Developing next-level phenotyping for fish in land-based recirculating aquaculture systems (RAS)

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TOPSECTOR

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Background & Objective

The problem:
Breeding and management decisions require data on feed conversion efficiency, health and welfare, stress, flesh quality, nutritional composition etc. that are currently difficult and costly to measure

The solution:
Combine existing imaging technologies (e.g. 3-D, Multi-spectral, X-ray, ultra-sound, NMRI) and advanced artificial intelligence into a high-throughput system

The approach:
Build a consortium of producers, researchers and computer scientists to identify requirements and develop a research & development strategy

The product:
Comprehensive research and development plan/proposal to design, build and validate a practical, high-throughput system for routine management decisions and selective breeding

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Progress: Expanded consortium

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Progress: Expanded ambition to benefit the _entire_ fish culture sector

- Additional production systems
  - Land- based recirculating systems
  - Sea cages
  - Ponds & Raceways
- More applications
  - Breeding
  - Disease/deformity/stress detection
  - Routine monitoring, sorting & management
- More species

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Current Prototype

- Standard (RGB) and 3-D imaging only
- In-built weighing scale (problematic)
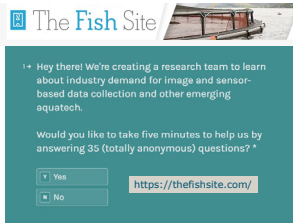- Basic real-time sorting capabilities

Top camera
LED light bars
Front camera
Camera trigger
Tag reader
Load cells for weighing
2-Category sorting

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Potential additional capabilities

Xray image for feed intake and skeletal problems
Computer counts beads in special feed

Spectral imaging for health and quality traits

MRI images of fish adipose tissues (red area)
Grass carp
Nile Tilapia
Turbot

Ultrasound for internal organs

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Initial priority: Understand the market for this technology

- Comments on proposal emphasized need for **practical** applications
- Initial consortium meetings also ⇒ consensus on need for **market analysis** before proceeding
- Survey developed in collaboration with The Fish Site
  - Part 1: Questions about potential users and applications (producers, processors, breeding programs, researchers)
  - Part 2: Questions about desired capabilities and willingness to pay
- Currently live online!

The Fish Site

↑ Hey there! We're creating a research team to learn about industry demand for image and sensor-based data collection and other emerging aquatech.

Would you like to take five minutes to help us by answering 35 (totally anonymous) questions? *

☑ Yes

☒ No

https://thefishsite.com/

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Path to completion

January
- Digest/analyze results of market survey

February
- Develop specifications/requirements for system capabilities for different market sectors and concept-level design

March/April
- Develop operational-level R&D plan with specific objectives, work packages, tasks, deliverables, and a realistic time-line.
- Identify sources of R&D funding to implement operational-level plan and realize a prototype for commercially viable system
- Write funding proposal

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