RAS Aquaculture Systems (update for FFW roadshow)

A scoping study of the technical, regulatory, and economic challenges with respect to the development of the Recirculation Aquaculture System sector in England

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Background & Research

Background

- Ukraine invasion and rising food prices
- Fisheries Act
- Ministerial interest / English Aquaculture Plan.
- Defra commissioned Cefas for a high-level overview.

Research methods

- Literature search – published peer reviewed and grey literature, seed-corn, project, seminars and summits, newsletter & trade magazines.

- Stakeholder Survey
  - Stakeholders taken from FHI database
    (66 RAS stakeholders identified , 29 respondents = 44%)
  - Which RAS system and species most familiar -
  - Hierarchical ranking approach

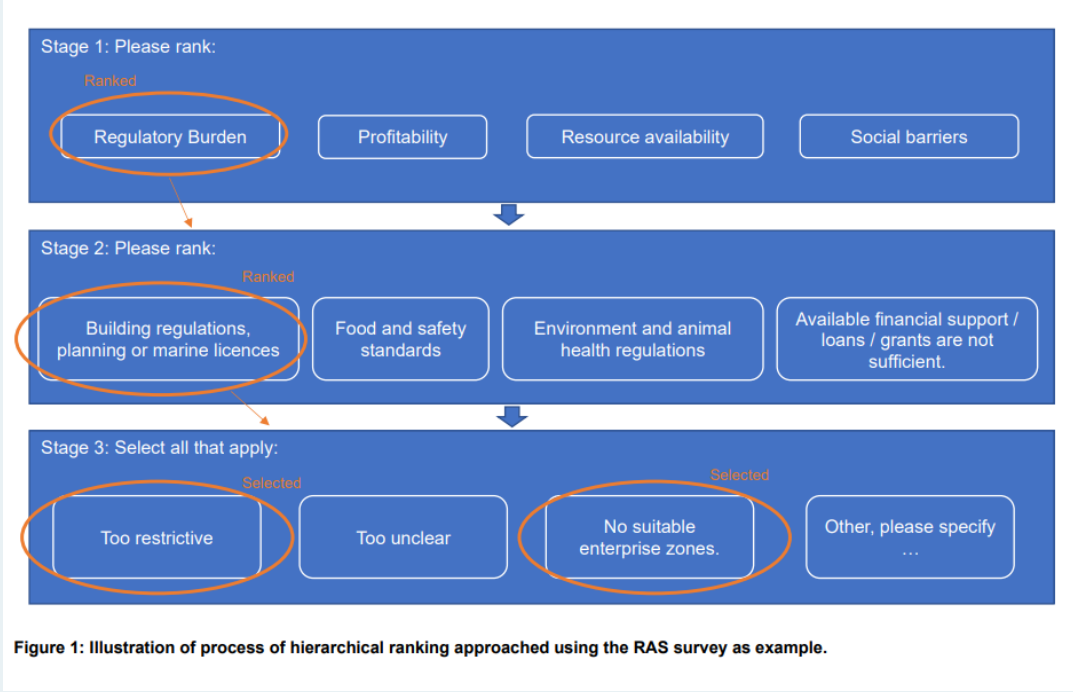

Figure 1: Illustration of process of hierarchical ranking approached using the RAS survey as example.

Key Findings (Literature)

- Growth in RAS continues at pace globally – (5k to 120K tonnes)
- England = small scale operations - Larger systems in development
- A range of RAS systems exist with hybrids being developed (LCA ?)
  - Increasingly linked with Aquaponics (circular economy)
- RAS address many environmental concerns of aquaculture
  - Escapees, discharge, predation, biosecurity, use of water and habitat.
- Biggest concern is carbon footprint – Requirement to drop kWh per kilo by 60%.
  - Alternative energy, Recapturing energy from waste, maximising internal efficiencies, closer to market.
- Spatial foot-prints are relatively small & feed utilisation is efficient
- Areas for development difficult to identify – Growth anticipated on Brown field sites and terrestrial farms.
  - Simplified licensing and permitting, water supply and infrastructure.
- Significant technical expertise required – skills not often transferrable
  - University role in technical expertise and providing graduates

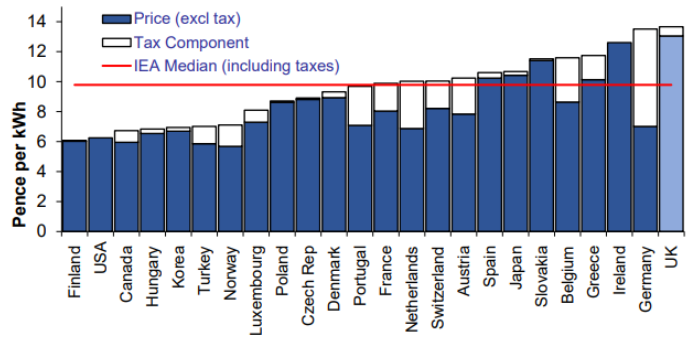

Figure 10: International comparison of industrial electricity prices in the International Energy Agency– 2021 (BEIS 2022)[1].

Table 4: Spatial footprints required for increases in RAS production in England.

	Production (tonnes)	Land Required (Ha)	Heathrow (1227 Ha) (% of area)	Hyde-park (142 Ha) (% of area)
EAP aspirations by 2040	34,608	21.6	1.76%	15.2%
Equivalent of Scottish Salmon production	160,000	124	10.1%	87.3%

Key Findings (Survey)

- Costs of establishing RAS restricting the growth of RAS in England.
- High production cost and a lack of suitable space identified by stakeholders.
- Higher level of investment and operating cost than other traditional aquaculture systems.
- Break even period for RAS reached later than other systems.
- High economic vulnerability: "if something goes wrong, it really goes wrong!"
- Regulatory barriers seen as the second biggest barrier.
- 86% of respondents were happy to take part in further engagement.
- Industry would benefit from increased financial support in R&D and early stages
    - Grants, Tax reliefs and special development zones.

Conclusions

- Without better incentives – rapid growth in English sector is not foreseen.
- However, 3 – 6 farms (5 to 10K each) could achieve EAP target of 34,608T by 2040.
- Social acceptance of RAS – requires early engagement with stakeholders.
- Increased uptake of partial RAS anticipated (climate change and low flows in rivers)
- Further growth in Salmon and Prawns most likely in England (market demand)
- Tilapia and Catfish may be economically challenging.
- Longer term – high value species such as Yellowtail, Meagre or Grouper may be viable
    - Requires adequate hatcheries and supply lines.

Recommendations

Regulatory

- Updating and clarification of permitted development rights (as per Scotland)
- Clarification of environmental permitting (discharge)
- Review the barriers for importing prawn larvae into Epi isolated systems
- Clarification of Hygiene rules on farms for local authorities and farmers

Non-Regulatory

- Explore why RAS is excluded from Enterprise zones (tax breaks and benefits)
- Increased support for transition to alternative energy systems
- Encourage universities to develop engineering projects for emerging hybrid systems
- Development of larger future workforce with Educational facilities.
- Semi-structured interviews within RAS facilities to deliver information on barriers.
- Research within communities of possible RAS to ID how to build with community support.

Next steps

Continued investment is expected.

- Lessons learn't and increasing knowledge will reduce business failure rates
- Given potential for increasing aquatic food security whilst minimising environmental impacts, government should recognise barriers to growth by adopting a risk-based approach to health, hygiene, permitting and planning.

Policy team have taken away for consideration (but no further budget)

Cefas to pursue funding for further work from other sources.

- Technical recommendations from Ian Tew's Seedcorn project
- Recommendations from report
- Social studies where literature is mostly absent.

Further information & videos

Links are provided below for examples of whats happening in the RAS world for those with further interest .

Billund Aquaculture RAS Technology - YouTube

African Catfish Facility in Slovakia - with AquaMaof RAS technology - YouTube

Atlantic Sapphire, Salmon City - Homestead Bluehouse - YouTube