Agrifood system solutions are climate solutions

FAO

Pathways towards lower emissions – A global assessment of the greenhouse gas emissions and mitigation options from livestock agrifood systems

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Sustainable Livestock Transformation Initiative

1.	2.	3.	4.	5.
Building science and evidence-based narratives / visions on Sustainable Livestock	Promoting the adoption of tailored and context-specific good practices	Promoting and implementing policy and responsible investment for impact at scale	Facilitating cooperation partnership and innovation to accelerate a sustainable transformation of the livestock sector	Taking a holistic approach that considers the multiple sustainability dimensions

"Outcome" = actors along the value chain share and adopt good practices

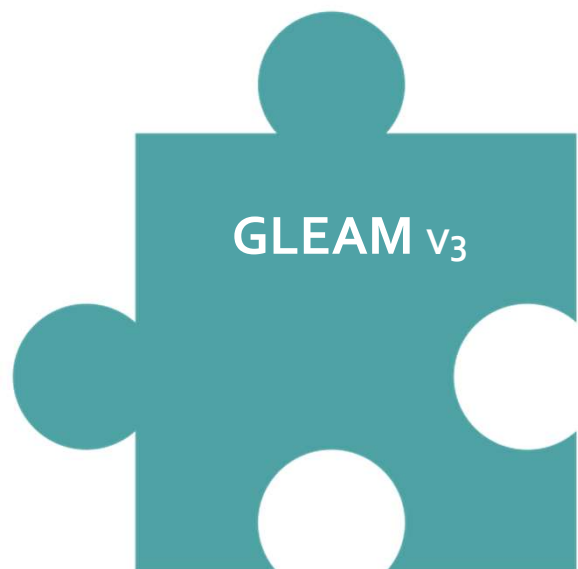"Impact" = better production, better nutrition, better environment and a better life

0   [@Wisser, Dominik (NSAL)] - option 2 with puzzle
                Lanzoni, Lydia (NSAL), 2024-07-17T08:19:04.472

Overview

GLEAM v3

Updated global GHG assessment

Mitigation pathways

Assessment of technical mitigation potential

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GLEAM system boundary

Indirect emissions

Direct emissions

Indirect emissions

Enteric fermentation, manure management

On-farm energy consumption

Land use change Fertilizer Pesticides

Energy Transport

Feed

Transport Primary processing Packaging

Retails and households

Upstream emissions

On-farm emissions

Downstream (post-farm) emissions
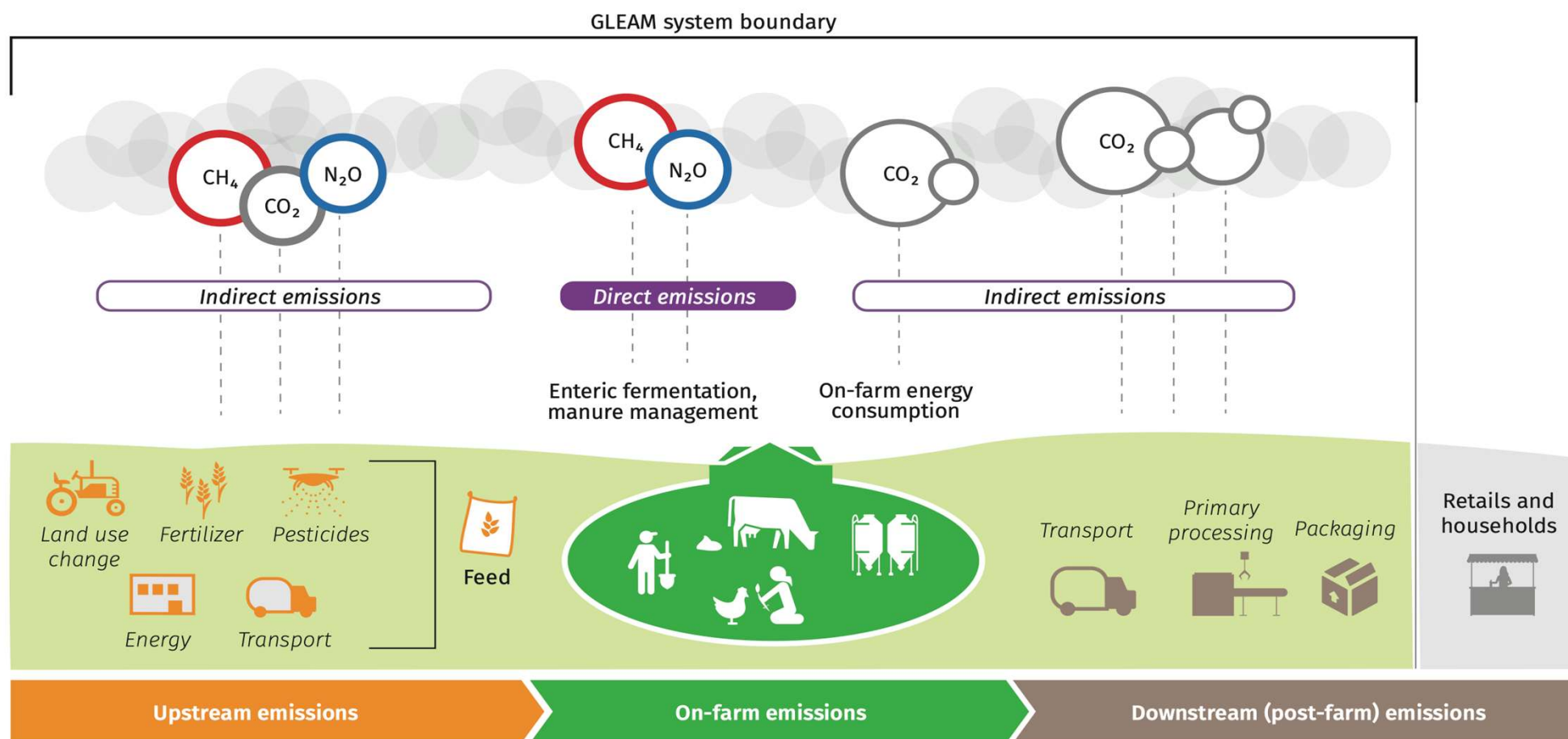
Livestock contributes about 12% to the total GHG emissions (6.2 Gt CO_2eq)
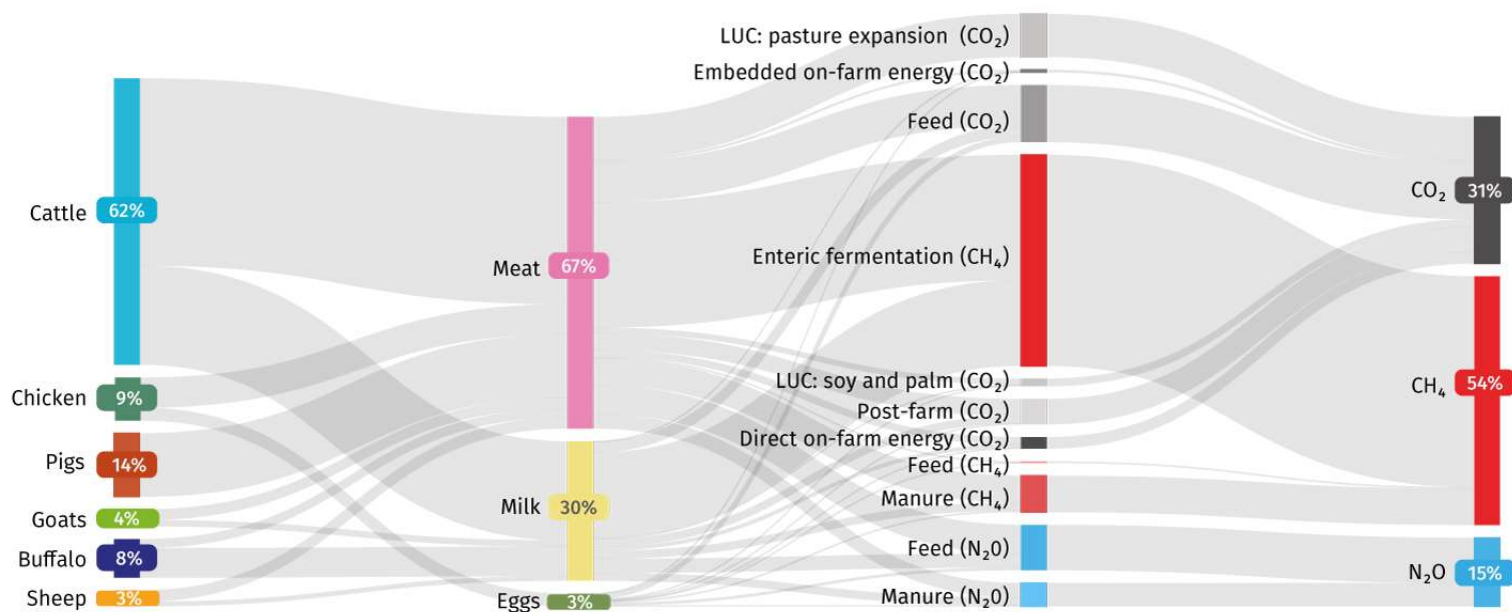
GHG emissions assessment

High income, 20%

Low and middle income, 80%
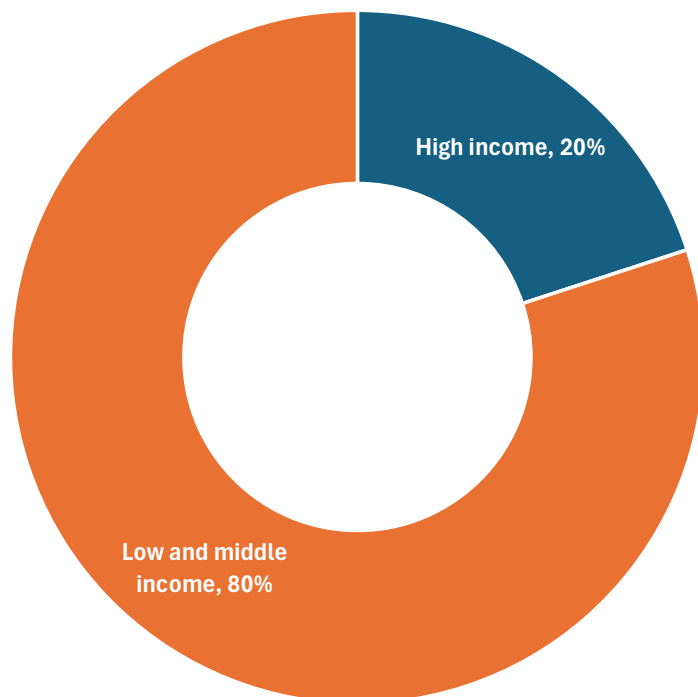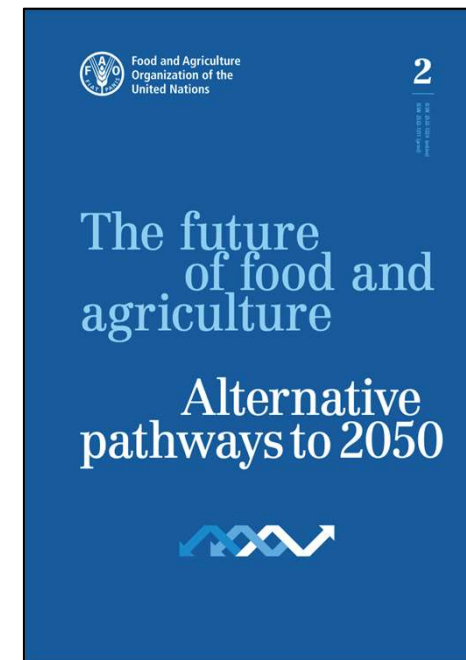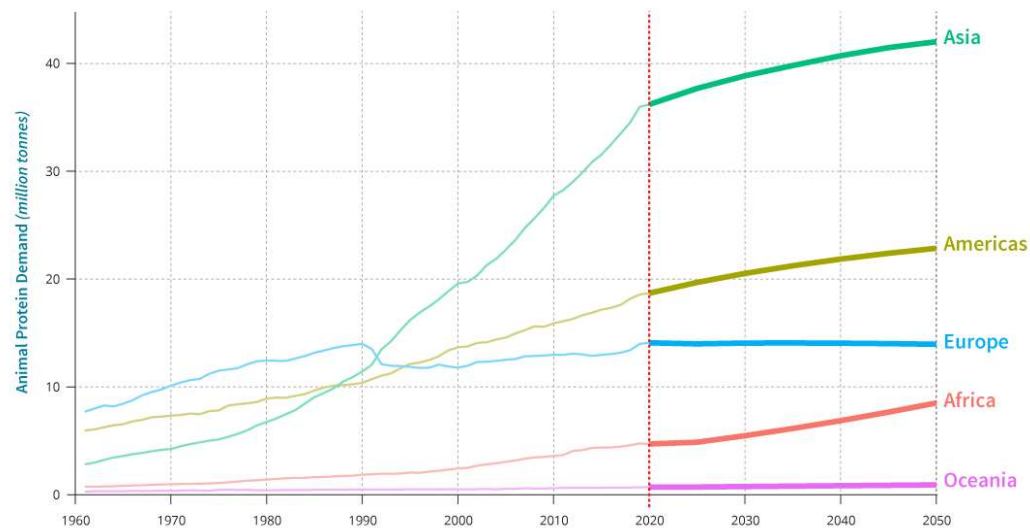
🔗 **80 percent** of emissions take place in low- and middle-income countries

🔗 **20 percent** of emissions in high-income countries
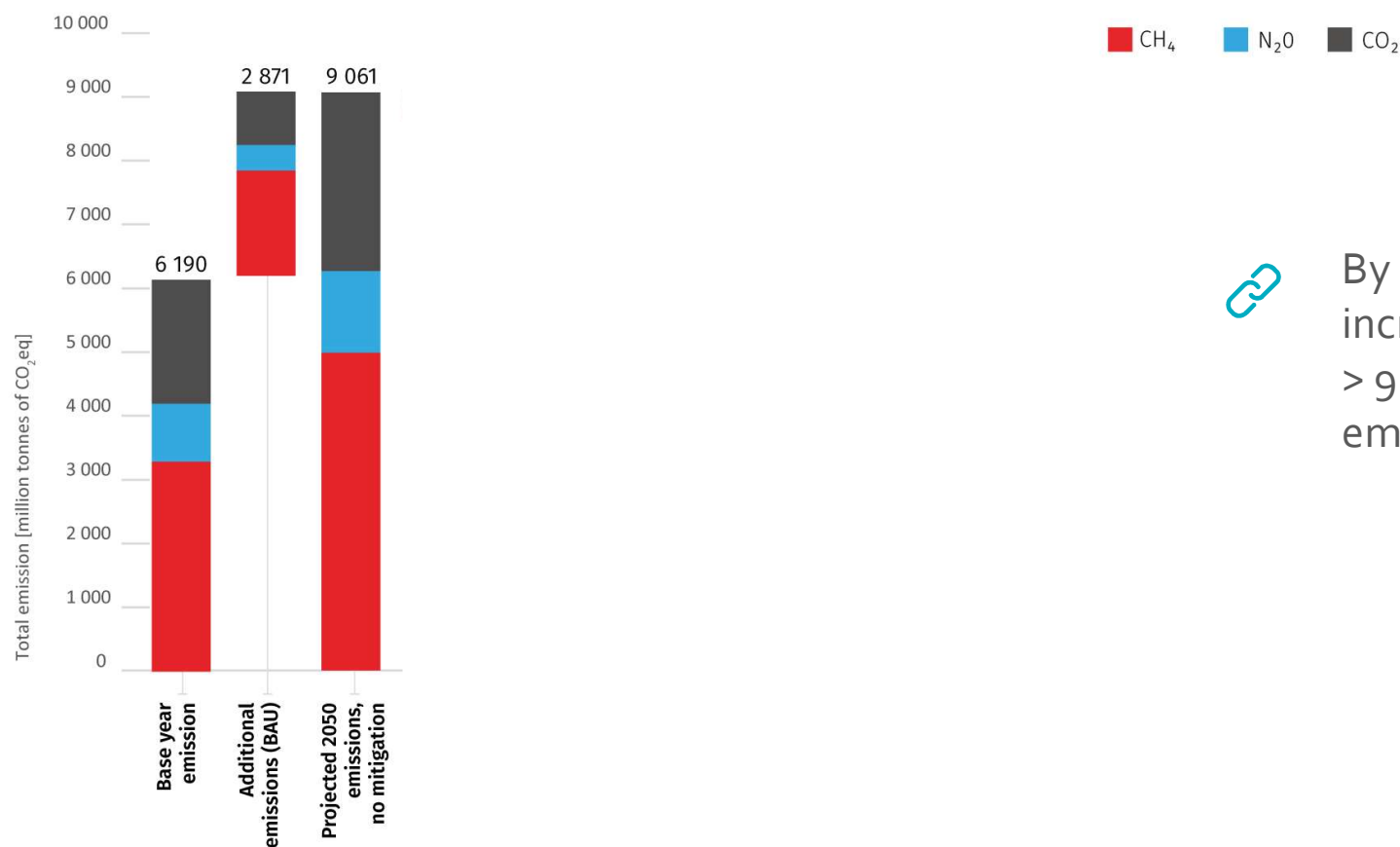
Production of terrestrial animal products is expected to increase by 20% by 2050
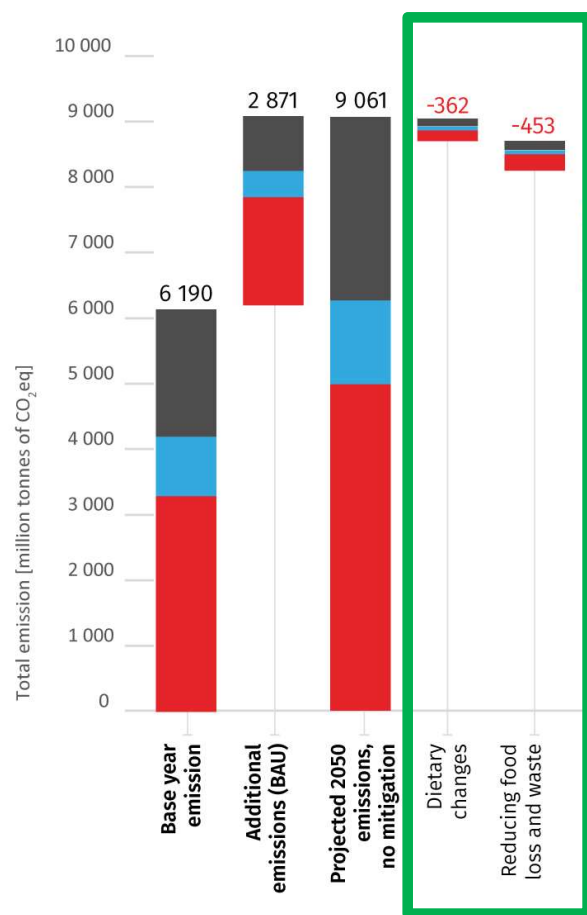
Pathways towards lower emissions

Legend: CH_4 (red), N_2O (blue), CO_2 (dark grey)

By 2050, livestock production will increase by **20 percent**, resulting in > 9 Gt CO_2eq with no change in emission intensity

Pathways towards lower emissions

Legend: CH₄ (CH_4), N₂O (N_2O), CO₂ (CO_2)

Chart y-axis: Total emission [million tonnes of CO_2eq]

Bar values: 6 190, 2 871, 9 061, -362, -453

Bar categories: Base year emission, Additional emissions (BAU), Projected 2050 emissions, no mitigation, Dietary changes, Reducing food loss and waste
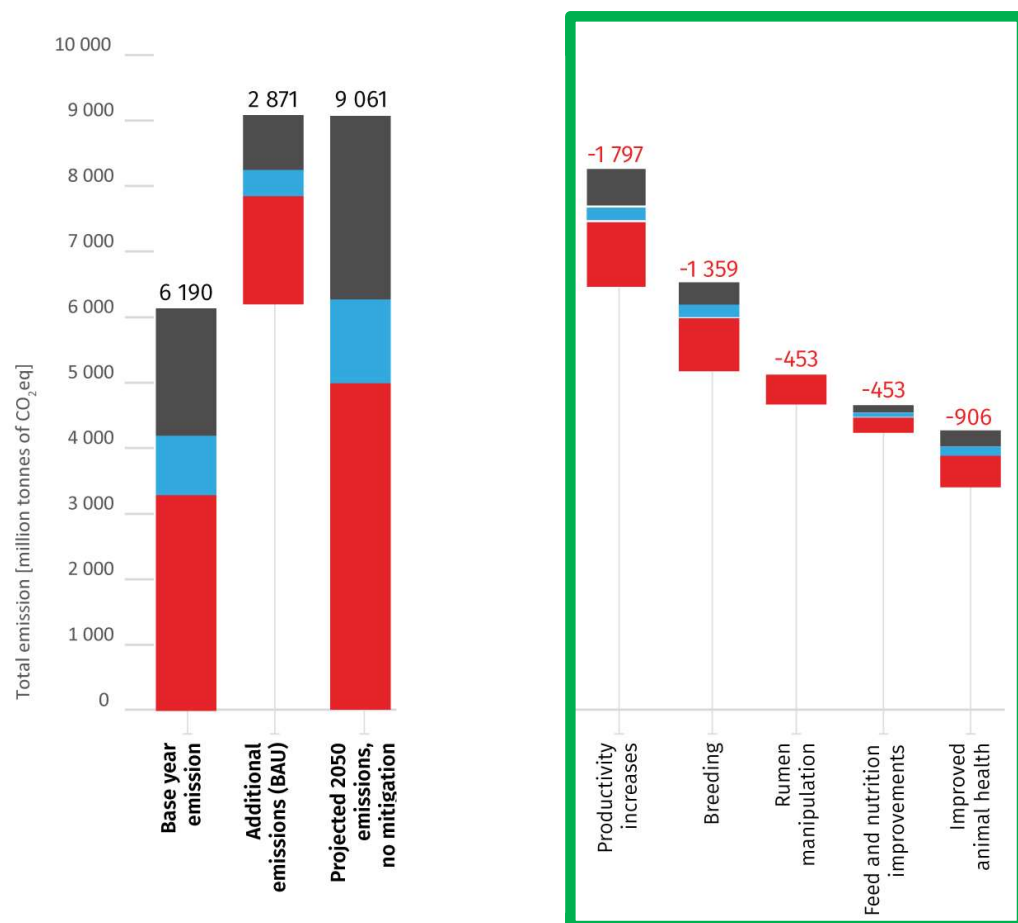
Demand side mitigation options: 4 – 5 percent

✓ Dietary Changes

✓ Reducing food loss and wastes

- Nationally recommended diets consider nutritional, health, cultural, and environmental concerns
- More than 800 M are food insecure and poor
- Decrease GHG emissions in HICs
- Increase GHG emissions in LMICs

Pathways towards lower emissions

Legend: CH$_4$ (red), N$_2$O (blue), CO$_2$ (dark grey)

Chart values:
- Base year emission: 6 190
- Additional emissions (BAU): 2 871
- Projected 2050 emissions, no mitigation: 9 061
- Productivity increases: -1 797
- Breeding: -1 359
- Rumen manipulation: -453
- Feed and nutrition improvements: -453
- Improved animal health: -906

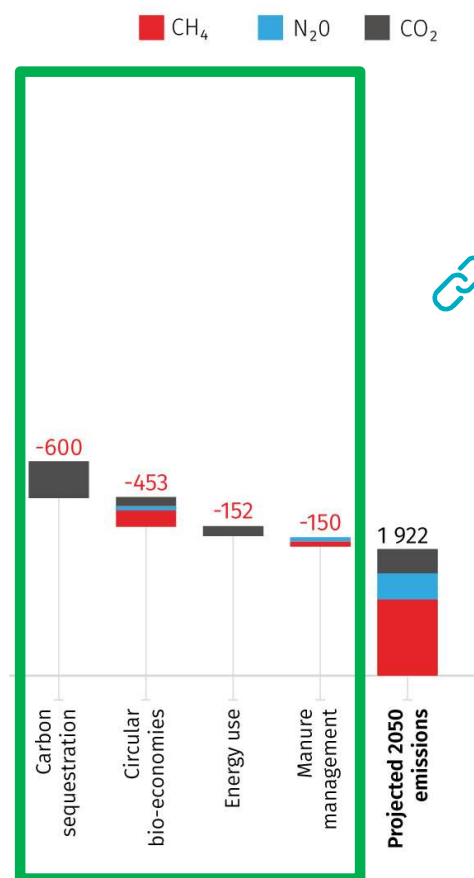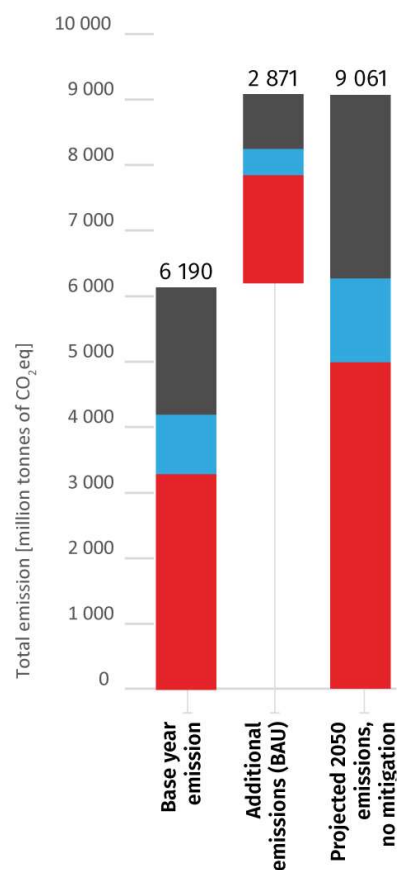Y-axis: Total emission [million tonnes of CO$_2$eq]

On-farm measures: 5 – 20 percent

- ✓ Productivity increase of low producing animals
- ✓ Genetic improvement and breeding
- ✓ Rumen manipulation (feed additives, methanogens vaccine)
- ✓ Feed and nutrition improvements (feed formulation)
- ✓ Improved animal health, control of infectious diseases through one health

FAO, 2023 – https://doi.org/10.4060/cc9029en

Pathways towards lower emissions

Legend: CH4, N2O, CO2 (colored markers)

Left chart (Total emission [million tonnes of CO_2eq]):
- Base year emission: 6 190
- Additional emissions (BAU): 2 871
- Projected 2050 emissions, no mitigation: 9 061

Middle chart (waterfall):
- Carbon sequestration: -600
- Circular bio-economies: -453
- Energy use: -152
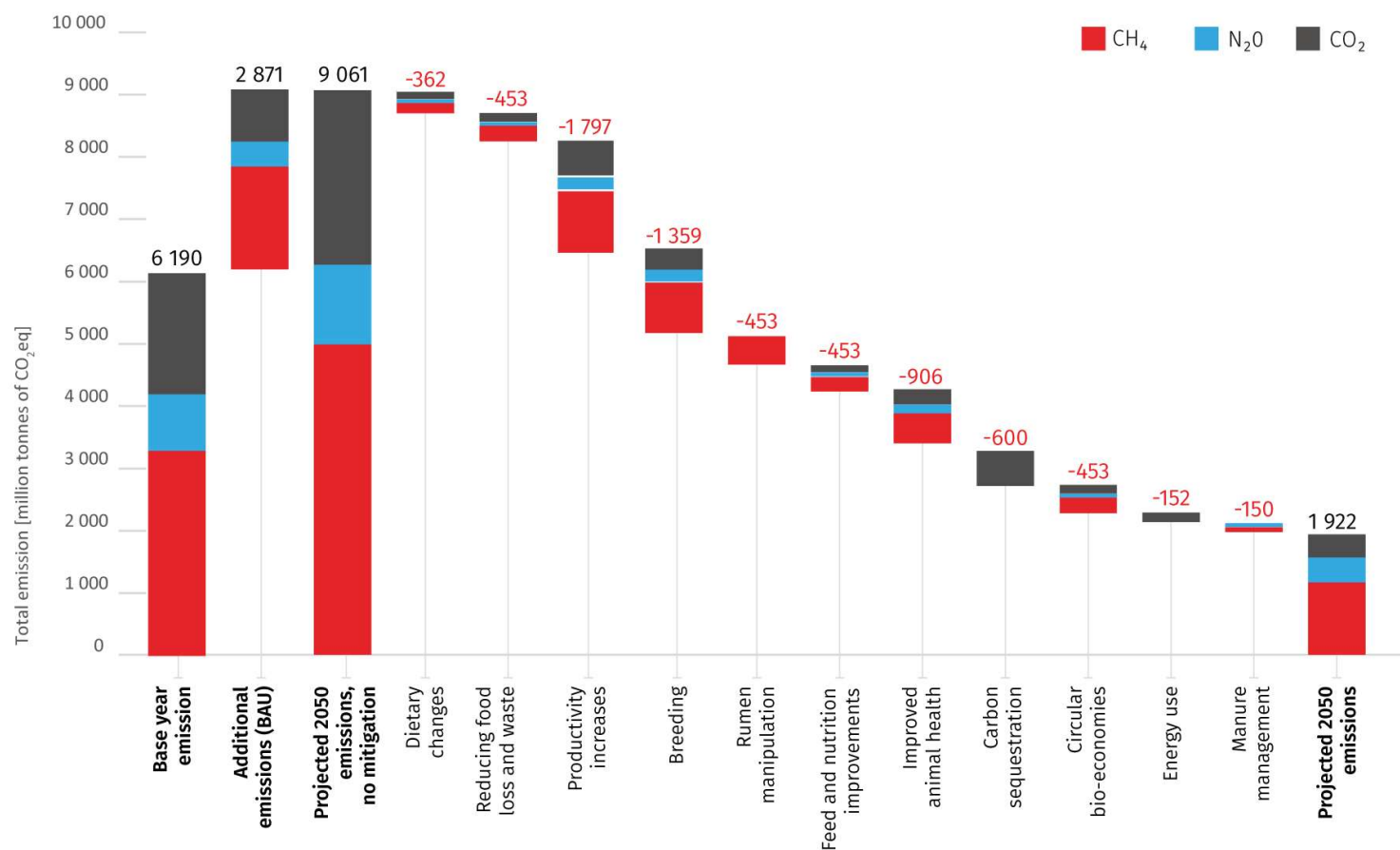- Manure management: -150
- Projected 2050 emissions: 1 922

Other solutions: 1.6 – 6.6 percent

- ✓ Carbon sequestration
- ✓ Circular bio-economy
- ✓ Renewable energy use
- ✓ Best Manure management systems

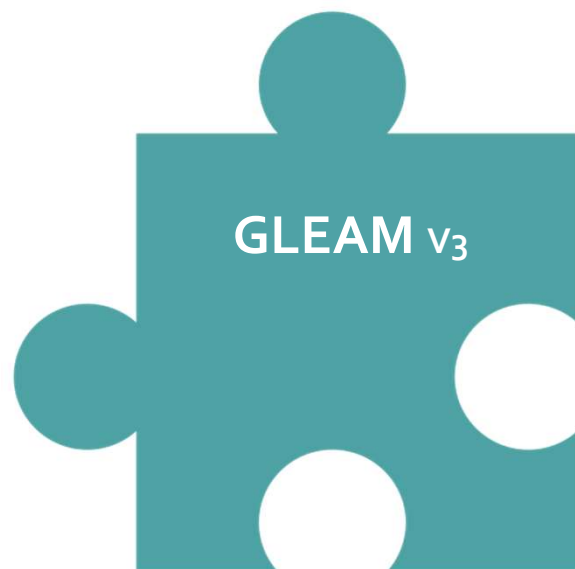FAO, 2023 – https://doi.org/10.4060/cc9029en

Pathways towards lower emissions

- Global overview
- Overlapping effects
- Pathways are specific for regions/production systems/species
- **Refinements needed with local data!**

FAO, 2023 – https://doi.org/10.4060/cc9029en

Towards regional pathways (2025)

GLEAM v3

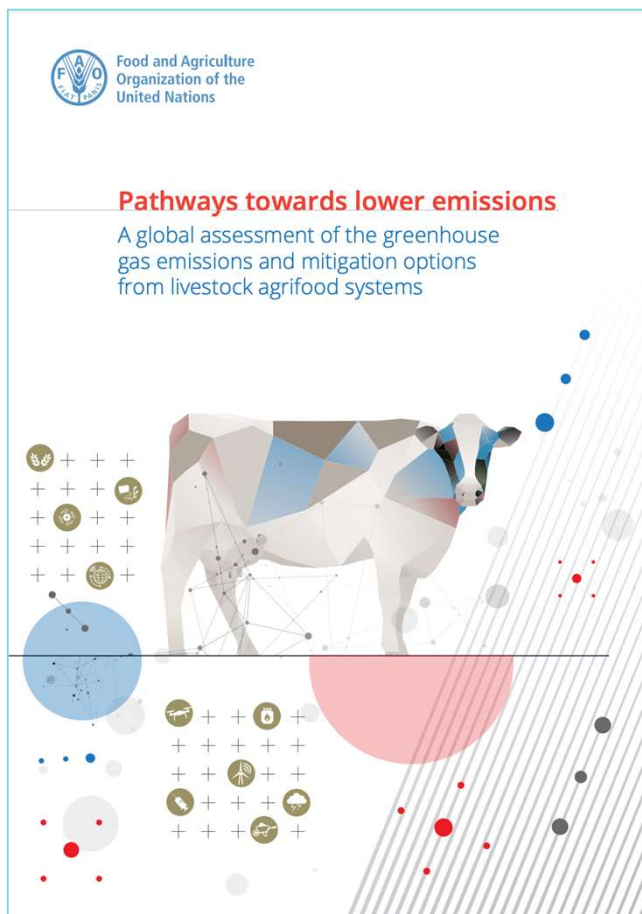Mitigation pathways

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Key messages

- Livestock agrifood systems contribute 6.2 Gt CO_2eq emissions, representing approximately 12 percent of all anthropogenic GHG emissions in 2015

- About 80 percent of emissions are concentrated in low- and middle-income countries

- The adoption of technical and innovative interventions on both the supply and the demand sides has the potential to reduce GHG emissions in short-term

- There is no one-size-fits-all solution; pathways need to be specific to production systems and local conditions

- Regional data and expertise is needed

GLEAM and other tools can provide the evidence to support the sustainable livestock transformation initiative

Food and Agriculture Organization of the United Nations

Pathways towards lower emissions

A global assessment of the greenhouse gas emissions and mitigation options from livestock agrifood systems

Thank you!

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