

David Willer

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 @SAGB



Shellfish
Association of Great Britain



seafish



SEPAmatic®



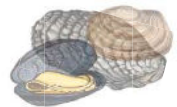
Mussels to the masses

Dr David Willer



Bivalves - an underexploited UK source of nutritional health & economic wealth

- Our need for more nutritious sustainable diets
- The nutritious, sustainable yet underexploited bivalve sector
- Why we need new bivalve solutions across the supply chain
- How to participate in turning opportunity into reality

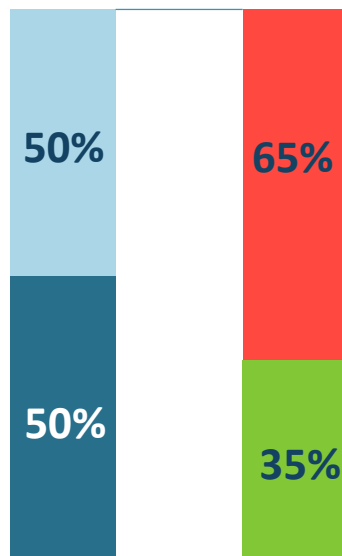


Poor diets are harming our health, economy and environment

Standard Western Diet *

Caloric Intake

Ultra-processed foods



Sugars, processed grains, fats, processed vegetable oils, alcohol

Meat, fish, pulses, eggs, dairy, fruit, vegetables

* Average US & UK diet



63% UK adults **overweight** and 30% **obese**
Obesity **denies** every adult of **9 years of life**



Obesity costs UK **£27 billion** of which NHS **£6.1 billion** per year

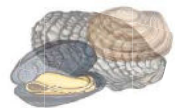


Unsustainable intensive arable farming to produce ultra-processed foods **drives soil degradation and carbon emissions**

60% of carbon in UK soils **already degraded**, costs us **£1.2 billion** per year



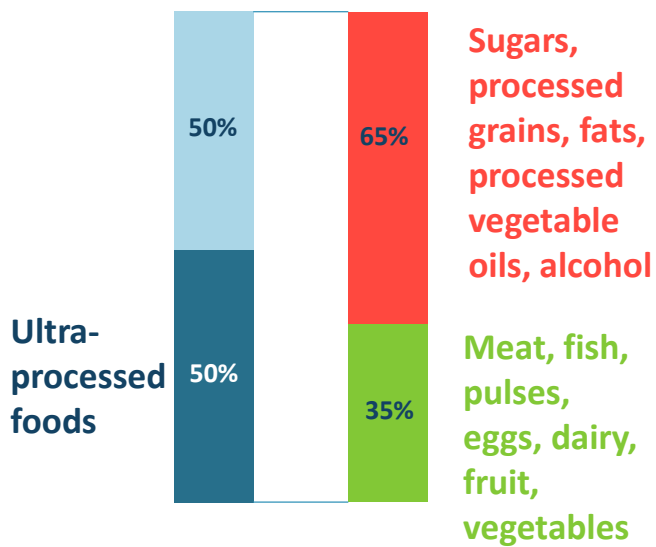
Remaining UK soils contain **10 billion tonnes carbon** – equivalent to **80 years UK emissions**



Healthier, sustainable diets are more protein and nutrient-rich

Standard Western Diet *

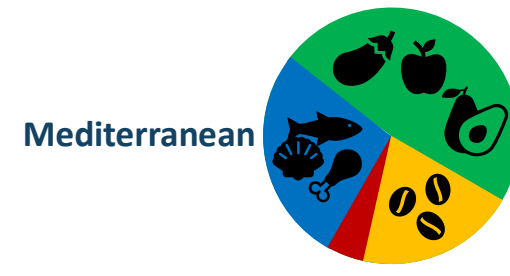
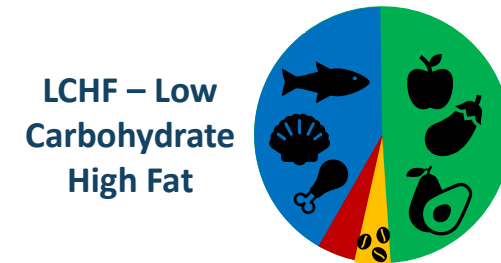
Caloric Intake



* Average US & UK diet

- Lots of **micronutrient rich** whole foods
- Adequate **protein** – 0.8 – 2 g per kg bodyweight
- Minimal free sugars
- More **fibre** – over 30g per day
- **Sustainable** production

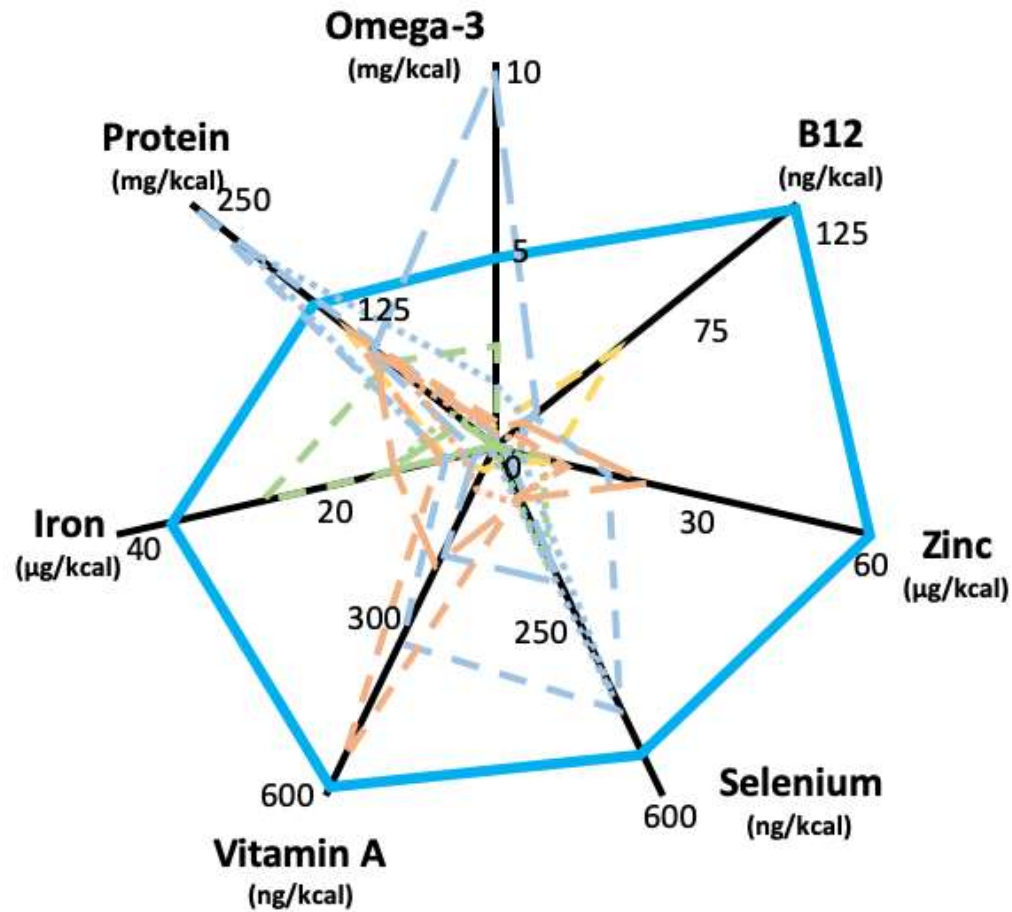
Illustrative healthier diet examples



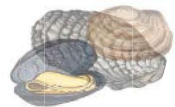
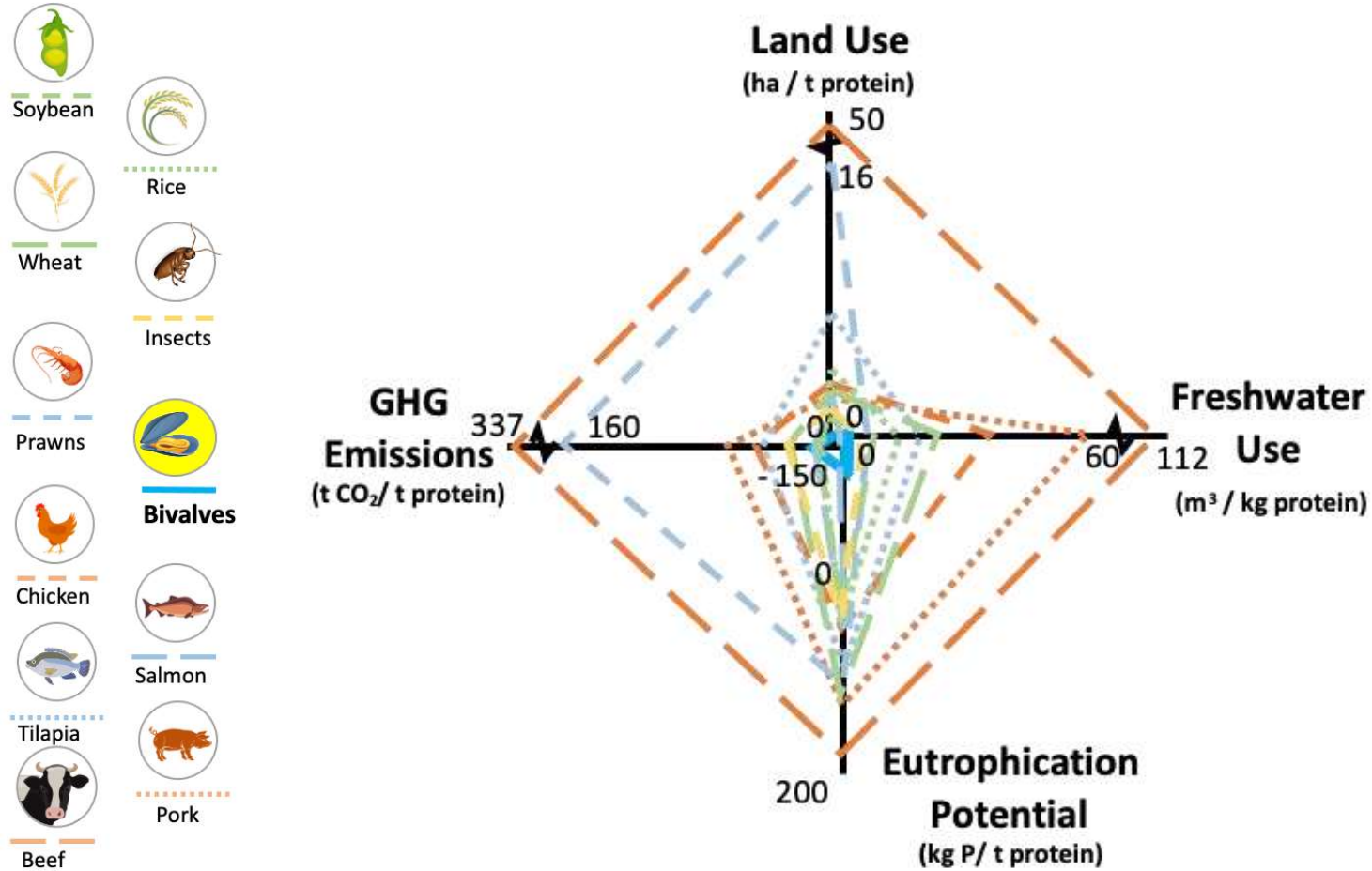
Meat & fish
Fruit & veg
Pulses, nuts, roots & wholegrains
Other



Bivalves offer a superior micronutrient-rich source of dietary protein



Bivalves also are a highly sustainable source of food



So, could UK's tiny bivalve sector grow to feed millions and generate billions?

Mussels Illustrative Example



A tiny sector

With scope for growth

Of great potential value

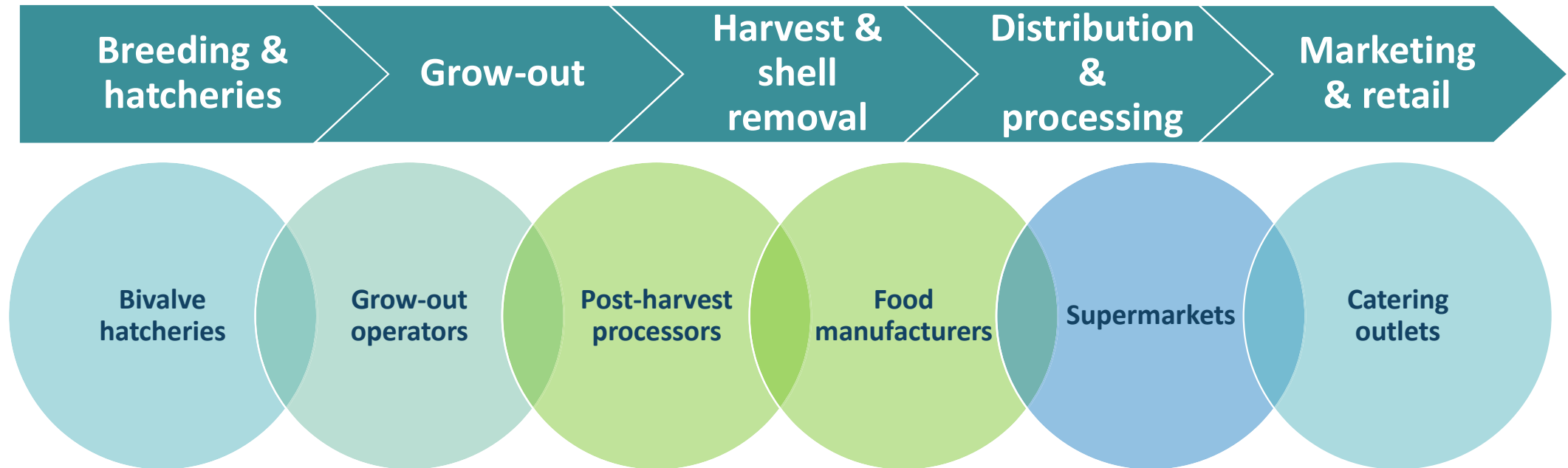
Typical sites:

- Off shore reefs
- Wind farms
- West Country
- Scotland
- etc

- UK production today is tiny – just 2700 tonnes mussel meat in 2020
- Research has shown UK has **560 km² coastline** suitable for mussels *, equivalent to a 30 m wide strip around the entire UK, which could produce **6.5 million tonnes mussel meat per year**
- If ultimately say only 10% of potential coastline were exploited this equates to the annual **protein requirements of ~4 million people**
- Even if wholesale market prices of ~£10/kg mussel meat fell say by as much as 50% due to sector growth, this would still represent **~£3.5 billion** per year wholesale
- By comparison the UK's most valuable food export, Scottish salmon, is currently worth around £1 billion per year



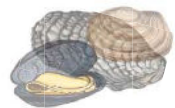
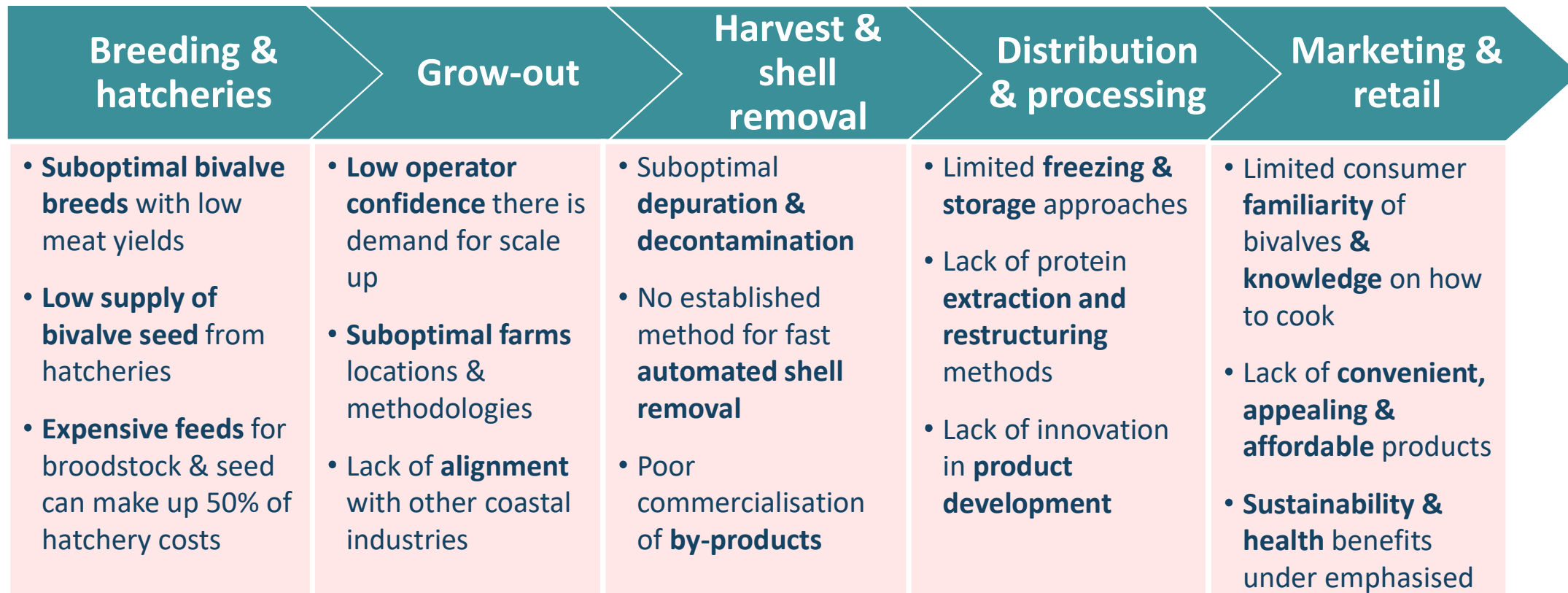
Innovation & investment will be required involving supply chain collaboration



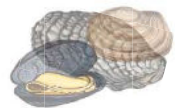
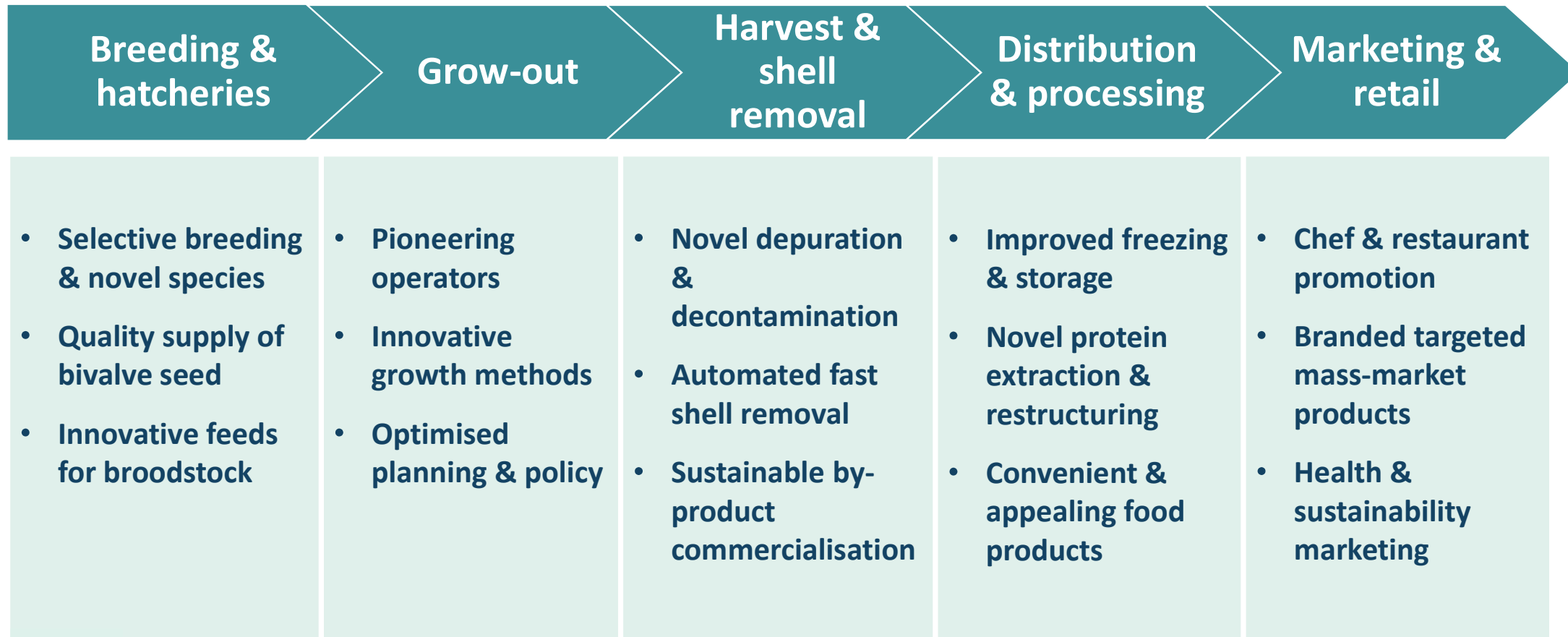
***Significant investment is needed to deliver improvements across the supply chain
Today much of production and retail stages are highly fragmented
Leading food manufacturers and supermarket chains have key roles to play***



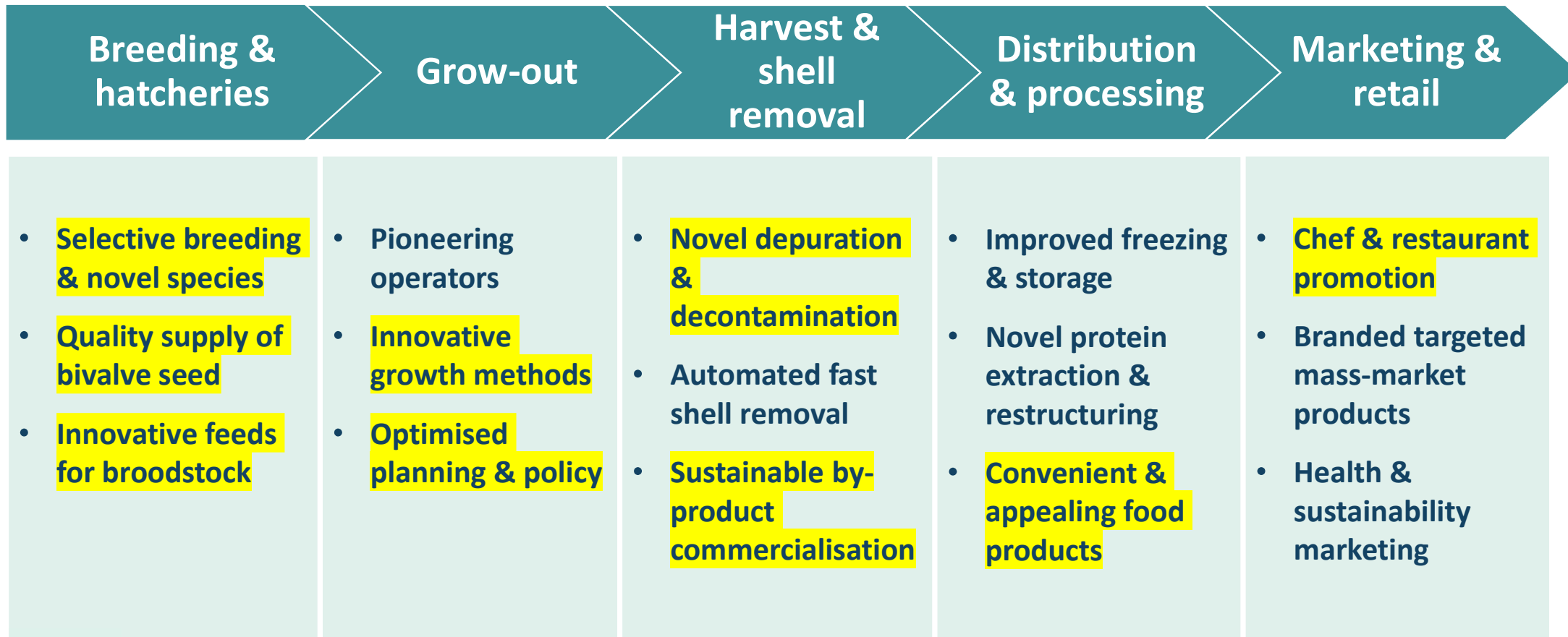
Several key barriers to growth help explain why bivalve sector is tiny



Break through innovation investment under discussion to drive market growth



Break through innovation investment under discussion to drive market growth



Cambridge University research areas and opportunities for collaboration

	Supply chain innovation	Current Cambridge University Research Group focus areas	References
Breeding & hatcheries	<ul style="list-style-type: none"> • Selective breeding & novel species 	<ul style="list-style-type: none"> • Shell-less clams that can reach 1m length in 6 months 	Willer & Aldridge 2020. <i>Frontiers in Sustainable Food Systems</i> . https://doi.org/10.3389/fsufs.2020.575416
	<ul style="list-style-type: none"> • Quality supply of bivalve seed 	<ul style="list-style-type: none"> • Microencapsulated feeds to improve juvenile growth rates & reduce mortality in hatcheries 	Willer & Aldridge 2019. <i>Aquaculture</i> . https://doi.org/10.1016/j.aquaculture.2019.02.072
Grow-out	<ul style="list-style-type: none"> • Innovative feeds for broodstock 	<ul style="list-style-type: none"> • Microencapsulated feeds to improve broodstock conditioning 	Willer, Furse & Aldridge 2020. <i>Scientific Reports</i> . https://doi.org/10.1038/s41598-020-69645-0
	<ul style="list-style-type: none"> • Innovative growth methods 	<ul style="list-style-type: none"> • Intensive controlled enclosed systems for growing bivalves faster than previously possible 	House, Aldridge & Willer. In preparation
Harvest & shell removal	<ul style="list-style-type: none"> • Optimised planning & policy 	<ul style="list-style-type: none"> • Research into global and UK site feasibility 	Willer & Aldridge 2020. <i>Nature Food</i> . https://doi.org/10.1038/s43016-020-0116-8
	<ul style="list-style-type: none"> • Novel depuration & decontamination 	<ul style="list-style-type: none"> • Intensive controlled enclosed systems 	House, Aldridge & Willer. In preparation
Distribution & processing	<ul style="list-style-type: none"> • Sustainable by-product commercialisation 	<ul style="list-style-type: none"> • Bivalve shells for phosphorous removal & reuse on fields 	Reynolds, Willer & Aldridge. In preparation
	<ul style="list-style-type: none"> • Convenient & appealing food products 	<ul style="list-style-type: none"> • Microcapsules to improve palatability, nutrient profile & value of bivalves 	Willer & Aldridge 2020. <i>Frontiers in Nutrition</i> . https://doi.org/10.3389/fnut.2020.00102
Marketing & retail	<ul style="list-style-type: none"> • Chef & restaurant promotion 	<ul style="list-style-type: none"> • University canteen trials to replace less sustainable foods with bivalves & influence future thought leaders 	Willer, House, Pilling & Garnett. In preparation



Need for innovation investment requires us to engage major stakeholders



Engagement: In 2020 we begin collaboration with Nomad Foods, Europe's largest frozen food company and owners of Birds Eye, Findus and iglo.



Objective: Assess the potential for mass-market food products using bivalves



Output: Major publication in December 2021 in *Nature Food* on 'Opportunities and challenges for upscaled global bivalve seafood production'



Impact: In April 2022 **Nomad Foods launch Open Innovation Portal** with the aim to bring bivalves into everyday meals within 2-3 years



Nomad's invitation to collaborate and profit from bivalve sector innovation



Seeking Partners To Develop Innovative Bi-Valve Solutions Along The Whole Supply Chain From Sea To Plate & Beyond

Nomad Foods

From United Kingdom

Very responsive

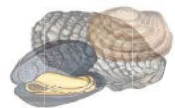
Deadline at 31/05/2022

Write your proposal

<https://www.innoget.com/technology-calls/2070/seeking-partners-to-develop-innovative-bi-valve-solutions-along-the-whole-supply-chain-from-sea-to-plate-beyond>

Nomad are looking to **collaborate with individuals, companies or academic institutions** to **develop innovative solutions along the whole supply chain** from sea to plate & beyond, including:

- **Selective breeding**, for production, processing, nutrition & organoleptic properties
- Sustainable farming & harvesting
- **Post-harvest treatments** eg depuration, decontamination
- **Consumer safety**
- **Meat/protein extraction**, preferably without denaturing the protein
- **Freezing**
- **Product structuring & development**, of intact meat, minced/chopped meat or extracted protein.
- Environmentally responsible **use of by-products** eg shells
- **LCA measurement & reduction** throughout supply chain
- **Nutritional benefits**
- **Consumer attitude & behaviour change**



Thank you

Dr David Willer

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SAGB 2022 - Mussels to the masses





52nd Annual Conference

Shellfish Association of Great Britain

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