



Food and Agriculture Organization  
of the United Nations

# Pathways towards low carbon livestock

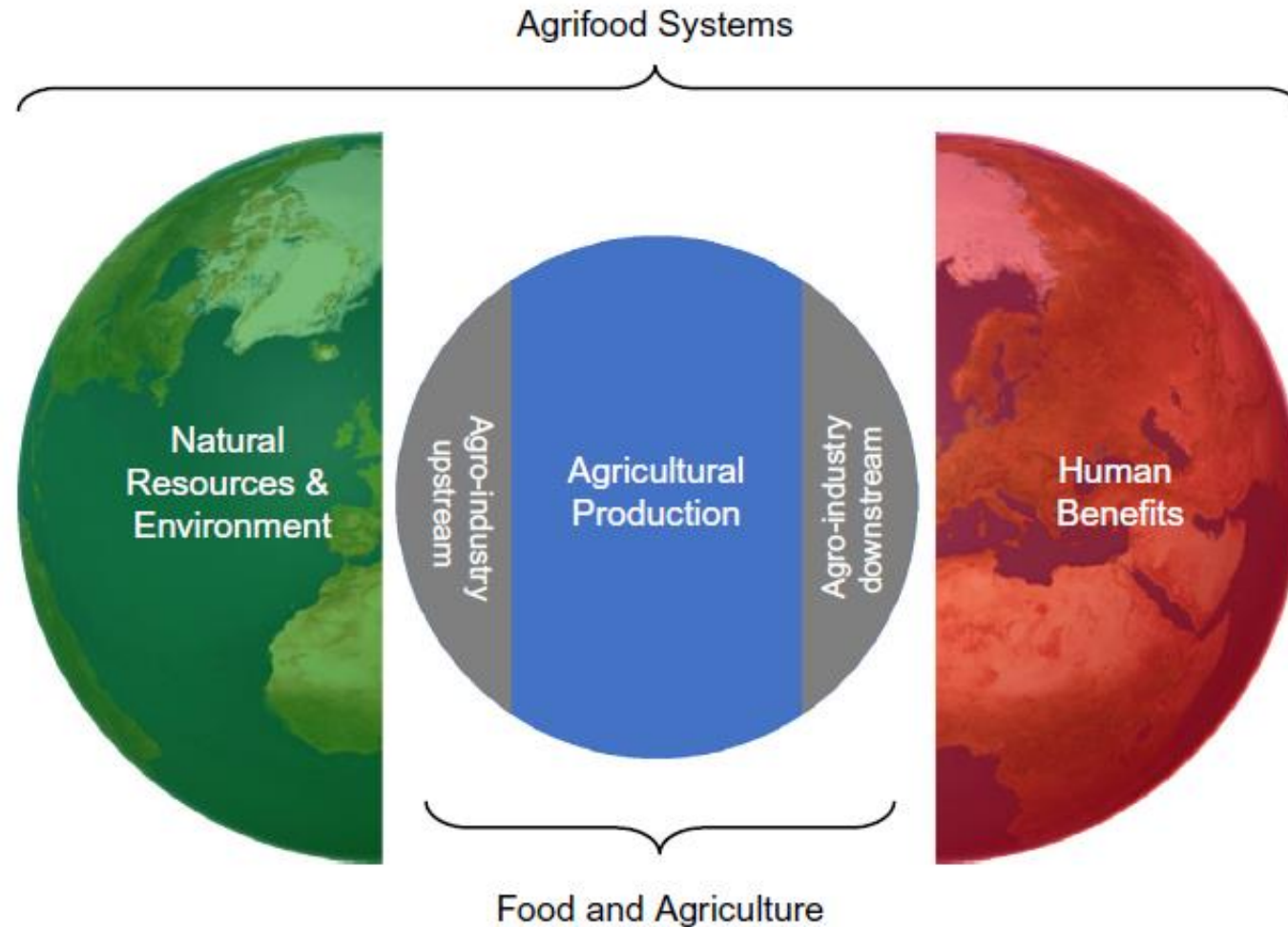
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21 October 2019, Rome, Italy

# Mismatch between human and natural systems



Source: *Sustainable Food and Agriculture: An Integrated Approach*, 2019

# Mismatch between human and natural systems

## *The role of livestock*



- Biomass appropriation - HANPP (58%)
- Climate gas emissions - 8.1 Gg CO<sub>2</sub> eq.
- Land use - 29% of global surface area
- Nutrient use - 65 Tg N
- Biodiversity - habitat change)
- Water - 31% of total agriculture water use)

Source: *Sustainable Food and Agriculture: An Integrated Approach*, 2019; Krausmann et al., 2009; Uwizeye, 2019; de Fraiture et al., 2007

# Mismatch between human and natural systems

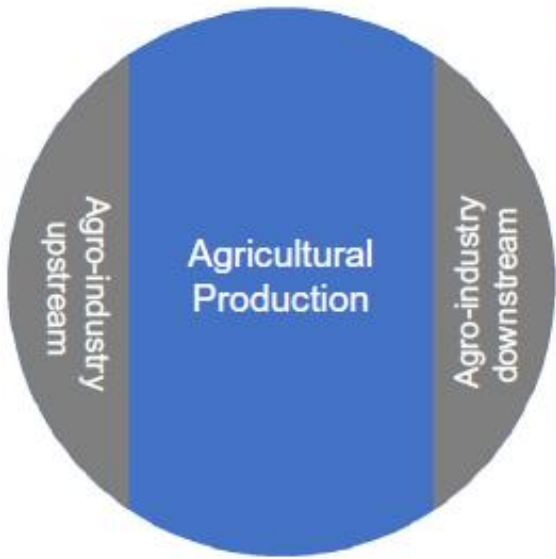
## *The role of livestock*

- Food - 17% calorie and 33% protein consumption
- Capital - \$3.1 trillion & land
- Livelihoods, income and employment
- Fertilizer, energy, fibre
- Buffer
- Social and cultural functions



# Mismatch between human and natural systems

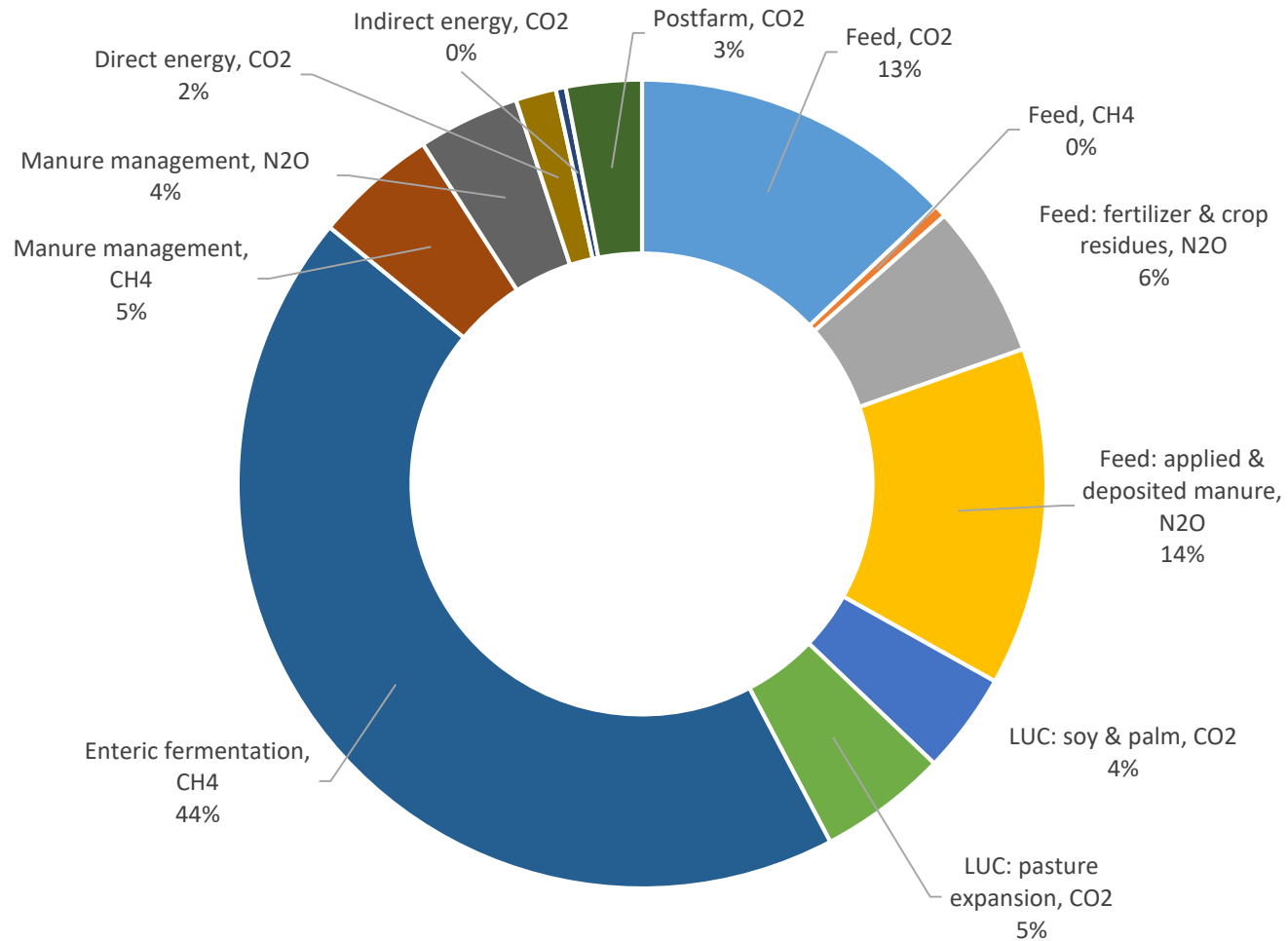
## *The role of livestock*



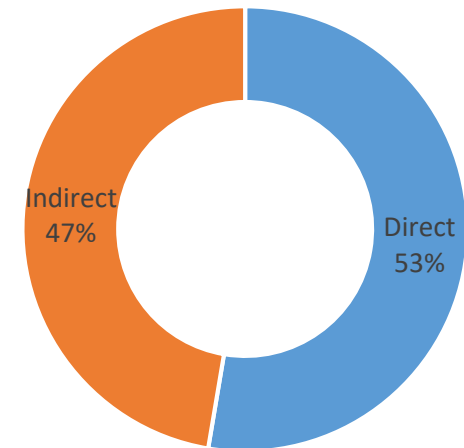
### Systems change:

- Continued demand growth in LMIC
- Intensification
- Shift from ruminants to monogastrics
- Growing scales, vertical integration
- Geographic concentration
- Growing trade and resource transfers
- Frequent shocks

# Livestock GHG emissions

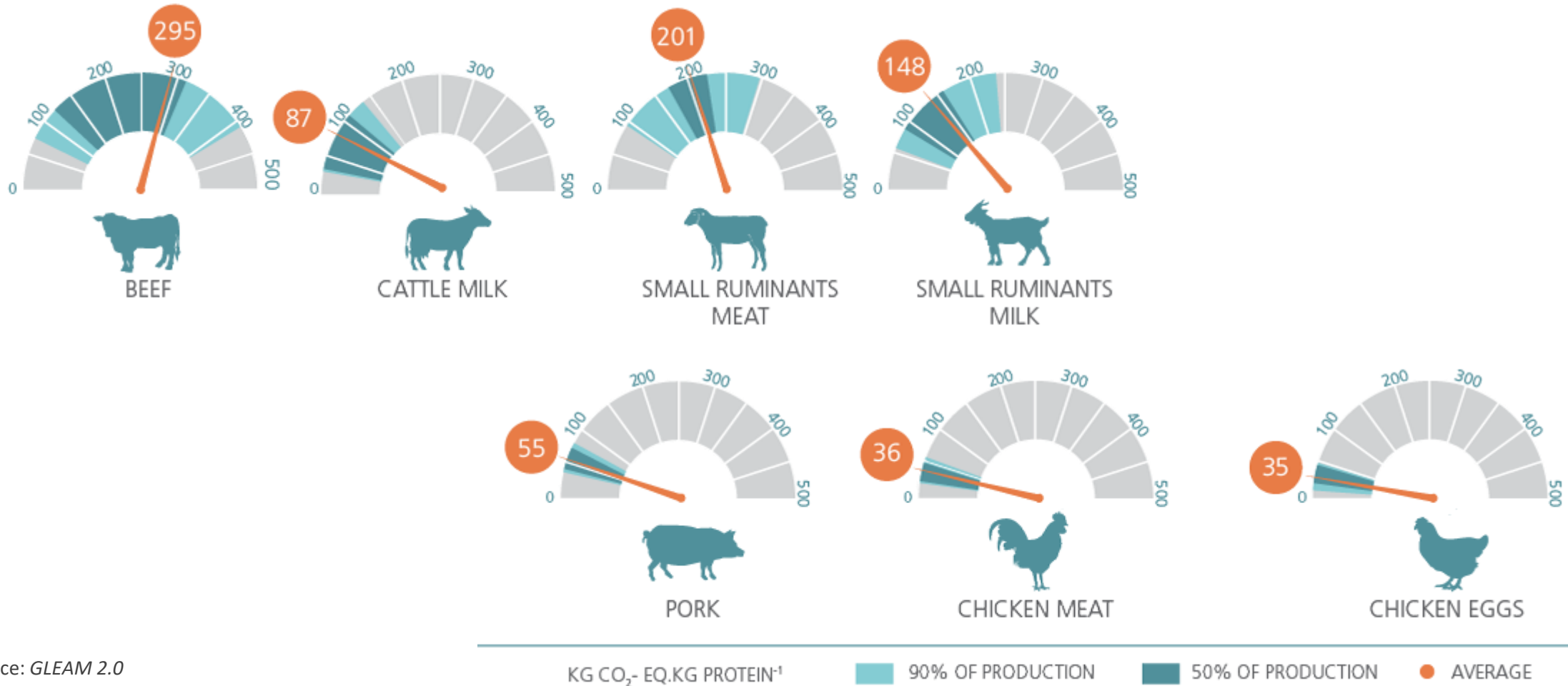


Livestock systems  
emitted 8.1 Gg CO<sub>2</sub> eq.  
in 2010



Source: GLEAM 2.0

# Emission intensity by commodities



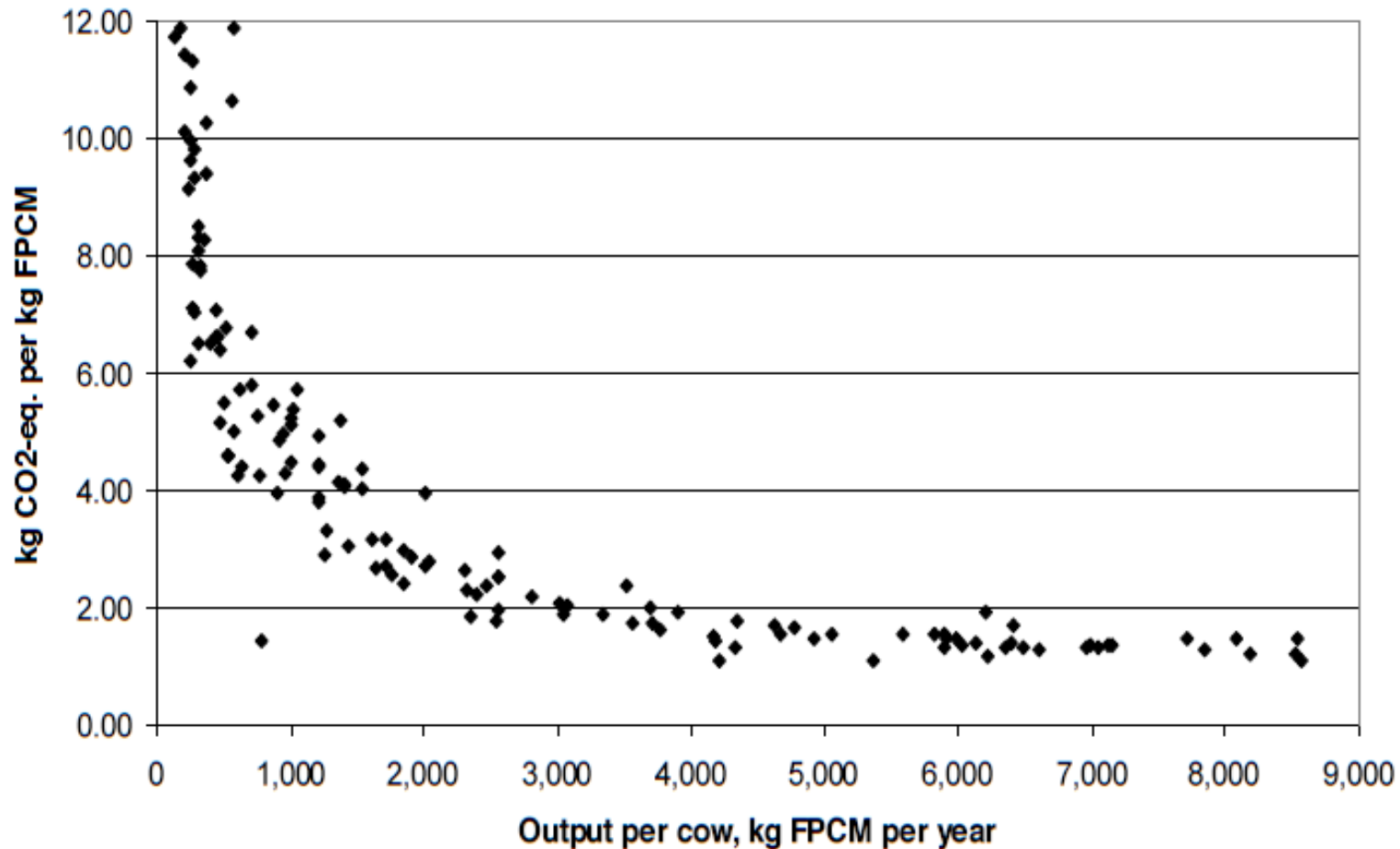
Source: GLEAM 2.0

# What are the options?

- Improve efficiency – reduce emission intensities
- Regenerative grazing – create offsets
- Circular livestock
- Consumption and alternatives

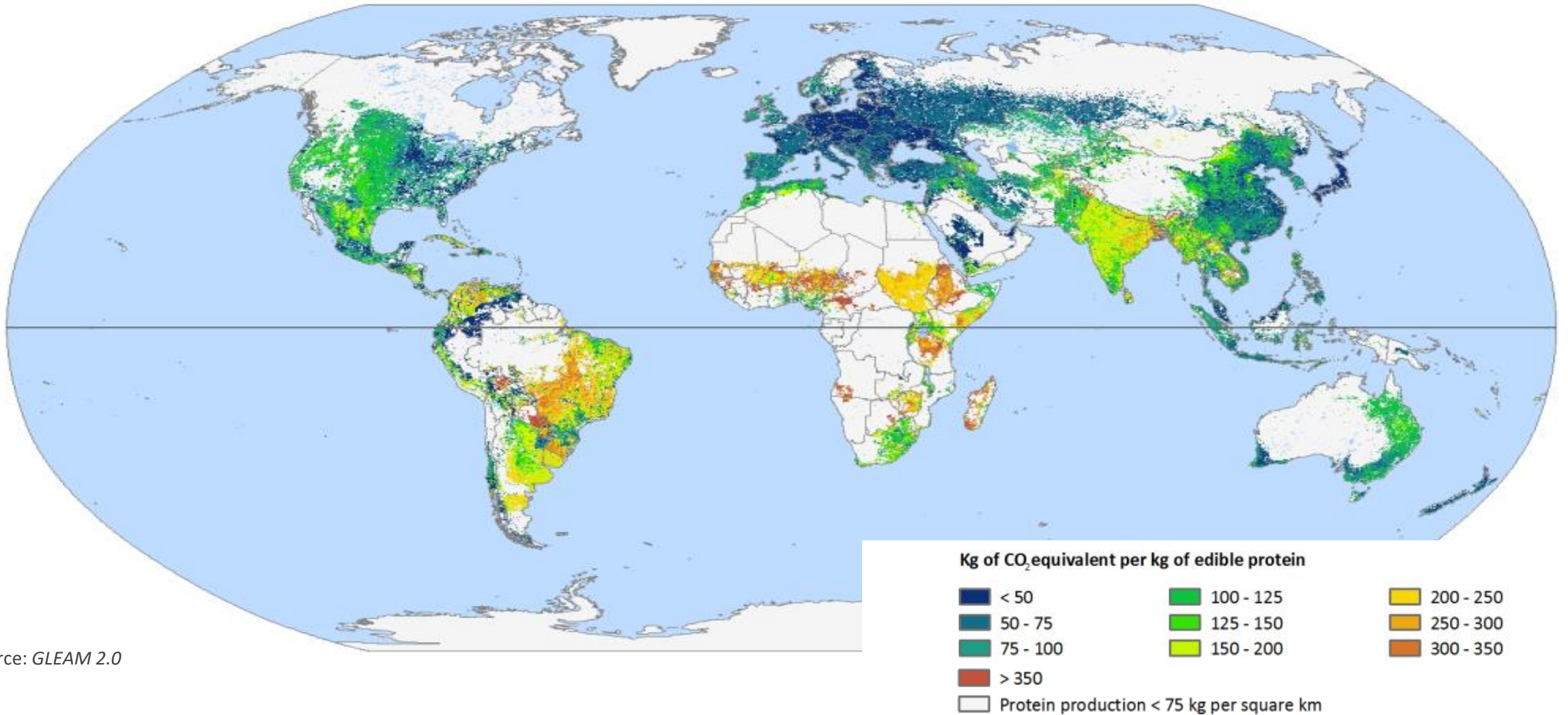


# Productivity gains and emission intensity reduction



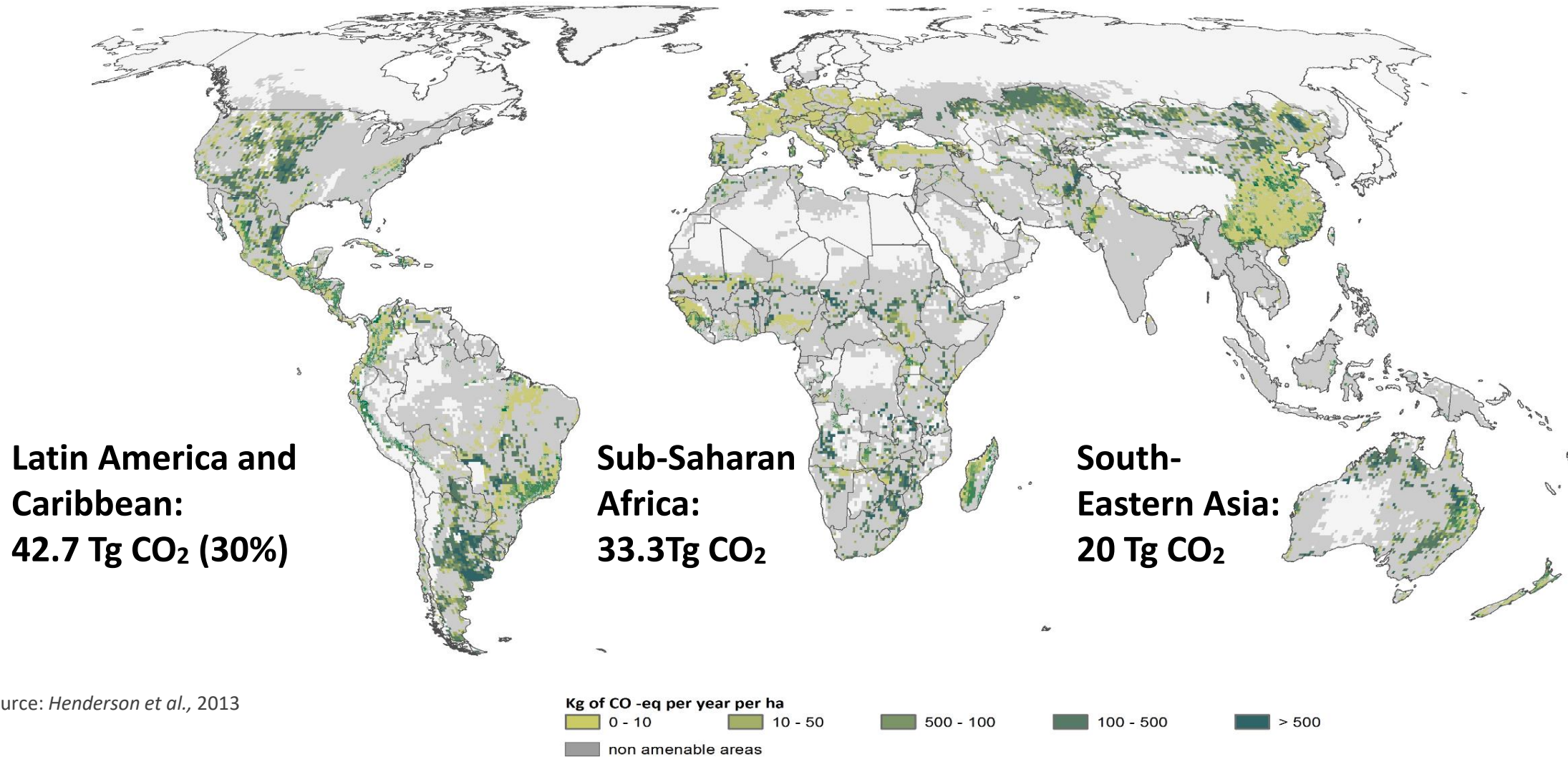
Source: Gerber et al., 2011

# Productivity gains and emission intensity reduction



Source: GLEAM 2.0

# Improved grazing management could sequester 148 Tg CO<sub>2</sub> yr<sup>-1</sup>



Source: Henderson et al., 2013

# Livestock in the circular bio-economy

- Increased use of waste and by-products as feed
  - Food waste
  - Agro-industrial by-products
  - Crop residues
- Improved use of livestock waste and by-products
  - Energy (biogas)
  - Fertilizer – creating opportunities nutrient cycling
  - Feed (e.g. whey)

# Consumption and alternatives

- Healthy Diets
- Shift to low carbon livestock products
- Shift to low carbon substitutes (plant based, microbial protein, cellular agriculture)

# What next: integrated solutions

- Recognize multiple functions and diversity of livestock
- Location matters
- Combine solutions for increased effectiveness
- Avoid shift of burden



Thank you

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