

Evaluation of the environmental efficiency of innovative dairy cattle housing and management systems in Germany



Landesforschungsanstalt für
Landwirtschaft und Fischerei

Session 46 - Viable future dairy farming systems and products from production, feeding, environmental and consumer viewpoint, Part 1

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Gefördert durch



Bundesministerium
für Ernährung
und Landwirtschaft

Projektträger



Bundesanstalt für
Landwirtschaft und Ernährung

aufgrund eines Beschlusses
des Deutschen Bundestages

Background - global context

Dublin Declaration of Scientists on the societal role of livestock

Publication of the strategy paper by the ATF → based on ATF webinars, the 6th Assessment Report of the IPCC and the EU methane strategy

atf animal task force
A European Public-Private Partnership

BAMST

TUM
Technical University Munich

Conclusion

There is no sustainable agriculture without livestock.

Meat production in balance with circularity supports environment and climate.

ATF & BAMST, The role of meat in society: presenting Dublin Declaration of Scientists, Brussels, Belgium, 2023-04-12 | W. Windisch: Meat in sustainable food systems, circularity, ecological context, metrics | 78

PROF. WILHELM WINDISCH
TUM Technical University of Munich

AGRICULTURAL METHANE

ASSESSING ITS SIGNIFICANCE AND SEEKING SOLUTIONS

A policy brief from the Animal Task Force

Windisch (2023): Sustainable livestock systems what does this mean? ATF Seminar, Brussels, 15 November 2023

Background - Germany

- **German Climate Protection Act**

- Reduction in greenhouse gas emissions in agriculture of around 10% by 2030 compared to 2020
- Milk production as important lever to achieve these sector targets (Ahrend, 2022)
- 39% of total emissions in the agricultural sector in Germany emanate from dairy farming (Fuß et al. 2022)

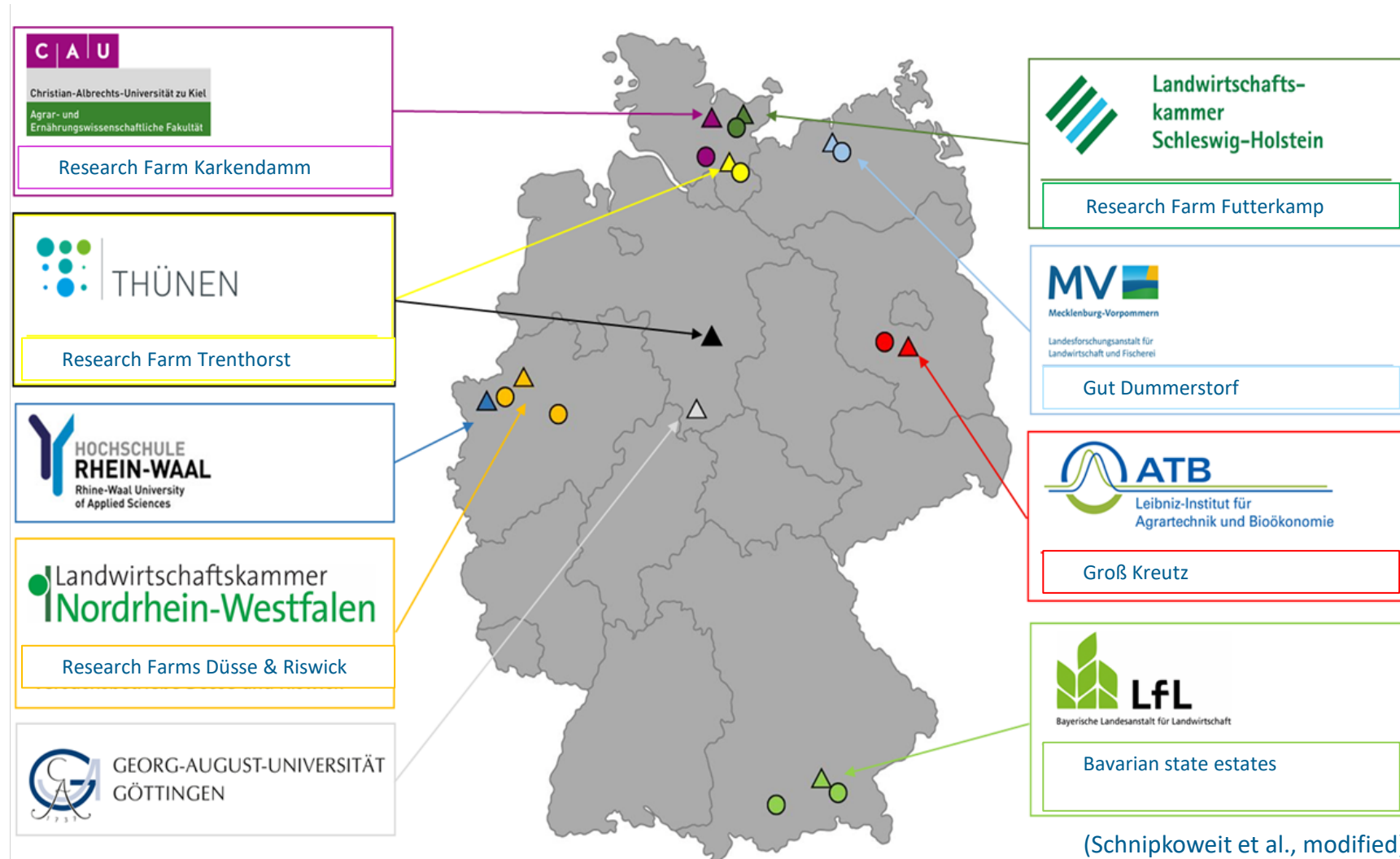
- **Consumer requests**

- Animal-friendly husbandry
- Sustainable farming methods
- Influence on purchase decisions (Sala et al., 2017)



InnoRind - Aims & Partners

A germanwide network project



- **Cattle Innovation Network - Sustainable cattle farming in Germany taking into account animal welfare, environmental impact and social acceptance (InnoRind)**

- **9 research institutes & 9 research sites are involved**

➔ **Recommendations for action for broad operational practice**

InnoRind - Topics

Innovation projects

Calves

- Mother-bound rearing
- Early group housing
- Optimized rearing of fattening calves



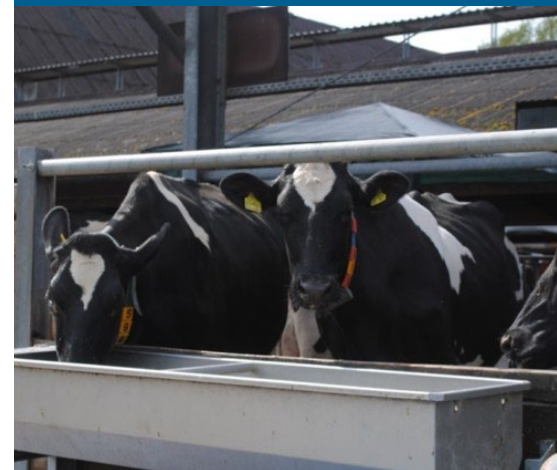
Fattening cattle

Innovative husbandry concepts



Dairy cows

Optimized calving area



Animal welfare planning

Further development of the concept



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(Schnipkoweit et al., modified)

InnoRind - Topics

Innovation projects

		Animal welfare	Cross-sectional topics	Environmental impacts	Economic assessment
Heat stress and climate in barn	Animal hygiene and antibiotics reduction	Calves - Mother-bound rearing - Early group housing - Optimized rearing of fattening calves 	Fattening cattle Innovative husbandry concepts 	Dairy cows Optimized calving area 	Animal welfare planning Further development of the concept  © Andreas Pelzer
		Societal acceptance		Feasibility on the farms	Stable construction

(Schnipkoweit et al., modified)

Environmental impact assessment - Aim

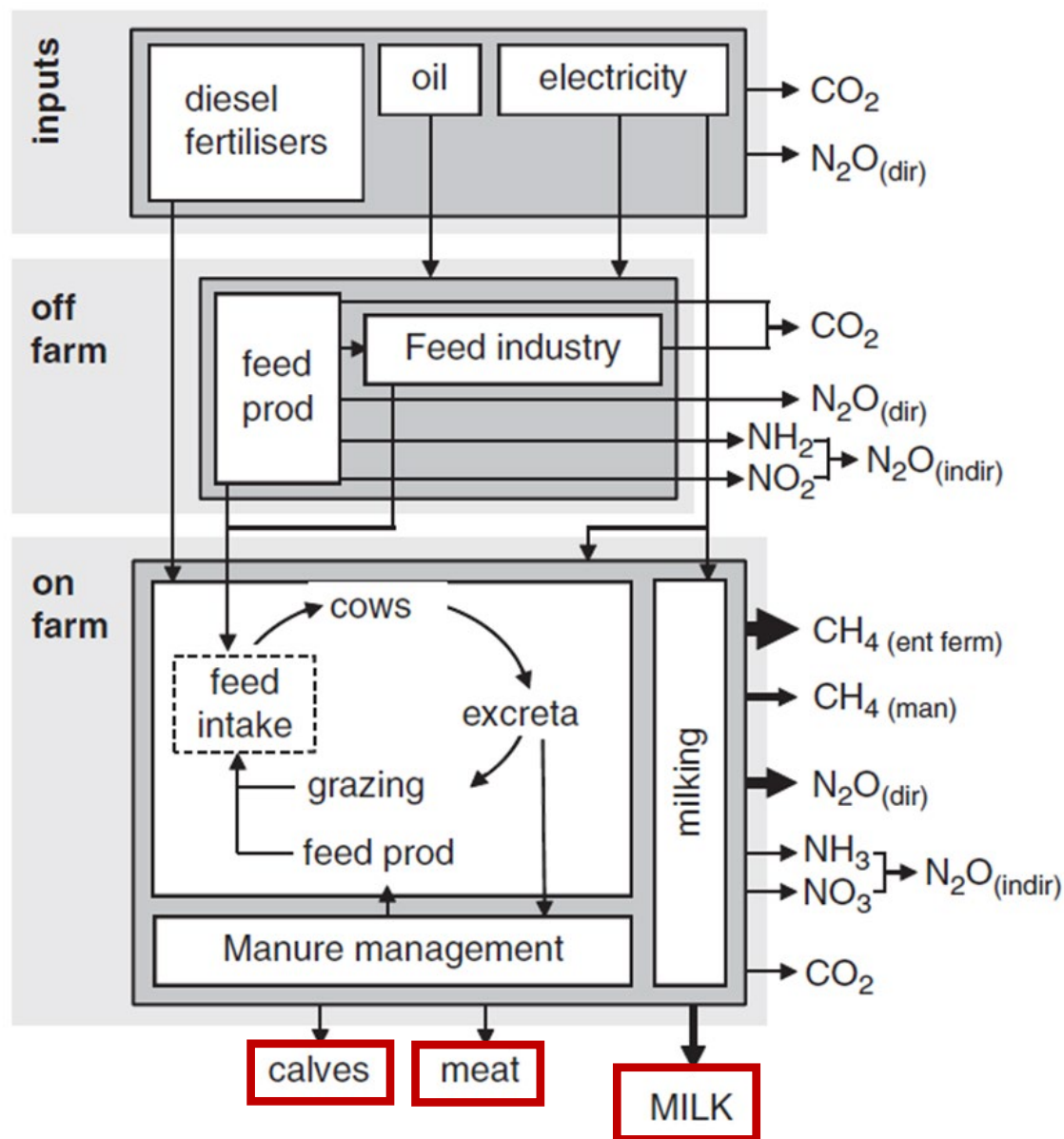
Single farm data as a basis for: Life cycle assessment

- Calculation of emissions and other environmental impacts: eutrophication, acidification, greenhouse gas potential, land use, ...
- Comparative calculation of "Operating standard" & "Innovation" in the respective system
- Identification of "hot spots" and derivation of reduction potentials with perspective transferability to the broad farm practice



Environmental impact assessment - Method

Milk production system



**1. Definition of system borders:
from cradle-to-farm gate**

**2. Definition of functional unit:
1 kg ECM**

**3. Determination of allocation method:
mass allocation, surplus calves and
culled cows included**

Dir: direct

Indir: indirect

Ent ferm: enteric fermentation

Man: manure

Schematic overview of the milk production system
from cradle-to-gate (Henriksson et al., 2011)

Environmental impact assessment - First results

Calves - emitting surface: NH₃

Group	Specification	Emitting surface [m ² /animal]
Innovation	Pair Housing	2.1
Innovation	Small Group Housing "Dummerstorf maximum" (6 calves)	2.5
Innovation	Small Group Housing "Dummerstorf ideal" (4 calves)	3.8
Operating Standard	Single Housing	3.1



But: In general

- Health, welfare, growth & performance (average daily gain)
- Previous studies showed high impact of performance on environmental impacts (Drews et al., unpublished)

Environmental impact assessment - Current status & Outlook



2023



In general

- Experimental design
- Building application

Environmental impacts

- Data recording of "Operating standard" starting in 11/23
- First farm visits

2024



In general

- Completion of construction
- Start of trials

Environmental impacts

- Life cycle assessment: start of modelling
- Further farm visits (done & planned)
- Parameter recording "Innovation" after end of trials

2025



In general

- End of trials
- Analysis and evaluation

Environmental impacts

- "Operating standard" vs. "Innovation"
- Derivation of **hot spots & reduction potentials**
- Addressing **conflicting goals between animal welfare and environmental efficiency**

Many thanks for your attention!



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