## Scottish innovation landscape

<table>
<thead>
<tr>
<th>Area</th>
<th>Funding (£)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aquaculture</td>
<td>£11.2M</td>
</tr>
<tr>
<td>Stratified Medicine</td>
<td>£8M</td>
</tr>
<tr>
<td>Sensors and Imaging</td>
<td>£10M</td>
</tr>
<tr>
<td>Digital Health</td>
<td>£10M</td>
</tr>
<tr>
<td>Industrial Biotech</td>
<td>£10M</td>
</tr>
<tr>
<td>Oil and Gas</td>
<td>£10.6M</td>
</tr>
<tr>
<td>Construction</td>
<td>£7.5M</td>
</tr>
<tr>
<td>DataLab</td>
<td>£10M</td>
</tr>
</tbody>
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**SAIC is 1 of 8 ICs funded by SFC**
Scottish aquaculture: a snapshot

- Scottish aquaculture: worth over £1.8bn to UK economy & 8,000 jobs
- Salmon production 179,000 tonnes 2014 and exports worth approx. £500m
- Mussel production 2015, 2\textsuperscript{nd} highest ever at 7,720 tonnes
- 5 main salmon producers, circa 140 active sites
- 3 main feed companies
- Active supply chain (genetics – equipment)
- Strong academic base, global links and alumni
- Strong Scottish SF&D brand
- Circa >£200m of planned investment/pa
- \textbf{BUT}, market share is falling
Aquaculture: driving growth in one of Scotland’s key industries through innovation and international ambition
Ambitious growth plans

Vision 2030 Strategy

- Doubling of current production value to £3.6Bn
- Associated job creation 18,000
- Major drive to catalyse innovation in the supply chain
It’s our job to actively seek out and fund innovative, transformational aquaculture research that delivers growth in the Scottish aquaculture industry...

..... we’re here to problem solve and help ensure that great projects get funded.
4 Priority Innovation Areas

1. **Environmental and health challenges**
   With a specific focus on sea lice and gill health (Inc. Diagnostics)

2. **Sustainable Feeds and Nutrition:**
   Optimizing raw materials and associated health benefits

3. **Unlocking additional capacity and facilitating growth:**

4. **Development of secure, health certified Scottish mollusc spat production systems:**
Industry Partners
Academic Partners
Funding guidance

• Collaborative projects must have a lead industry sponsor paired with a Scottish HEI research partner.

• Applications MUST:
  - Be novel with strong scientific basis
  - Meet a commercial need
  - Deliver a benefit to the Scottish sector
  - Demonstrate ability to drive economic growth

• Typically technology readiness levels 4-7

• Open Call for expressions of interest, also themed Calls directed by industry priorities
Total project value (Q3 2016)

- **£10.35m**: Total
  - **£2.75m**: 26.5% SAIC contribution
  - **£6.92m**: 67% Industry contribution
  - **£0.68m**: 6.5% Academic contribution
Global challenge:
The Global Challenge

In the year 2050, the world population will require 100% more food, and 70% of this food must come from efficiency-improving technology.
Challenges = Opportunities

The challenges faced with the finite supply of fish oil

Algae Products Market is expected to reach US$44.6 Bn by 2023 — Credence Research

According to a new market report published by Credence Research Algae Products Market — Growth, Future Prospects, Competitive Analysis, and Forecast 2016 – 2023, algae products market is expected to reach US$44.6 Bn in 2023, expanding at a CAGR of more than 50% from 2016 to 2023.

Growing demand for algae from the pharmaceutical and nutraceutical industries is driving the demand for algae products in the region. North America is also expected to boast higher demand for algae products in the near future due to growing algae research and developments in the region. Other regions such as Asia Pacific, Latin America and Middle East are also expected to see significant growth in the near future.

BioMar and Morris weighing up use of poultry derived protein in salmon feed

Working in partnership with leading marine aquafeed producers and Scottish research institutes, the two companies are looking to develop a low-cost, high performance alternative to current, often expensive and environmentally unfriendly, marine based feed products.

The Scottish Aquaculture Innovation Centre (SAIL) announced support to the tune of £460,000 ($561,175) for the pilot project and another five further projects, including Algae, University of Edinburgh, University of Strathclyde, and University of Aberdeen.

For more information, visit: https://www.sail.ac.uk/
Salmon compared with other protein sources:

<table>
<thead>
<tr>
<th></th>
<th>Salmon</th>
<th>Beef</th>
<th>Pork</th>
<th>Chicken</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protein Retention</td>
<td>31%</td>
<td>18%</td>
<td>21%</td>
<td>15%</td>
</tr>
<tr>
<td>Energy Retention</td>
<td>23%</td>
<td>27%</td>
<td>14%</td>
<td>10%</td>
</tr>
<tr>
<td>Edible Yield</td>
<td>60%</td>
<td>52%</td>
<td>46%</td>
<td>41%</td>
</tr>
<tr>
<td>Feed Conversion Ratio (FCR)</td>
<td>1.1</td>
<td>3.0</td>
<td>2.2</td>
<td>4-10</td>
</tr>
<tr>
<td>Edible Meat per 100 kg fed</td>
<td>61kg</td>
<td>17kg</td>
<td>21kg</td>
<td>4-10 kg</td>
</tr>
</tbody>
</table>

**Graphs:**
- Graph on the left: Comparison of greenhouse gas emissions (in kg CO₂ equivalents per kg produced) for Salmon, Pork, and Beef.
- Graph on the right: Water use in liters per 1 kg of edible weight for Salmon, Pork, Beef, and Chicken.
Changing Diets: Protein

- Aquaculture utilizes 80% of fishmeal availability
- Most other protein comes from non GM Soy – niche market
Changing diets: Fish Oil

- Fish oil supply is finite and demand is growing. Aquaculture uses 70%.
- Micro algal or plant sources?
Opportunities Circular economy feedstocks and production methods:
Potential alternative sustainable sources:

• Opportunities for supply protein and lipid
• Must be the right profile, free from contaminants, non GM.
• No anti-nutrition factors – pro nutrition
• Oils rich yield in EPA and DHA.
• Available – space in diet - cell walls
• Quantity >$10^3$ tonnes security or speciality diets
• >200,000 tonnes fish feed annually in Scotland
• Price competitive, low Co2
Changing context

Independent Review of Innovation Centres Programme – led by Professor Graeme Reid

This independent review will focus on the delivery of the original vision, aims and objectives of the Innovation Centres Programme. It will be led by Professor Graeme Reid and supported by an Advisory Committee and economic assessment consultants, EKOS Ltd. This approach has been chosen to ensure transparency of the review and the credibility of its recommendations.
Connect and collaborate

- Sign up to our Connect+Collaborate service at [http://eepurl.com/8yBWv](http://eepurl.com/8yBWv)
- Call us on 01786 278 322 or visit us at Stirling University Innovation Park
- Email us at [info@scottishaquaculture.com](mailto:info@scottishaquaculture.com)
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