

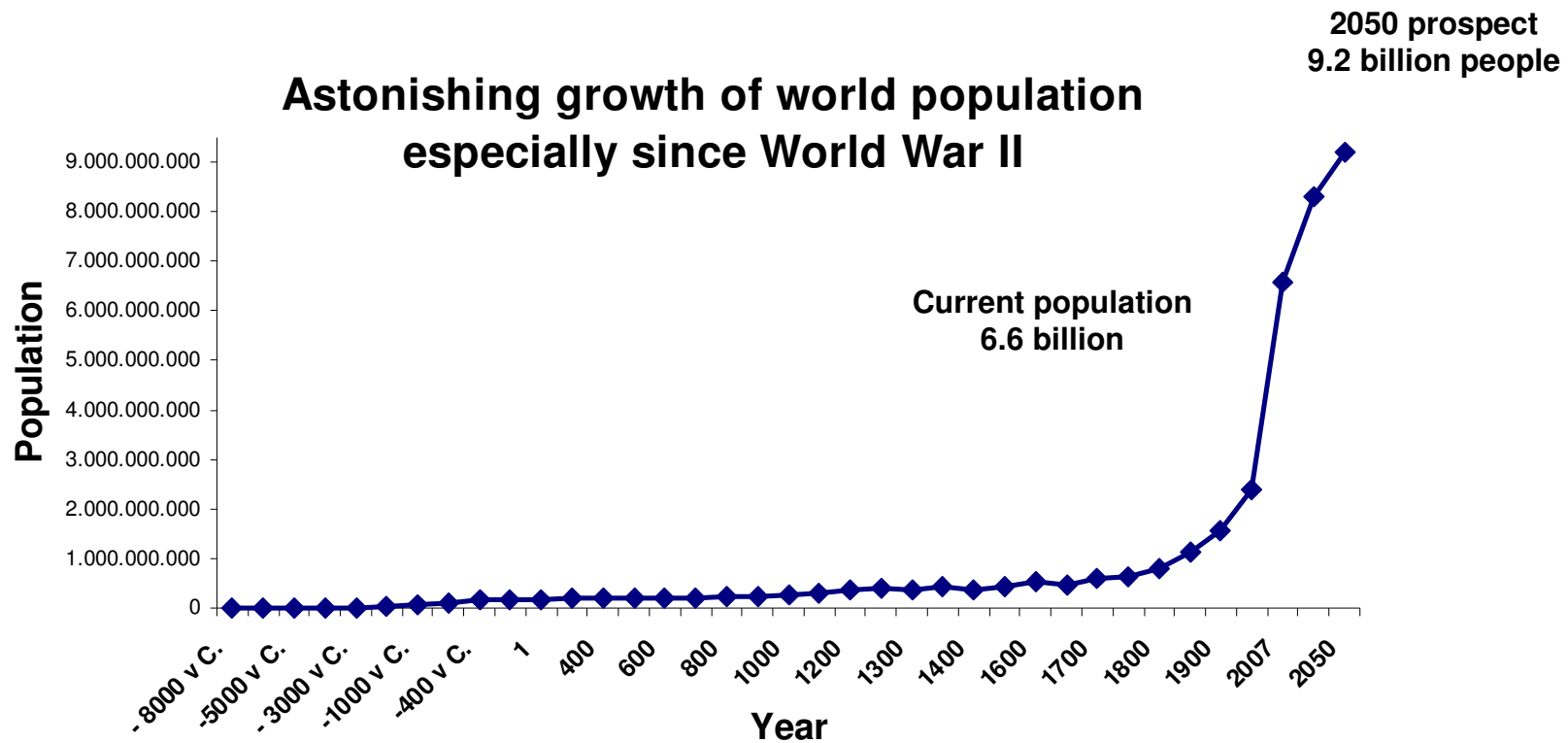


Sustainability challenges in the feed and aquaculture

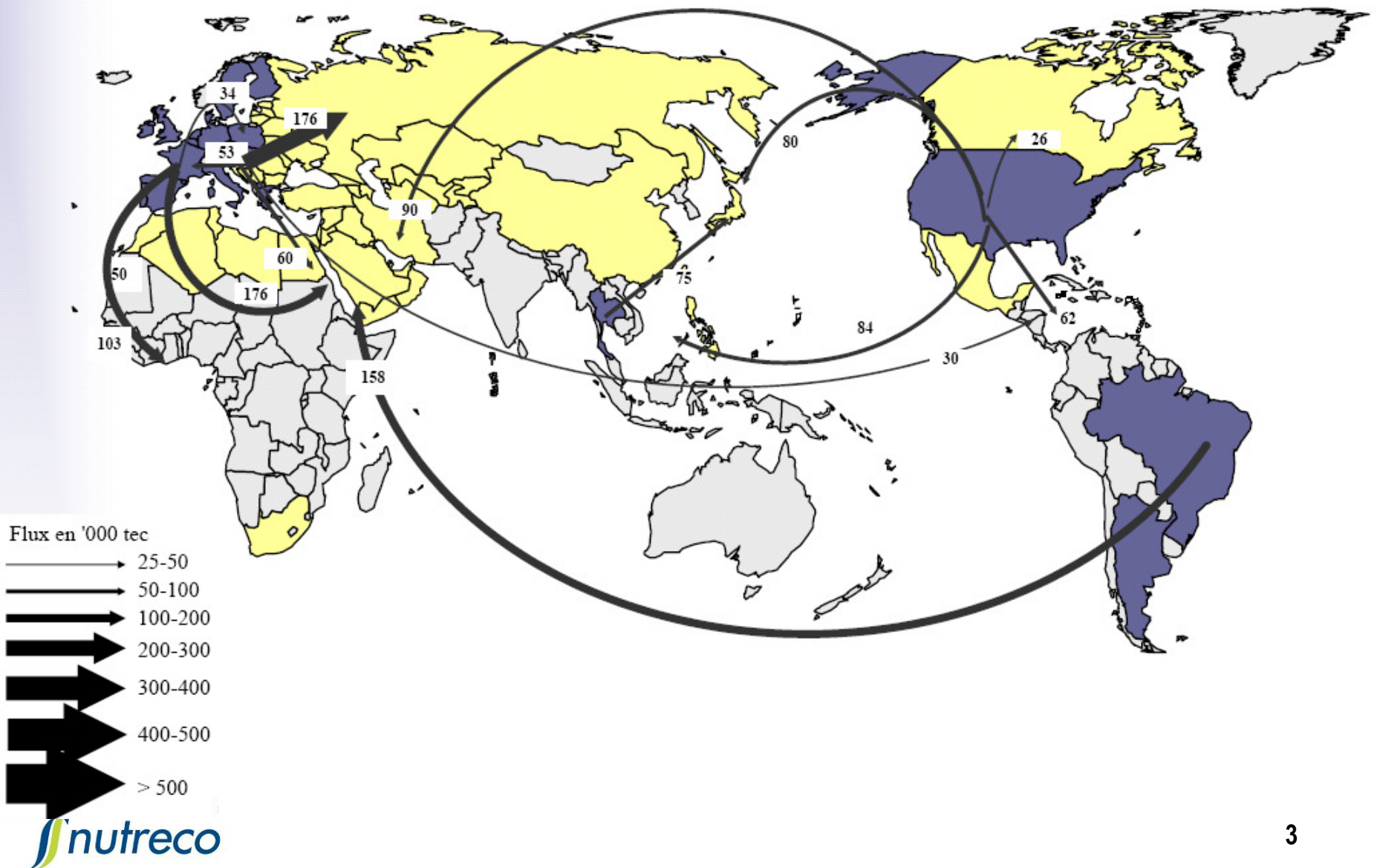
Leo den Hartog

Nutreco R&D and Quality Affairs
Wageningen University

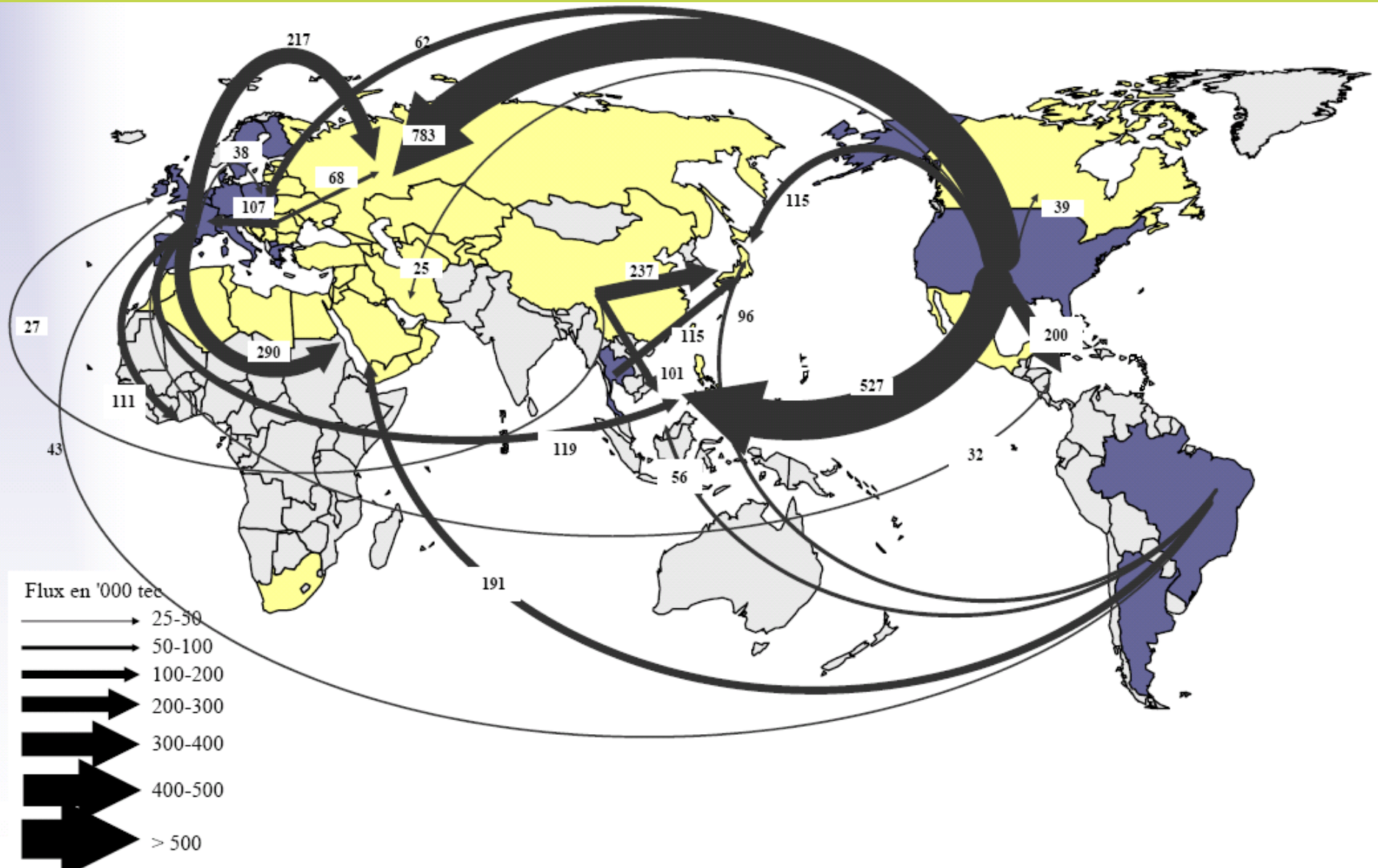
Global population developments...



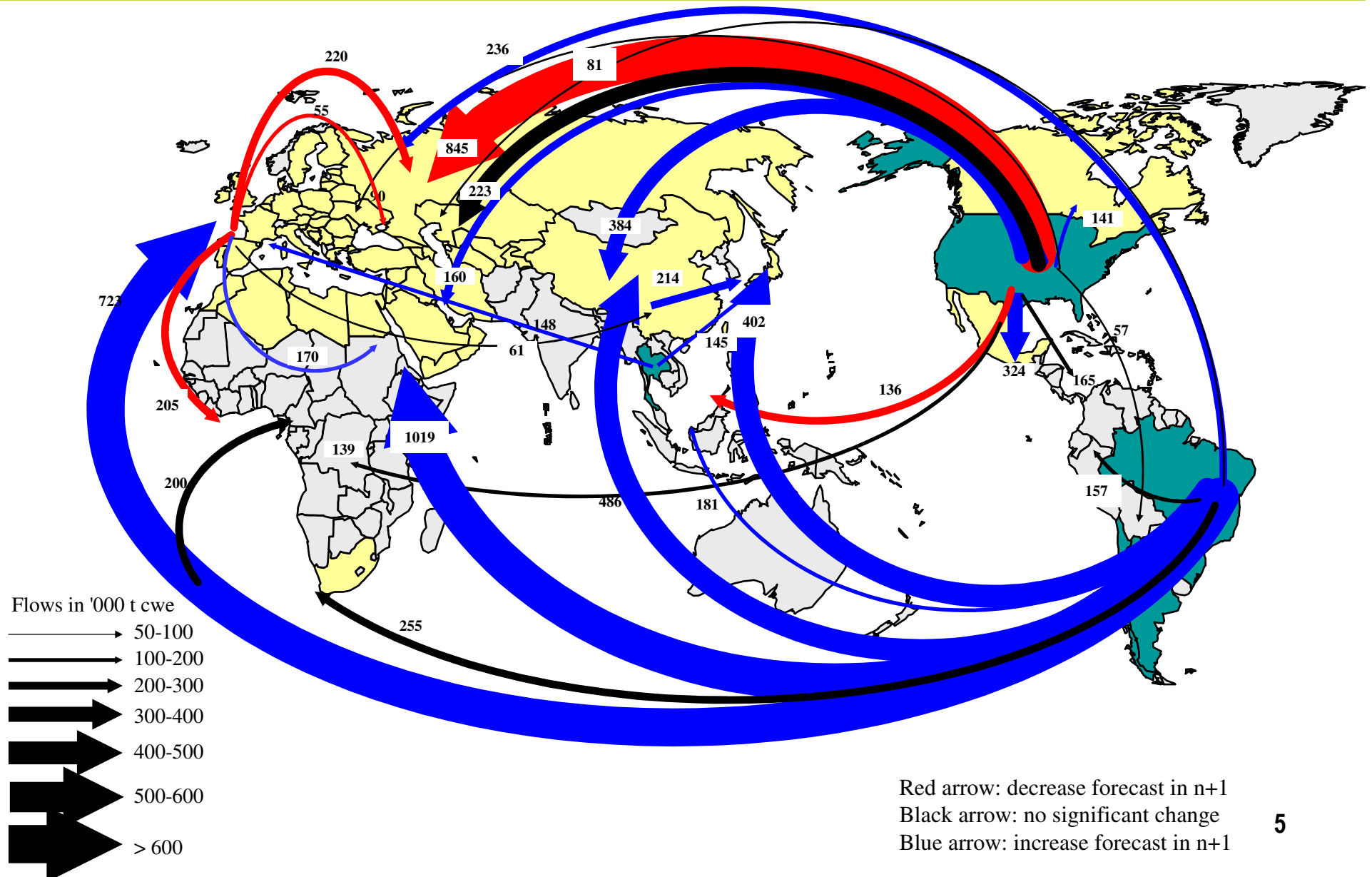
Poultry meat Trade Flows, 1987



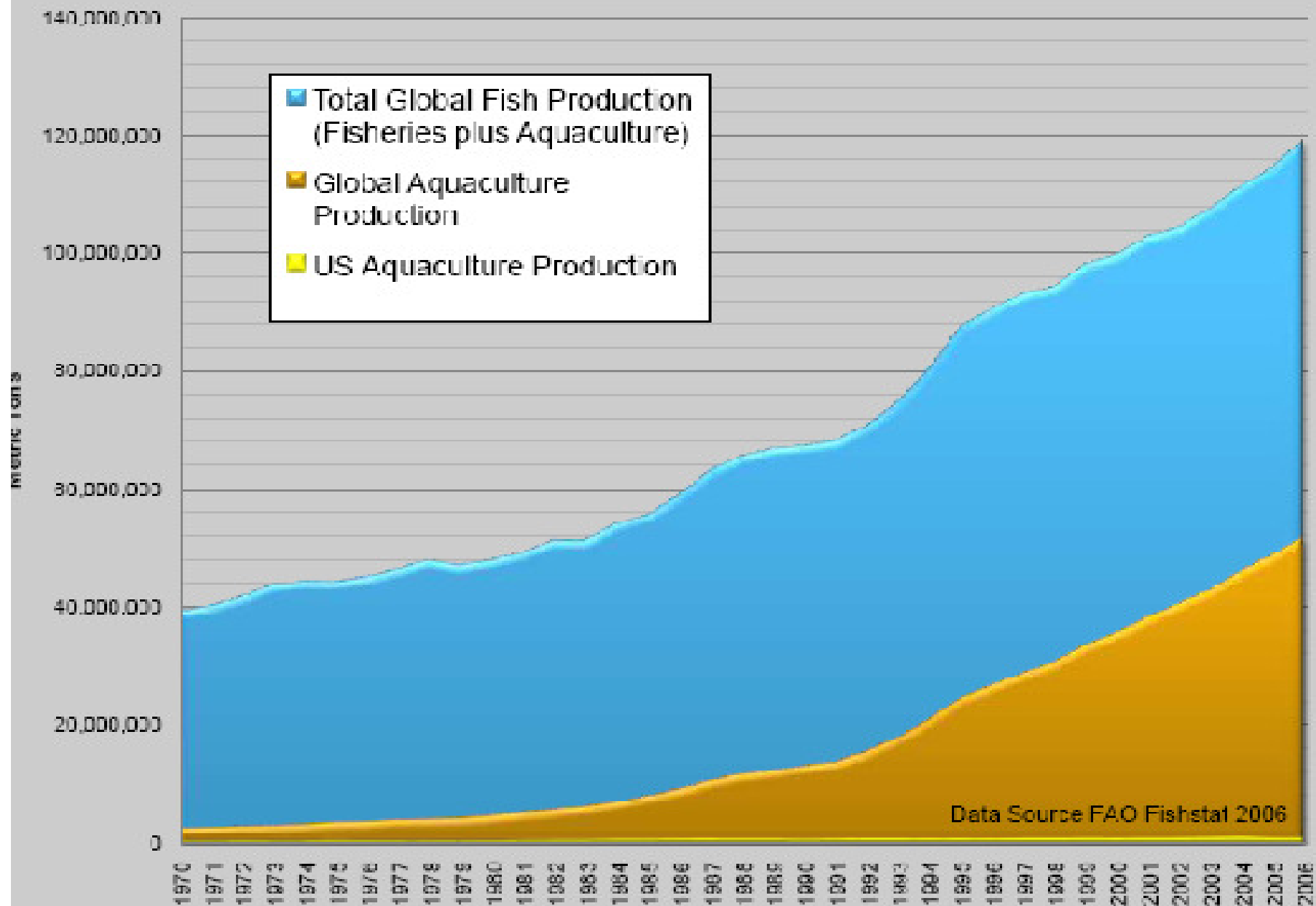
Poultry meat Trade Flows, 1995

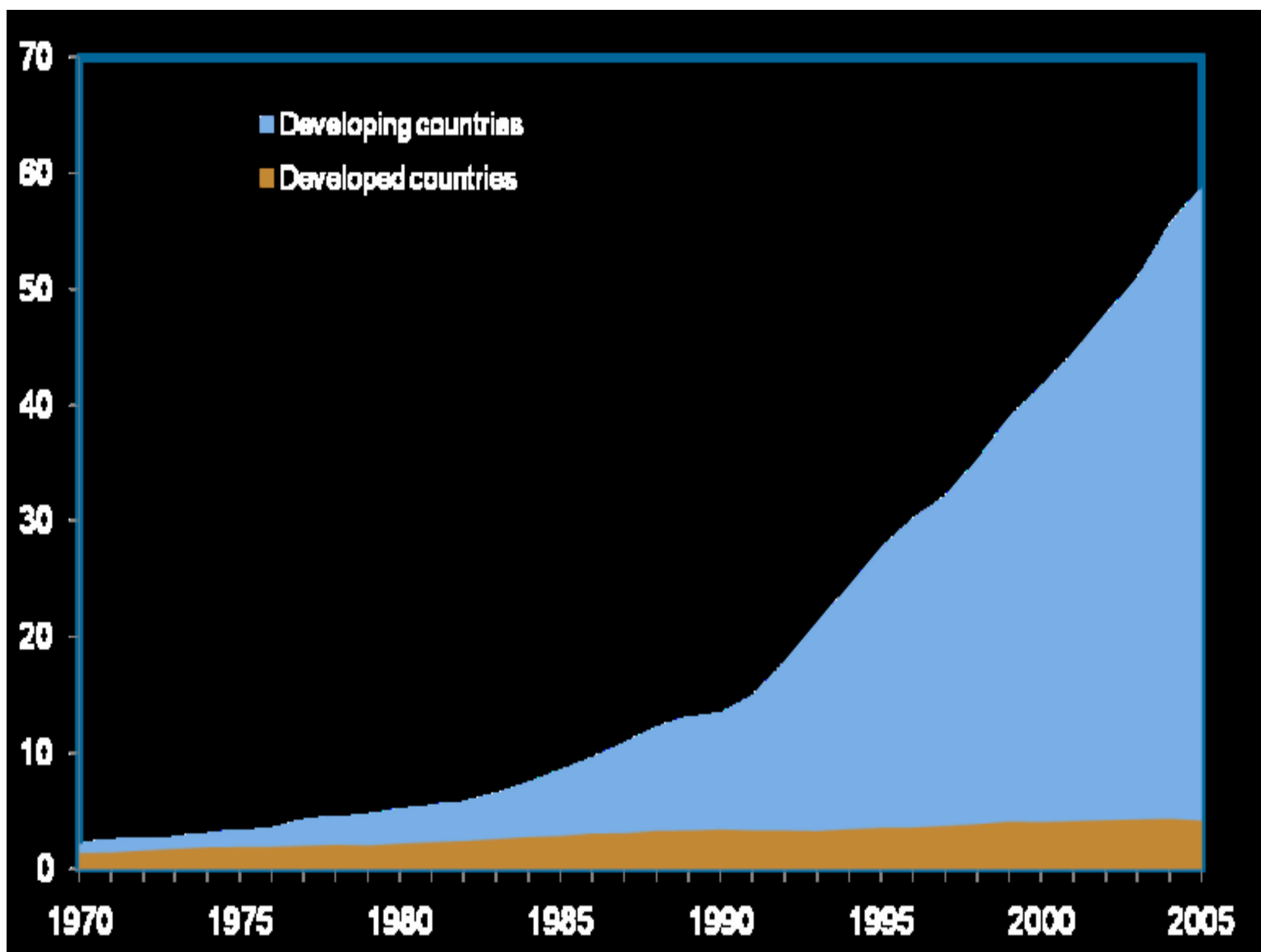


Poultry meat Trade Flows, 2007

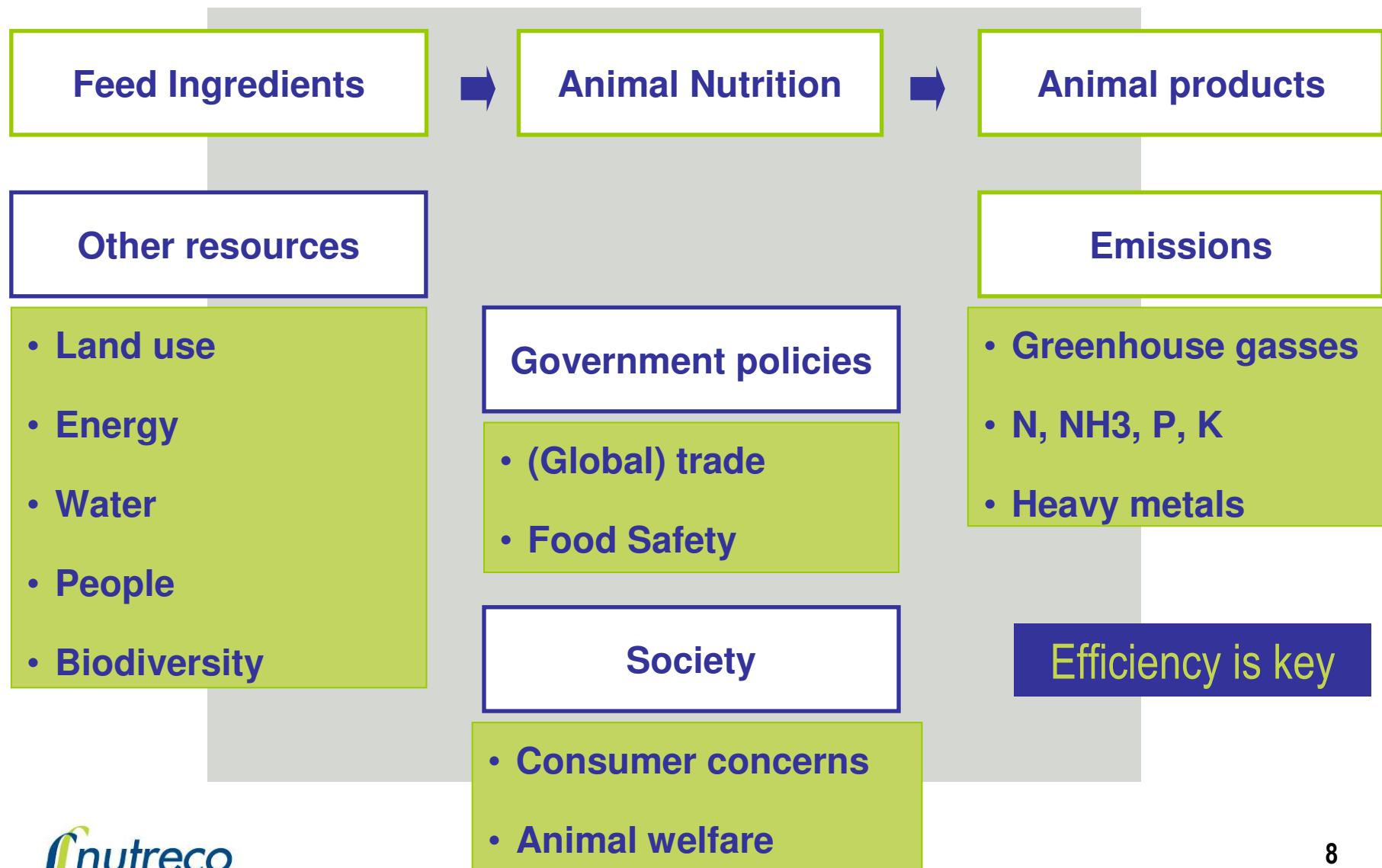


Almost half of seafood is produced on a farm





Animal nutrition at a critical junction



Industry initiatives

- v Management of natural resources
 - v Sustainability raw materials

Round Table on Responsible Soy

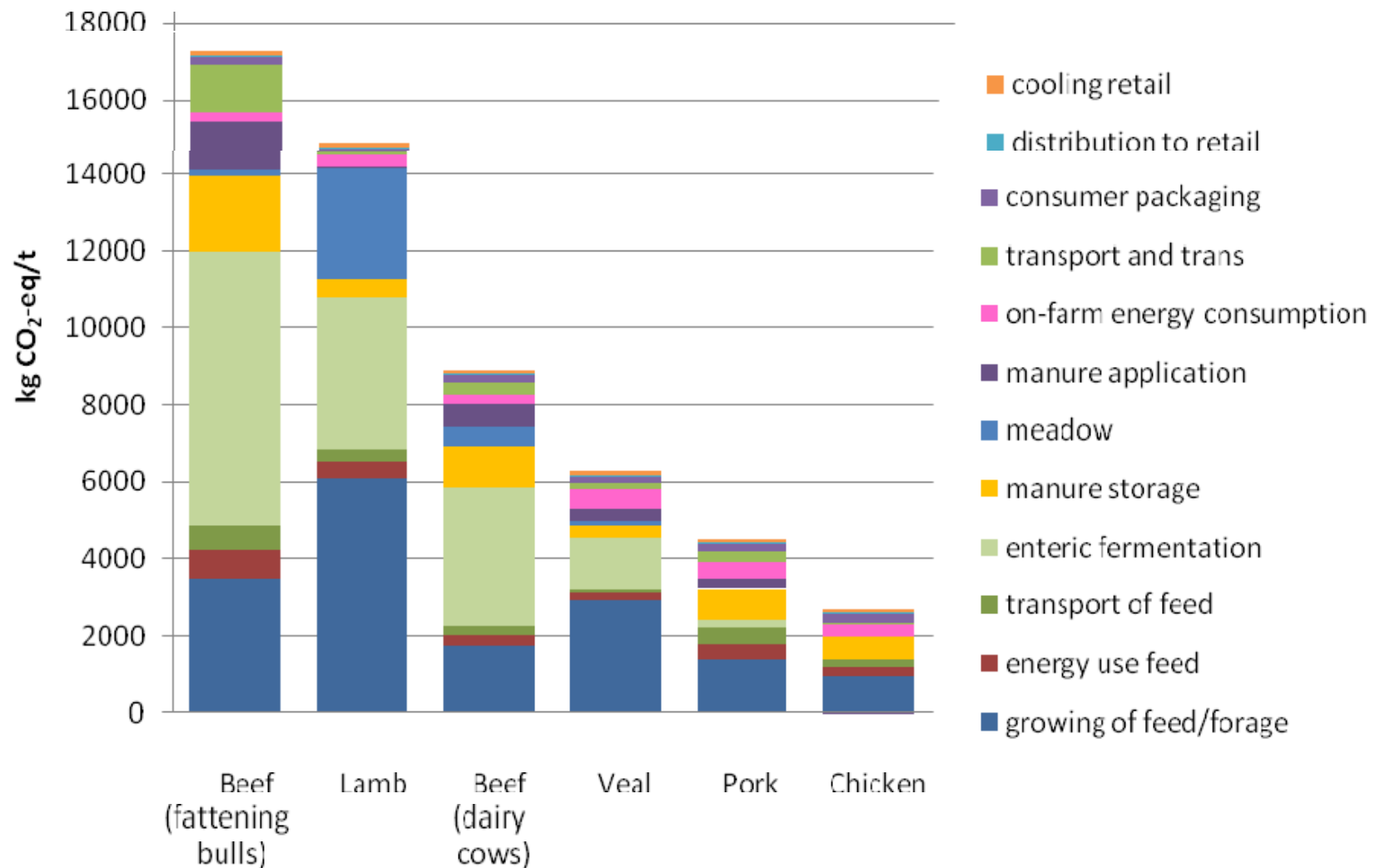
Aim: set up of multistakeholder and participatory process that promotes economically viable, socially equitable and environmentally sustainable production, processing and trading of soy



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)

Sources of GHG emissions for several meat products in the Netherlands



Source: Blonk et al, 2008

Sustainability profile of feed ingredients

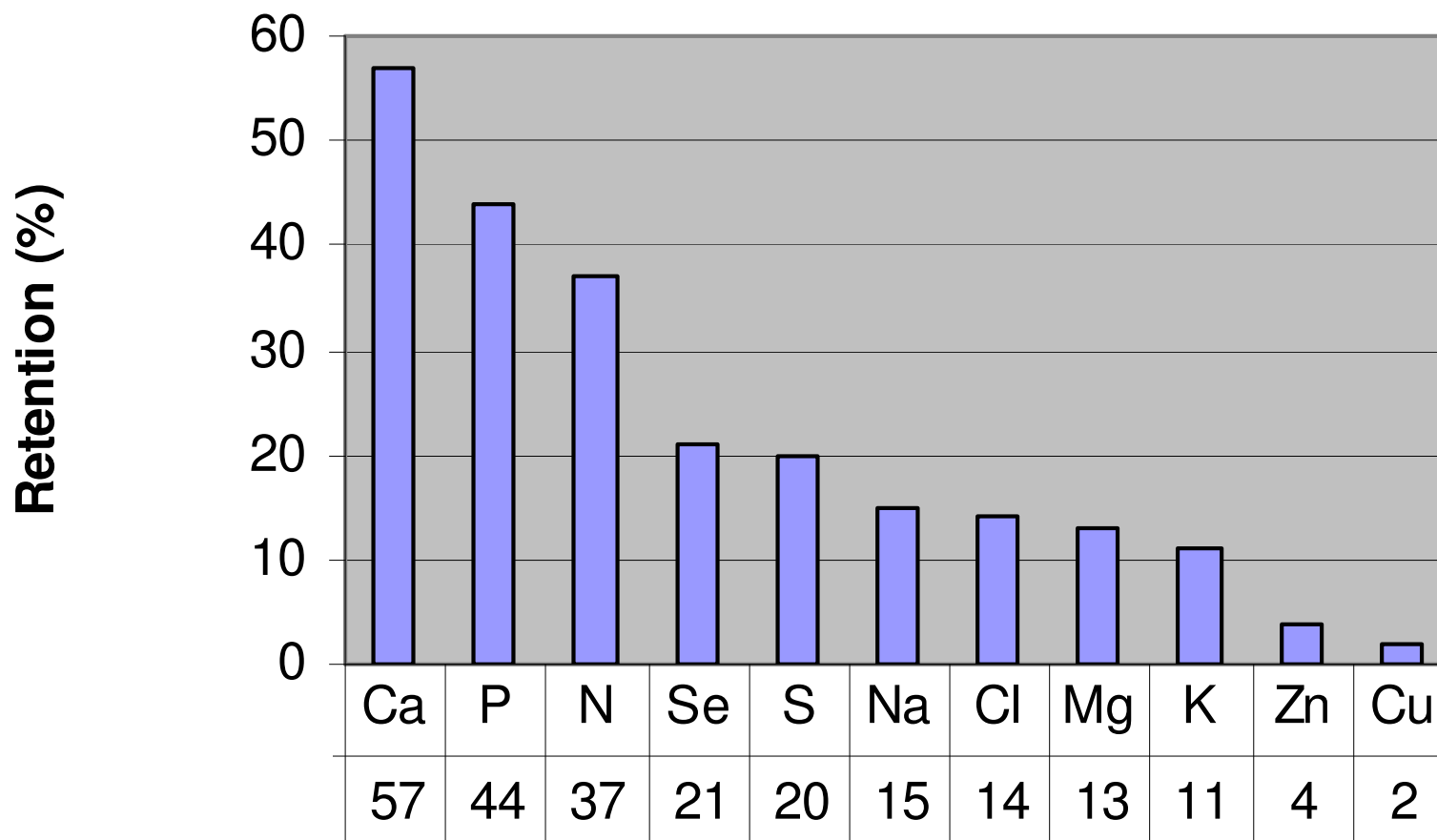
	CO₂ footprint	Energy use	Land use
	CO ₂ eq/ton	MJ/ton	M ² /ton
Maize	392	2252	1136
Wheat	368	1885	1120
Tapioca	308	2493	1333
Soybean meal	757	5728	2901
Corngluten feed(US)	1069	10541	1602
Beetpulp	62	939	46
Palm oil (crude)	1401	2367	1911

Examples for compound feed production in the Netherlands

Methodology needs standardisation !

PAS2050 and ISO14040/44 (CLA's) probably best candidates

Retention efficiency in fattening pigs



Strategies to reduce nutrient excretion & emission

v Improving feed efficiency

Lower FCR

- 0.1 reduction → 3% less nutrient excretion

Strategies to reduce nutrient excretion & emission

v 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

v 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

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	Estimated costs (OECD, 2007)
EU27 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

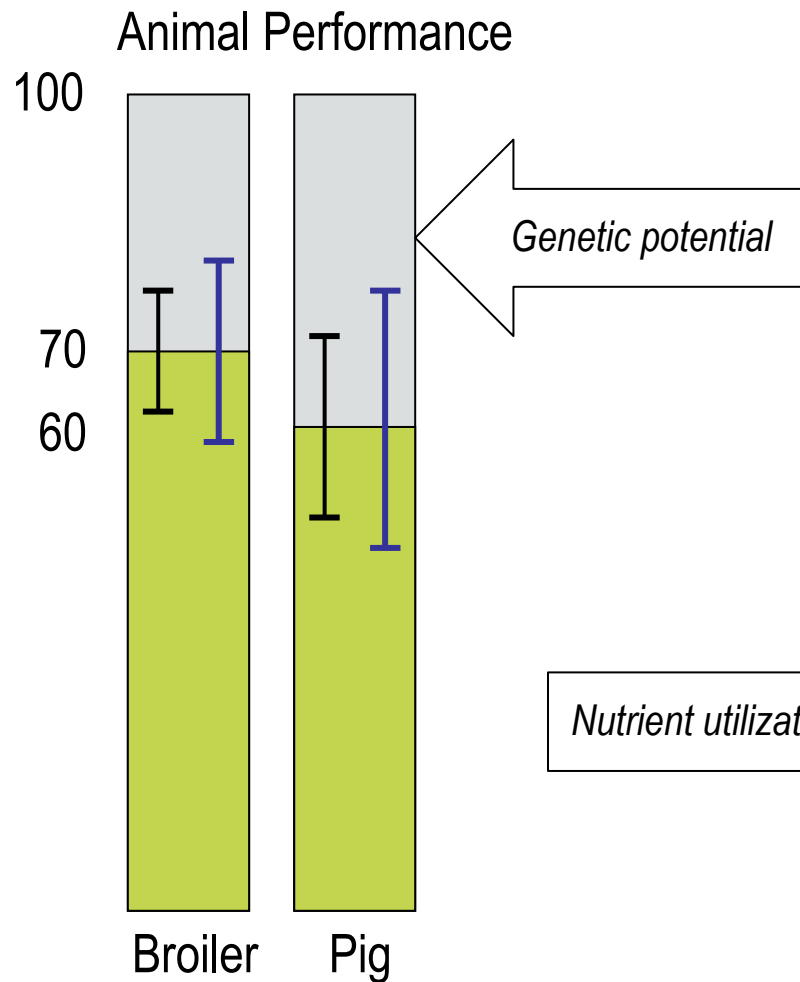
Food safety



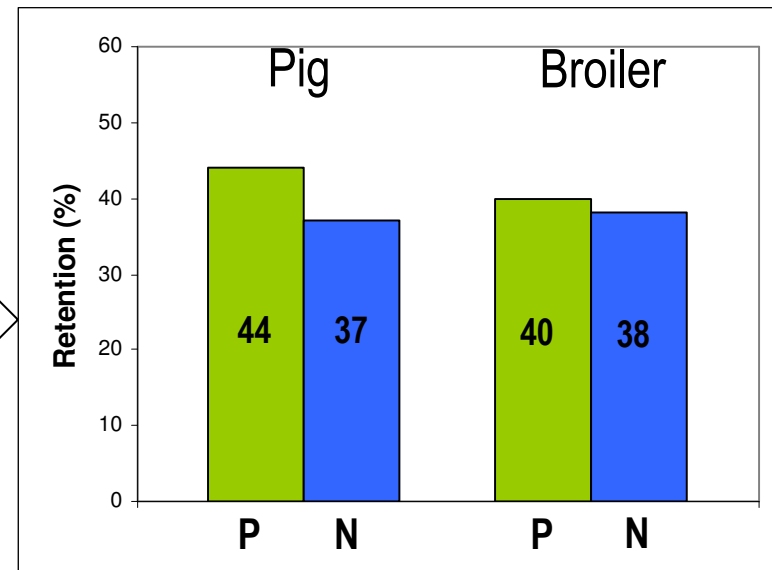
Year	Ranking
2009	2
2008	2
2007	8
2006	6
2005	7
2004	4
2003	2
2002	2
2001	2

	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

Optimizing productivity potentially possible



- Genetic potential only partly utilized
- Huge variation among farms / animals
- Nutrient utilization still low



Source: Nutreco, 2009 Compilation of data

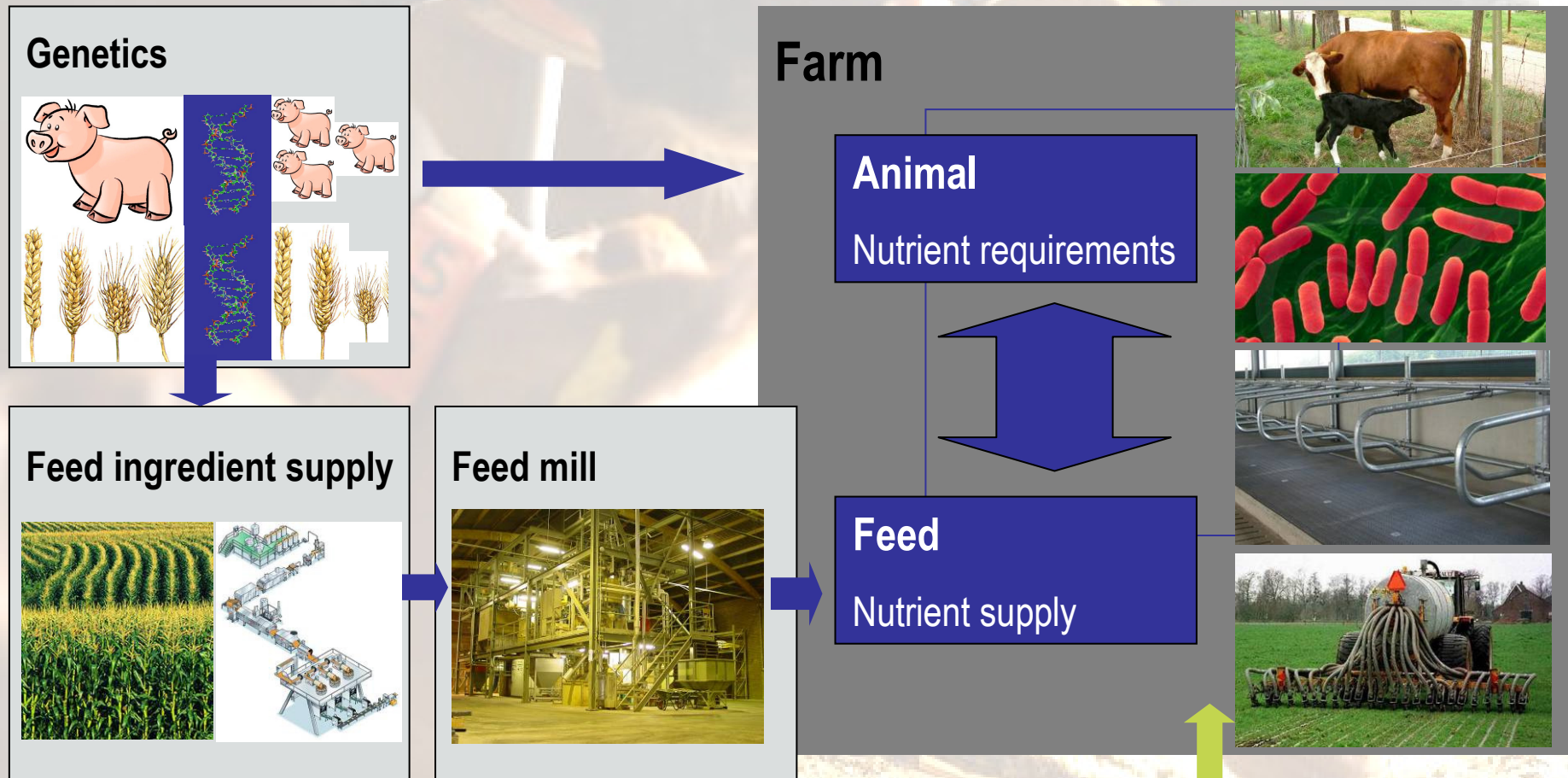
Variation between farms

Digestibility of organic matter on 14 different pig farms

Body weight		Digestibility
40 kg	⇒	77 – 84 %
70 kg	⇒	78 – 86 %



Optimizing productivity: balancing nutrient supply and nutrient requirement



Housing systems

Backyard



VS.

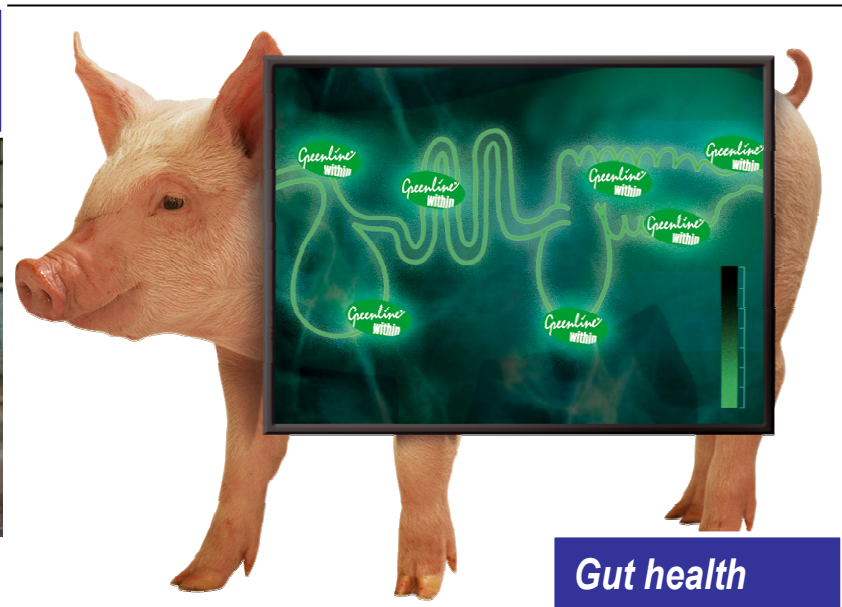


Modern farming

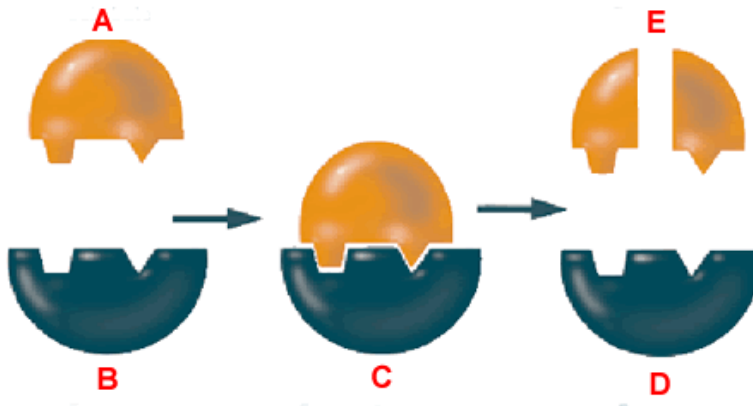
Innovation areas in animal nutrition



Fermentation technology



Gut health



Enzyme treatment

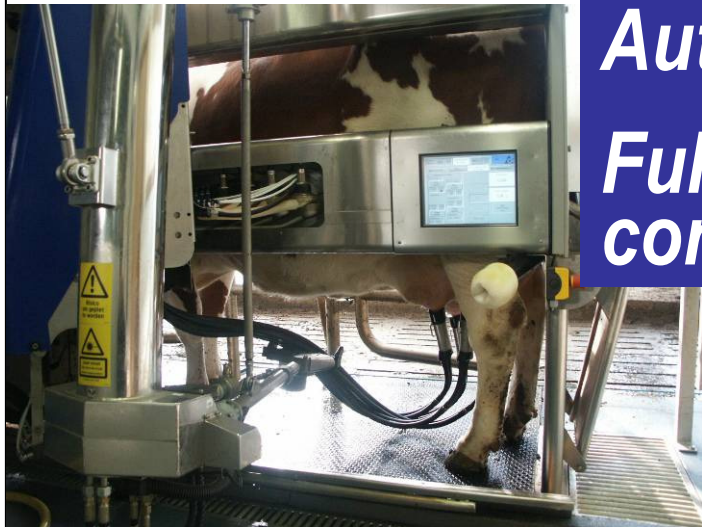
Near Infra-red Reflectance Spectroscopy



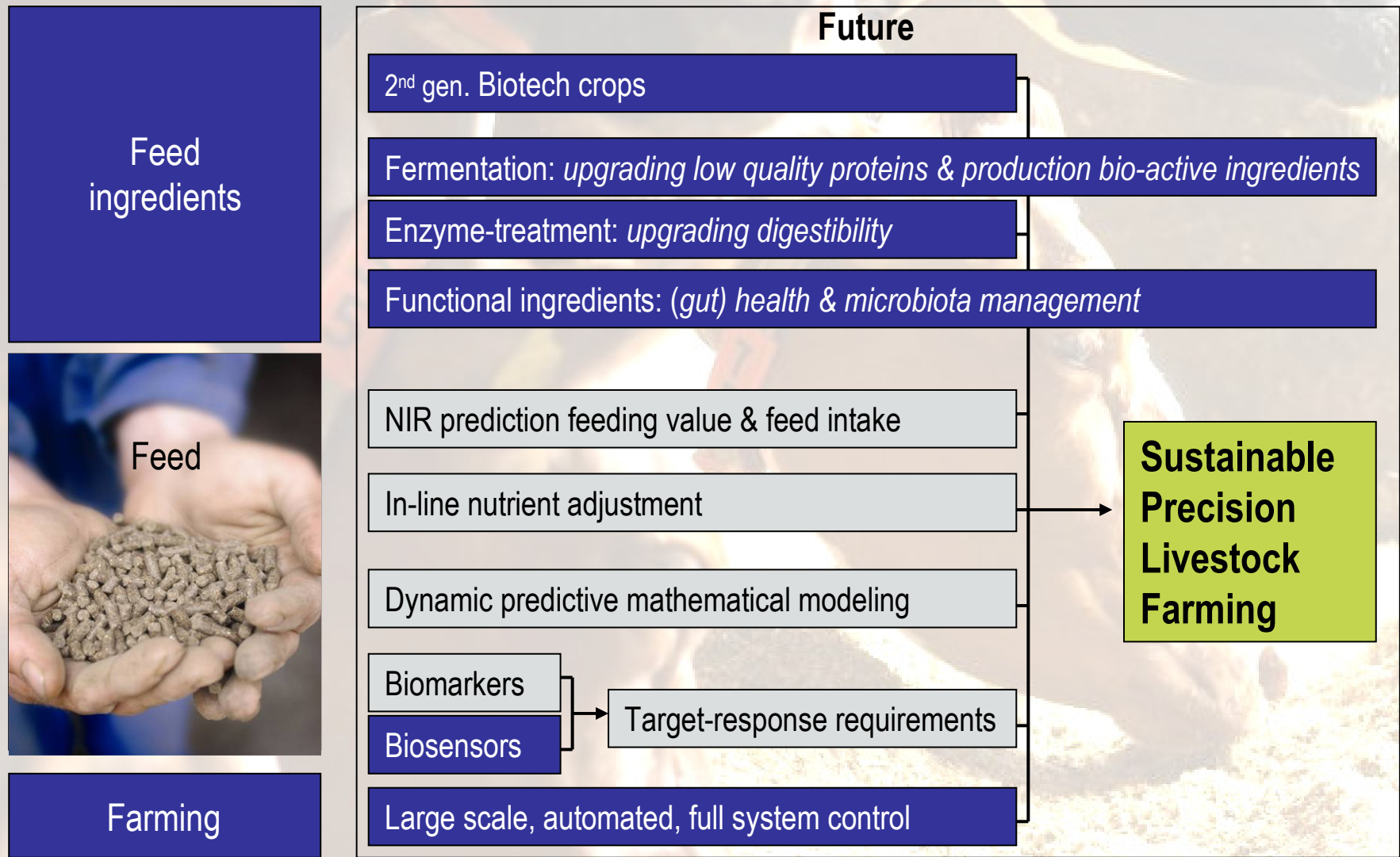
Future farming



**Large scale
Automated
Full system
control**



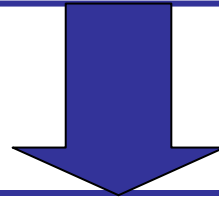
Towards Sustainable Precision Livestock Farming



Conclusions

Closing the gap in Animal Nutrition and Farming:

On average worldwide the productivity of farm animals is **30-40% below** their **genetic potential** because of suboptimal conditions and health status



Sustainable Precision Livestock Farming based on **nutri-genomics, full system control** and **farm automation**

Conclusion: a change in business model is required

