# Sustainable expansion of bivalve shellfish aquaculture for global food security

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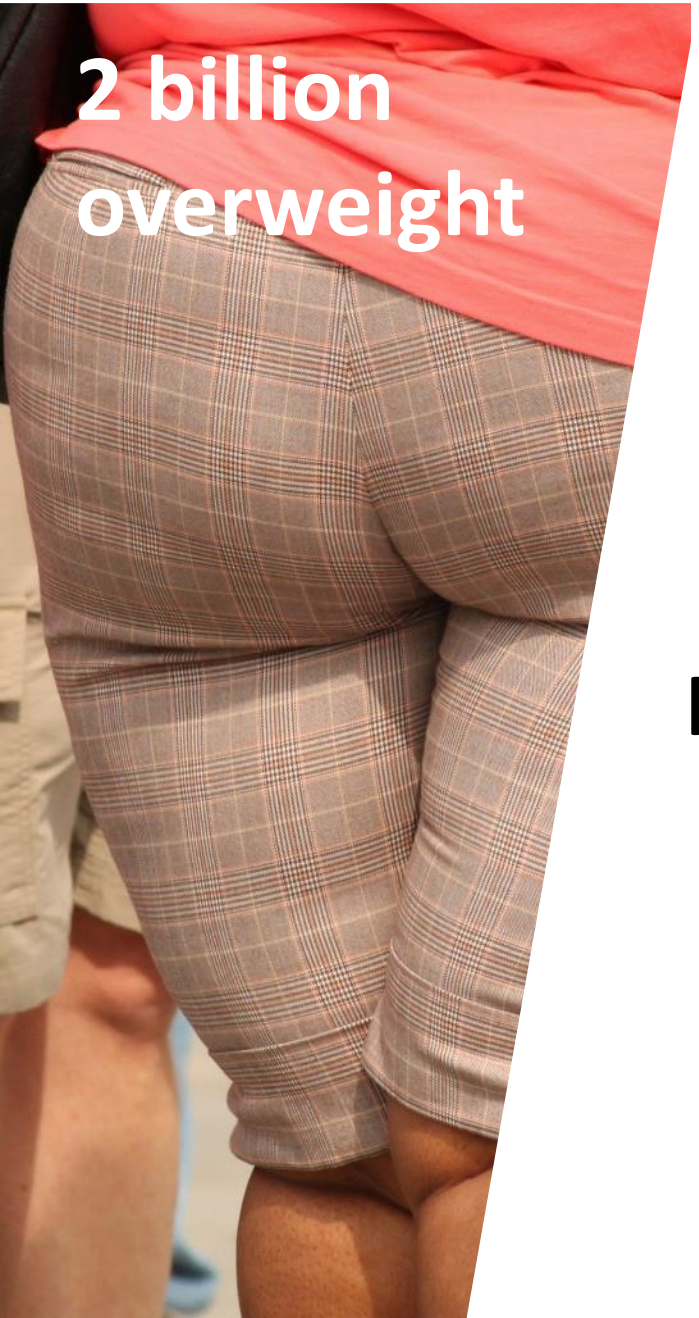
# Food production & consumption today threaten health & planet

# Food production threats to our planet



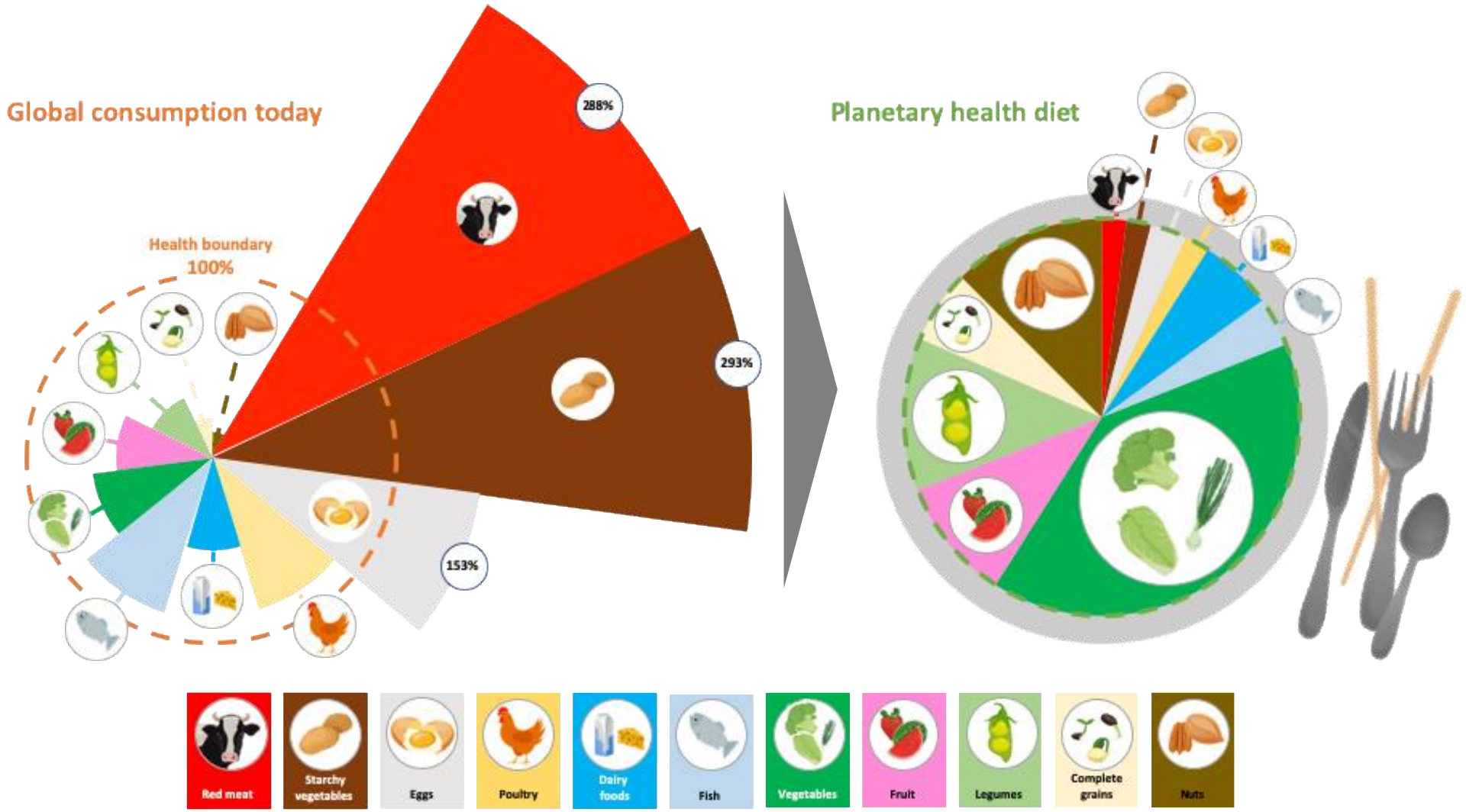



# Food consumption threats to human health



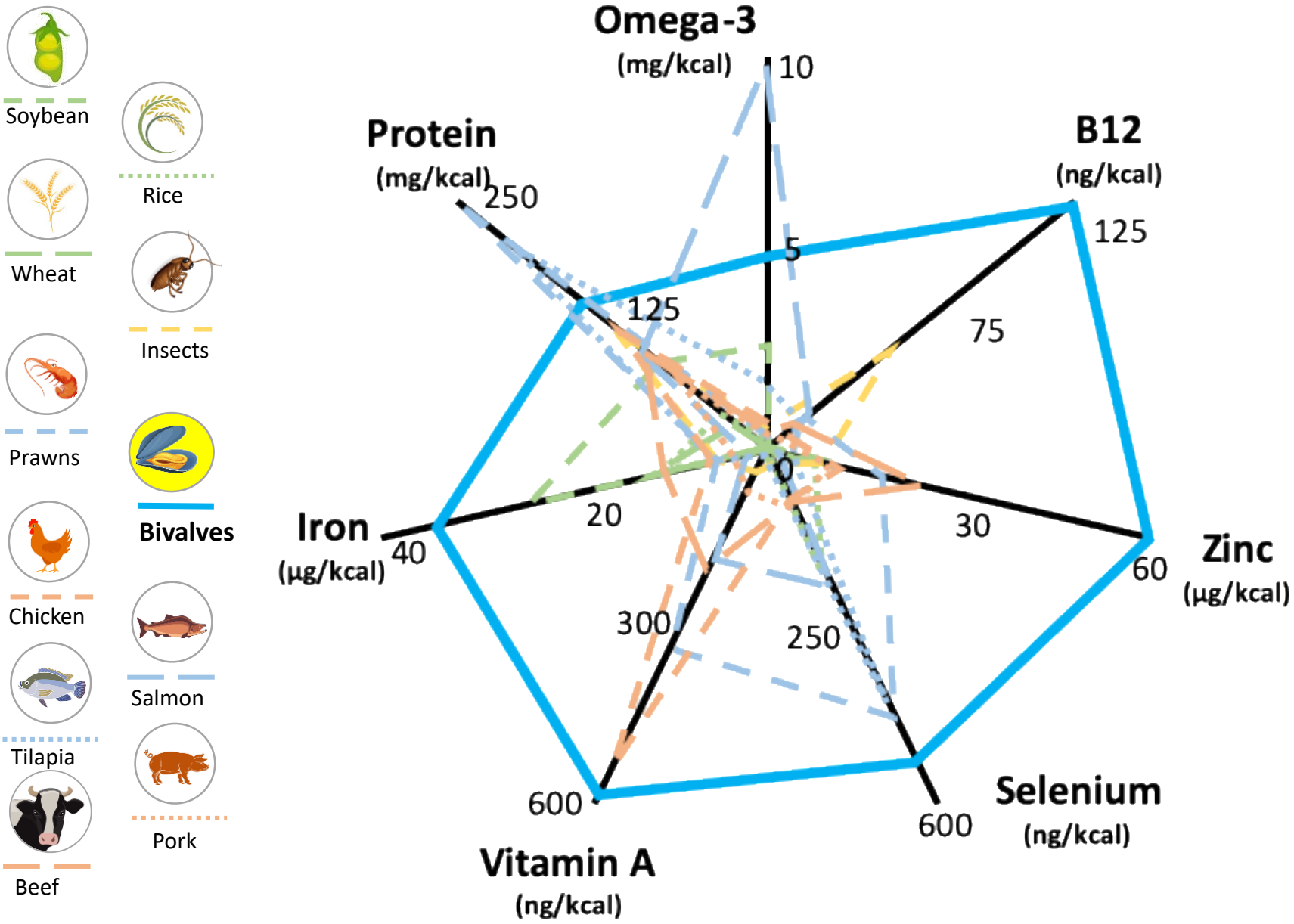

**Continued population growth to 10 billion by 2050**

# Healthy food means a big shift to a more nutrient rich diet

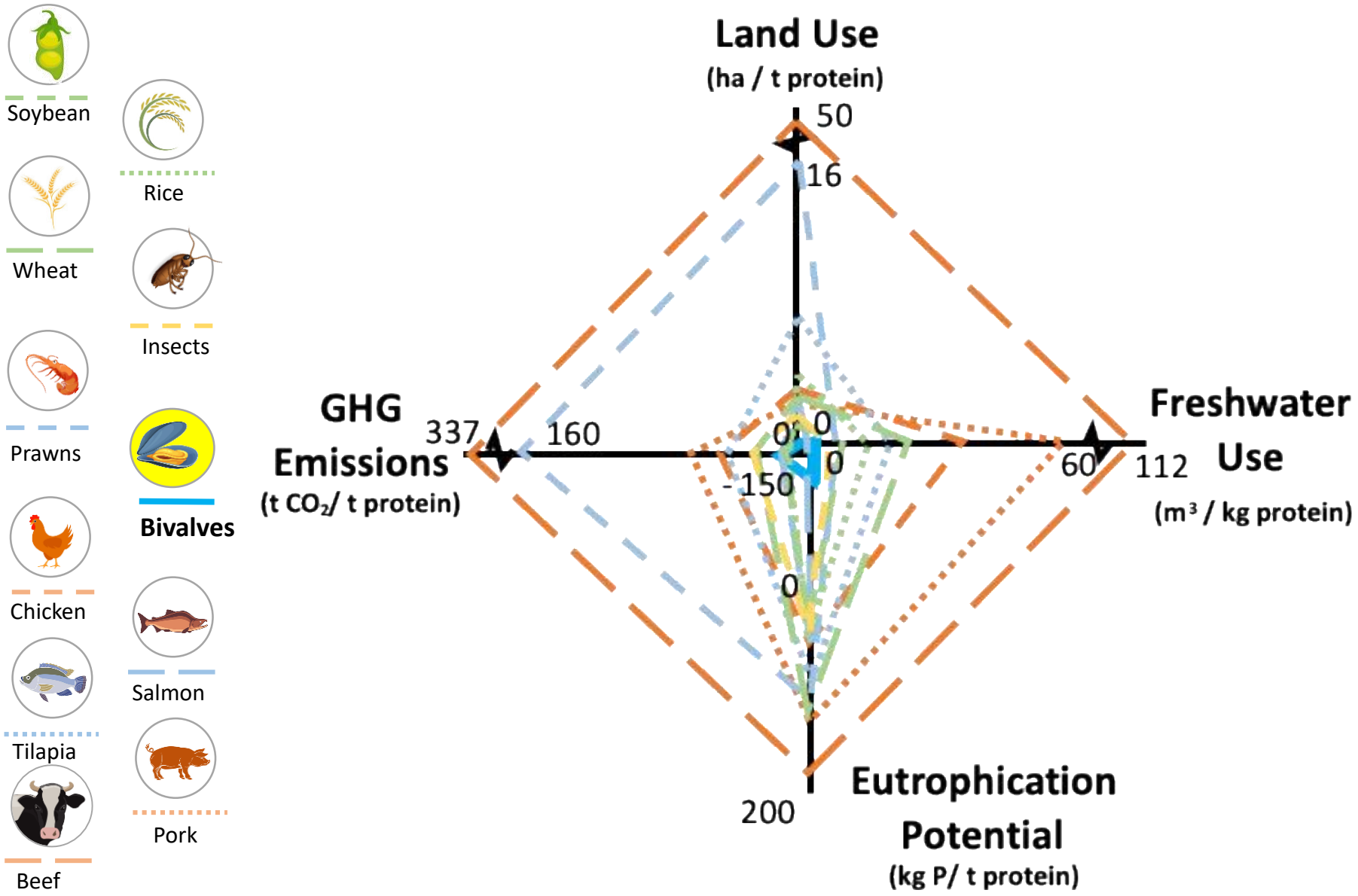


# Bivalve shellfish offer nutrient rich sustainable food

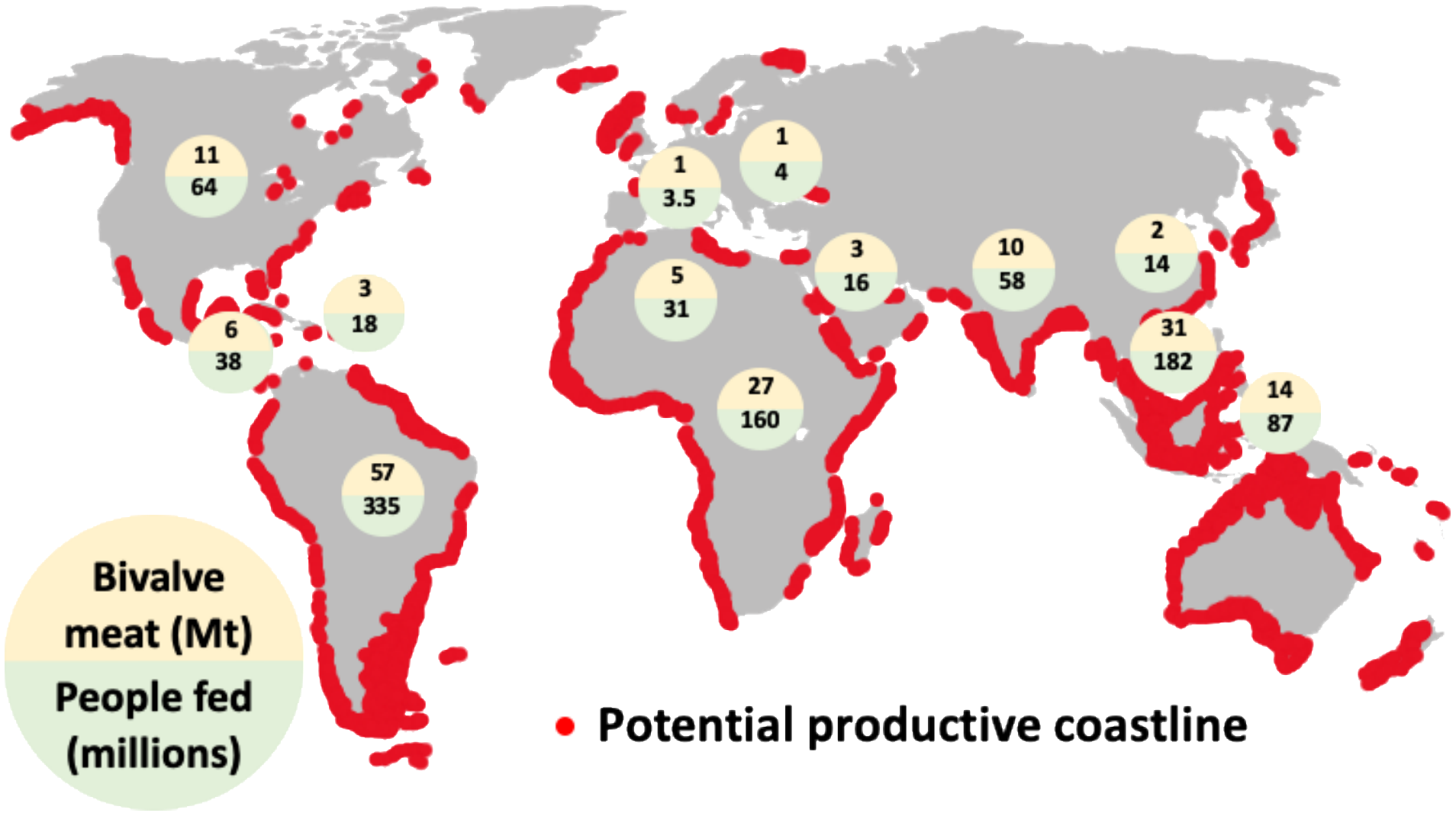
# Bivalve shellfish have a superior nutrient profile to other foods



# Bivalve shellfish have lower environmental footprint than other foods



# Potential to feed over 1 billion people with bivalve aquaculture




*Willer, D. F. & Aldridge, D. C. (2020). Sustainable bivalve farming to deliver food security in the tropics. Nature Food. Accepted.*

# Improvements needed to increase production of and demand for bivalves

## Production




## Demand



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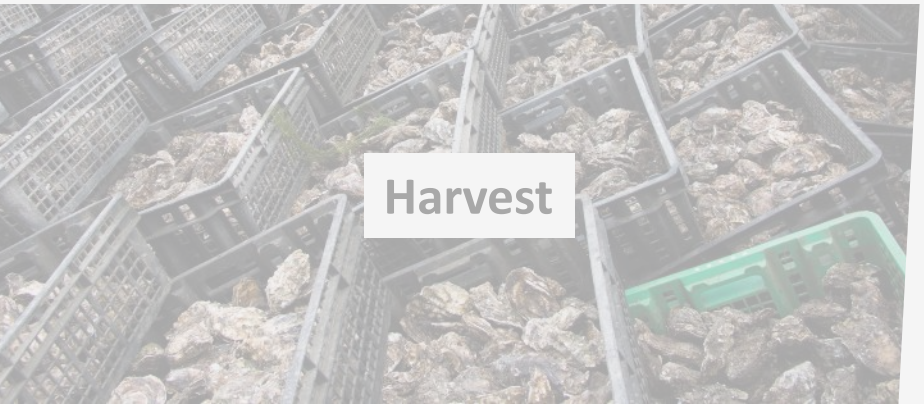
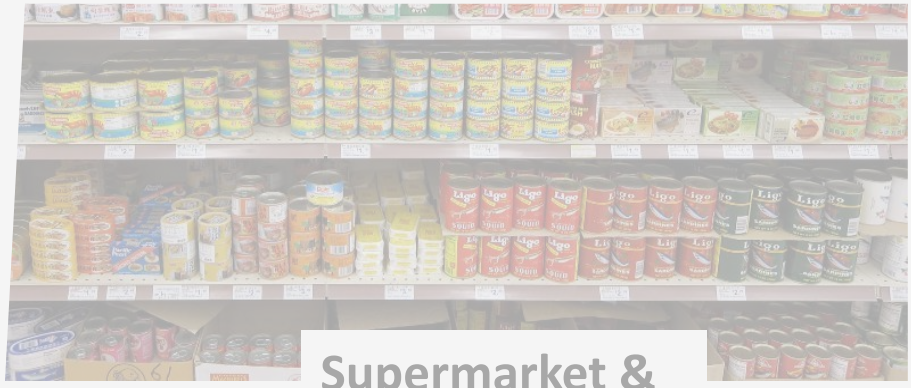
## Production

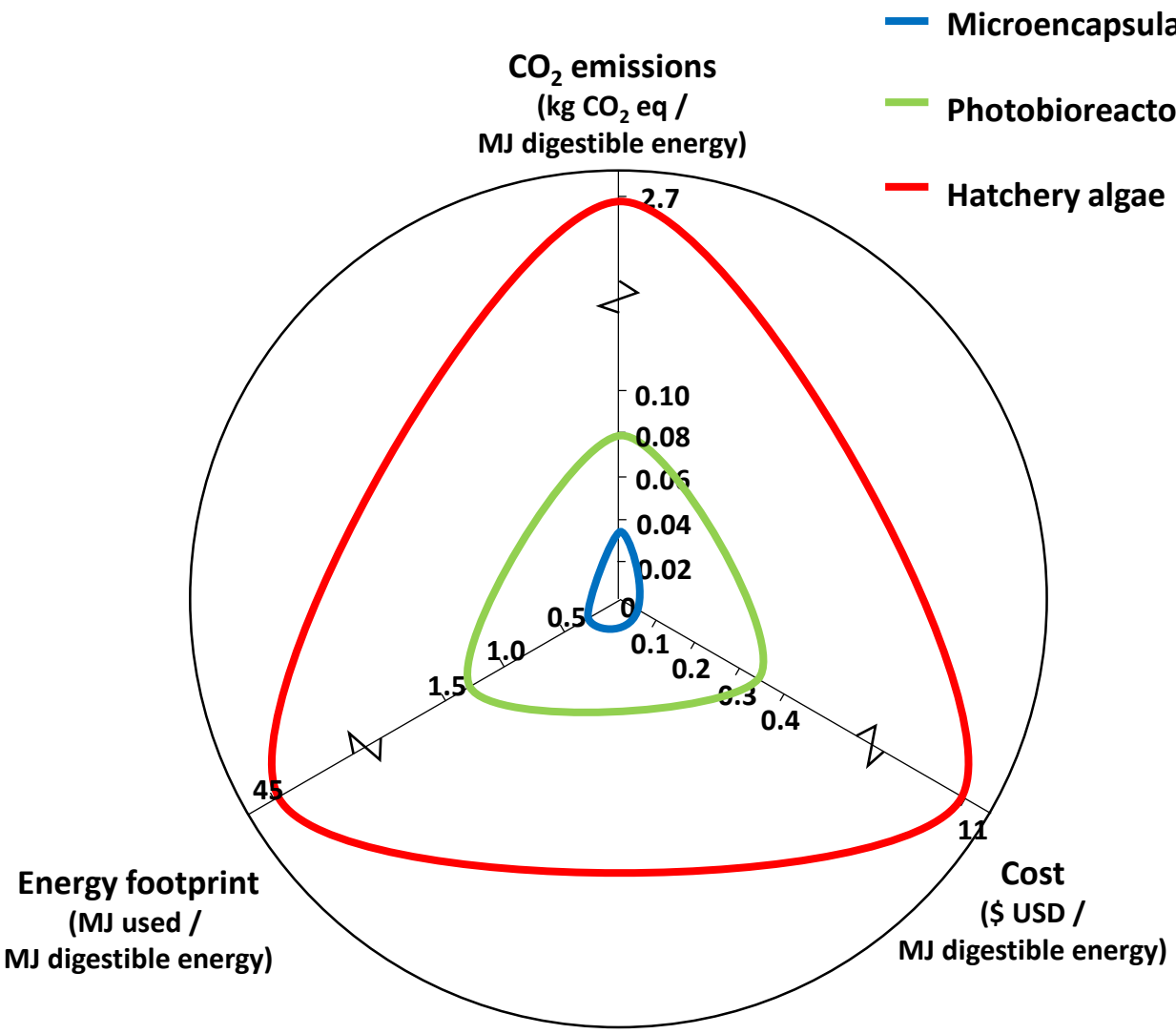




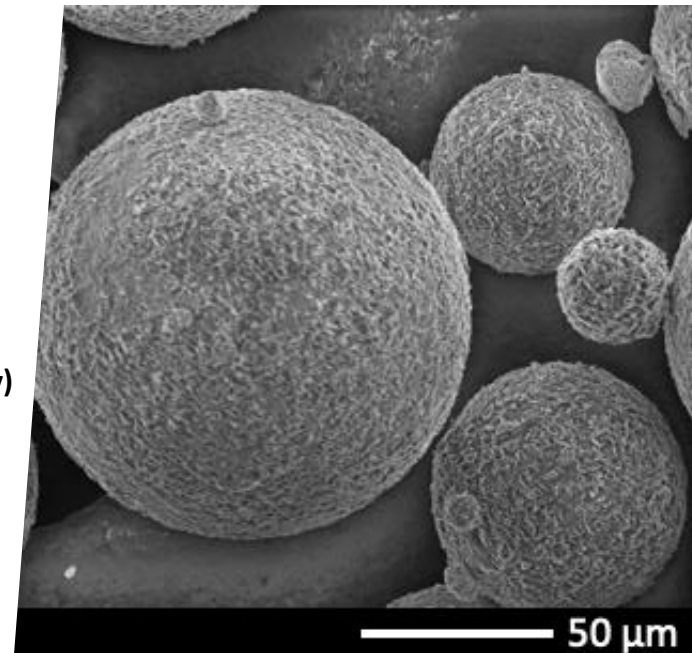

## Demand

# Microencapsulated feeds are cost effective & sustainable



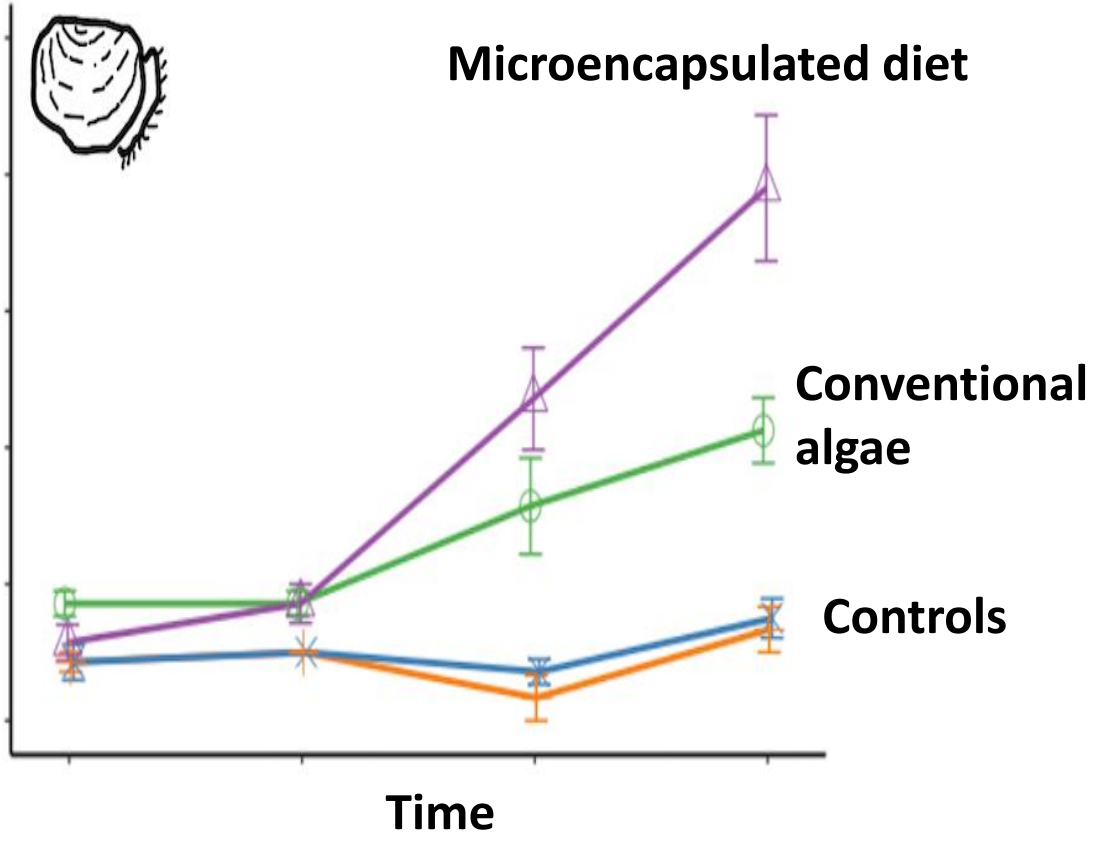

- Sustainably sourced algae
- Lipid encapsulant
- Optimised buoyancy, shape, size, palatability




*Willer, D. F. & Aldridge, D. C. (2019). Microencapsulated diets to improve bivalve shellfish aquaculture for global food security. Global Food Security 23, 64–73.*

# Microencapsulated feeds improve bivalve growth & reproductive output

**Juvenile bivalve size**




**Gamete quality & yield enhanced by microencapsulated feed**

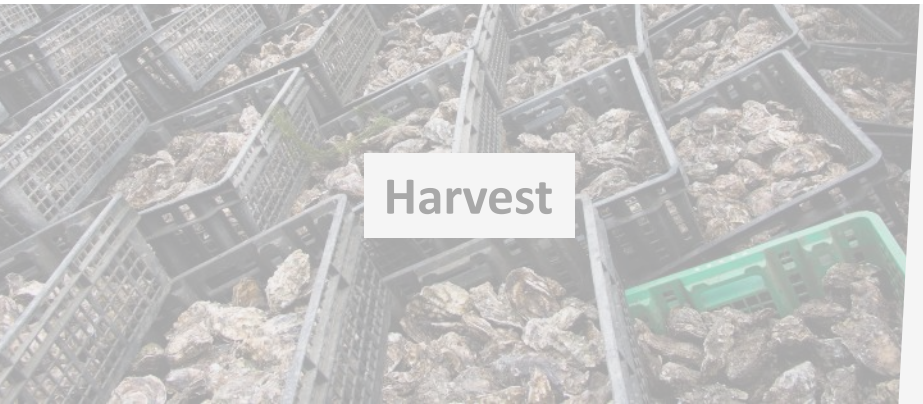
*Willer, D. & Aldridge, D. C. (2019). Microencapsulated diets to improve growth and survivorship in juvenile European flat oysters (Ostrea edulis). Aquaculture 505, 256–262.*

*Willer, D. F. & Aldridge, D. C. (2020). Microencapsulated algal feeds as a sustainable replacement diet for broodstock in commercial bivalve aquaculture. In review.*

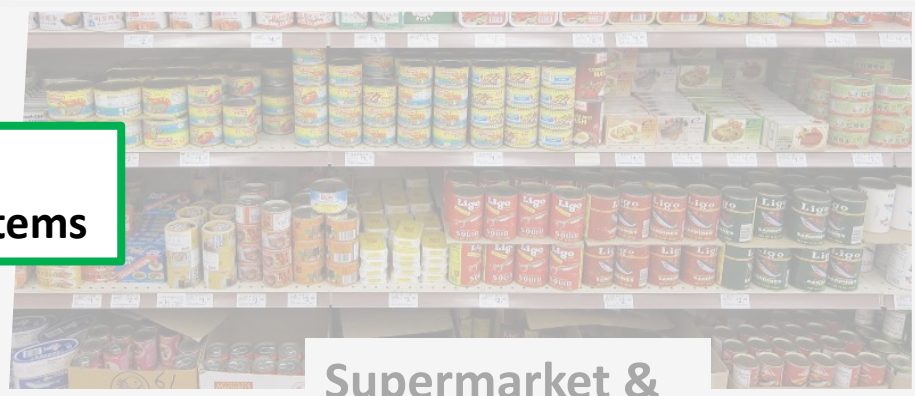
# Improvements needed to increase production of and demand for bivalves

## Production



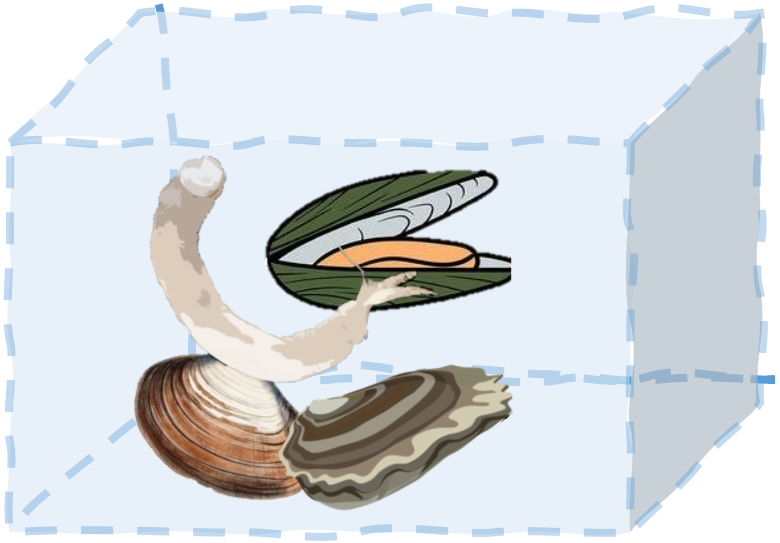



## Demand


# Controlled aquaculture systems could enable safe & fast bivalve grow-out

**Research planned for Q4 2020 onwards**



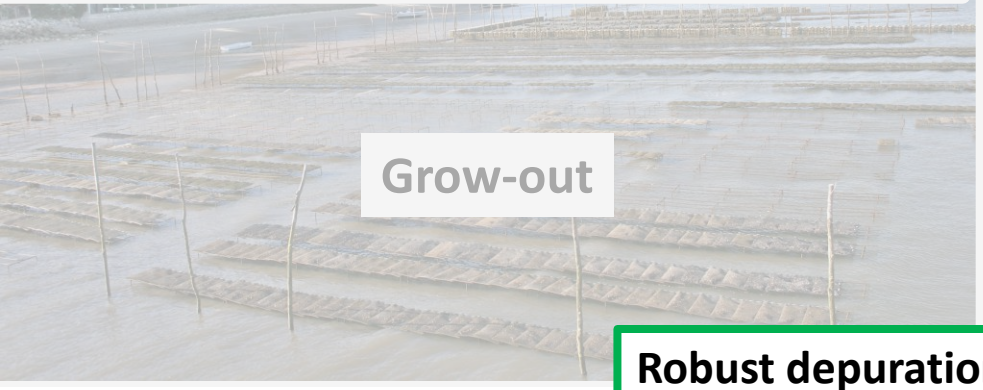
- **Enclosed systems to ensure water quality & food safety**
- **Safe use of novel fast-growing bivalve species**
- **Optimised growth parameters – temperature, saltwater formulation, enclosure design**

UK SEAFOOD INNOVATION FUND

*Willer, D. F. & Aldridge, D. C. (2020). From Villain to Saviour – The Underutilised Potential of Shipworms for Sustainable Aquaculture. In review.*

# Improvements needed to increase production of and demand for bivalves

## Production

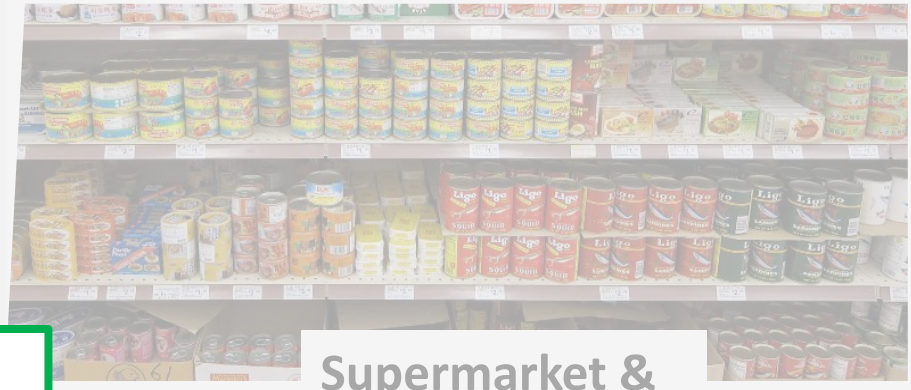





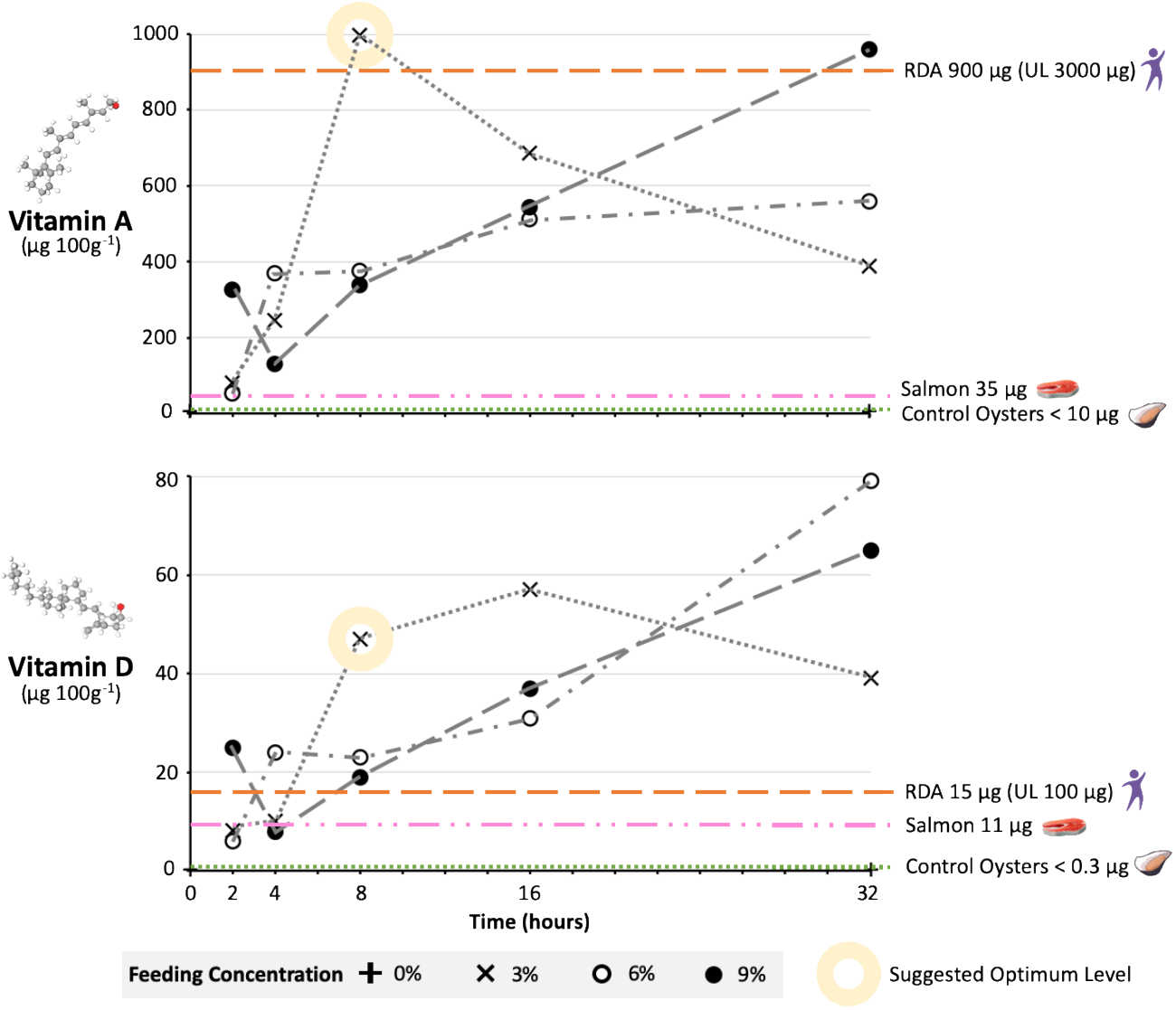
Robust depuration protocols

Opportunity for targeted nutritional fortification

## Demand


# Microencapsulated feeds enabled targeted fortification to tackle region-specific human nutritional deficiencies




*Willer, D. F. & Aldridge, D. C. (2020). Vitamin bullets. Microencapsulated feeds to fortify shellfish and tackle human nutrient deficiencies. Frontiers in Nutrition. Accepted.*

# Improvements needed to increase production of and demand for bivalves

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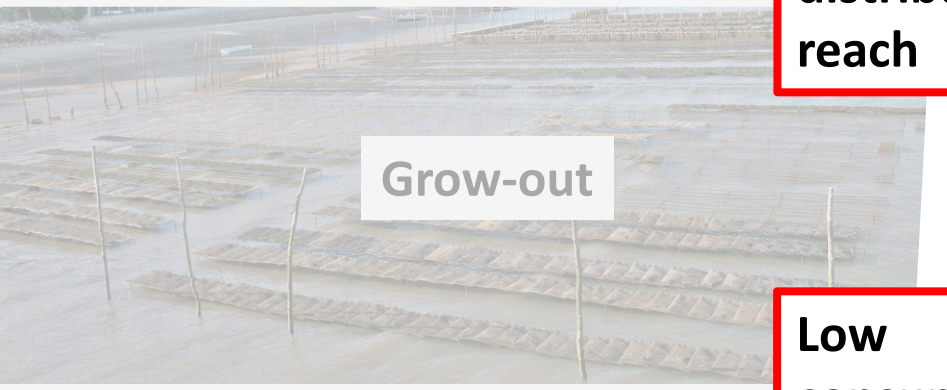


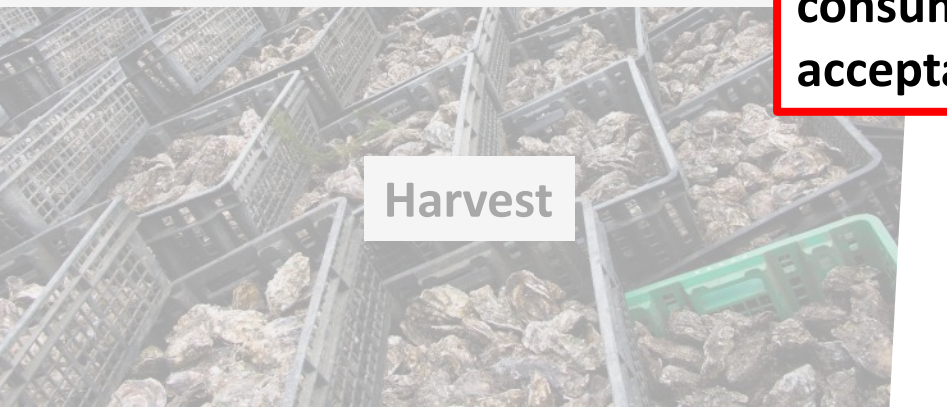


**Storage difficulties**

**Limited distribution reach**

**Low consumer acceptance**

## Demand

**Storage, processing & distribution**

**Food processing innovations**

**Major food brand incorporation**

**Supermarket & restaurant retail**

**Societal engagement**

# Food industry collaboration can increase demand for bivalve-based foods

- Integration of bivalve meat into familiar processed food products
  - Displace less sustainable fish & meat
  - Enable longer storage and wider distribution
  - Increase affordability
  - Tailor to regional tastes
- Stakeholder engagement
  - Major food brand incorporation
  - Restaurant & celebrity chef promotion of traditional bivalve meals
  - Promotion of health & sustainability benefits by governmental bodies

## Collaborations starting Q3 2020



Nomad Foods


*Willer D.F., Aldridge D.C. (2020). The world's their fish finger. University of Cambridge Magazine. https://www.cam.ac.uk/stories/fishfinger.*

# A blue horizon

Outstanding production potential

Nutritious

Sustainable


New innovations to increase production quantity & quality

Opportunities to apply innovations to other aquaculture sectors

High food industry and market interest

# Thank you

**Sustainable expansion of bivalve shellfish aquaculture for global food security**

Research led by David Willer & Dr David Aldridge

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