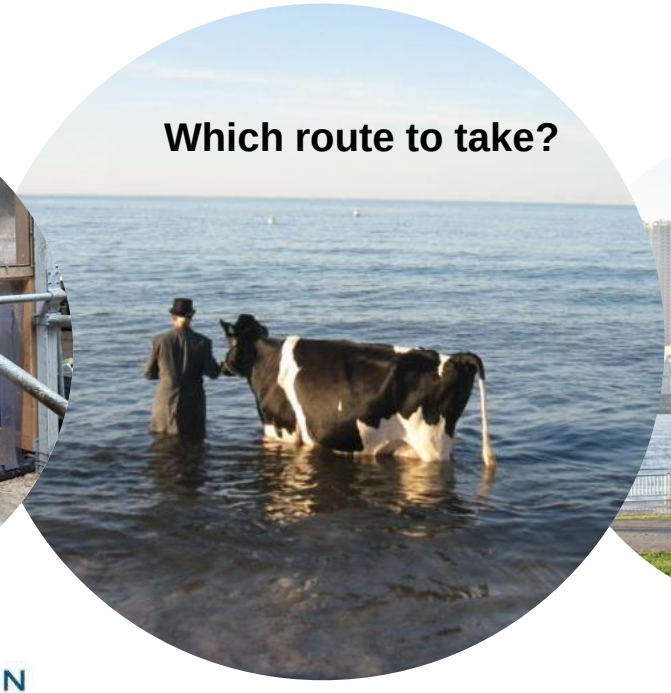
Environment as a challenge for intensive livestock farming

R4D / IFMA webinar February 2023



Abele Kuipers, Paul Galama

Trend in environmental focus field in Netherlands

Production

1945----------1985

Animal welfare

1970----------

Nitrate leaching

1980----------

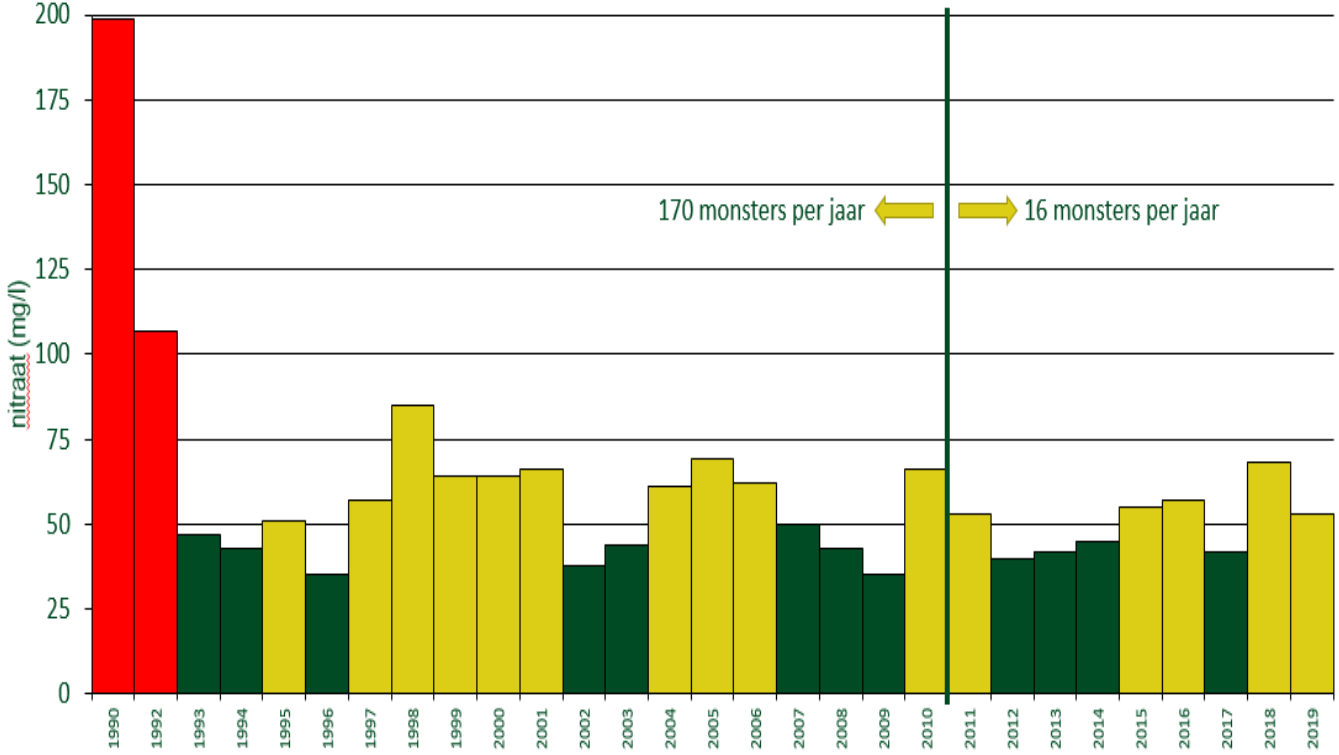
N-emissions 1995--------

GHG emissions 2015-------EU Green Deal

How we look at animal welfare / nature ……. ?

Nitrogen leaching – Founding De Marke Experimental farm - 1990

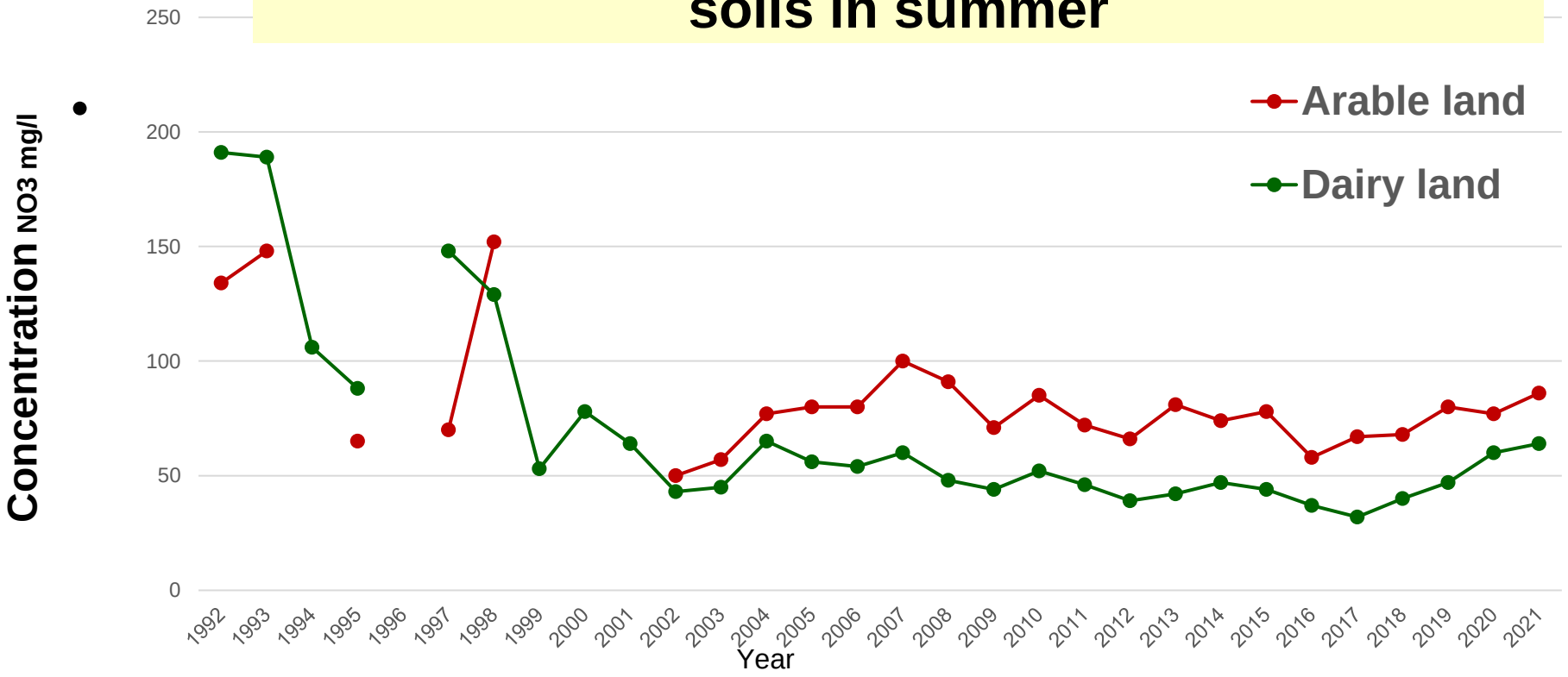
De Marke: Nitrate content in upper groundwater



- **Adapted nitrate management in 1992**
- **Quick decrease in 1st years**
- **Later it fluctuates around 50 mg/l**
- **Country wide: grasslands**

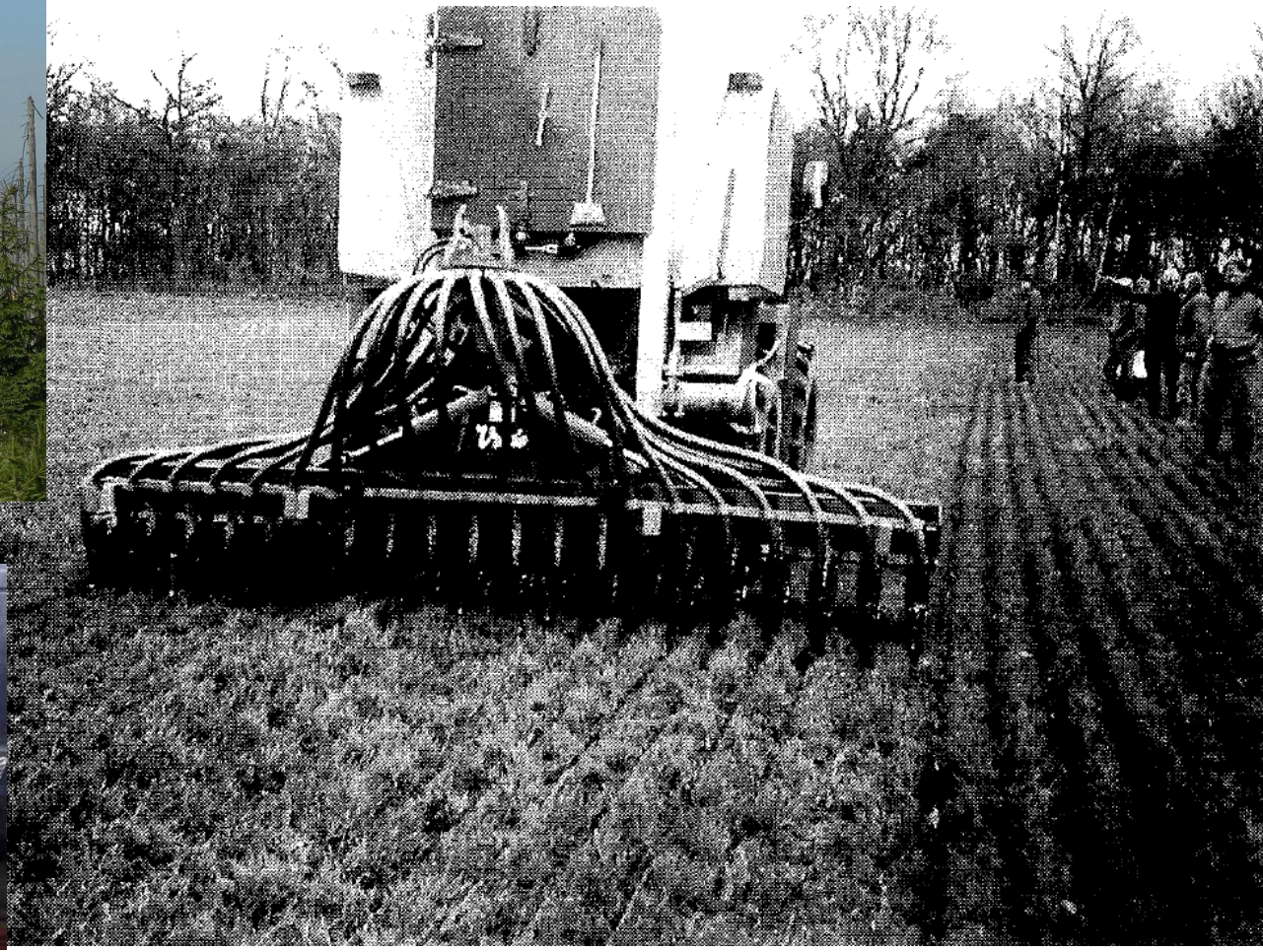
from 400 kg to <250-200 kg N/ha

Nitrate (NO3 mg/l.) in upper groundwater - sandy soils in summer



Acidification by NH3-emission: Injector with slurry tank with filter

Regulating air filter of cars



Since 2019: N-Emission Crises in our region

- Natura 2000 areas: EU-wide 27000 sites; 18% of land area; 9% of marine area; birds and habitat directive

- Goal: Protect nature, reduce N-precipitation on those areas

- Our 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 …….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

- Minister for N and nature

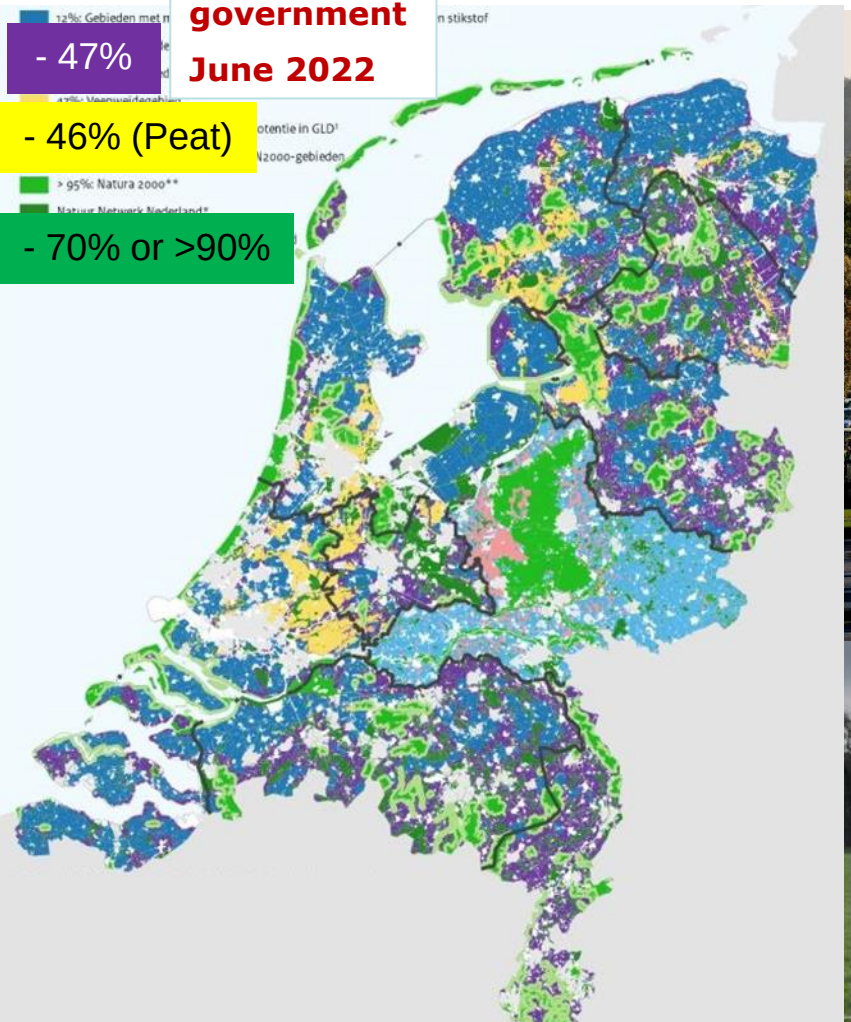
N-Chart government

June 2022

- 47%

- 46% (Peat)

- 70% or >90%



resulted in large scale protests

Political party

Farmer - Citizen

Choice: keep less animals or innovate

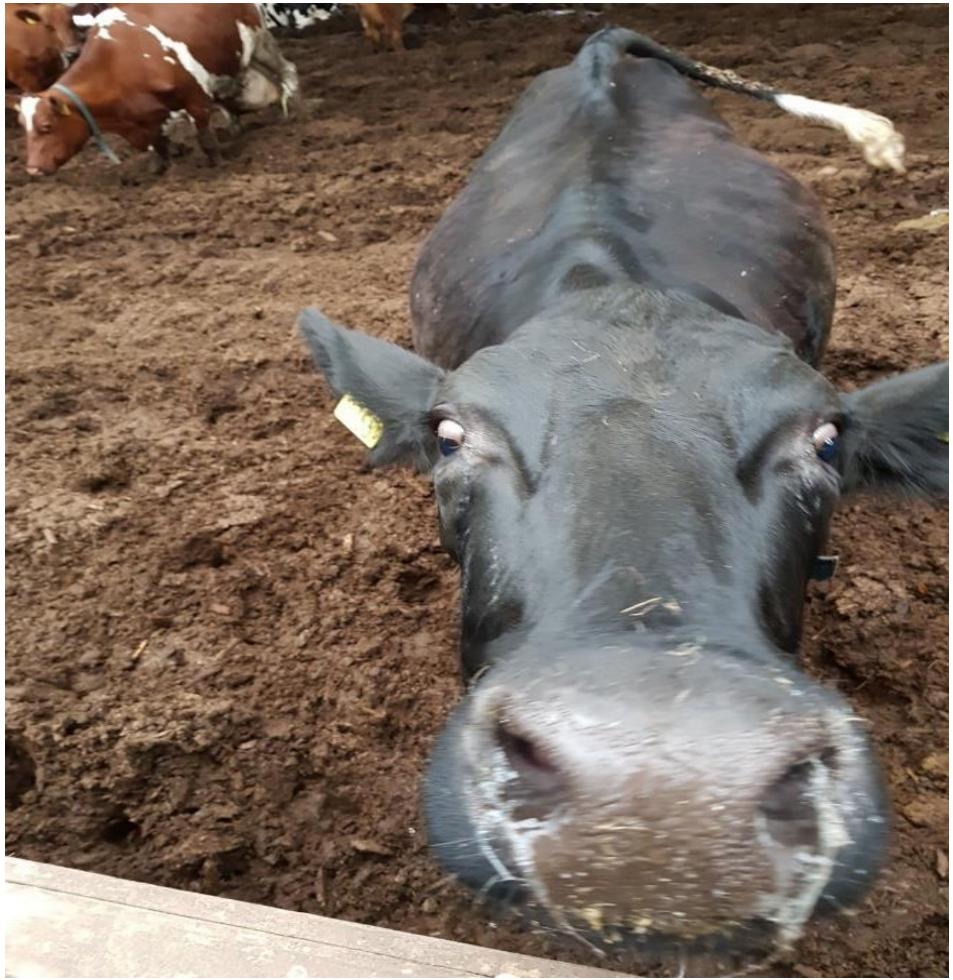
Presently by out program for
"peek polluting" farms (3000)
close to Nature 2000 areas

- ammonia deposition limit is set

- use of Aerius model for
  calculation of deposition

- to be done by farmer himself

Principles: Ammonia – from manure; Methane mainly from ruminants (75%)



Observations

- From EU projects: Difficult in the field to distinguish between practices for ammonia and methane
- Ammonia binds to acid; enzyme fytase plays a role
- Methane is affected by micro-organisms
- On 40 CCCfarms we measured from 20 to 80 ppm (mg/m3); low level to handle; We study smart ventilation techniques to realize a higher concentration

Wish: from means regulations to purpose regulations

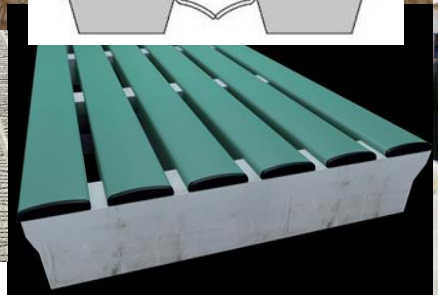
Means regulations are based on certifying certain techniques or practices. For instance, use of certified floor systems or manure facilities, or feed substances that reduce ammonia or methane emission.

Purpose/target regulations are based on a norm. For instance, EU N norm in surface and ground water of 50 mg nitrate / liter; or a certain quota of ammonia emission per farm.

For control: Sensors on farm level are needed.

For emissions, this is possible with closed barns in pig and poultry husbandry, but more difficult with open housing systems in dairy.

Paul continues: On farm level - Floor types and protein feeding



Central Biogas plants – Denmark (>30 % of all gas)

Conclusions

- **A continuous pressure on animal welfare**
- ***Reducing ammonia emissions to air and water priority in parts of Western Europe; solvable***
- **Methane reduction is a challenge to work on**
- ***Look for integrated solutions***
- **Reduction % in experiments may be less than in practice**
- ***From mean regulations to purpose regulations ……..***
- **Certification of methods increasingly important**
- ***Juridical procedures and action groups to the forefront***

Environmental challenges with intensive livestock production

Resilience for dairy (R4D), 21 August 2024

Paul Galama and Abele Kuipers

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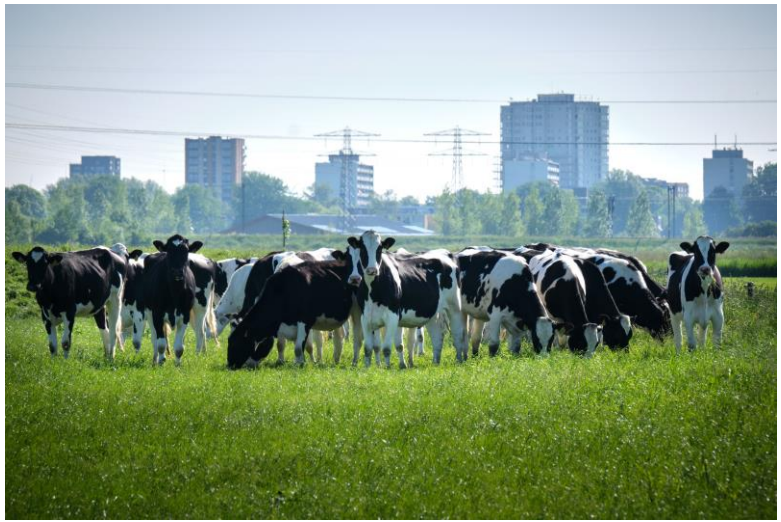
ifma INTERNATIONAL FARM MANAGEMENT ASSOCIATION

Resilience 4 for Dairy

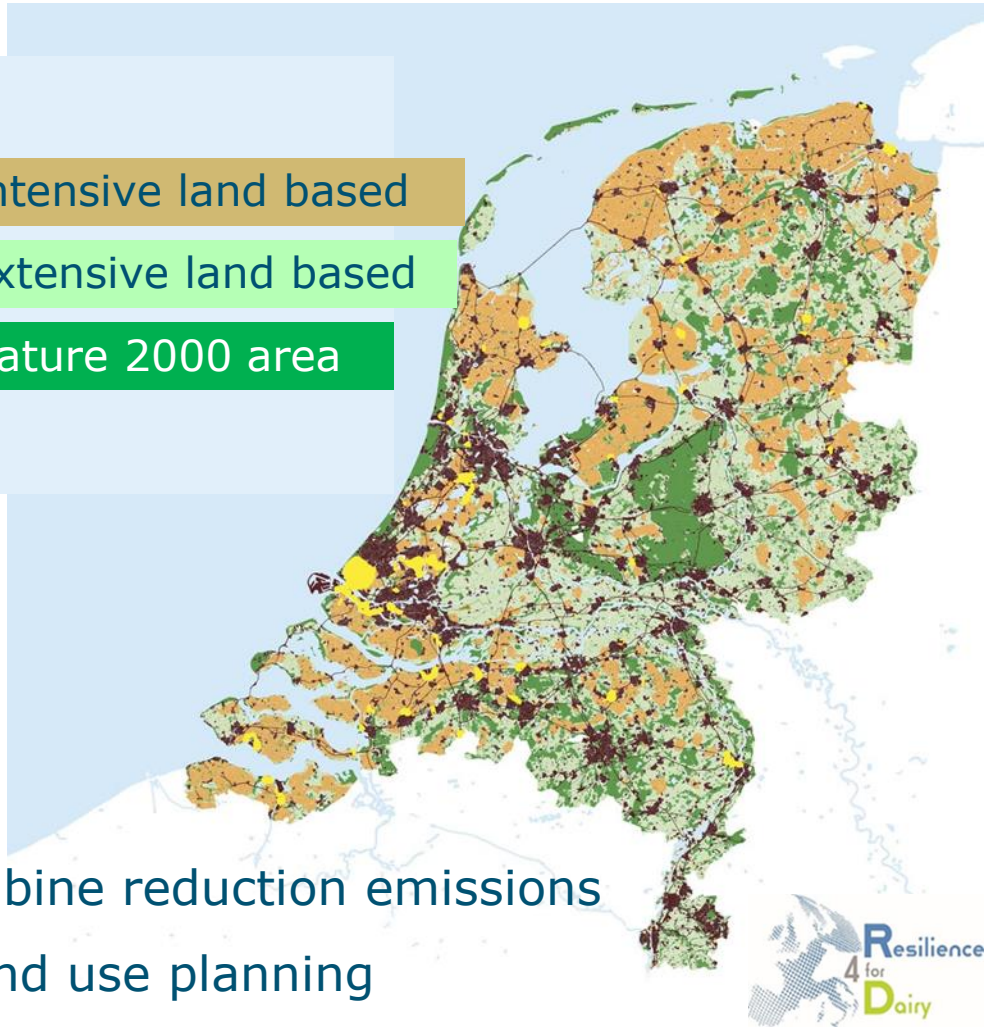
Farming in the backyard of 18 M people



Intensive land based

Extensive land based

Nature 2000 area



Challenge to combine reduction emissions with land use planning

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Resilience 4 for Dairy

Topics

1. Optimize nutriënt cycle with ANCA tool
2. Reduction potential NH3
3. Research topics, innovations whole manure chain

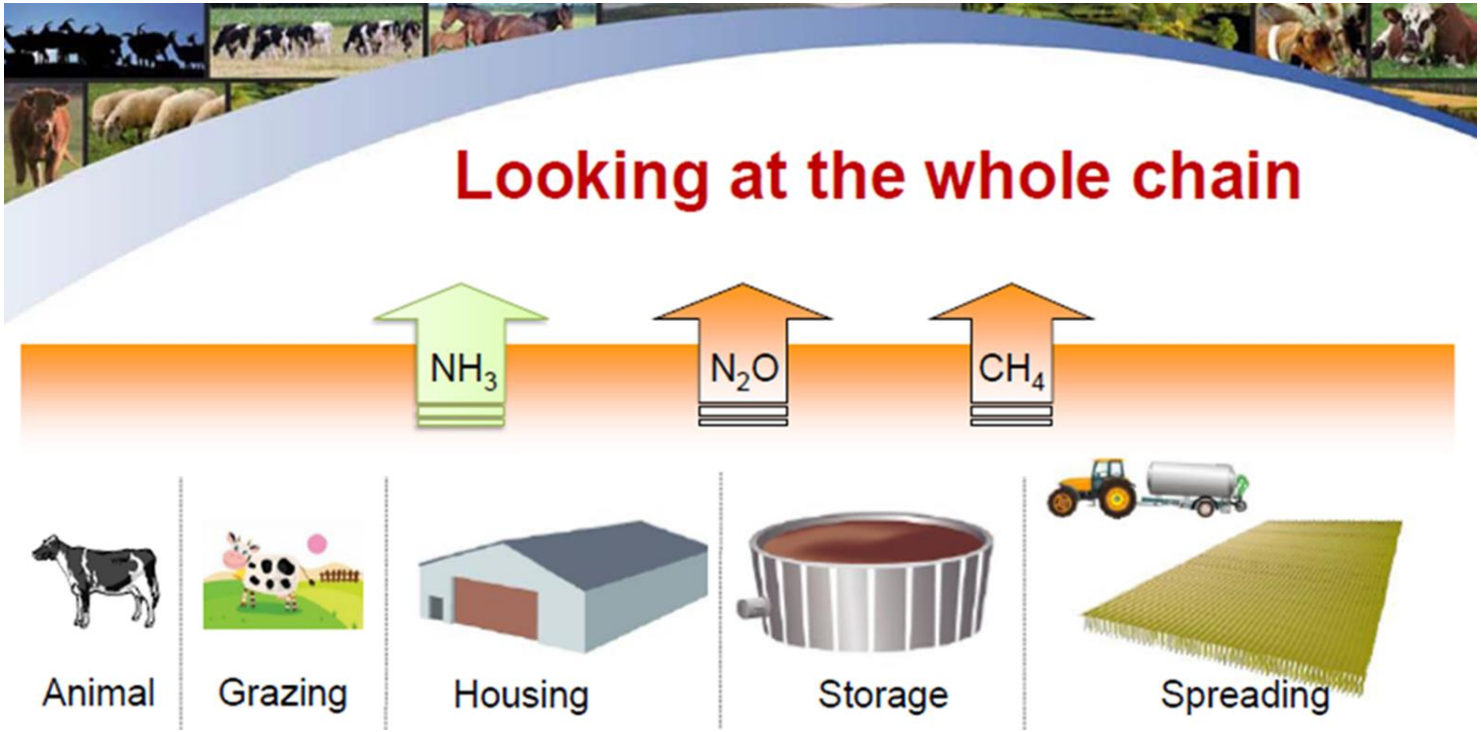
Whole farm assessment tools

agrecalc

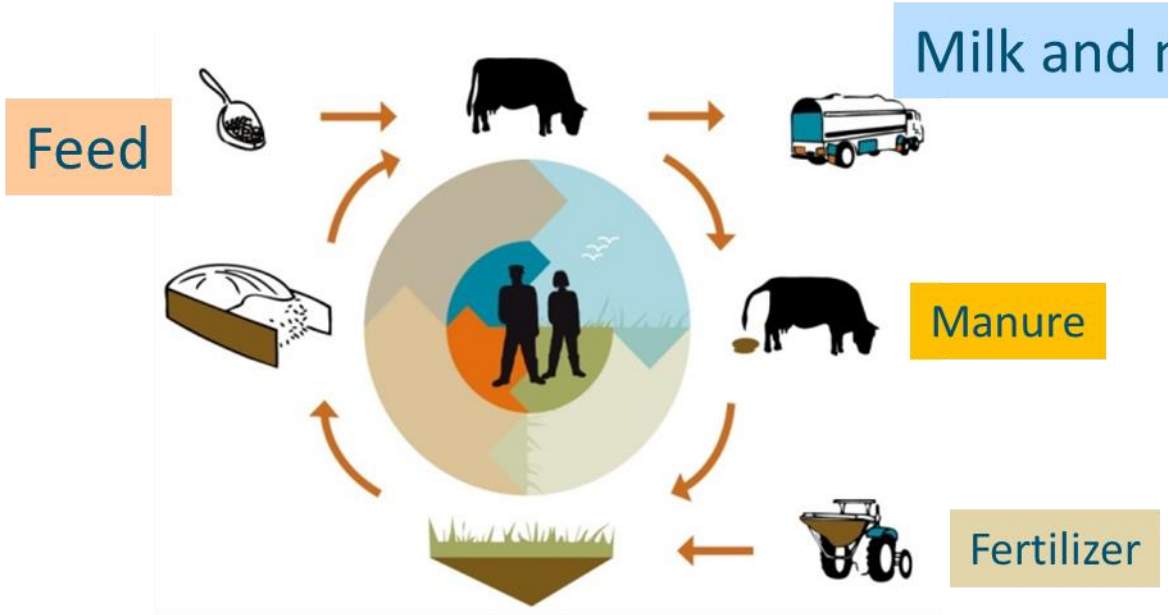
CAP'2ER®

ANCA

KRINGLOOP WIJZER



Optimize nutrient cycle with ANCA tool
(Annual Nutrient Cycle Assessment)



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Resilience 4 for Dairy

ANCA tool on farm level

Annual Nutriënt Cycling Assessment

Gives insight in:

- NPC efficiëncy in parts of cycle
- Crop production
- Pollotion soil, air and water

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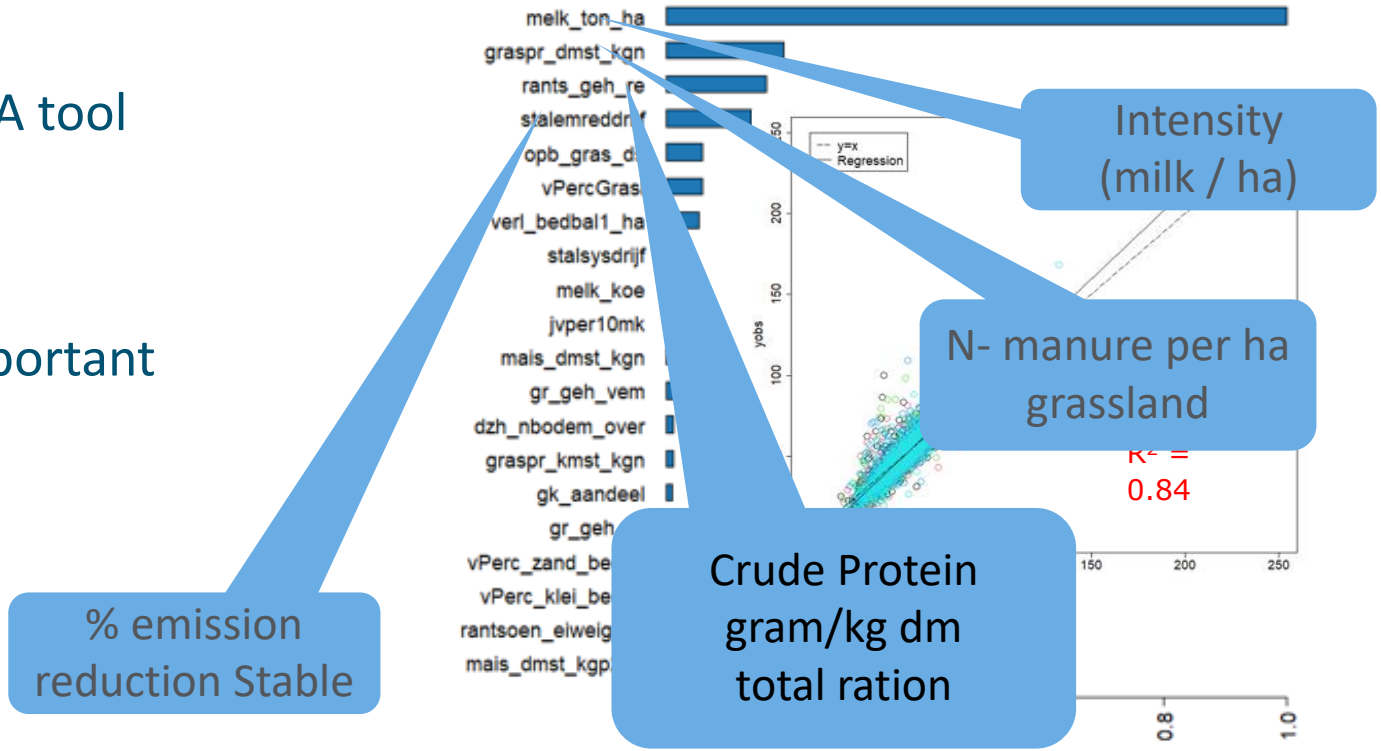
Explanation ammonia emission per ha

- Data 2021 ANCA tool
- 12000 farms
- 47 variables
- Select most important



150 dairy farmers and 45 farm guiders 4 years

Goal: 155 gram Crude protein per kg dry matter

Crude Protein ration in 2022 per class

Intensity → Soil type ↓	Extensive (<14.000)	Average (14.000 <x<20.000)	Intensive (>20.000)
Clay	**157**	**159**	**162**
Peat	**162**	**162**	**163**
Sand	**152**	**157**	**155**

- *Class based on soil type and intensity (milk per ha)*
- *ANCA data from 137 farms*

Other important developments to reduce ammonia

More grazing

Dilution with water

Low emissions floors and manure application

Total 50 to 70% reduction

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Netwerk
praktijkbedrijven

Learning networks

Integrated approach:

- Emissions NH3 and GHG
- Water quality
- Biodiversity

18 research farms:

Data about feeding and emissions barns to check feasibility and applicability

22 variation of demonstration farms to finetune measures with advisors

70 ambassadors farms to apply measures

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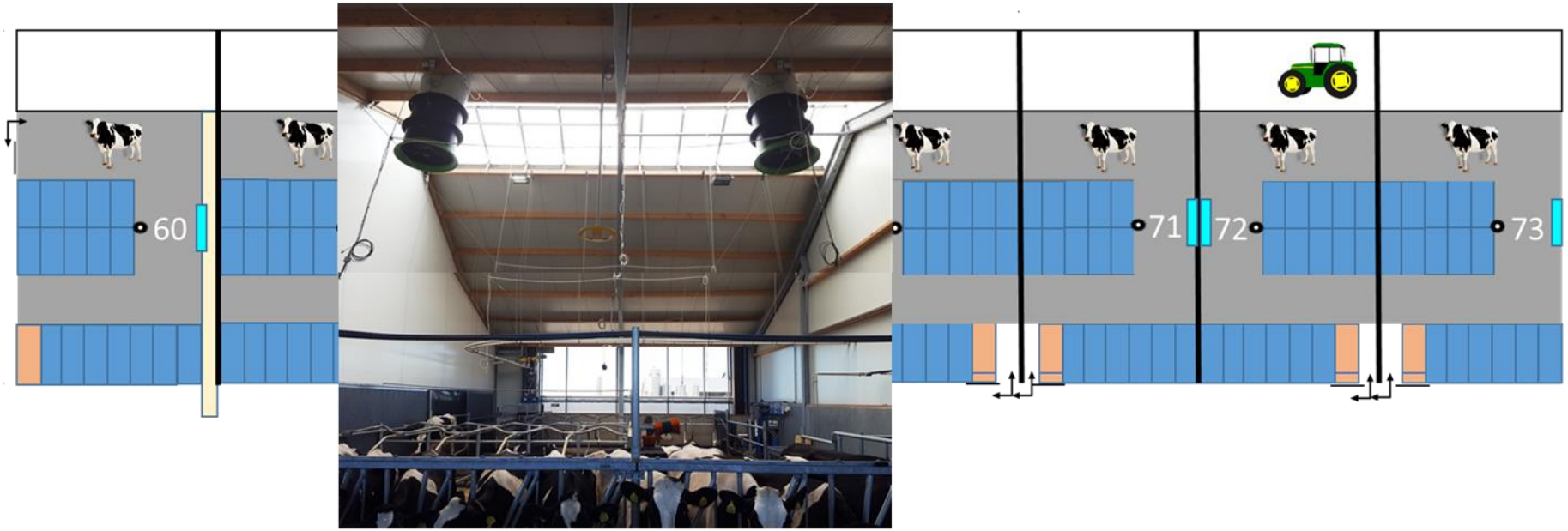
Dairy Campus: case – control units of each 16 cows

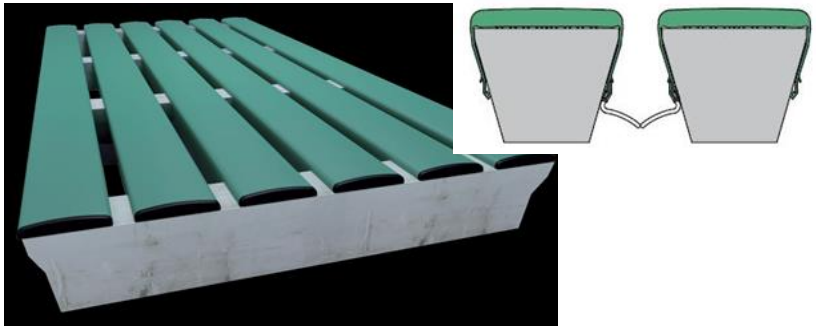


Examples floor types in practice

Swaans concrete floor G6

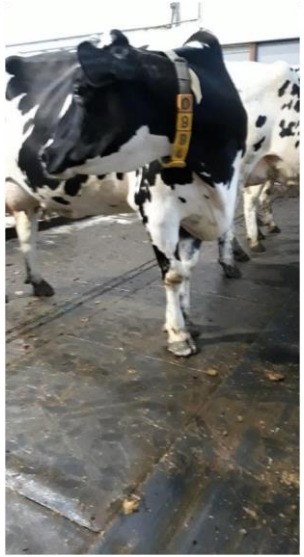
Proflex Meadow

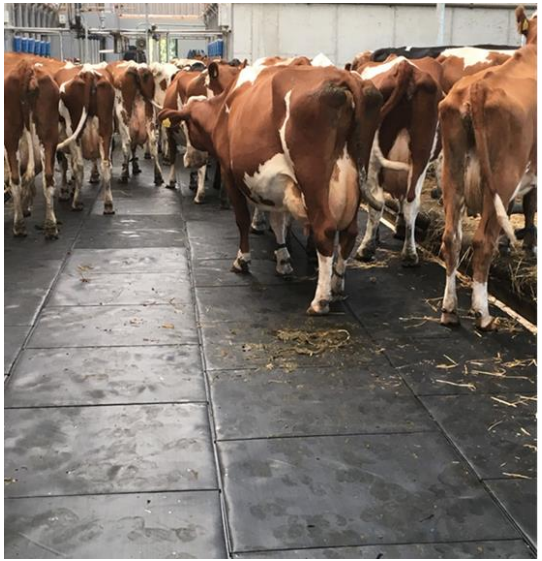
Emission factors are in discussion



Green flag floor with flaps

New permeable floor type





40 to 60% reduction ammonia emission:

- spraying water and adding urease inhibitor
- adding acid to urine: reduces NH3 and CH4

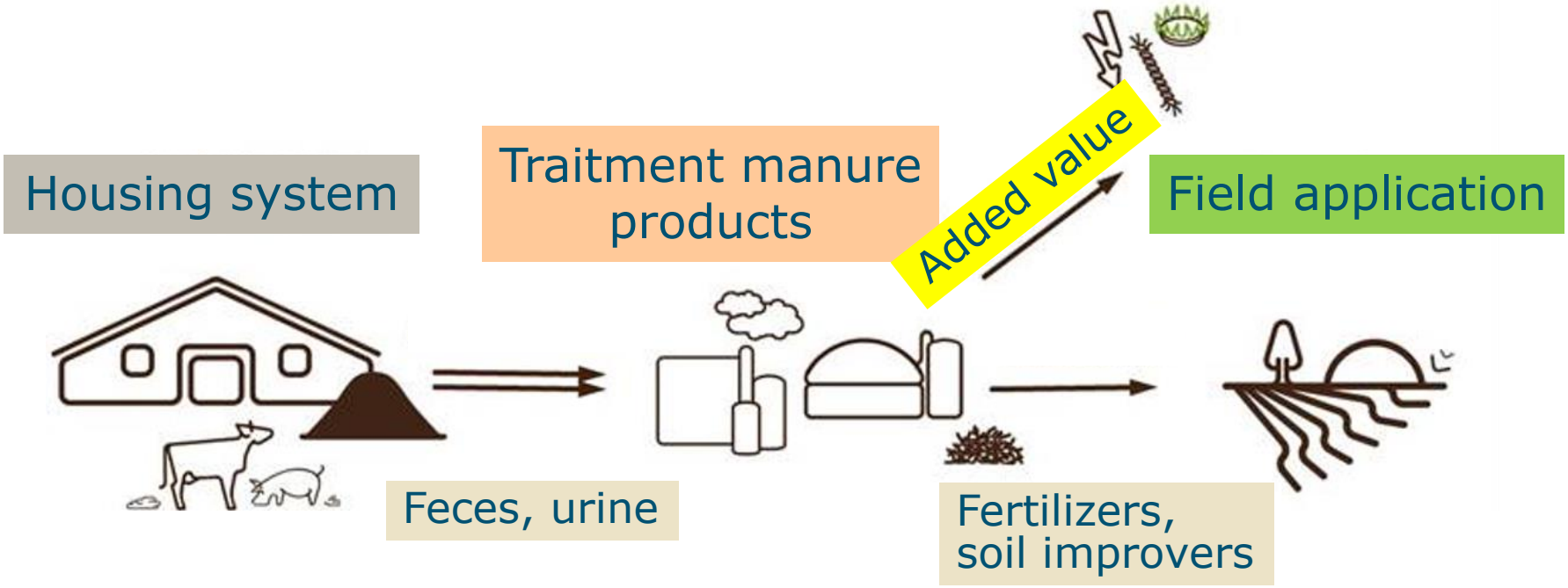
CowToilet separates 35% of urine production

35% reduction of NH3

CowToilet separates 35% of urine production

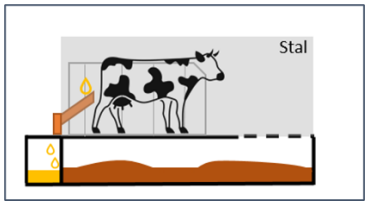
35% reduction of NH3

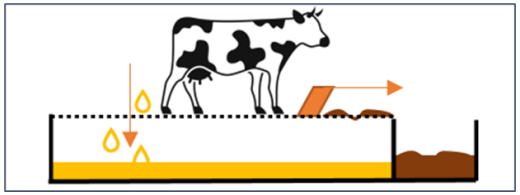
Optimizing manure chain
(Emissions (ammonia, GHG, manure quality, economics)

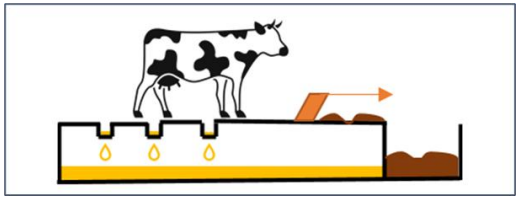


Topics

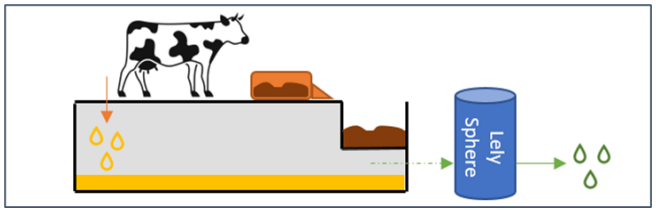
1. Cubicle barn
    1. Separation feces and urine
    2. Separation and sucking air form urine storage
    3. Digest fresh manure and mechanical separation



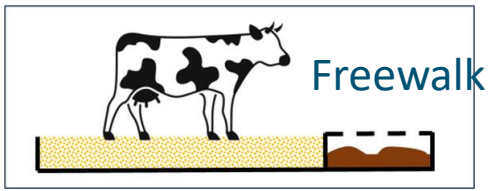




2. Freewalk barn
    1. Composting bedding
    2. Separation feces and urine



3. Quality manure products



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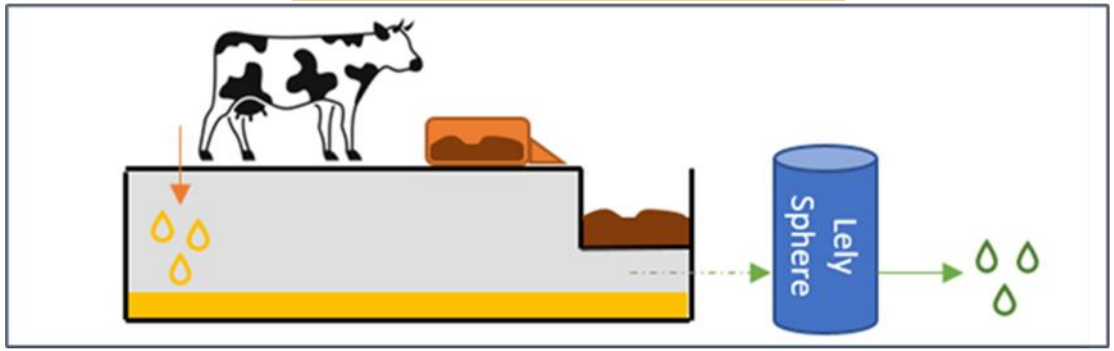
Lely sphere
Network of farmers in preparation

Lely Sphere: more than 70 % reduction ammonia barn

3 manure products



Air suction

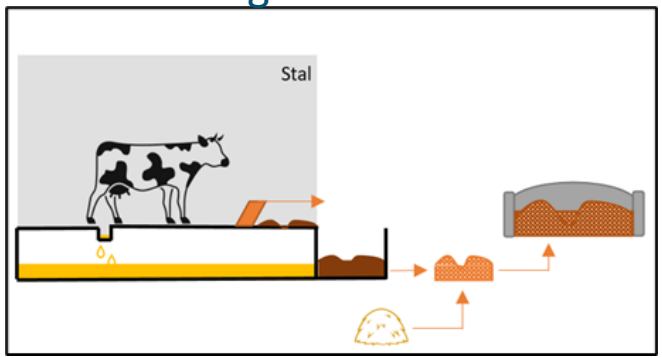
Liquid (K)

Solid (P)

Ammonium Sulphate (N)

Two examples concrete separation floor

urine storage under floor

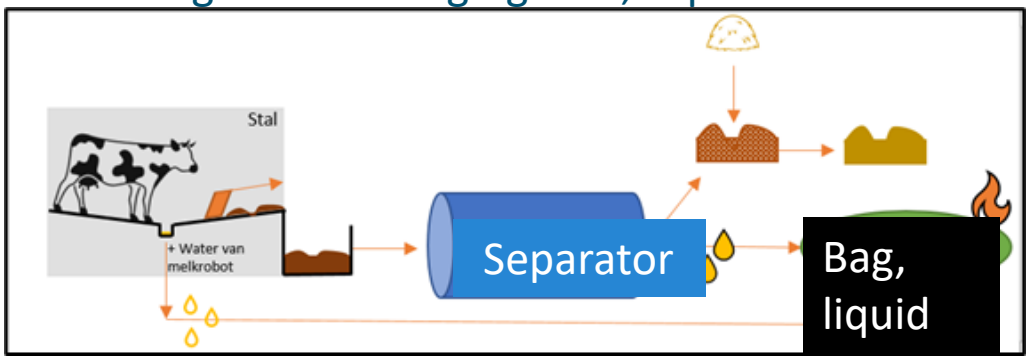


Adding straw

Urine

Fermented feces

flushing urine through gutter, separate feces



Urine

Feces

Solids

Liquid and urine

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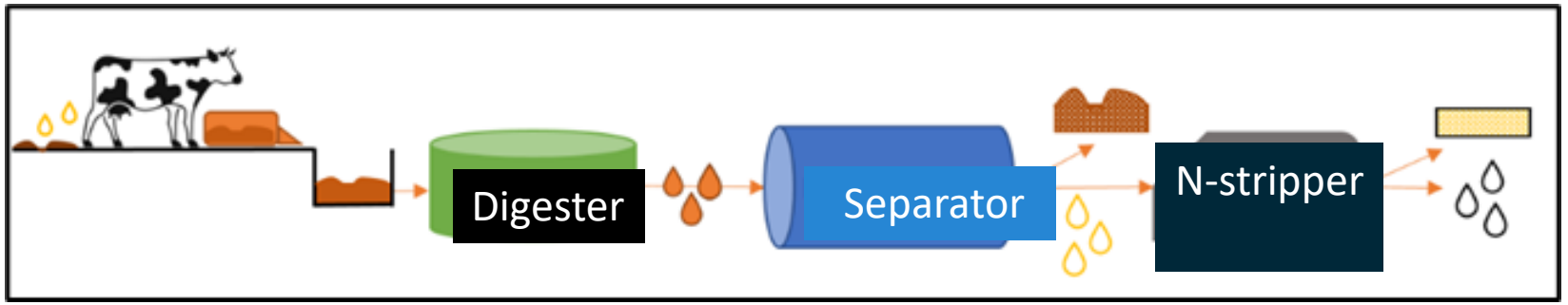
Jumpstart: digest fresh slurry and mechanical separation



Digestate

Solids

Liquid (effluent)

Freewalk barn with bedding composting wood chips

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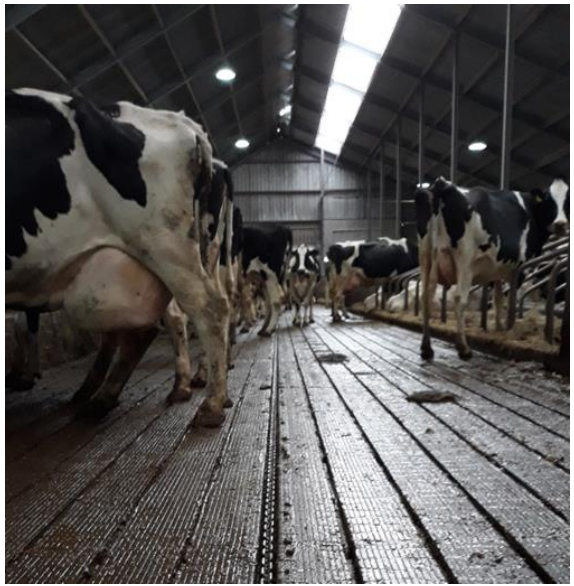
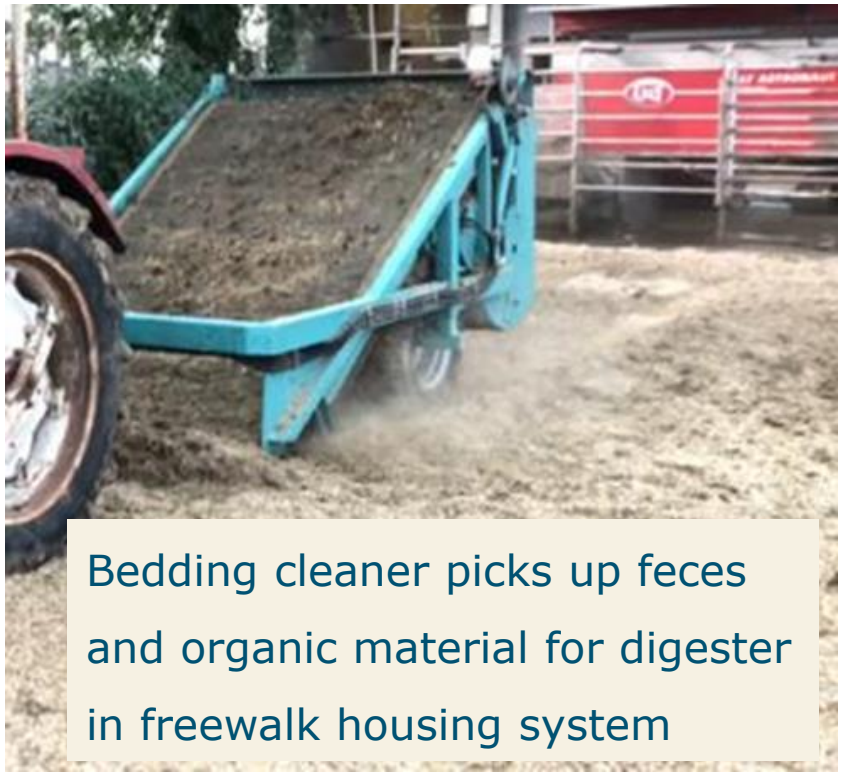
30% less ammonia, but 30% more methane emission

Examples remove slurry or feces from barn

for storage in covered silo or digesting



Separation feces and urine



Bedding cleaner picks up feces and organic material for digester in freewalk housing system

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Freewalk housing with bedding cleaner

Sand bedding to separate urine

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Dairy housing and manure quality

Housing system	Renure	Organic fertiliser	Soil improver
Cowtoilet: urine / slurry with less urine	++	+	
Permeable floor: urine, feces / feces straw	+ 0		+
Concrete floor: urine and feces	-	+	
Lely sphere:	+ -		+
Freewalk wood chips composting			++
Freewalk sand bedding: urine, feces+sand	++	+	
Jumpstart, fresh slurry digest-separate	--	+	

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Renure = REuse Nitrogen from maNURE (“Fertiliser”)

Take home messages

1. Good management is a cheap way to reduce emissions:
   feeding, grazing, manure management (stable, storage, application)

2. With High Tech further reduction of emissions is possible and
   can help to make different manure products to optimize fertilising

3. Developments:
   Improving floor types in Cubicle and bedding in Freewalk barns

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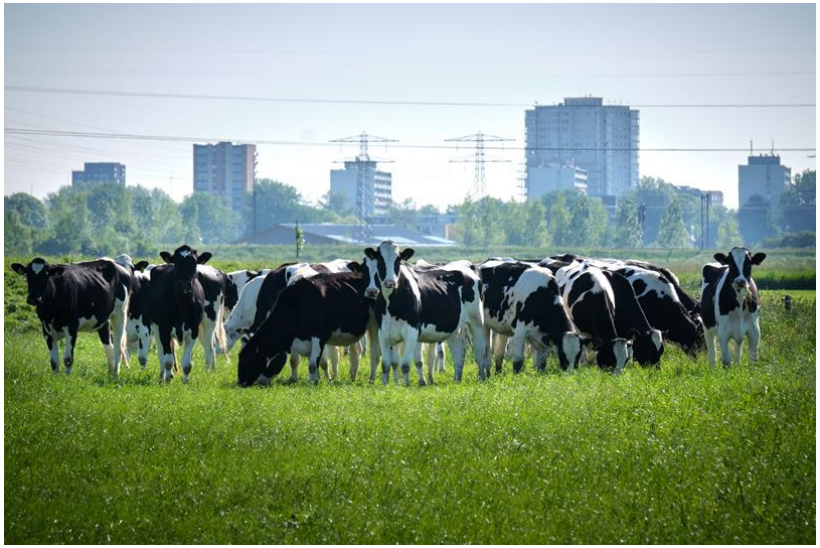
Resilience 4 for Dairy

Thanks

Paul.galama@wur.nl



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4 Resilience for Dairy

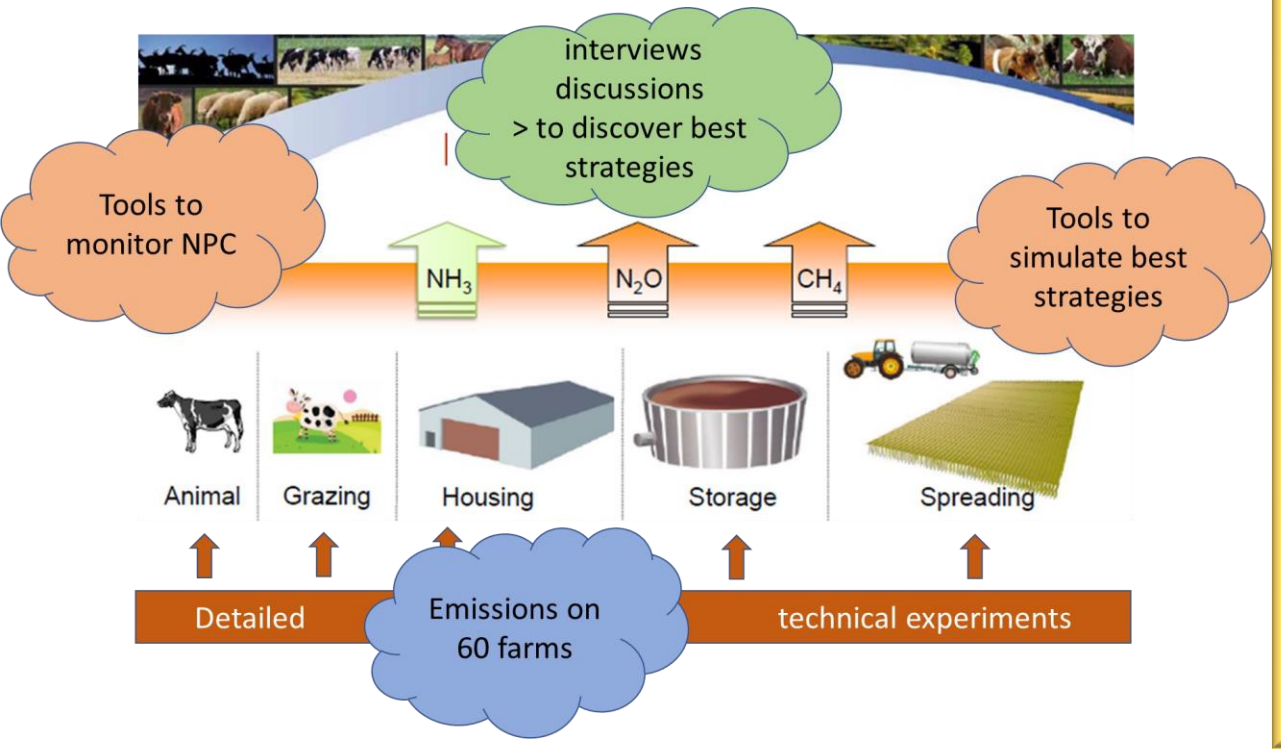
Environmental debates on agriculture - current situation in Poland

Adam Cieslak

Poznan University of Life Sciences, Department of Animal Nutrition, Poland

1 January 2021 - 31 December 2023

CLIMATE CARE CATTLE FARMING



Countries:

Netherlands

Italy

Latvia

Germany

Poland

Lithuania

United Kingdom

France

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farming

1 January 2021 - 31 December 2023

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Diversity of dairy farms in Poland

The largest number of farms – 20-49 dairy cows

1 January 2021 - 31 December 2023

Current trends

- change in the structure of dairy farms: closing of small dairy farms - no successors
- farm robotization (milk production)
- investing in renewable energy sources - increasing electricity prices
- introduction of new EU regulations

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Surveys - characteristics of farms (52)

	MEAN	SD	<min.; max.>
Size (ha)	**188**	**369**	**<5; 2000>**
Arable farming (ha)	**150**	**302**	**<4; 1500>**
Grassland (ha)	**40**	**64**	**<0; 350>**
Permanent grassland (ha)	**9**	**34**	**<0; 150>**
Herd size	**173**	**386**	**<20; 2500>**
Dairy cows	**95**	**167**	**<8; 1000>**

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1 Farmers have the obligation to contribute to environmental protection as much as possible

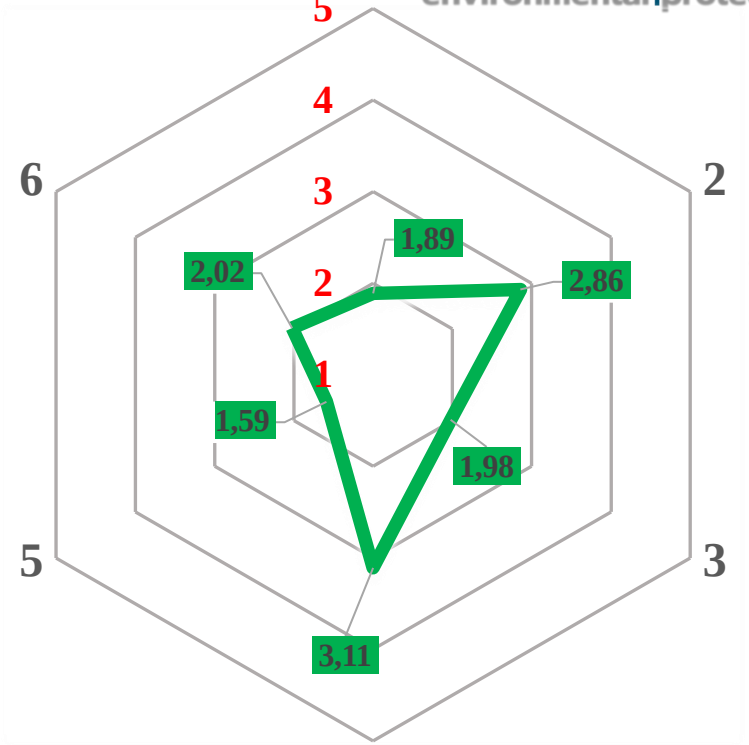
2 I am willing to take environmental protection measures on my farm even if it is at the expense of revenues

3 The negative environmental effects of farming are often overestimated by the public

4 An individual farmer cannot do anything to reduce greenhouse gas emissions

5 Climate change impacts are already noticeable

6 Sustainable farming practices can create business opportunities



Legend:
1 – Strongly agree
2 – Agree
3 – Unsure
4 – Disagree
5 – Strongly disagree

Surveys - conclusions (2022)

1. A higher awareness characterizes Polish agriculture of greenhouse gas and ammonia emissions than we assumed.
2. Surveyed farmers cannot use this knowledge to counteract the negative effects of agricultural production on the environment.
3. Better implementation of the current farmers knowledge requires financial support and educational programs.

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1 January 2021 - 31 December 2023

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sourcefile:///C:/Users/user/Downloads/brochure_enteric-logos.pdf

Present challenges

- The largest protests in recent years
- The impetus was to import grains from Ukraine (lack of quality control)
- Fallowing land and improving animal welfare - the most doubts - increase in production costs
- The question raised is whether EU society can afford the Green Deal.
- Nitrogen directive - less of a problem (large area of Poland)
- Emission calculator for dairy farms - still in development

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Resilience 4 for Dairy

1 January 2021 - 31 December 2025

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Thank you for your attention!

Acknowledgements:

ERA-NETs SusAn, FACCE ERA-GAS & ICT AGRI 2018 Joint Call
National Ministry or Agency

For more information: www.CCCfarming.eu

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Resilience 4 for Dairy

1 January 2021 - 31 December 2023

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Farmers have the obligation to contribute to environmental protection as much as possible

Environmental debates – the Ireland perspective

George Ramsbottom
Teagasc

Trend in environmental focus field in ~~Netherlands~~ IRELAND

Farmers have the obligation to contribute to environmental protection as much as possible

Production

1945----------1985

Animal welfare

1970----------

Nitrate leaching

1980----------

N-emissions 1995--------

GHG emissions 2015--

-----EU Green Deal

GHG minus 90% by 2040

Biodiversity 2015--------

Pesticides halved by 2030

Now: 4% land set aside for biodiversity

Chemical fertiliser usage in Ireland declined significantly in 2023

Richard Halleron
December 22, 2023 7:00 am

Ireland + Add to myFT

Irish farmers pressured to cull up to 200,000 cows to meet climate goals

Dairy farming produces much of Ireland's emissions, but herd-owners say large-scale culling is not the answer

Target 50% reduction

AGRI-BUSINESS

Fonterra aims for 30% on-farm emissions cut by 2030

Fonterra has today (Thursday, November 9) announced that it is targeting a 30% reduction in on-farm emissions by 2030. The...

November 9, 2023 10:31am

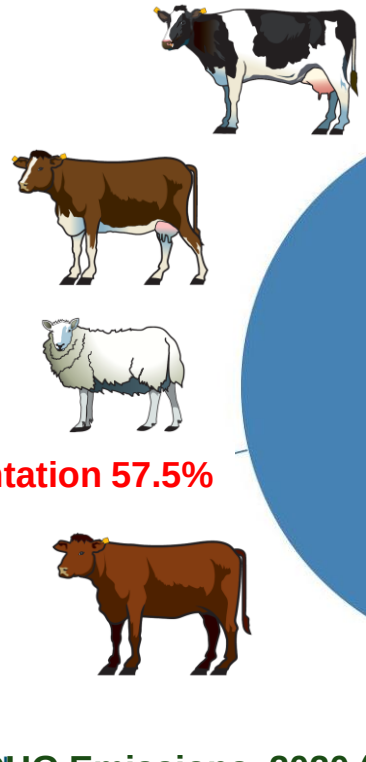
DAIRY NEWS

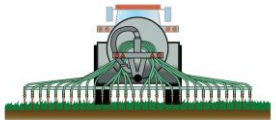
Lakeland Dairies launches Sustainability Incentive Payment

Lakeland Dairies has launched a farm sustainability strategy, with a key component being a payment to support farmers in carrying...

November 8, 2023 1:00pm

Agriculture is responsible for 37% of Gaseous Emissions





Agriculture GHG Emissions, 2020 (EPA)

Gaseous emissions reduction

3 Key Pillars of Climate Action

Signpost Advisory Programme

- Available to all farmers
- Enhanced advisory & training support
- "Know my Number - Make my Plan" *supported by the* Sustainability Digital Platform
- Engage with 50,000 farmers by 2030

Sustainability Digital Platform

- New Secure Online platform
- Facilitating Whole Farm sustainability assessment
- Farmer & Advisor Understand emissions profile

National Centre for Agri-food Climate Research & Innovation

- New Virtual Centre
- Accelerate & co-ordinate Climate Research & Innovation Programmes
- Providing leadership, nationally & internationally

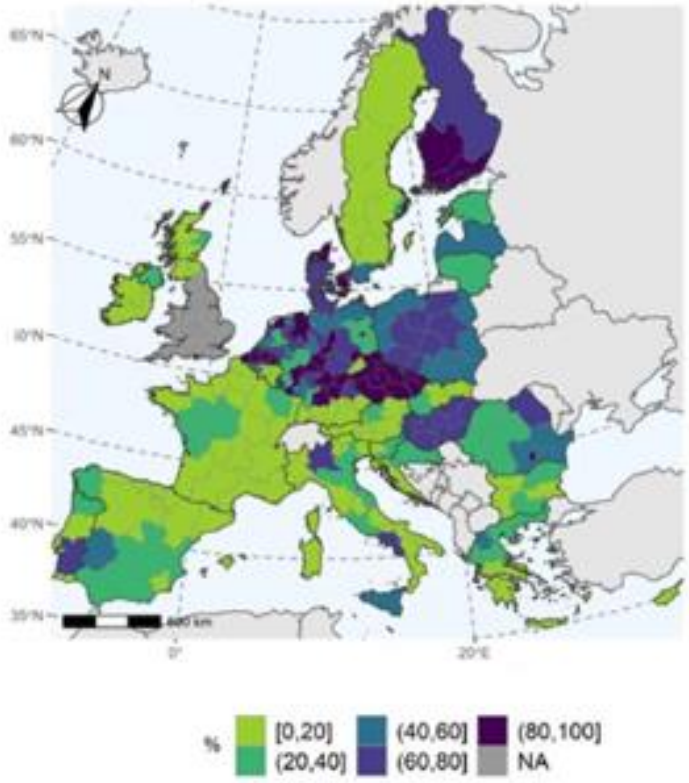
2023

600 workshops

10,000 farmers

WAGENINGE
UNIVERSITY & RESEAR

Water quality - river nitrogen levels



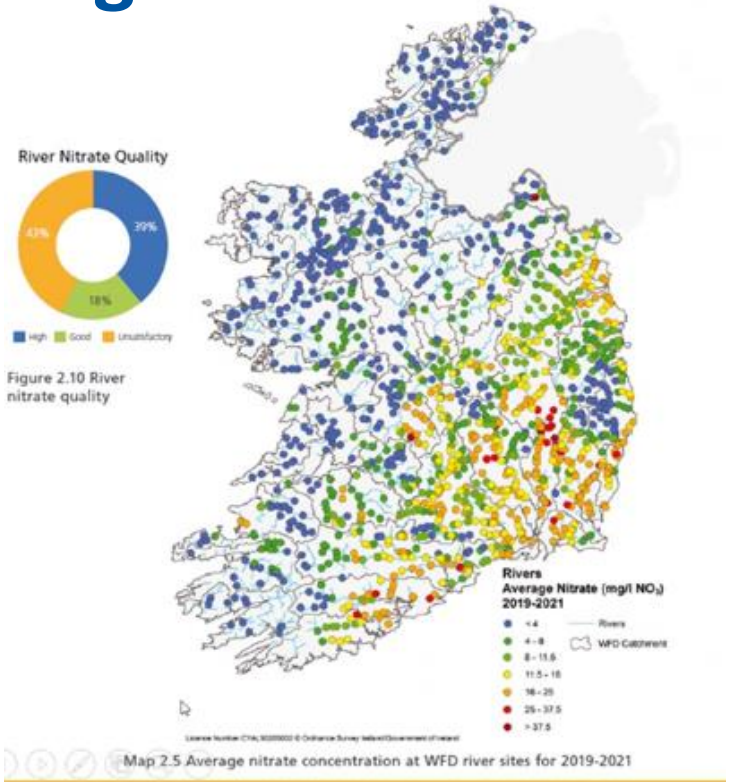


Figure 2.10 River nitrate quality

Map 2.5 Average nitrate concentration at WFD river sites for 2019-2021

the obligation to contribute to protection as much as possible

- 46 advisers
- Free
- Confidential
- Voluntary
- 4,500 farmer participants

Summary

- Ireland's environmental s
- Irish agriculture faces c nges
- A whole of industry approach