Livestock production in developing countries: globally significant and locally relevant

John McDermott
Deputy Director General

International Livestock Research Institute

Swedish Agricultural University
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Livestock in Developing Countries

Globally Significant

1. Global trends and drivers
2. Environmental implications
3. Livestock issues - developing vs developed

Locally Relevant

1. Important systems for the poor
2. Future issues and choices

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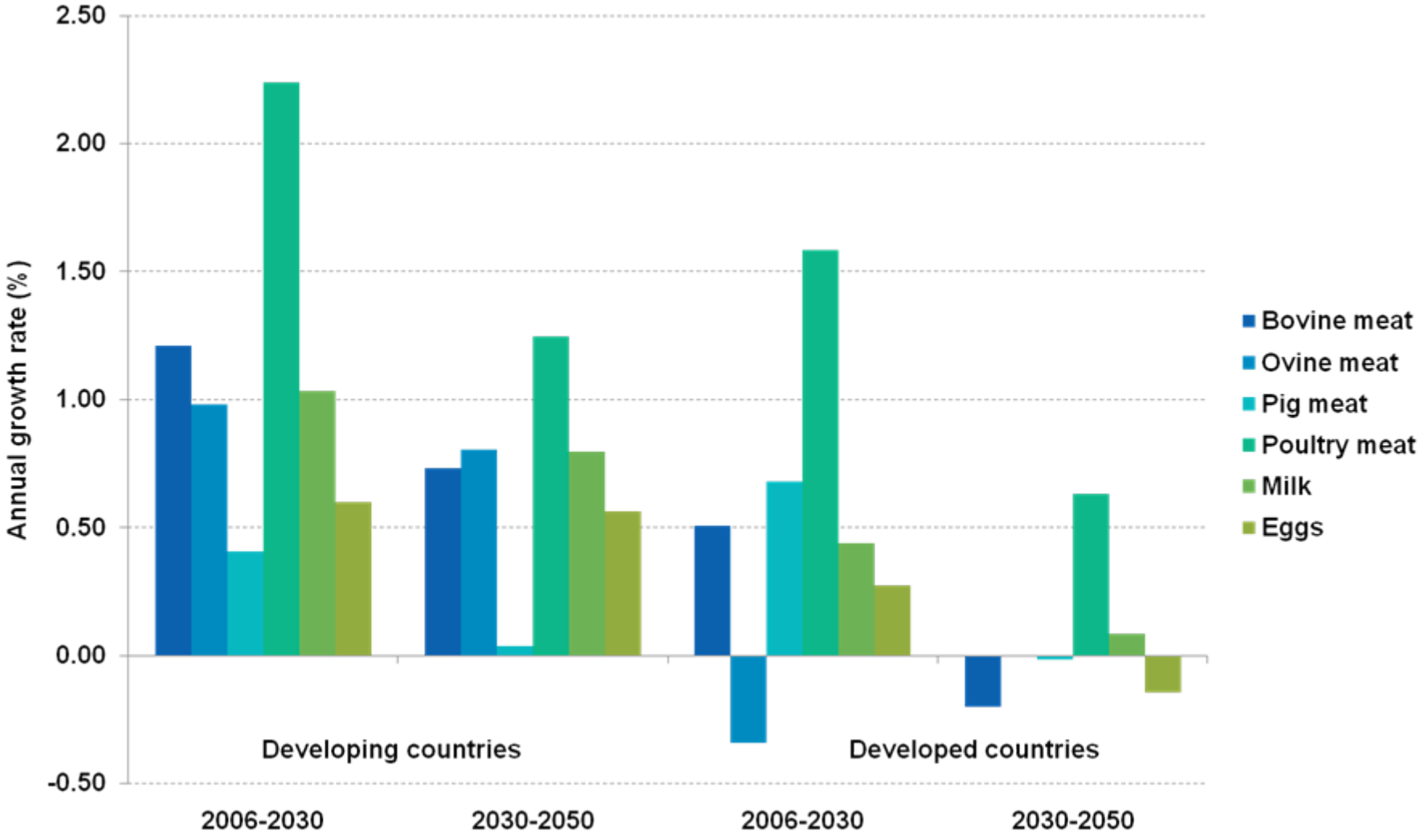
Annual growth in per capita consumption of livestock products

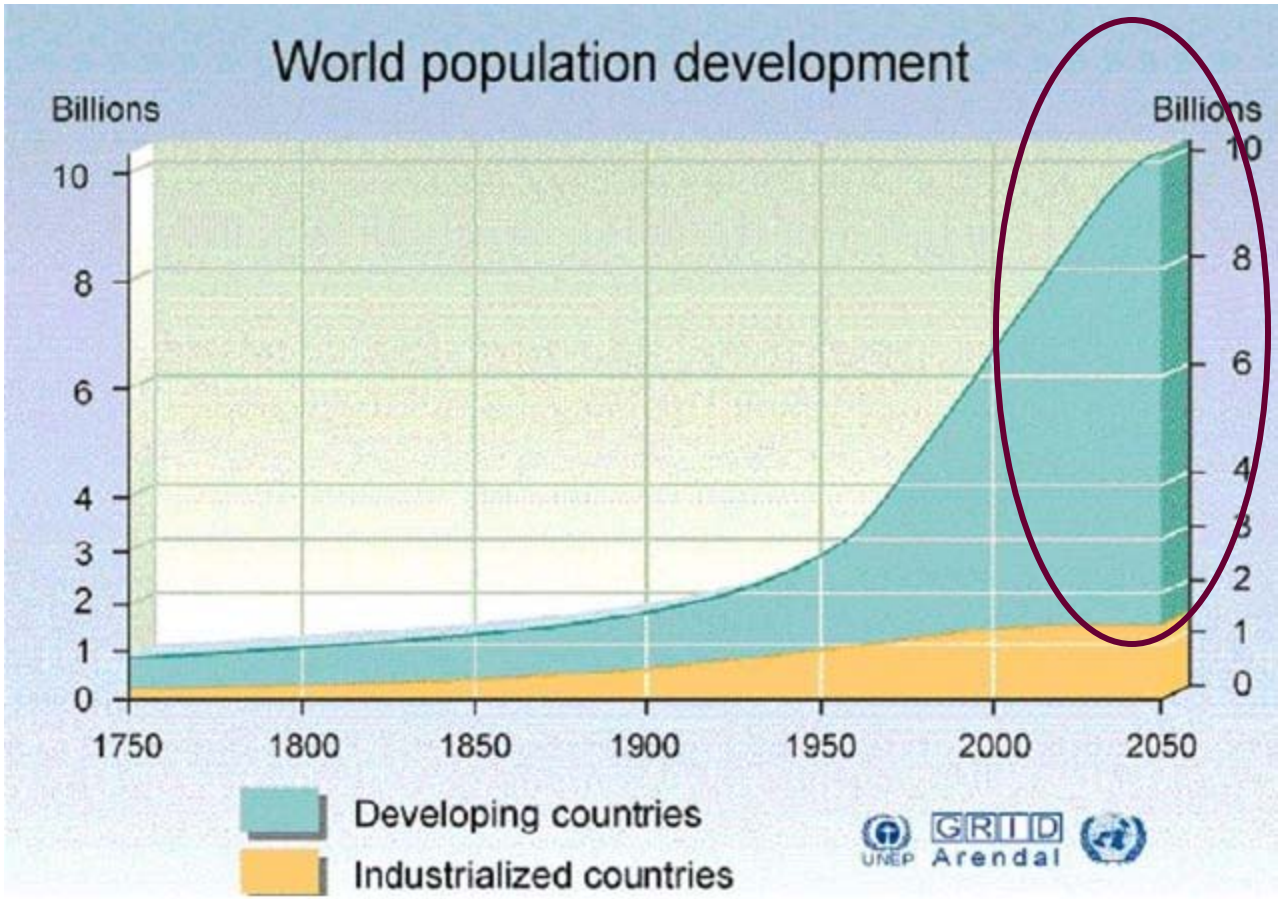


Revised demand for livestock products to 2050

		Annual per capita consumption		Total consumption	
	year	Meat (kg)	Milk (kg)	Meat (Mt)	Milk (Mt)
Developing	2002 2050	28 44	44 78	137 326	222 585
Developed	2002 2050	78 94	202 216	102 126	265 295

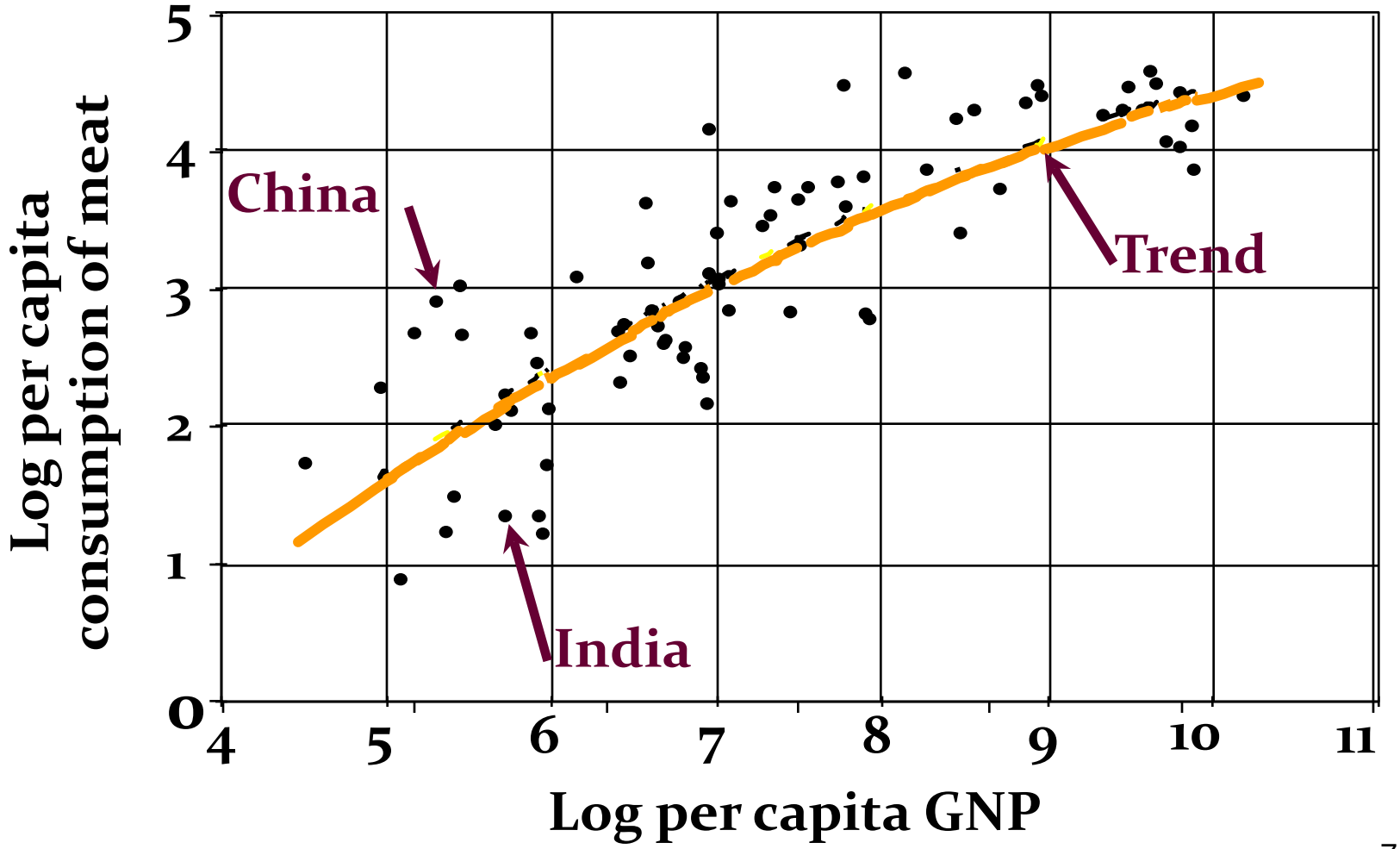
Rosegrant et al 2009

Population Growth in Developing and Industrialized Countries: 1750 - 2050



The Livestock Revolution:

A strong increase in demand for meat and milk as income grows



Livestock to 2020: The Next Food Revolution, a joint IFPRI, FAO, ILRI study.

As people get richer they consume more animal products

	1962	1970	1980	1990	2000	2003
	Consumption Kg/person/year					
Cereals	132	145	159	170	161	156
Roots and tubers	18	19	17	14	15	15
Starchy roots	70	73	63	53	61	61
Meat	10	11	14	19	27	29
Milk	28	29	34	38	45	48

Steinfeld et al 2006

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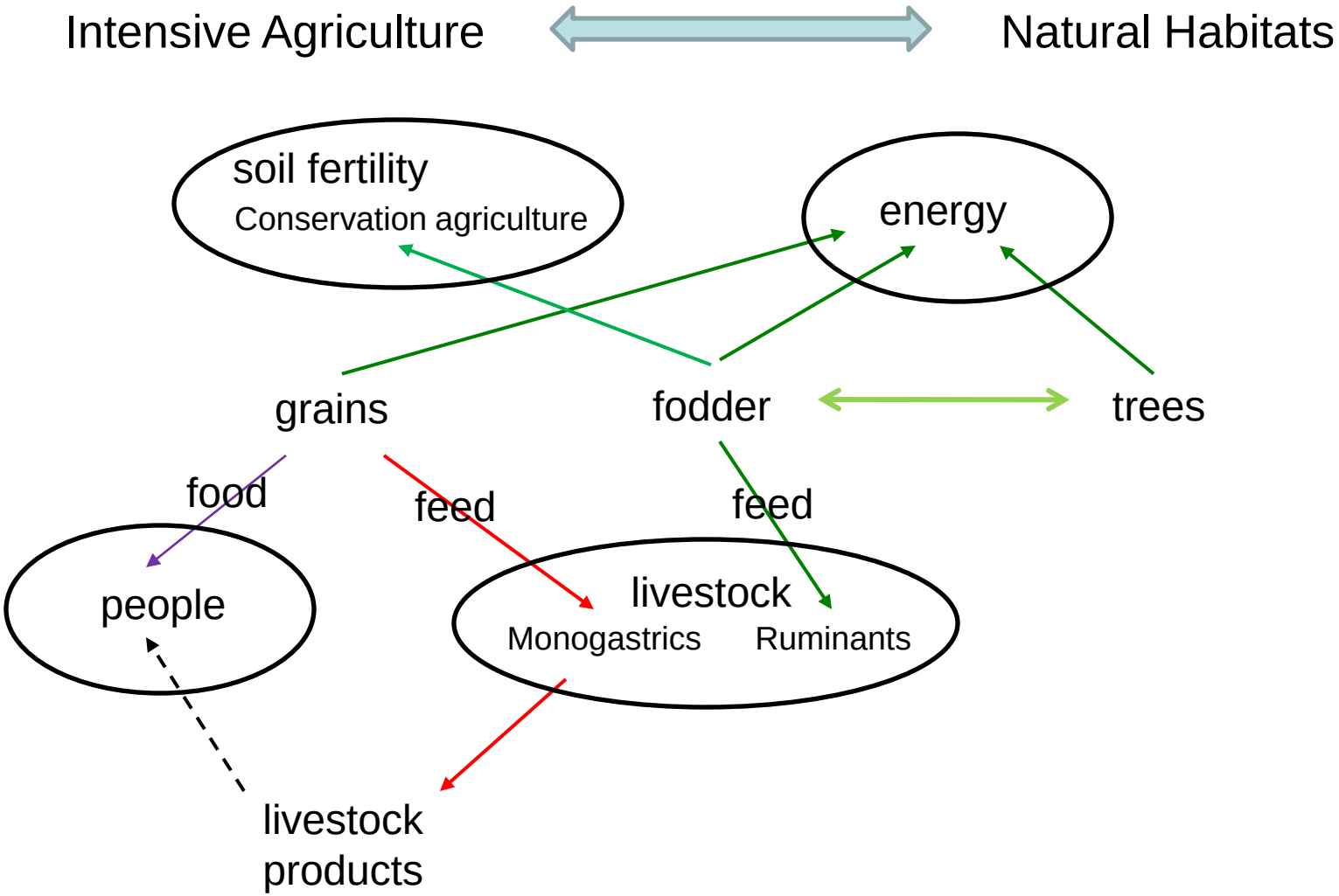
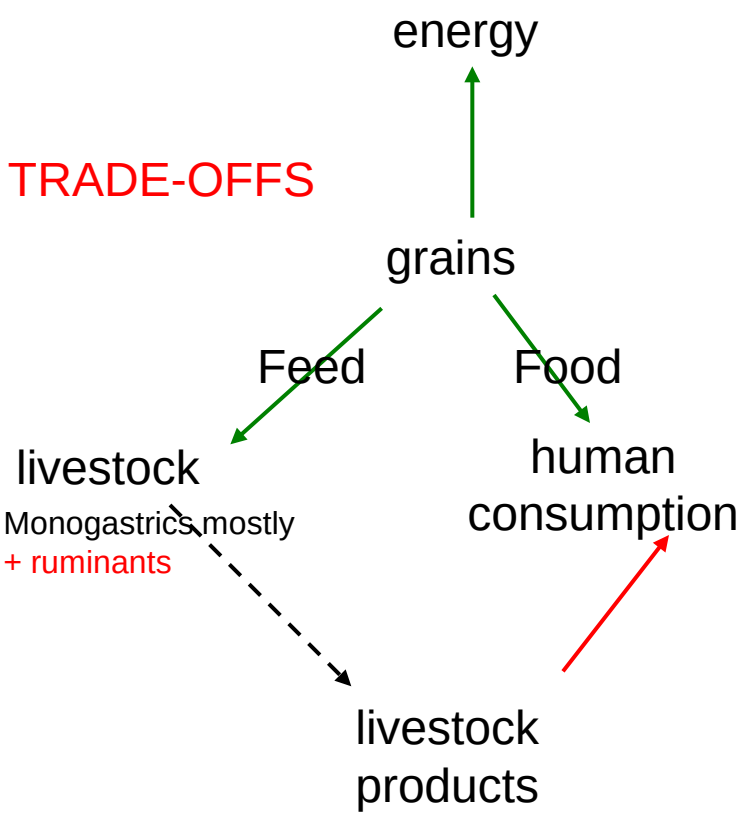
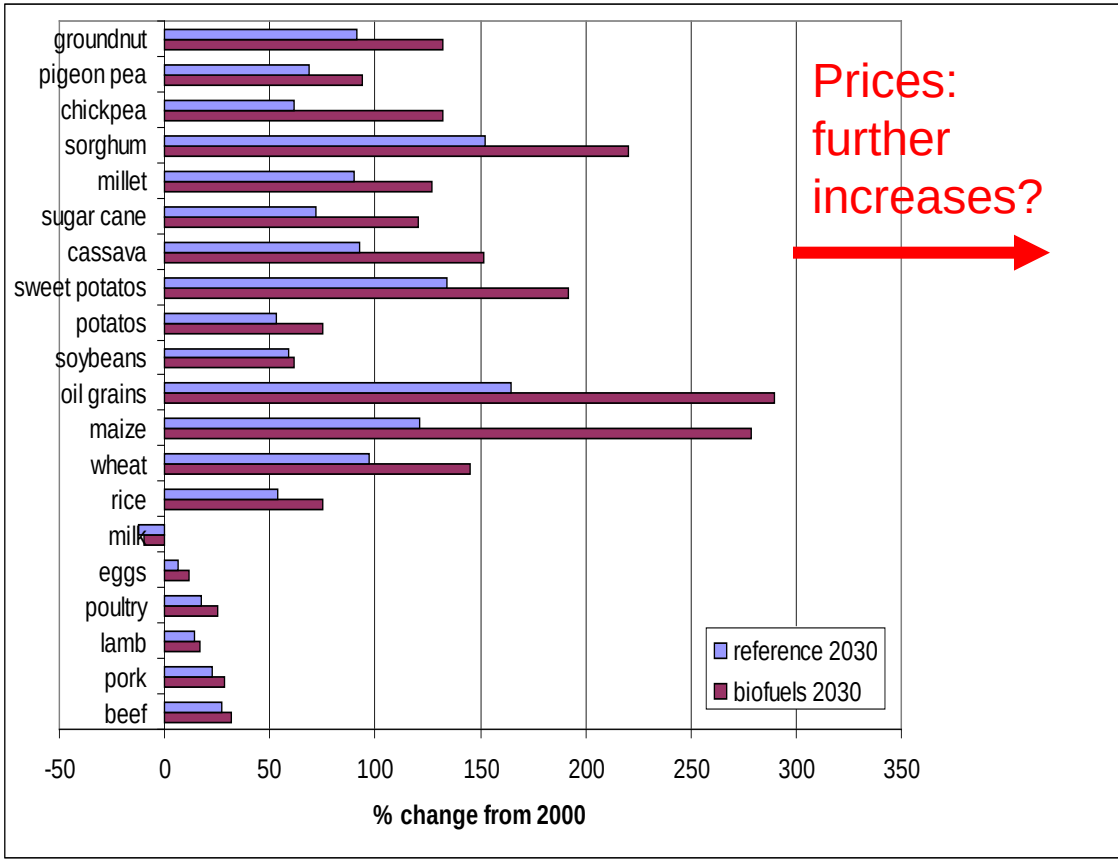
TROPICAL BIOMASS TRADEOFFS



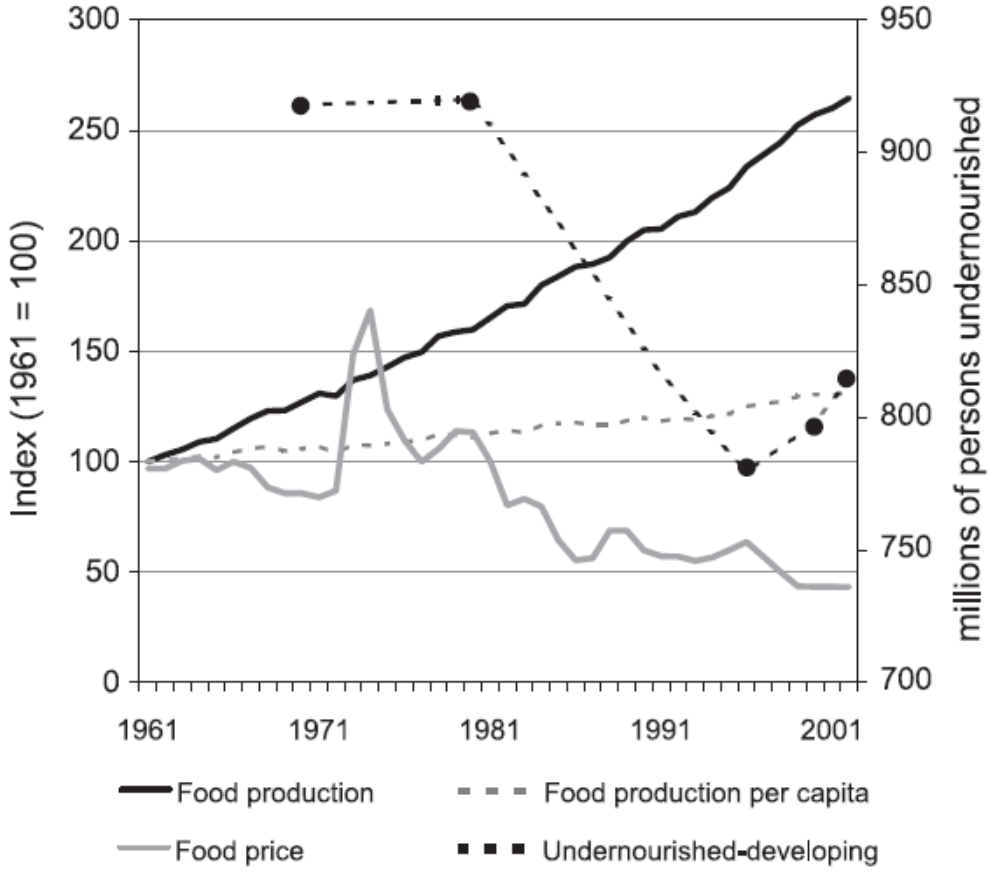
In intensive systems, feed shortages for ruminants might increase demand for cereals further…this will increase competition for biomass with other sectors





Herrero et al. 2009

When it was all holding together…

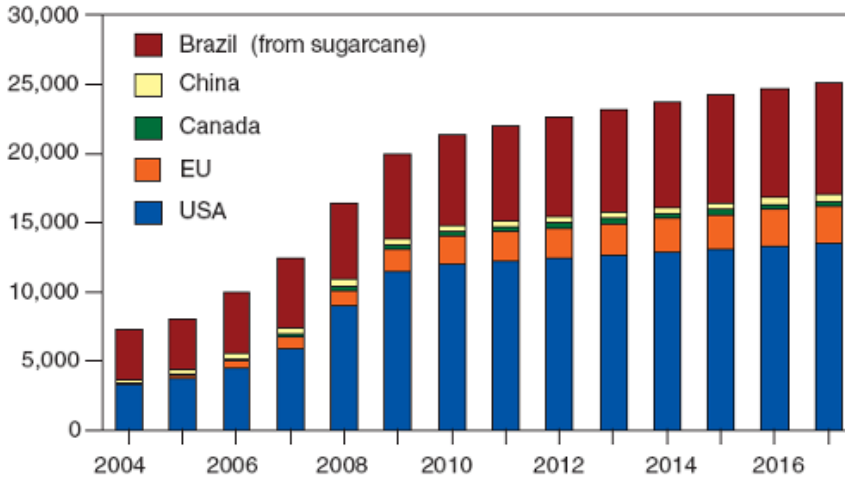


Wood et al. 2005

…it might still do…but it is much more complicated and we need to target appropriate investments thoughtfully

ETHANOL PRODUCTION

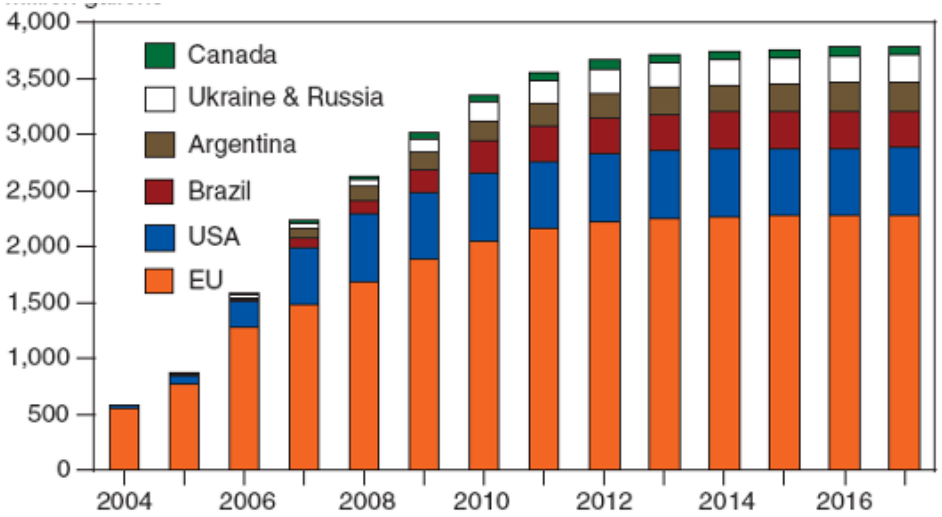
Millions of gallons



Source: USDA Agricultural Projections to 2017.

BIODIESEL PRODUCTION

Millions of gallons

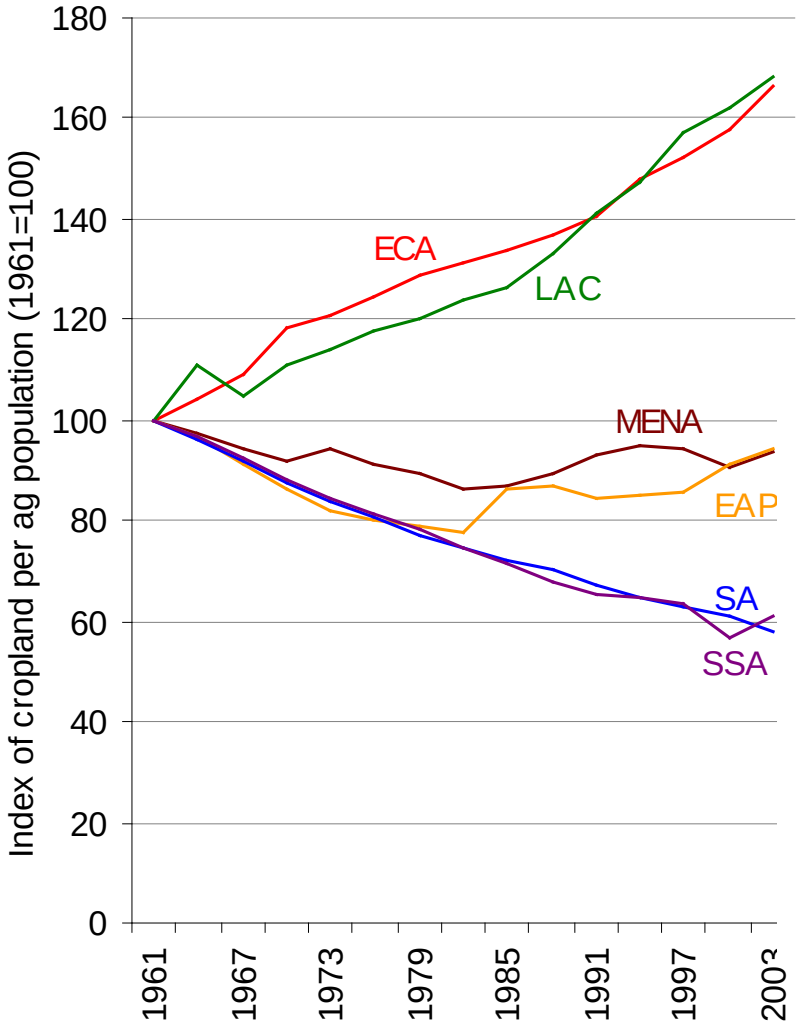


Source: USDA Agricultural Projections to 2017.

Mostly from grain feedstocks
– except for Brazil

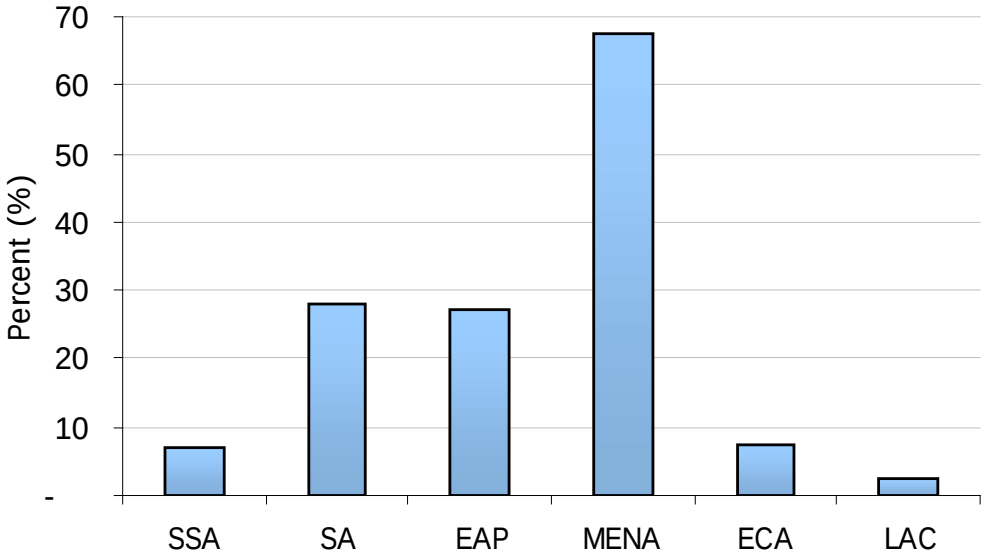
Source: USDA Agricultural Projections to 2017

Increasing land and water constraints (WDR, 2008)



Cropland per capita of agricultural population

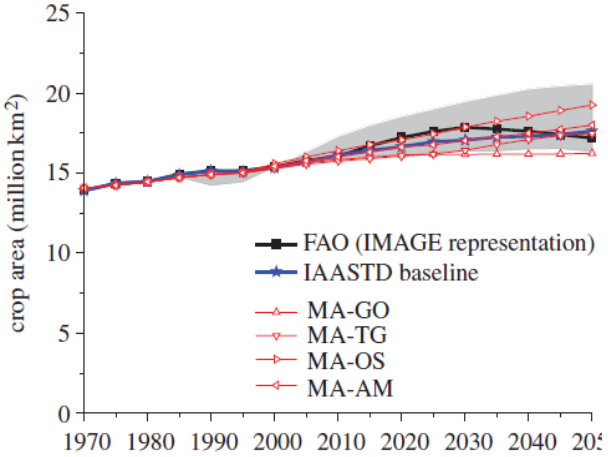
% of population in absolute water scarcity



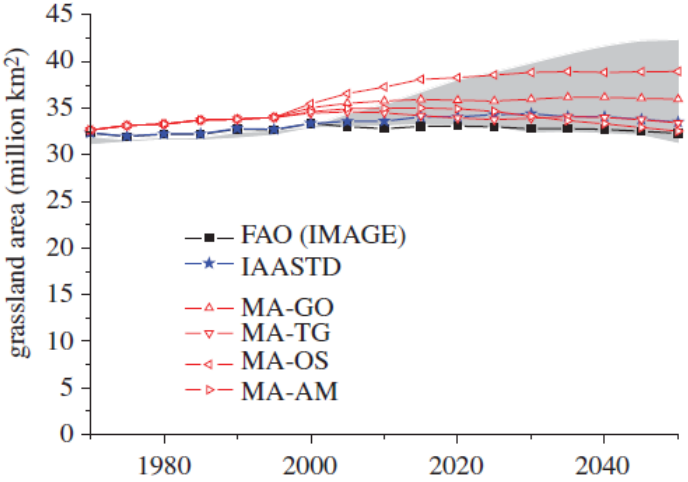
Projected land use changes to 2050 from several studies

(Smith et al 2010)

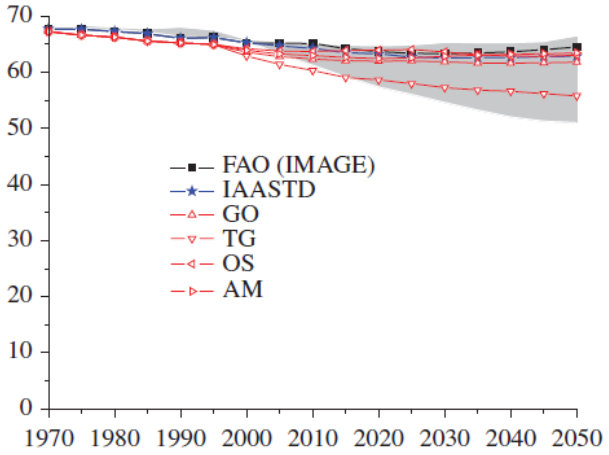
Cropland
+10 to 20%



Rangeland
avg = 10%



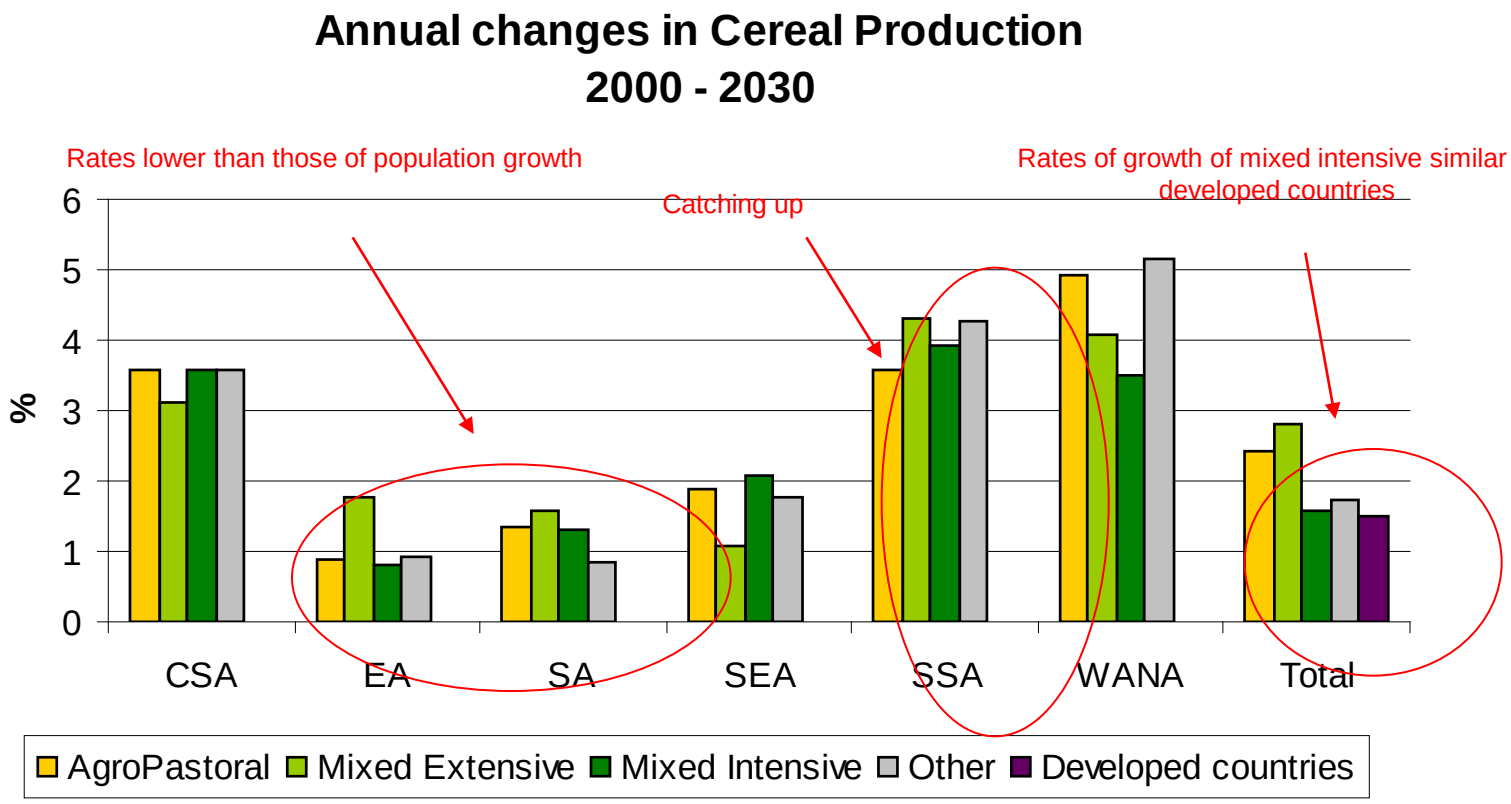
Natural habitats
0 to -20%



Croplands expanding at a faster rate than rangelands

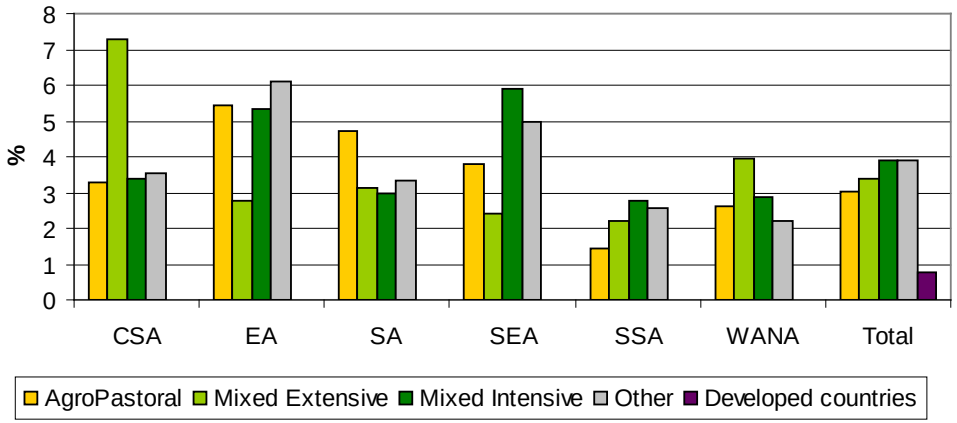
Key driver: Expansion of monogastric production and intensification of ruminant production with grains

Rates of cereal production due to water and other constraints in places



Rates of production of animal products increase at significantly faster rates….

Annual rates of change - beef production 2000-2030

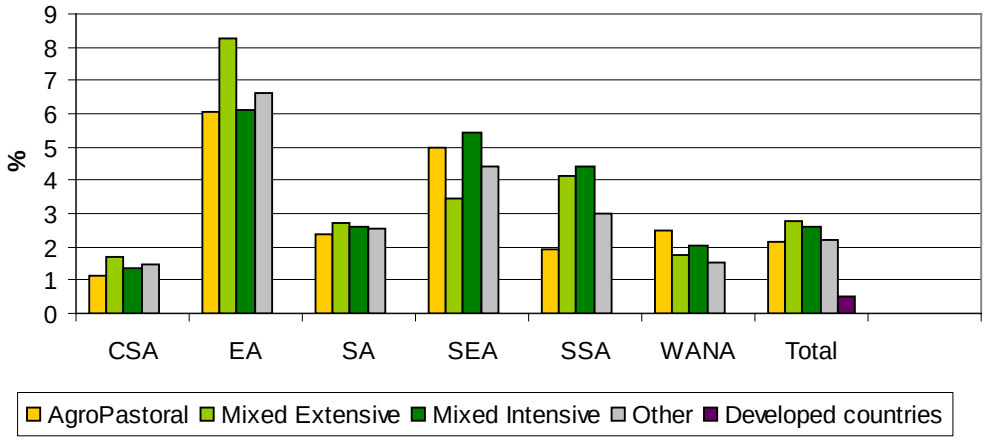


Increased consumption
Increased incomes

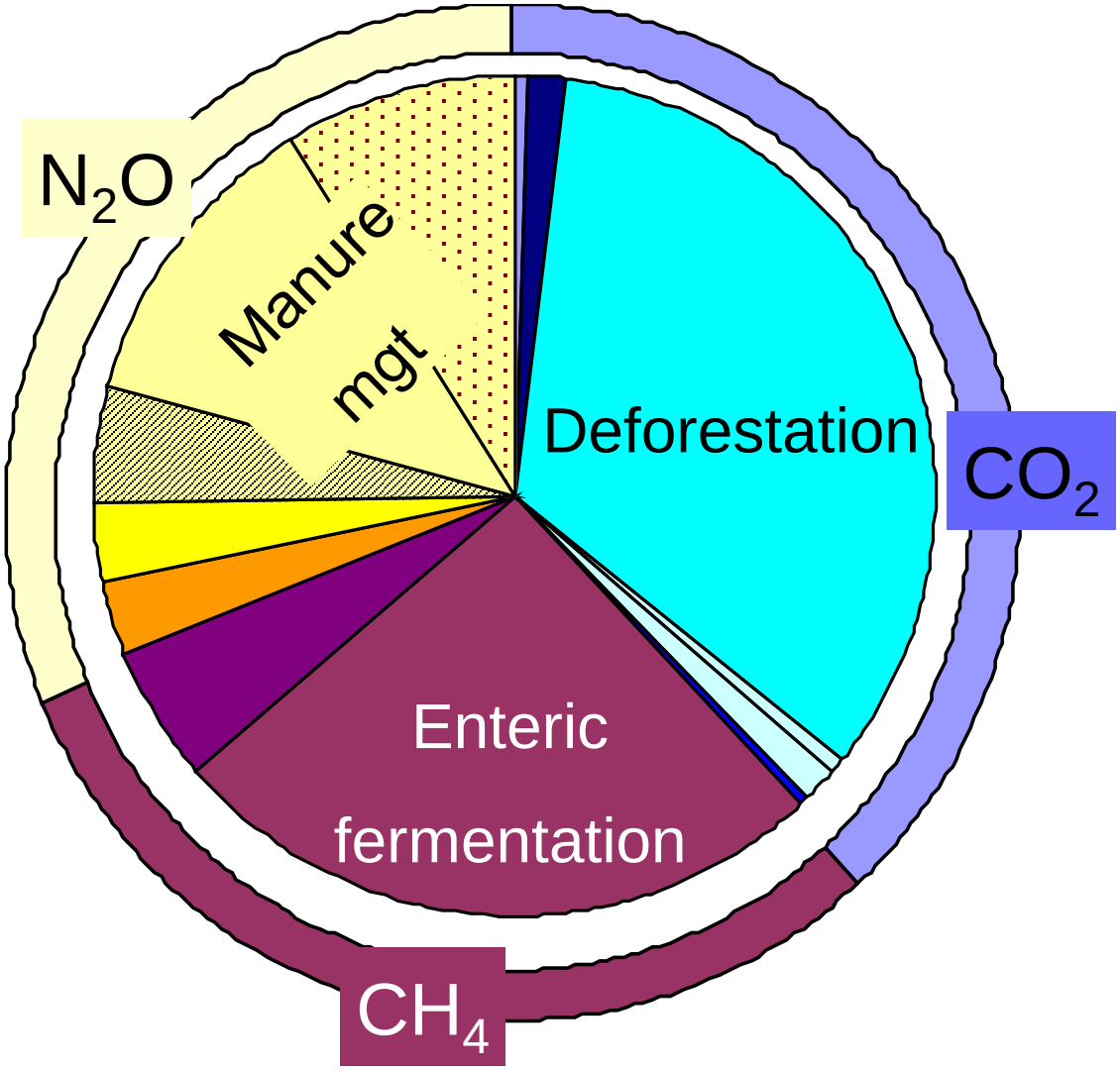
…but increased pressure on resources (land, feeds, etc)

Growing industrialisation….

Annual rates of change - milk production 2000-2030



Livestock and GHG: 10-12 [rather than 18%] of global emissions



- Chemical N. fert. production
- On-farm fossil fuel
- Deforestation
- OM release from ag. soils
- Pasture degradation
- Processing fossil fuel
- Transport fossil fuel
- Enteric fermentation
- Manure storage / processing
- N fertilization
- Legume production
- Manure storage / processing
- Manure spreading / dropping
- Manu indirect emissions

Prepared by Bonneau, 2008

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Developing vs developed differences: Production

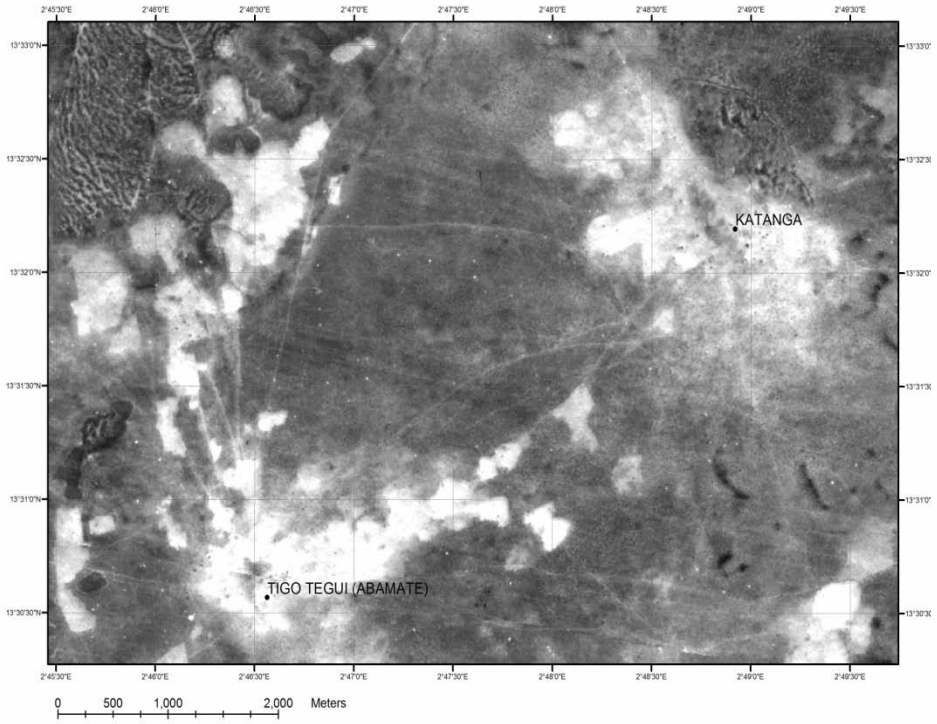
- No consolidation of small into larger farms (Africa)
- Livelihoods will require high-value products and diversification

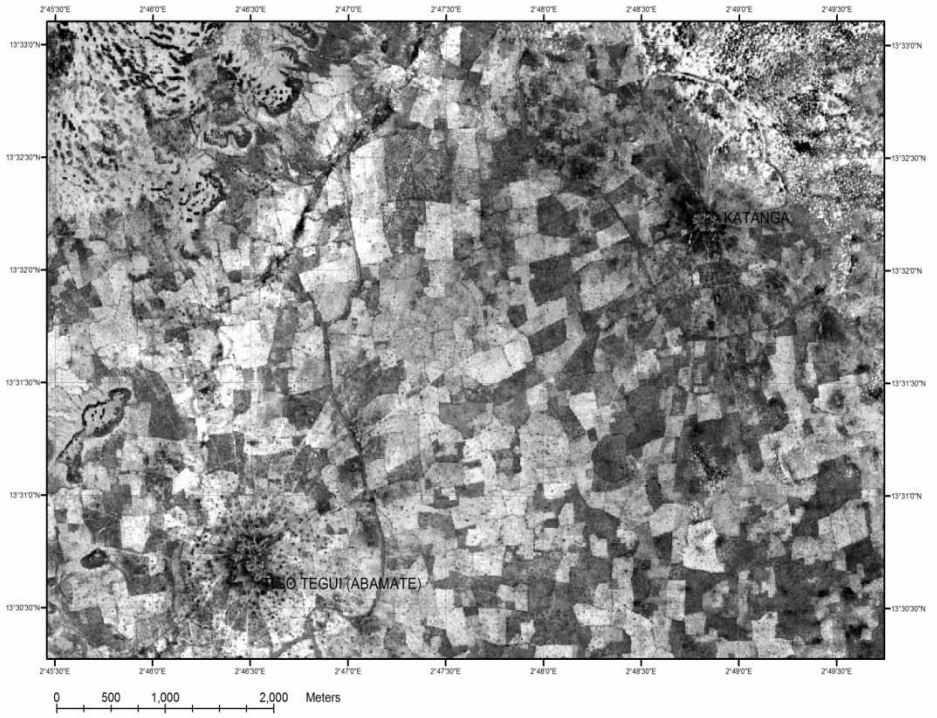
Cultivated land per agricultural person (ha) (FAO)

	1960-69	**1970-79**	**1980-89**	**1990-99**
Ethiopia	0.51	0.45	0.36	0.25
Kenya	0.50	0.35	0.28	0.23
Mozambique	0.39	0.37	0.30	0.25
Rwanda	0.22	0.21	0.20	0.16
Zambia	1.37	1.07	0.90	0.78
Zimbabwe	0.73	0.66	0.58	0.53

An example of the changing nature of livestock systems

W. Africa 1966 – pastoral system → 2004 – crop-livestock system





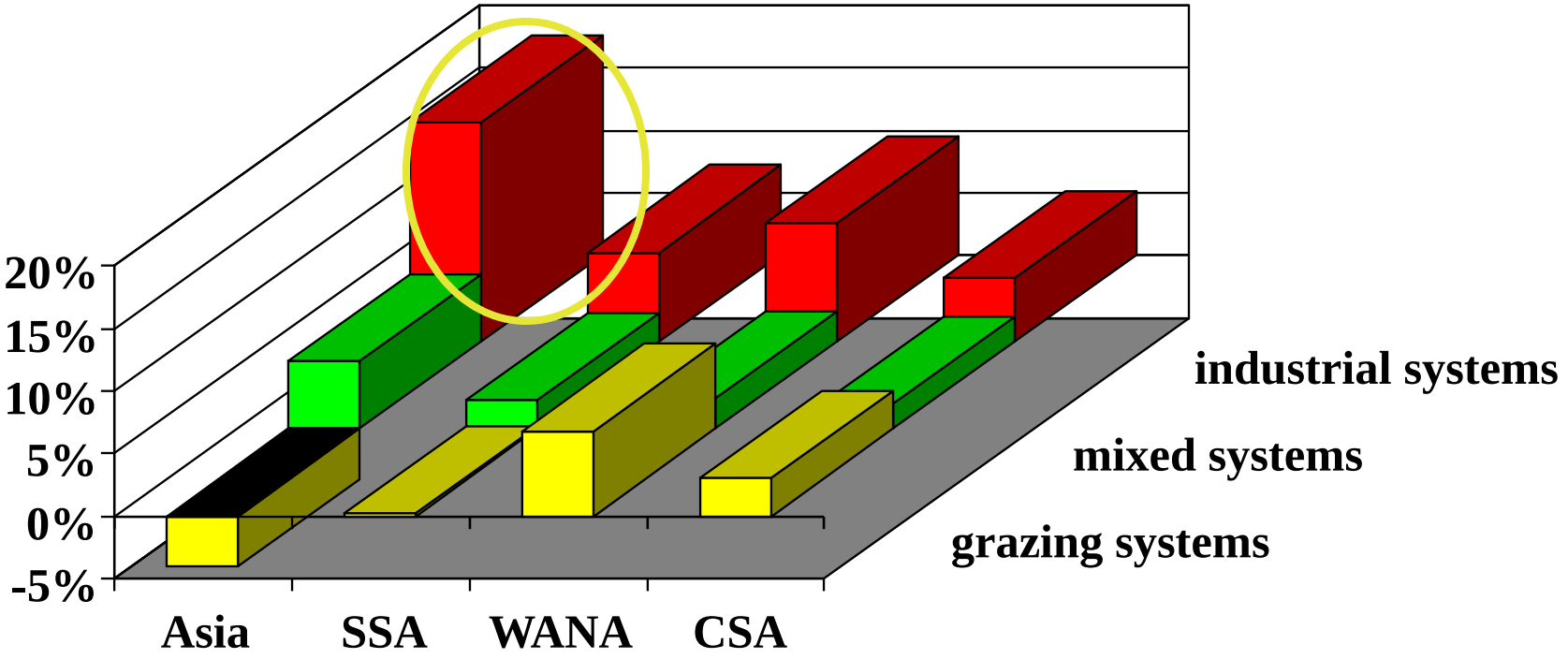
Courtesy of B. Gerard

Developing vs developed differences: Markets

- Booming Demand – how will the poor participate?
- Nature of demand differs by country type (World Development Report 2008)
  Agriculturally–based / Transforming/ Urbanizing
- Demand differs by income (Table 1.4 LLS, 2006)
  - quantity < USD 5 per day
  - quality critical > 10 USD per day

  Evolution to longer and more complex value chains
- Greatest opportunities in agriculturally-based poor countries is in local and not export markets

The Livestock Revolution: Growth in meat mainly in industrial systems



Growth Rates (%/Y) of Meat Production in Different Production Systems in Developing Countries

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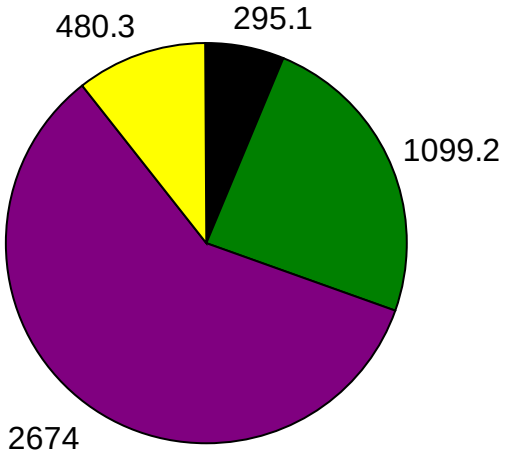
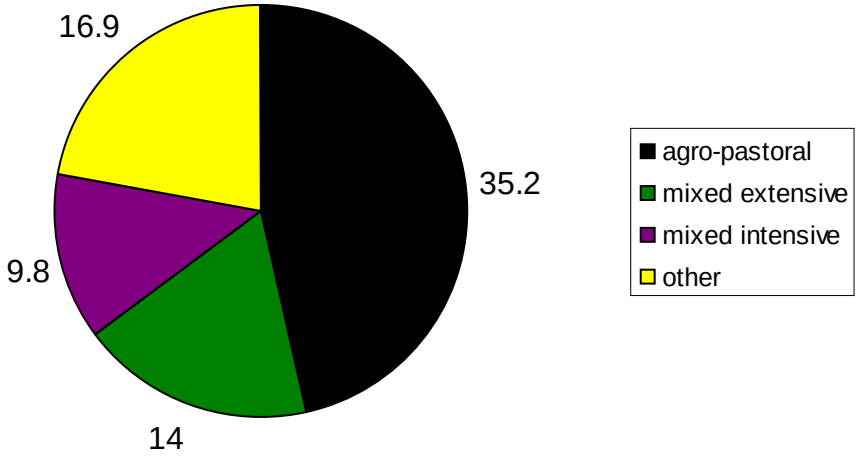
Globally, most people are (and will be) in mixed crop – livestock systems

population (millions)



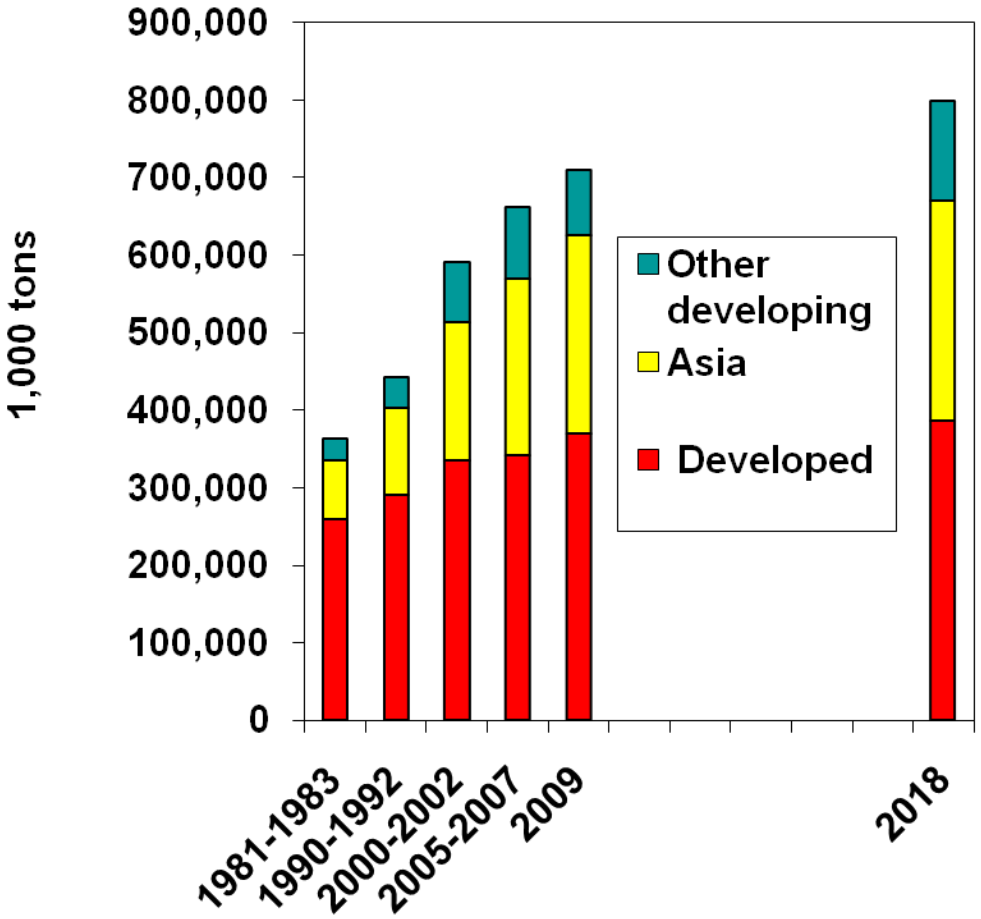
area (million km2)



Mixed systems produce 65% beef, 75% milk and 55% of lamb in the developing World

Mixed systems produce almost 50% of the cereals of the World and the share will increase to over 60% by 2030

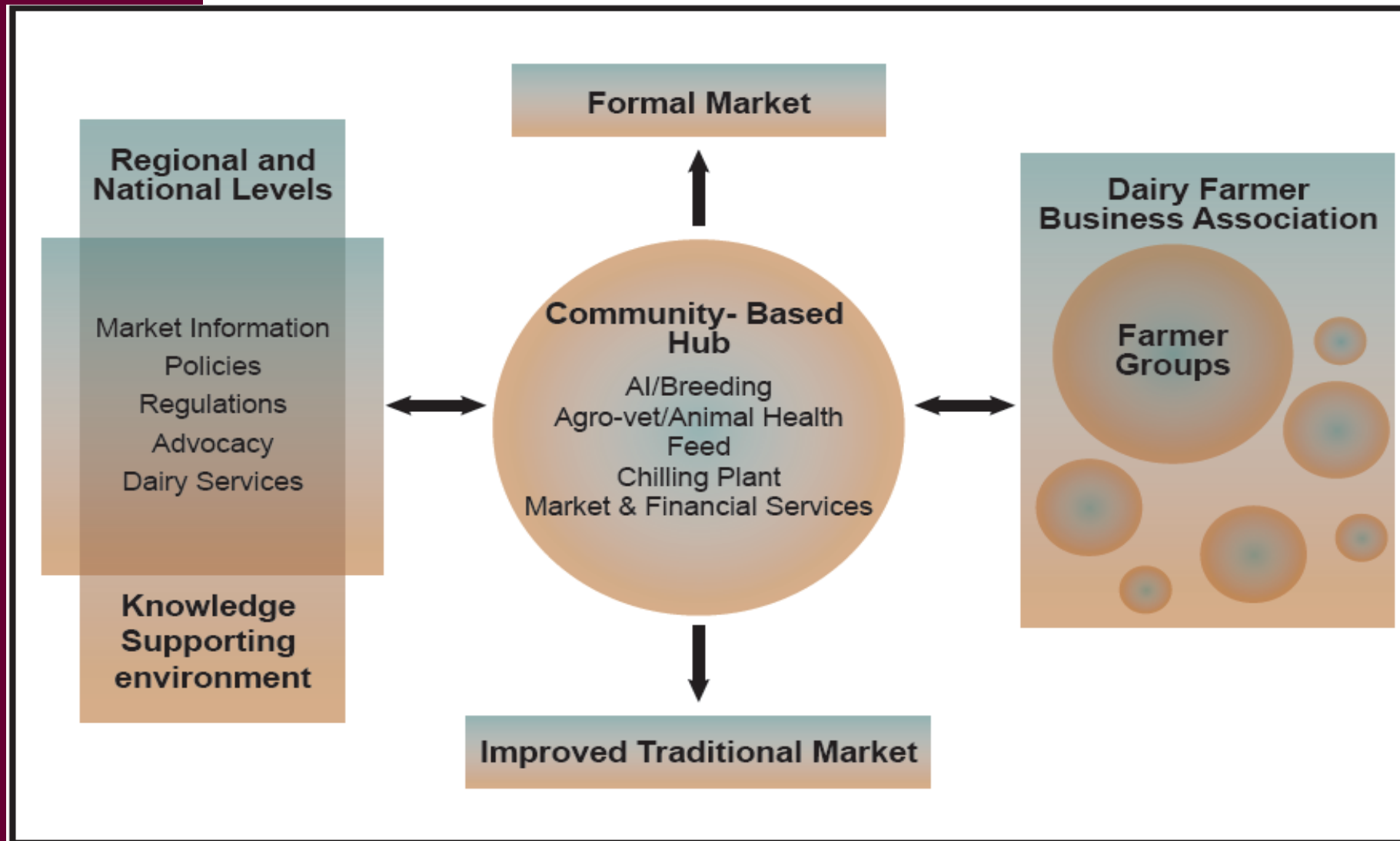
Global Milk Trends 1981-2018 Production



Over the past twenty-five years developing countries contributed nearly three-quarters of global consumption gains for both meat and dairy

.....in dairy 80% of production increase came from smallholders

Smallholder dairy systems – East Africa and South Asia



Smallholder dairy systems – East Africa and South Asia

3. Production efficiency

Feeds (important)
a. Better utilization of dual purpose crops and agricultural by-products
b. high-yielding grasses (Napier, Bracharia spp.
c. formulation and supplementation

Breeding (important)
a. Increase supply of improved animals (potential for strategic application of new technology)
b. Role for private entrepreneurs

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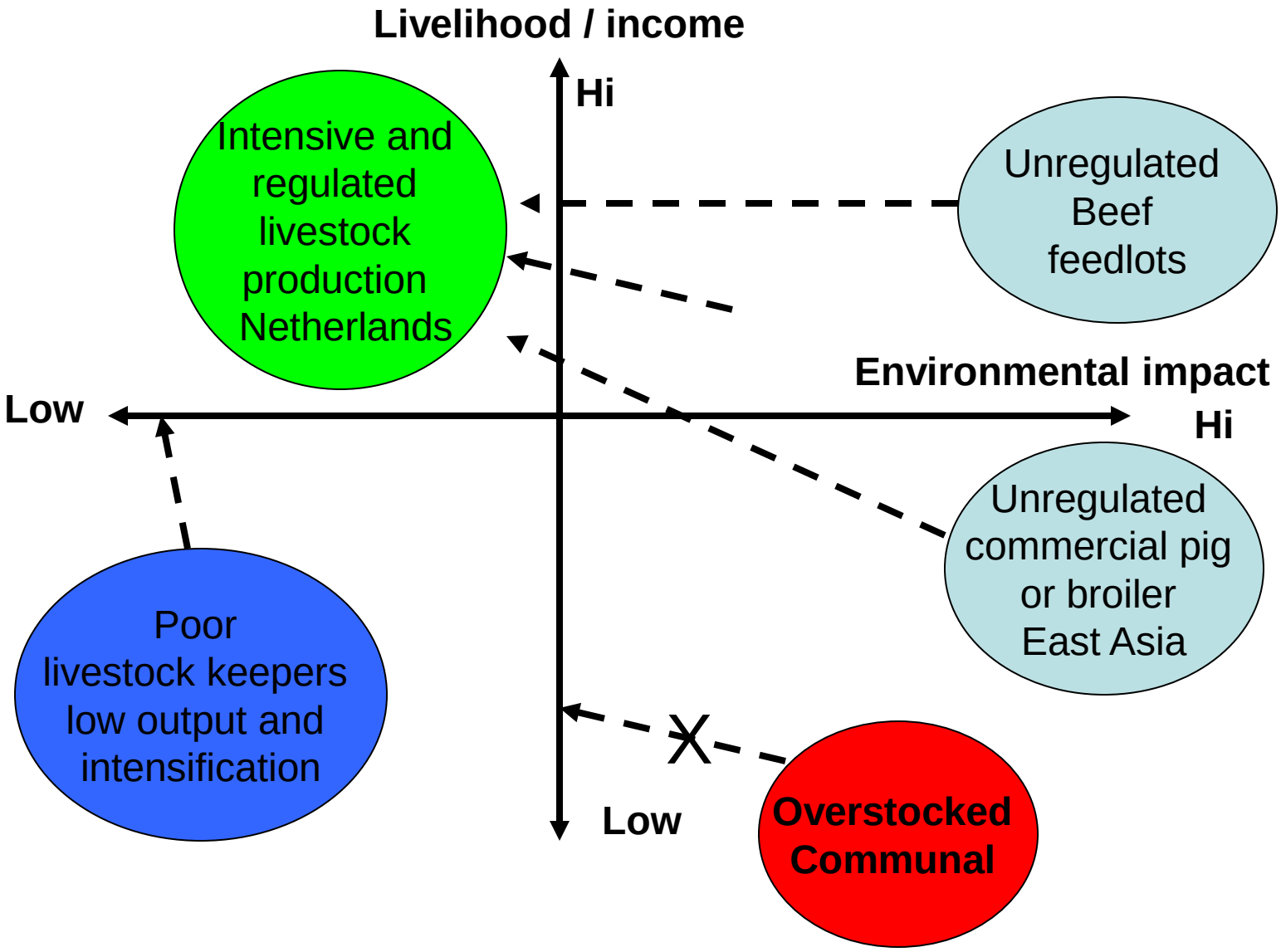
Can livestock be sustainable?



Some key trade-offs

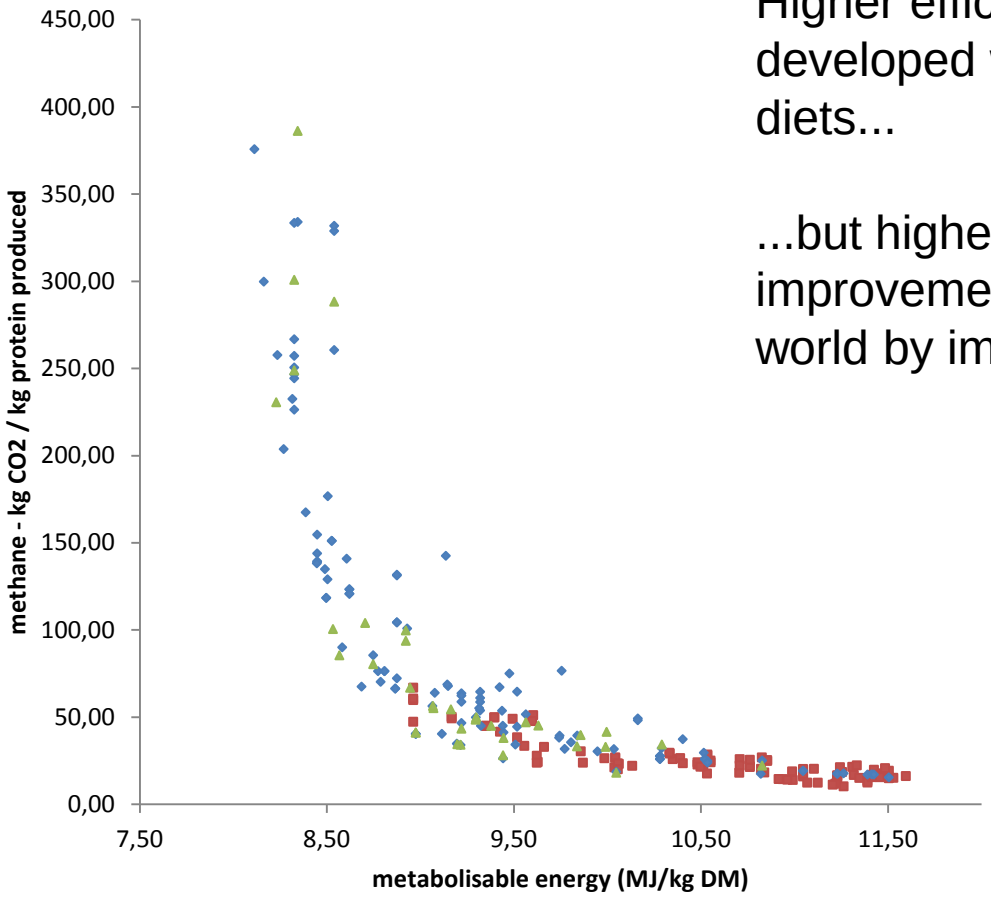
- **Biomass:** food, feed, fuel and conservation agriculture
- **Sustainability** – **socio-economic** versus **environmental** and how are these valued ("multi-value" approach)
- Choices about **where and how** we raise animals
  - Wetter versus drier areas
  - Ruminants versus monogastrics
  - Moving towards moderate intensity systems

Livestock and climate change

- Adaptation and mitigation have to go hand in hand……. to generate win/win solutions, especially for poor countries with low carbon footprints
- Significant adaptation needs as systems change to meet demand for livestock products and/or become more resilient to climate change
- Mitigation options (developing countries):
  - Bridging large production gaps
  - Reduced deforestation: animals from wetter to drier areas
  - Techs – fermentation, many management, ….
  - Incentives >> rules

Herrero et al 2009

Efficiency of GHG emissions per kg of protein produced

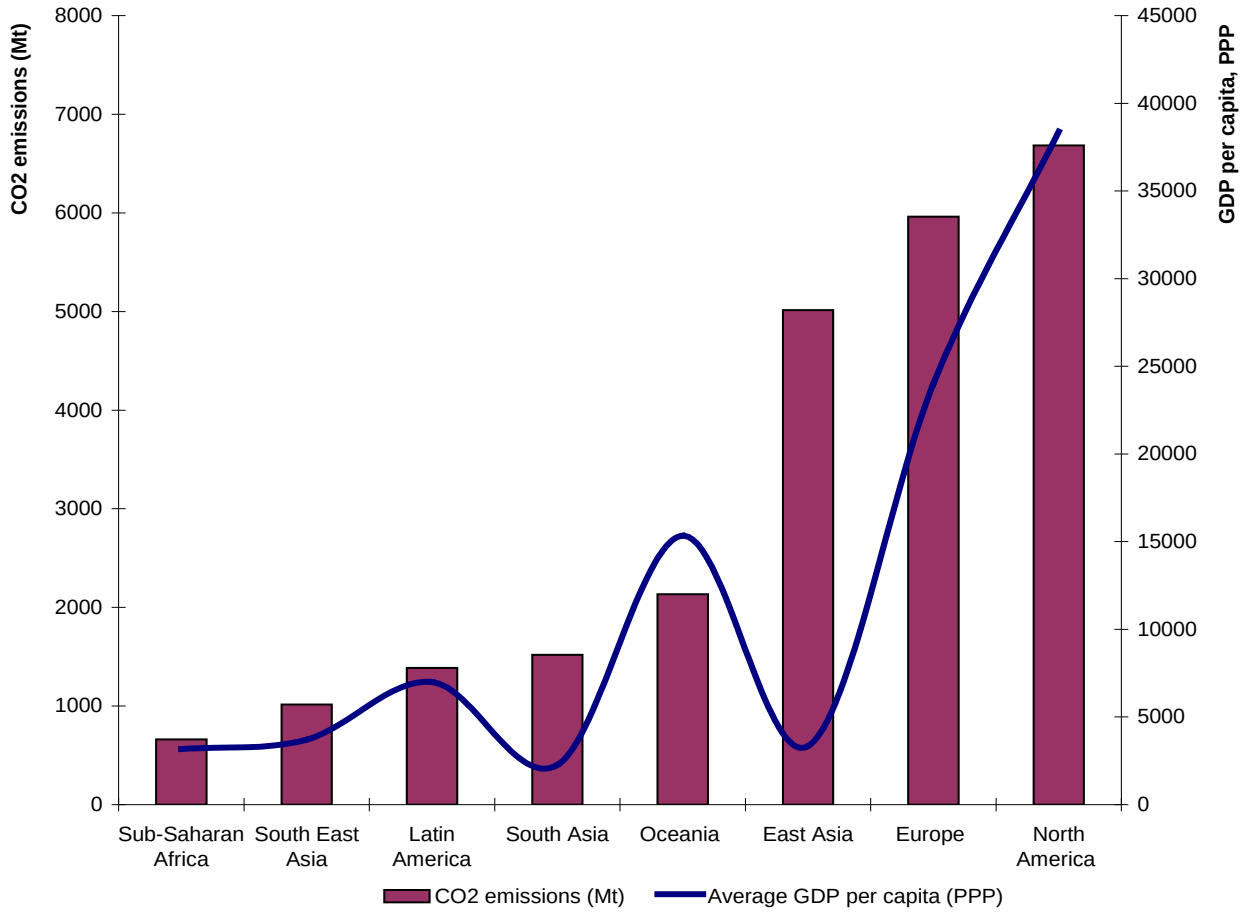


Higher efficiencies in the developed world due to better diets...

...but highest potential for improvement in the developing world by improving diets

Herrero et al. PNAS (forthcoming)

Consumption: the higher the income, the higher the GHG emissions per capita



McDermott et al 2010

What might change in future?

1. Dramatic change in relative prices of grain to meat (ruminants versus monogastrics)
2. Improvements in inputs and arrangements for sustainable intensification of smallholder agriculture to meet demands
3. Better valuation of environmental and / or social (equity) externalities and how to manage these
   - Incentives and rules (poor versus richer countries)
   - Livestock in drier versus wetter areas

International Livestock Research Institute

Better lives through livestock

Animal agriculture to reduce poverty, hunger and environmental degradation in developing countries

www.ilri.org

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