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Drivers for changes in land use, management and technologies

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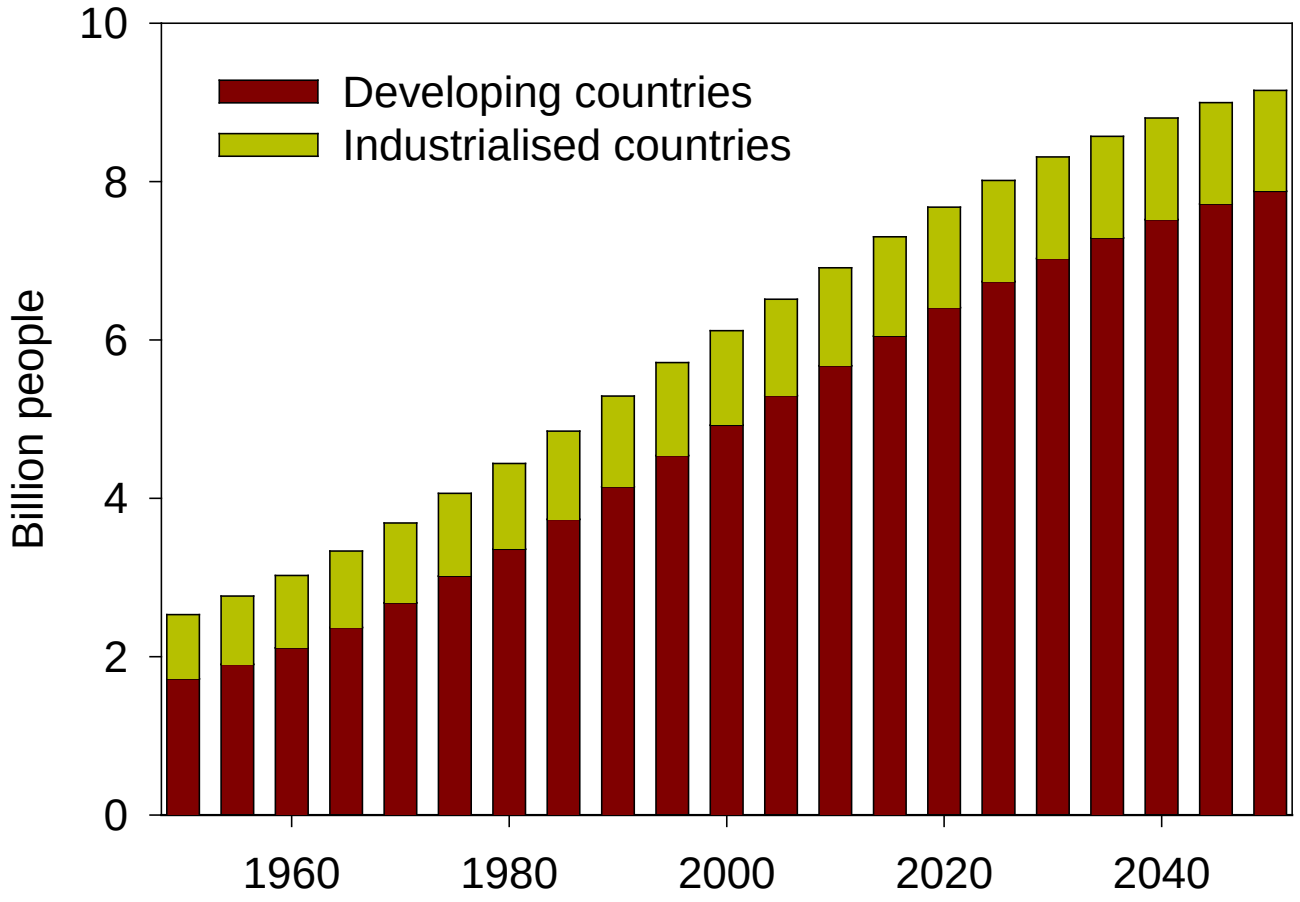
Types of driver for land use change

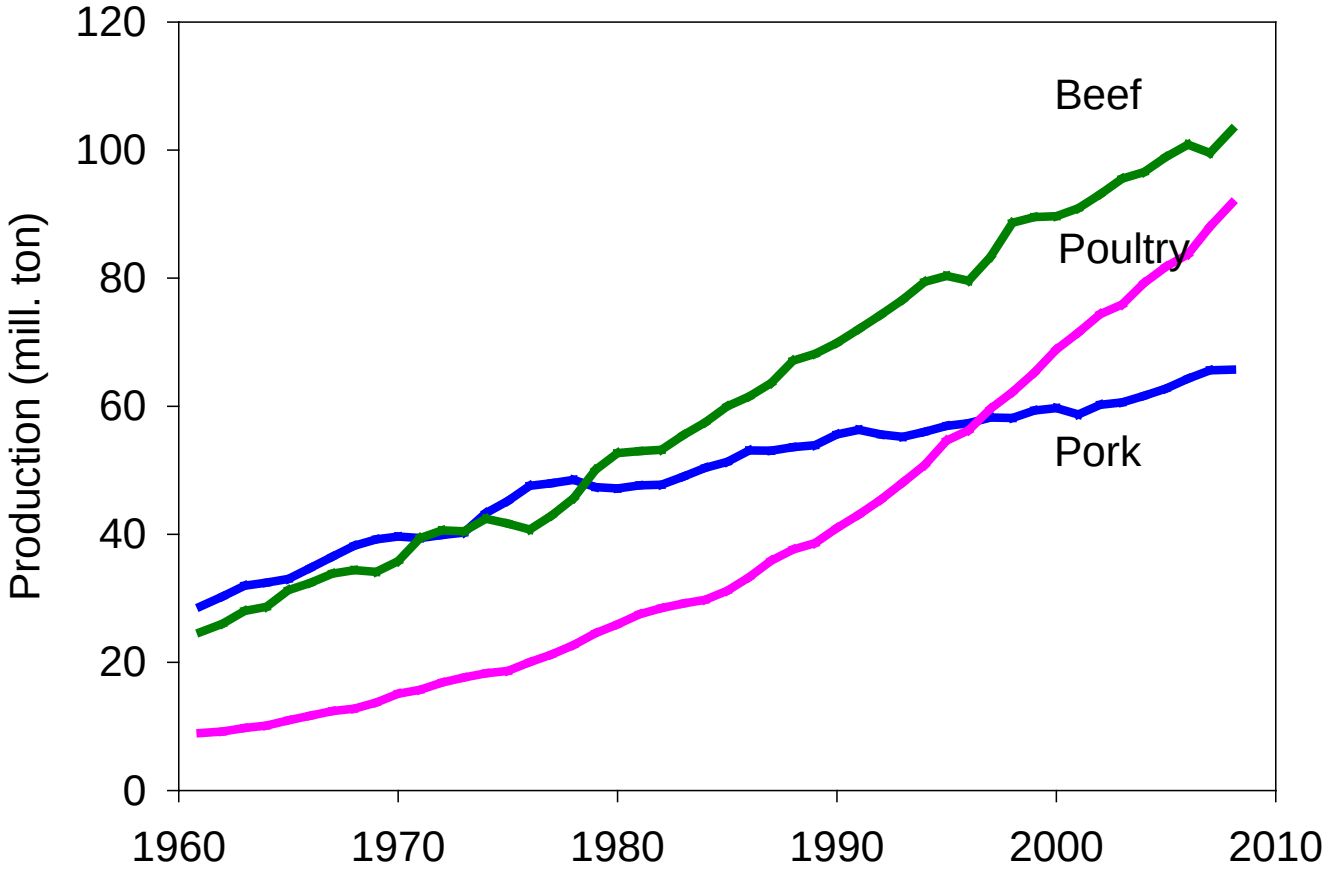
- Global
  - Food consumption (growth, meat consumption)
  - Demand for bioenergy
  - Demand for organic / sustainable food products
  - Technological developments in agriculture (breeding, biotechnology) – productivity
- EU
  - Agricultual policy – support focus (production, social, environmental, nature)
  - Environmental and climate policy
- National
  - Priority of food versus bioenergy
  - Priority of agriculture versus nature
  - Priority of organic farming
  - Priority of reforestation
  - Concern for export and employment
  - Need for area for infrastructure and urbanisation
  - Need for protecting groundwater and quality of streams, lakes and marine waters
- Local
  - Highly prioritised nature and environmental concerns
  - Special opportunities (climate and soils) and expertise (farmers, organisational)
  - Differences in nitrogen retention and reduction

The global population grows

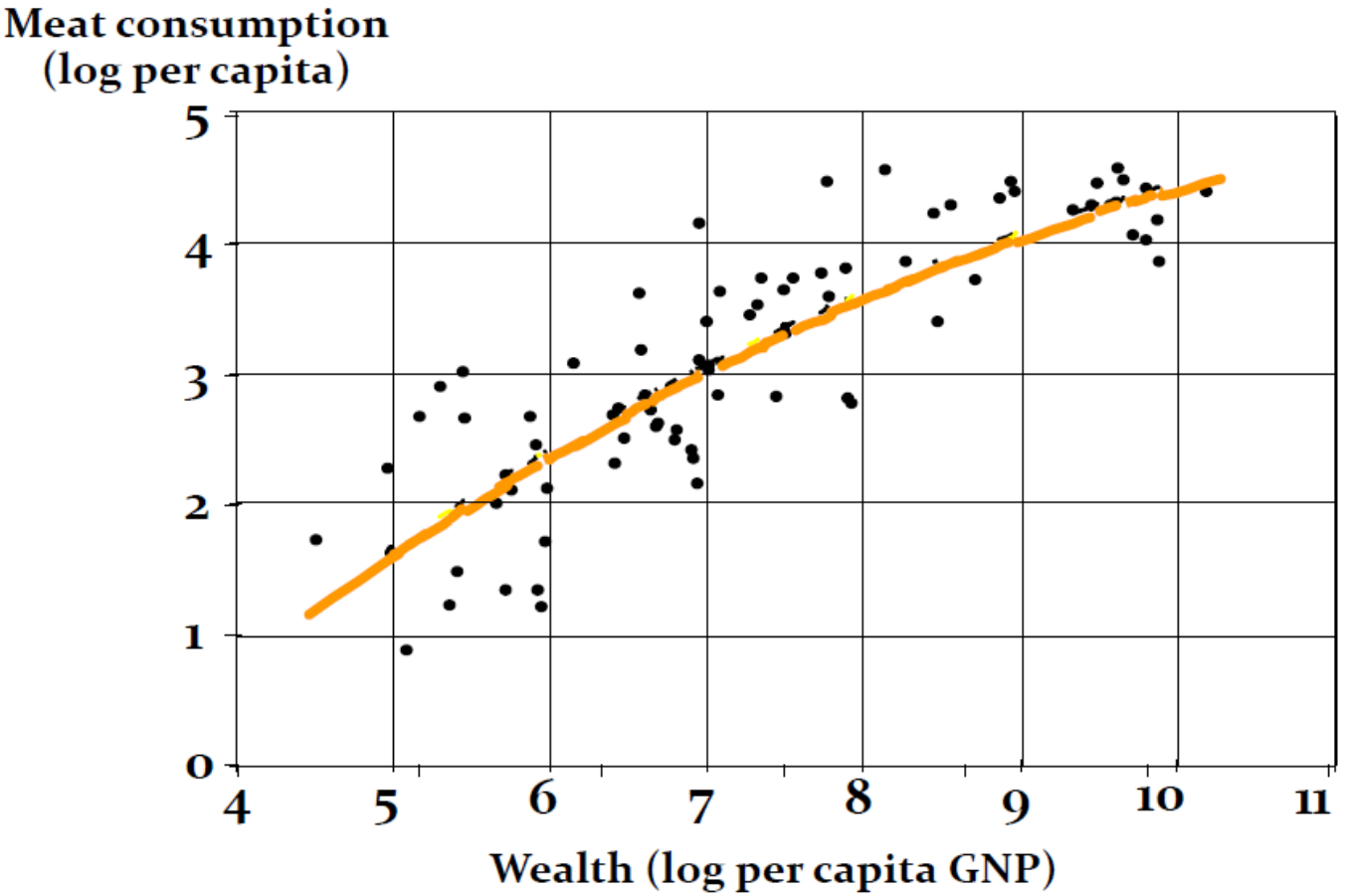


But the global middle class grows even faster (3 billion more by 2050)

World meat production increases



Wealth and meat consumption



IFPRI, FAO, ILRI

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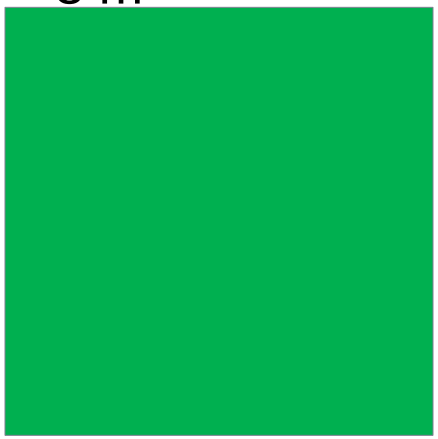
Area use for food production (DK norms)

1 kg wheat

1,5 m^2

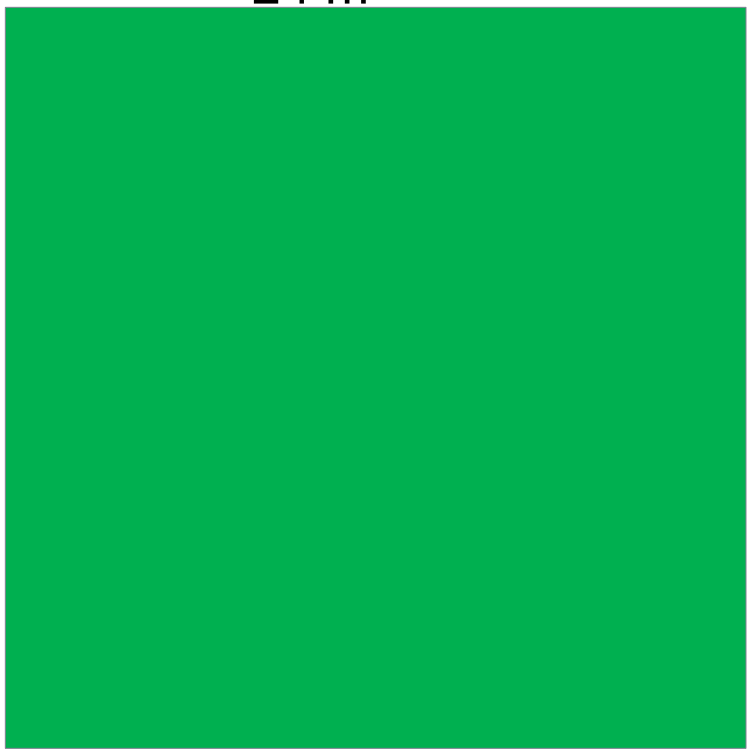
1 kg pork

8 m^2



1 kg beef

24 m^2



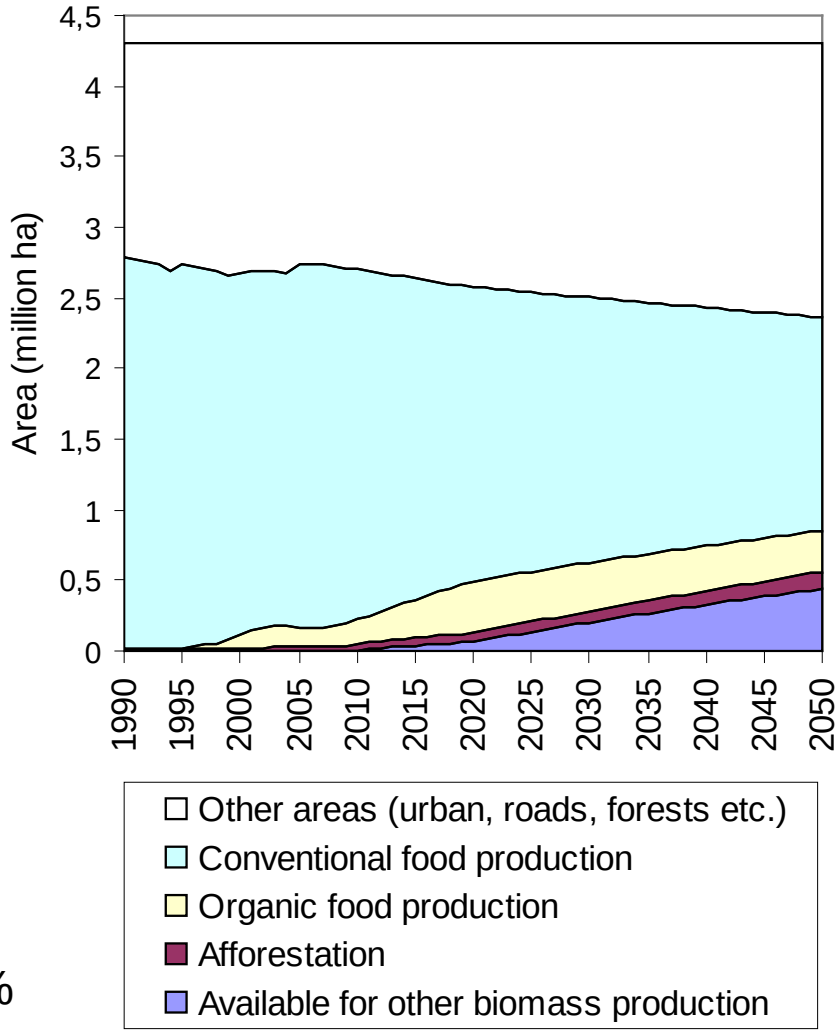
Agriculture in Denmark

- Agriculture occupies 62% of land area
- 55 % of agricultural area is in cereals
- 20 % of cereal grains are exported
- 80 % of butter and cheese are exported
- >80 % of meat is exported
- Detailed and strict regulation on N fertiliser and manure use has been implemented – primarily to reduce nitrate leaching

Increasing efficiencies in livestock production

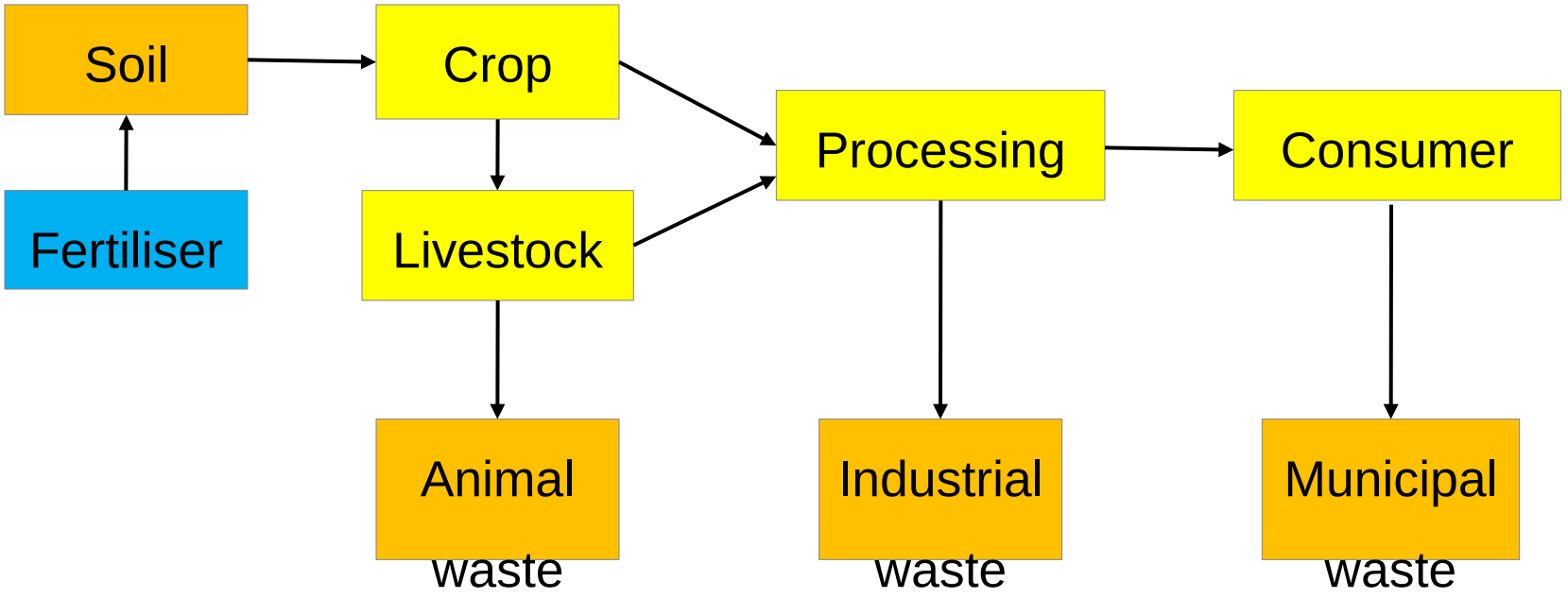
		2010	2050
Dairy cows	Milk yield (kg cow^{-1} yr^{-1})	8,900	13,600
	Efficiency (kg milk SFU^{-1})	1.36	1.54
	Nitrogen-utilisation (%)	27	30
Sows	Produced piglets (sow^{-1} yr^{-1})	25.5	35.0
	Efficiency (SFU piglet^{-1})	58	51
Piglets	Efficiency (SFU piglet^{-1})	58	51
(7 – 30 kg)	Nitrogen-utilisation (%)	48	58
Porkers	Efficiency (SFU pig produced^{-1})	215	198
(30 – 100 kg)	Nitrogen-utilisation (%)	42	48

Increasing productivity in crop production



Assumptions:
Same total crop production
Annual yield increases of 0.70 %

Current thinking: Linear food chains



Consequences: Ressource depletion, emissions, pollution (low total efficiency)

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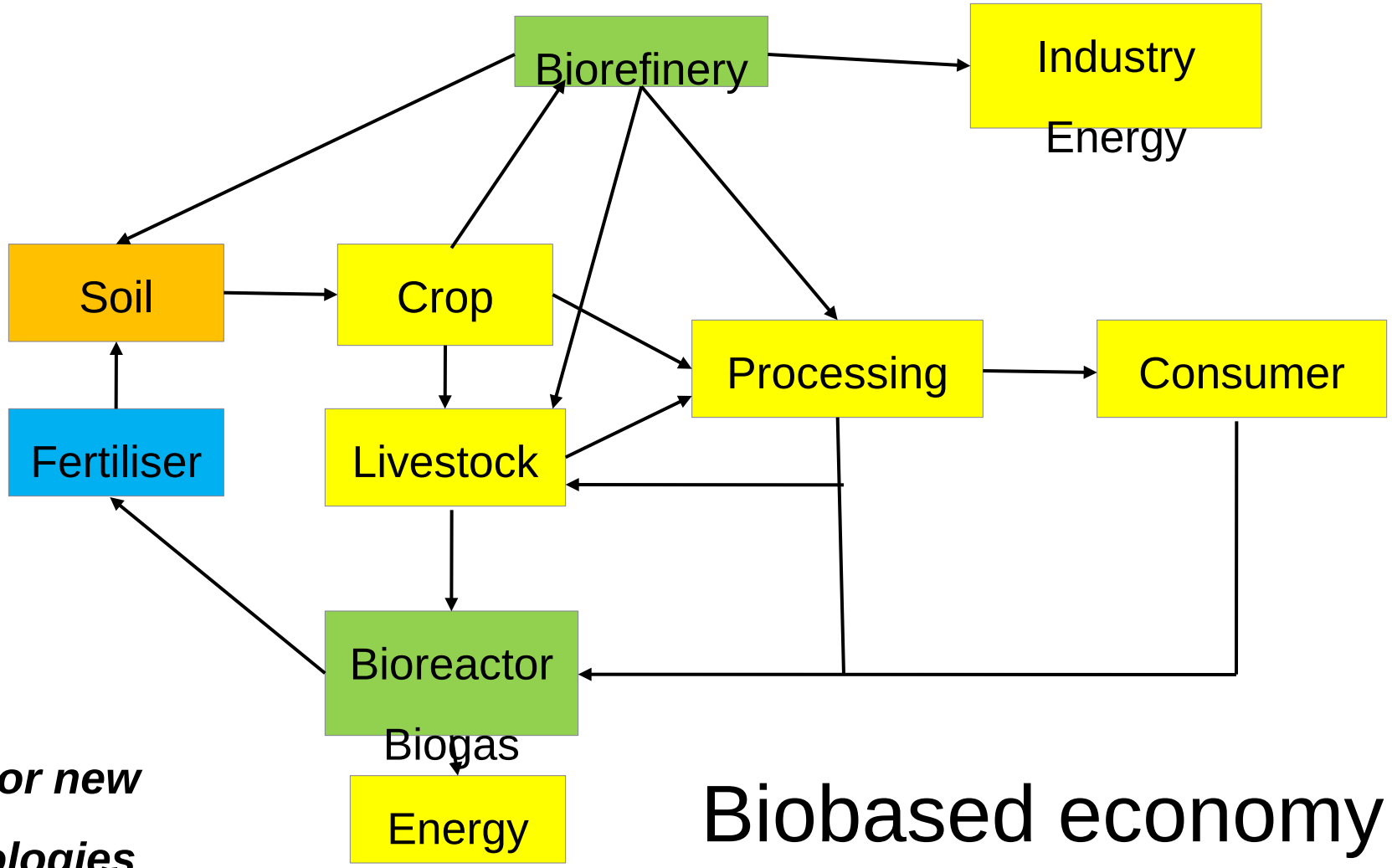
Future: Circular food chains - recycling



Need for new technologies

Biobased economy