



# Can the Livestock Revolution Continue?

About livestock, resources, and stakeholders

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Brasilia, 17 May 2011




## Quotes

- “Without livestock, we would not exist.”
- “Finally, there is meat on my plate”
- “A business, an export opportunity.”
- “it’s enough; perhaps too much. After all, other things count, too.”



# Outline

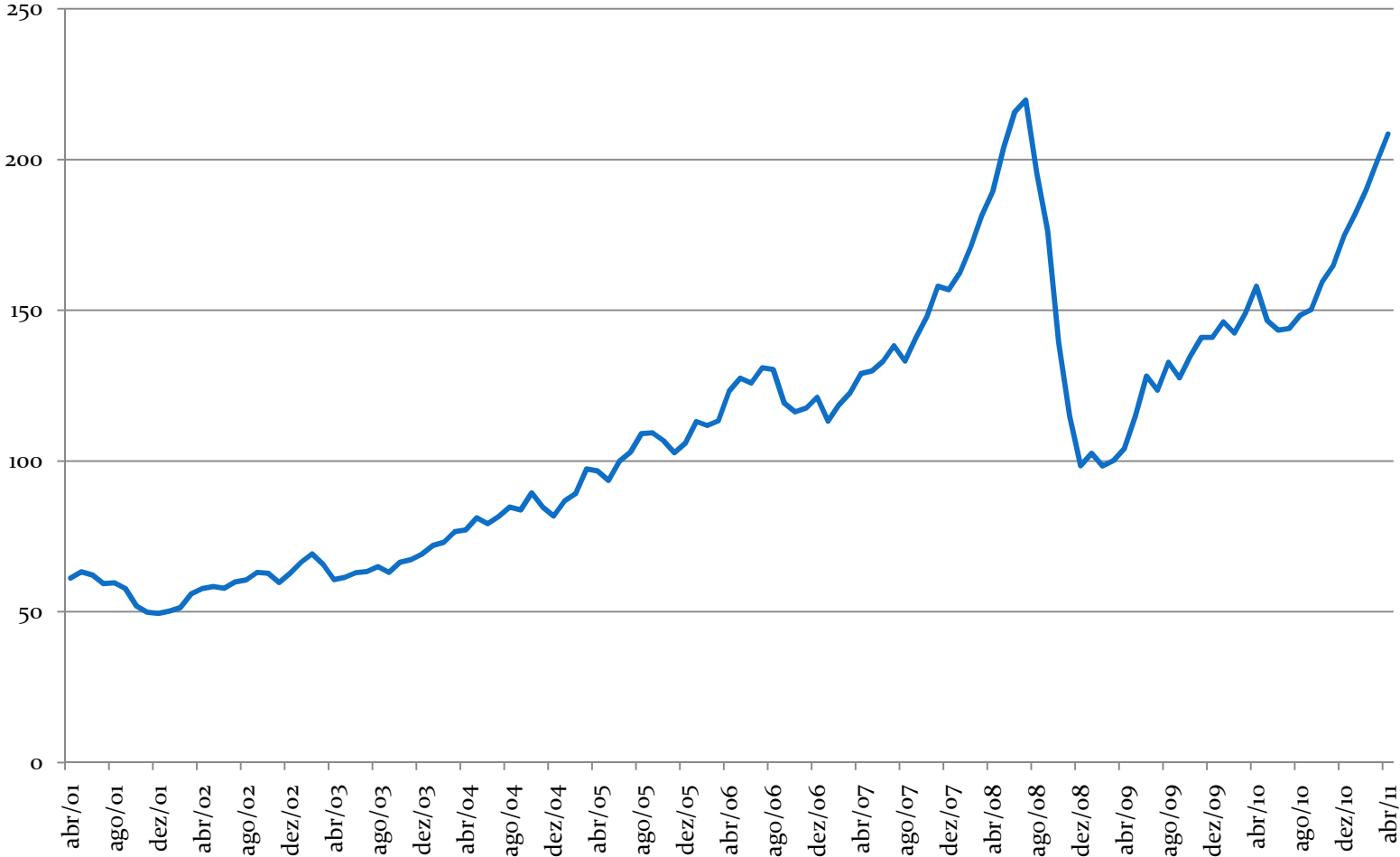
- A new era of resource scarcity?
- Meat, Milk and Eggs: will demand continue to grow?
- How to accommodate sector growth?
- What are the concerns? And the solutions offered?



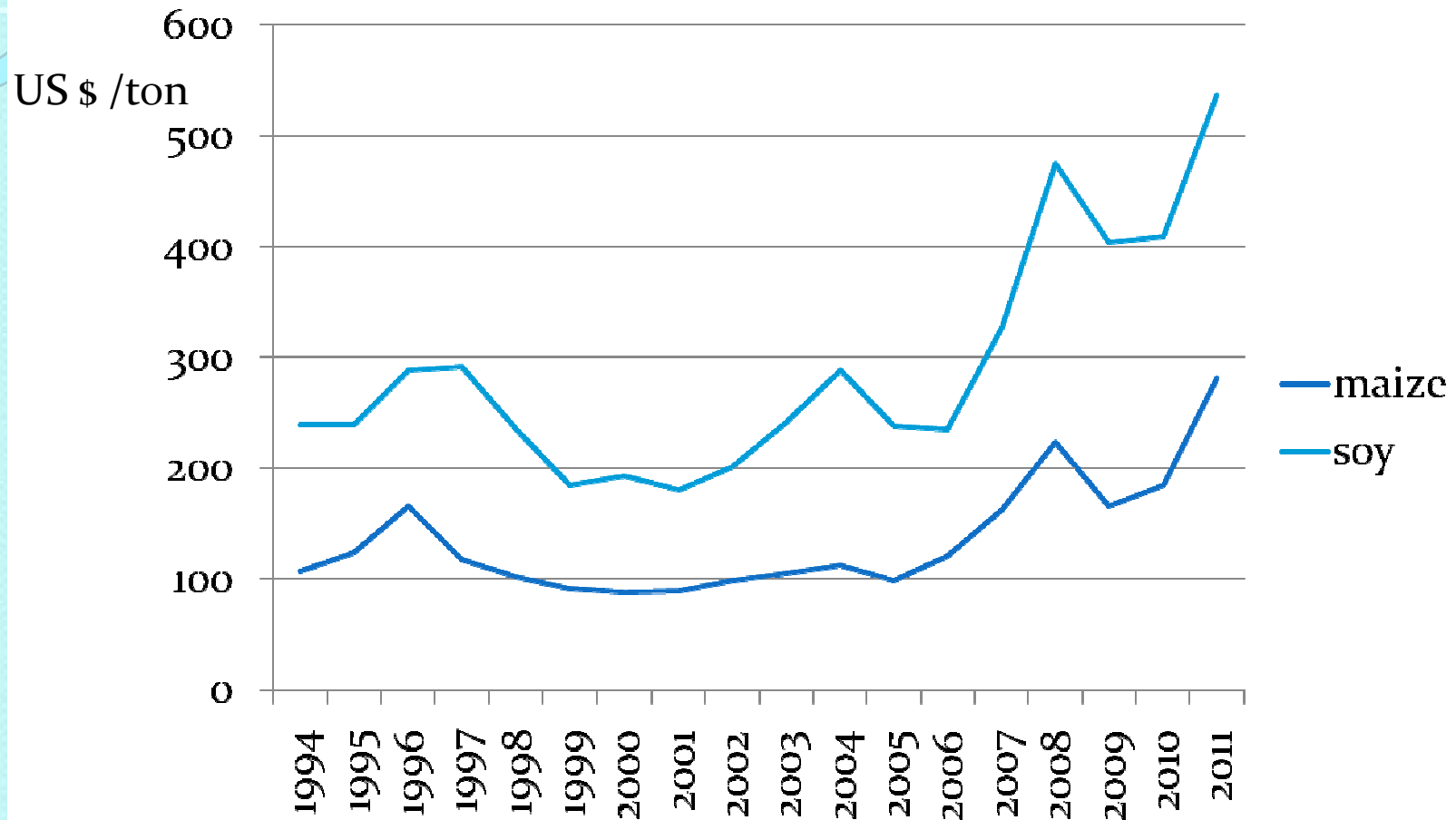
**° ARE WE RUNNING OUT OF  
RESOURCES?**

# Commodity prices on the rise

**Commodity Price Index Monthly Price**



# International prices for maize and soy



Source: FAO commodity prices, 2011



## Land

- By 2050, 33 % more people need to be fed
- 70 % more meat and milk
- Expansion of biofuels will continue
- Uncertainties of climate change
- Potential for agriculture expansion is limited

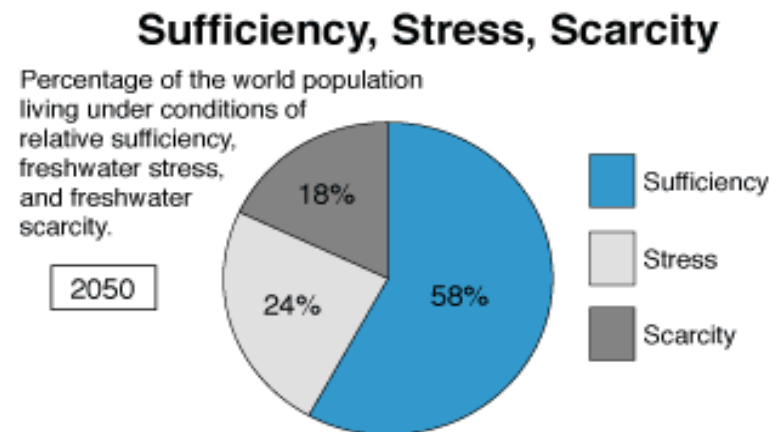
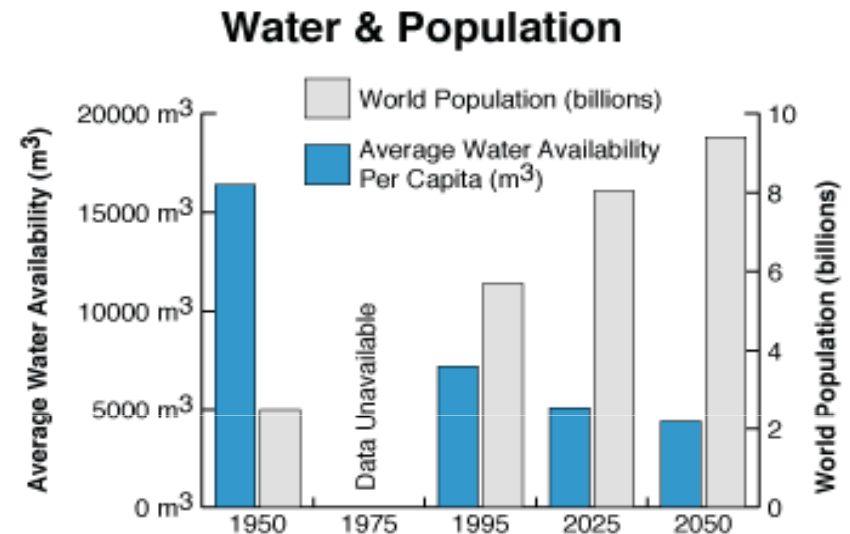


## Livestock and Land Use

- 26 % of global land is pasture
- 12 % of global land is crop land, 1/3 thereof is for feed
- Yield growth accounts for most of agric. production increases
- Area expansion into forests, mainly in Latin America

# A Global Water Crisis

- 2 billion people lack access
- Demand is growing; freshwater is getting scarce
- 70 % of total freshwater use is for agriculture



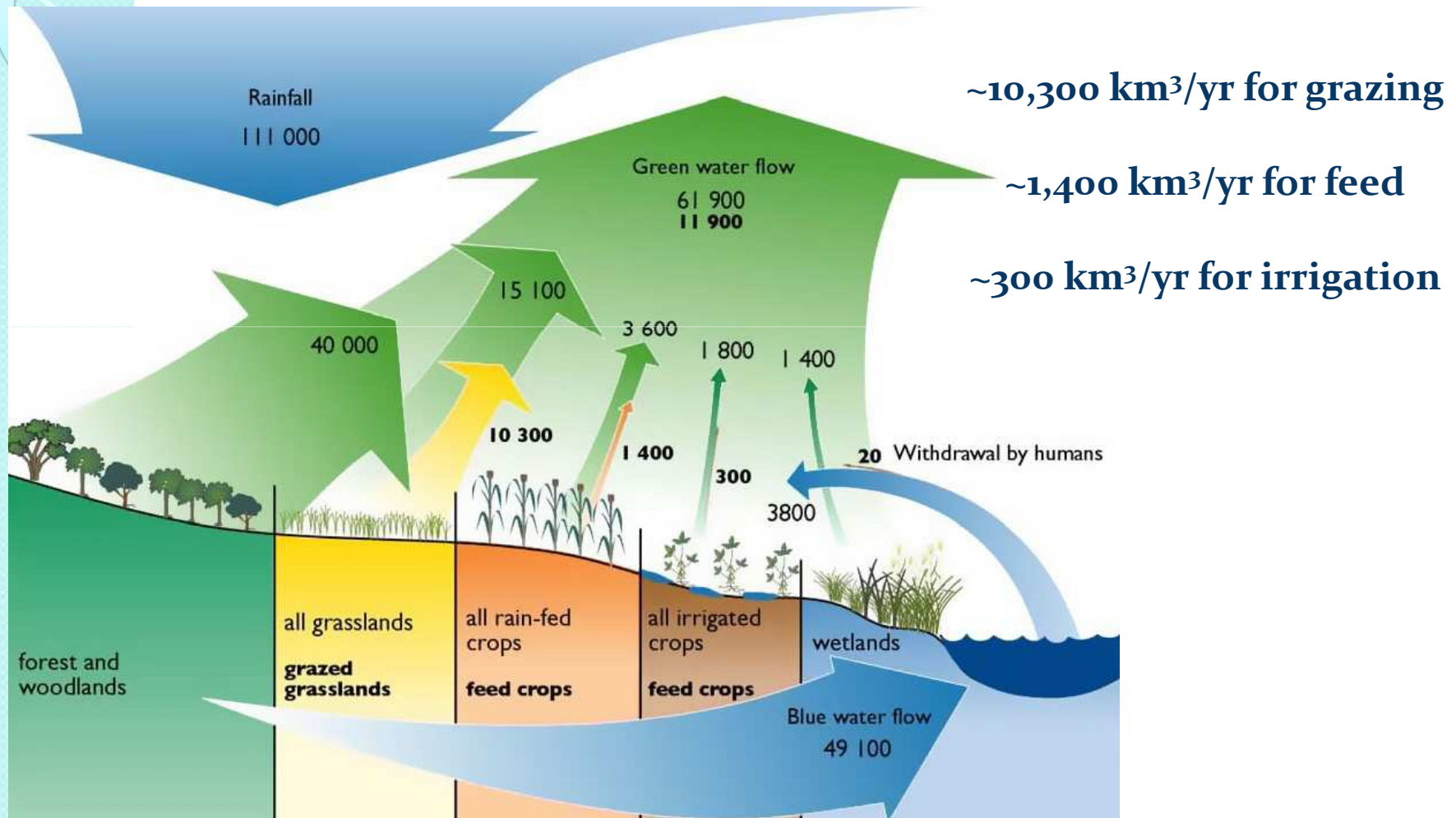


# Livestock and Water

- Direct water use is small
- Indirect water use and impact on water cycles is huge:
  - Water for feed production
  - Impact grazing on water quantity and water quality
  - Water pollution from livestock waste

# Water use by livestock production

Livestock sector uses 20% of green water flows ~11,900 Km<sup>3</sup>/yr

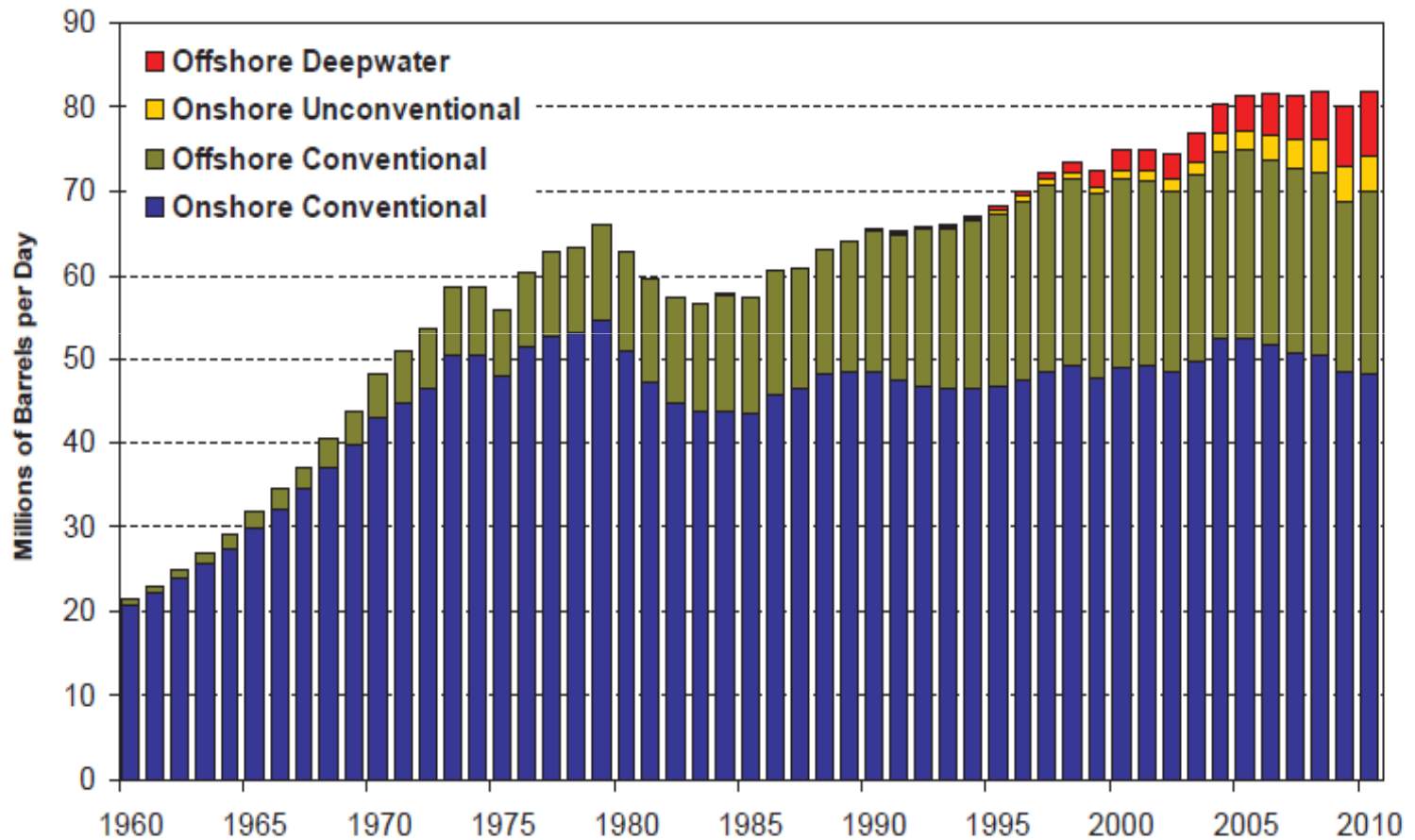


Deutsch et al. 2010

# Peak Oil

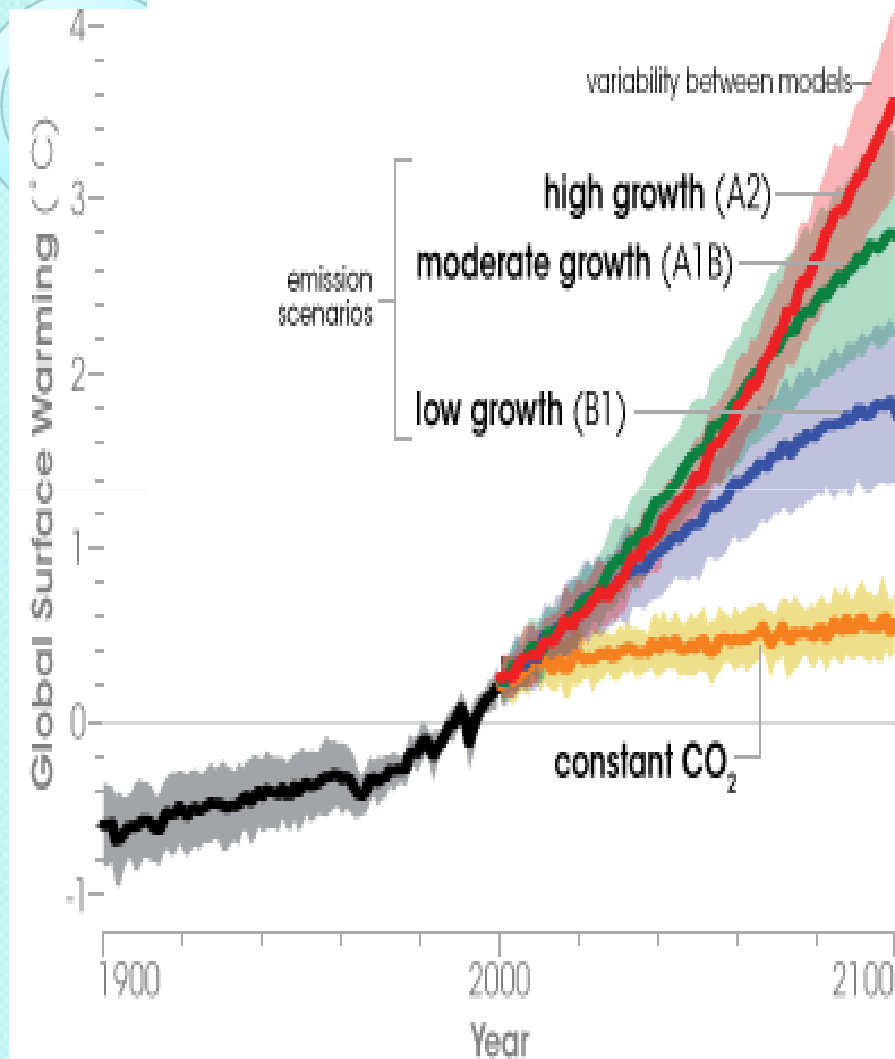
Exhibit 5

Global Oil Production – Onshore and Offshore, Conventional and Unconventional



Source: Energyfiles, Energy Information Administration, BP Statistical Review of World Energy, Wood Mackenzie As of 12/31/10

# Climate Change



- 2007 IPCC report indicate that the global surface temperature is likely to rise a further 1.1 to 6.4 °C during the 21<sup>st</sup> century

- The rate of warming over the last 50 years is almost double that over the last 100 years ( $0.13^{\circ}\text{C} \pm 0.03^{\circ}\text{C}$  vs.  $0.07^{\circ}\text{C} \pm 0.02^{\circ}\text{C}$  per decade)



# Livestock and Climate Change

- Land use and land use change (deforestation and degradation)
- Nitrogen fertilizer production and use for feed
- Emissions from digestion
- Emissions from livestock waste
  
- Climate change to affect feed and water availability
- Pastures as a potential carbon sink



# Implications for the Livestock Sector

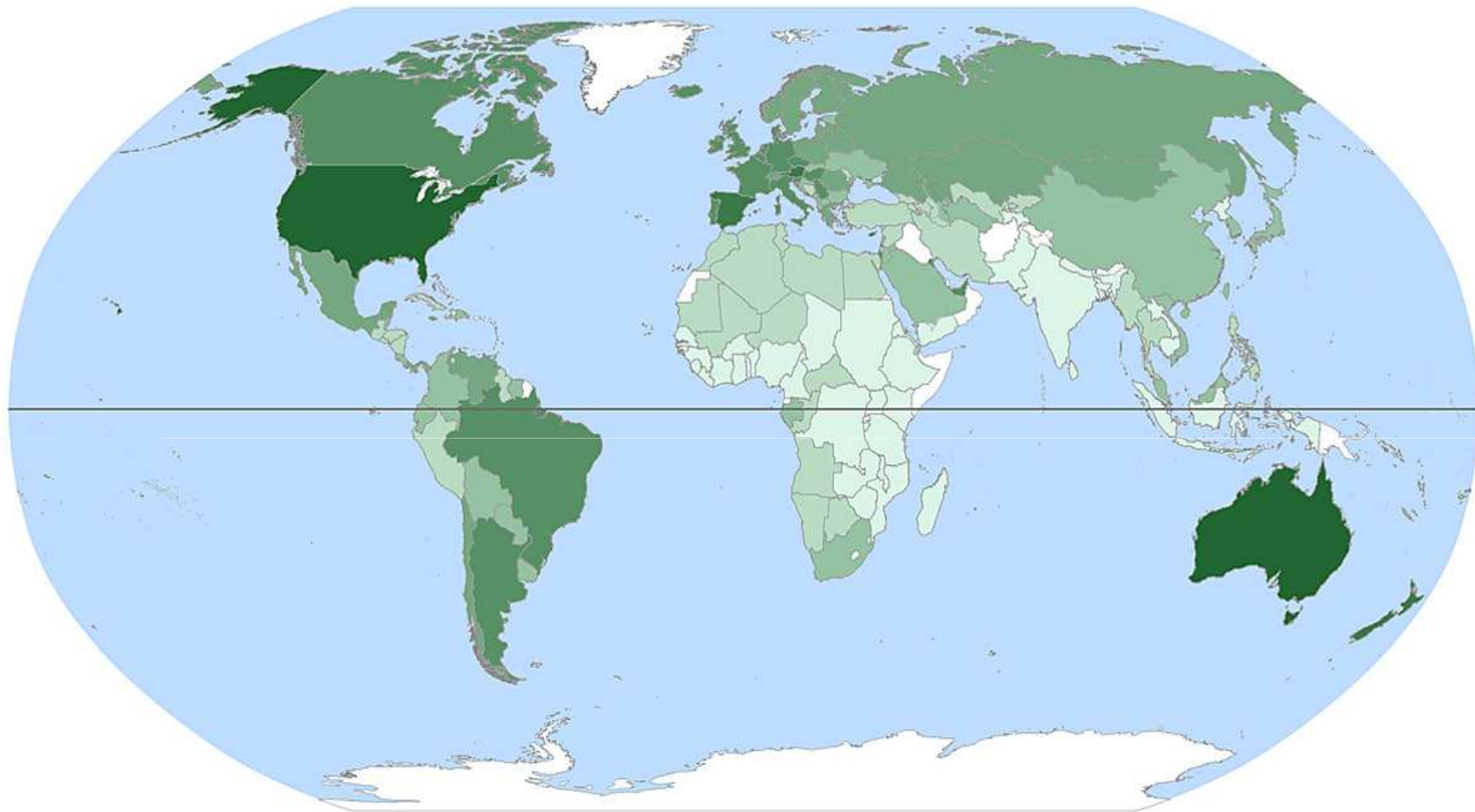
- Resource constraints have started to “bite”
- Higher input prices trigger acceleration of technological change (“induced innovation”)
- Sector growth has to be achieved through productivity gains
- Climate change adaptation
- Other resource issues: “peak phosphate”, biodiversity

The Livestock Revolution



**WILL DEMAND CONTINUE TO  
GROW?**

# Per capita Meat Consumption (Kg/year)



FAOSTAT, 2007



# Key features of Livestock Revolution

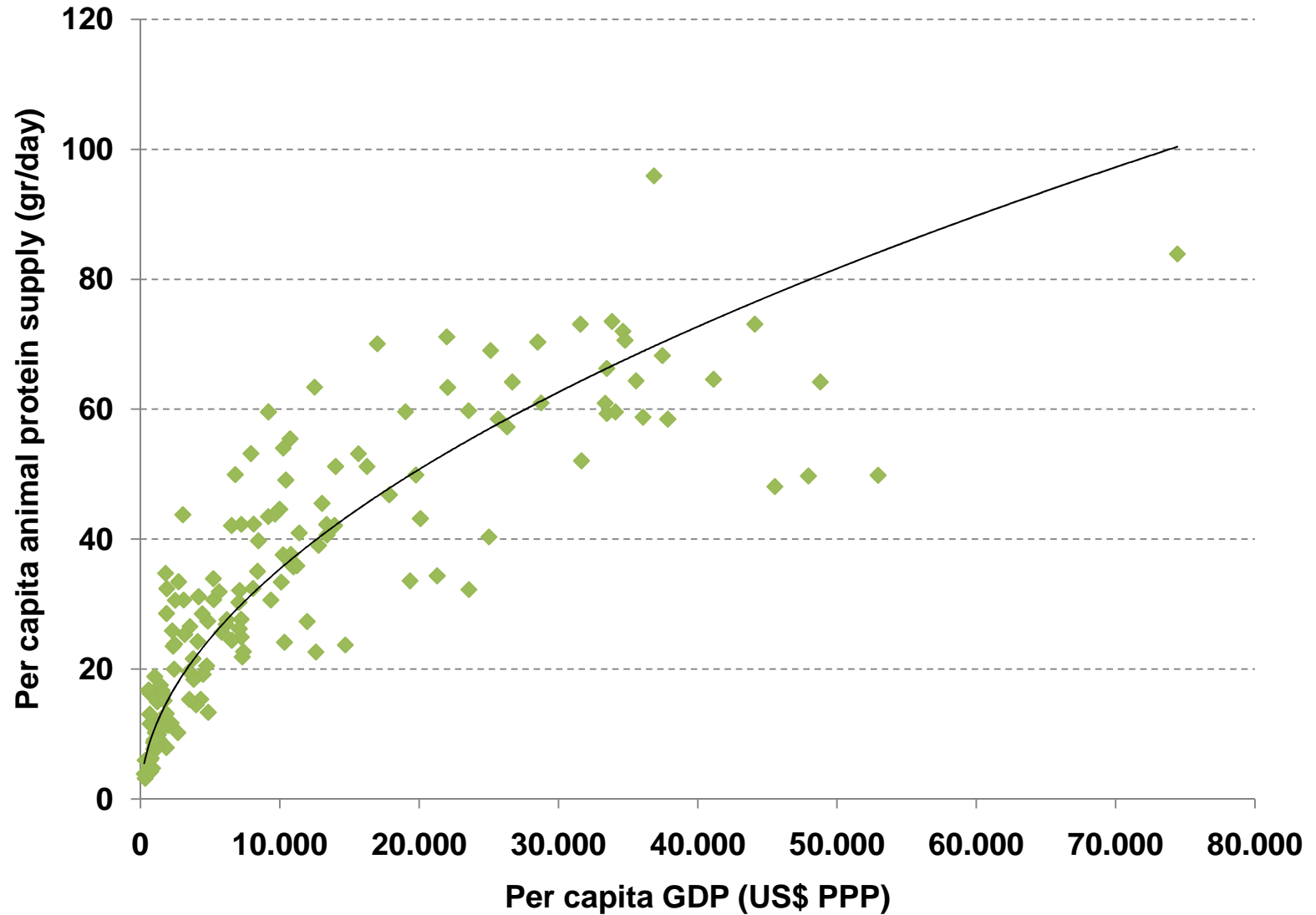
The livestock revolution: rapid growth and transformation

- Demand Side:
  - income growth
  - population growth
  - urbanisation
- Supply side:
  - Shifts in species and feed resources
  - Technological change
  - Market integration
  - Upscaling

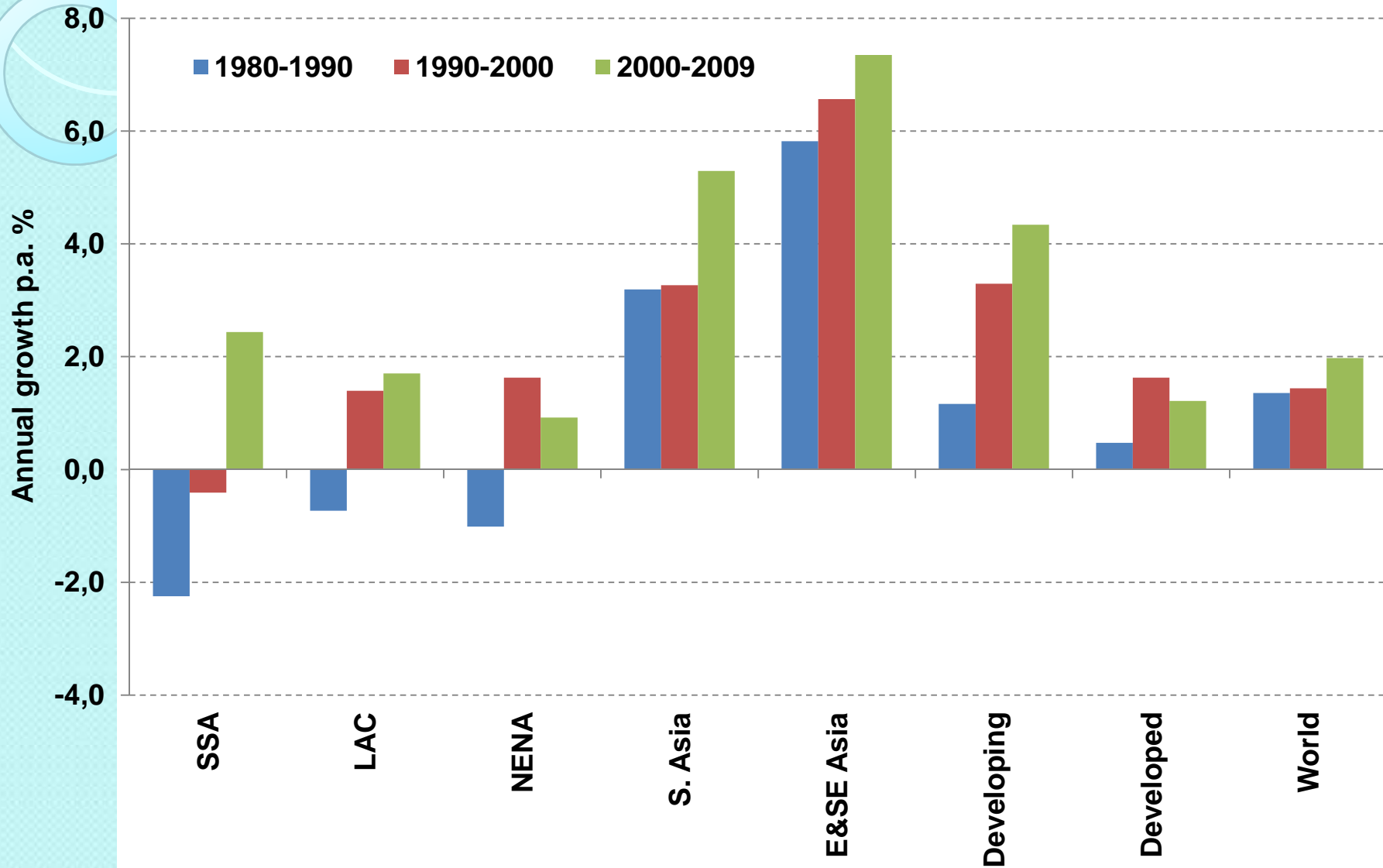
# What happened so far...

- **LR in the US** (1950s): hybrid maize, nitrogen fertilizer
- **LR in Europe** (1960-70s): like US, plus protectionism
- **LR in Asia** (from 1980, still on-going): rapid economic growth, decline of Soviet Bloc
- **LR in Latin America** (slow moving, on-going): low production costs
- **LR in Africa and South Asia?**

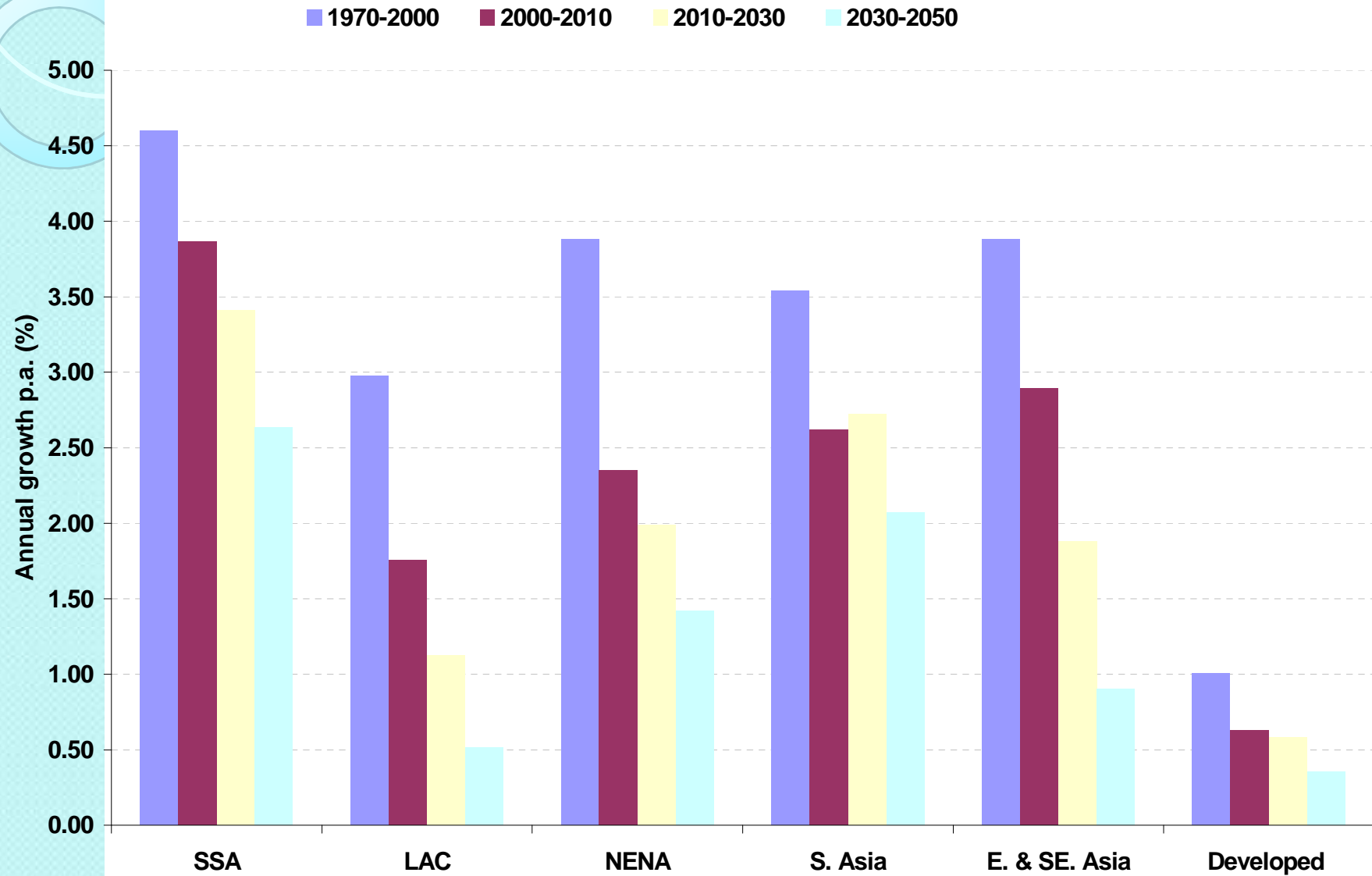
# Relationship between animal protein consumption and income



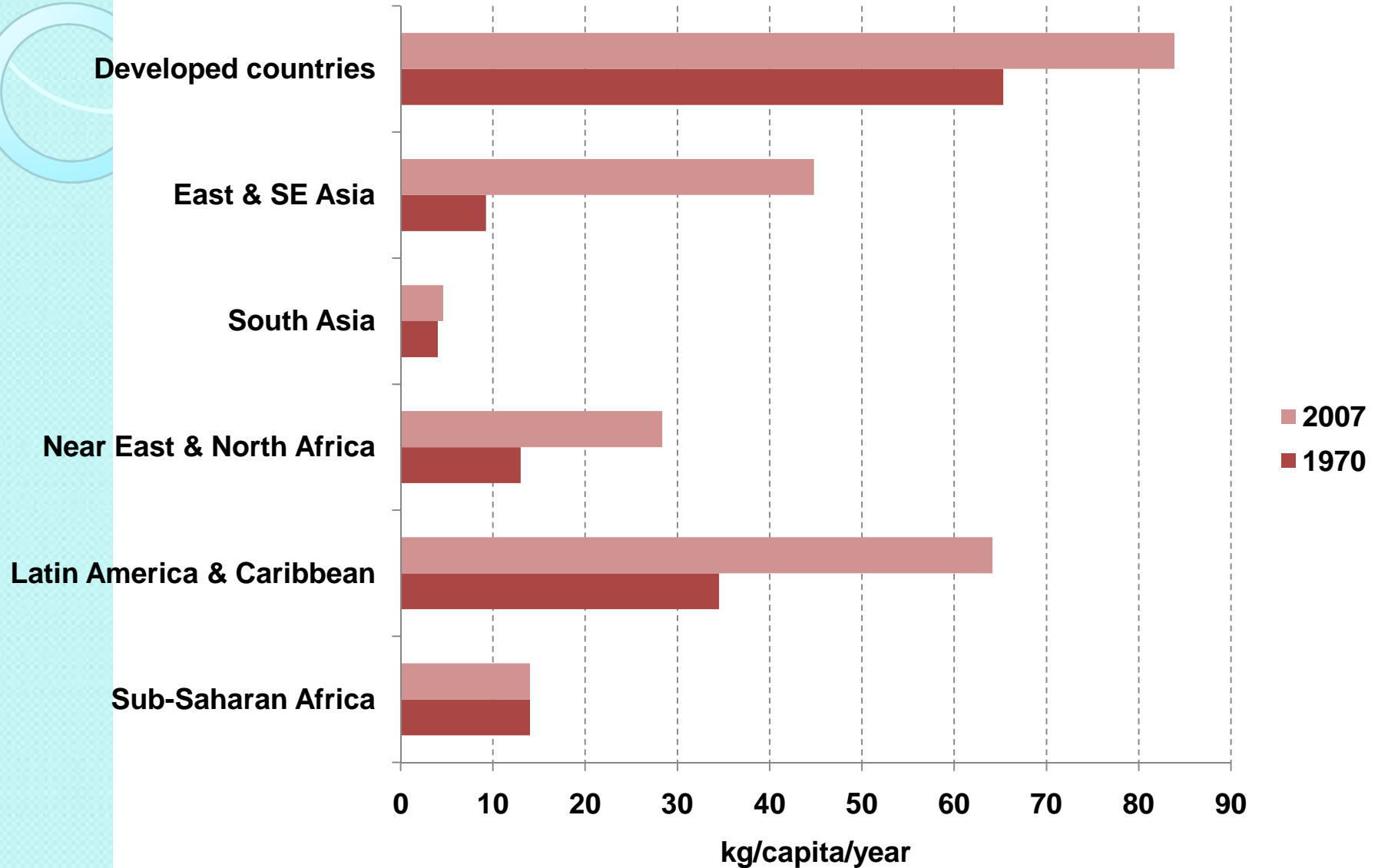
# Per capita income growth



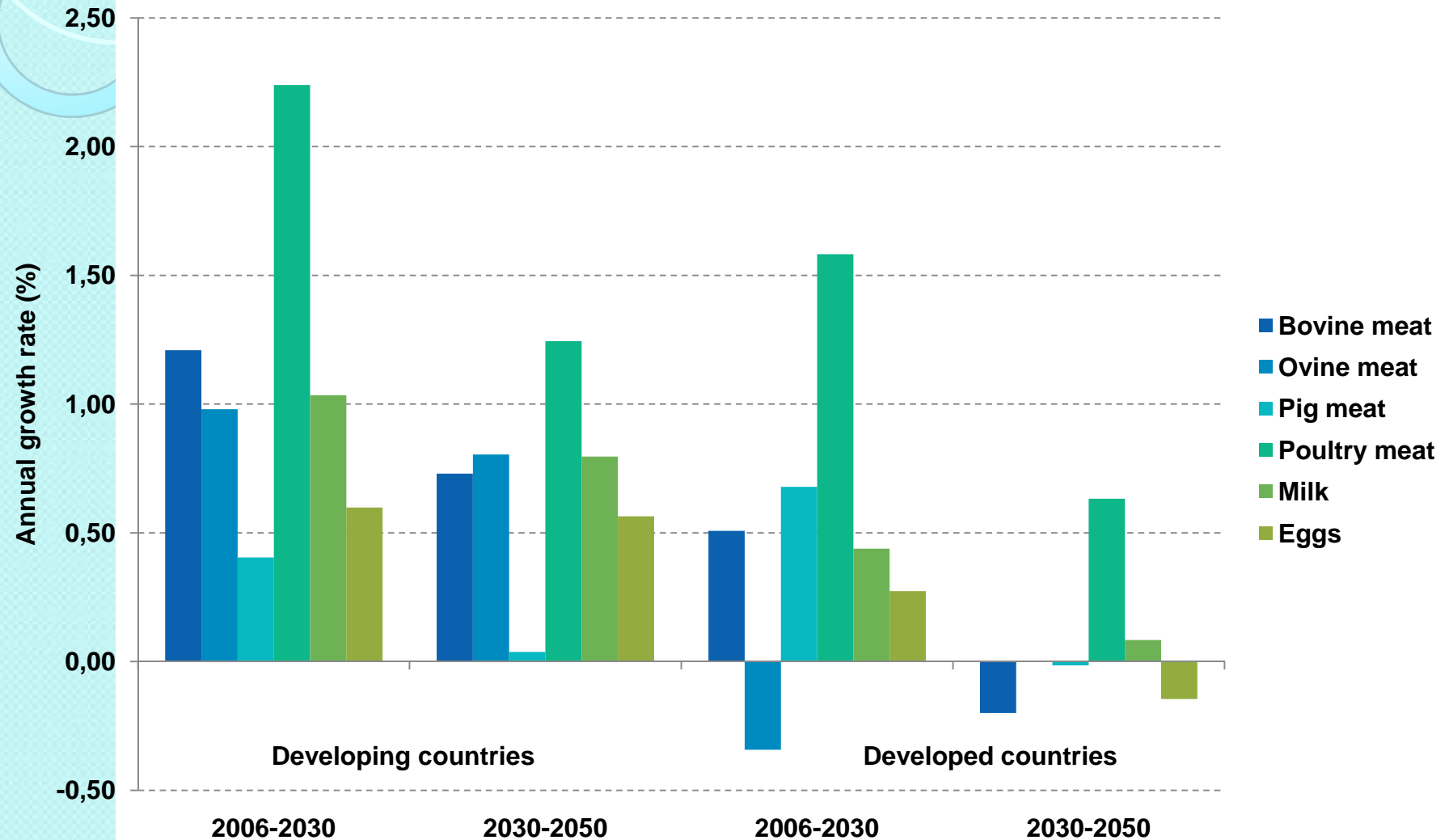
# Annual urban growth rate



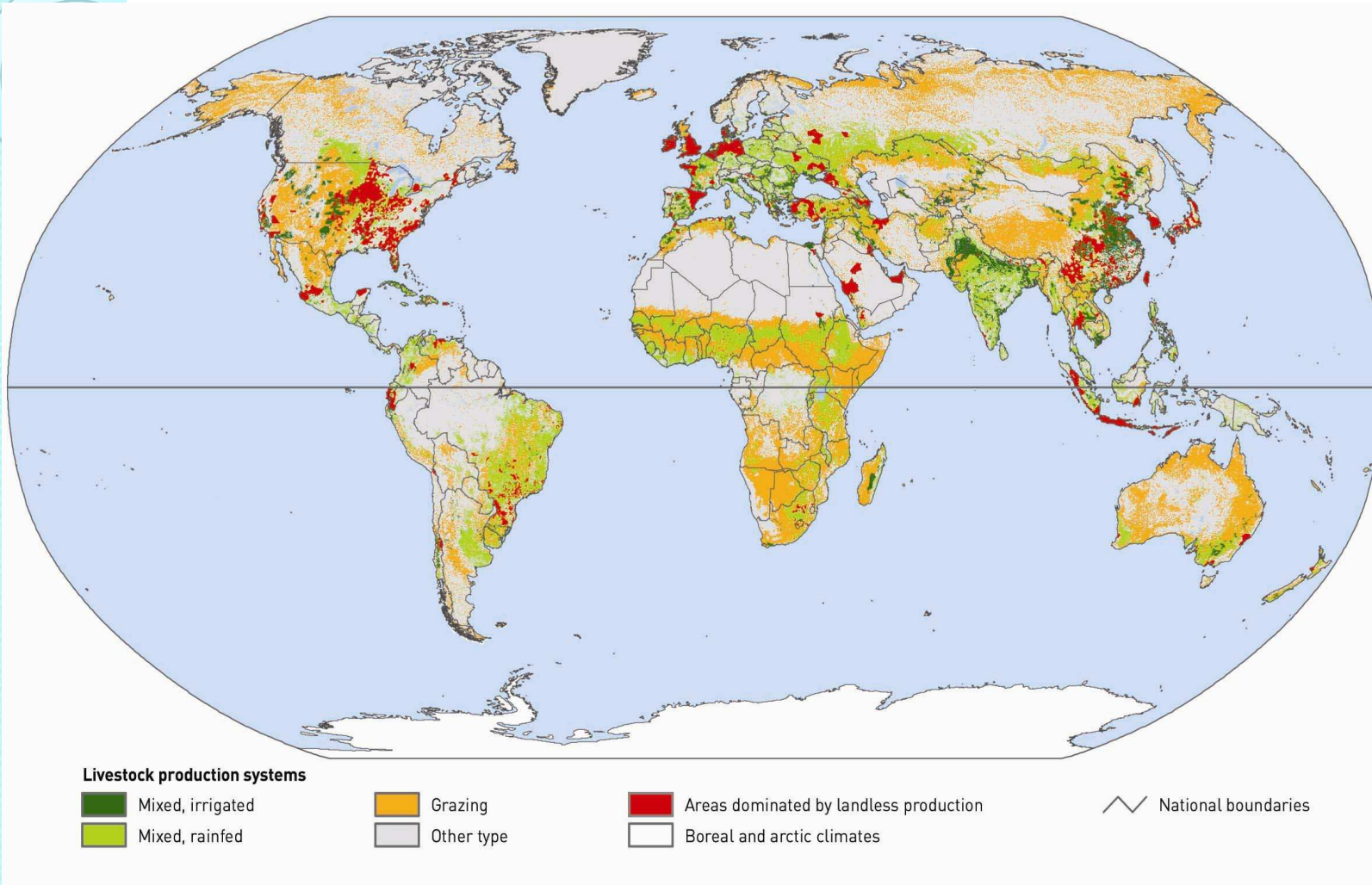
# Per capita meat consumption (2)



# Annual growth in per capita consumption of livestock products



# Distribution of livestock production systems





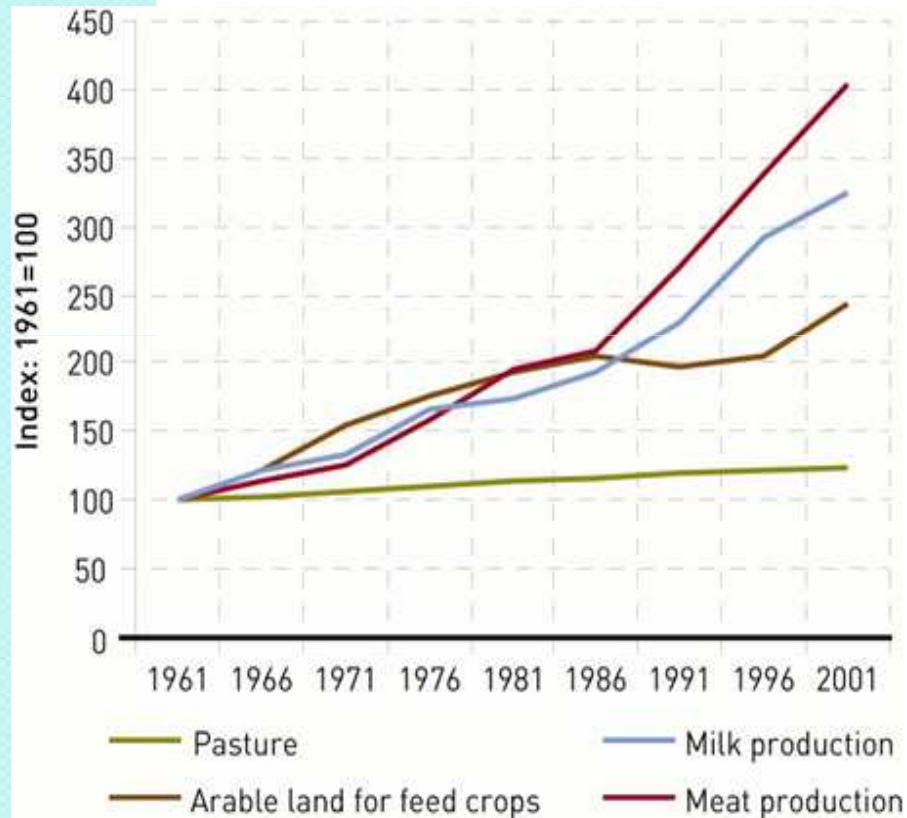
When it comes to accommodate sector growth,



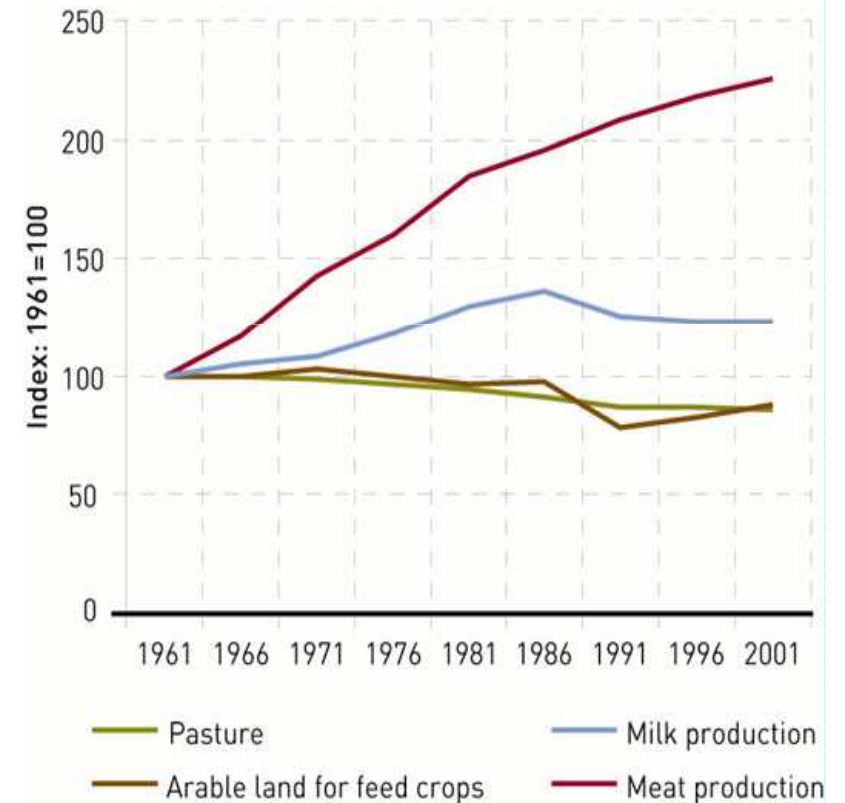
**EFFICIENCY IS KEY**

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

## South America

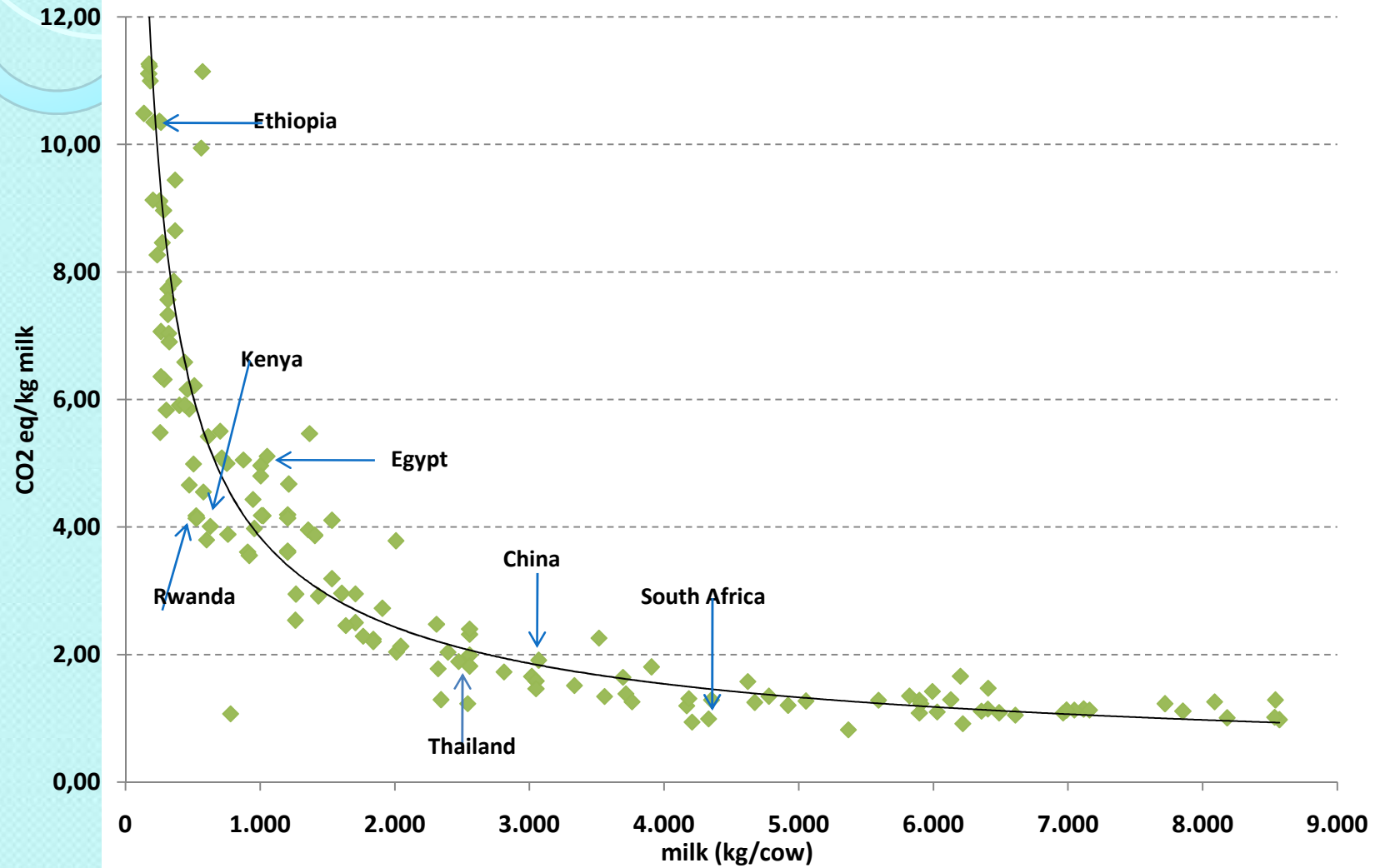


## EU-15



- improved feed efficiency
- increased reliance on feed Imports

# Intensification

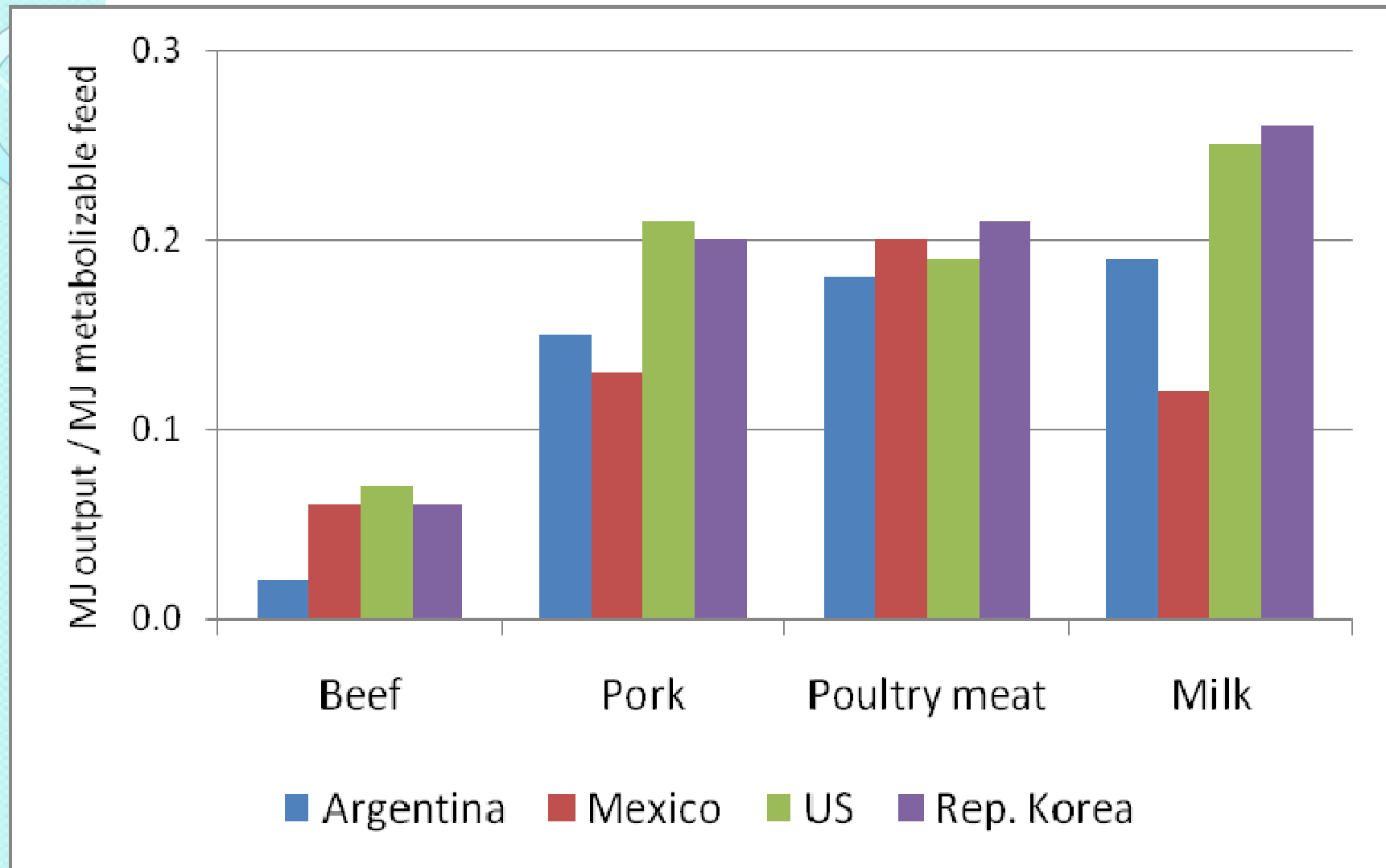


## Comparison of resource inputs and waste outputs: dairy production in 1944 and 2007 in United States

	1944	2007	
Milk produced, billion kg	53.1	84.2	
	<b>Resources/waste per billion kg milk produced</b>		<b>% of 1944</b>
Total dairy population (10 <sup>3</sup> )	948	202	21
<b>Resource use</b>			
Feed, kg (10 <sup>9</sup> )	8.26	1.88	23
Land, Ha (10 <sup>3</sup> )	1,705	162	10
Water, Liters (10 <sup>9</sup> )	10.76	3.79	35
<b>Waste Output</b>			
N excretion, kg (10 <sup>6</sup> )	17.47	7.61	44
P excretion, kg (10 <sup>6</sup> )	11.21	3.31	29
Manure, kg (10 <sup>9</sup> )	7.86	1.91	24
<b>GHG emissions</b>			
Methane, kg (10 <sup>6</sup> )	61.8	26.8	43
Nitrous oxide, kg (10 <sup>3</sup> )	412	230	56
Carbon footprint per billion kg of milk, kg of CO <sub>2</sub> (10 <sup>9</sup> )	3.66	1.35	37

*Capper et al. 2009*

# Efficiency across species



**Efficiency is key to reducing the sector's demand for resources**

# Productivity growth differs

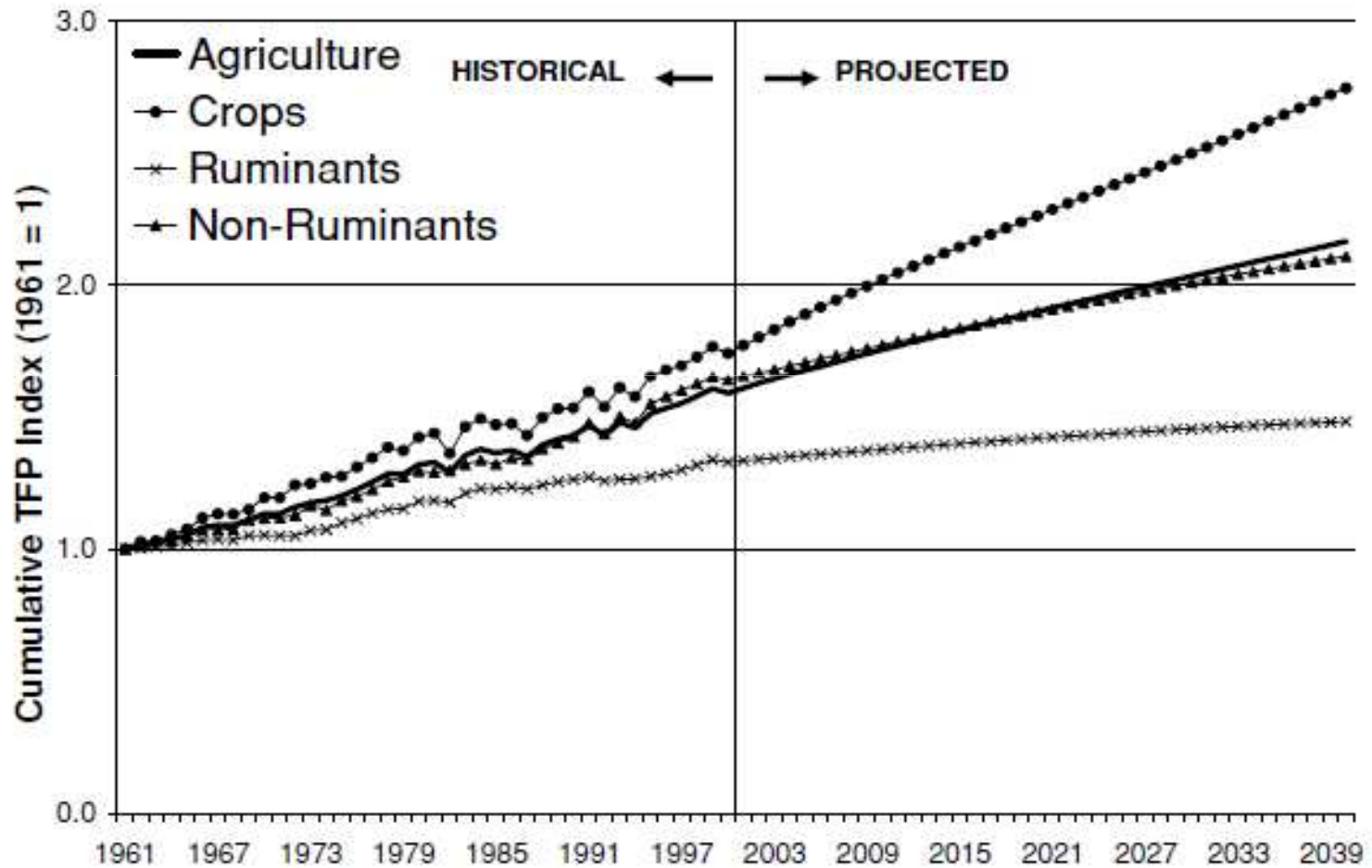



Fig. 1. Industrialized countries (1961–2040): cumulative Malmquist index in agriculture and subsectors.

Ludena et al, 2007

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- Despite higher input costs, sector growth will continue
  - Intensive production is more efficient and has lower emissions
  - Huge performance gaps within systems and across countries
  - Technical solutions are available but incentives need to be better aligned

In search of a common perspective



# HOW CAN WE MOVE FORWARD?



## What solutions have been offered?

- No problem, no solution required – denial, business as usual
- Problems are local – technical fixes
- Problems are substantial and systemic – policies needed
- Problems are huge and can hardly be fixed – rein in growth
- Problems are beyond control - vegetarianism



## An emerging consensus

- Curbing demand is difficult and slow; ethical problems
- Business as usual not an option either
- Large efficiency gains can be realized, and sector growth can be “accommodated”.

Requires:

- Alignment of incentives
- Rapid change of practices
- Continued technological innovation
- Development of institutions
- Large potential for the provision of environmental services (carbon sequestration, biodiversity, water)



# Building an Agenda

## State actors:

- Align incentives towards improved environmental outcomes
- Provide regulatory framework

## Private sector:

- Improve practices through adoption, research and development



# Building an Agenda

## Civil Society:

- Advocacy, "watchdogs"

## Science:

- Research and development, independent public good research

## Int'l organizations:

- Facilitation, coordination



# Omissions

- Huge social dimension of livestock, mainly in Africa and Asia
- The economic dimension
- Non-food livestock products and services
- Consumption (over- and under-)
- Human health aspects (zoonoses, residues)
- Animal welfare

## Wrap up

- Livestock is at the centre of most contemporary resource use issues (land, water, energy, nutrients, climate change)
- Demand for livestock products will likely continue to be strong
- Efficiency is key to reducing resource requirements and environmental impact; requires:
  - Technology adoption and development need to accelerate
  - Supporting policy frameworks
  - Stakeholder concertation



 **THANK YOU**

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