

Practices in managing finfish aquaculture using RAS technologies, the Dutch example

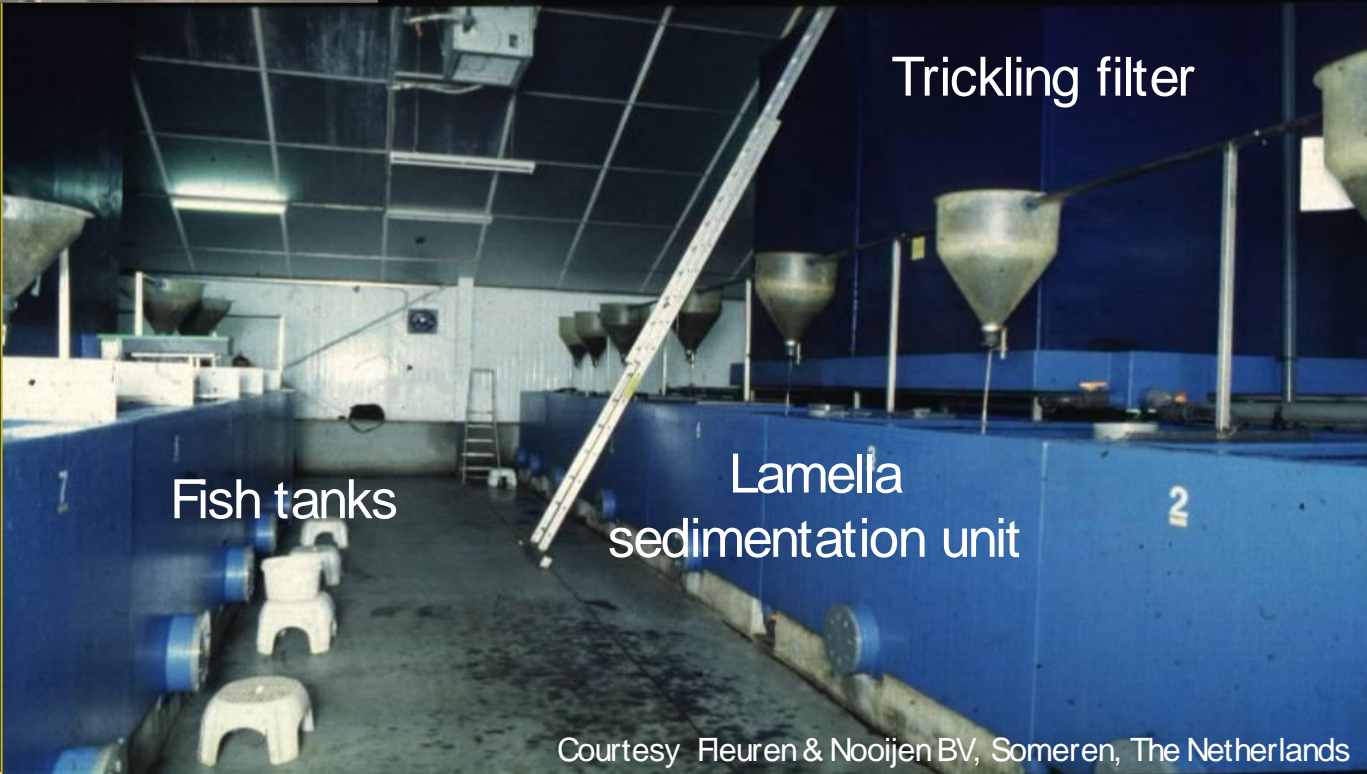
O. Schneider^{1x}, E. Schram¹, M. Poelman¹,
A. Rothuis², A. van Duijn³, H. van der Mheen¹



Outline

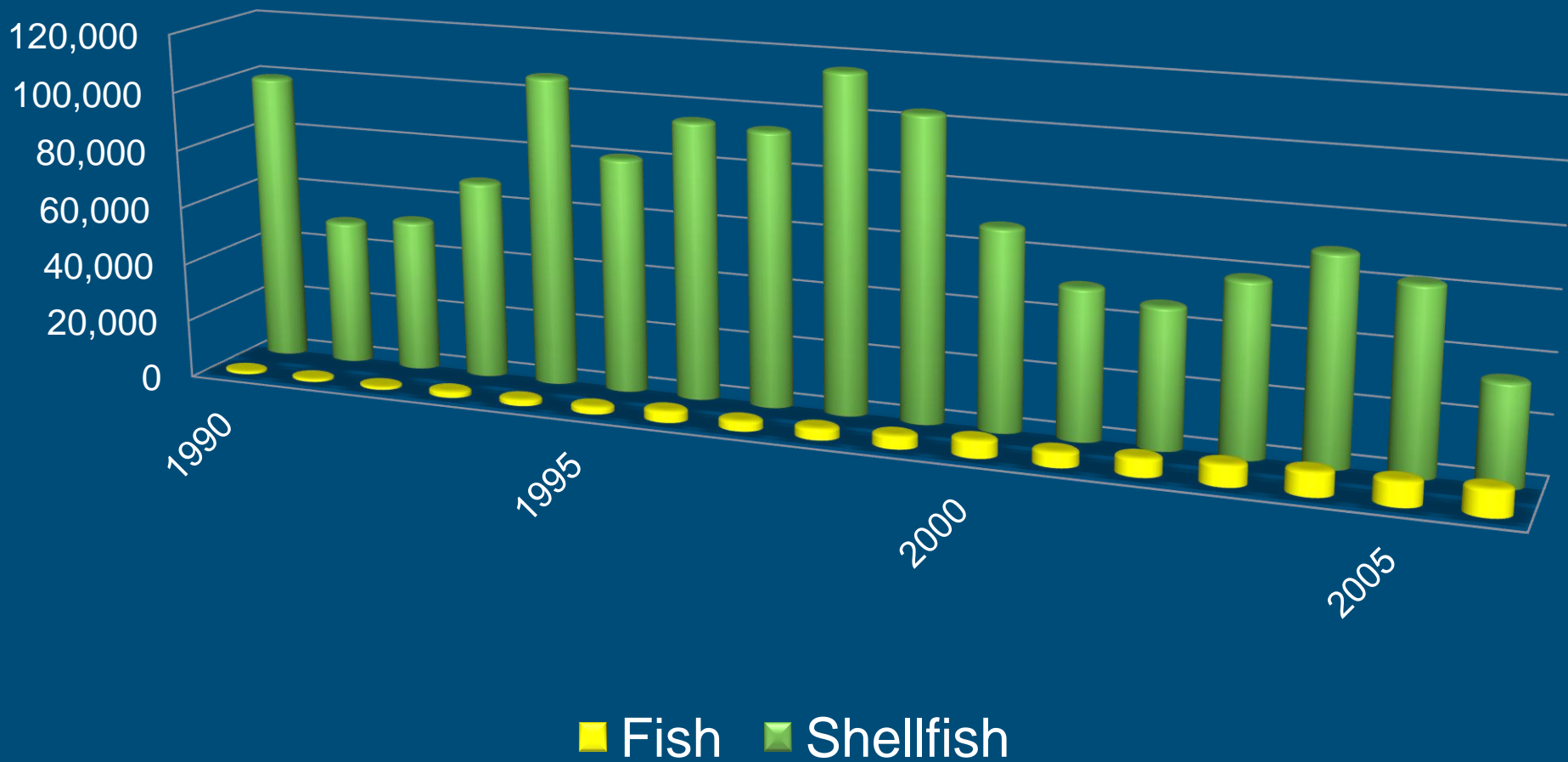
- Dutch aquaculture sector
- Recirculation aquaculture systems
- Sustainability (focus on ecological implications)
- Pitfalls, Challenges & Opportunities
- Conclusions

Dutch aquaculture sector

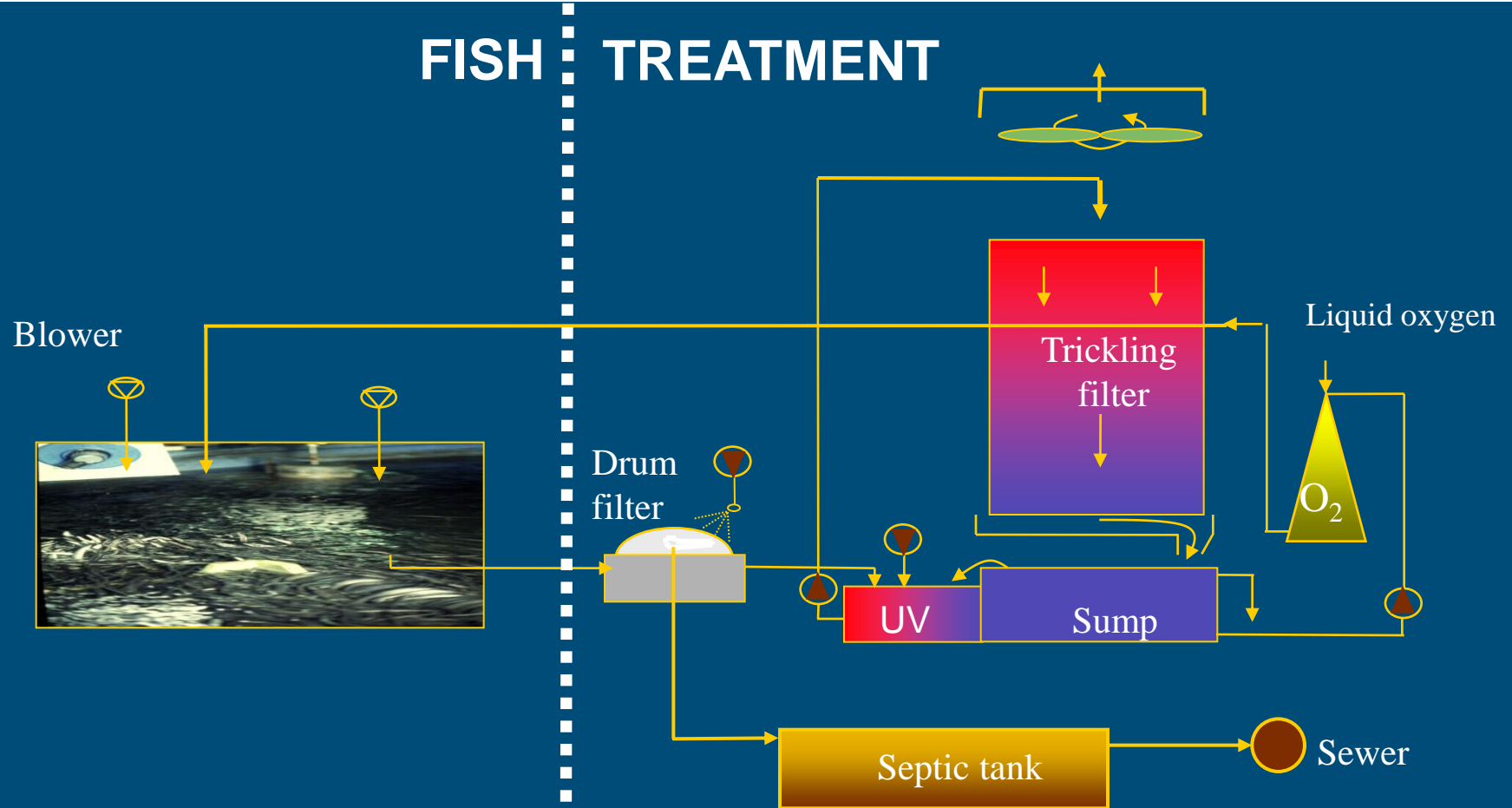


Courtesy Fleuren & Nooijen BV, Someren, The Netherlands

Dutch aquaculture sector



RAS – technical concept



After Kamstra, 1998. Wegwijzer in de paling teelt.

RAS – two sides of a coin

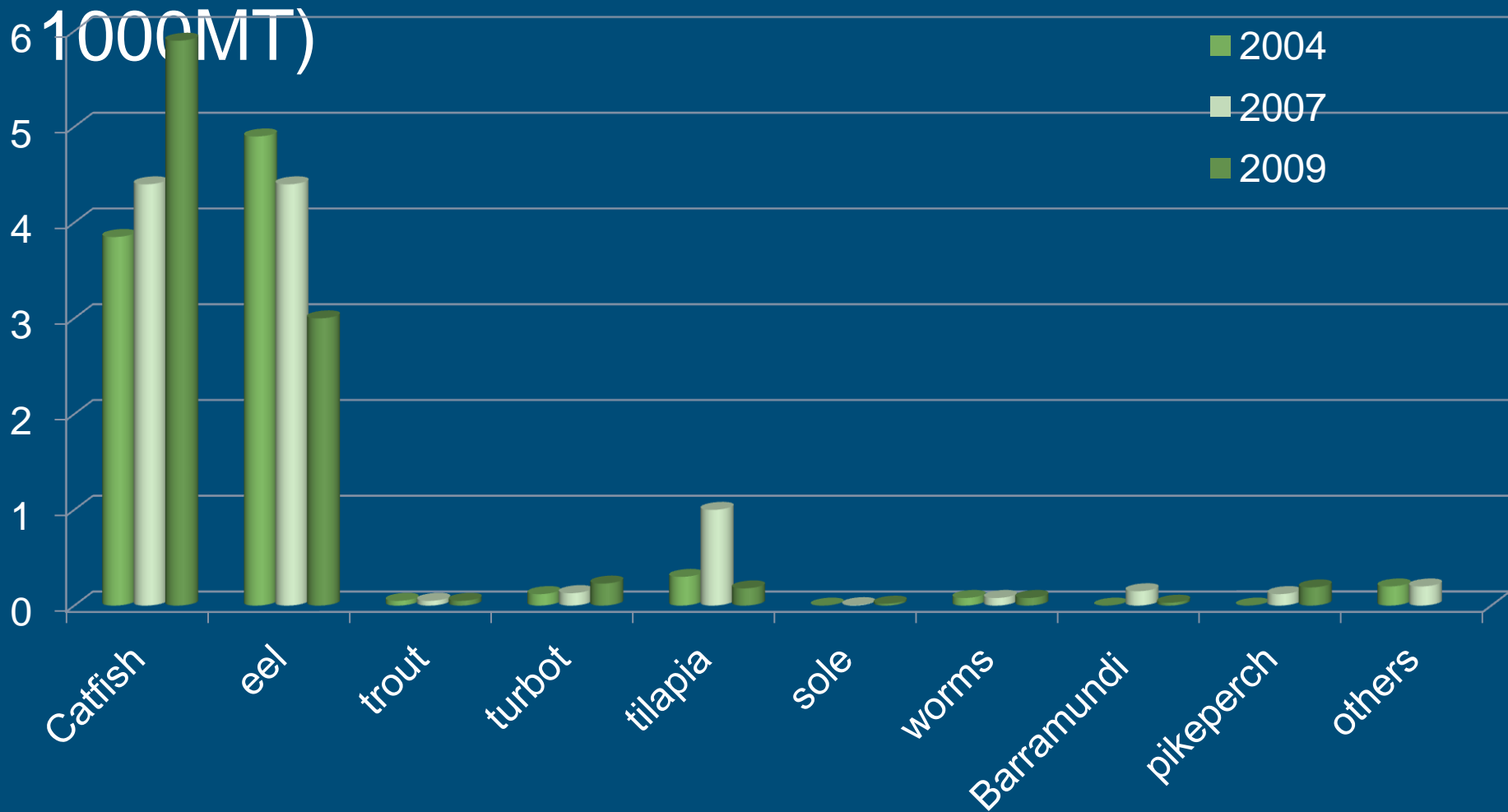
Cons?

- Pollution (nutrients & optical)
- Fish meal / oil
- Bad quality /taste
- Intensive husbandry
- Bad welfare
- Aggression
- Not organic
- ...

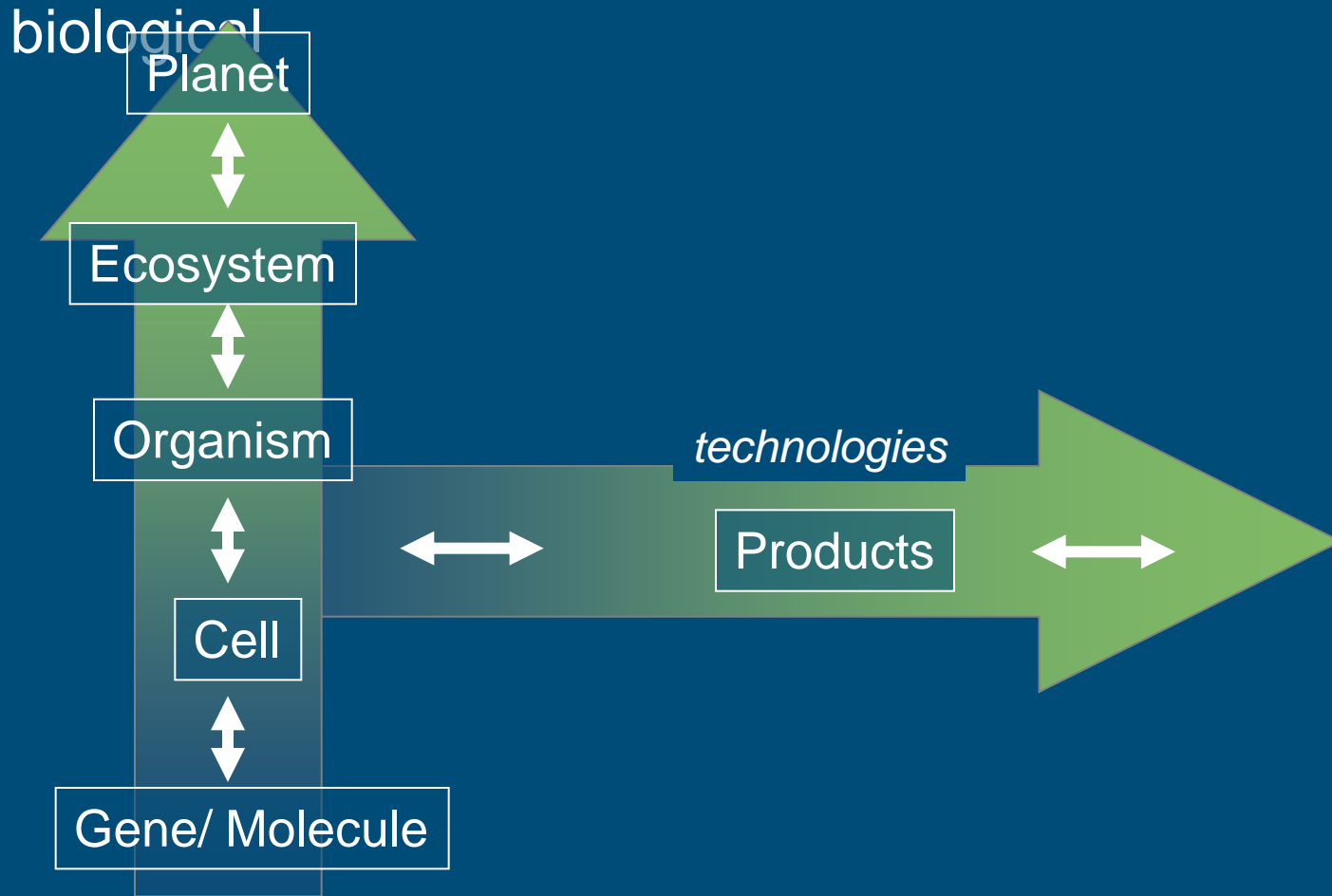
Pros?

- Fish is healthy
- Highly efficient
- Higher food safety
- Higher quality
- Low emission
- Less resources
- All year around
- Sustainable
- Close to the market
- ...

RAS - the Dutch context (production



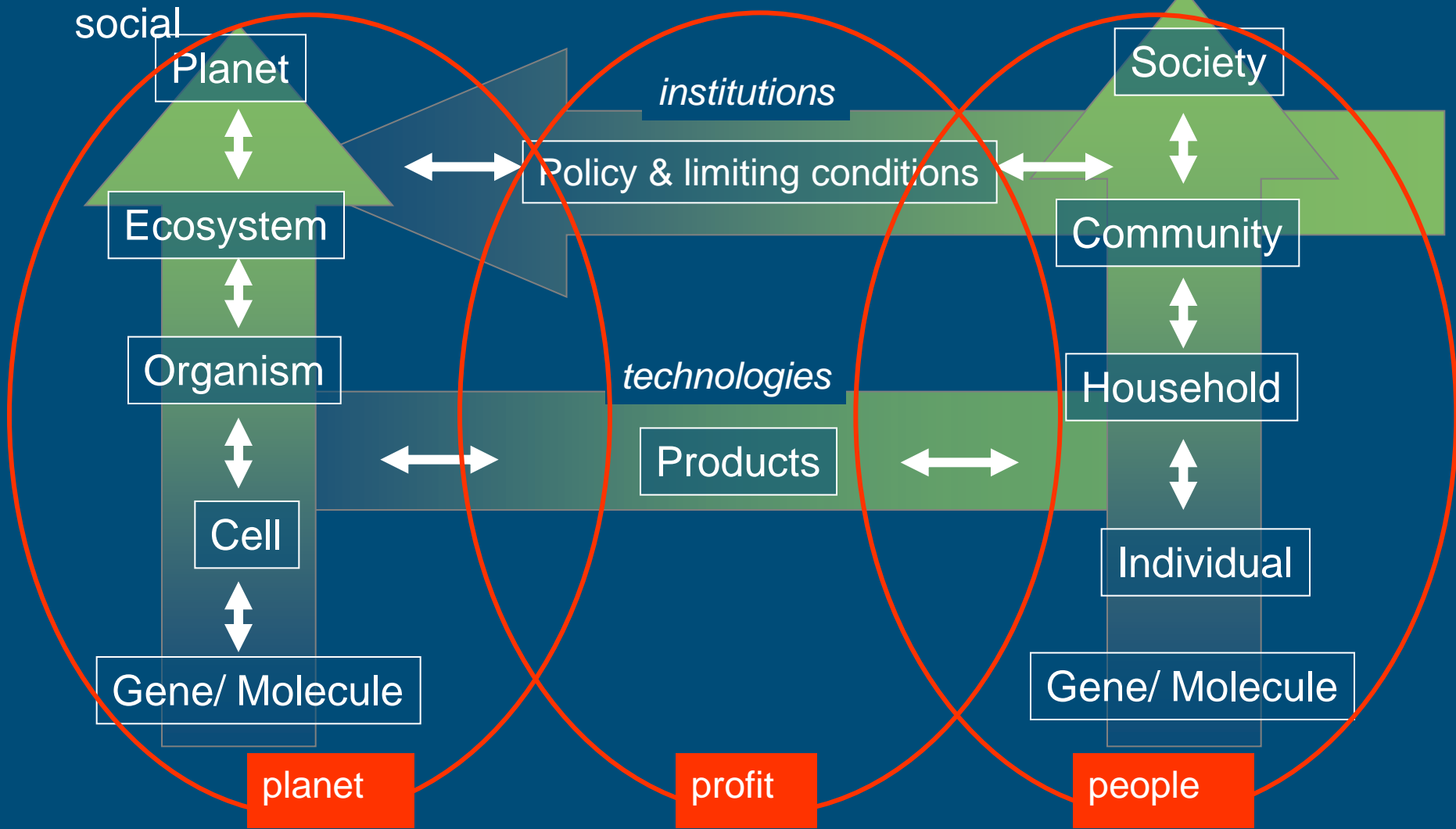
The Wageningen approach to Sustainability:



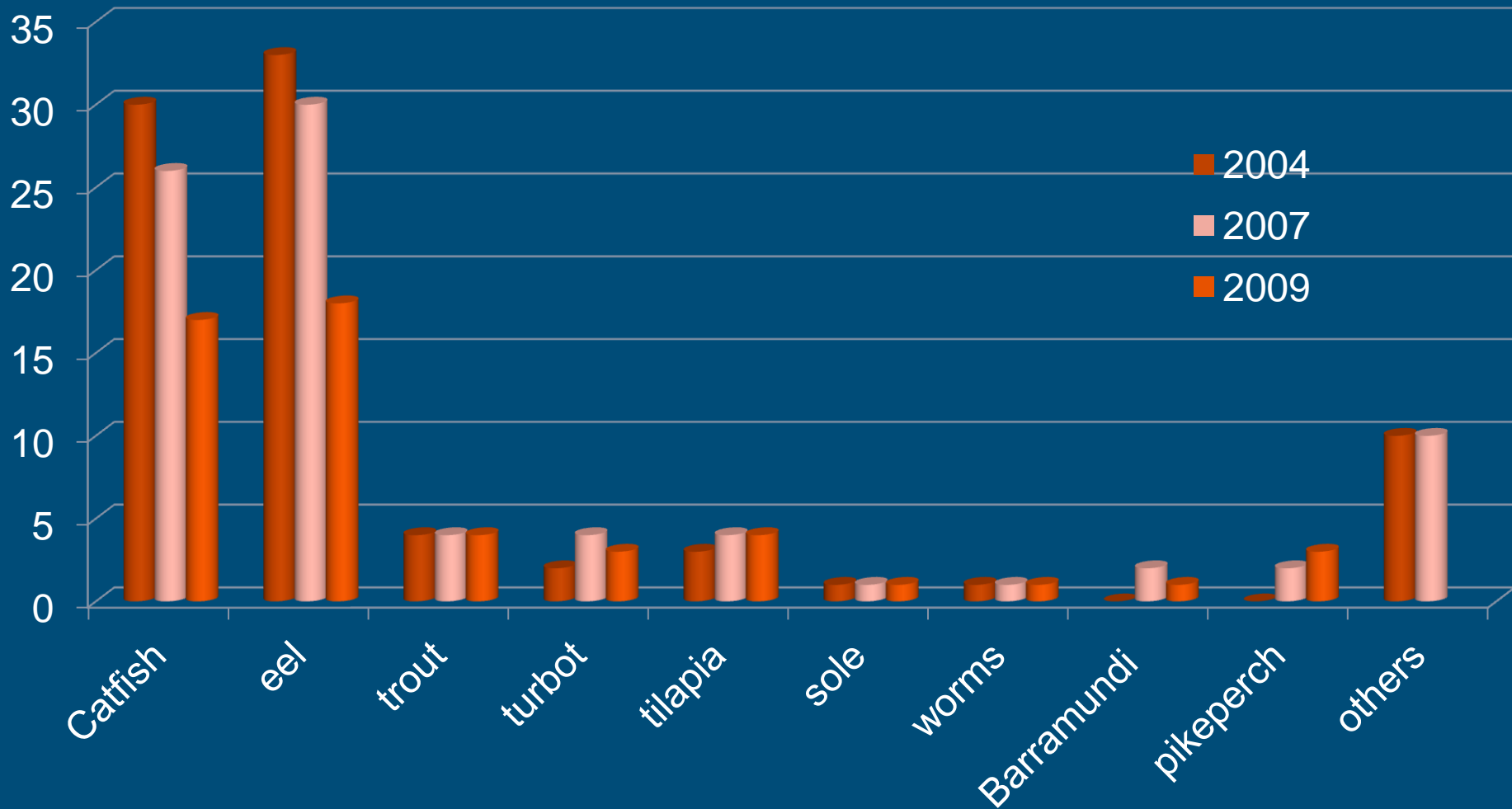
To explore the potential of nature to improve the quality of life

The Wageningen approach to Sustainability: biological & social

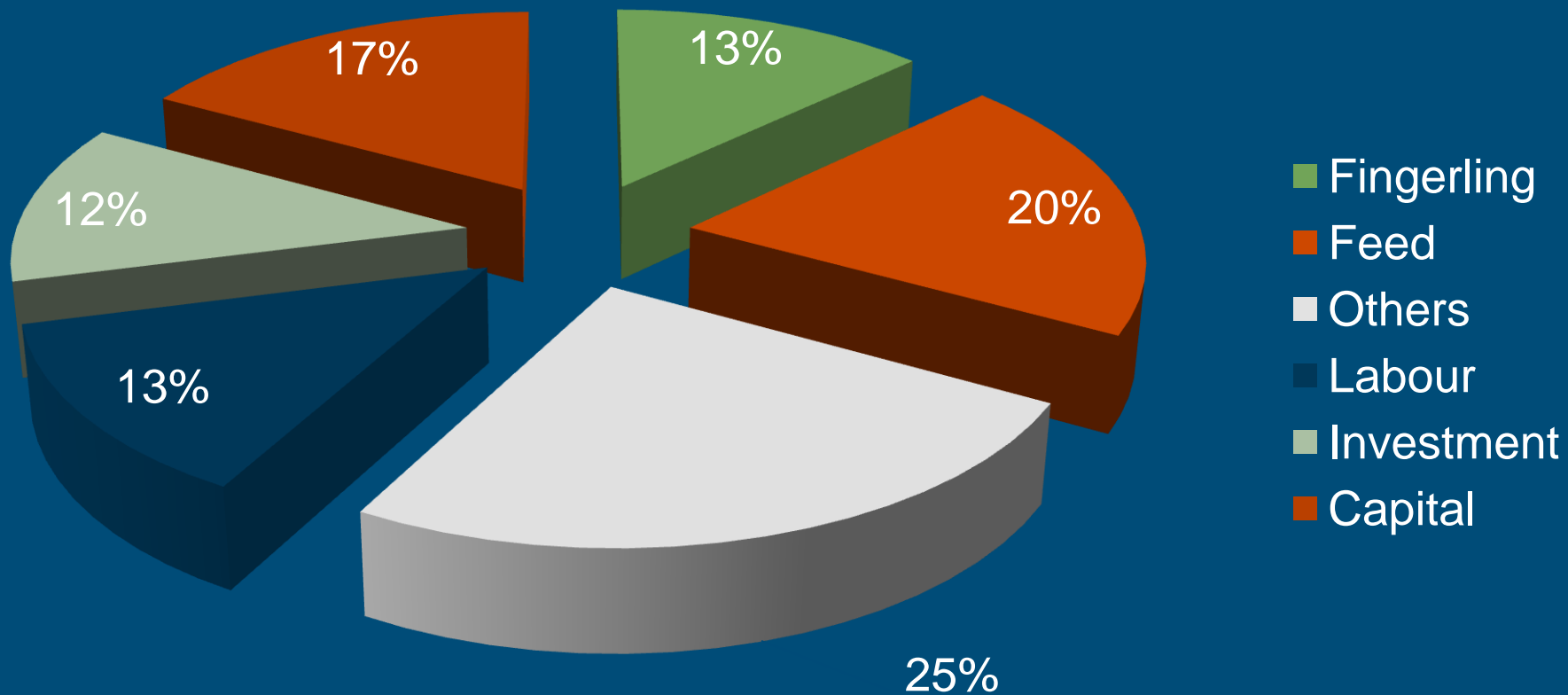
social



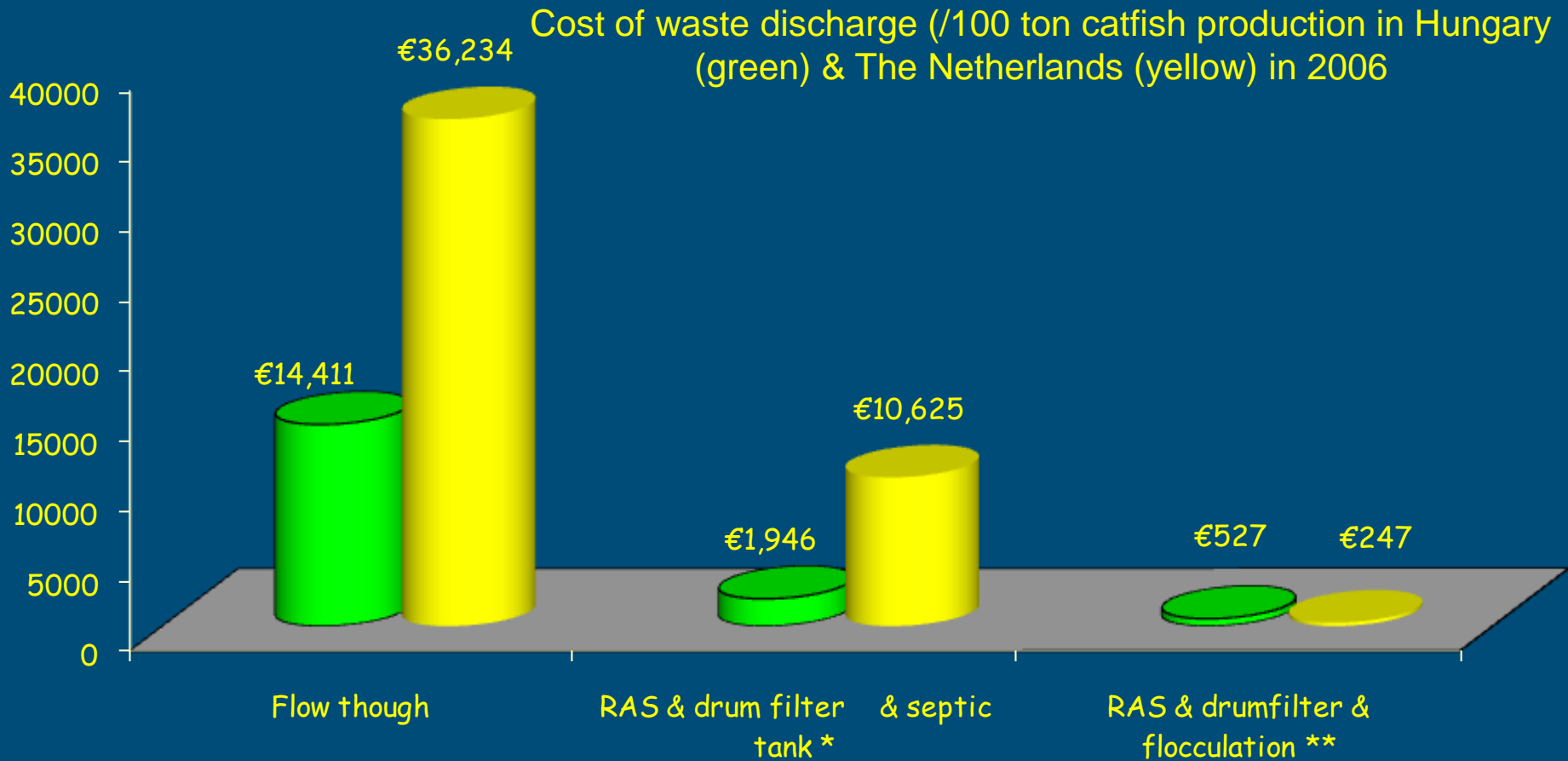
Sustainability – Economy (no of farms)



Sustainability – Economy (e.g. turbot)



Sustainability - Economy

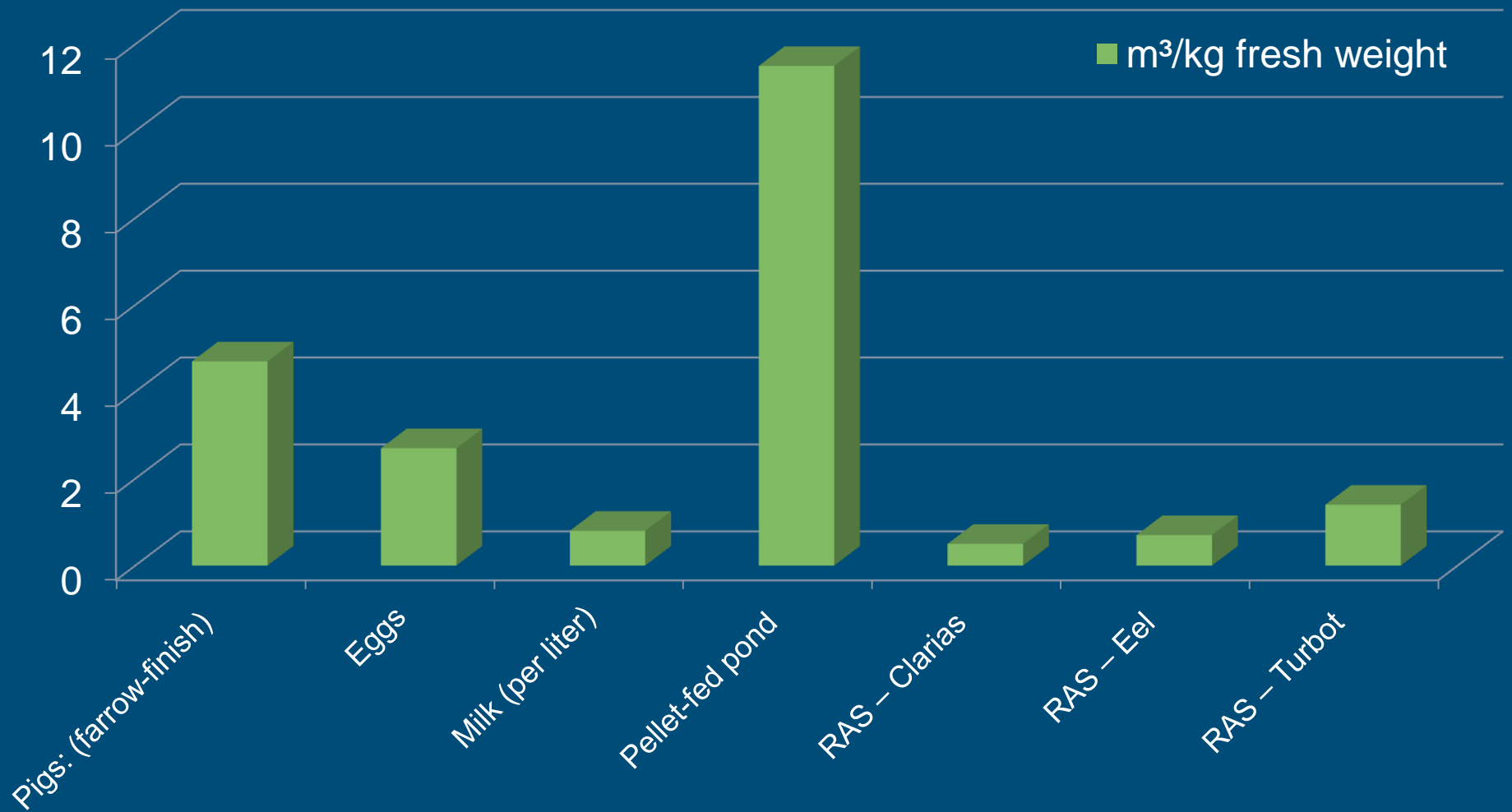


*Based on Kamstra & vd. Heul, 1999, ** based on Ebeling et al., 2005

Sustainability - Economy



Sustainability – Ecology (water use)



Verdegem et al

IMARES

Sustainability – Ecology (feed/waste manipulation)

Faeces from basal diet



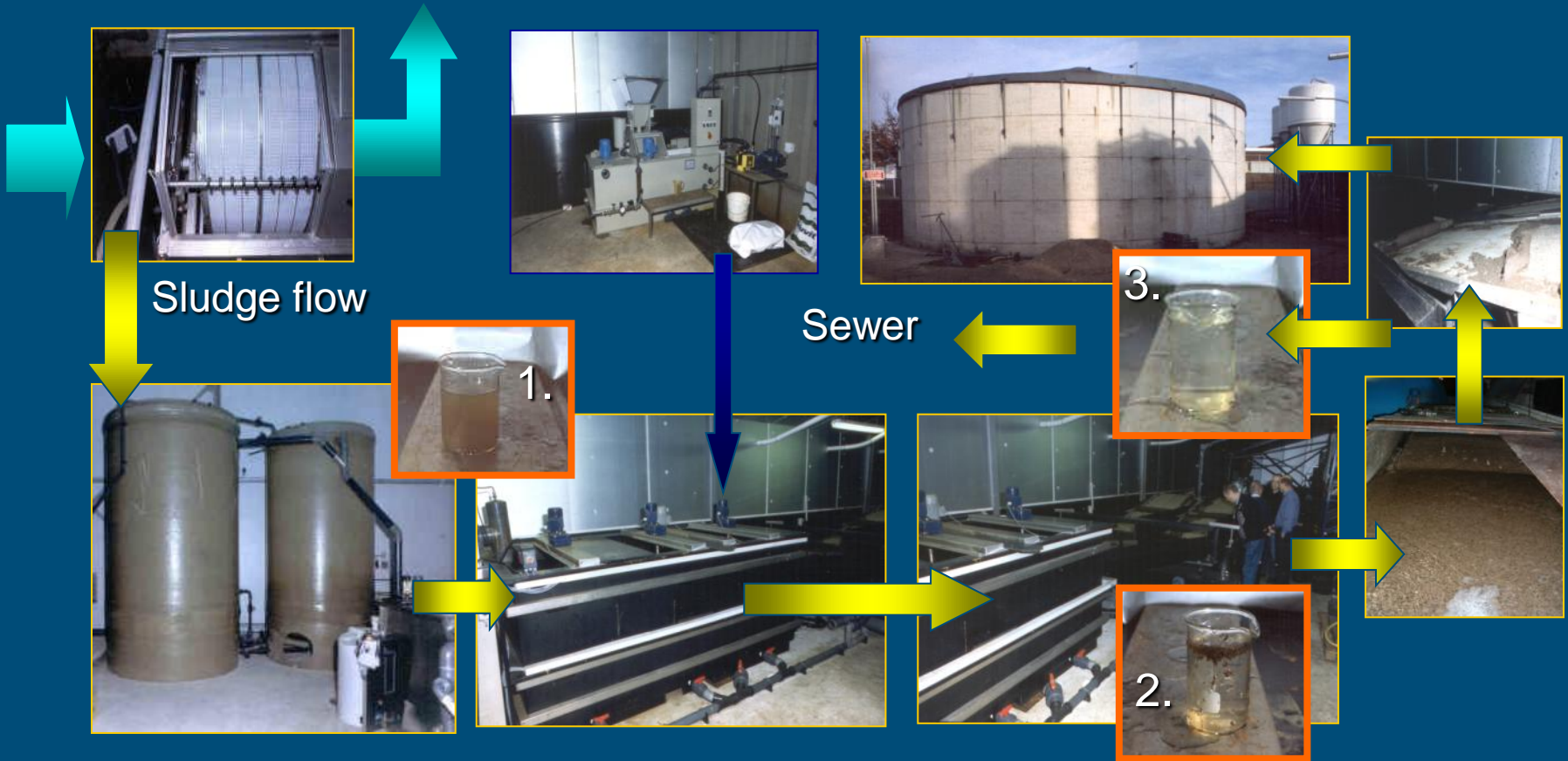
Faeces from modified diet



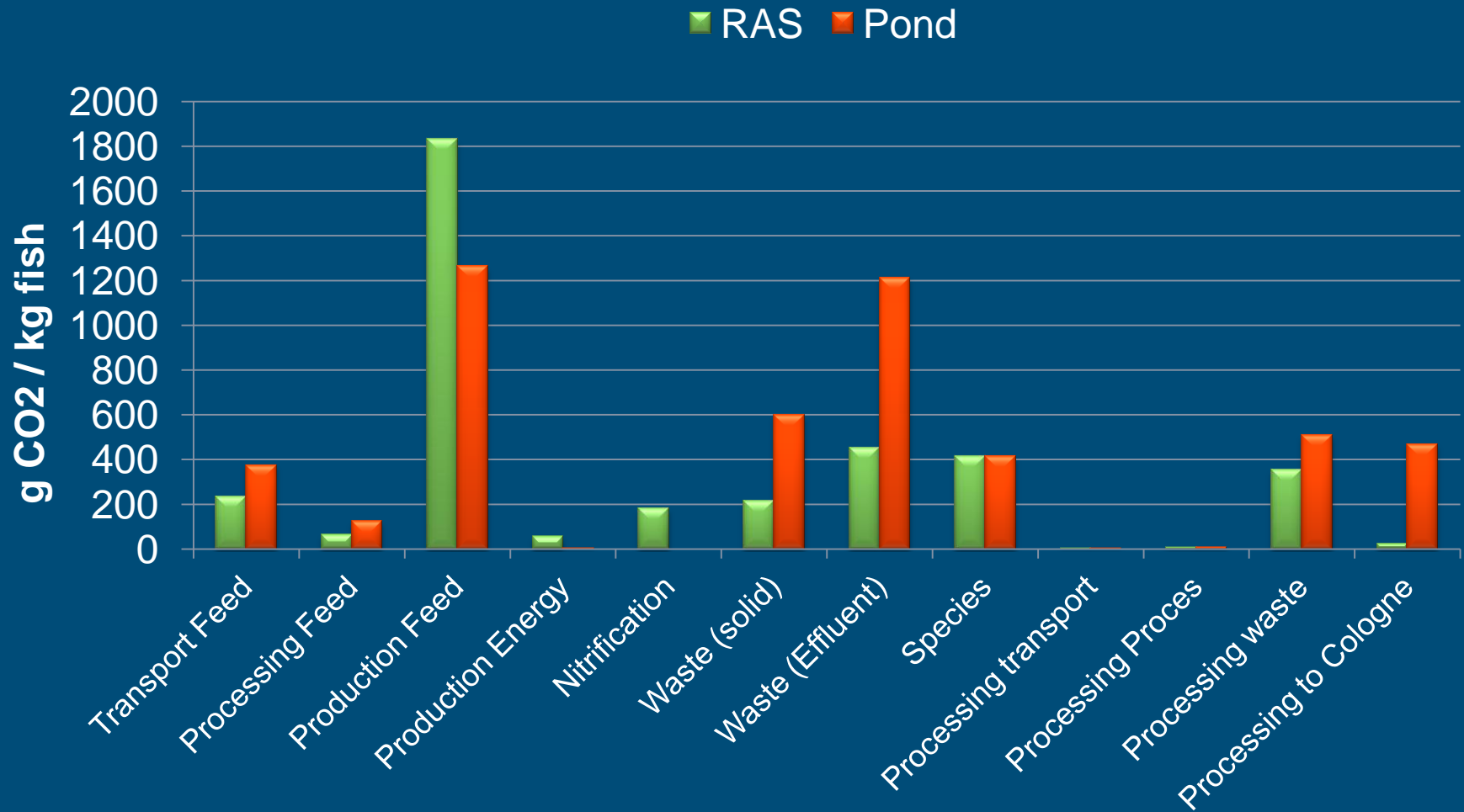
Courtesy Brinker et al 2010

IMARES

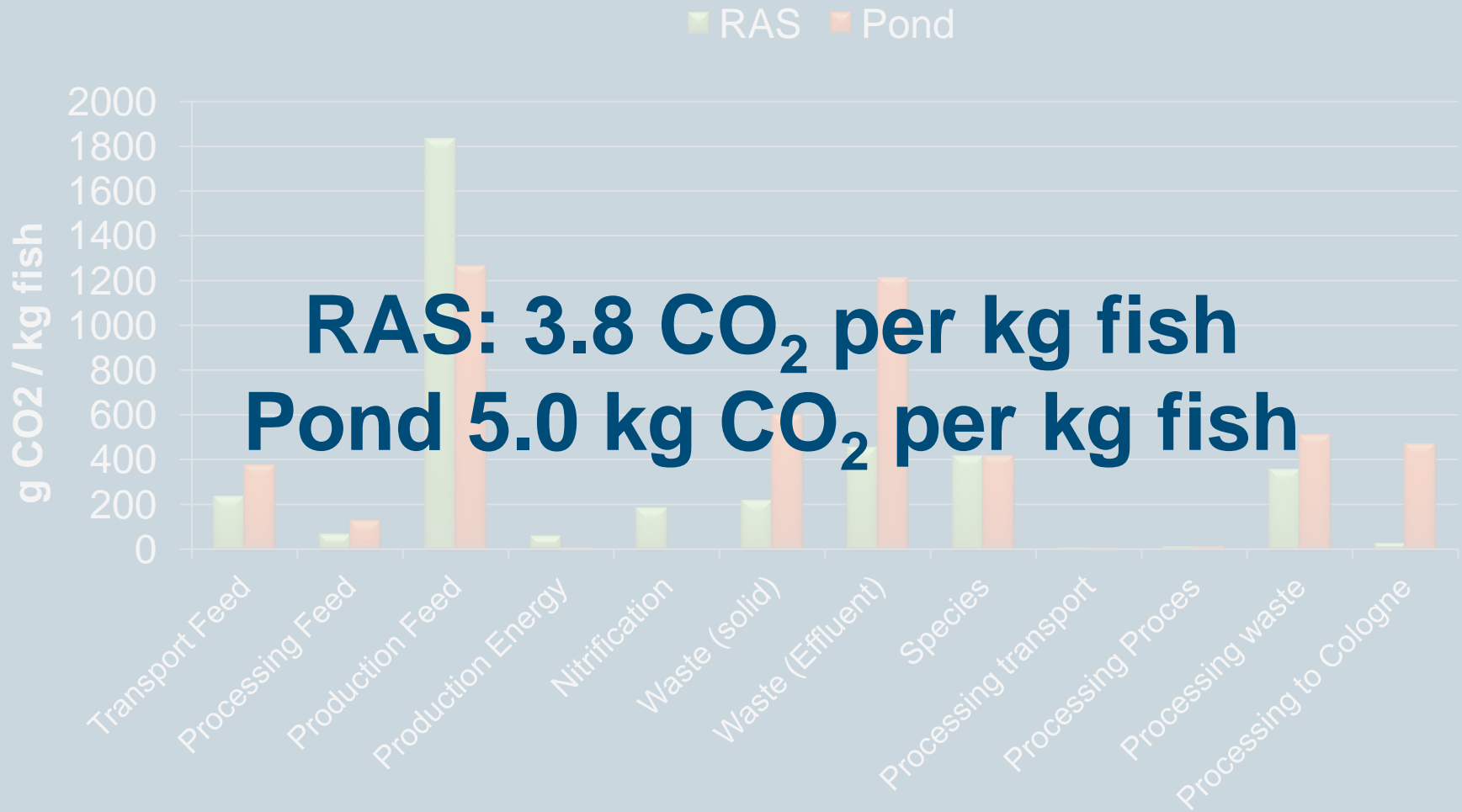
Sustainability – Ecology (waste treatment)



Sustainability – Ecology (CO₂ Foot print & LCA)



Sustainability – Ecology (CO₂ Foot print & LCA)



Sustainability – Social & Governance

■ Society

- Natural resources (fish meal & oil, seeds, water, energy, food miles)
- Welfare (husbandry, transport, slaughter)
- Stichting Milleukeur, Global GAP, ASC

■ National Governance

- Rules & Frameworks
- Financial stimulation based on sustainability indicators

■ European Governance & Strategy

- Water directive
- Veterinary directive
- Exotic species directive

Pitfalls, Challenges & Opportunities

African catfish

- ~30 years, no substantial market

Barramundi

- no market, 1st placement inferior quality

Happy Shrimp

- limited market, too high cost price

Tilapia

- not competitive

Pitfalls, Challenges & Opportunities

Economy

- Pangasius, Tilapia, Cod, Turbot, Flounder
- Supermarkets (sustainability & product safety & quality)
- Cost price

Ecology

- Resource use
- Waste management

Social

- Eel
 - Reproduction & sustainability dialogue
- (Marine) Waste management
- Certifications (GlobalGAP, Aquaculture Stewardship Council)

Pitfalls, Challenges & Opportunities

Species driven

- African catfish → Consolidation
- Claresse → new market
- Eel → dialogue & assessment
- Sturgeon → Caviar → less fisheries & illegal practices
- Sole → product replacement
- Yellowtail kingfish → product replacement
- Worm → pond culture

System driven

- Zeeland Sole → extensive IMTA on land
- Shrimps → Biofloc systems
- Urban RAS
- RAS export (e.g. to Norway, Africa, South America & Asia)

Conclusions

- Dutch aquaculture sector = innovative
- Well structured governance framework
- Stakeholders dialogues & several umbrella organisations
- Instruments in place to develop sustainable sector
 - animal welfare, nutrient emissions, new species, drug use & others
- Some pitfalls & issues, but as well several opportunities

Dutch Seafood for the future?

