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A food system perspective to livestock husbandry, why we should look beyond greenhouse gases

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FRN Webinar, 9.2.2023





## Content

- I. Why to measure GHG?
- 2. How? Eco-efficiency as way to measure the impact of livestock on the environment
- 3. What is overlooked? Agriculture as driver of earth system exceeding planetary boundaries
- 4. Understanding the dynamics in current food system leading to exceeding planetary boundaries.
- 5. Livestock to close cycles and improve efficiency in the food system
- 6. Why ruminants are part of the solution and not the problem
  - I. Current feed-food competition
  - 2. Dairy as the highest protein efficiency without competing with humans
  - 3. Contested role of methane in global warming



## Why measuring greenhouse gases from dairy farms?

#### Emissions of Greenhouse Gases by Sectors



Sources: FAO, EDGAR, World Resources Institute (c) (i) (=)



#### Impacts are usually assessed with life cycle assessment

- Measures eco-efficiency or product / animal
- For example dairy production in Germany (g CO2-eq (kg ECM)-I)







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Adapted von Frank, H., 2019. Modelling greenhouse gas emissions from organic and conventional dairy farms 10.

#### **Issues with life cycle assessement**

## Is highly dependent on the method



Adding soil carbon change

## Environmental footprint of livestock





# Eco-efficiency does not say anything about planetary boundaries



Campell et al 2017 7







#### Sustainable livestock is part of a circular food system



Keep the number of animals that can be fed on grass, crop residues and waste



(van Zanten et al, 2018, defining a land boundary for susitainable livestock consumption, *Glob Change Biol*. 2018; 24: 4185–4194. <u>https://doi.org/10.1111/gcb.14321</u>)

#### Global land resource inputs and protein outputs in animal production



# **Protein efficiency**

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Shepon et al., 2016

# A focus on ruminants? Isn't that a climate catastrophe?





Allen, M.R., Fuglestvedt, J.S., Shine, K.P., Reisinger, A., Pierrehumbert, R.T., Forster, P.M., 2016. New use of global warming potentials to compare cumulative and short-lived climate pollutants. Nature Climate Change 6, 773–776. https://doi.org/10.1038/nclimate2998

#### In summary

- I. The narrative is based on eco-efficiency is only a part of the story
- 2. Sustainability is about a food system that remains within planetary boundaries not just GHG
- 3. Circularity is a promising way to achieve this Feed no food
  - I. Recycle "waste"
  - 2. Make optimal use of grassland with dairy production with beef meat at by product
- 4. Warming potential of methane is highly contested
  - I. might be less central to climate change as usually calculated animal numbers reduce.



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