimization:

- More efficient separation
- Increase temperature during stripping
- Increase pH during stripping



- Farmer's perspective to act
- Communication with stakeholders
- Education of on-farm educators
- Check if measures work properly on farm (enforcement)
- Activity data for accounting
 - Compatibility with existing models reporting emissions ('cash' efforts)
 - Count nr of farmers implementing measures

Climate envelope

www.integraalaanpakken.nl

Thank you

