Qualitas.

The Swiss way of breeding dairy cattle for reduced methane: CH₄COW

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Introduction I



- Climate change is reality
- Agriculture accounts for 14.3% of greenhouse gas emissions in Switzerland
- More than 80% of methane comes from agriculture, mostly from dairy and beef cattle

→ Actions are required

Introduction II

High CH₄ emissions from dairy

Levels to reduce emissions :

• Farm

• Herd

• Animal







Manure management, feed purchasing, Roughage quality, production systems, ...

Replacement strategy, longevity, management, ...

see next slide

Introduction III

High CH₄ emissions from dairy

Reduction on animal level:

• Feeding, CH₄ inhibitor



Potential:

30% reduction (*z.B.* Hristov et al., 2015)

• Breeding



25% reduction
g CH₄/kg milk, target trait
(e.g de Haas et al., 2017)
Integration in breeding program, until 2050

Introduction IV

Reduction on animal level : Breeding

• Very effective in combination with genomic breeding value estimation (ssGBLUP)



 Sustainable if the trait is consistently considered in the breeding program → Integration in TMI

But

• We need a lot of phenotypes

 \rightarrow expensive, difficult

Introduction V

Methane reduction at breeding level

- Variation exists: in average 437±94 g CH₄/d (Koning et al., 2017)
- Heritability h² 0.11-0.35 (z.B. Lopes et al., 2022; Manzanilla-Pech et al., 2021; van Breukelen et al., 2022)
- How to measure?





Picture: Agroscope



Introduction VI

How to measure?

Chamber



GreenFeed®



Sniffer in AMS

Picture: UoG



Methane reduction strategy of the Swiss Cattle Breeders Association (ASR)

- Project: genetic/genomic evaluation for CH₄ gEBV prediction for CH₄ emissions with a joint Canadian and Swiss evaluation for Holstein based on MIR predicted phenotypes
- Swiss R&D Project: CH₄COW

development of a CH_4 pheontyping strategy with sniffers and subsequent genomic evaluation for Swiss dairy cattle

- Data pool for further collaborations
 - NDGP (3rd Canadian project)
 - Global methane hub: BSW project with AT and DE

• ...







Swiss methane project: CH₄COW, overview

- Aim:
 - Development of a methane phenotyping strategy and a data pool
 - Genetic evaluation of methane emissions in Swiss dairy cattle
- 4 years ongoing project
- Funded: Confederation and 5 local governments and ASR (Swiss cattle breeding organisations)

Oualitas

Schweizerische Eidgenossenschaft Confédération suisse Confederazione Svizzera Confederaziun svizra

Bundesamt für Landwirtschaft BLW





Swiss methane project: CH₄COW, work status

- Sniffer installation on commercial farms
 - 30 Holstein farms (20 in AMS, 10 in feeding stations)
 - 33 Brown Swiss farms
 - 2 prototypes in place since June 2024
 - Mid november: Installation start of the MooLoggers Plus (ML)

→Long term data recording, various environments, various breeds

Data stream and controlling



Swiss methane project: CH₄COW, work status

Control

cð

Merge

Data stream



One record per visit:

- Cow ID
- Start time
- End time
- Yields



One record per second * ML:

- Time stamp
- CO₂ ppm
- CH₄ ppm
- Flow
- Temperature
- etc.



CH₄COW: develop phenotypes

Open questions:

- g CH₄ (weight per period)
 - ppm \rightarrow g: body weight is needed
- ppm (concentration)
- daily averages

. . .

- weekly averages
- combination of sniffer (ppm) and GreenFeed® (g) phenotypes



Løvendahl et al., 2024



Swiss methane project: **CH₄COW**, next steps

- Short term
 - Install all MooLoggers
 - Establish data pipelines
- Mid term
 - Develop phenotyp
- Long term
 - Genetic evaluation (project level)
 - Holstein
 - Brown Swiss



Thank you for your attention

