

Emissions as a challenge for dairy farming

Air filtering as technique

EAAP congress Lyon, August 2023



Climate Care Cattle farming



Another promising route?



Trend in environmental focus field in Netherlands

Production

1945-----1985

Animal welfare

1970-----

Nitrate leaching

1980-----

N-emissions 1995-----

GHG emissions 2015-----

-

Biodiversity 2015-----

Since 2019: N-Emission Crises

- Natura 2000 areas: in total 162 nature areas, as reported in 2000 to EU.
- Goal: Protect nature, reduce N-precipitation on those areas
- Environmental Institute:
 - 42-45% N from animal manure
 - 12% from traffic
 - 9% from industry
 - 32% from outside country; 3% from sea

Ammonia precipitates close to source (within 25 km?); NOx not

2019: Environmental action group won procedure about protection of nature at High Juridical Court

- Resulted in:

Maximum N-deposition of 0.7 gr/ha/yr limit for economic activity; in Germany is this factor 100 gr/ha/yr; Denmark 200-700gr/ha/yr

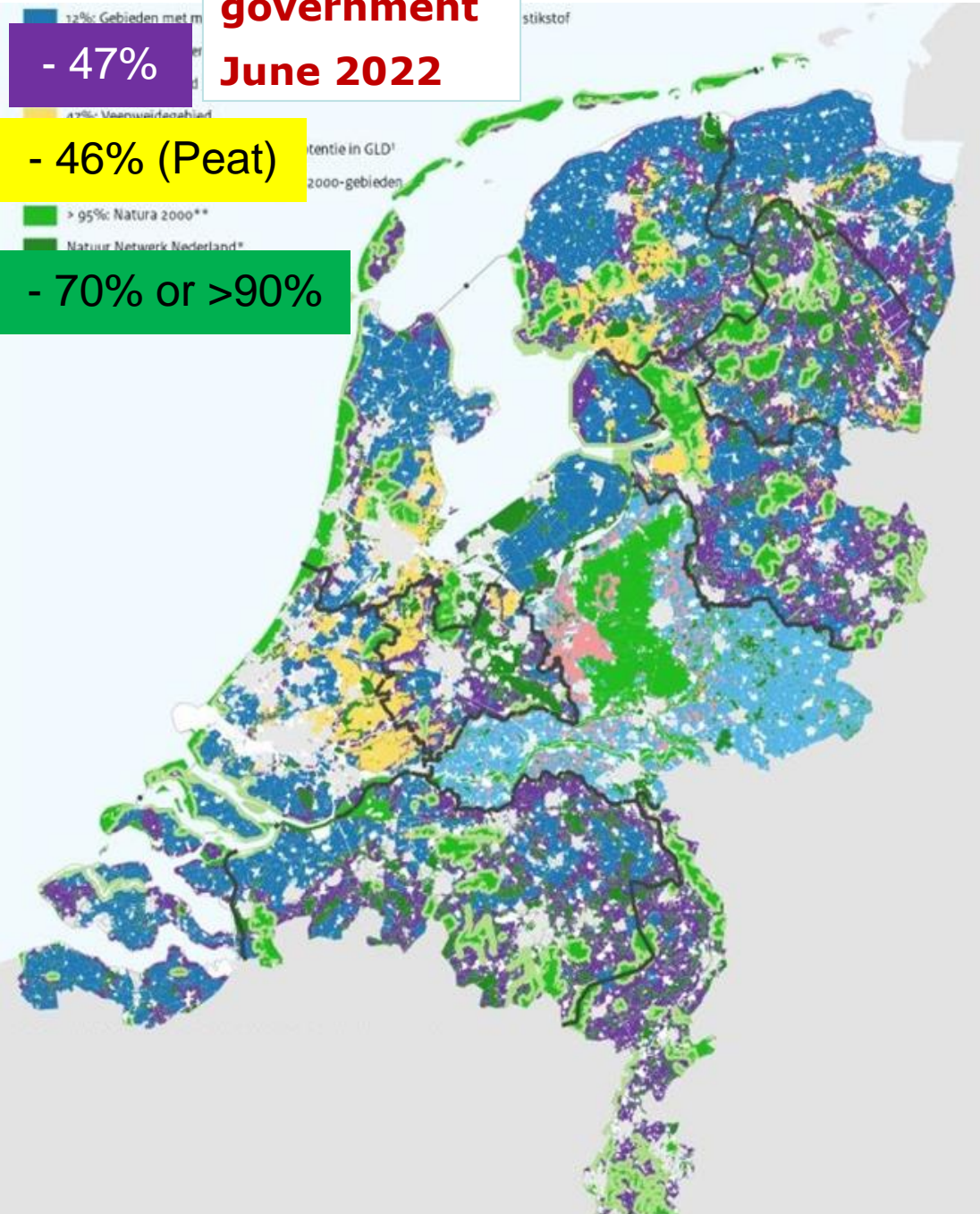
- All activities delivering N stopped – concerned 18000 construction projects

**N-Chart
government
June 2022**

- 47%

- 46% (Peat)

- 70% or >90%



resulted in large scale protests



Political party
Farmer - Citizen



Choice: keep less animals or innovate

Presently by out program
for “peek polluting” farms
(3000 farms)
close to Nature 2000 areas

- emission limit is set
- using Aerius model for
GHG emission calculation
- to be done by farmer himself



Choice: sell animals or innovate

Our goal

filtering of ammonia and methane in same flow

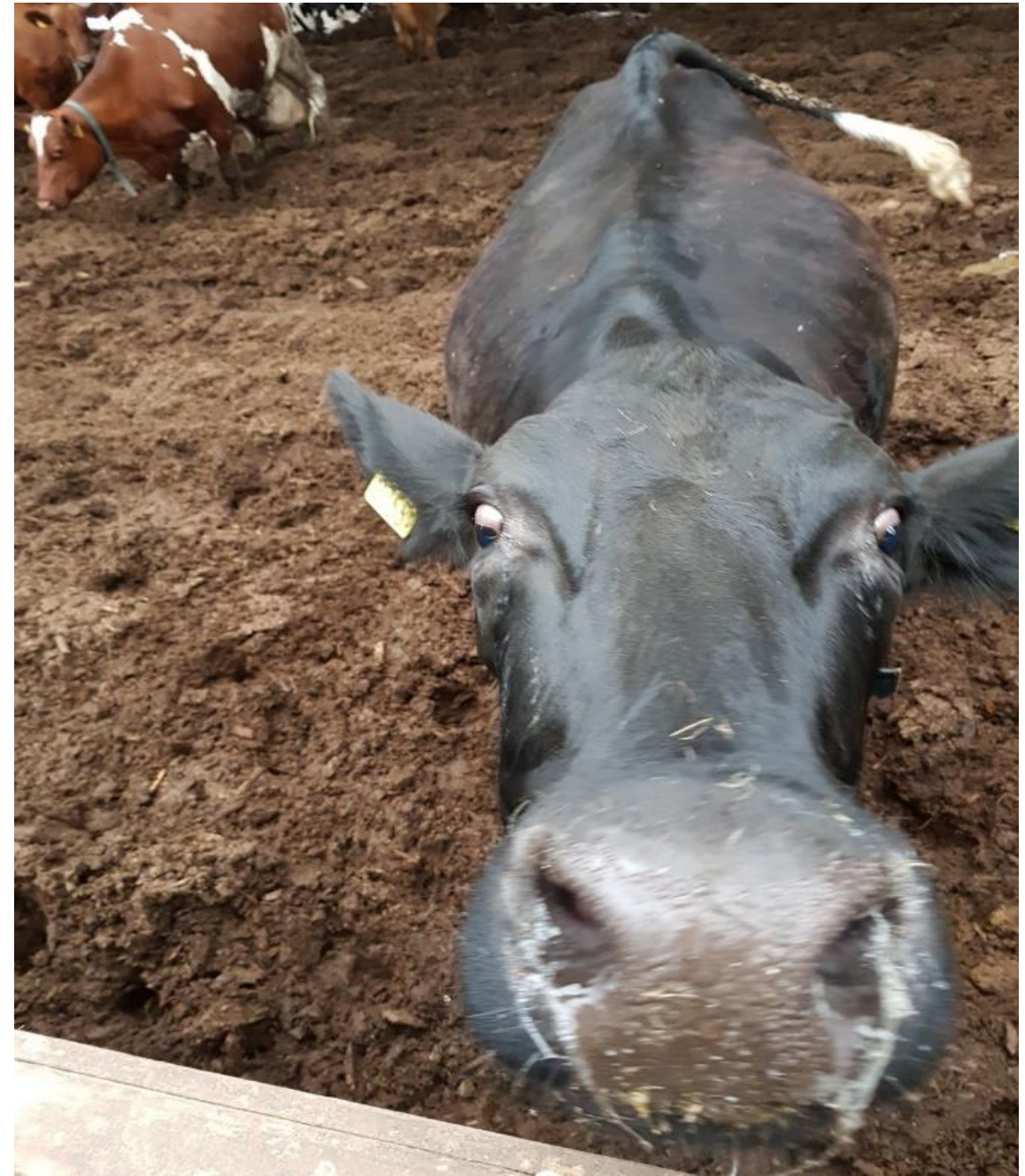
Less known techniques in dairy sector

Target: realize big reduction in emissions

Principle: do not adapt cow to the environment, as with genetics and methane blockers in feed

Instead: adapt environment to the cows

Ammonia – mainly from manure



Air filtering techniques: use of acid (like in pig and poultry housings)



Air sucked
from below
floor -
manure
cellar

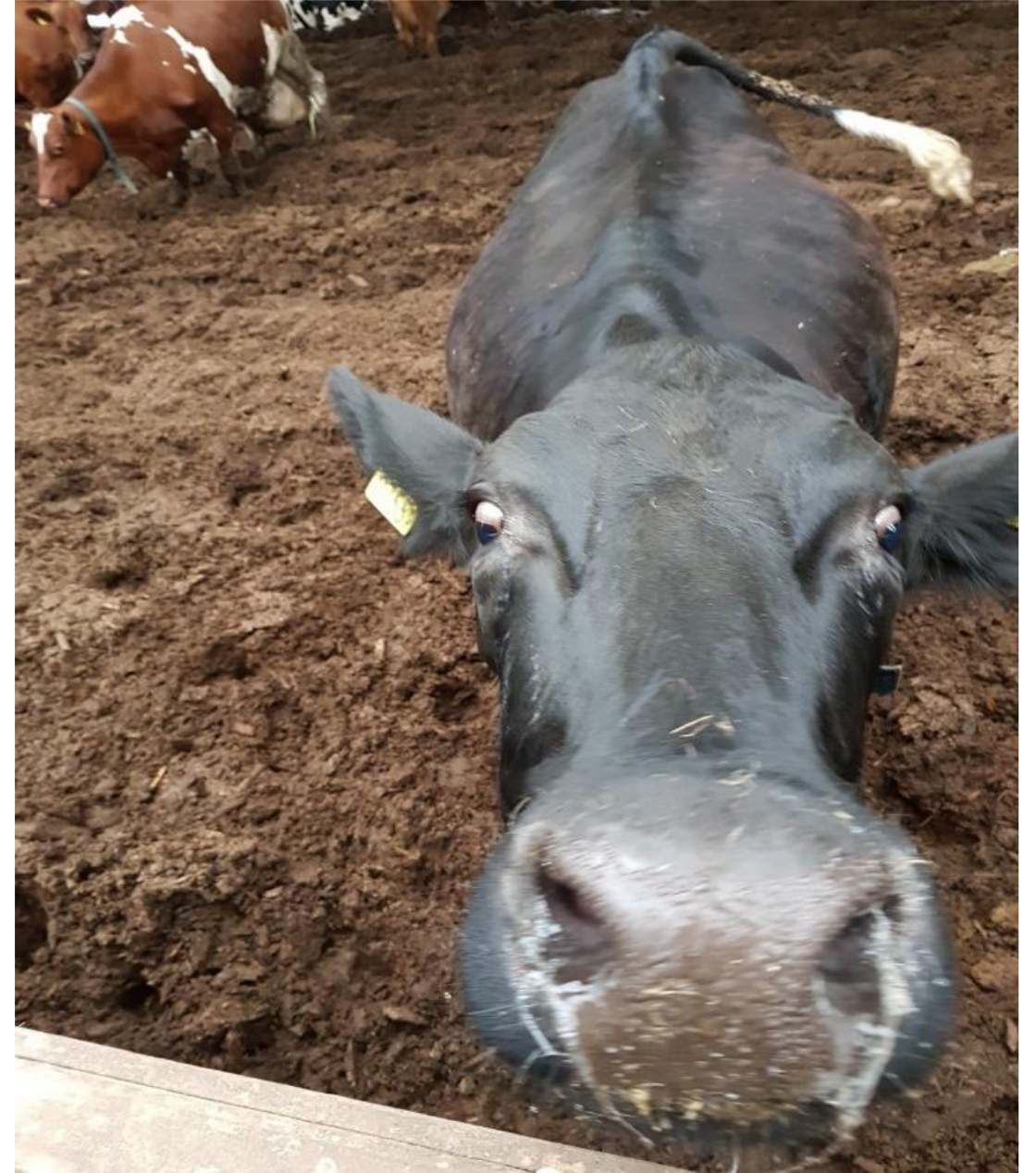
> 70%
ammonia
reduction



Focus on methane

from manure 25-30%

Main source rumination of cow (70-75%)

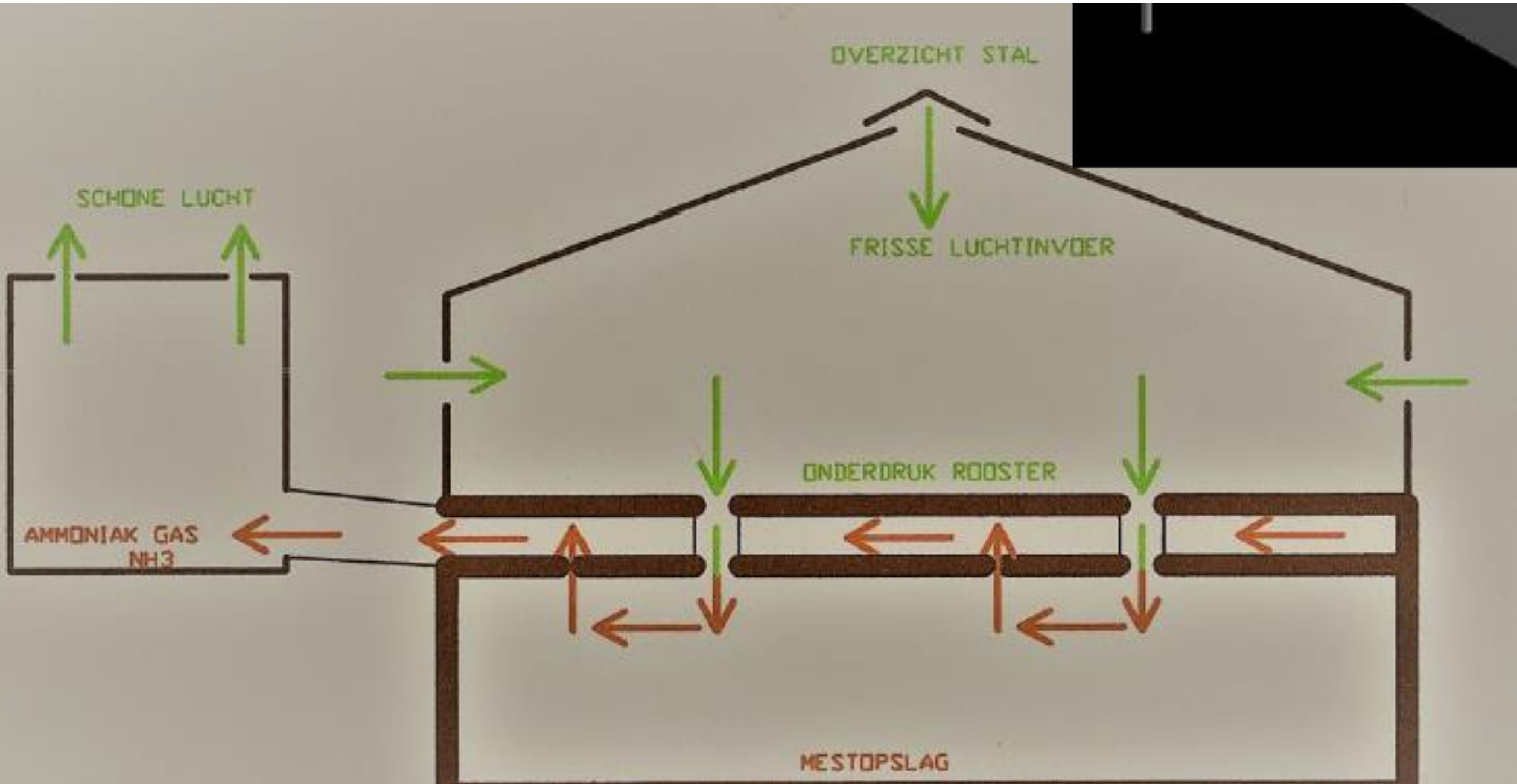


Methane level

- On 40 CCCfarming dairy farms we measured from 20 to 80 ppm (mg/m³) methane
- To process methane, literature learns that > 500 ppm is required to be successful with filtering and oxidation

We study smart ventilation techniques to realize a higher concentration

Air circulation using negative pressure under the slatted floor



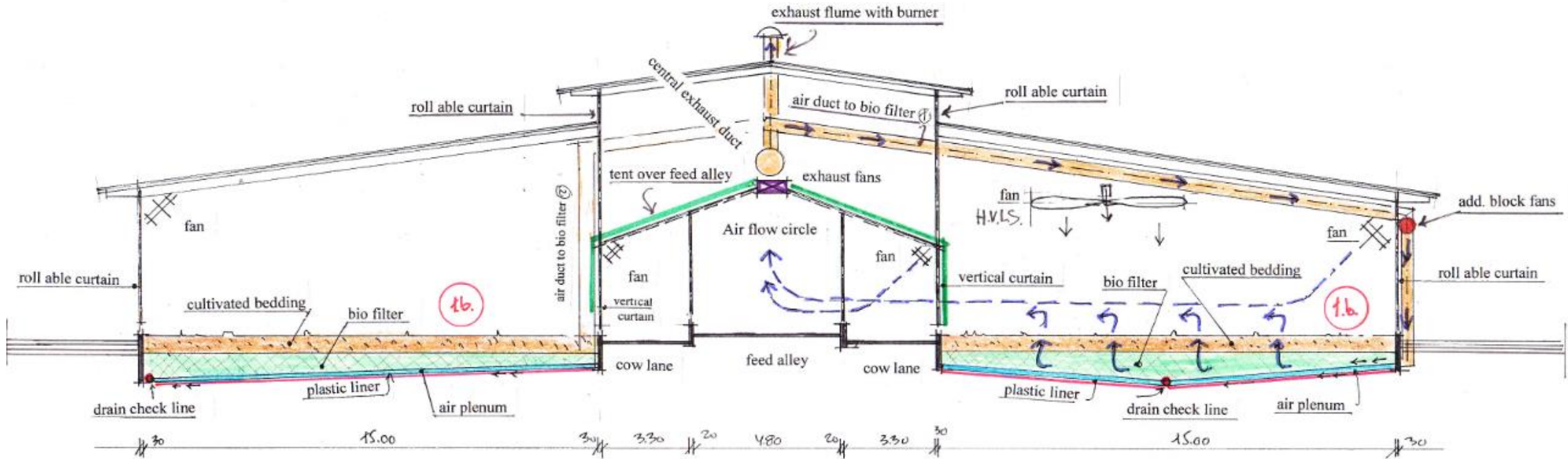
- From Cecile Levraut, WUR, the Netherlands



Denmark: onderzoek naar optimaliseren methaankap



Haalbaar
300 tot 500 ppm CH₄



negative air pressure tube

How to catch the methane

Oxidation (farm Van Roessel)



Biobed (research WUR)

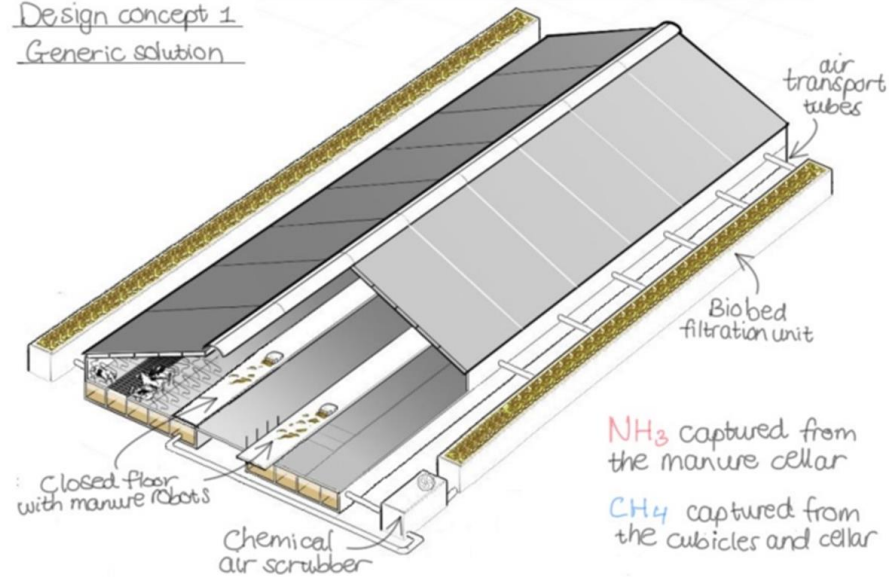


Use of absorbents

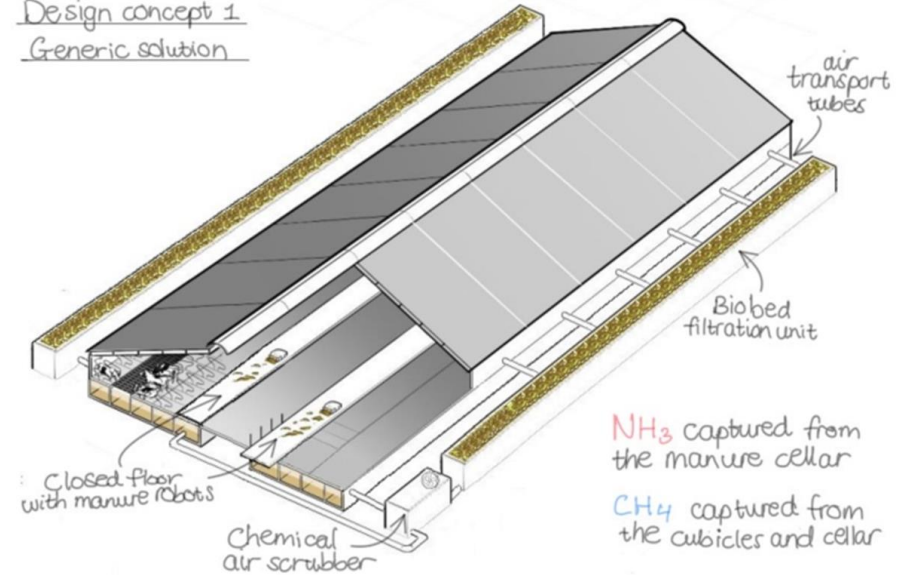


Designs combining ventilation and filter techniques

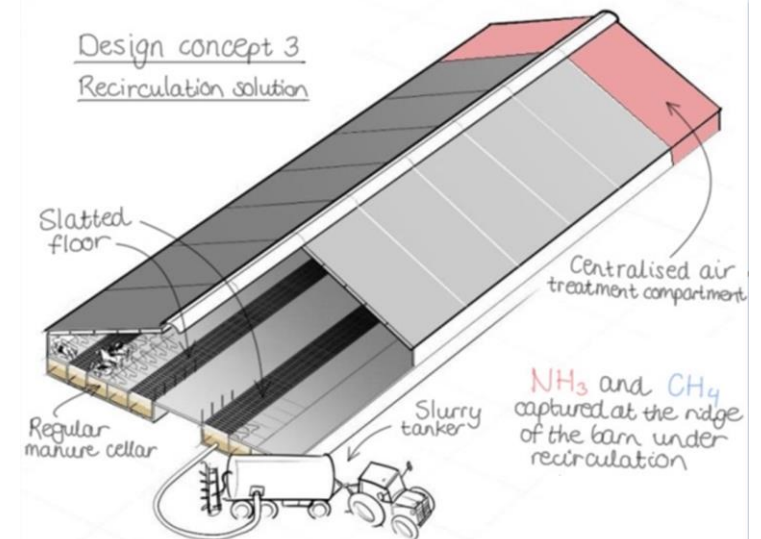
Design concept 1
Generic solution



Design concept 1
Generic solution



Design concept 3
Recirculation solution



Kees Wiering and Peter Groot Koerkamp
WUR

Conclusions



- Reducing emissions priority in parts of Western Europe
- Ammonia reduction by filtering air very promising, but costly investment
- Methane reduction is a challenge to work on
- Juridical procedures and action groups to the forefront
- Certification of methods increasingly important
- Other options: acidification; cooling manure