Global Methane Genetics initiative

Led by WAGENINGEN UNIVERSITY & RESEARCH

In Partnership with BEZOS EARTH FUND, Global Methane Hub

GMG Dairy Working Group meeting

23-04-2026

WAGENINGEN UNIVERSITY & RESEARCH

Agenda

- Welcome
- Open discussion
- GMG dairy projects
  - **Beat Bapst:** Brown Swiss
  - **Elisenda Rius-Vilarrasa**: Red Dairy Cattle
  - **Rasmus Bak Stephansen & Filippo Miglior: Jersey**
  - **Yvette de Haas**: DK-NL Holstein
  - **Raffaella Finocchiaro & Marcin Pszczola:** IT-PL Holstein
  - **Birgit Gredler-Grandl:** Update GMG

Update GMG

NEW projects & proposals

- **ICARDA**: measure methane in small holder farms in Africa & India
- **Buffalo proposal** (Lead University of Adelaide, Australia, Asian countries & South America)
- **Asia cattle proposal** (Bangladesh, India, Indonesia, and Pakistan)

Share data,

and accelerate genetic progress to reduce methane emission

Global Methane Genetics Initiative

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Password

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BEZOS EARTH FUND

WAGENINGEN UNIVERSITY & RESEARCH

Global Methane Hub

ICAR THE GLOBAL STANDARD FOR LIVESTOCK DATA

For registration, please contact us at methane-register@datagene.com.au

GMG project: Framework adoption & incentivization system for genetic selection as methane mitigation tool

Methane breeding value validation protocol

Webinar
May 11, 2026

SWOT analysis trait definition Selection index Breeding objective

Webinar
April 13, 2026

Review of policy levers and market mechanisms

Webinar
May 7, 2026

Session at ICAR meeting in Verona: Adoption & Incentives to Breed for Methane Mitigation
https://icar2026.it/meeting-programme/ & panel discussion

Webinars & WG meetings

News flash*

Towards guidelines to validate genetic evaluations for enteric methane emissions

Date and time
Monday, 11 May 2026
12:00-13:00h CET

Latin America working group meeting

Date and time
Tuesday, 12 May 2026
16:00-17:30h CET

Beef working group meeting

Date and time
Monday, 18 May 2026
13:00-14:30h CET

Microbiome working group meeting

Date and time
Tuesday, 9 June 2026
12:00-13:30h CET

Webinar planning GMG initiative 2026

Measuring methane emissions using Laser Methane Detection (LMD) in rural livestock systems: key considerations

Date and time
Wednesday 25 March 2026
9:00-10:30h CET

SWOT analysis of methane trait definitions and consequences for breeding programs

Date and time
Monday, 13 April 2026
12:00-13:00h CET

Dairy working group meeting

Date and time
Thursday, 23 April 2026
12:00-13:30h CET

Sniffer data aligning and editing pipelines

Date and time
Wednesday, 29 April 2026
14:00-15:30h CET

Sheep working group meeting

Date and time
Thursday, 30 April 2026
12:00-13:00h CET

Enabling adoption of methane-reducing breeding programs through GHG accounting and MRV frameworks

Date and time
Thursday, 7 May 2026
12:00-13:00h CET

Africa working group meeting

Date and time
Friday, 8 May 2026
13:00-14:30h CET

WAGENINGEN
UNIVERSITY & RESEARCH

* https://www.wur.nl/en/news/methane-emissions-cows-and-sheep-can-be-reduced-25-using-breeding-programmes

In person meetings

World Congress on Genetics Applied to Livestock Production

Madison, Wisconsin
12-17 July 2026

Save the date

Course:
Data editing
Phenotypes
Genetic analyses
Breeding program

Any other business & closure

Contact:
gmg@wur.nl

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EMBRACE-BS

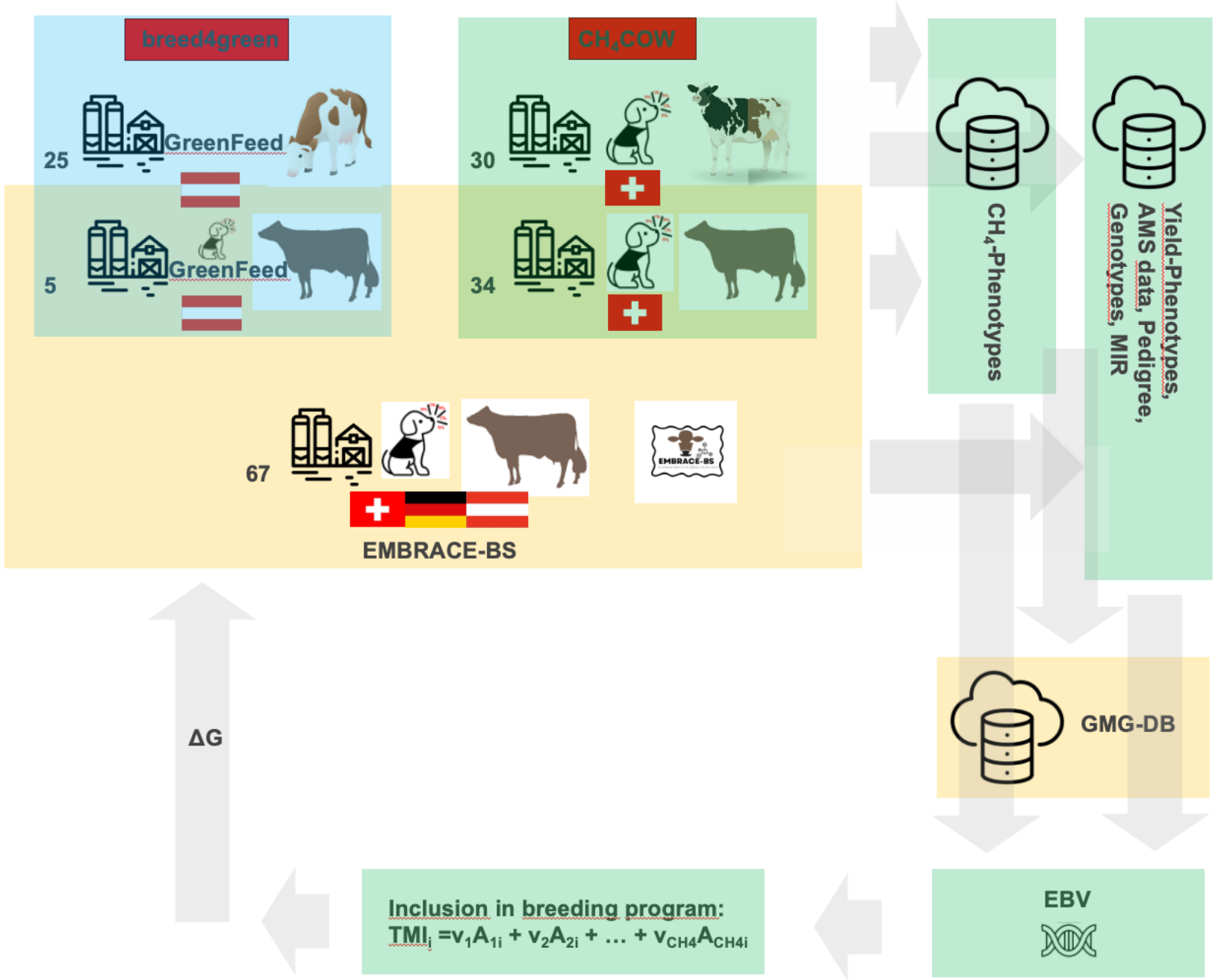
Enhancing **M**ethane Mitigation Through **Br**eeding in Small Cattle Populations - a Flagship **A**cross **C**ountry Initiative with **B**rown **S**wiss

Where we are

Beat Bapst, Qualitas AG

Outline

- Project overview
- Project objectives
- Were we are / first results
- Coming soon
- Examples of challenges
- Conclusion



Overview:

EMBRACE-BS is based on **breed4green** and **CH_4COW** projects

Objectives

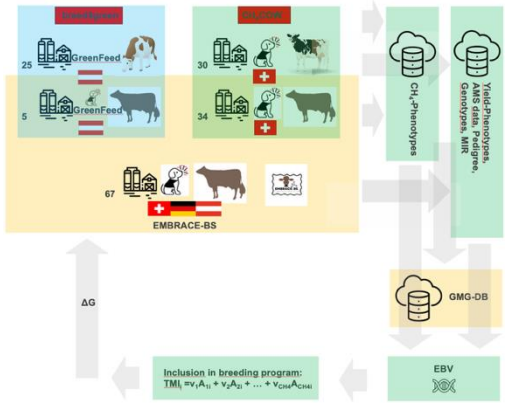
1. Expansion of the phenotyped BSW populations in AT, CH, and DE

EMBRACE-BS:	3360 cows with Sni
breed4green:	240 cows with Sni and GreenFeed
CH_4COW:	1815 cows with Sni
LfL Research farm:	50 cows with GreenFeed
Total:	**~5500 cows with phenotypes**

2. Merge data/information from these BSW projects to achieve consistency
3. Estimation of genetic parameters (VCE)
4. **Across country genetic evaluation**
5. Collect rumen fluid samples (microHub)
6. Feed the GMG database

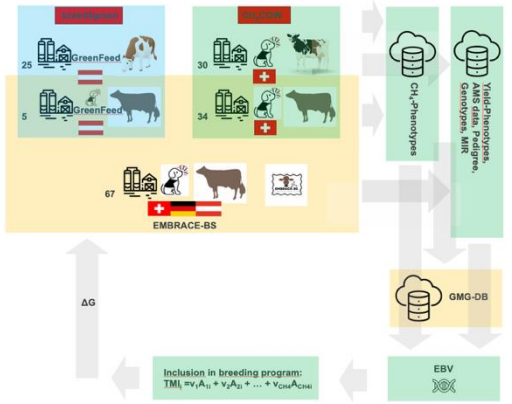
Where we are: 😃

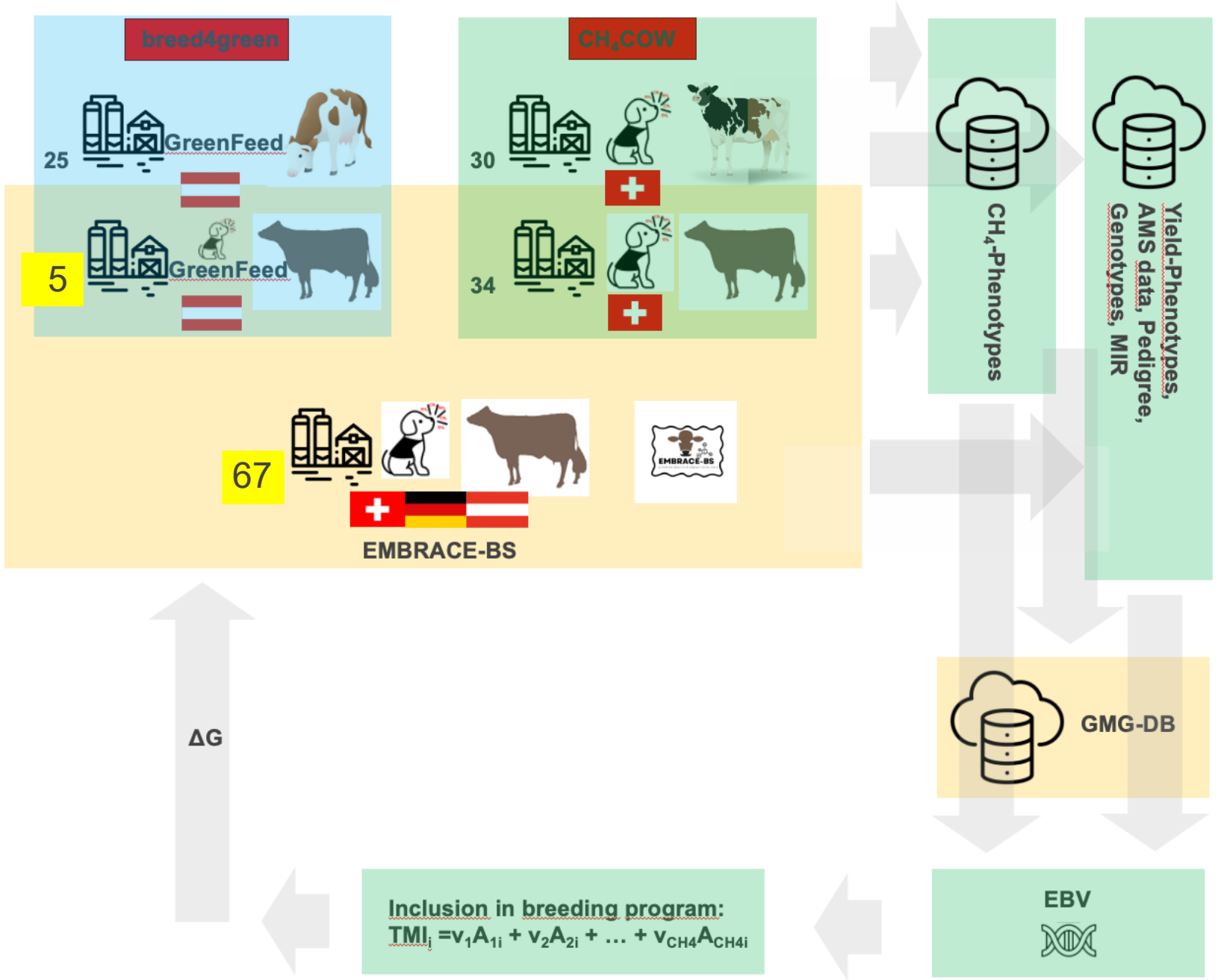
1. Sniffers (tecnosens.it, MooLogger) are now in operation
2. Sniffer data is automatically transmitted (alcantaradata.com) and distributed
3. Quality control of daily sniffer data works on different levels
4. Data editing & phenotypes:
   V1 +/- running



Coming soon:

1. Definitions (format, frequency, automation) of additional data transfer: yield, genotypes, pedigree, MIR, AMS
2. Initial feedback to breeders in early summer
3. After the test phase: start feeding the GMG database

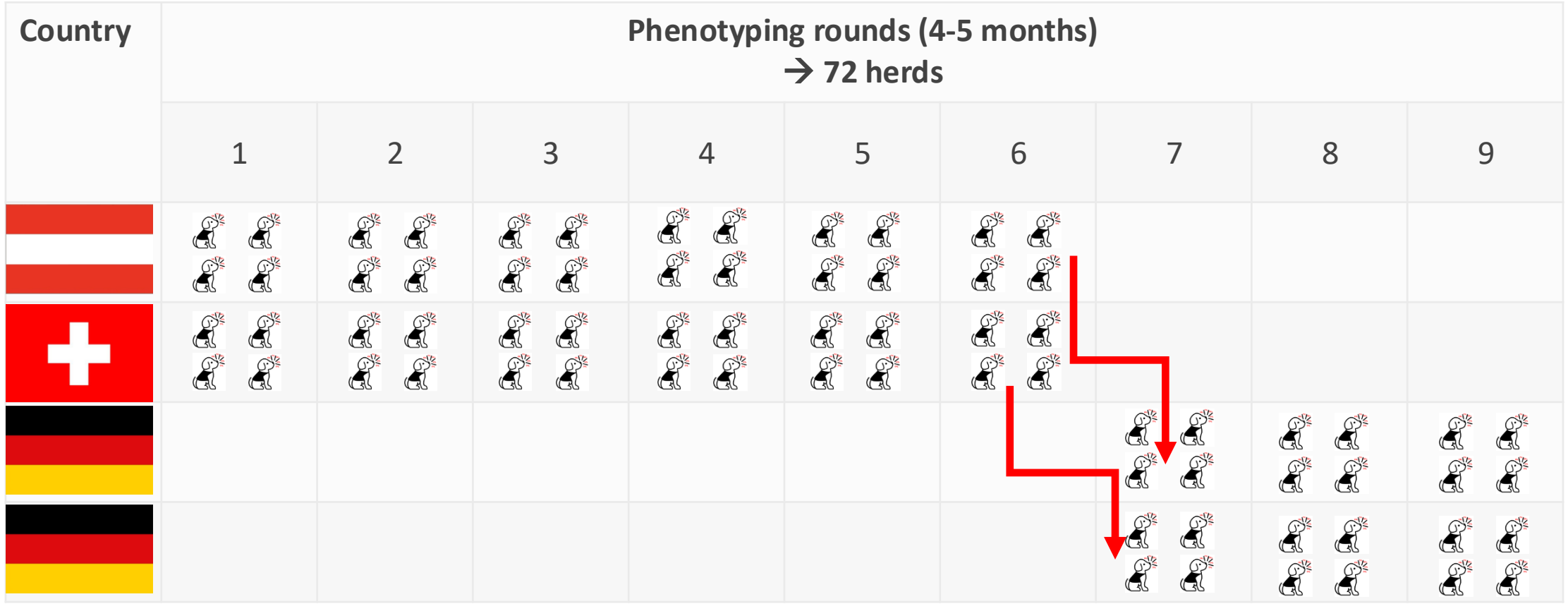




Challenge I:

8 MooLoggers in action, phenotyping 72 herds

Challenge I: 8 sniffers in action simultaneously tight schedule

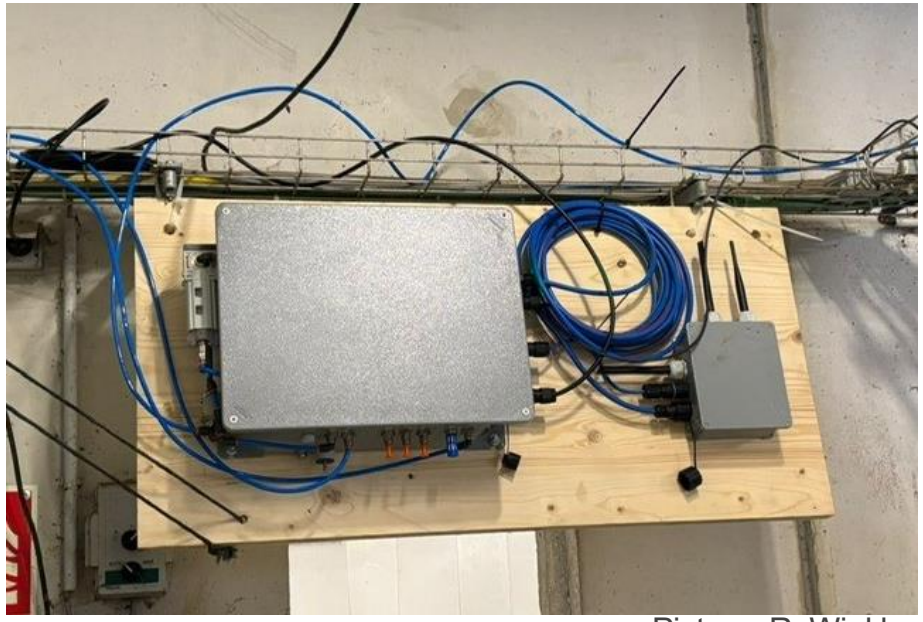


Challenge I: 8 sniffers in action simultaneously tight schedule

1. Is each sniffer working as expected from the start?
2. Is the device made for so many changeovers?

→ A dedicated coordination

is required



Picture: R. Winkler

Challenge II: Farmers are key to sucess

1. They need to believe in the idea
2. They must be willing to do extra work
3. They must accept few deviation without quitting

→Farm selection by breeding organizations

Picture: N. Berger

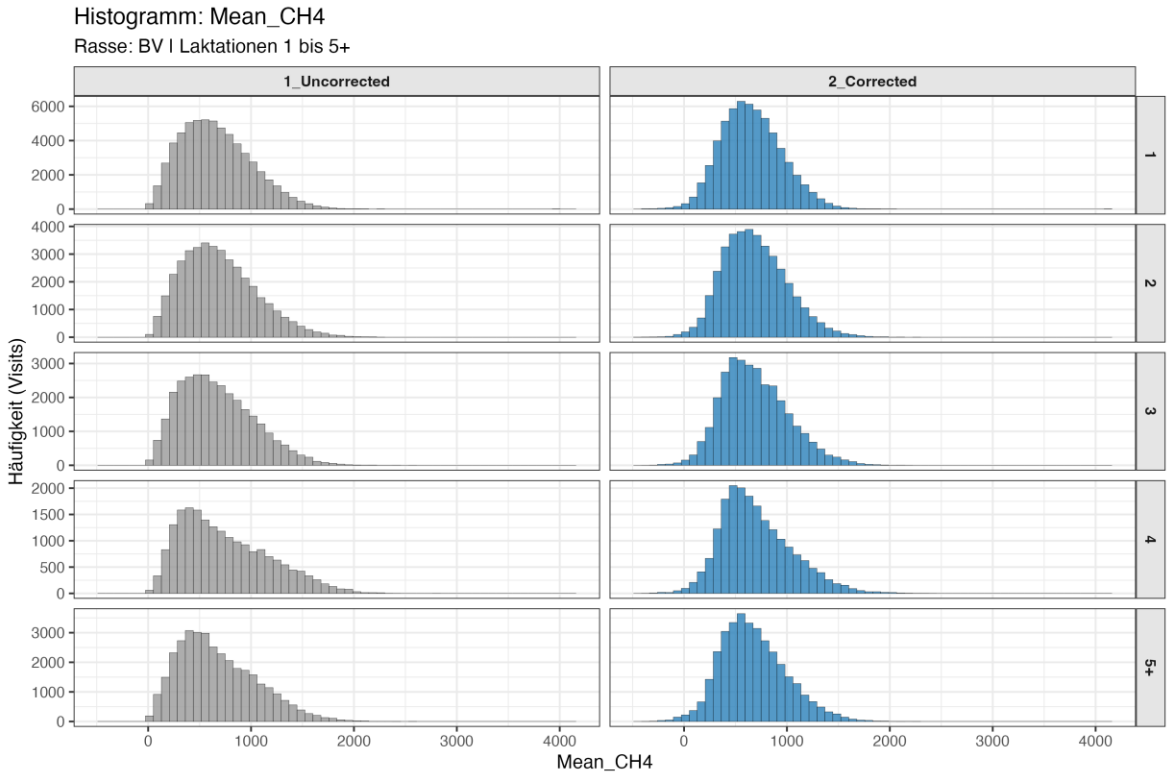
Challenge III: Is the data processing on track?

Difficult to assess before reaching variance components estimation

1. Approach so far:
   check distribution

→ Other solutions?

Before and after diurnal correction



Conclusion

- EMBRACE-BS is on track
- New topic
  - Not all developments are yet foreseeable
  - Solutions sometimes need to be developed on the fly
- Knowledge exchange is essential

Thank you for your attention!

Questions / Comments?

Austria:
Christa Egger-Danner, Martin Mayerhofer, Martin Wackerle

Switzerland:
Beat Bapst, Adrien Butty, Annika Frei (ETH Masterstudent), Timothée Neuenschwander, Patrick Stratz

Germany:
Reiner Emmerling, Elena Frenken, Robin Joest

In strong collaboration with:
Lucas Alcantara, BSW Breeding Organisations, Breeders, Aubry (Installation company), GMG team, Tecnosens, Others

Red Dairy Team

Sweden
Elisenda Rius-Vilarrasa, Patricia Ask-Gullstrand, **Sofia** Nyman, **Tomas** Klingström

Norway
Bjørg Heringstad & **Karoline** Bakke (NOR),

Denmark
Trine Michelle Villumsen & **Martin** Bjerring

Finland
Enyew Negussie (FIN)

Canada
Filippo Miglior, **Christine** Baes & **Debora** Santschi (CAN),

United Kingdom
Mike Coffey & **Raphael** Mrode (UK)
DNK),

PROGRESS UPDATE

GMG redDairy

Denmark | Finland | Sweden | Norway | Canada | UK

GMG

Red Dairy

WP1 - Progress Report

4/6 partners collecting data from the GMG funding

Denmark · Finland · Sweden · Norway · Canada · UK

Strong commitment and active support

Excellent Technical support

Follow-up meetings every 3 months

WP 1 - Progress Overview

Sniffer installation and data collection

Trine M. Villumsen

Martin Bjerring

MILESTONE STATUS – Work package 1

Milestone	2025	Status
Farmers signed on, equipment bought, pipelines set up	Y1	On track
Collection of Phenotypes, pedigree and genotypes on farms	Y1–4	On track
Rumen microbiome sampling (central lab analysis)	Y1–3	On track
Combined genetic evaluation setup	Y3–4	On track
Outreach	Y2–4	On track

NARRATIVE HIGHLIGHTS

Outreach

Papers to WCGALP and EAAP

Installation

2 sniffers installed in DNK, 4 in SWE, 5 in NOR and 3 in FIN installing Apr–May.

Challenge

Data Pipelines

DNK operational;
SWE gas DB;
FIN and NOR available

Key Metrics — 2025

CH_4 phenotyping, equipment, and microbiome sampling progress vs. targets

952
Cows with CH_4 phenotype
Target: 1,940

14 / 14
Sniffers purchased
11 operational

920
Genotyped animals
with CH_4 phenotype

0
Microbiome samples
Awaiting ethics permit

CH_4 PHENOTYPE PROGRESS

952 of 1,940 (49%) — *Target: 1,940 animals*

Key Metrics — 2025

CH_4 phenotyping, equipment, and microbiome sampling progress vs. targets

952
Cows with CH_4 phenotype
Target: 1,940

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Genotyped animals
with CH_4 phenotype

0
Microbiome samples
Awaiting ethics permit

CH_4 PHENOTYPE PROGRESS

952 of 1,940 (49%) | *Target: 1,940 animals*

COUNTRY DEPLOYMENT STATUS

Country	Sniffers	Installation	Data Pipeline	Microbiome
Denmark	2	Complete	Established	Awaiting permit
Sweden	4	Complete	Only DB Operational	On track
Norway	5	Complete	Ready not tested	uncertain
Finland	3	Apr–May 2026	Ready not tested	Awaiting permit

Swedish project

SECTION

National activities on methane projects

Patricia Ask-Gullstrand

Sofia Nyman

Linnea Bark

Anna Medved

Elisenda Rius-Vilarrasa

Thomas Klingström

Ingemar Ohlsson

Data infrastructure

Rebecca Danielsson, feeding expert

Swedish Methane projects - Red Dairy Cattle

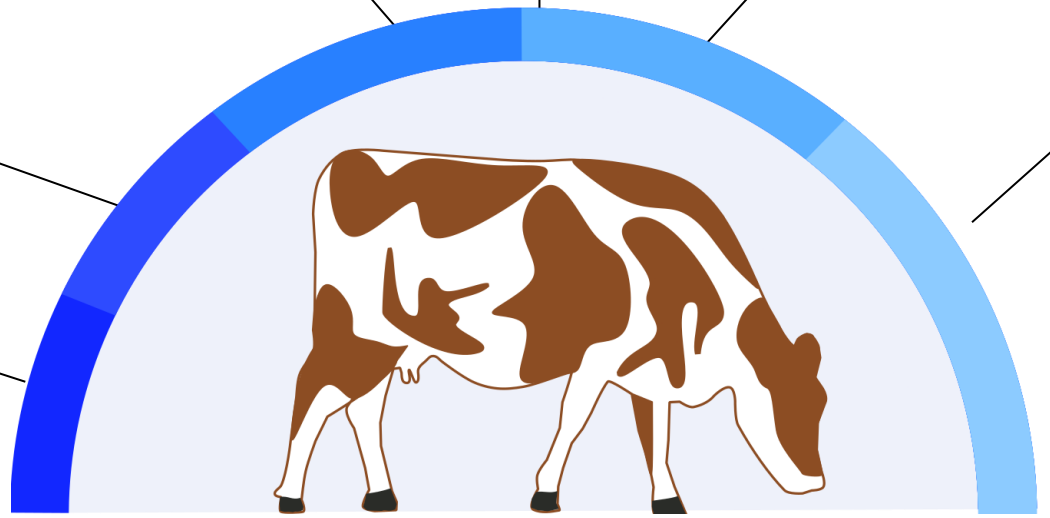
Commercial farms
(~12 farms)

National and International funding
2025-2028
(2025-2029)

Nordic (NAV) and
International Cooperation
(GMG)

Equipment
- 11 sniffers (9 national)
- 1 GreenFeed (+ 2)

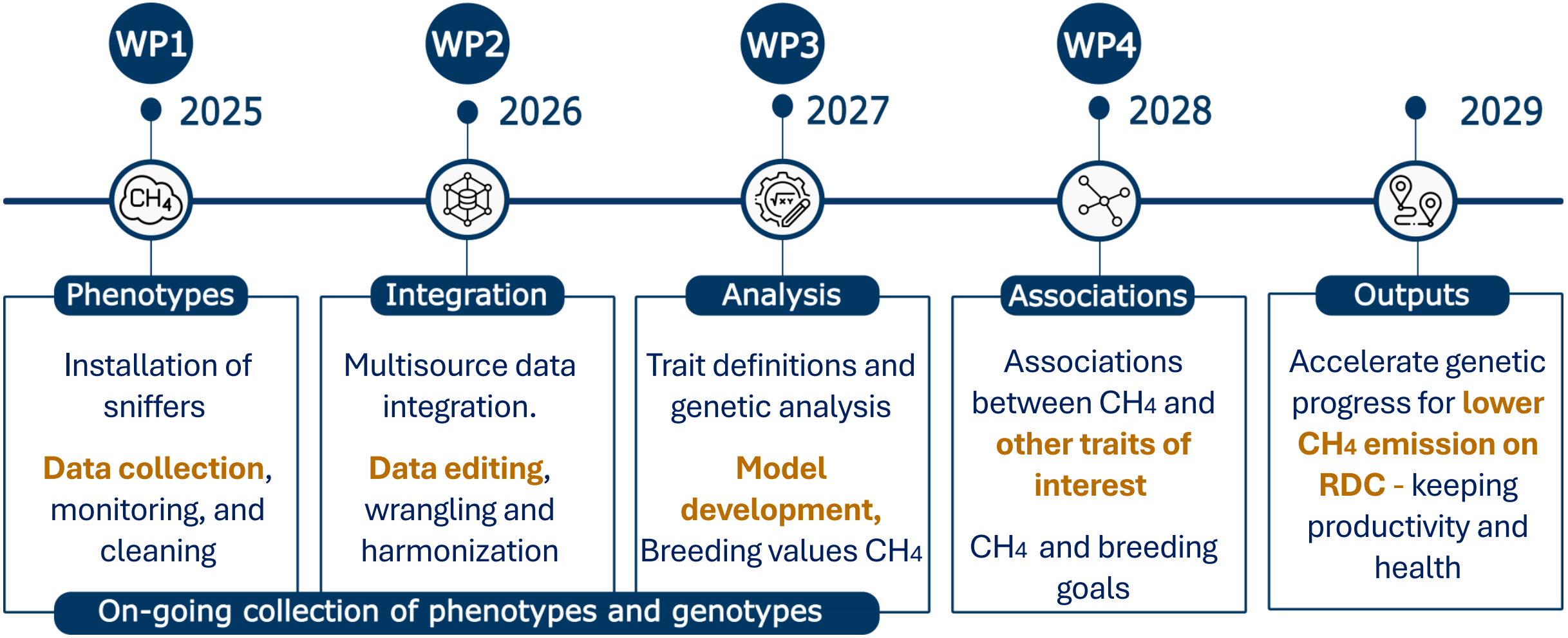
Data collection:
- Methane – **CH4**
- Carbon dioxide – **CO2**
- **MIR** (from routine milk recording)



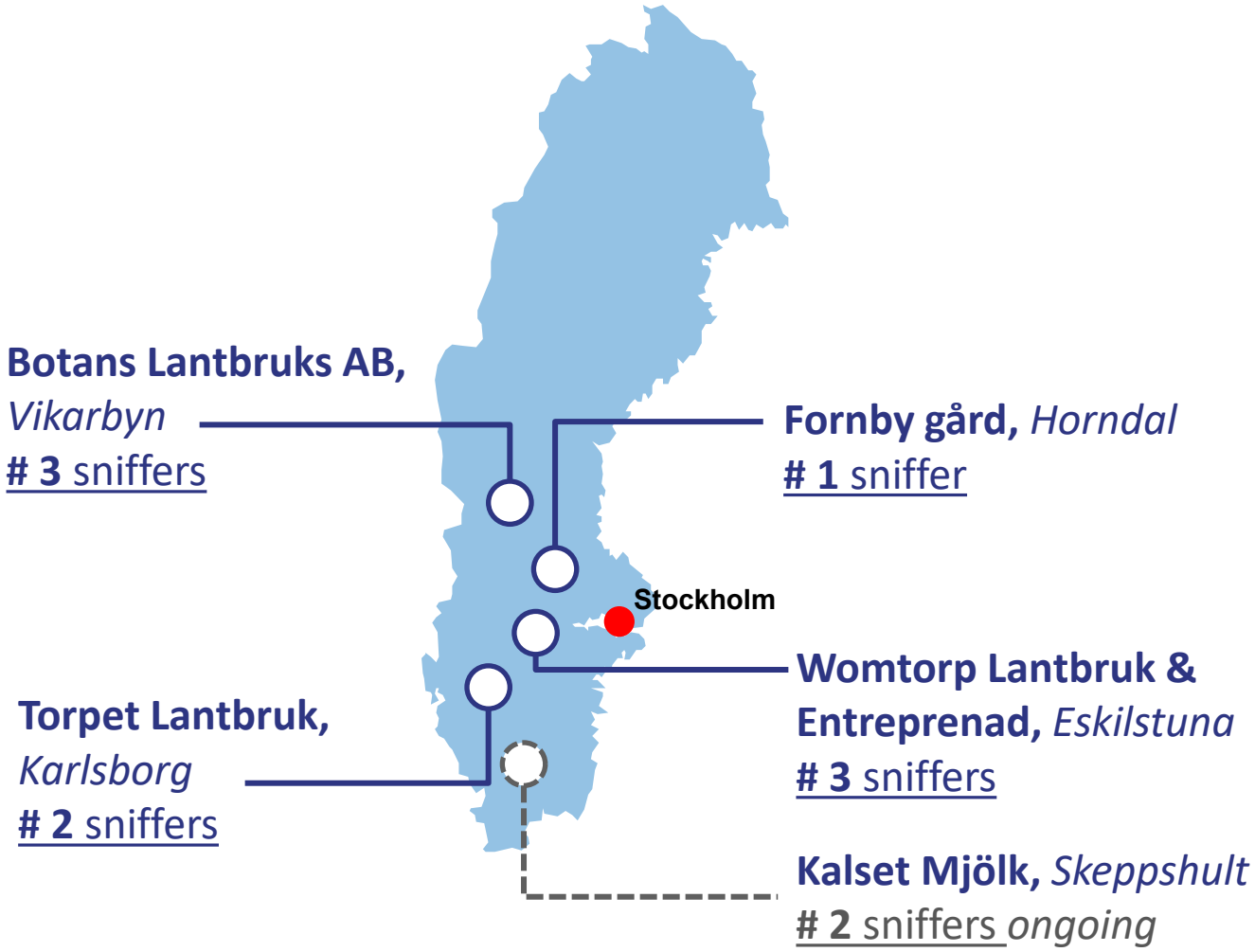
Resources
- 1 full time researcher
- 1 Industry PhD
- 2 technicians
- 4 Part time researchers/experts
- Project manager/coordinator

Acknowledgements

Swedish Methane projects



Methane data collection, today



- **Mixed herds,** RDC and HOL, **but focus on RDC**
- **November 2025** - 2 first sniffers installed “test data”
- **December 2025,** start of “official data” collection

Methane data collection, today – year 2029

TODAY

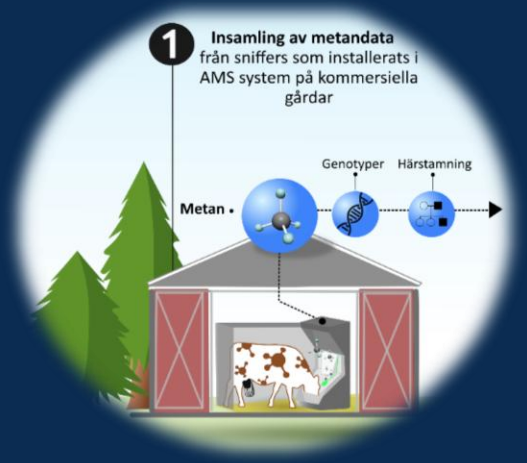
- **# 9** Sniffers
- **# 4** farms
- **# 390** unique **methane** RDC cow **registrations**
- Time recording **~3 months**
- **# live data monitoring**
- **MIR data** – all farms in Växa's cattle database

Year 2029

- **# 11** Sniffer + # **1 GreenFeed (+2)**
- **# ~ 20** farms
- **# 2 800** unique **methane** RDC cow **registrations**
- Time recording **3-6 months/farm**
- **Proxy for methane trait (MIR),** on all RDC cows
- Live data monitoring + alert system

VÄXA

From raw data to breeding values



Methane data collection

Gigacow, SLU

VÄXAs
Cattle database

VÄXA

Data
handling/alignment
Trait definition
Genetic analysis

NAV

Nordic genetic evaluation of methane traits, DNK, FIN and SWE

Methane phenotype

Nordic Breeding Goal - NTM

CLIMAT TRAITS

FEED EFFICIENCY

CONFORMATION

HEALTH

PRODUCTION

Thanks!

Picture + Content

Subtitle or short lede describing the content

Picture placeholder

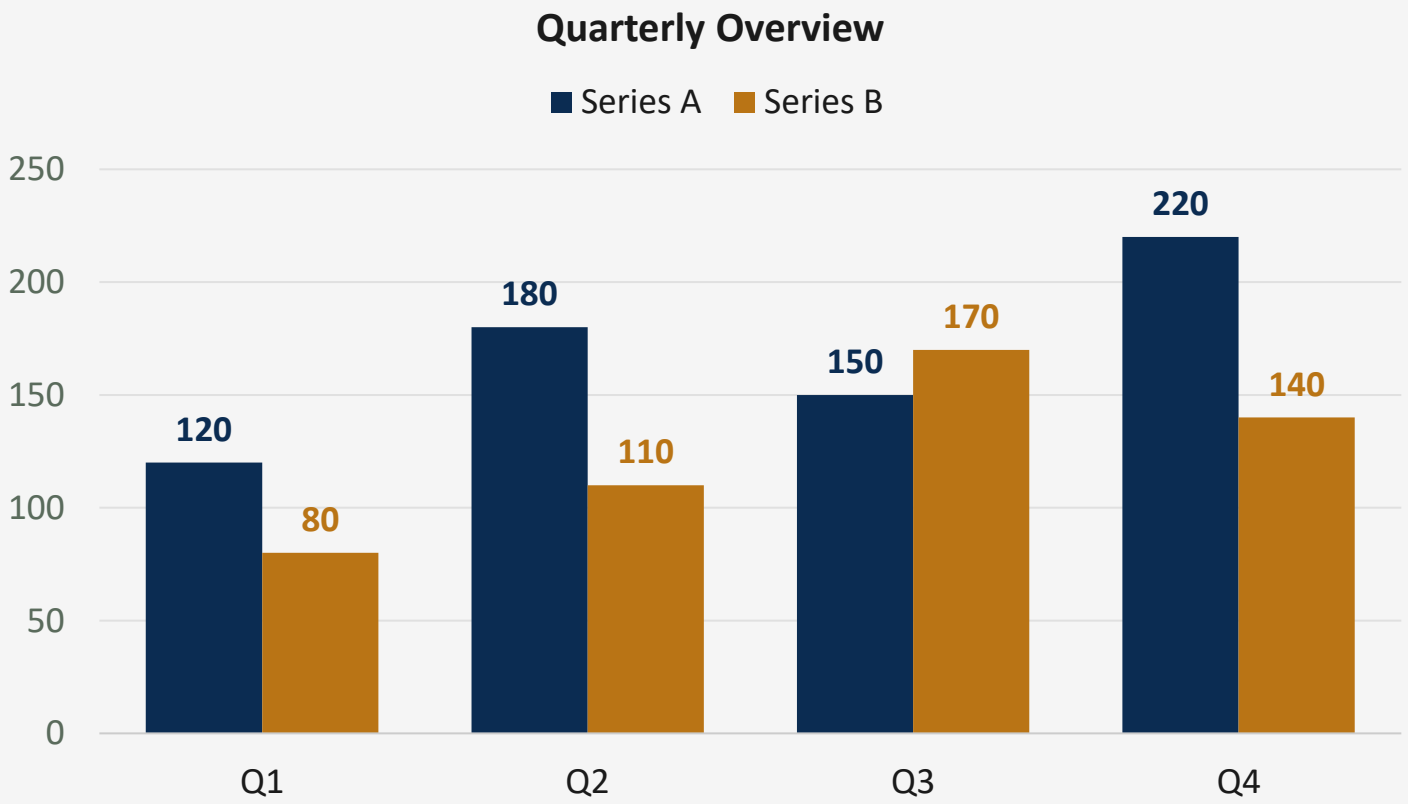
KEY POINTS

Section Heading

- Key point one
- Key point two
- Key point three
- Key point four

Chart Title Goes Here

Brief description of what this chart shows



KEY TAKEAWAYS

- Insight one from the data
- Insight two from the data
- Insight three from the data
- Final observation or next step

19

Global Methane Genetics - Jersey

Rasmus Stephansen, Trine Villumsen, Débora Santschi, Christine Baes, Filippo Miglior & Olivier Bulot

By ChatGPT

Global Methane Genetics initiative

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Global Methane Genetics - Jersey

Methane mainly recorded on Holsteins – why not **Jersey**?

We expect **differences** due to size, genetics and microbial composition in rumen

Initiatives already started in Canada and Denmark

An opportunity to **accelerate** number of recordings

World Jersey for global **dissemination** of results

By ChatGPT

The "yellow" team






AARHUS UNIVERSITY

UNIVERSITY of GUELPH

Lactanet

VIKINGGENETICS innovative breeding

SEMEX® Genetics for Life®

What we have achieved so far

Sniffers installed in Canada (6; total 12)
& Denmark (10; total 25)

M1.1 completed, and we are collecting data

Bilateral data sharing agreement -> start developing bi-country model in summer 2026

PostDoc from Canada visits Denmark - harmonizing sniffer data

GMG Jersey Poster at WCGALP 2026

Next Steps

Expect first data upload to GMG database ultimo 26

Start rumen sampling in mid 2026 (only Denmark)

Danish data into NAV Methane evaluation May 2026

Dissemination by World Jersey - one article on starting phenotyping in GMG Jersey

- Stimulate interest in other countries with Jersey´s

By ChatGPT

Challenges, issues, and open questions

Challenges in getting license from ministry and farmers willing to allow rumen sampling

Many sniffers to install at once and keep up running in terms of costs and recruiting staff

Thank you for your attention

#GoYellowCow

International collaboration developing standards and quality control measures for phenotyping with a used in breeding programs, and accelerating the phenotyping

Trine Villumsen, Coralia Manzanilla-Pech, Yvette de Haas, Roel Veerkamp, Viktor Milkevych, Mogens Lund, Chantal van Gemert, Birgit Gredler-Grandl, Anouk van Breukelen, Rasmus Stephansen, Johan Snijders, Martin Bjerring.

Problem:

Lack of standardisation (sniffer/setup)

Comparability across farms/countries

Limits use in genetic evaluation

Objective:

Develop international standards

Harmonize data collection processing

Enable genetic evaluation

Build large dataset (~20k HOL cows)

WAGENINGEN UNIVERSITY & RESEARCH

Ministerie van Landbouw, Natuur en Voedselkwaliteit

150 YEARS CRV BETTER COWS > BETTER LIFE

Global Methane Genetics initiative

AARHUS UNIVERSITY

Ministry of Food, Agriculture and Fisheries of Denmark Danish Agricultural Agency

VIKINGGENETICS breeding for what truly matters

FROM MEASUREMENTS TO BREEDING VALUES

*Lab and on farm **validation** of sniffers*

***Protocols** for installation & calibration*

***Automated pipeline** (GEDA) operational*

*Bi-country **genetic evaluation***

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CURRENT PROGRESS & CHALLENGES

Data

WUR
- 10K HF cows
- 89 farms
- 2018-2025
- CarItech
- CH4, CO2 ppm

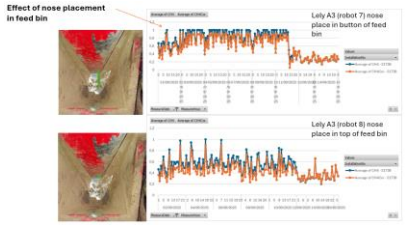
Future:
- 25 Moologger

AU
- 9K HF cows
- ~25 farms
- 2016-2025
- Guardian
- CH4, CO2 ppm

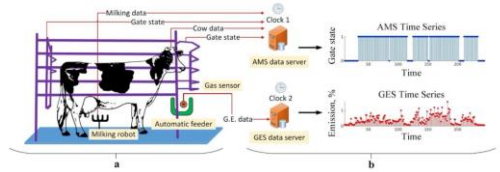
Future:
- 30 Guardian

Sniffer comparison

Protocols



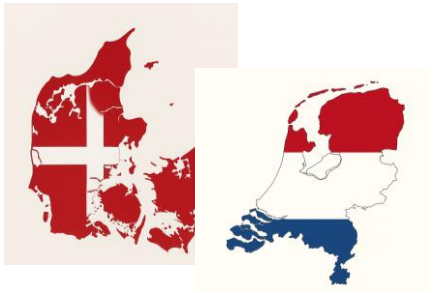
Pipeline development



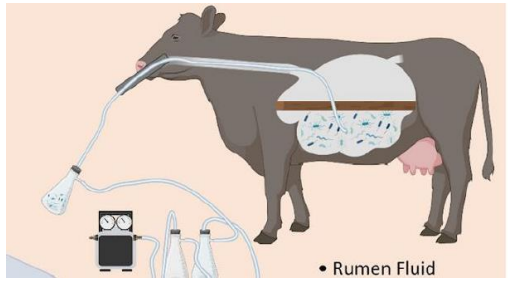
Challenges

Robust trait

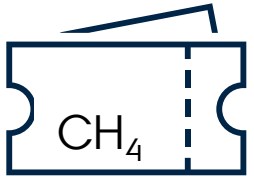
Bi-country evaluation



Rumen samples



Credit system



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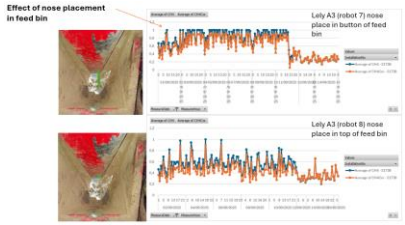

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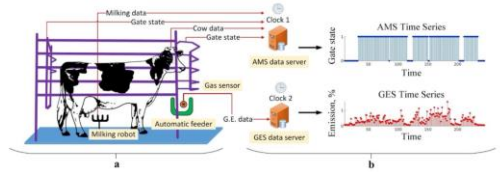

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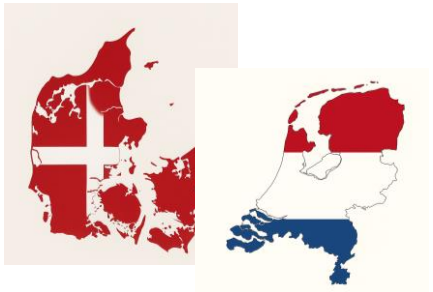
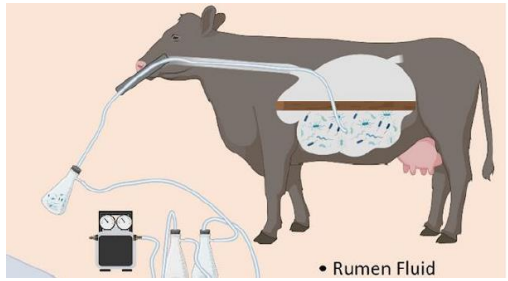
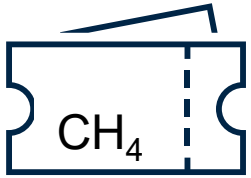


Rumen samples



Credit system



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Ministerie van Landbouw, Natuur en Voedselkwaliteit

150 YEARS CRV BETTER COWS > BETTER LIFE

Global Methane Genetics initiative — Led by WAGENINGEN UNIVERSITY & RESEARCH — In Partnership with

AARHUS UNIVERSITY

Ministry of Food, Agriculture and Fisheries of Denmark
Danish Agricultural Agency

VIKINGGENETICS breeding for what truly matters

Sniffer comparison for large-scale methane recording

April 23, 2026

Yvette de Haas, Chantal van Gemert, Johan Snijder

WAGENINGEN
UNIVERSITY & RESEARCH

Develop protocols for methane recordings

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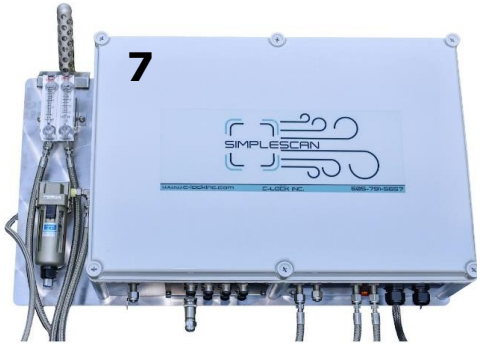
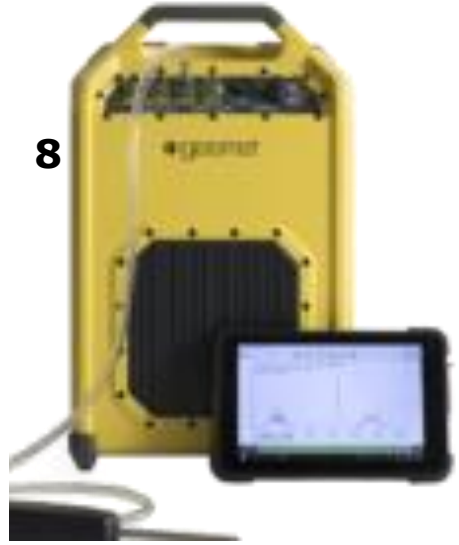
Establishing quality standards for **sniffers** and setting up test facility (lab and on farm) for different sniffer types that will serve as guidelines when starting to collect methane records

- Compare specifications of commercially available sniffers
- Calibrate and validate a few of these in our Air Quality Lab
- Set up a test facility on farm with different sniffer types
- Validate these sniffers against the lung method* and a GreenFeed
- Set up protocol for methane recordings with a sniffer device

* https://edepot.wur.nl/536449

Commercially available sniffers

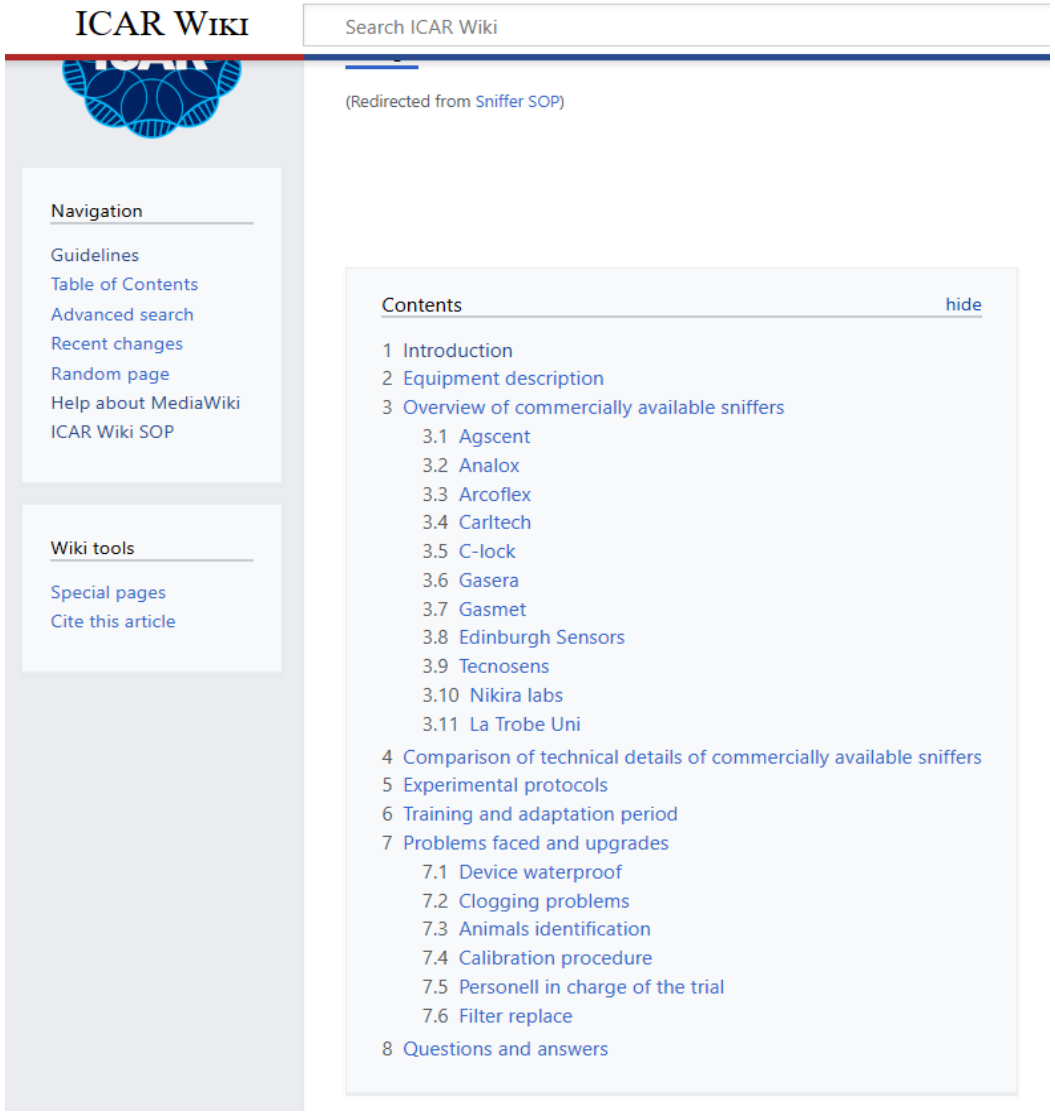




https://carltech.nl/en/products
https://agscent.com/products/agscent-air/
https://gasera.fi/product/gasera-one-pulse/
Arcoflex: https://doi.org/10.1016/j.cej.2025.165629
https://edinburghsensors.com/products/gas-monitors/
https://www.tecnosens.it/en/Tecnosens-products/moologger
https://www.c-lockinc.com/products/emissions-monitoring/simplescan
https://www.gasmet.com/products/category/portable-gas-analyzers/gt5000-terra/

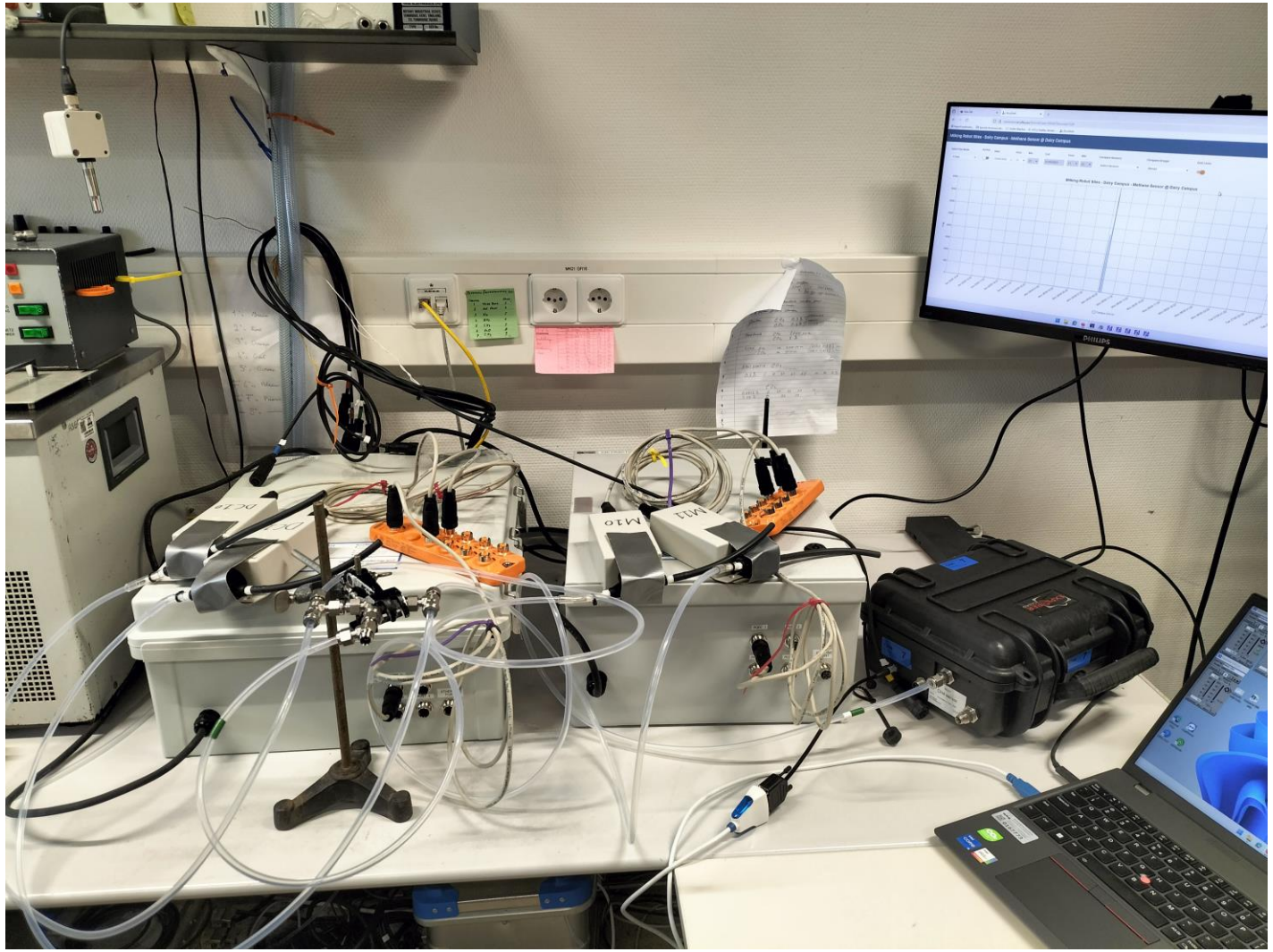
Specifications

- Type of (infrared) sensors used
- Measured gas/gases
- Range of gas measurements
- Response time
- Repeatability, accuracy
- Internal data storage
- Interface
- Size & Weight
- IP value
- Price



ICAR Wiki page: https://wiki.icar.org/index.php/Sniffer_SOP

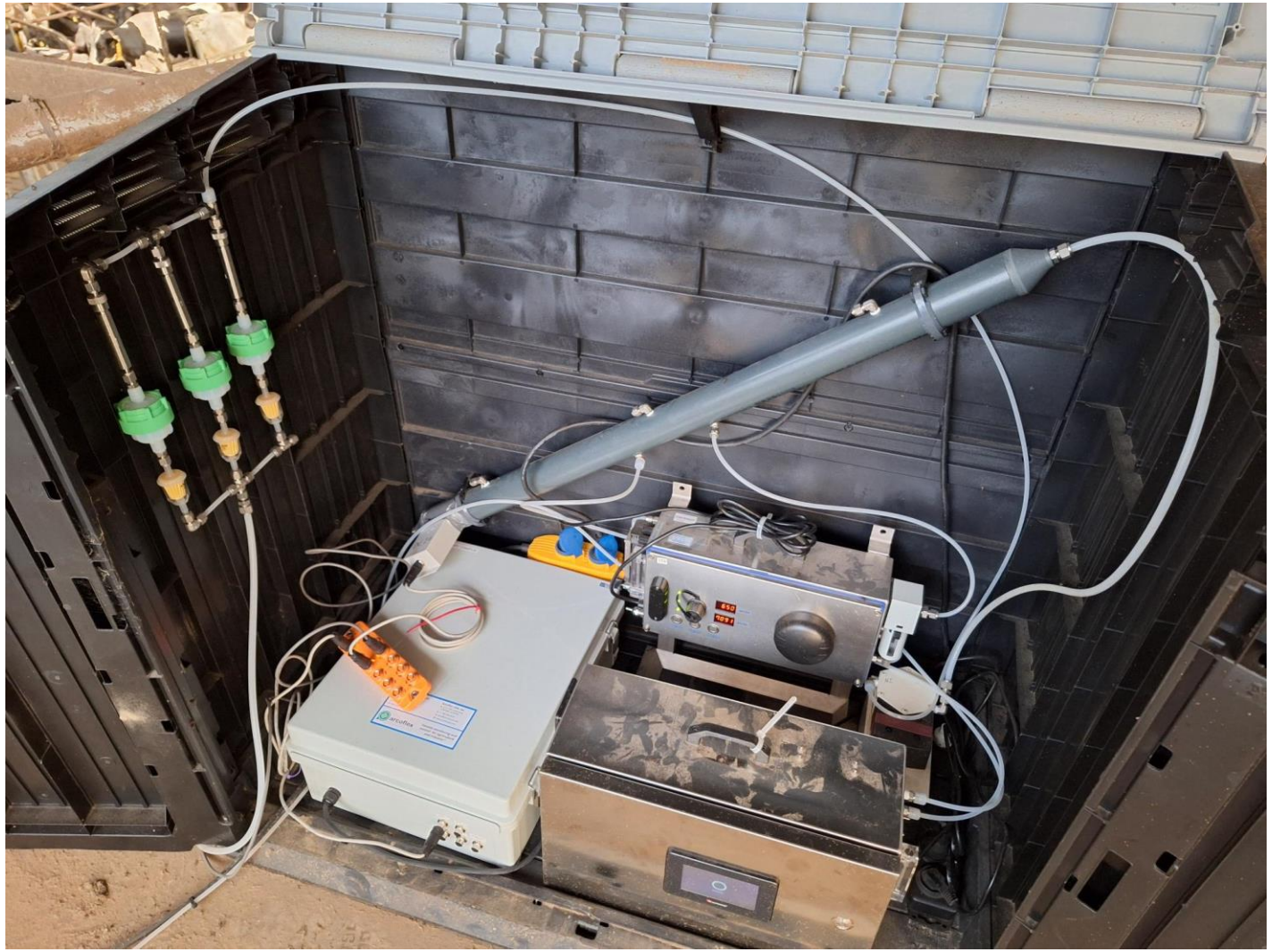
Set up lab facility



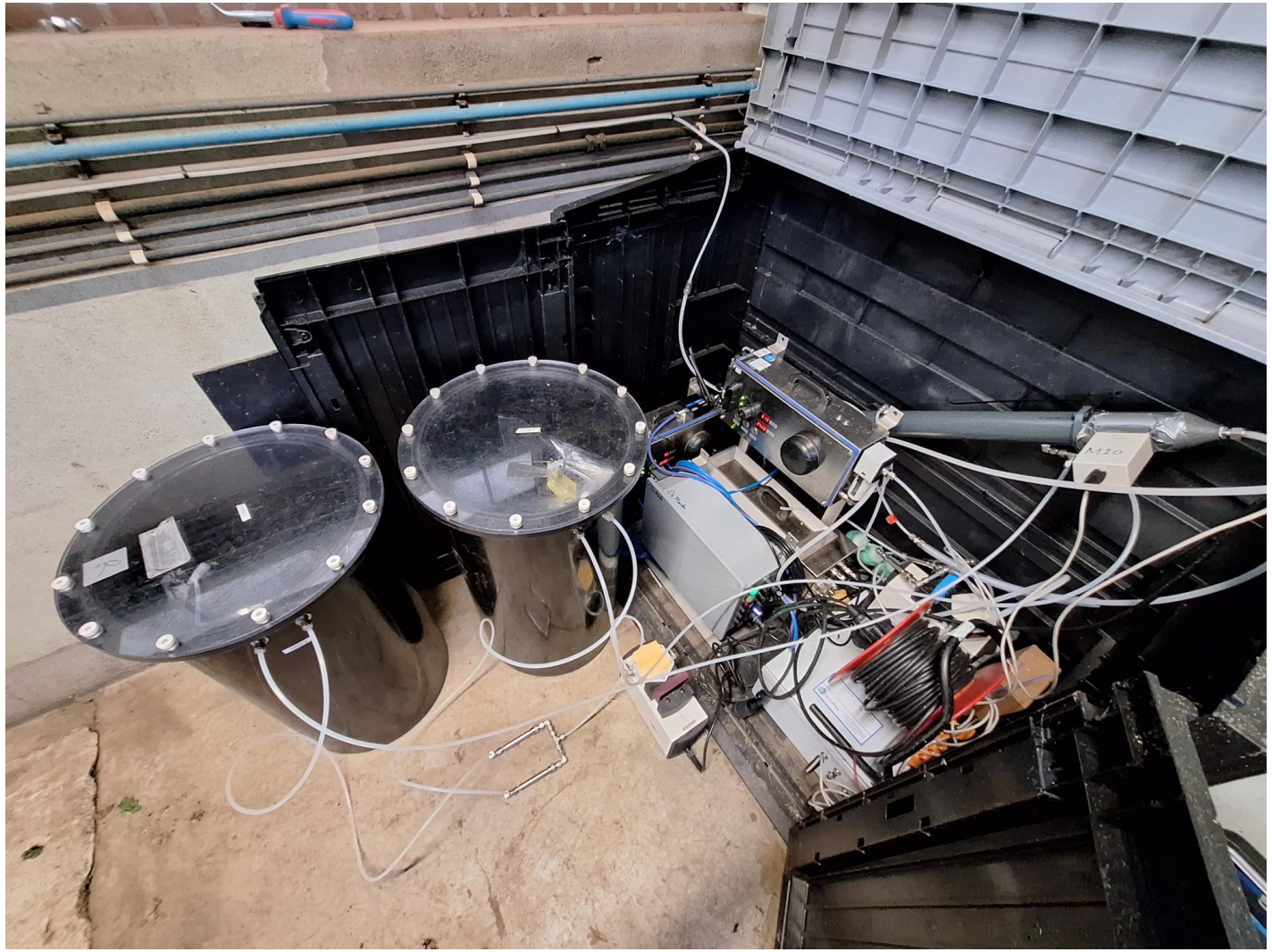
Results from lab testing

Offered CH_4 concentration (ppm)	Recorded CH_4 concentration (ppm)							
	Sniffer 1a	Sniffer 1b	Sniffer 2a	Sniffer 2b	Sniffer 3a	Sniffer 3b	Sniffer 4a	Sniffer 4b
145	147	139	160	198	246	287	200	189
295	295	288	308	328	461	280	349	337
595	592	584	603	588	685	668	647	637
1192	1179	1171	1200	1115	1221	1402	1246	1237
1787	1758	1750	1799	1642	2017	2152	1843	1839

Set up on farm facility

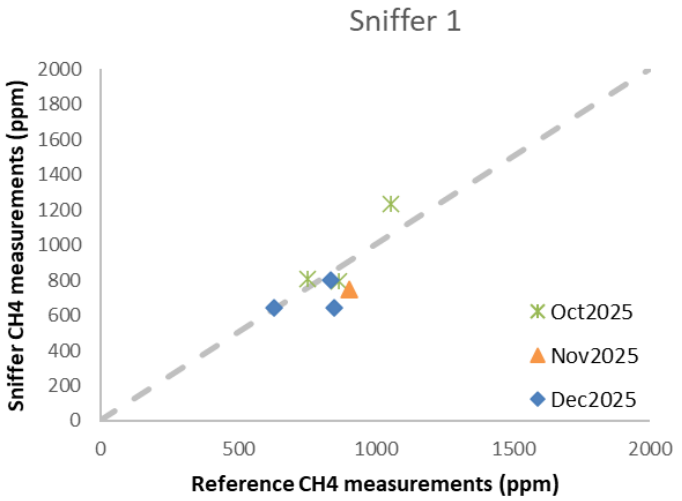


Test facility with lung method (= Gold Standard)

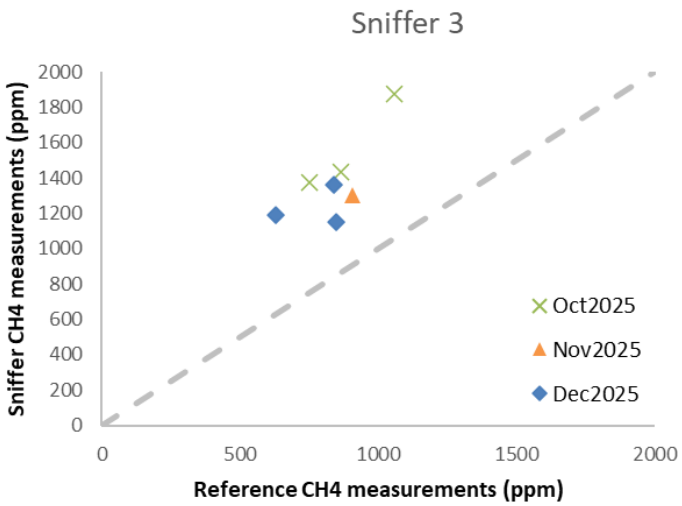


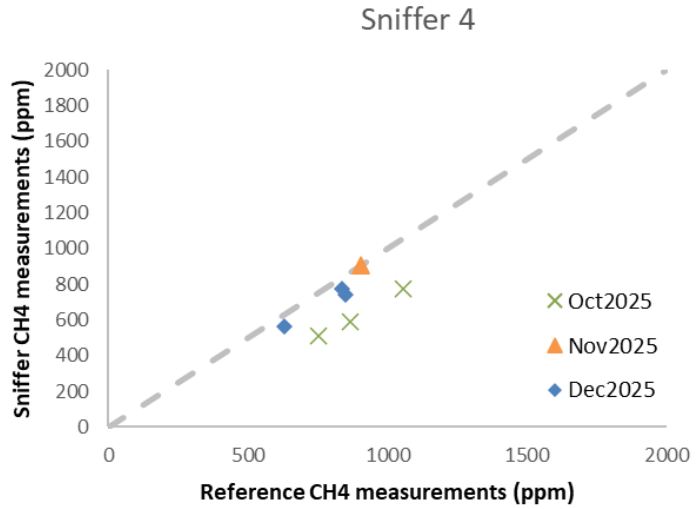
https://edepot.wur.nl/536449

Results from lung method



Sniffer 2 broke down after only a few weeks in the barn





Comparison with the GreenFeed

	Pearson				Spearman rank		
	GreenFeed	Sniffer 1	Sniffer 3		GreenFeed	Sniffer 1	Sniffer 3
Sniffer 1	0.31				0.32		
Sniffer 3	0.33	0.98			0.34	0.98	
Sniffer 4	0.24	0.89	0.91		0.33	0.92	0.95

GreenFeed-visit not at the same moment as AMS-visit; sniffers all same air

Summarzing conclusions

- There are differences in performance of sniffers to record methane concentrations in the breath of dairy cows
- The lung method is a way to longitudinally monitor the performance of sniffers over time
- First results between methane production (g/d, with GreenFeed) and methane concentrations (ppm, with sniffers) show a positive correlation

Official ICAR testing centre for validation

Validation of sniffer and other methane recording devices with ICAR

I. Air Quality Lab of Wageningen University & Research
II. Innovation and Research Center Dairy Campus

- Now manufacturers can request validation of their devices through ICAR for *Ruminant gas production CH_4 and CO_2*
  https://my.icar.org/applications-for-icar-validation/edit/

Thank you for your attention

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Yvette.deHaas@wur.nl

GMG:
Accelerate the collection GHG data in two European milk-producing countries.

Raffaella Finocchiaro (ANAFIBJ) & Marcin Pszczola (PFHBiPM)
Project Leaders

Italian Partners
Francesco Tiezzi – University of Florence
Giulio Visentin – University of Bologna
Maddalena Zucali – University of Milan
Guido Invernizzi – University of Milan

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Project overview

- 6 → GMG funding
- 9→ other fundings or agreements

Microbiome → 500 cows

- **2 Farms** with 2 ML each for all year long
- **All the farms** are following the rotation as reported

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Project status – Installation through Italy

ROBOT DISTRIBUTION IN ITALY

SUMMARY BY BRAND

BRAND	UNITS	TOTAL (UNITS × 50)
TDM	14	700
GEA	5	250
DELAVAL	11	550
LELY	2	100
TOTAL	32	1,600

LEGEND
- TDM
- GEA
- DELAVAL
- LELY

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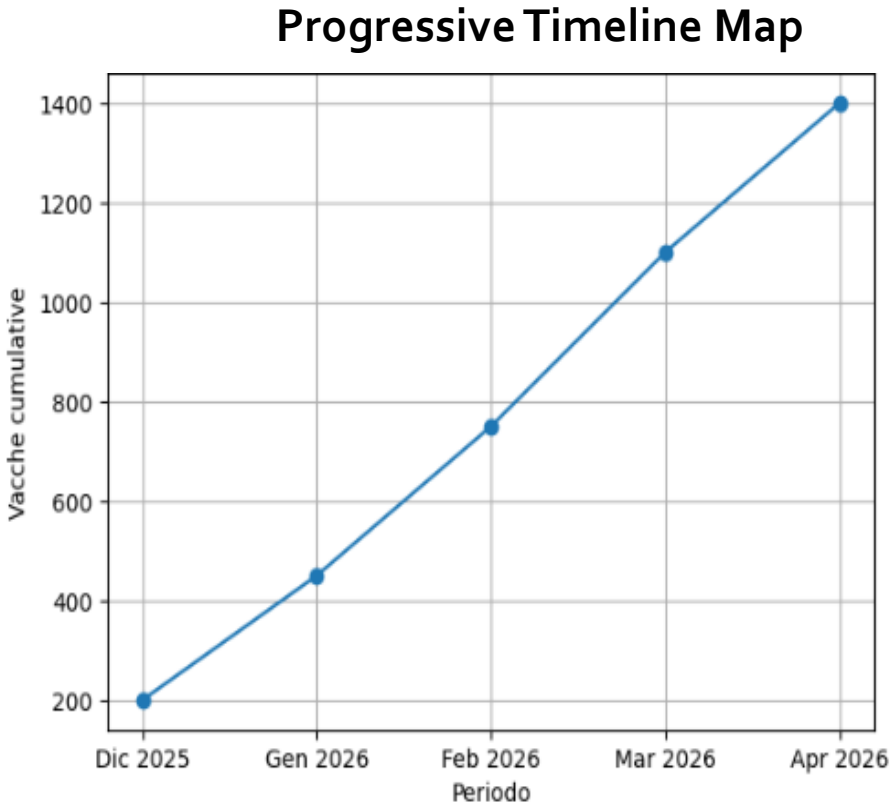
Project status – data process

- **GMG managment tool** to follow the MooLogger logistics

- Once installed every day ad midnight ML data are downloaded to ANAFIBJ database
  - Email alerts if data are not downloaded from «X» ML
- Depending on the agreements each AMS company provides the data usually once a week with different ad hoc procedures
- ML/AMS data alignment in progress
  - Testing GEDA
  - Testing in-house scripts



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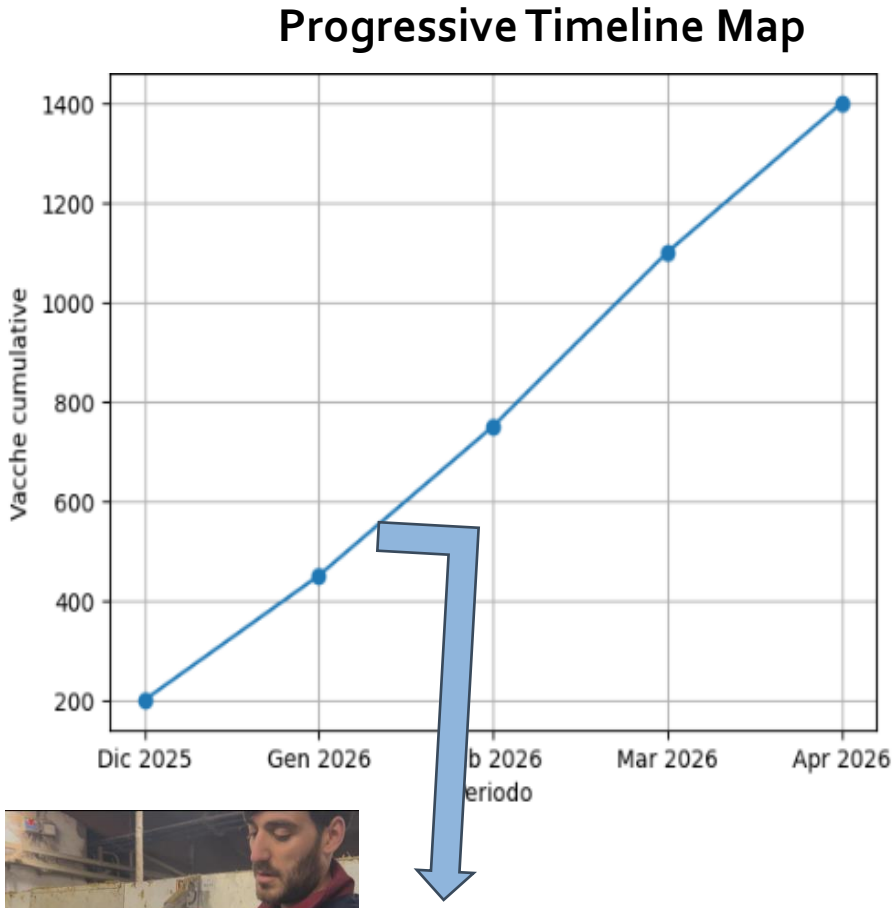

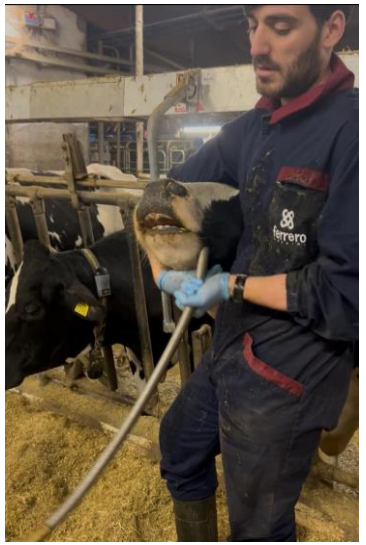

Microbiome -> + 100 samples collected

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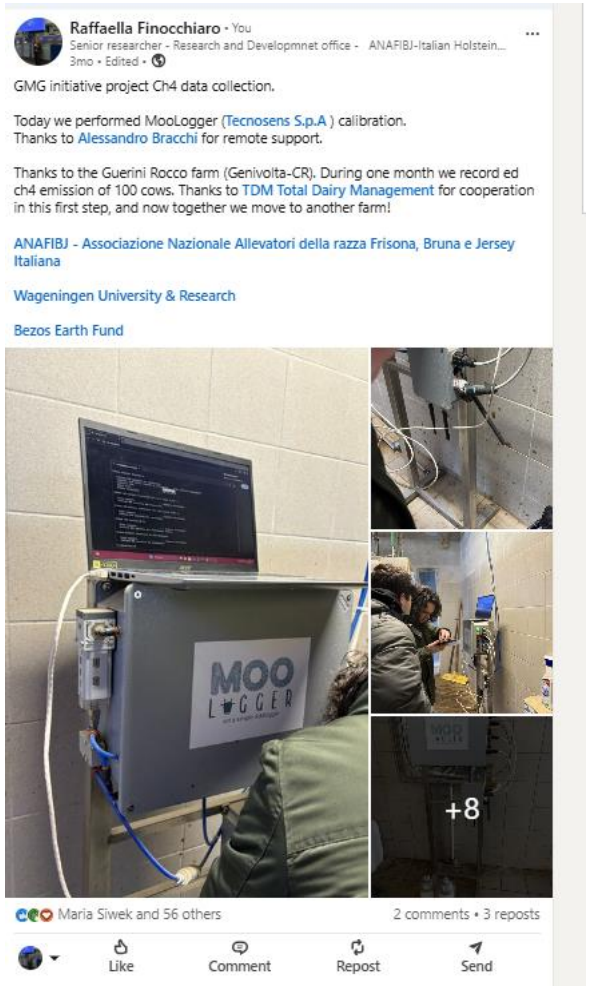
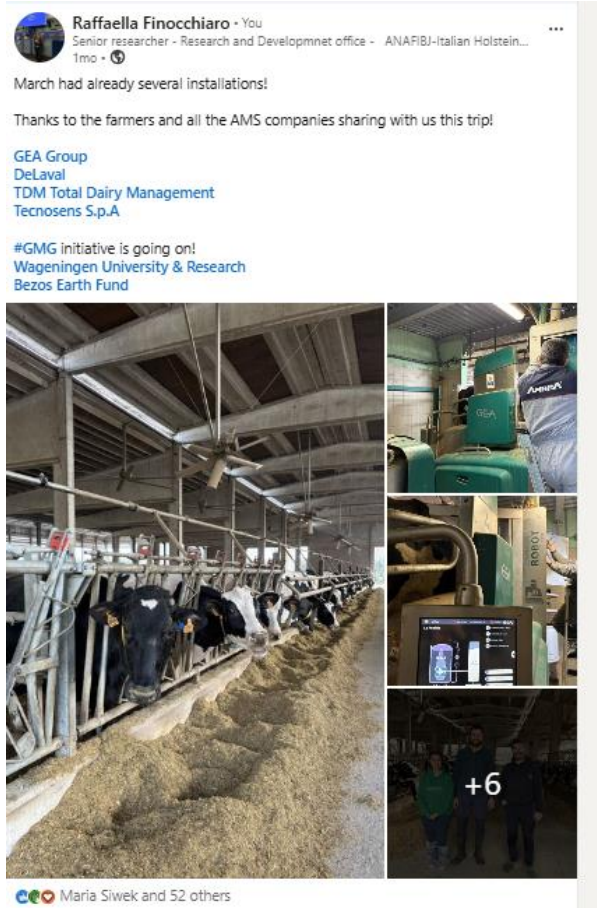
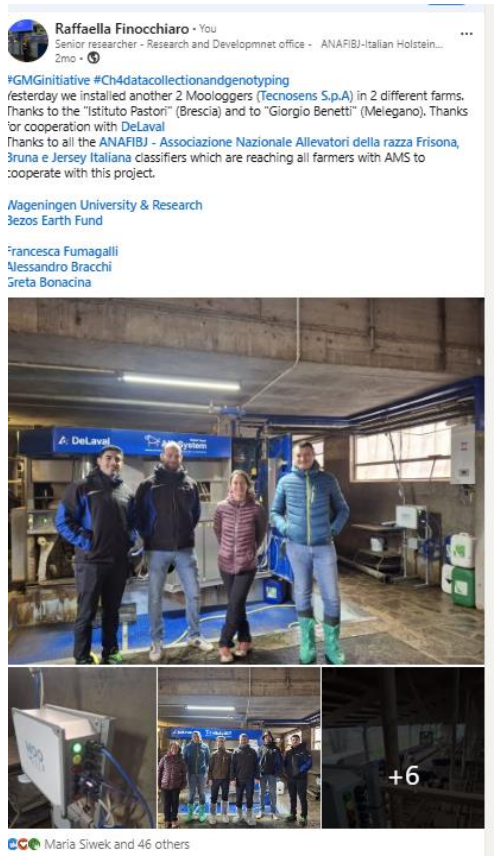
Project status – Italy GMG jourey on LinkedIn and IG







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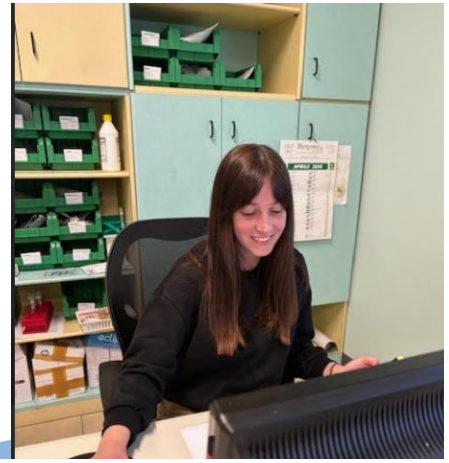
Project status – GMG and ANAFIBJ team

Manuel Galleani -IT

Francesca Fumagalli
Coordination with farmers and classifiers

Elisa Ferrari and Elena Moretti
administration

Mirko Bolzoni – Installation ML



Alessia Pea
preparing samples to genotype procedures

Chiara Franzoni Migliorati coordination genotyping sample

Lorenzo Benzoni coordination genotyping sample and farmers contacts

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Thank you also to..

- We would like to thank you also all our partners which are helping on data-collection and data analysis

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