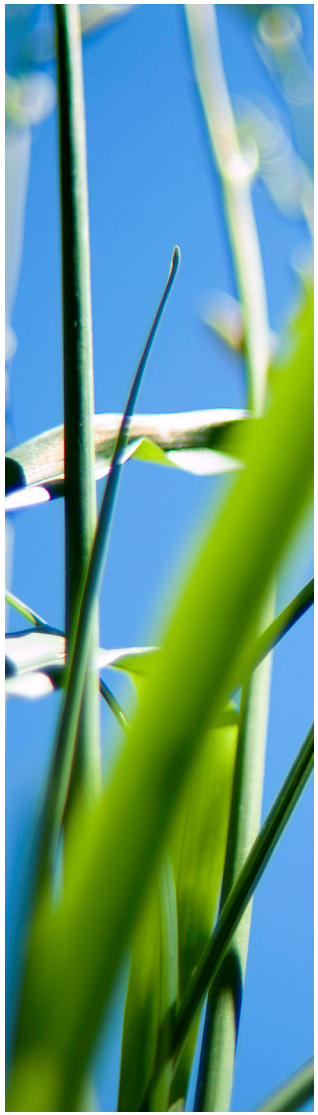
Sustainable Animal Nutrition



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Animal nutrition at a critical junction

Feed Ingredients → **Animal Nutrition** → **Animal products**

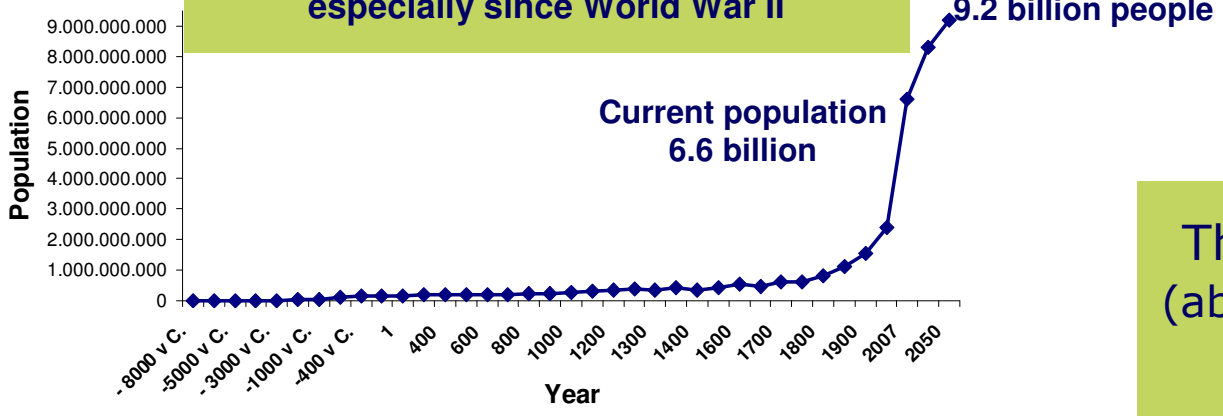
- **Availability**
- **Price & volatility**

- **Increased demands**
  - **Quantity**
  - **Quality**

Animal food chain

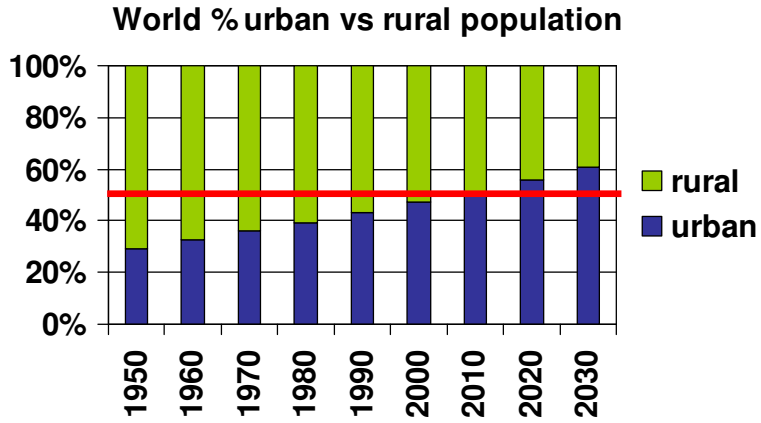
Animal product consumption grows steadily

Astonishing growth of world population especially since World War II

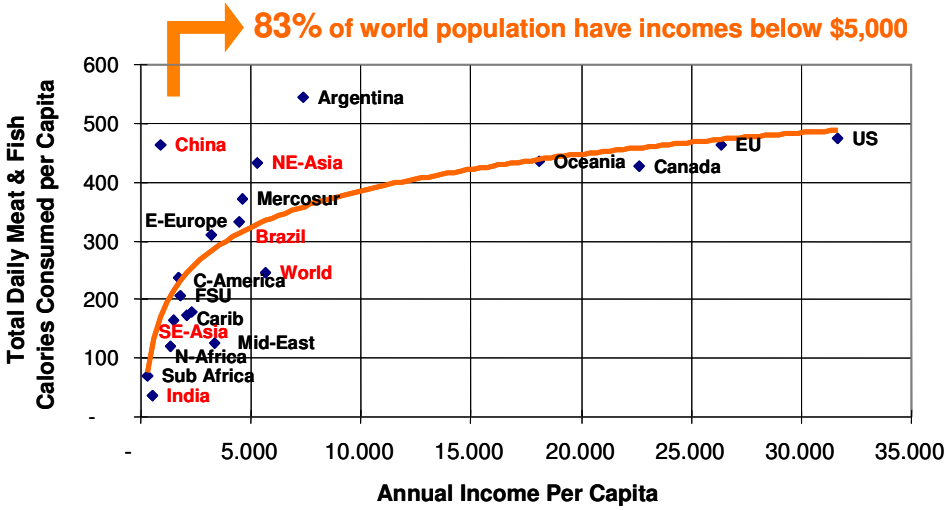


The higher the income (above 2$/day), the more meat consumed

… and half of all people live in cities



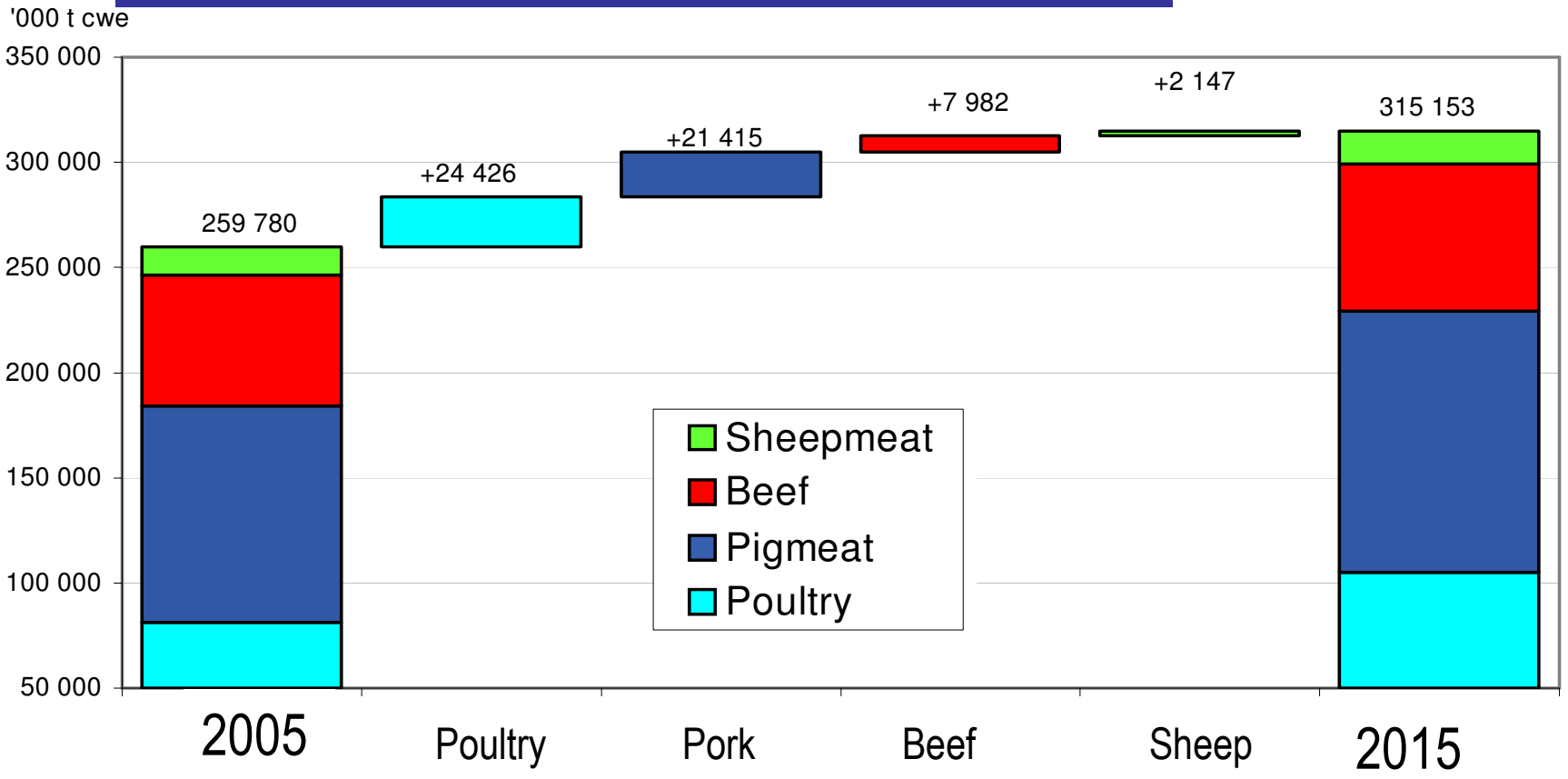
Source: UN World Population Prospects



Source: Bunge at Agri Vision 2005 based on FAO, World Bank

Animal product consumption grows steadily

Expected increase + 20%, mainly poultry & pork
Financial crisis may interfere!



Source: GIRA, 2005

Drivers of commodity prices

Feed Ingredients → **Animal Nutrition** → **Animal products**

- **Availability**
- **Price & volatility**
- Biofuels
- Industrial

Policies

- Trade policy
- Agricultural policy
- Biofuel / energy policy
- Food safety regulations (GMO)
- Sustainability criteria

- **Availability**
- **Price & volatility**

- Agricultural land
- Yield (output/ha)
- Farm management
- Farm input prices
- Weather
- Diseases

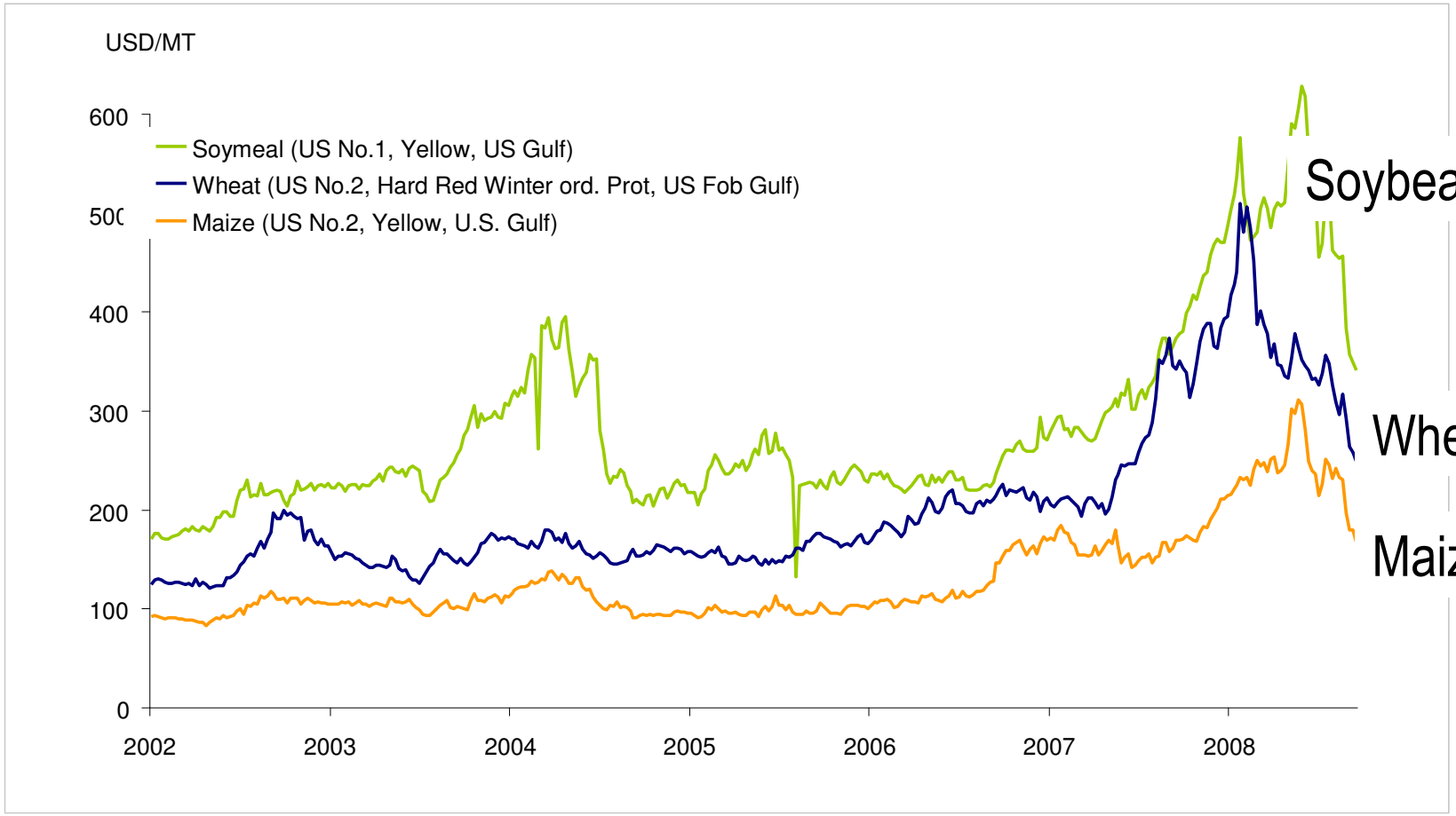
Supply factors

Other

- Fund Activity
- Exchange rates
- Freight rates
- Crude oil prices
- Technical specifications
- Market sentiment & speculation
- New non-agri market entrants

Source: RABO bank 2008

Price & volatility commodities



Source: USDA, 2008

Towards sustainable production…

Feed Ingredients → **Animal Nutrition** → **Animal products**

Other resources

- Land use
- Energy
- Water
- People
- Biodiversity

Government policies

- (Global) trade
- Food Safety

Society

- Consumer concerns
- Animal welfare

Emissions

- Greenhouse gasses
- N, NH3, P, K
- Heavy metals

Balance between:
economy
ecology
society

Industry initiatives

- Management of natural resources
  - Sustainability raw materials

Round Table on Responsible Soy

Aim: set up of multistakeholder and participatory process that promotes economically viable, socially equitable and environmentally sustainable production, processing and trading of soy




The '9 Principles':
- Impact of infrastructure (economy)
- Compliance with labour laws and requirements (social)
- Respect of land rights (social)
- Small scale and traditional land use (social)
- Rural communities and migration (social)
- Water as key resource (environment)
- Soil as key resource (environment)
- Protection of biological diversity (environment)
- Responsible use of agrochemicals (environment)

Towards sustainable production…

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Climate change
Acidification
Eutrification
Odour
…

- Food Safety

Society

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Balance between:
economy
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Livestock's contribution to GHG emissions

- Almost 18% of all GHG emissions is animal food related
- 30% of that is related to intensive systems
  (5.3% of total emissions)

Animal food related GHG emissions

CO_2: 38%
CH_4: 30%
N_2O : 31%

(*) in CO_2 equivalents

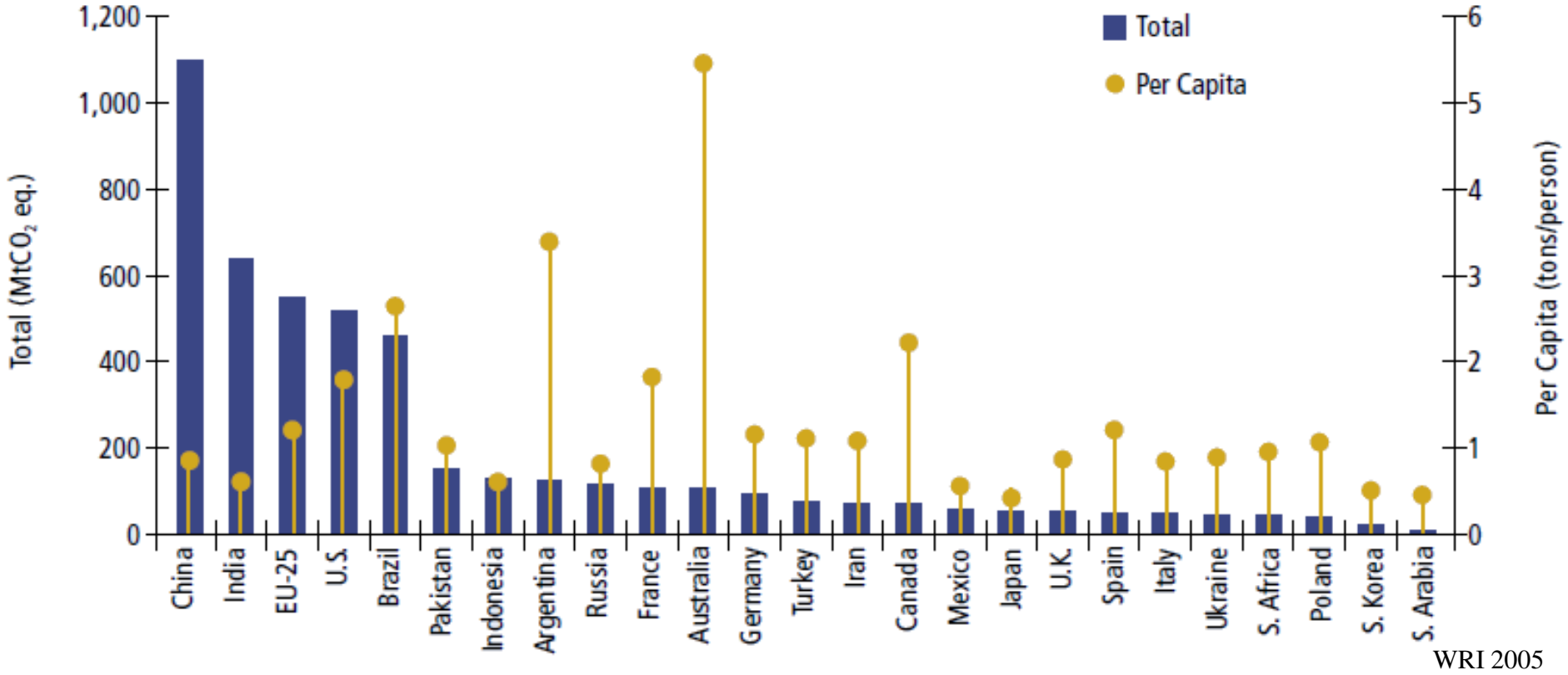
of which 89% related to deforestation
82% enteric fermentation
80% related to manure

Source: Livestock's long shadow (FAO, 2006)

Global warming potential

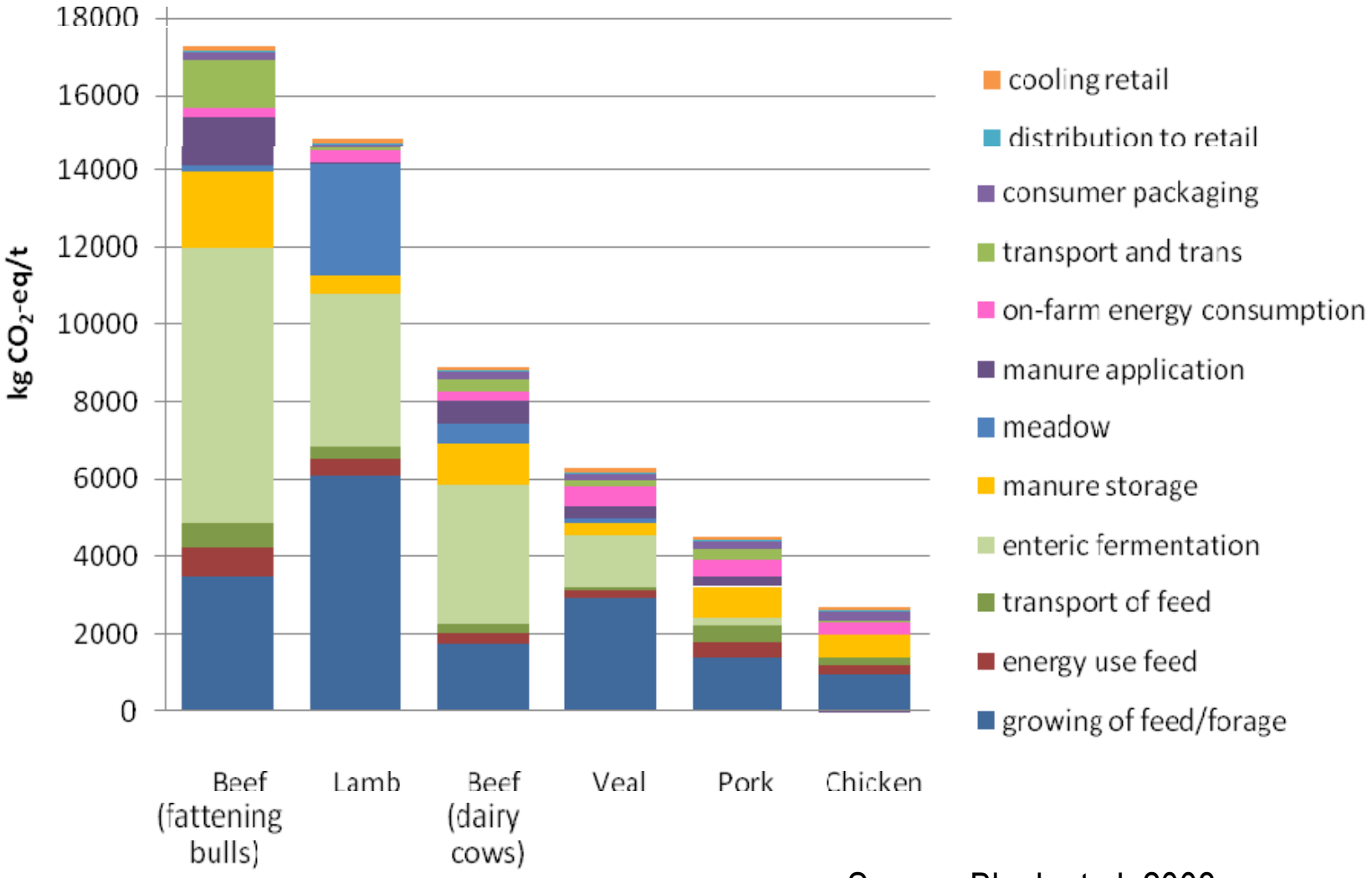
CO_2: 1
CH_4: 23
N_2O: 296

Agricultural GHG emissions by country



WRI 2005

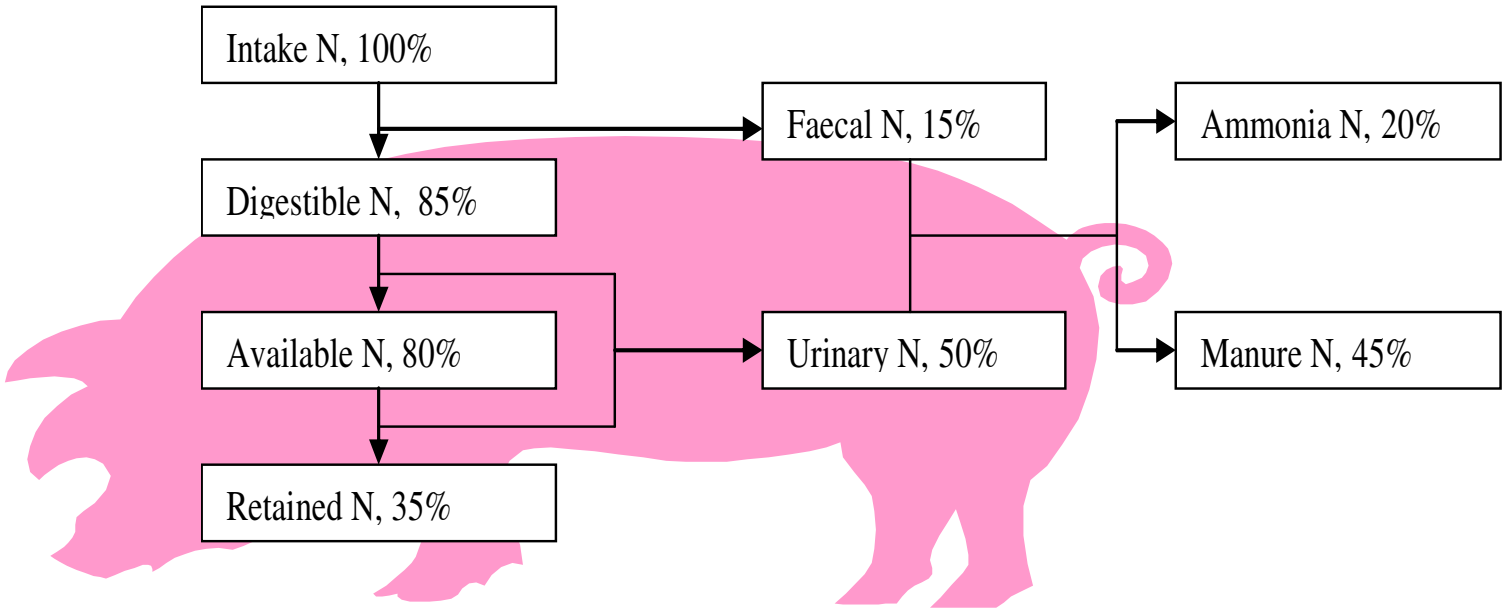
Sources of GHG emissions for several meat products in the Netherlands



Source: Blonk et al, 2008

Present nutrient efficiency apparently low

Nitrogen flow in pigs



Source: Ferket et al, 2002

Strategies to reduce nutrient excretion & emission

- Improving feed efficiency

Lower FCR

- 0.1 reduction → 3% less nutrient excretion

Strategies to reduce nutrient excretion & emission

- Meeting nutrient requirements

Avoiding excesses

- 0.5% reduction crude protein → 4% less N excretion

Lowering crude protein levels + addition synthetic amino acids

(Multi) phase feeding

- From one to two phases → 5% less N and P excretion
- From one to three phases →10% less N and P excretion

Separate-sex feeding

- 3% less N and P excretion

Strategies to reduce nutrient excretion & emission

- Using modern feed formulation techniques
  - Modern feed material tables
  - Formulation on basis of digestible nutrients
  - Managing feed material variability

for valuable feeding values

Strategies to reduce nutrient excretion & emission

- Improving nutrient digestibility and availability
  - Feed manufacturing technology
  - Choice of feed materials
  - Feed additives
    - Feed enzymes
    - Organic acids
    - Organic trace elements
    - Dietary stabilizers of enteric microflora
  - Plant breeding

Strategies to reduce nutrient excretion & emission

- Minimizing gaseous losses

Minimizing odour emission

- Reduction of non-digestible proteins
  - 1% CP reduction → 25% less odour compounds
- Avoiding excess sulphur in diet

Minimizing ammonia emission

- Lowering ureum level in urine
  - Lower crude protein levels in diet
  - Shift N-excretion from urine to faeces by increasing fermentable carbohydrates in diet
- Lowering of pH in urine / manure
  - Acidifying salts/acids in diet

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Balance between:
economy
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Why is food safety important?

- Incident statistics confirm necessity to stay alert

EU Rapid Alert System Food & Feed (EU-Commission, 2008)

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Number of notifications	360	473	708	1526	2310	2589	3158	2874	2925	3316
Feed %					3.1	2.5	3.0	4.4	5.6	6.8

- Incident costs are incredibly high

Food-Feed EU27 2007	Estimated costs (OECD, 2007) **EUR 650-1.000 million**

Direct costs, excluding reputation damage, loss market share,...

- Consumer confidence still fragile
- Media attention remains at high level

Food safety again top of mind

CIES Top of Mind Survey

- Decision makers in retail and consumer good industries
- Worldwide

Food safety

Year	Ranking
2009	2
2008	2
2007	8
2006	6
2005	7
2004	4
2003	2
2002	2
2001	2

	Ranking	
	2009	2008
Economy & consumer demand	1	4
Food safety	**2**	**2**
Corporate responsibility	3	1
Competitive landscape	4	9
Retailer – supplier relationship	5	5
Retail / brand offer	5	8
Consumer health & nutrition	7	3
Consumer marketing	8	11
Technology & supply chain	9	7
Human resources	10	6
Internationalisation	11	10
Regulations	12	12

Conclusion:
a change in business model is required

Old model	Maximize productivity	Food security Productivity & Rationalisation
Present model	Optimize profitability	Efficiency
New model	Optimize sustainable profitability	*Balance: economy, ecology & society* Efficiency Environmental responsibility Social responsibility Food safety & Food quality Consumer concerns