breed4green

First results from a dataset on methane emissions in commercial farms for genetic studies

Linke K.[1], Köck A.[1], Schmid C.[2], Burn S.-J.[3], Gruber S.[3], Steininger F.[1], Fuerst-Waltl B.[3], Zollitsch W.[3], Steinwidder A.[4], Guggenberger T.[4], Egger-Danner C.[1]

[1]ZuchtData EDV-Dienstleistungen GmbH, Vienna, Austria
[2]LKV Austria, Vienna, Austria
[3] BOKU University,Vienna, Austria
[4]Federal Agricultural Research and Education Centre Raumberg-Gumpenstein, Irdning-Donnersbachtal, Austria
Presenting author: linke@zuchtdata.at

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breed4green
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Federal Ministry
Agriculture and Forestry, Climate and Environmental Protection, Regions and Water Management
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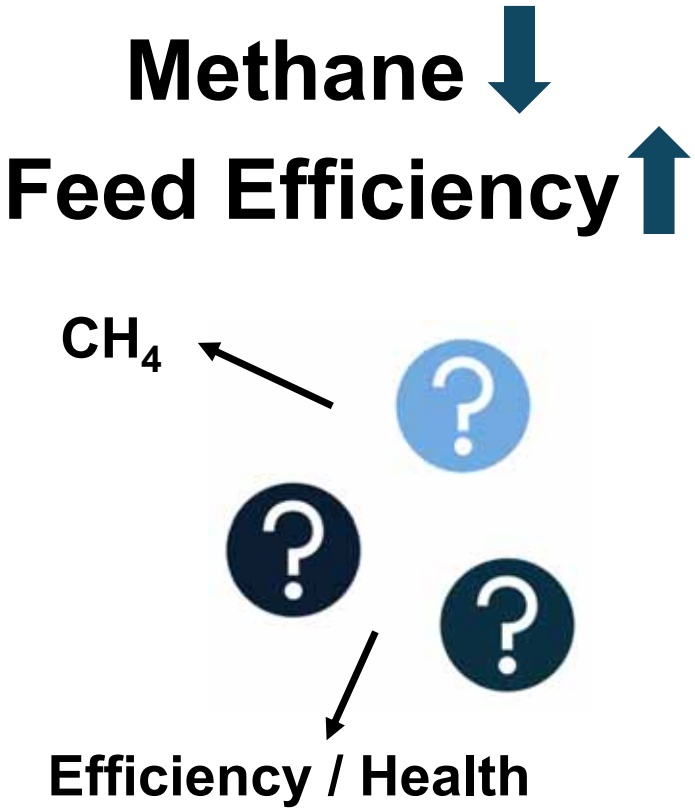
Aim of breed4green

- Research into the **genetic potential for improving feed efficiency and reducing methane emissions** in Fleckvieh and Brown Swiss cattle

Development of direct and indirect traits
Genetic parameters (heritability, correlations with other traits in TMI)

- Consideration of these traits in the breeding goal and breeding program* *(*after breed4green)*



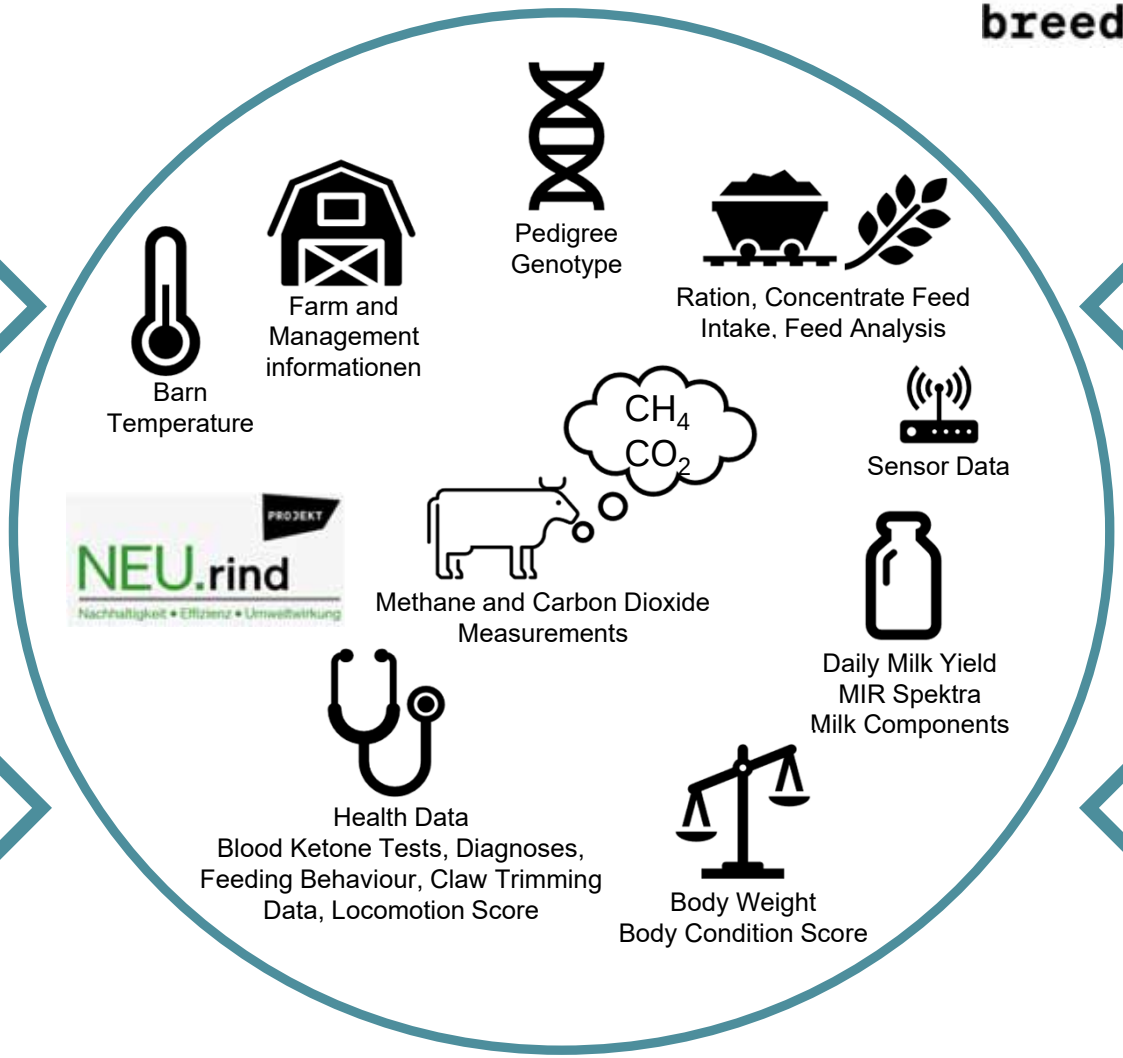
Data for Research in breed4green

breed4green

ZUCHT DATA

Station Data
Raumberg-Gumpenstein and Moarhof, Achselschwang, Aulendorf, ANAPRI;

Additional data from central cattle database and projects of Rinderzucht AUSTRIA



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Farms
Data Recording on 25 Fleckvieh and 5 Brown Swiss Dairy Farms

Cooperations
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A.N.A.P.R.I.
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uniform agri
LELY
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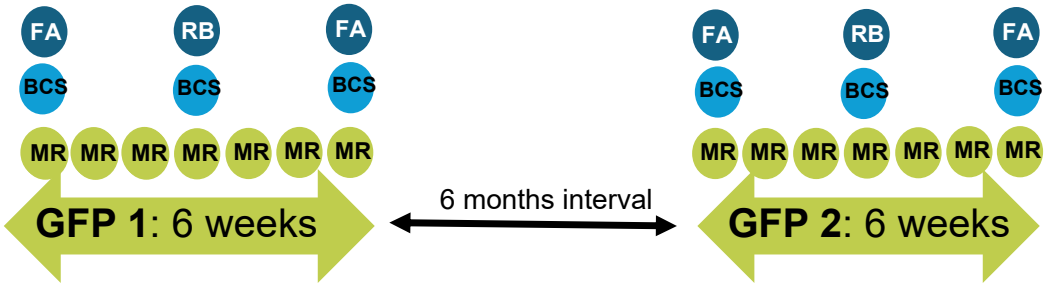
Overview Data Recording in breed4green

GreenFeed Periods (GFP) 1 & 2 (6 weeks each):
Methane and CO_2 measurements (GreenFeed)
body weight several times daily (automatic scales)



GreenFeed Periods (GFP) 1 & 2:
DHI (MR) and MIR spectra weekly
BCS 6x
feed analysis (FA) 4x
farm data, husbandry
ration analysis (RB) 2x

breed4green data recording 15 months on each farm (30 farms: 12/23 - 10/27)

MR MR MR MR MR MR MR MR MR MR MR MR

At each DHI visit (MR):
Milk yield & comp.
MIR spectra
Body condition score
Locomotion score
Ration

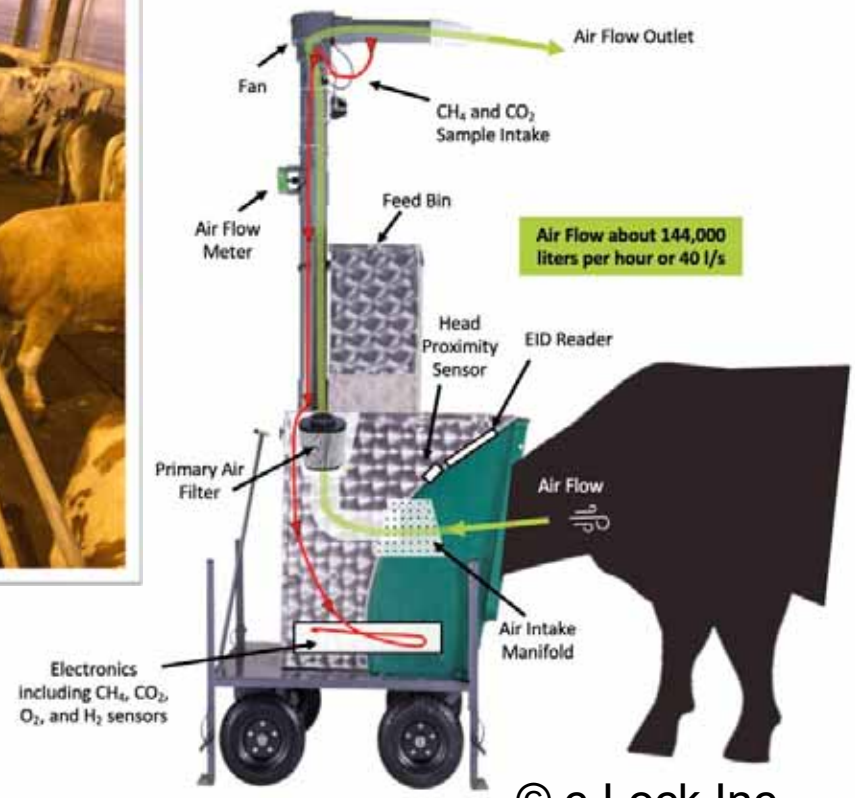
Recording for 15 months on each farm:

Day 7 and 14 after calving: ketosis tests and recording of feeding behaviour, prophylaxis, health information, claw trimming data, daily milk yield, milking interval (AMS / MMG data)
genotyping of all animals, ration composition,
if available, concentrate feeding station data and sensor data

Methane Measurement - GreenFeed

breed4green

ZUCHT DATA



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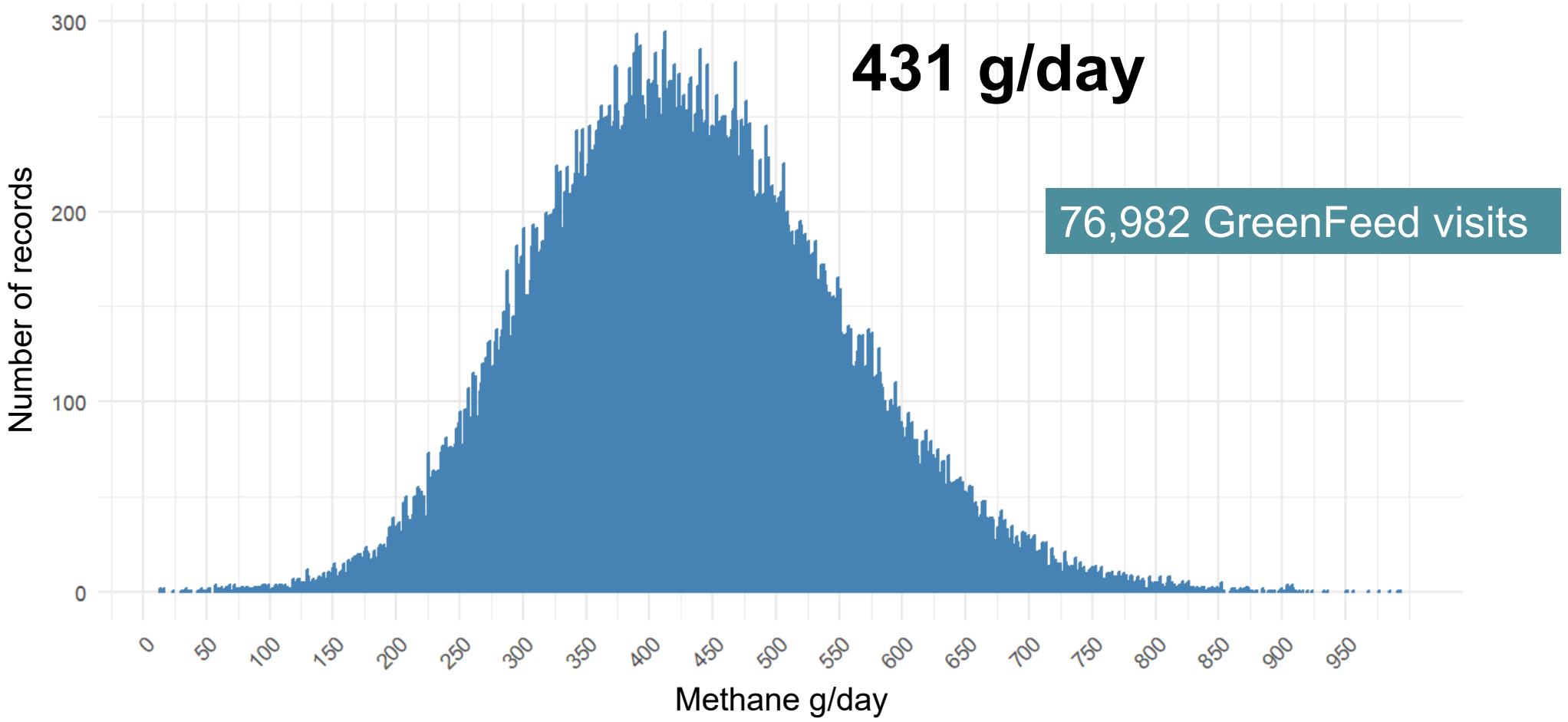
Methane Measurements - Cows

681 animals from 16 farms with at least 19 GreenFeed spot samples

Breed	Number of animals
Fleckvieh	581
Brown Swiss	90
Holstein	8
Pinzgauer	2

	Mean (kg)
Body weight	717
Milk yield	30.8

Methane Measurements



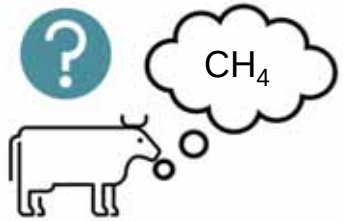
First Results Heritability – Fleckvieh

14 farms, 446 cows (at least 20 GreenFeed-measurements) in GreenFeed period 1

Trait	Number of records	Heritability
Methane g/day	446	**0.13** ±0.13
Methane g/kg milk	439	**0.20** ±0.13
Residual methane	415	**0.13** ±0.14
Body weight	421	0.18 ±0.15
Milk	439	0.27 ±0.14

Methane - Indirect Traits

- Direct measurement of methane too expensive for broad application in practice
- Routinely available indirect traits are of interest
- Work ongoing on prediction of methane emission
  - Milk mid-infrared spectra, fatty acid profiles
  - Models additionally including animal and farm information



Results see Astrid Köck (ZuchtData): Paper submitted
Presentation “Prediction of methane emissions based on milk fatty acid profiles shows similar performance to milk MIR spectra” **ICAR Session 1**

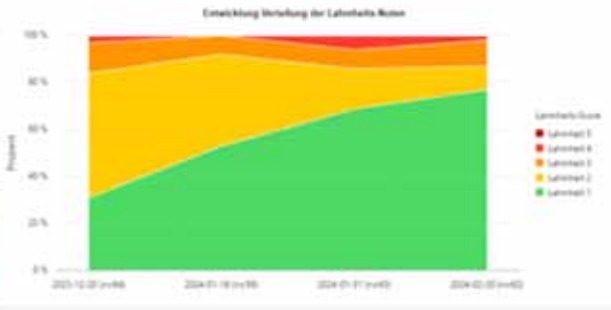
Feed Efficiency

- No routine recording of feed intake
- Indirect traits of interest
- Initial genetic analyses in Fleckvieh cattle
  - Estimated feed intake (Gruber equation): **h^2=0.19**
  - MIR spectra: **h^2=0.14**
  - Residual carbon dioxide: **h^2=0.24**
- Promising correlations with actual feed intake
- Appear suitable as indirect traits

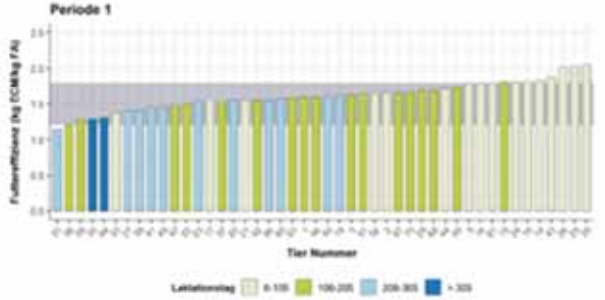
Results see S.-J. Burn (BOKU) at WCGALP 2026 and EAAP 2026

Feedback for Farmers

- Body Weight
- Body Condition
- Locomotion Score
- Methane
- Feed Efficiency
- Benchmarking
- Annual Meeting



Tier			P1						P2					
Nr	Name	Lebensnummer	L	Tgv	Tgb	ECM-kg	G-kg	M-g	L	Tgv	Tgb	ECM-kg	G-kg	M-g
1			3	162	210	35,3	862	482	4	0	13	38,4	869	
2			3	69	117	37,8	722		3	244	283	36,1	728	
3			6	160	208	34,3	784	484	7	0	12	40,4	760	



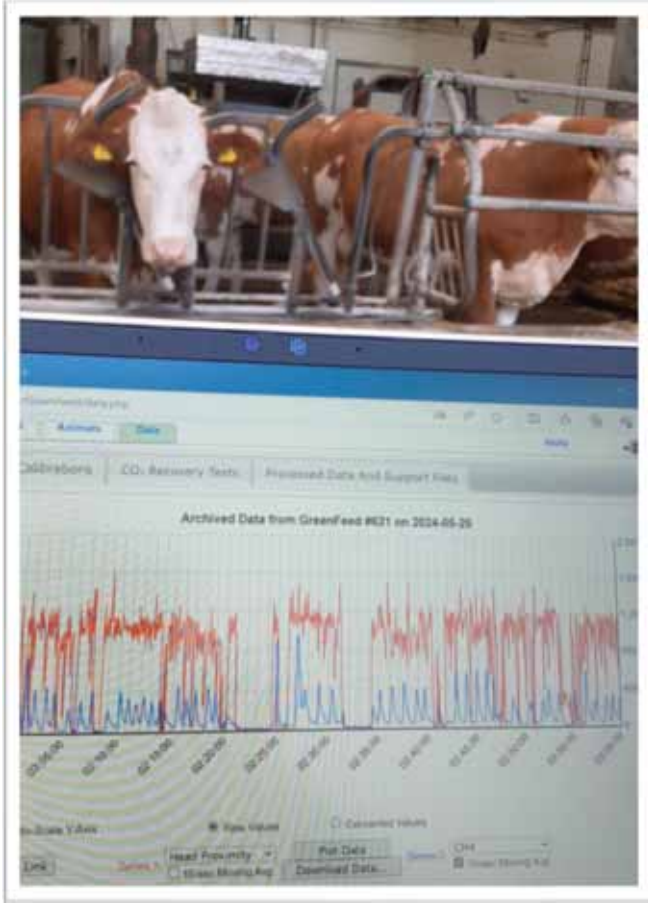
Tier			P1					P2				
Nr	Name	Lebensnummer	L	Tgv	Tgb	FA-kg	FE	L	Tgv	Tgb	FA-kg	FE
1			3	162	210	22,3	1,60	4	0	13	23,1	1,72
2			3	69	117	23,2	1,66	3	244	283	23,2	1,49
3			6	160	208	20,8	1,63	7	0	12	20,6	1,86

Kennzahl	Mein Betrieb	Anzahl Betriebe	Mittelwert	Minimum	Q25	Median	Q75	Maximum
ECM-kg[1]	35,7	9	31	20,5	30,5	32	34,2	35,7
Gewicht-kg	744	9	727	652	715	737	748	771
Methan-g	404	9	429	373	415	421	440	487
Methanintensität	11,7	9	14,6	11,7	13,2	14,5	15,4	17,9
Futteraufnahme-kg	21,7	9	20,4	19,1	19,9	20	20,8	21,7
Futtereffizienz	1,66	9	1,5	1,11	1,41	1,54	1,65	1,73

Feedback is important to encourage farmer participation!

Summary

- Recording of methane emissions on farms is feasible with GreenFeed
- Feedback is important to encourage farmer participation
- Preliminary genetic analyses show promising results for methane emission
- Broad data recording is important to understand the correlations to health and performance
- Indirect traits for methane emissions and feed intake are important for use in breeding



Thank you for your attention!

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