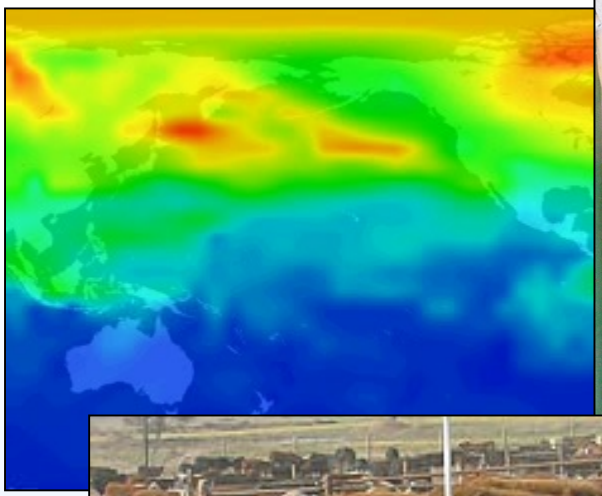
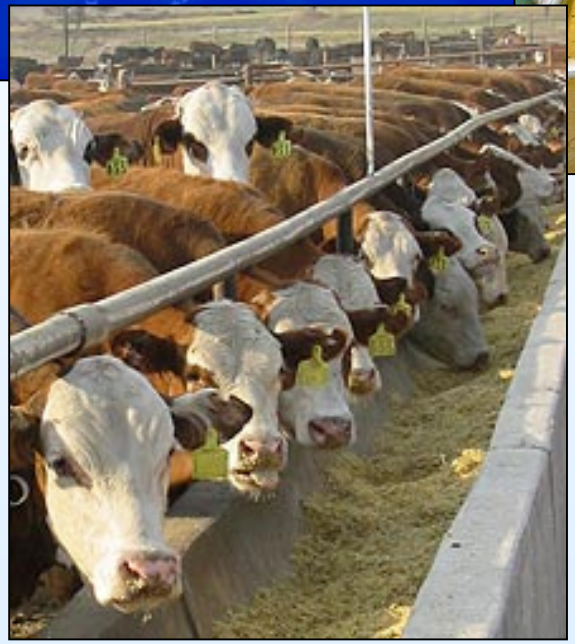
Reducing the Footprint of Animal Agriculture





Frank Mitloehner, PhD
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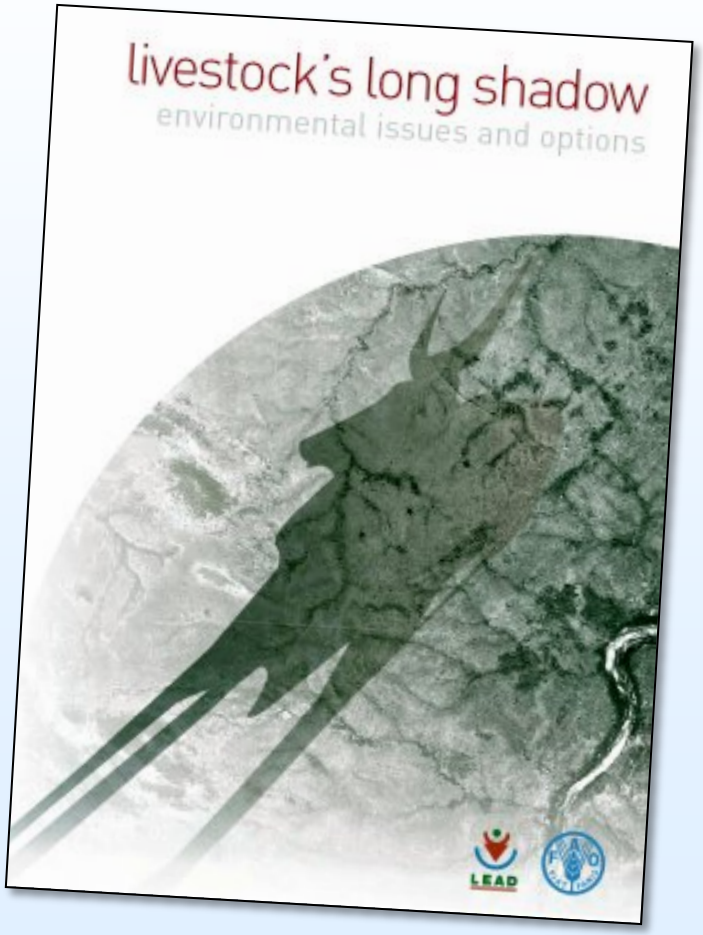
Facts or Fiction on Livestock and Climate Change

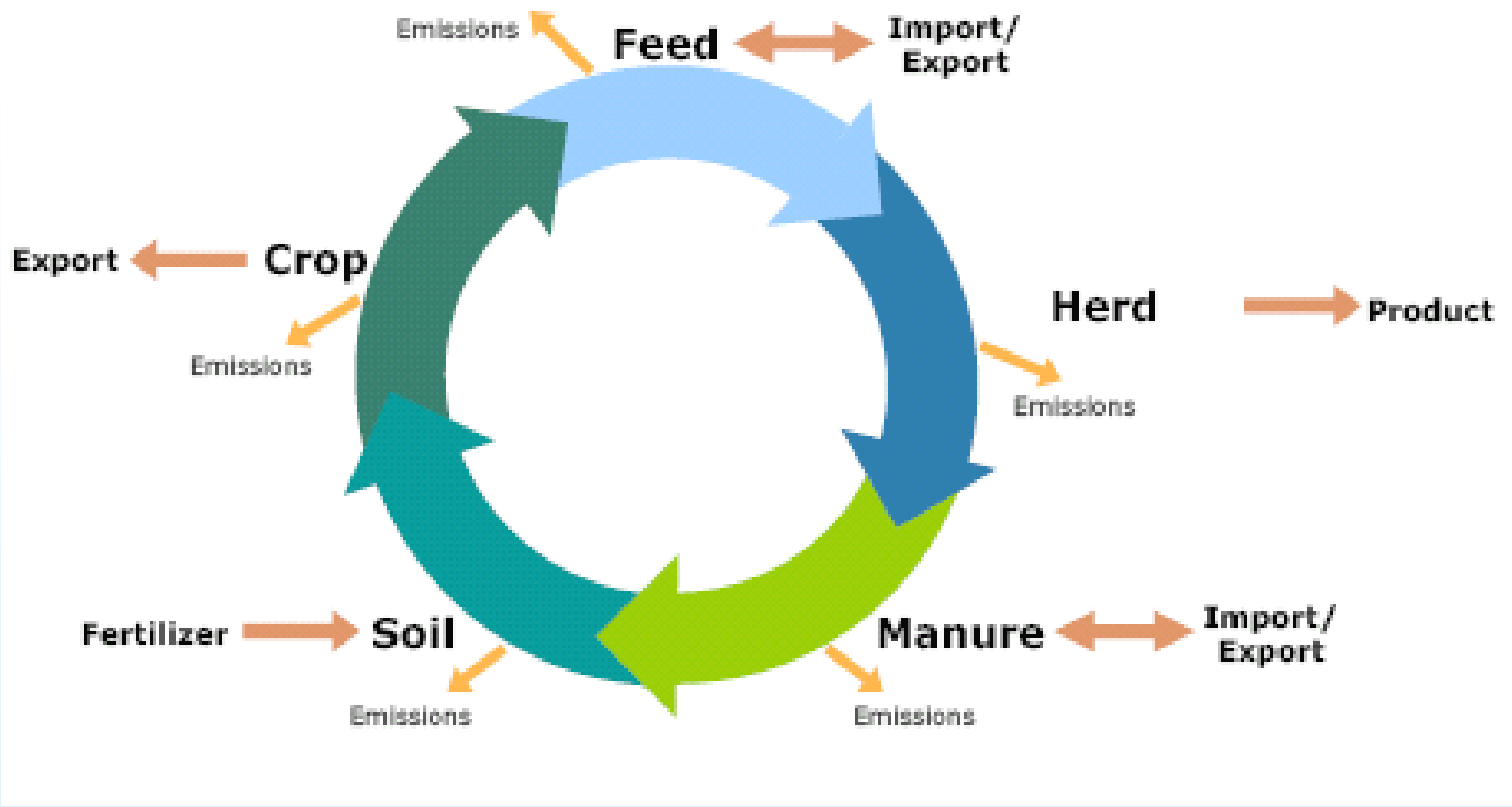
- Livestock produces 18% of all anthropogenic GHG globally
- Livestock produces more GHG than transportation
- Livestock occupies 70% of all agricultural land globally
- Grazing systems produce less GHG than conventional animal production in confinement systems

“Livestock’s Long Shadow” (FAO, 2006)

- “The Livestock sector is a major player, responsible for 18% of GHG emissions measured in CO_2e. This is a higher share than transport”

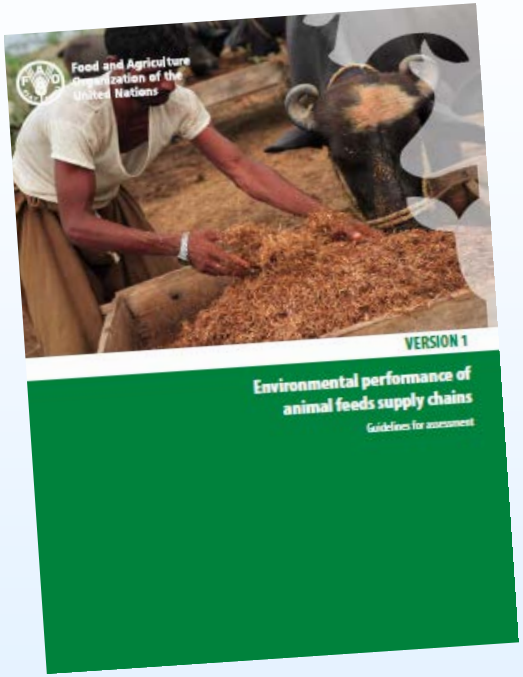


Life Cycle Assessment



(NRC, 2003)

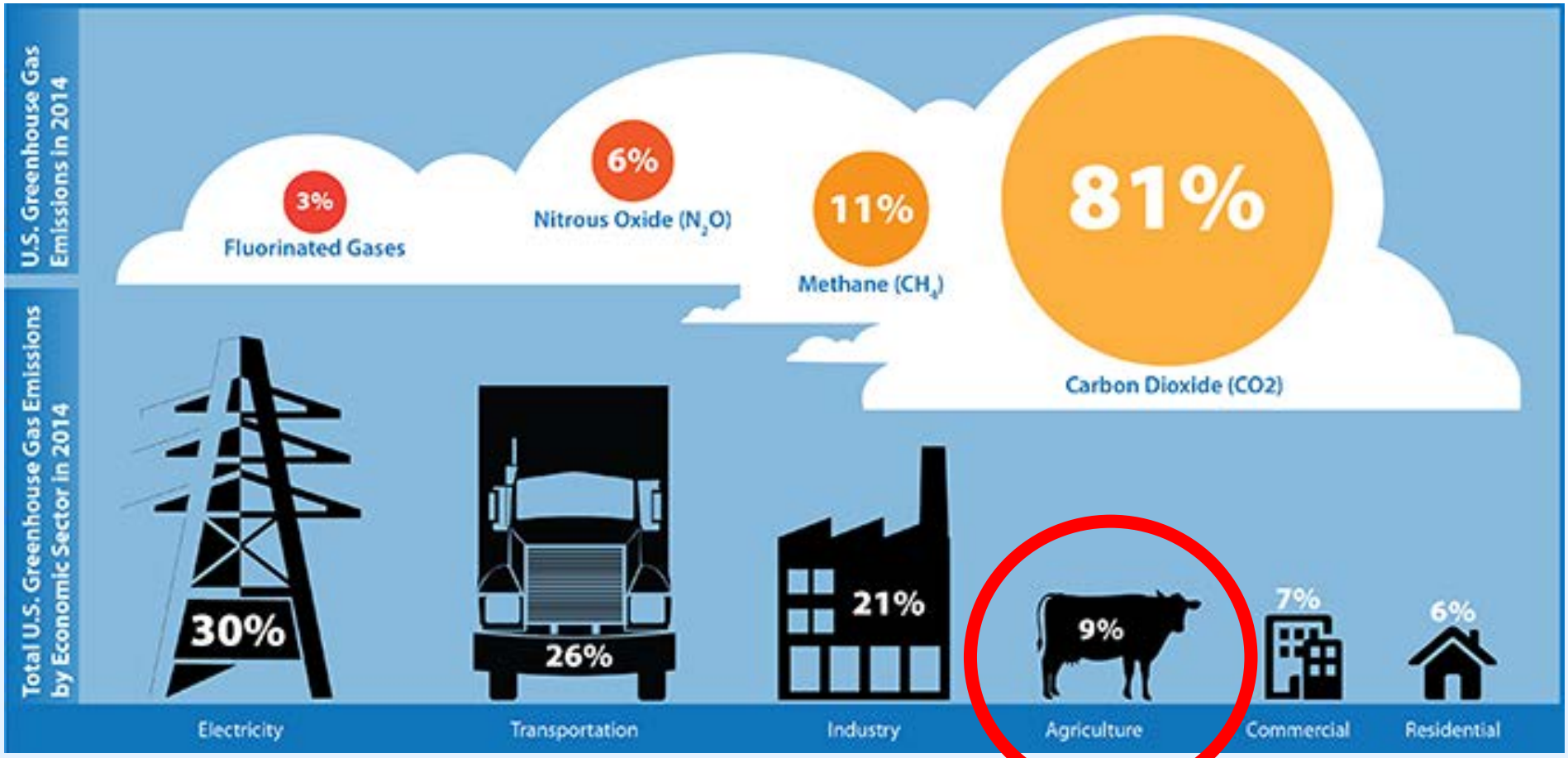
Livestock Environmental Assessment and Performance Partnership (LEAP)



- To develop internationally agreed sector-level methodologies and guidance to allow
  - transparent,
  - robust,
  - and fair measurement of the environmental performance of livestock supply chains

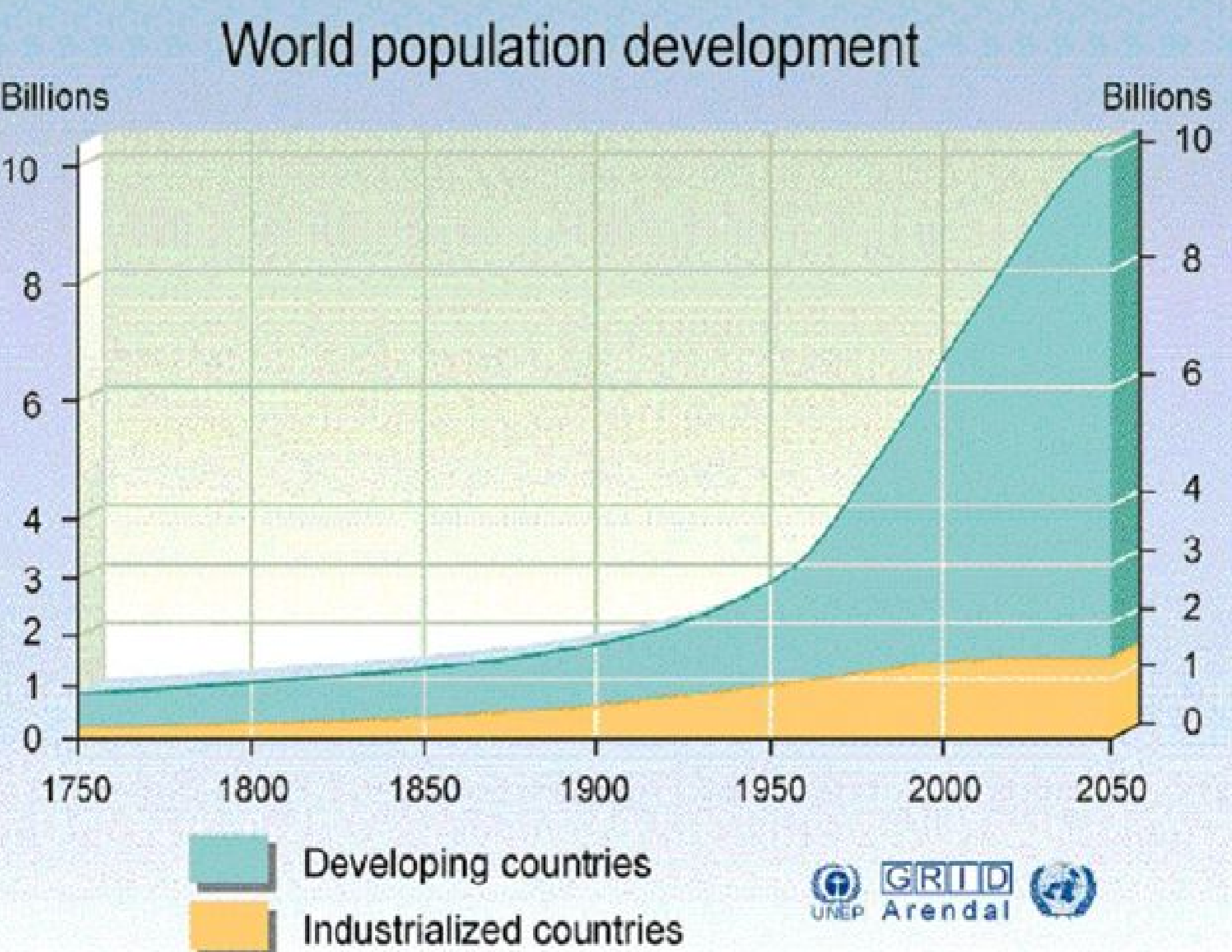
- FAO / LEAP Feed LCA Guidelines officially released

National-Level U.S. GHG Inventory

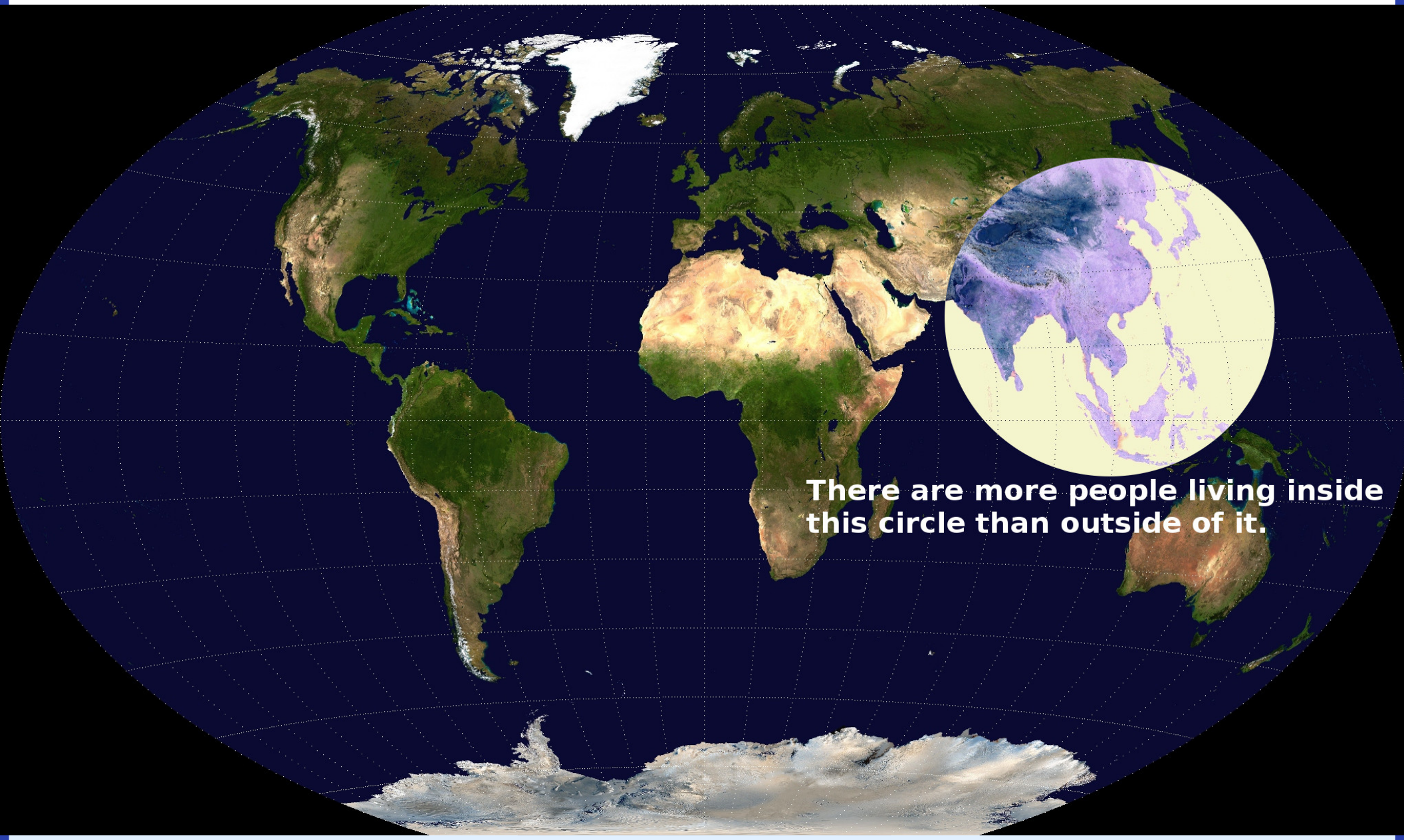


Source: EPA (2016)

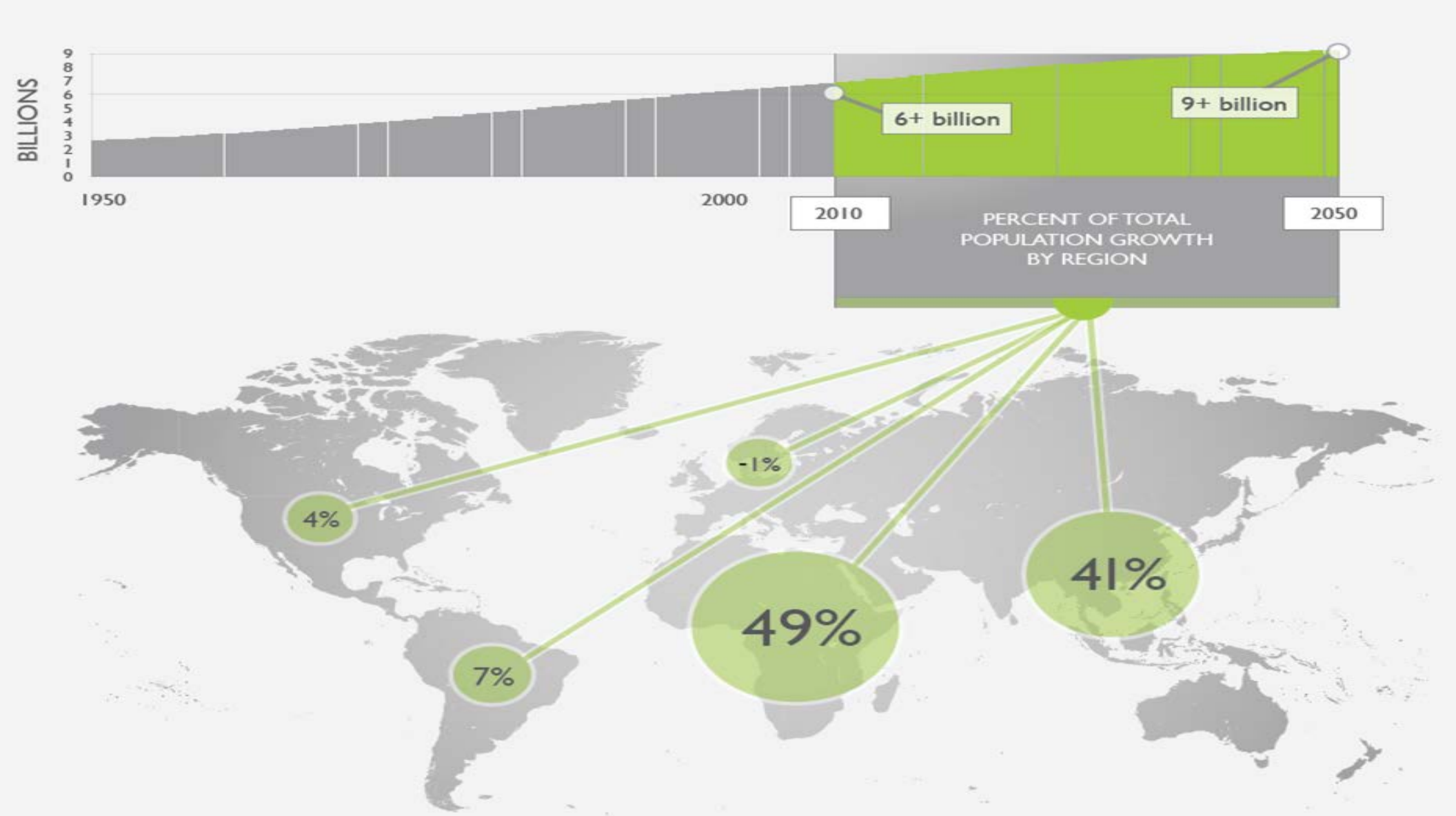
National Geograpic


World population development
Billions
Billions
10
8
6
4
3
2
1
0
1750
1800
1850
1900
1950
2000
2050
Developing countries
Industrialized countries
UNEP
GRID
Arendal

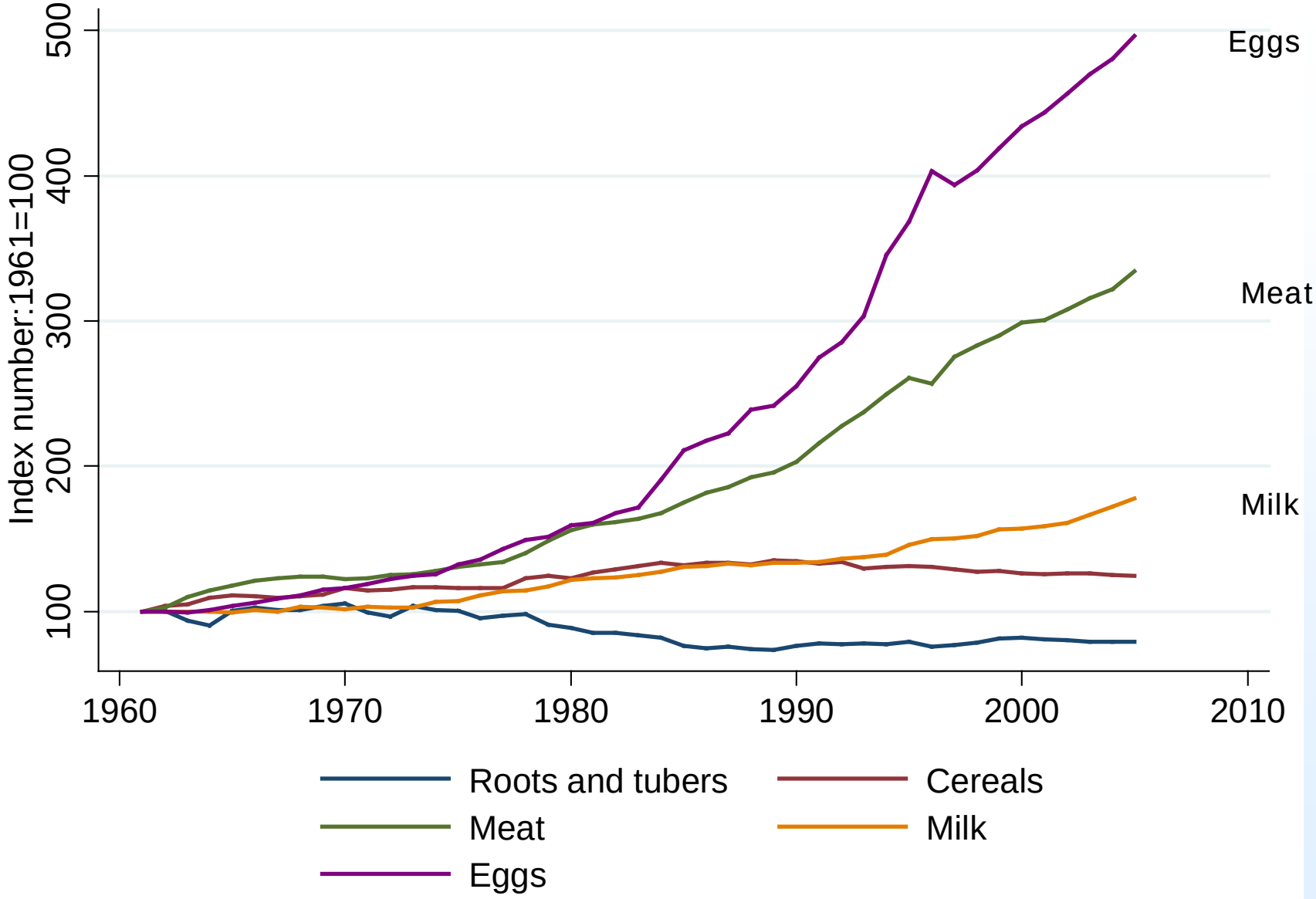
4.5 Billion + population of USA in 10 years



Today and Tomorrow's Markets

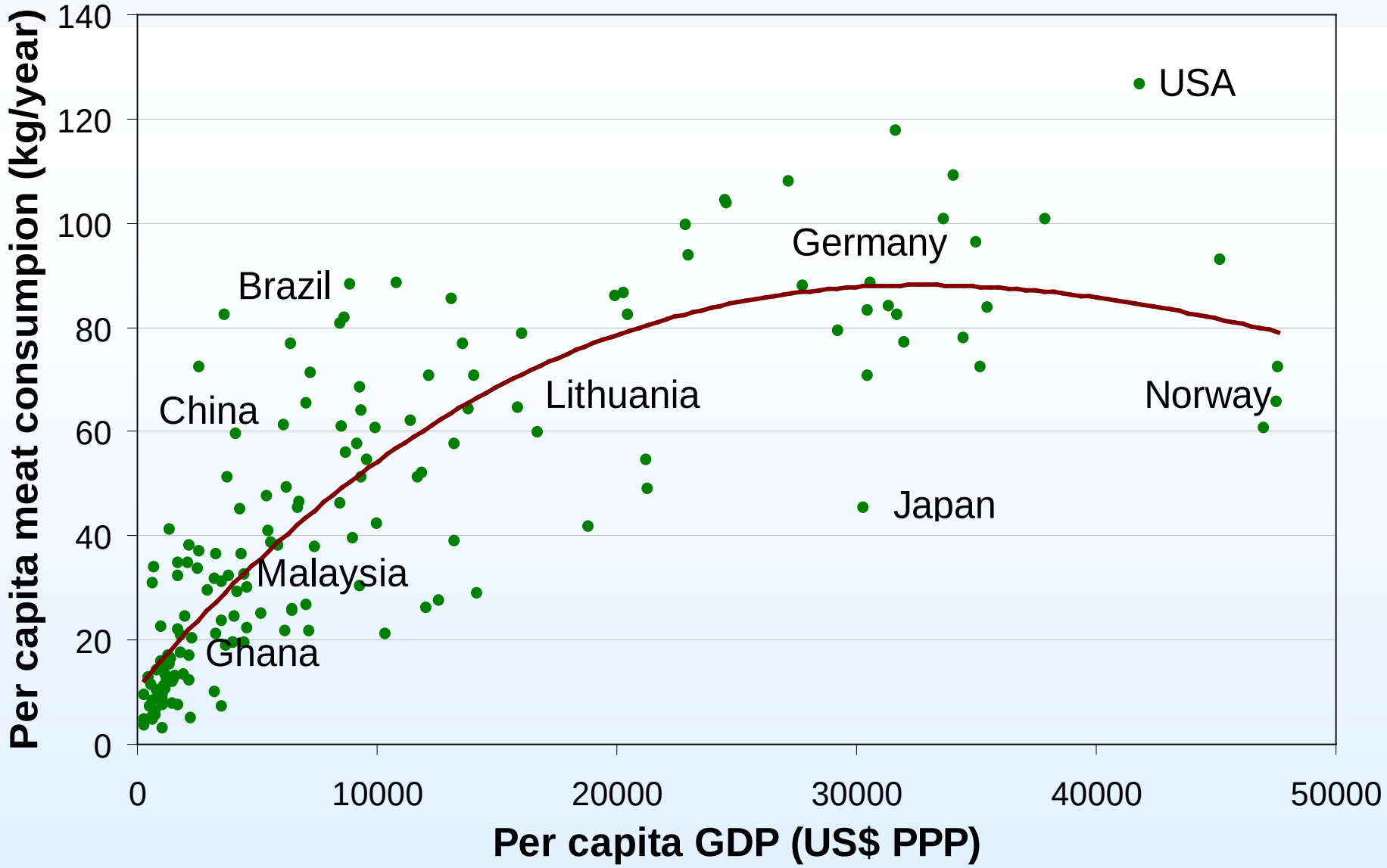


Consumption is growing rapidly in developing countries



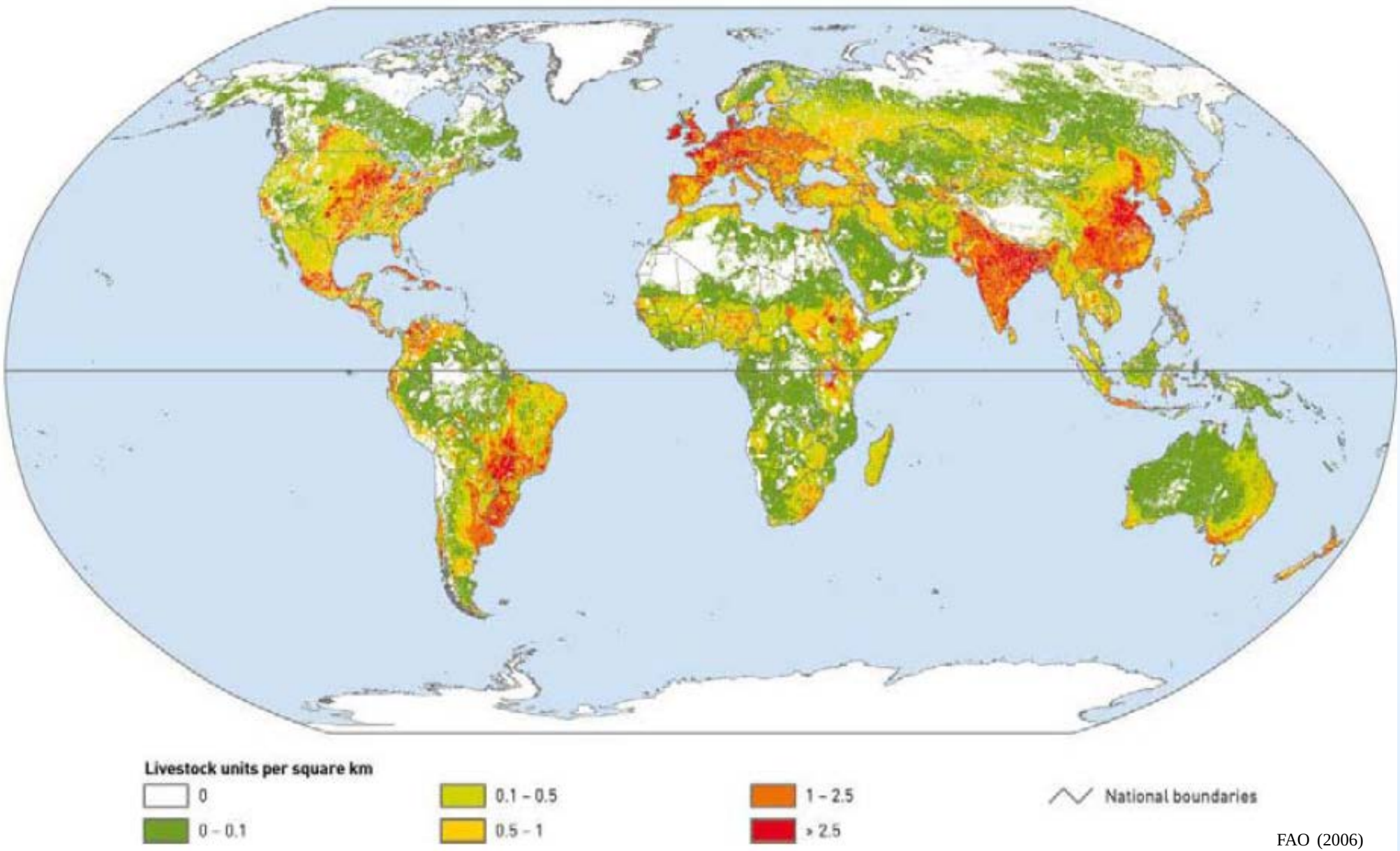
Per caput consumption of major food items in developing countries – kg per caput per year (index numbers 1961=100)

… driven by incomes …



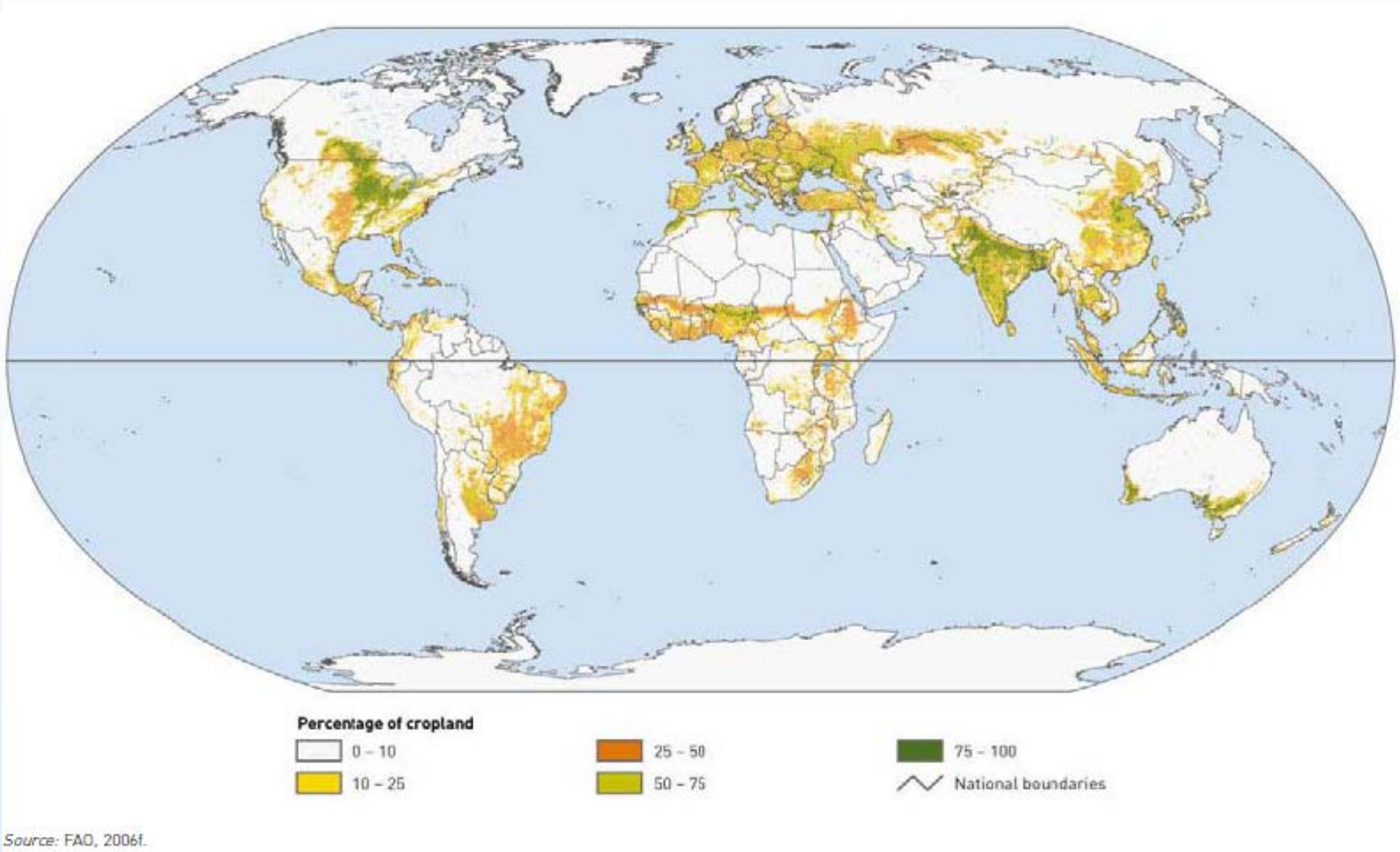
Per capita GDP and meat consumption by country, FAO, 2005.

Global livestock distribution



FAO (2006)

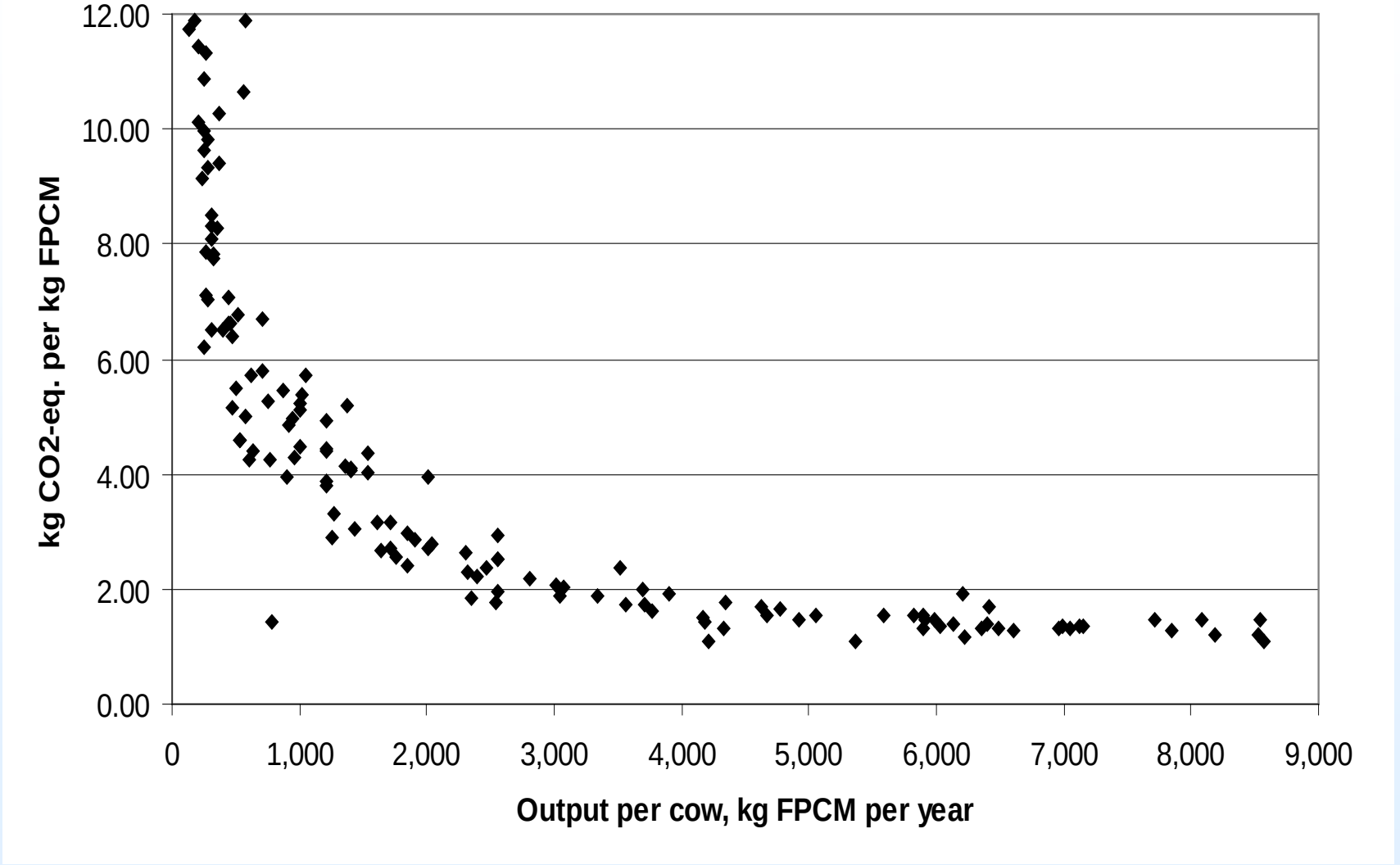
Distribution of cropland



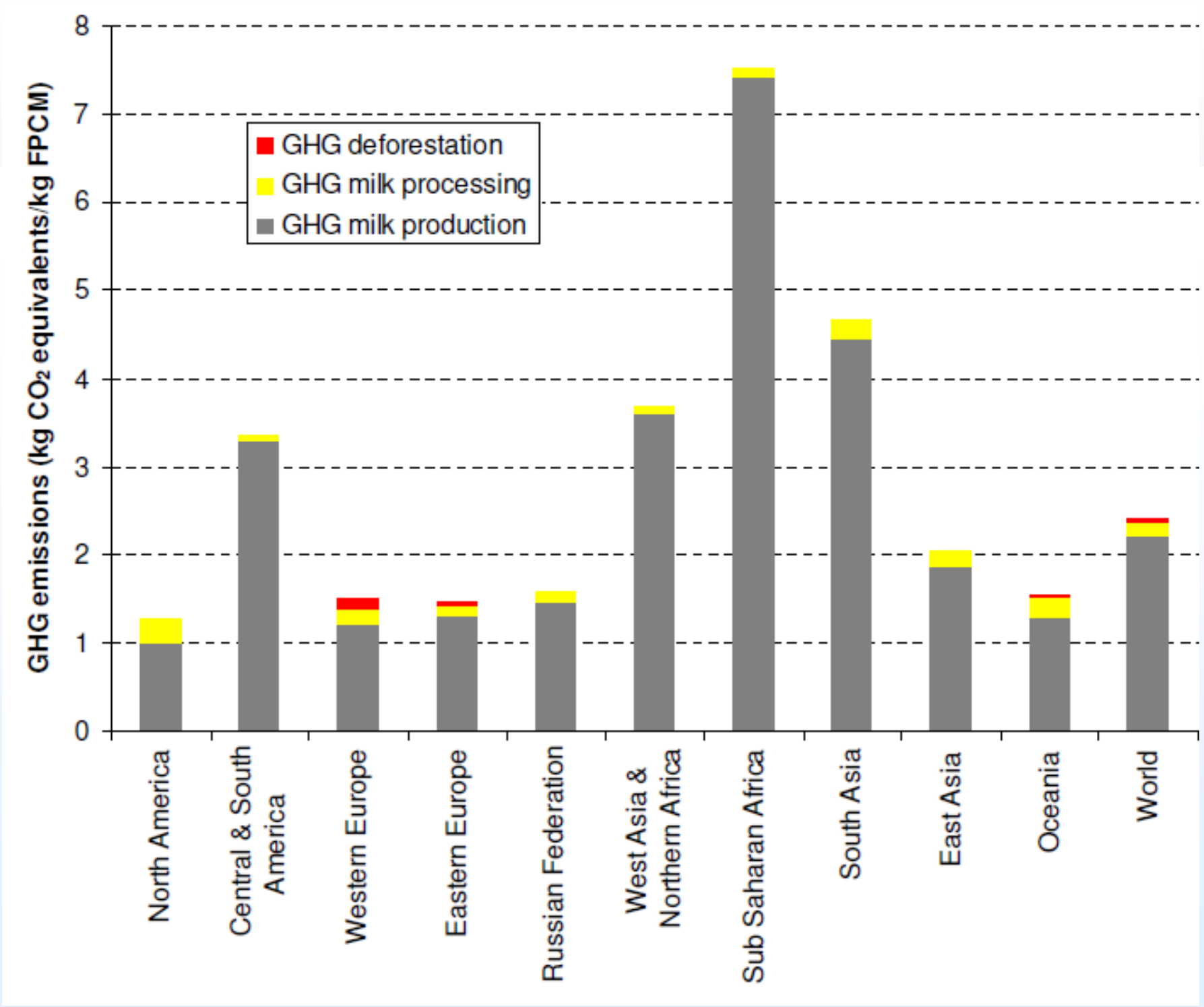
Source: FAO, 2006f.

FAO (2006)

Relationship between total greenhouse gas emissions and milk output per cow

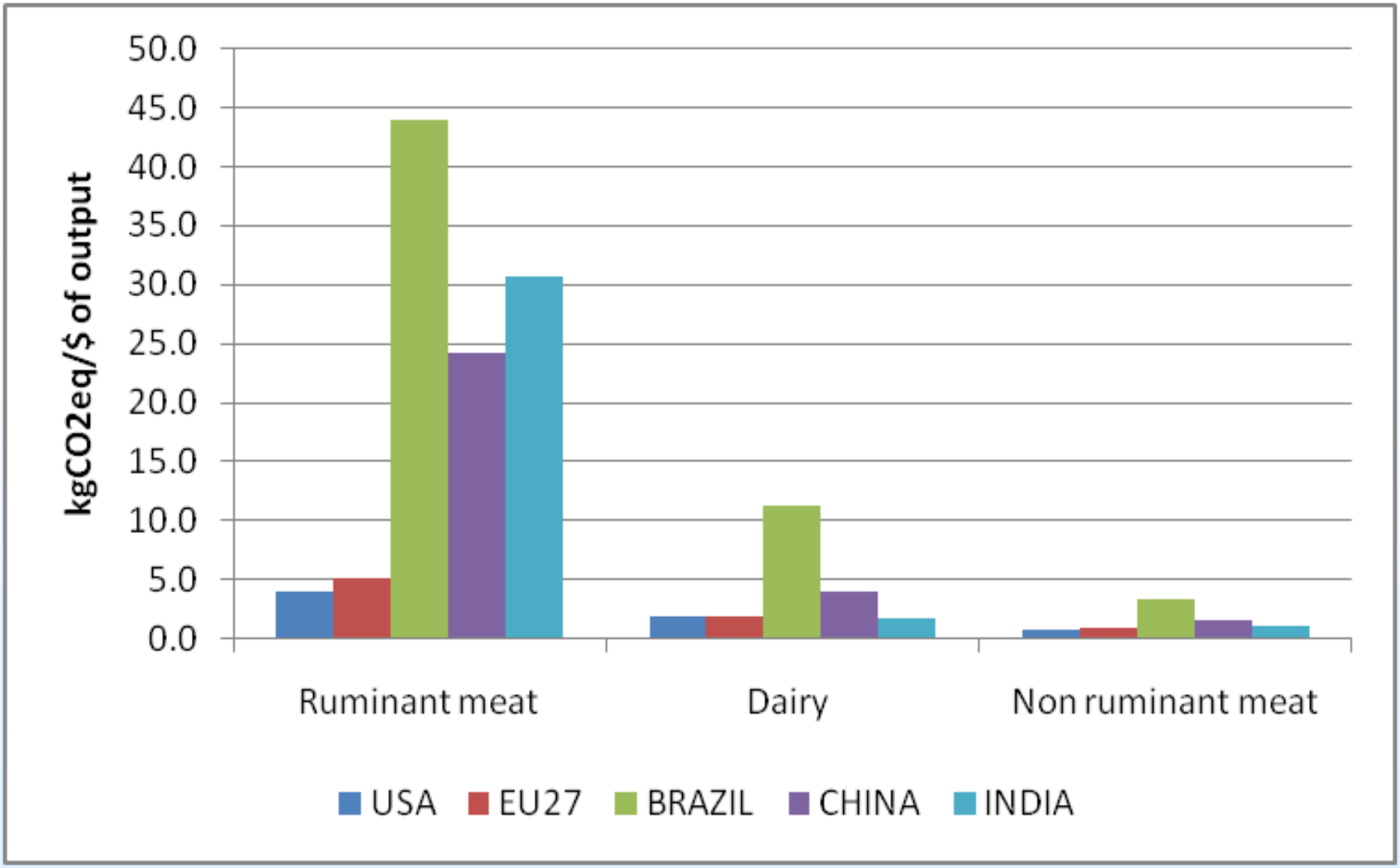


H. Steinfeld, 2015


GHG emissions (kg CO_2 equivalents/kg FPCM)
0
1
2
3
4
5
6
7
8
GHG deforestation
GHG milk processing
GHG milk production
North America
Central & South America
Western Europe
Eastern Europe
Russian Federation
West Asia & Northern Africa
Sub Saharan Africa
South Asia
East Asia
Oceania
World

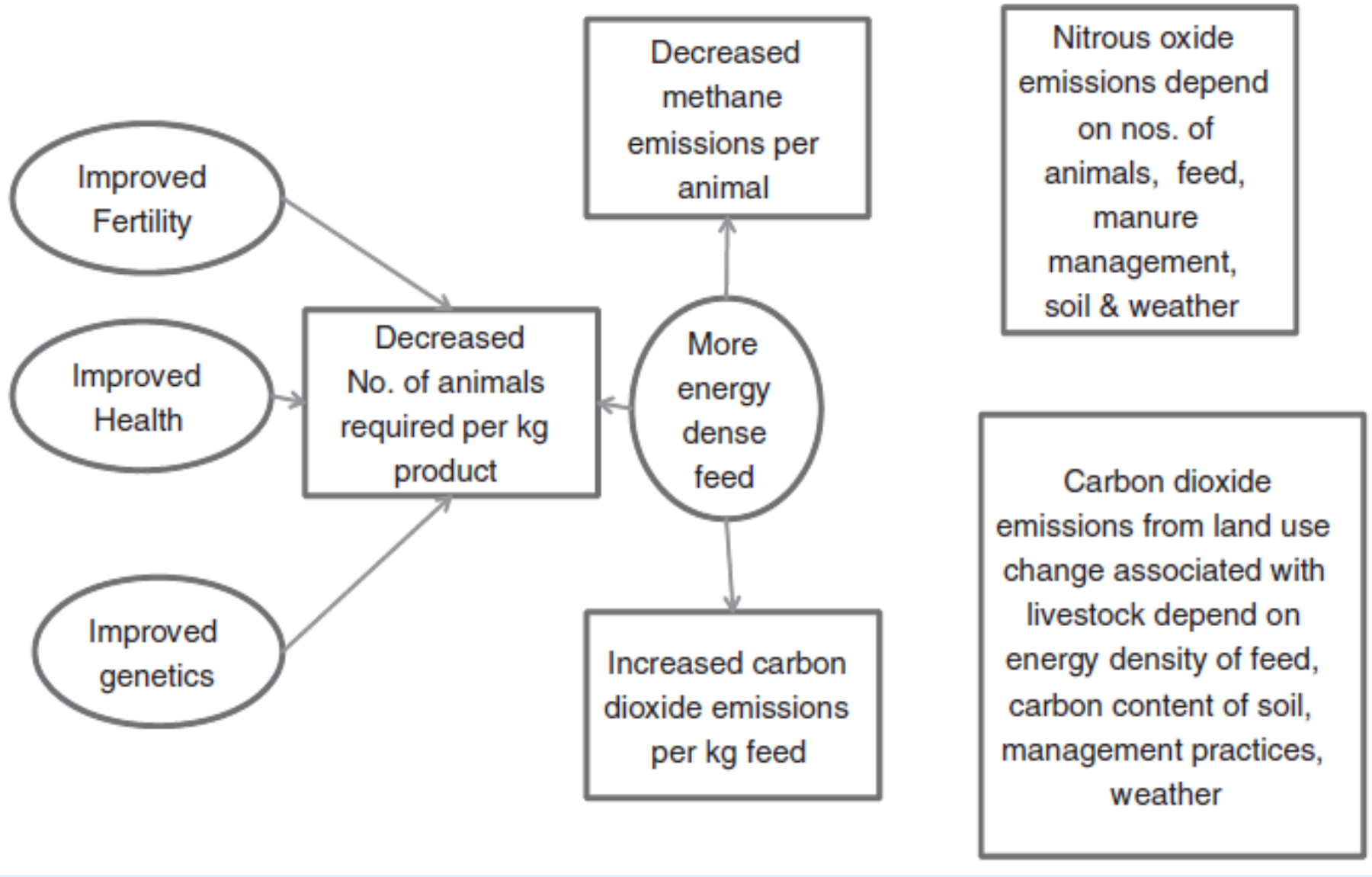
FAO (2010)

Emission Intensities



GTAP 2001 data base

Mitigation: interventions to improve productivity



Gill et al. (2010)

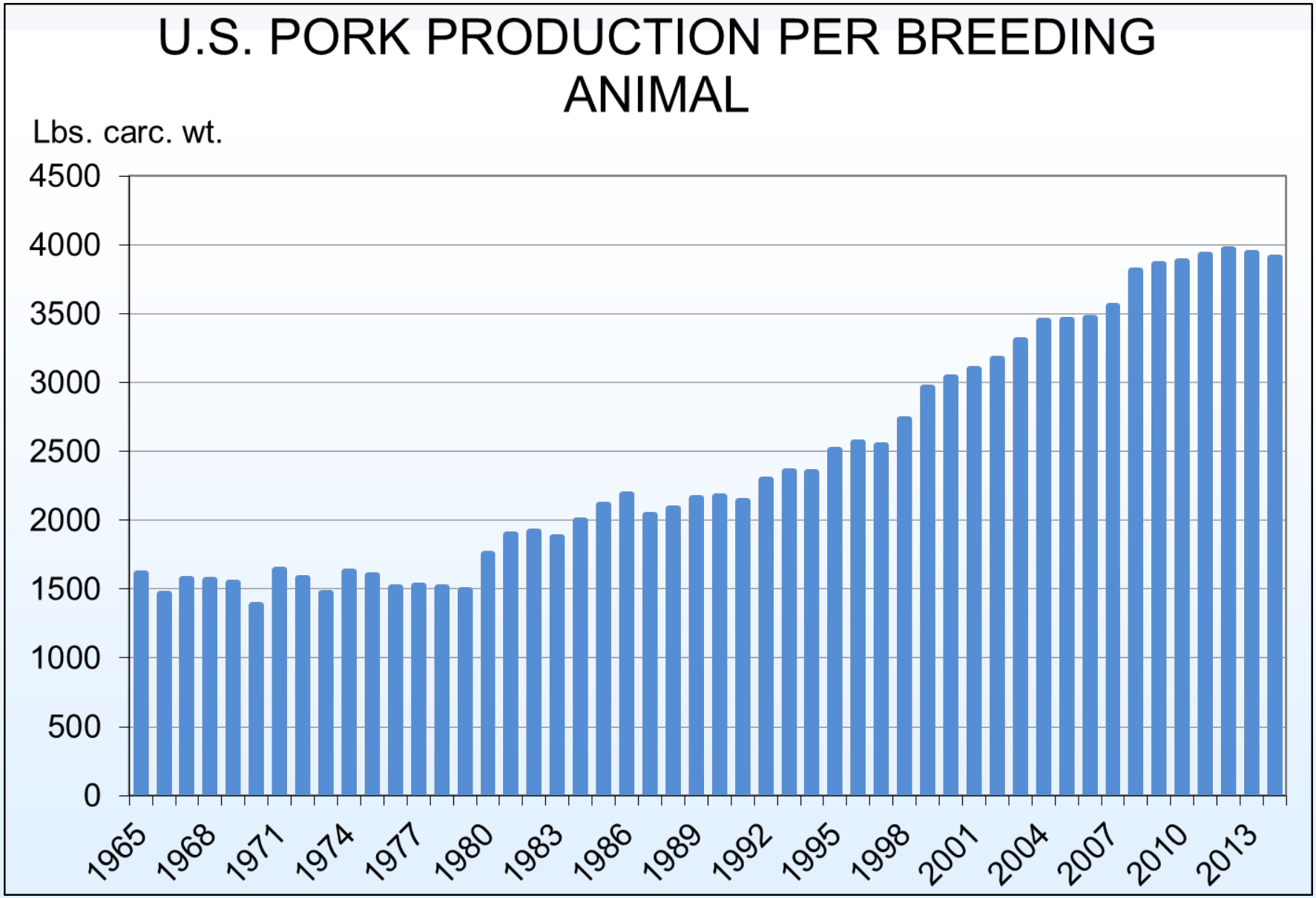
US Dairy trends

- In 1950, there were 25 million dairy cows in the US, vs 9 million today
- With 16 million fewer cows (1950 vs 2018), milk production nationally has increased 60 percent
- The carbon footprint of a glass of milk is 2/3 smaller today than it was 70 years ago

US Beef trends

- In 1970, the US had 140 Million head of beef
- By comparison, today there are 90 Million head
- In both 1970 and 2010, 24 Million tons of beef were produced

US Pork Trends

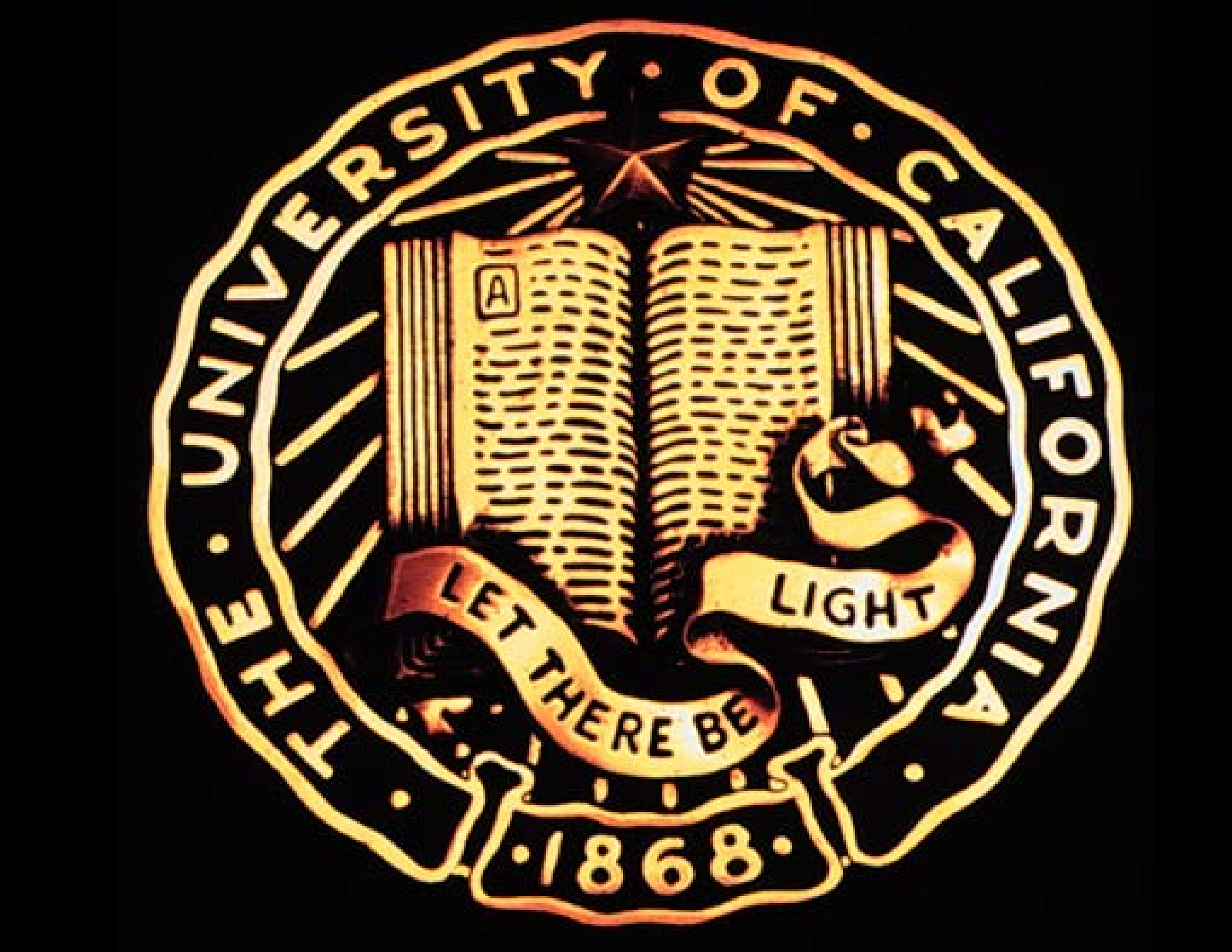


China Swine Example

- China's five year plan focuses on making farms larger and more efficient
- Half of the world's pigs live in China
- 50 million sows w/ 20 piglets born alive
- Equals annual production of 1 Billion pigs
- Pre-weaning mortality causes 400 Million pigs to never make it to the market
- One more pig per sow would mean 1 Million tons of feed saved

Summary

- Livestock in developing countries contribute to 70-80% of global enteric- and waste emissions (IPCC)
- Reductions of enteric- and manure emissions possible
- Production intensity and emission intensity are inversely related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