

# Environmental Impact of Animal Agriculture

Key issues

# What do we know?

- the livestock sector is large, growing and complex
- more than half of agric. GDP in industrialized countries
- the drivers – income, demographics, urbanization

# The challenge

By 2050, 30 % more people, 70-80 % more meat

Today, livestock use/provide

- 26 % of all land for pasture
- 35 % of all arable land for feed
- 58 % of anthrop. biomass appropriation for food
- 8 % of all freshwater
- 18 % of climate gas emissions
  
- 13 % of all calories
- 1.5 % of world GDP
- livelihood component to 1 billion people

# Contribution to climate change

**7.1 billion tonnes CO<sub>2</sub> equivalent**  
18% of total anthropogenic GHG emissions

**CO<sub>2</sub> (Carbon dioxide)**  
**2.7 billion tonnes CO<sub>2</sub>**  
9% of total anthropogenic CO<sub>2</sub> emissions

**CH<sub>4</sub> (Methane)**  
**2.2 billion tonnes CO<sub>2</sub> equivalent**  
37% of total anthropogenic CH<sub>4</sub> emissions

**N<sub>2</sub>O (Nitrous oxide)**  
**2.2 billion tonnes CO<sub>2</sub> equivalent**  
65% of total anthropogenic N<sub>2</sub>O emissions

# A food-chain perspective of GHG emissions

IPCC attribution

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- Emissions from **feed** production

- chemical fertilizer fabrication ← Industry and energy
- chemical fertilizer application ← Agriculture
- on-farm fossil fuel use ← Energy
- livestock-related deforestation ← Forestry
- C release from ag. soils ← Agriculture

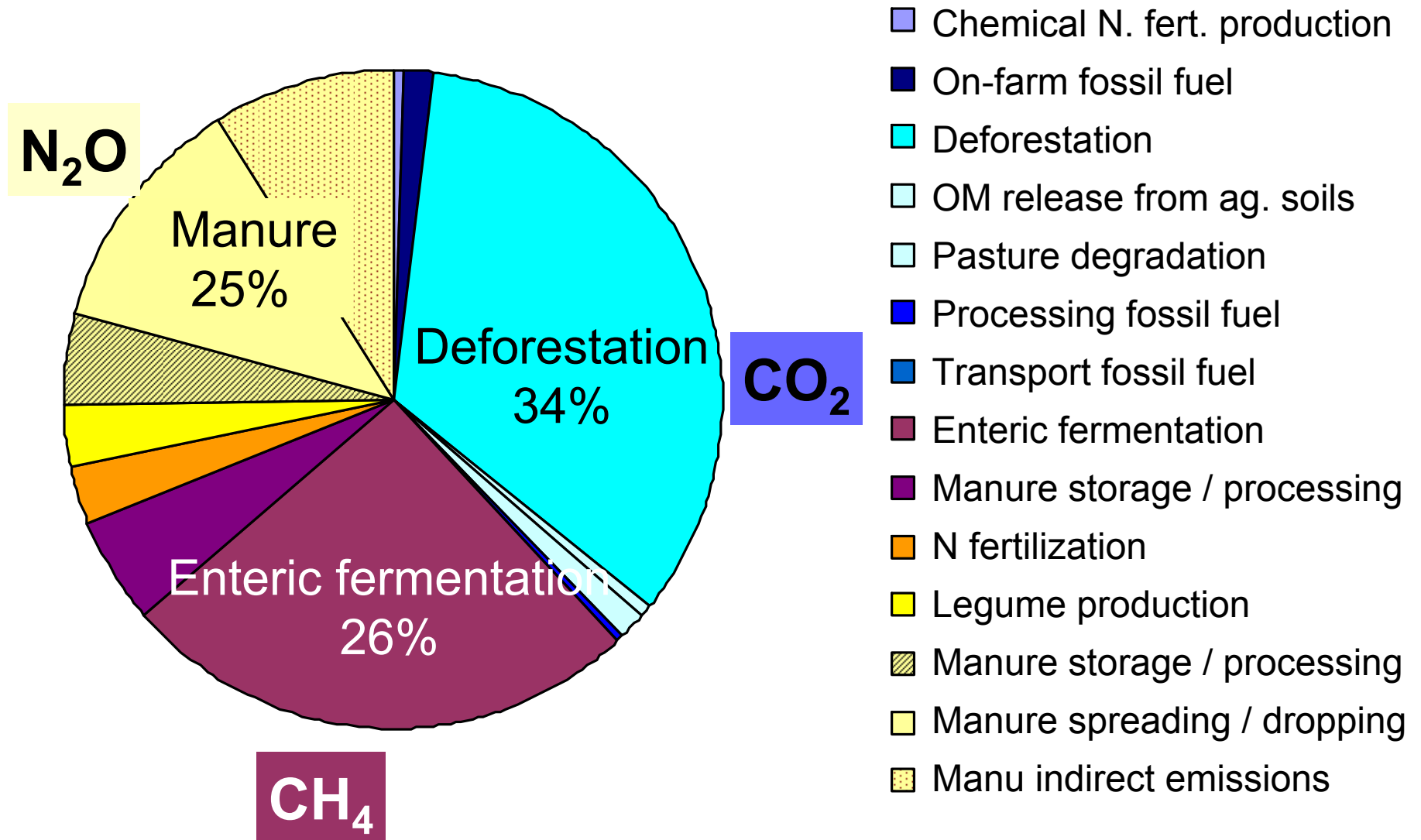
- Emissions from **livestock rearing**

- Methane from enteric fermentation ← Agriculture / livestock
- Methane and Nitrous Oxide from manure ← Agriculture / livestock

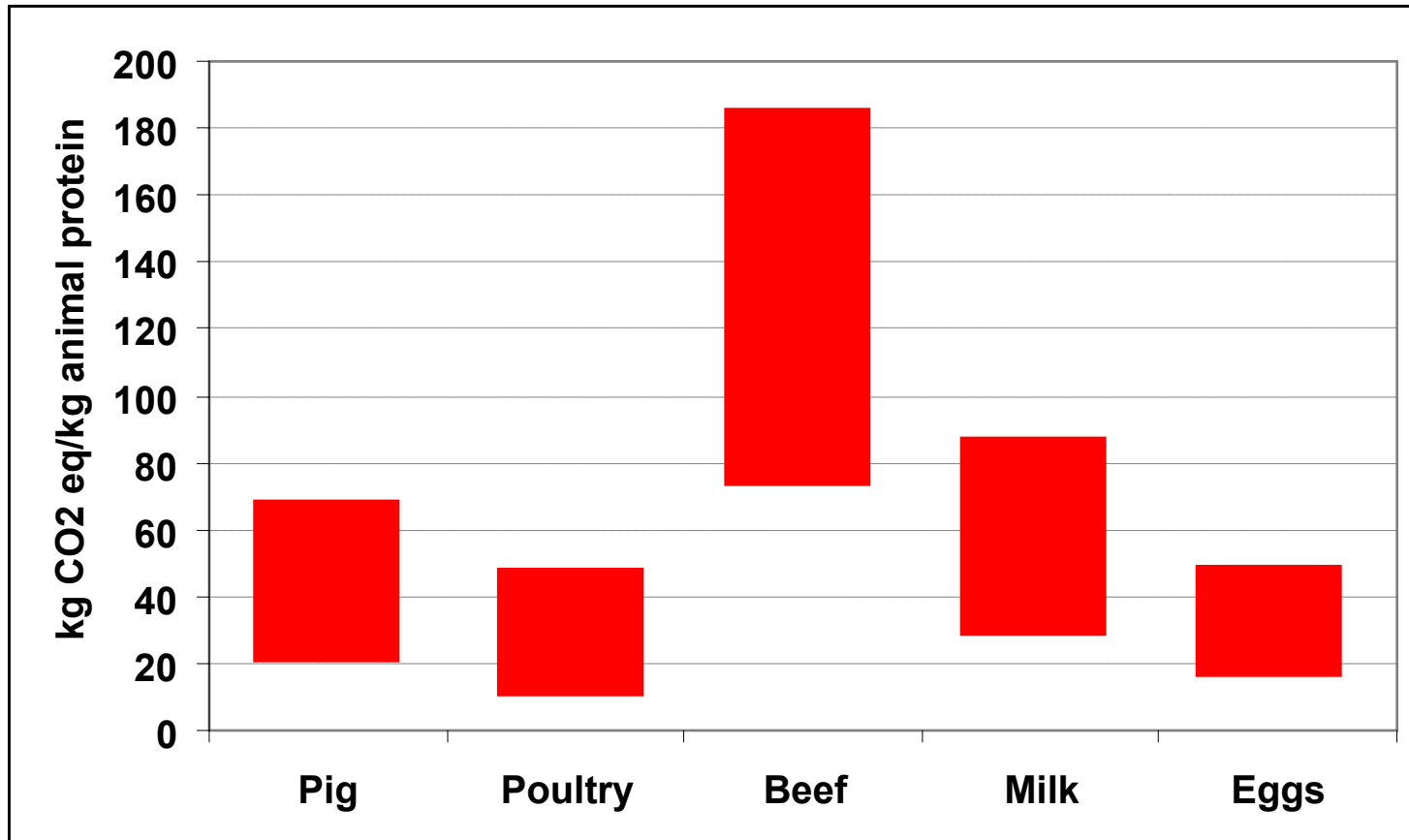
- **Post harvest** emissions

- slaughtering and processing ← Industry and energy
- international transportation ← Transport and energy

# Relative contributions along the food chain (2)

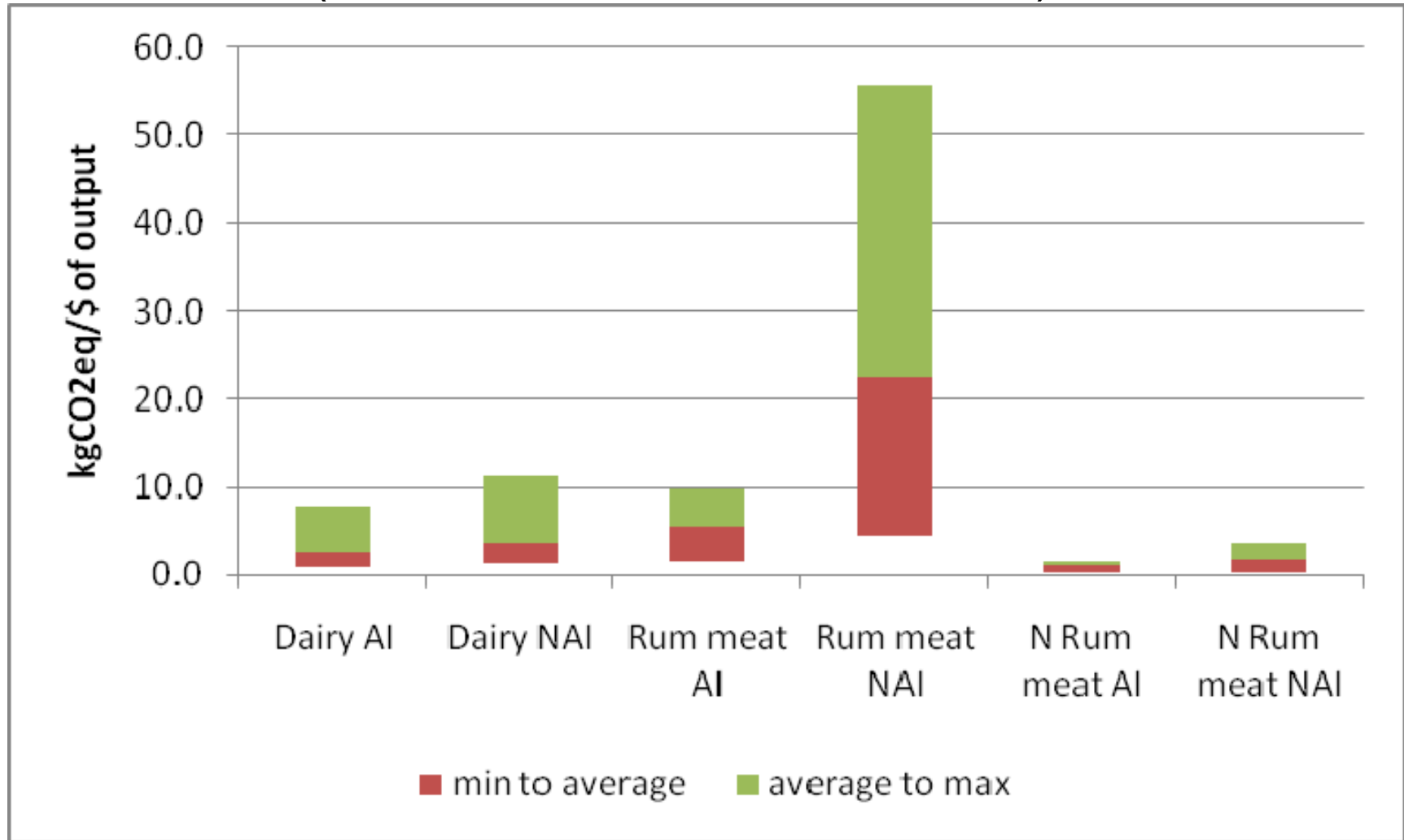


# Range of GHG intensities for commodities in OECD-countries



Source: DeVries & DeBoer (Submitted)

# Emission Intensities: Annex 1 & Non Annex I regions (direct emissions from livestock)

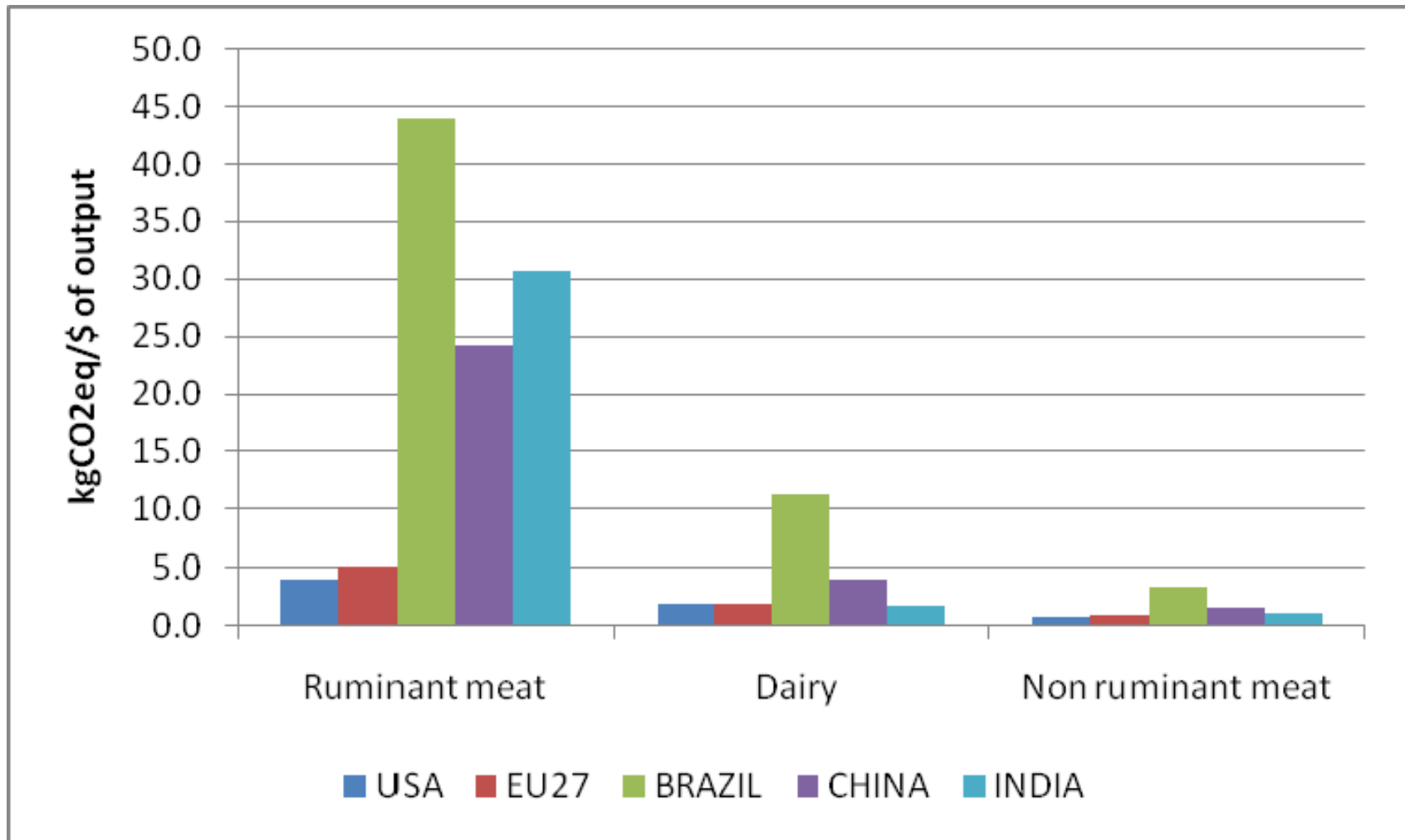


GTAP 2001 data base



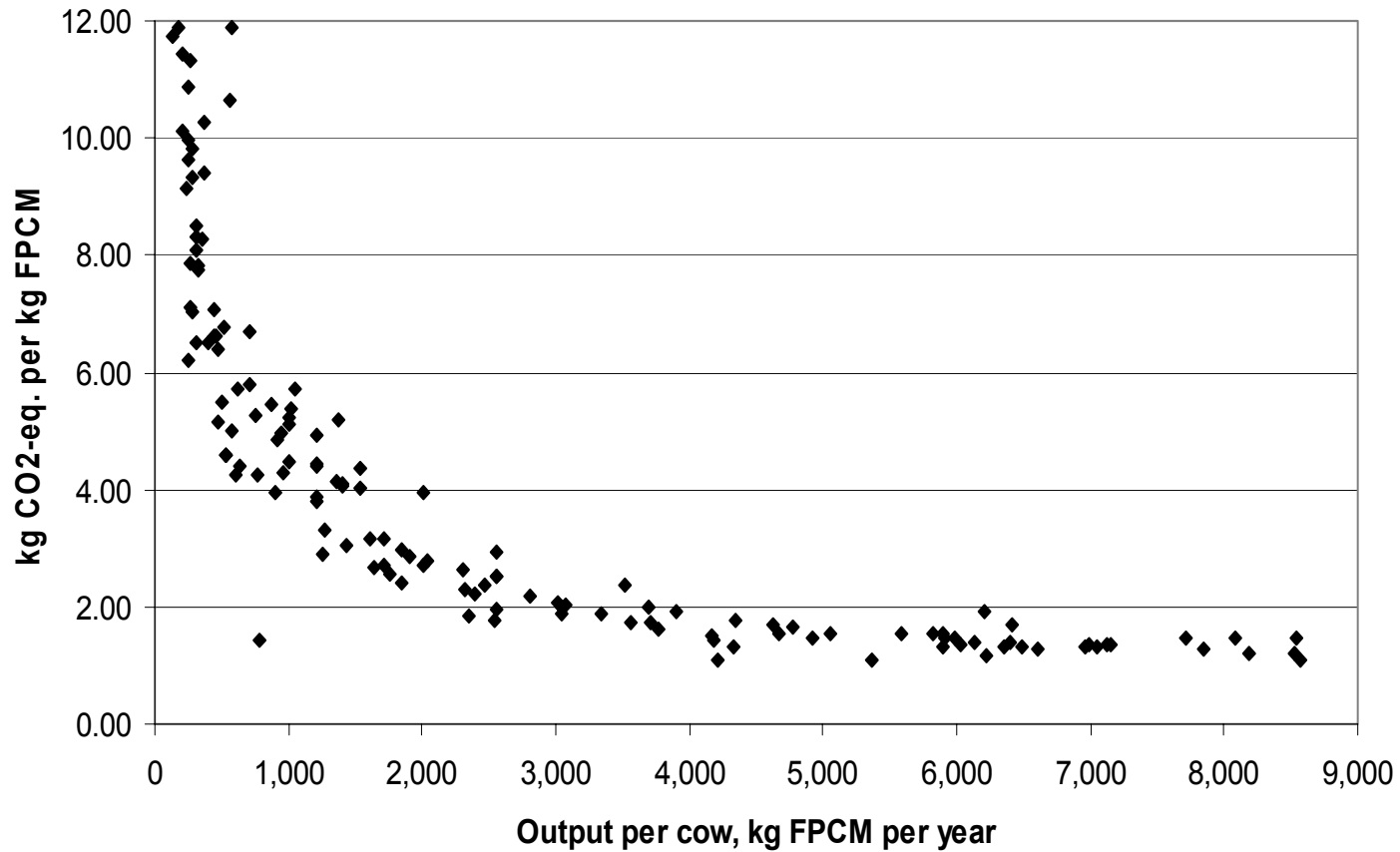
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(direct emissions from livestock)

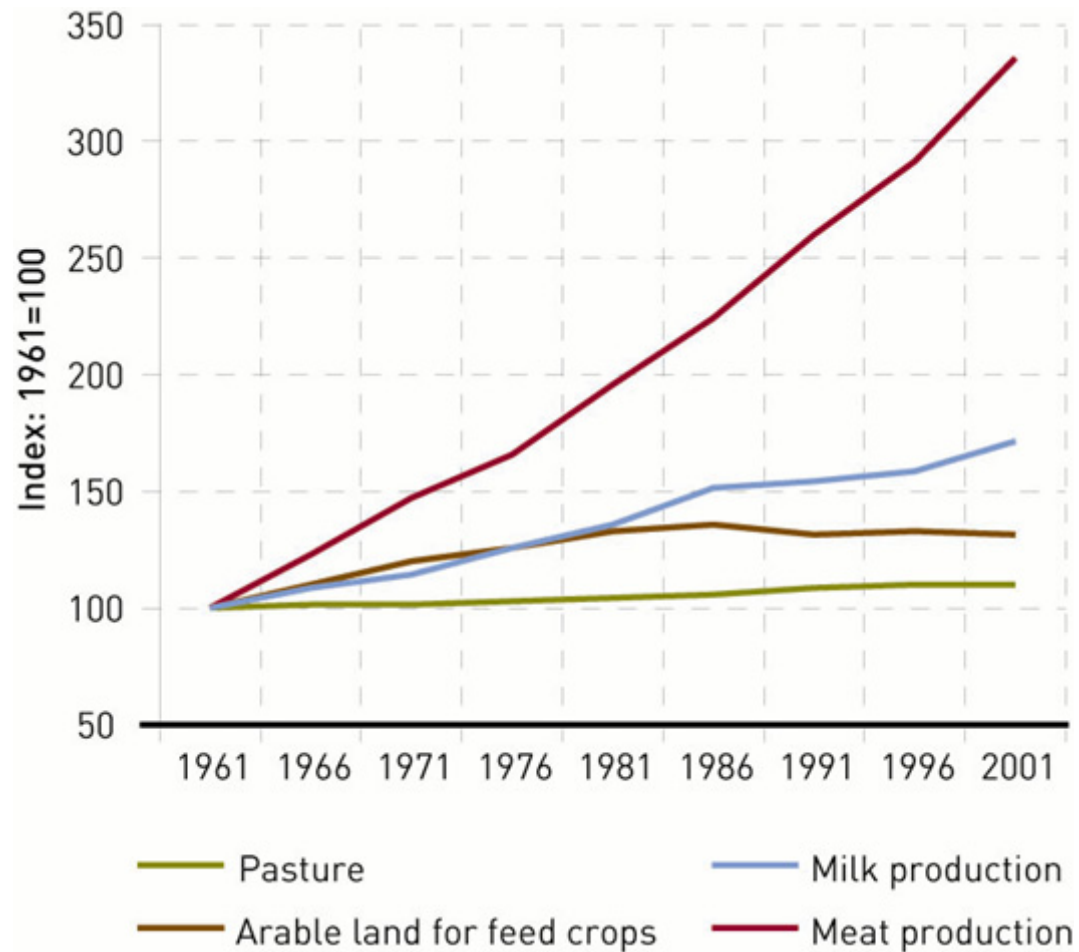


GTAP 2001 data base

# Relationship between total greenhouse gas emissions and milk output per cow



## Trends in land-use area for livestock production and total production of meat and milk



# Intensification is key

- Intensity enhances biological efficiency
- Production intensity and emission intensity are inversely related
- High production intensities are controversial
- Carbon taxes would work but only if globally applied

# What do we not know?

- How do we handle the poverty question?
- 600 million poor depending on livestock but intensification not a viable broad-based development strategy
- How to operationalise win-wins?
  - carbon sequestration in degraded grasslands
  - lowering emission intensities while improving productivity (e.g dairy in Africa, South Asia)

# What do we not know?

- Given that intensification is probably inevitable, how do we reconcile intensive production with other objectives?
  - more equitable growth
  - other environmental objectives – water, air
  - animal welfare
  - healthy food

# What do we not know?

- Where are the biological limits of animal productivity? “Performance gaps” - yield gaps?
- How to reduce nutrient losses in the entire chain?
- How to enable nutrient recycling (spatial planning)
- A cure against archea?

# What do we not know?

What policy instruments will reduce GHG emissions and enhance resource efficiency along the chain?

- prices/incentives/subsidies
- regulations
- institutional development
- technology development and dissemination
- spatial planning (to enable nutrient cycling)
- policy coordination



# What do we not know?

How to curb demand?

- health is a stronger motivation than environment

Are there viable substitutes?

- plant protein
- non-vertebrate protein
- in-vitro meat