

Sustainable livestock systems and methane

December 2021

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Outline

- Climate impact of GHGs – how important is methane?
- The methane pledge at COP26
- Global methane emissions by source
- Cattle as main contributor – where does it happen?
 - Reducing methane in developed world?
 - Reducing methane in developing world?
- Methane and sustainability

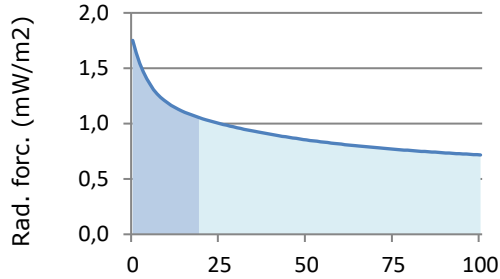


Climate impact

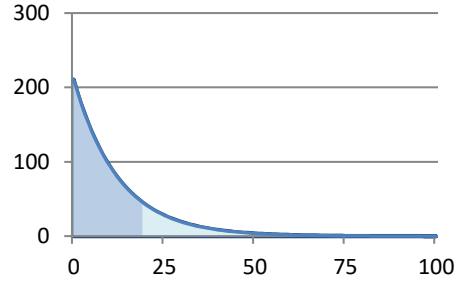
methane vs carbon dioxide

Emission pulse

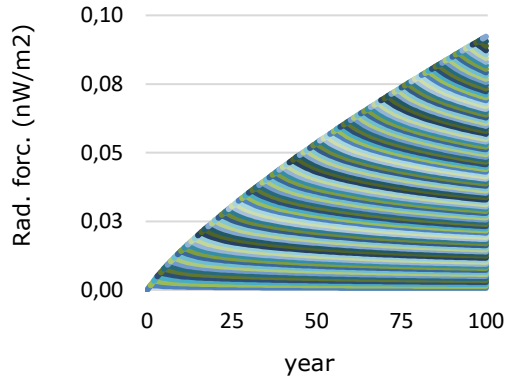
(a) 1 Mt CO₂



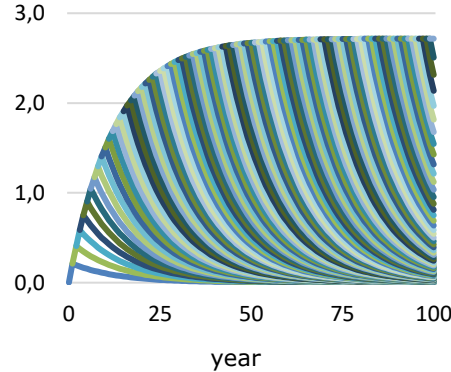
(b) 1 Mt CH₄



(c) 1 Mt CO₂ yr⁻¹ for 100 yrs



(d) 1 Mt CH₄ yr⁻¹ for 100 yrs



Continues flow

- Stable flux of methane → no *additional* warming
- Reducing methane is important to reduce overall climate impact
- but should not be at the expense of reducing CO₂

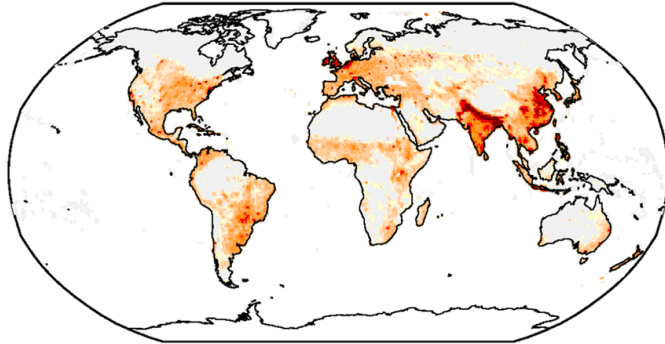
The methane pledge at COP26

Reduce methane emissions by 30 % in 2030 (reference 2020)

- >100 countries, not China, India, Australia and Russia
- 30% of anthropogenic emissions corresponds to 18.2 % of all emissions
- Reduces atmospheric methane concentration from 1900 ppb to 1550 ppb (=level 1980!)
- Various sectors should act! (of anthropogenic: enteric fermentation 30%, manure 4%, fossil fuel 29%, waste & landfills 20%)

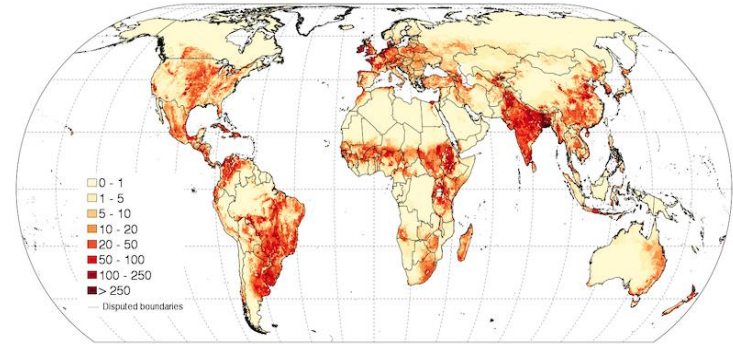
Cattle as main contributor

Methane emissions from
agriculture and waste



Saunois et al. (2020)

Number of cattle per square kilometer



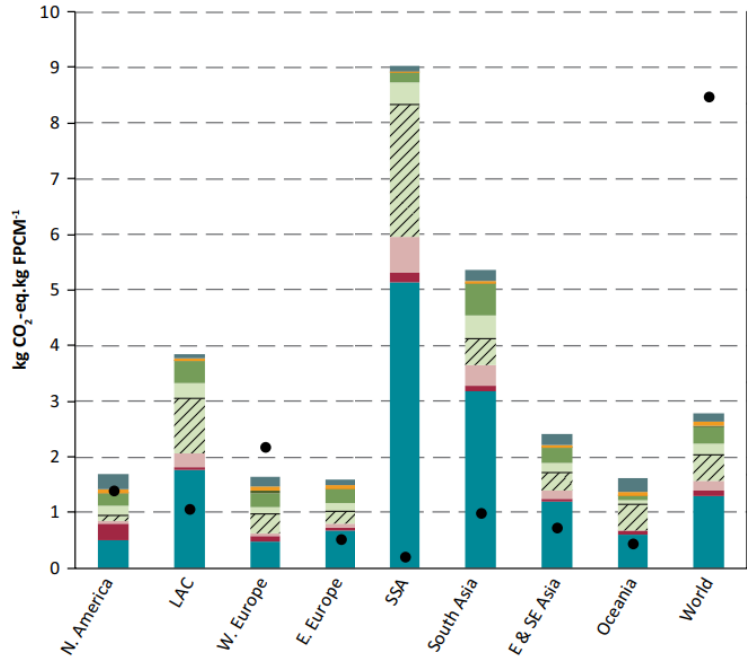
Gilbert et al. (2018) using livestock distribution data for 2010.

Reducing methane from cattle?

Livestock systems intrinsically differ between developed and developing world

Reducing methane in developed regions?

GHG emission intensities of milk



Generally intensive cattle systems

- high animal productivity
- high quality diets
- low emission intensity



Reducing methane?

Feeding

- feed additives
- feed quality
- dietary manipulation
- precision feeding

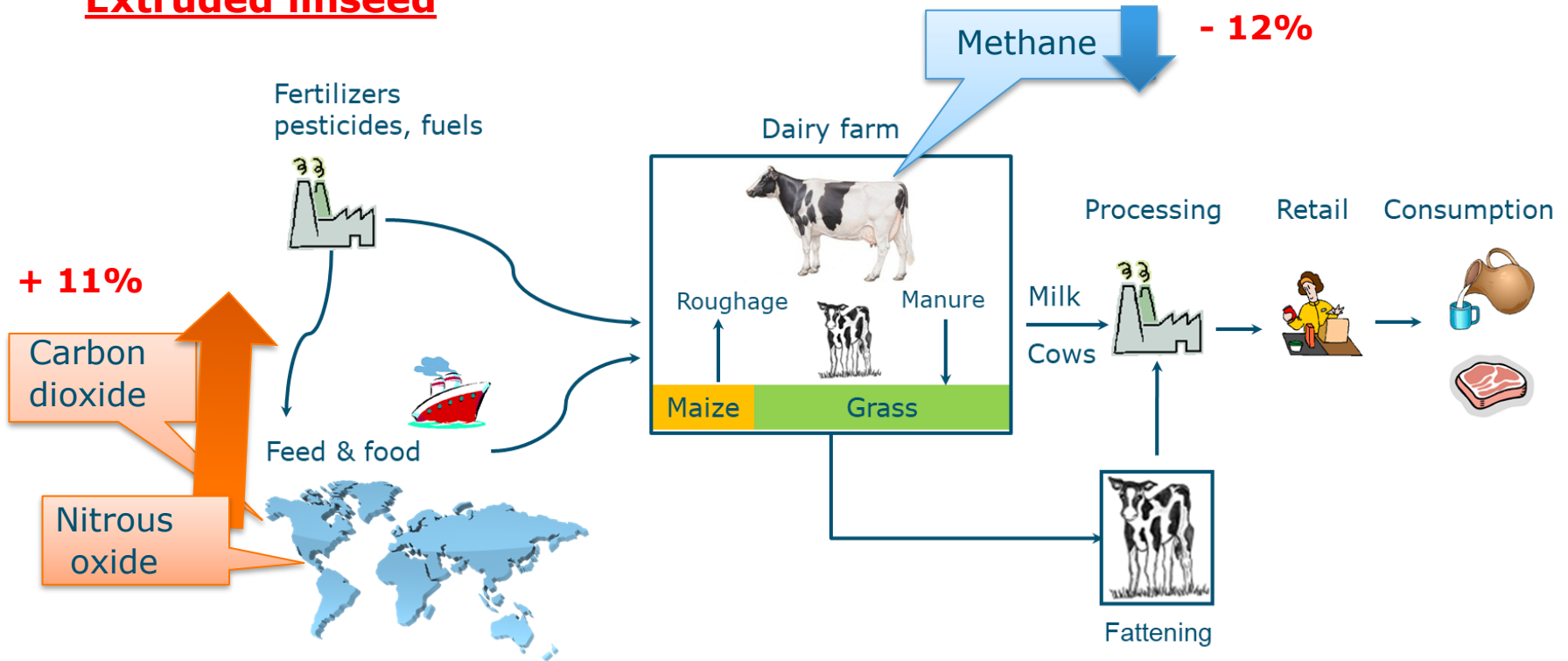
Animal management & breeding

- increasing productivity
- improving health
- reducing animal mortality

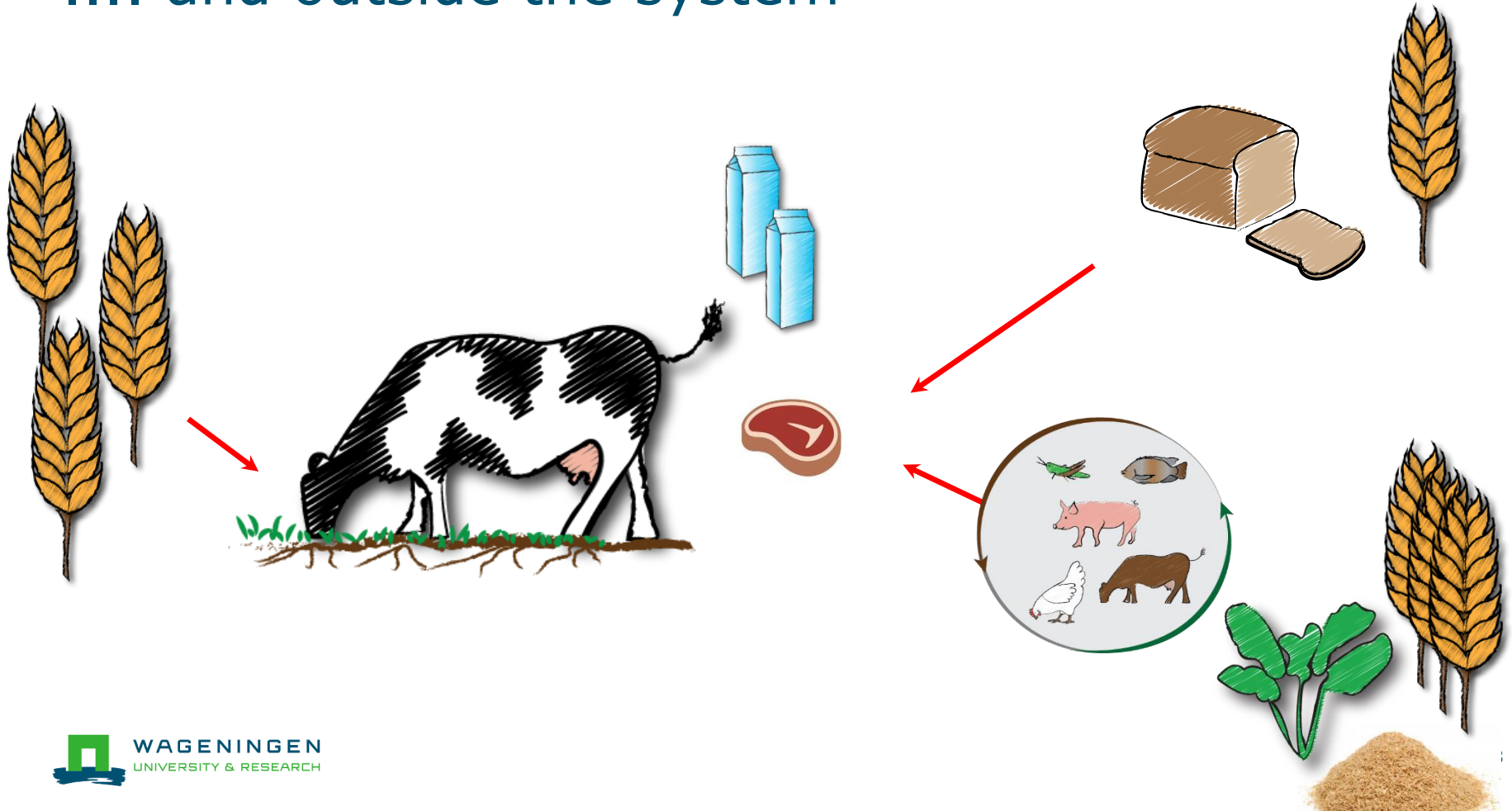
Consider consequences.....

Van Middelaar et al., 2014

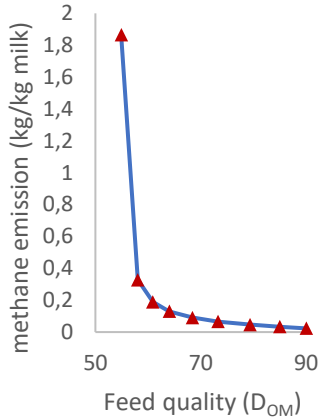
Extruded linseed



.... and outside the system

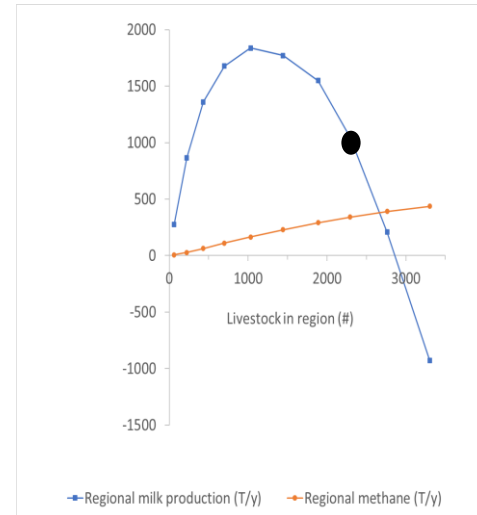
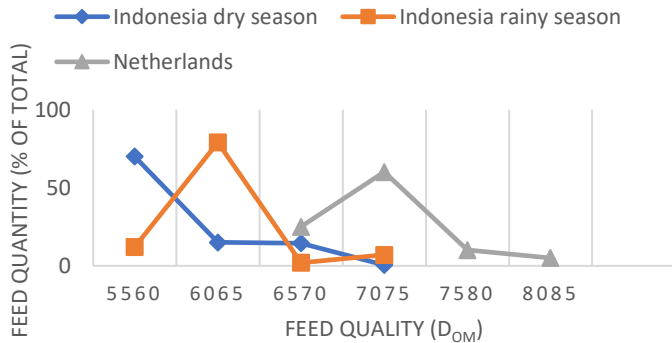


Reducing methane in developing regions?



Large ruminants (*10⁶)

	1980	2019	Δ (%)
World	1335	1709	28
Europe	249	117	-53
Americas	414	527	27
Oceania	35	35	0
Africa	173	361	109
Asia	465	668	44



Livestock in mixed crop-livestock systems

Manure (fertilizer, fuel)

Draught power

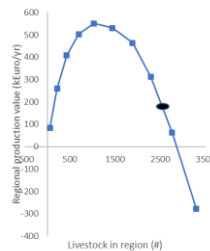
Banking and insurance function

Increase with increasing herd size (livelihood/support of crop production!)

Meat

Milk

Optimal herd size



Methane and sustainability

Reduce animal numbers

- Consume less (developed regions)
- Appropriate solutions to multi-functionality (developing regions)

Produce sustainably

- Produce in regions with least impact?
- Respect local eco-systems
- Prevent emission swapping
- Optimize food system rather than individual production chains or sectors
- Good science!



Thank you!

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