Methane mitigation: Joint nutritional and genetics solutions needed

Birgit Gredler-Grandl

LRG Annual Meeting, Berlin, October 24th, 2024





ICAR Feed&Gas working group

- Guidelines for recording of dry matter intake and methane emission in cattle and small ruminants
- Forum for ICAR members & researchers for knowledge exchange and collaboration on all aspects of DMI and CH₄
- Facilitate and co-ordinate international collaboration in research and development





THE GLOBAL STANDARD FOR LIVESTOCK DATA



ICAR Feed&Gas

Christine Baes, Lorenzo Benzoni, Maria Frizzarin, Karoline Bakke, Raffaella Finocchiaro, Rasmus Bak Stephansen, Jan Lassen, Caeli Richardson, Jennie Pryce, Nina Krattenmacher, Birgit Gredler-Grandl

Global Methane Genetics (GMG)

Accelerating Genetic Progress to reduce methane in ruminants





Coordinator: Roel Veerkamp & Birgit Gredler-Grandl Program for 5 years Budget: US\$ 20-30 million Close collaboration with Global Methane Hub







Stakeholders



Number of CH₄ phenotyped - Holstein cattle





Phenotyping program Global Methane Genetics



Holstein (~40k), Jersey (~8k), (Nordic) Red Breeds (~8k) Brown Swiss (~3k)

Beef:

World-wide sharing
Develop protocols
Phenotyping for
reference populations
Genetic evaluation

North America (~6k), Australia, Ireland, UK, NZ (~18.5k)

Sheep: global reference population Australia & NZ, UK, Ireland, Uruguay (~ 17k)

South America Beef & indigenous (~7k)

Africa Dairy & beef (~1.5k)

Microbiome:

Global reference population (~9.5k with potentially >20k)

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mitigation strategies





Nutritional strategies



Genotype x Environment effects not known



Phenotype

Environment

Environment

Joint effort needed to study interaction effects

- Official breeding values for methane are published in Spain and Canada (more countries following in 2025)
- Denmark: mandatory requirement of methane reduction in conventional dairy cattle
- "Landbrugsaftalen" law aimed to start January 1st, 2025
- Farmers have to feed
 - 3 months Bovaer OR
 - 12 months fatty acids



Open questions ...

- Do and why do animals respond differently to different diets and feed additives?
- What is driving low emitters?
 - Rumen morphology and physiology?
 - Passage rate?
 - Microbiome composition?
 - Digestibility?
 - ...
- Are tailored solutions possible?
 - Countries/production systems genetics/nutrition will be more effective?





- Study GxE effects of different diets
- Feed additives:
 - Project MetanHub (Geno, Norway) <u>https://www.metanhub.no/avl</u>
 - Are there genetic differences in the cow's response to methane inhibitors in feed?
 - Is the response to inhibitors heritable?
 - preliminary results show genetic variation



Discussion

- Collaborative network/program building: LRG ICAR ...
- Inventory of existing data
 - Pedigree, genotypes available → estimate breeding values
- Use existing selection lines (e.g. sheep NZ)
- New experiments:
 - Selection of low/high emitters based on breeding value
 - Test response to diets/additives
- Large(r) data sets are needed!



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Let's put ideas together!

Thank you for your attention





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