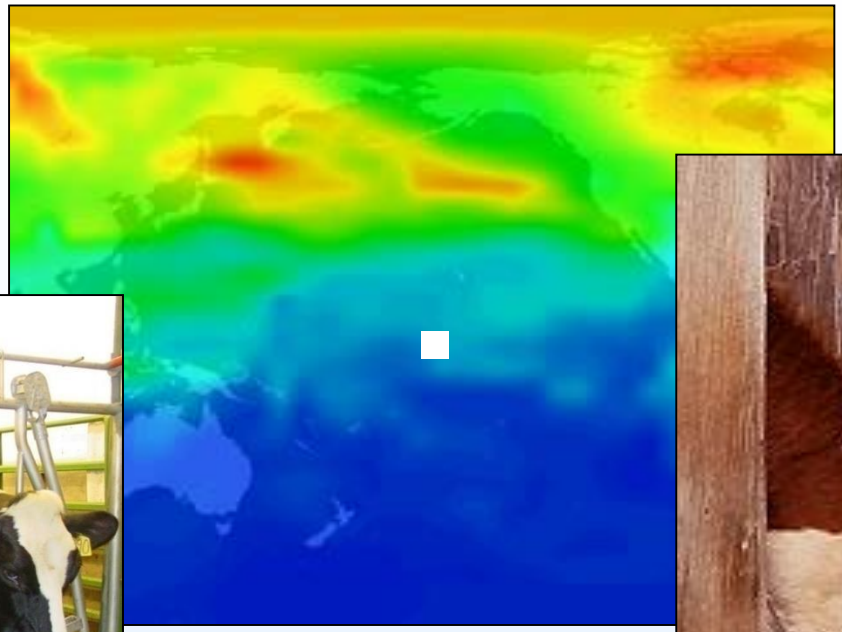
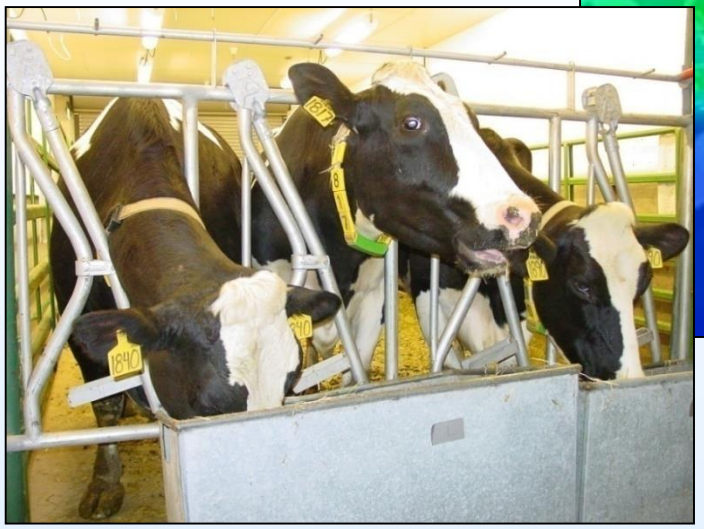
How to satisfy the rising demand for animal protein without depleting natural resources

GRSB, Banff, Canada, Oct 6 ‘16





Frank Mitloehner, PhD
Professor & Air Quality Specialist
Dept Animal Science
University of California, Davis

UTMÄRKTA BURGARE

Nu redoviser vi koldioxidutsläppet för alla produkter

Max klimatsatsning
Om Max miljöinitiativ. Läs mer.

Koldioxidkompensation
Vi kompenserar med trädplantering.

Utmärkta burgare
Koldioxidmärkning för alla produkter.

Nu ännu godare
Hamburgare med gott miljösamvete.

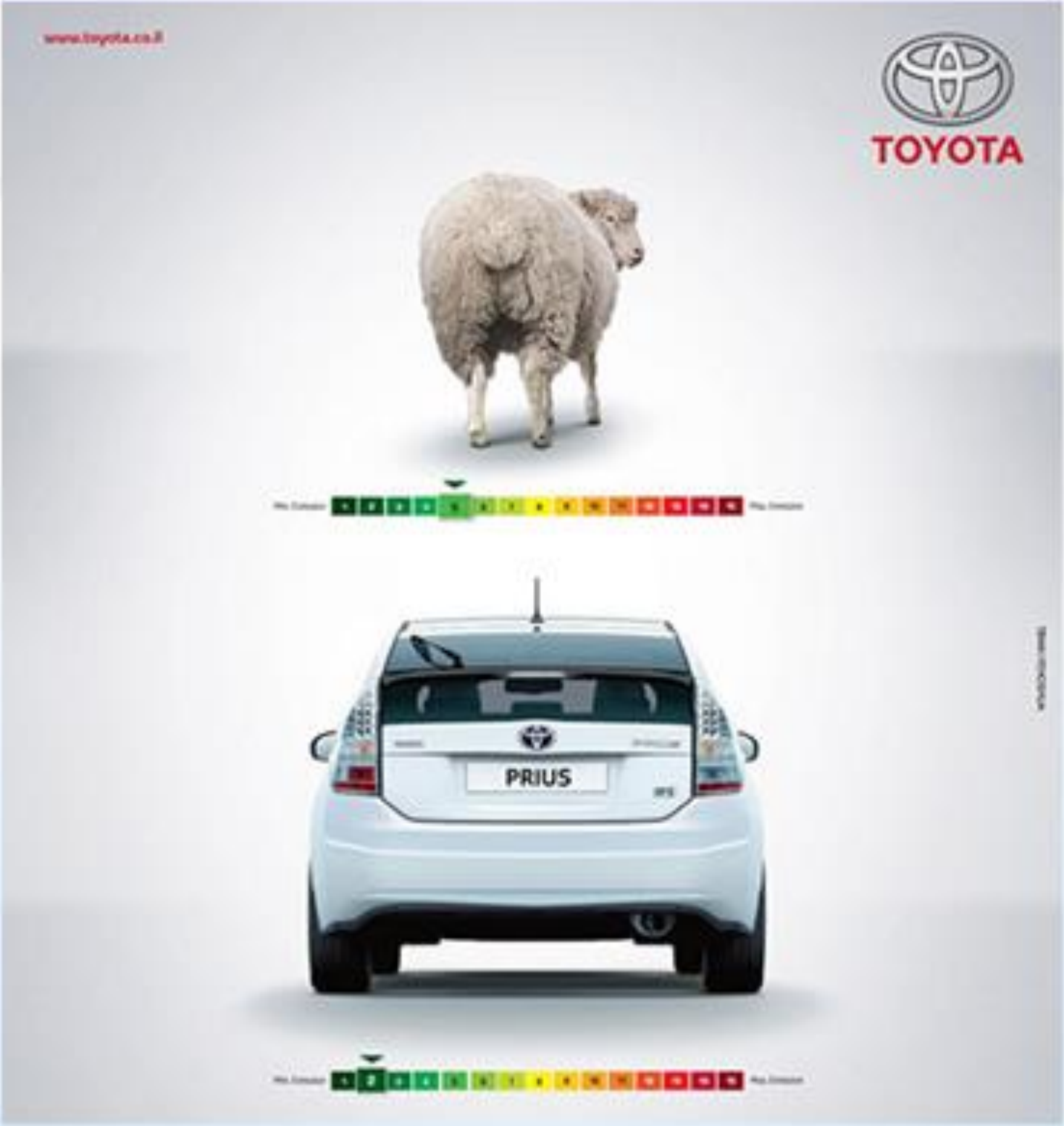
Intu torsk
Hållbara fångstmetoder och lägre CO2e.

Vindkraft
Max har tryt till vind-el.

Frågor & Svar

Metod

Övrigt miljöarbete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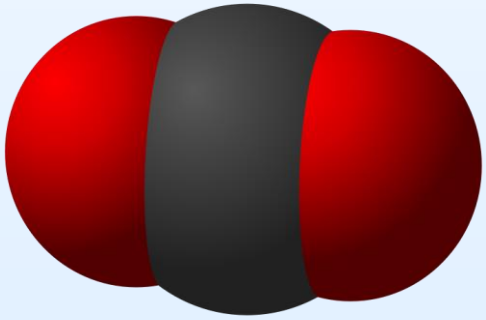
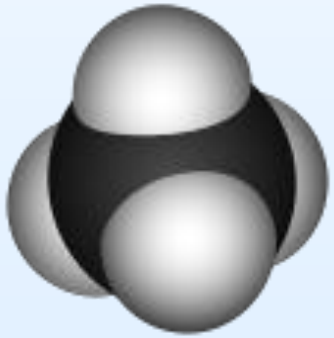
GHG & GWP

Global Warming Potential (GWP) of Main GHG

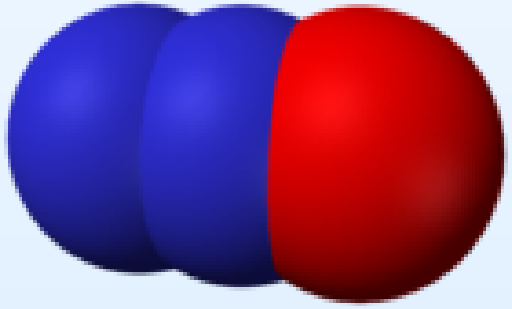
- Carbon Dioxide, CO_2 1
- Methane, CH_4 25
- Nitrous Oxide, N_2O 298



CO2 – Carbon Dioxide

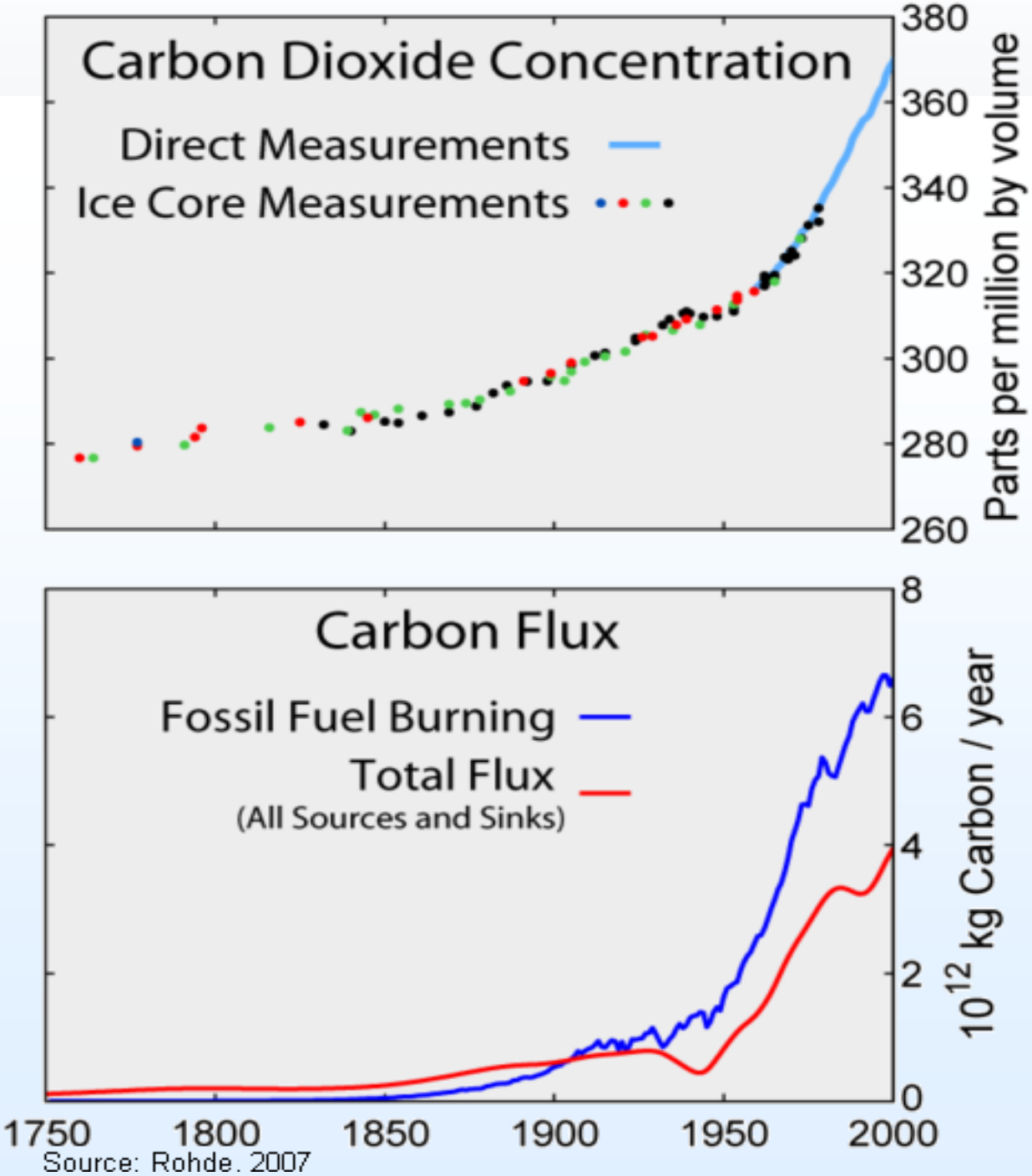


CH4 – Methane

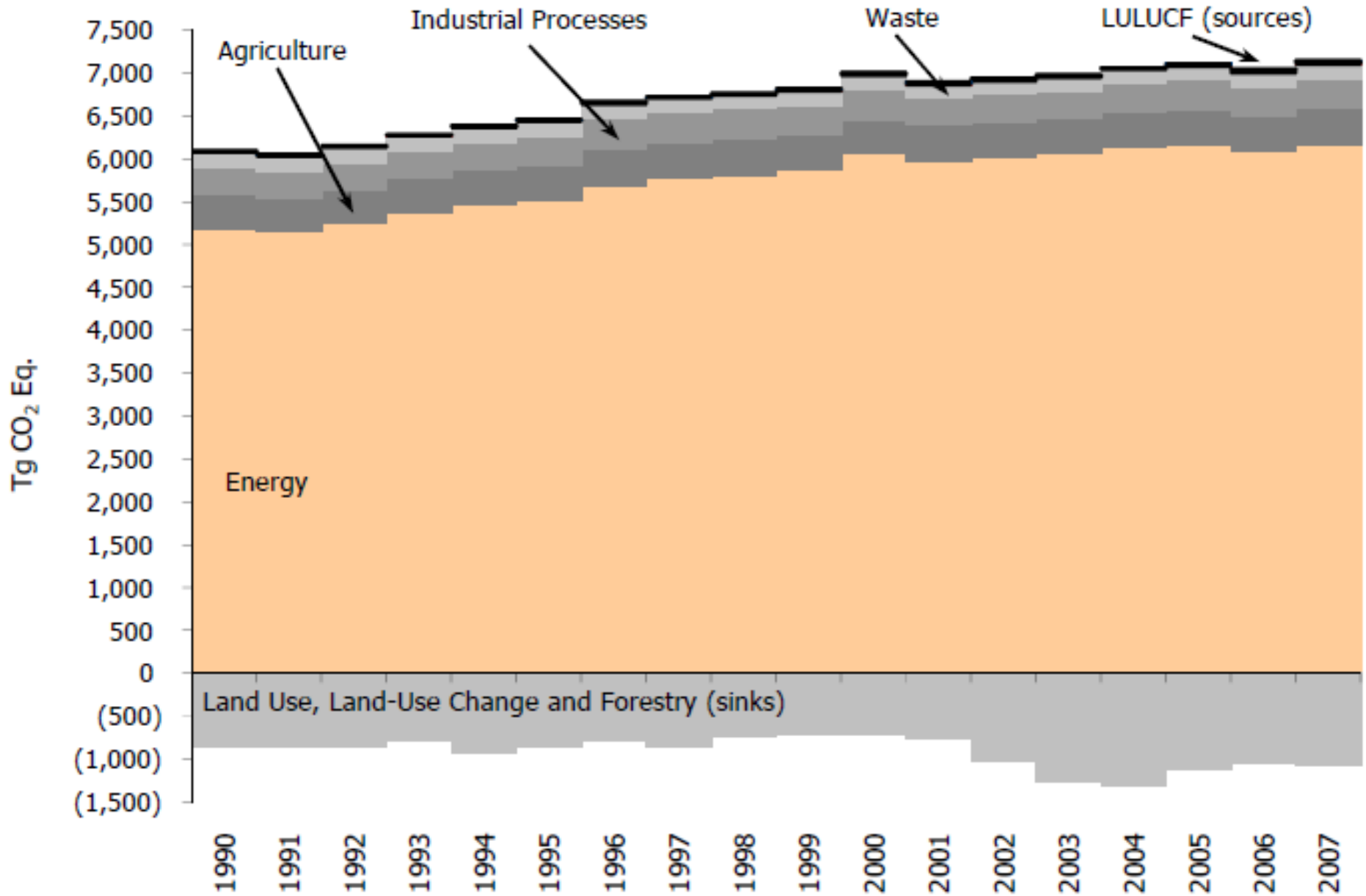


N2O – Nitrous Oxide

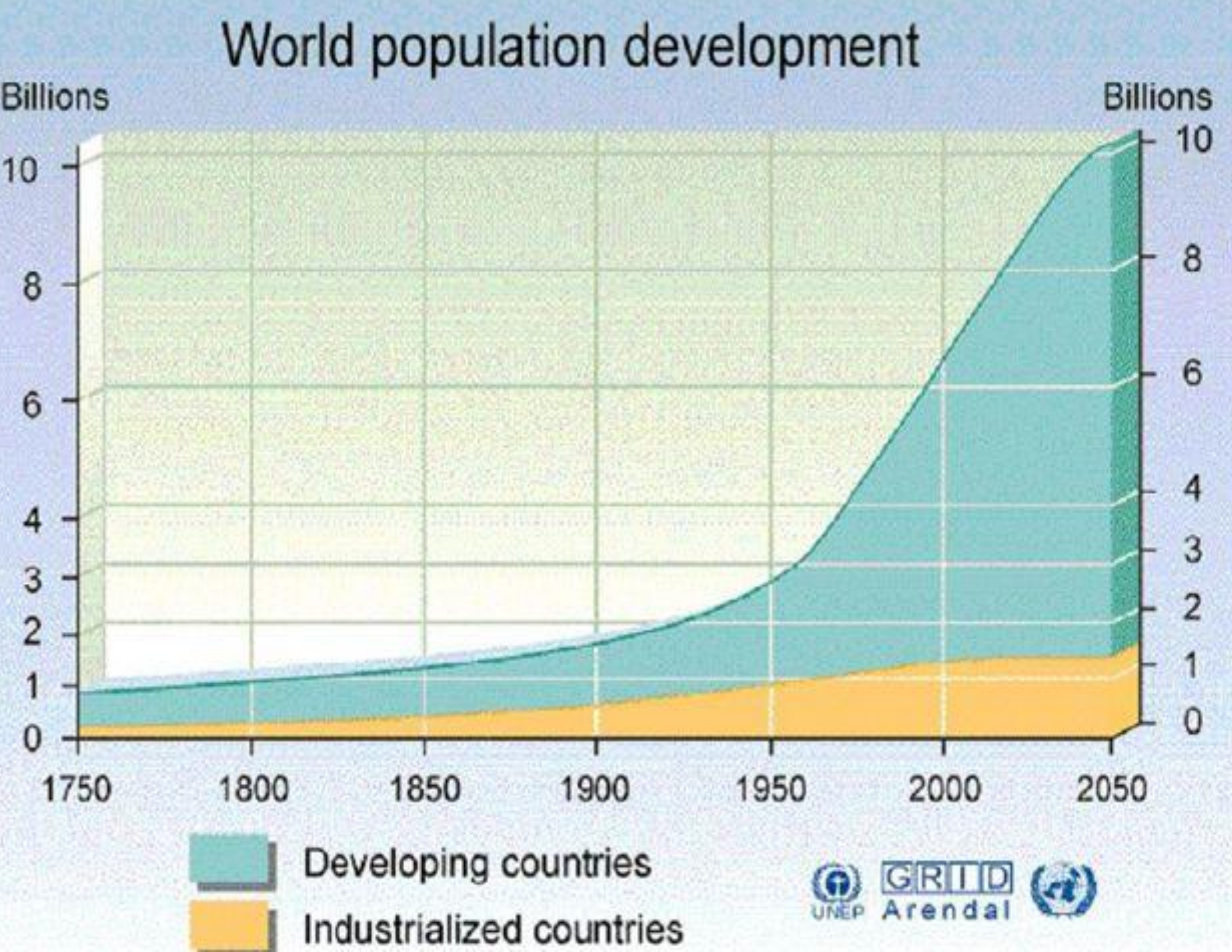
Carbon Dioxide and Carbon Flux



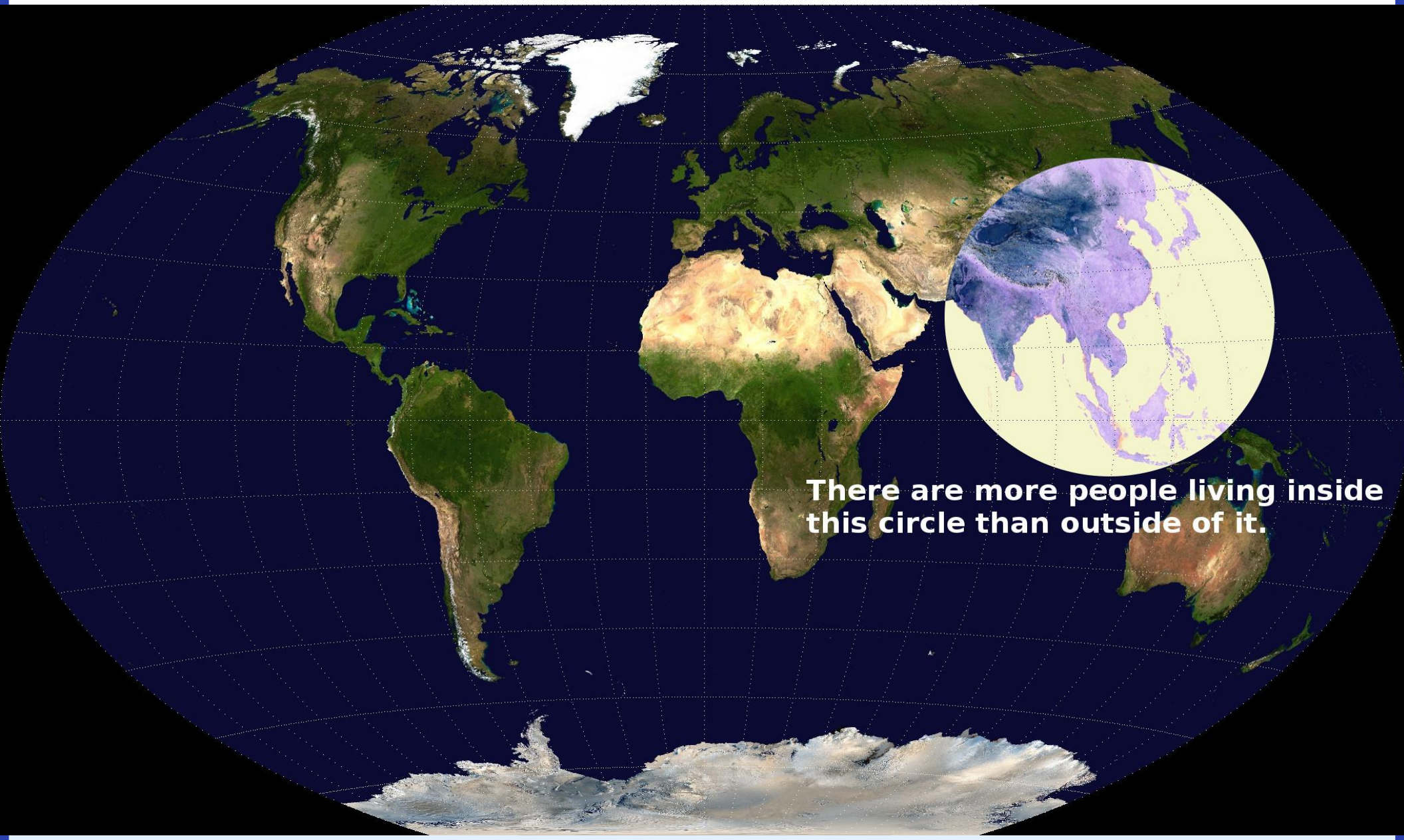
U.S. – the big GHG picture



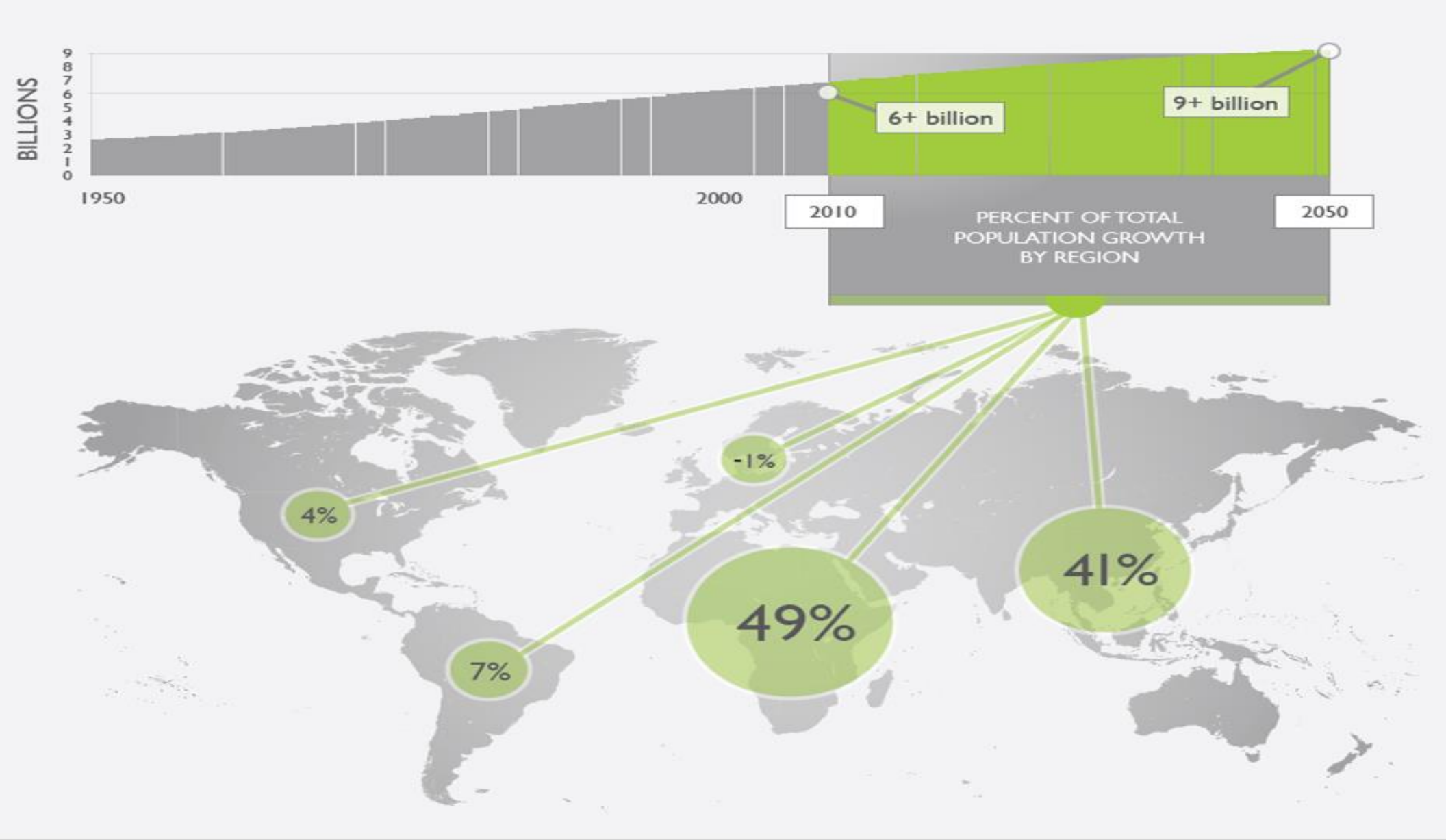
Source: EPA (2009)


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

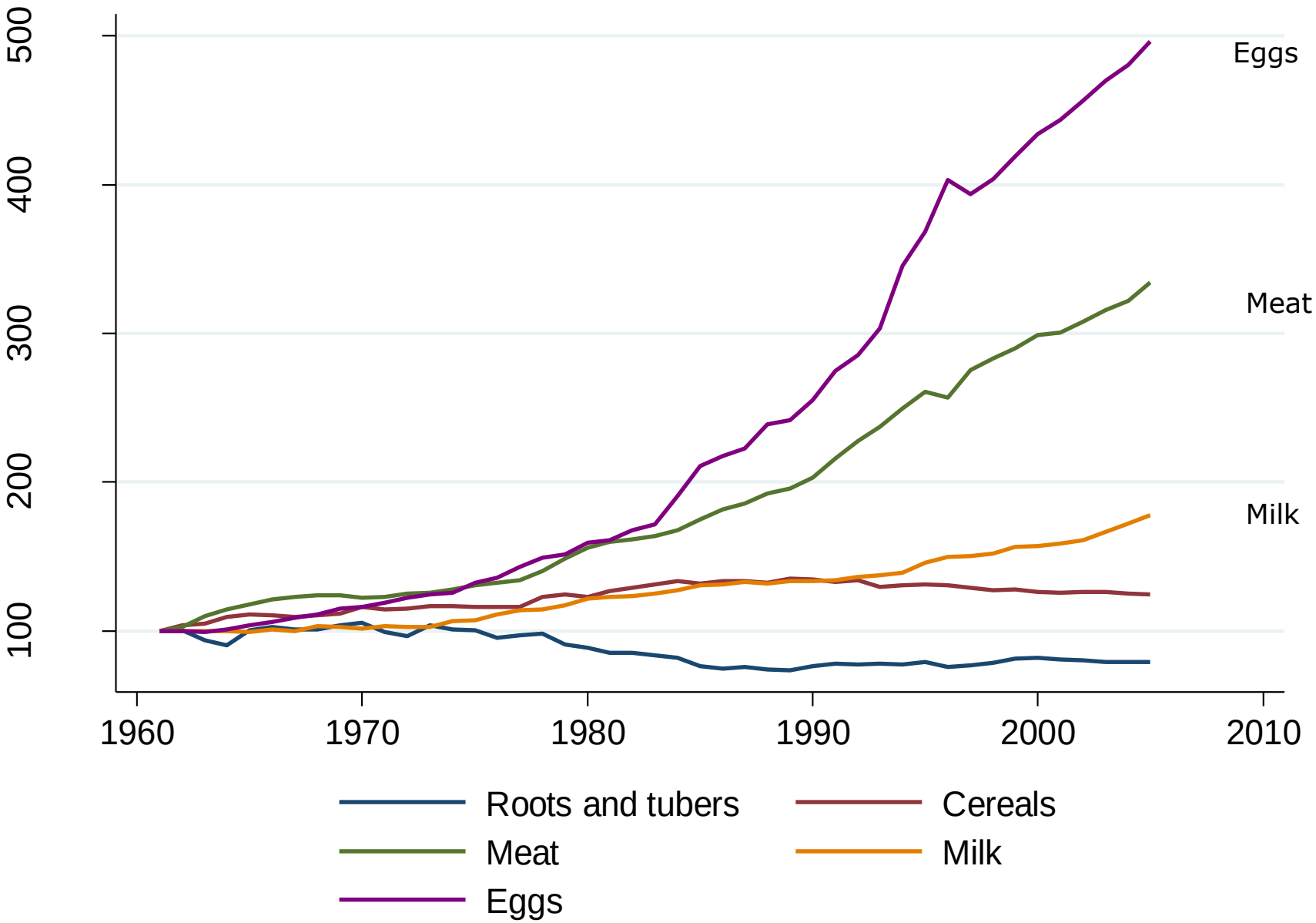
4.5 Billion + population of USA in 10 years



Today and Tomorrow's Markets

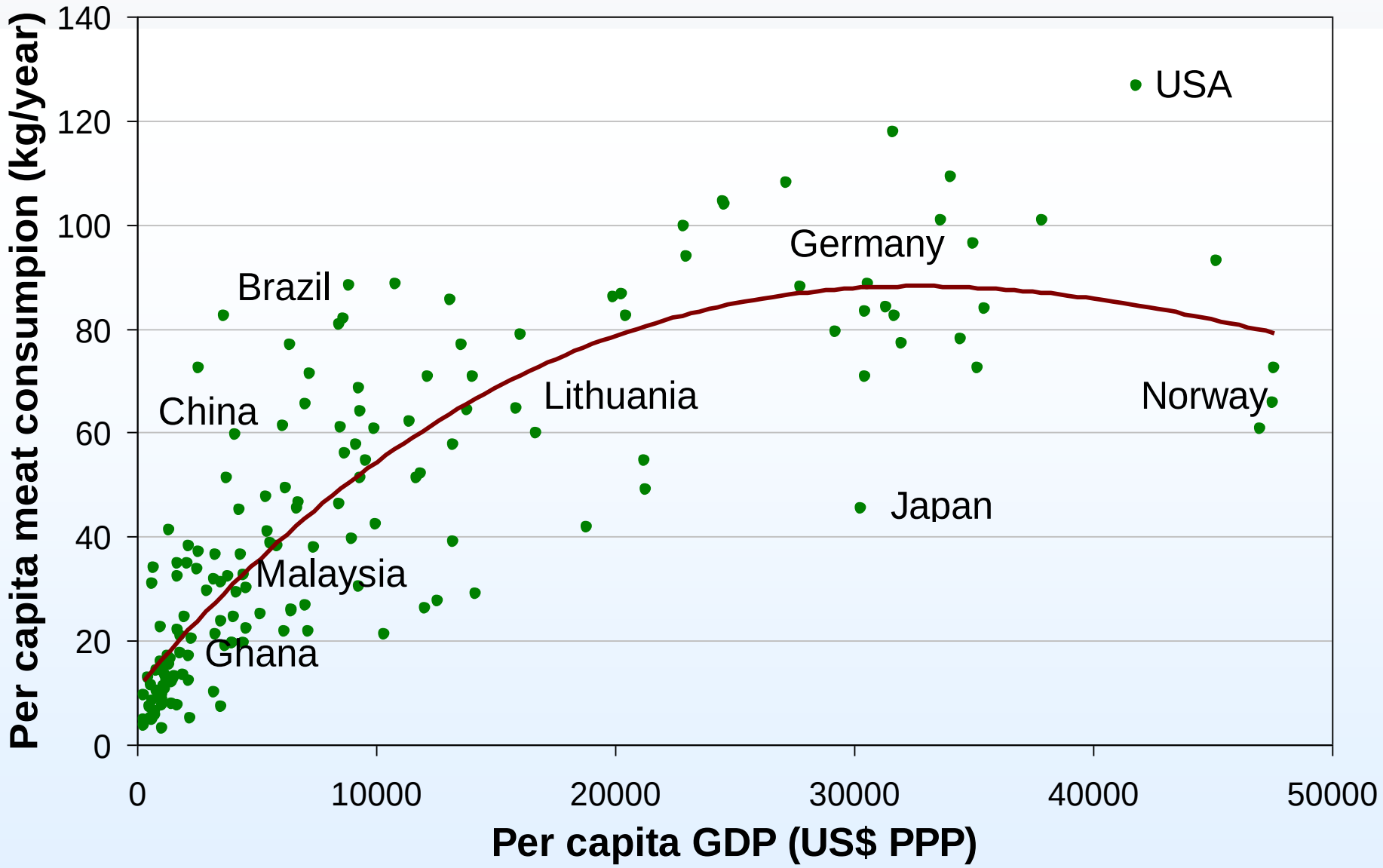


Consumption is growing rapidly in developing countries ...



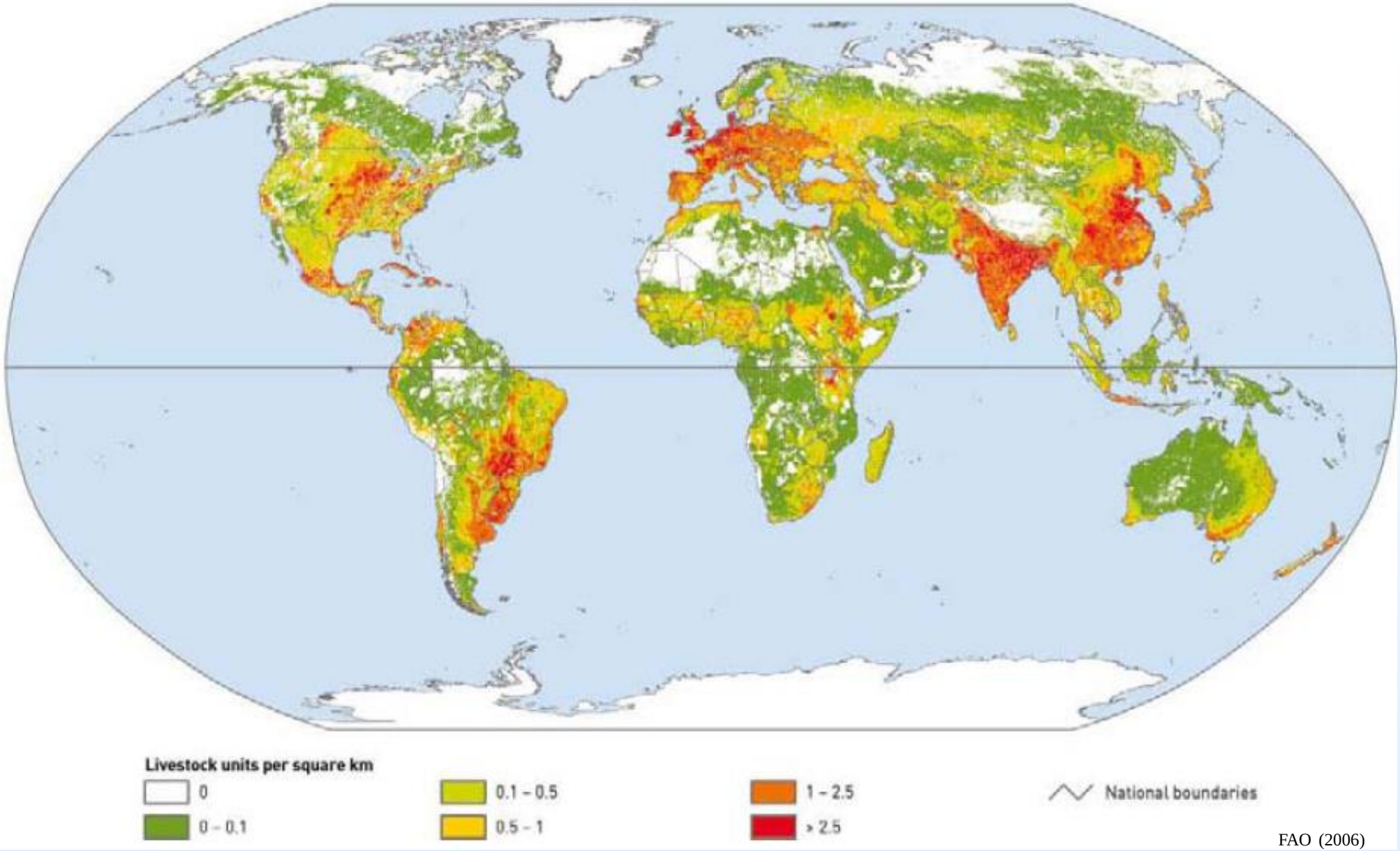
Per caput consumption of major food items in developing countries – kg per caput per year (index numbers 1961=100)

... driven by incomes ...



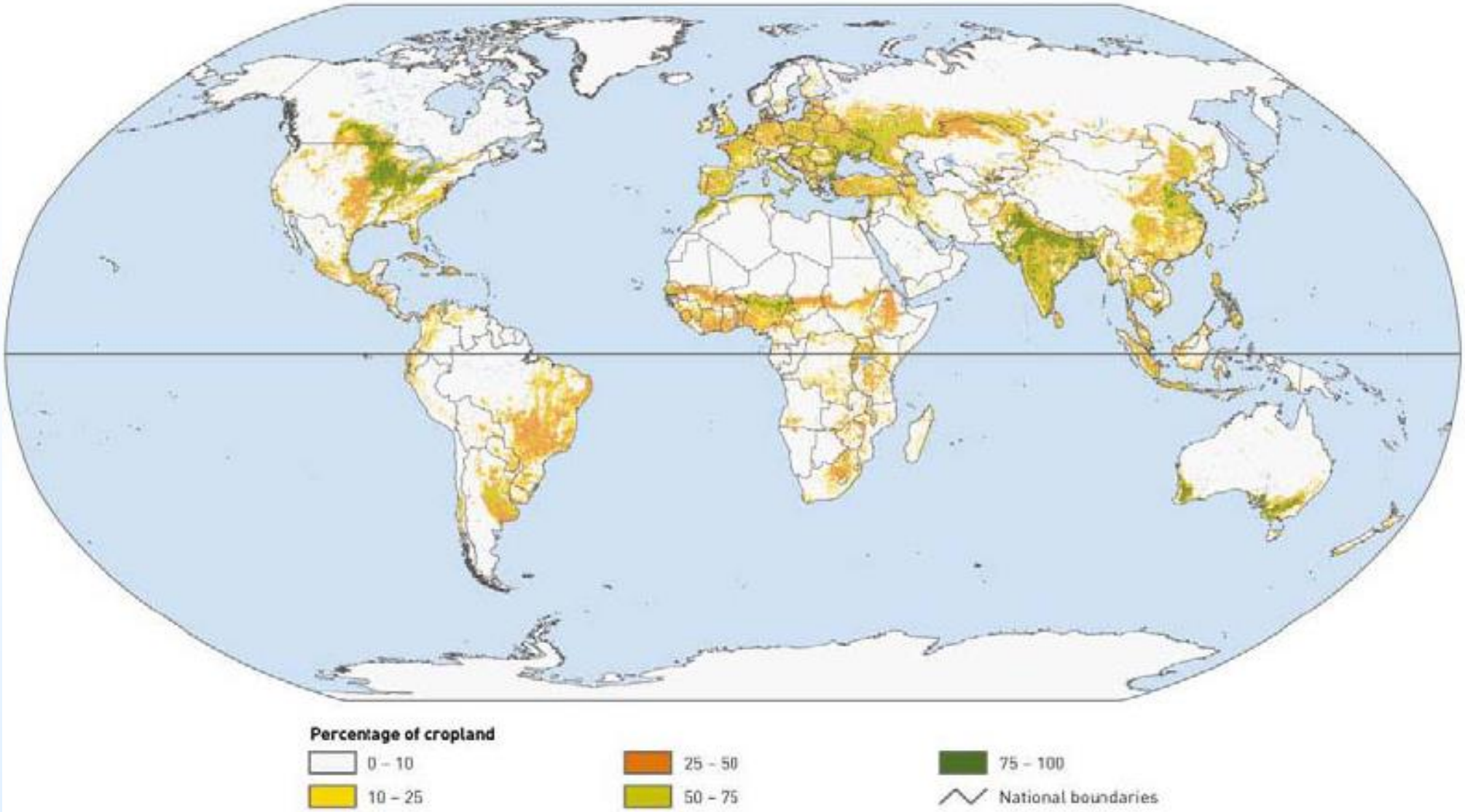
Per capita GDP and meat consumption by country, 2005.

Global livestock distribution



FAO (2006)

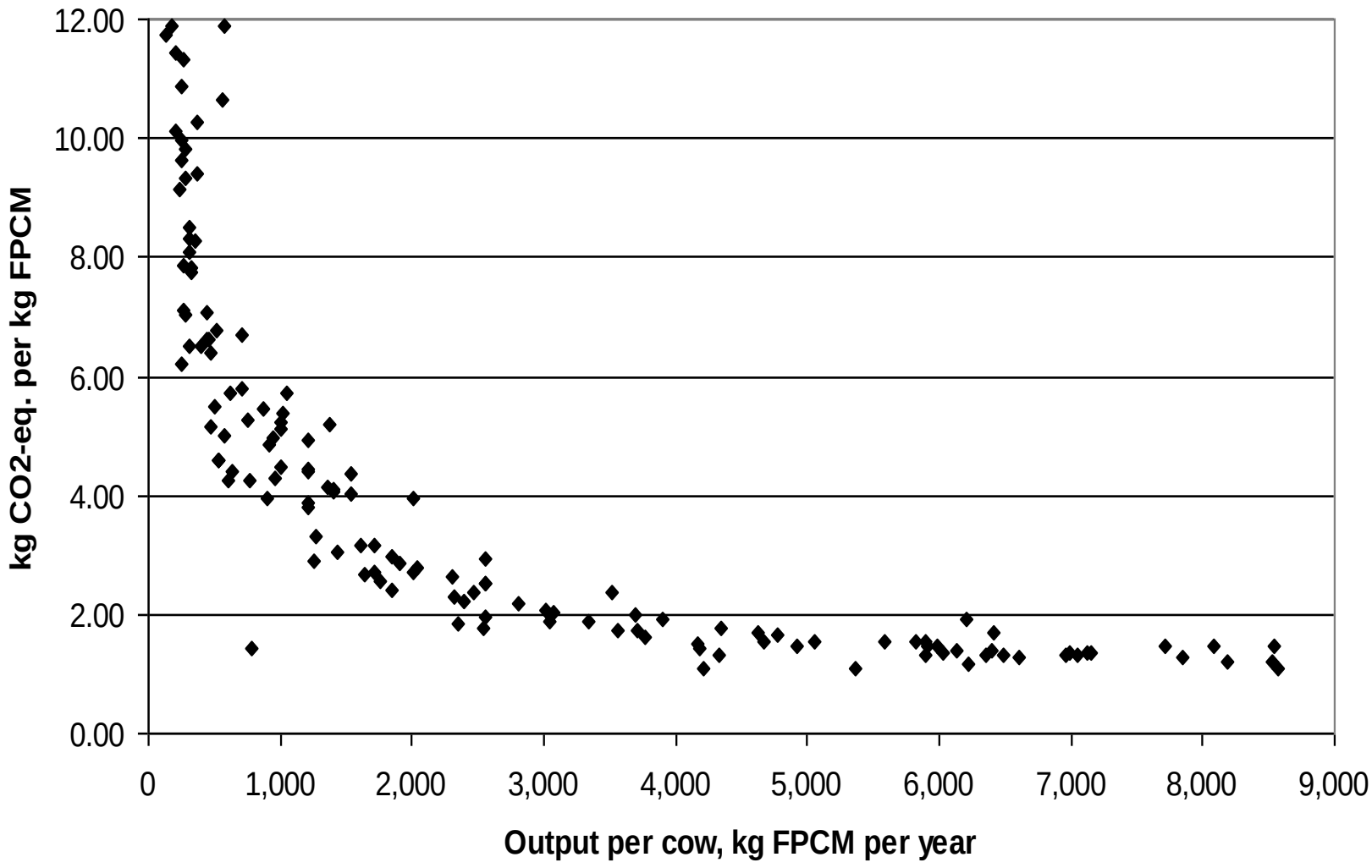
Distribution of cropland



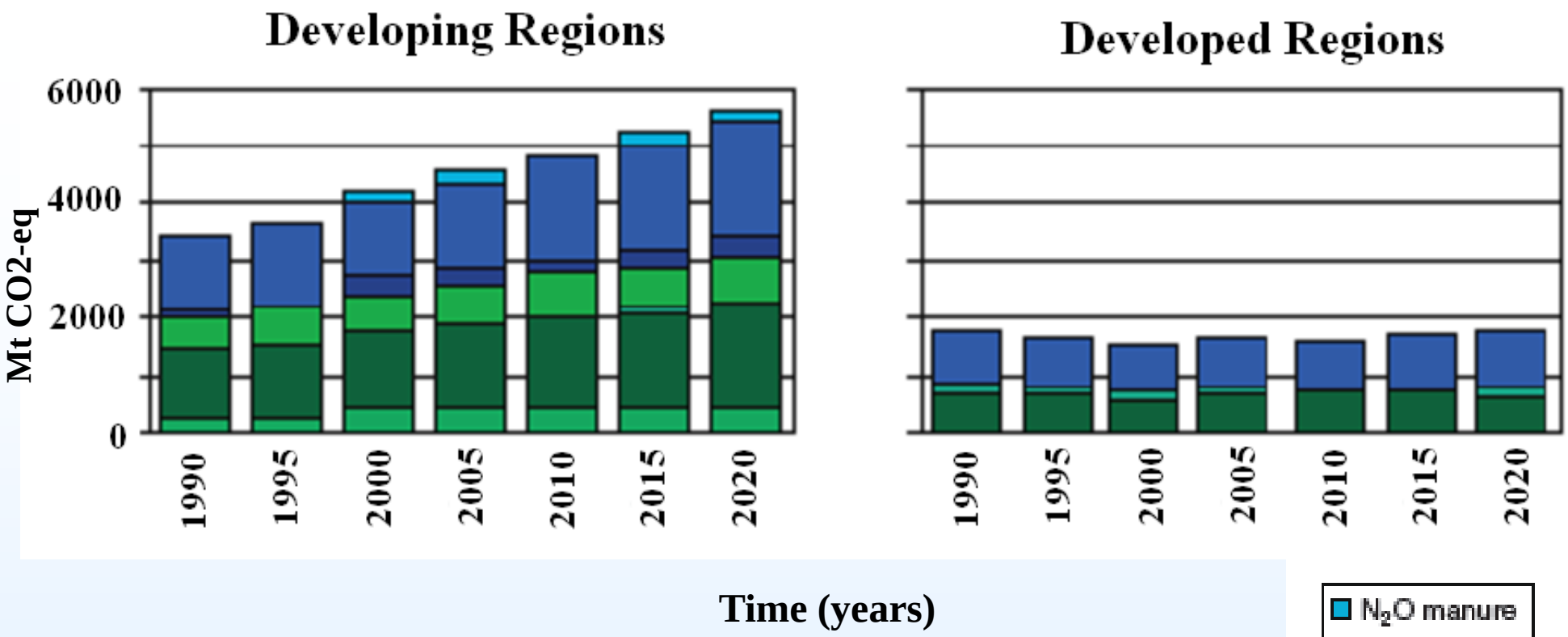
Source: FAO, 2006f.

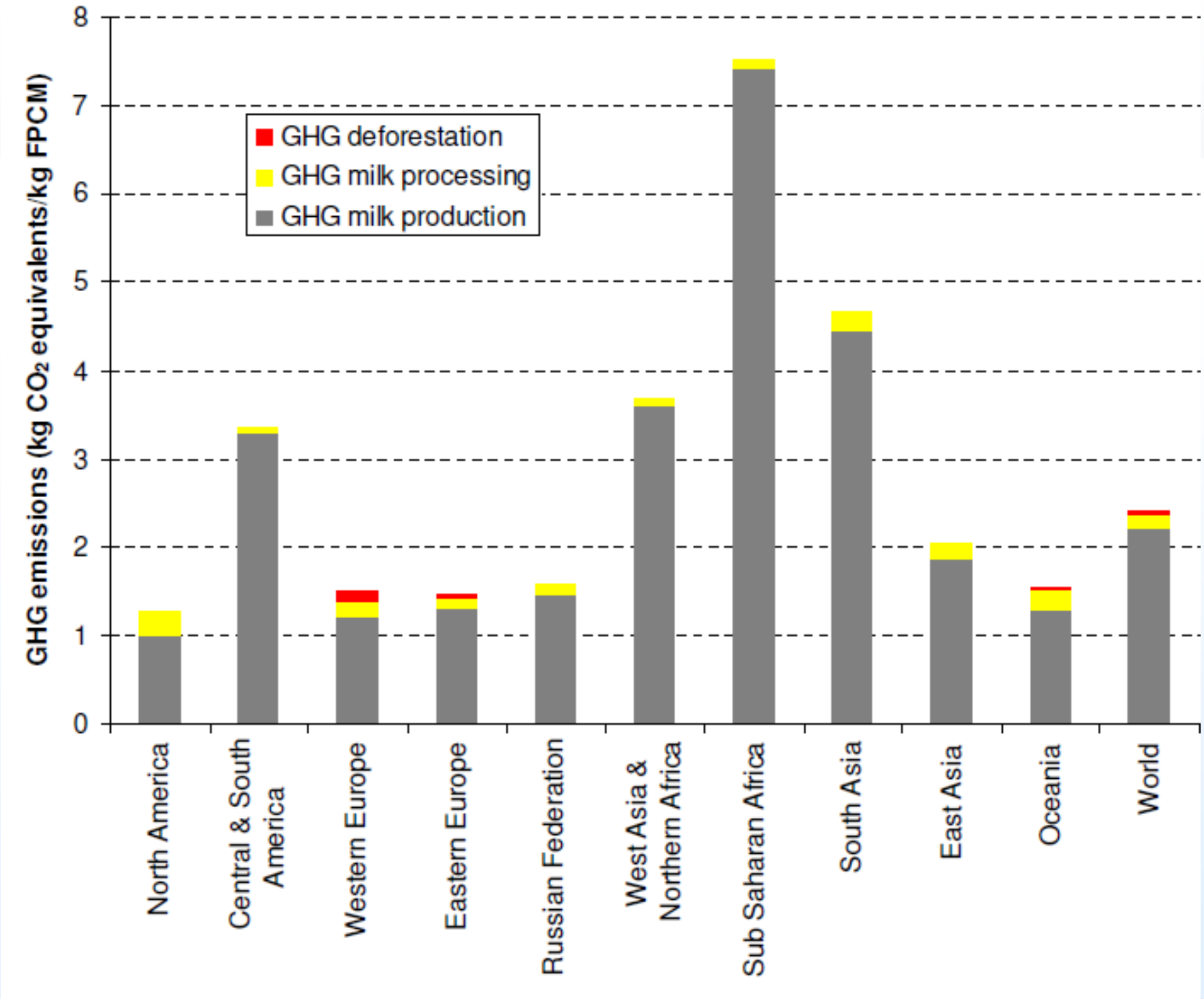
FAO (2006)

Relationship between total greenhouse gas emissions and milk output per cow



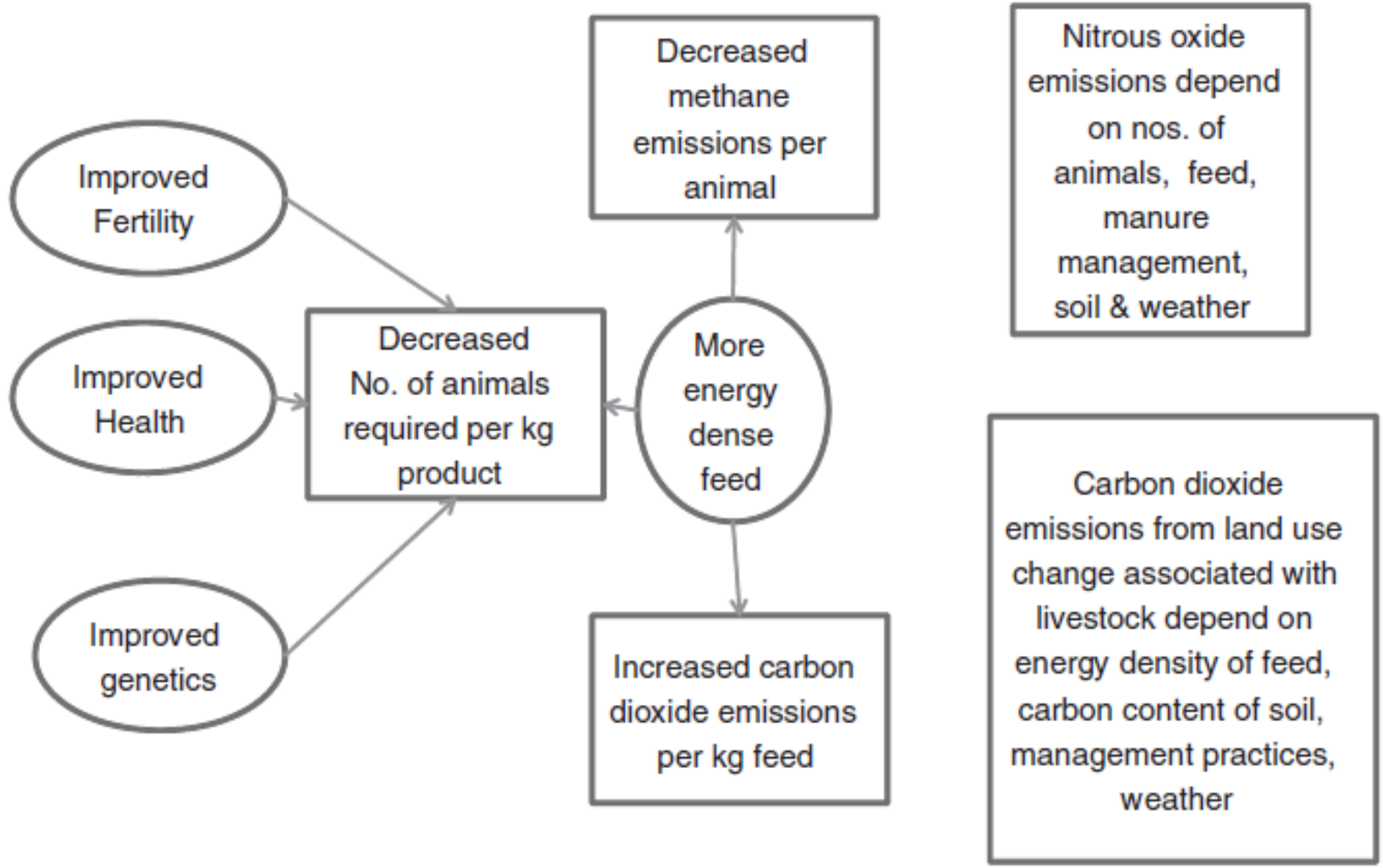
GHG by Regions




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)

Mitigation: interventions to improve productivity



Gill et al. (2010)

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 Dairy trends

- Today, there are 9 million dairy cows in the US, 16 million fewer than existed in 1950.
- Even though cow number have decreased dramatically (1950 versus 2013), 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.

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

Sustainable Intensification is key

- Production intensity enhances biological efficiency
- **Production intensity and emission intensity are inversely related**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