



Institute of Aquaculture Services for Industry

Contact Stirling for:

- Cooperative and contract research
- Diagnostics & immunology
- Physiological analysis
- Nutritional analytical services
- Field surveys and environmental monitoring
- Consultancy and advisory services

Aquaculture consultancy

As a global leader in aquaculture research and teaching, the Institute plays a major role in supporting the development of aquaculture world-wide. That position also enables us to provide a wide range of supporting services to the aquaculture industry on a paid-for basis. This can range from one-off laboratory analysis through to complex collaborative research or the input of expertise and management to start-up aquaculture ventures. In terms of advisory work, we also work with government

agencies around the world to provide input to policy development, and financial institutions to assist with due diligence and risk assessment. Projects of this type are managed through our dedicated consultancy arm "Stirling Aquaculture" which has a core staff that are able to draw on the expertise of other members of the Institute's staff or on a group of experienced associate consultants to meet the specific needs of each client and assignment. A careful combination of academic expertise

and applied management experience is often key to successful outcomes. Working at the interface between research and practice helps us to understand innovation and how it can be supported across a range of organizations. Key services include:

- Market opportunity and feasibility studies
- Sector studies and due diligence
- Technical assessments
- Project management



Stirling Aquaculture has recently carried out studies on the aquaculture sector for the European Parliament and Commission

Contract research/aquarium trials

We offer a long-established and successful contract research service which supports development and testing of a wide range of products for use in aquaculture and fisheries, including parasiticides, antibiotics, vaccines, feeds and feed additives. Our commercially

oriented approach allows us to offer a professional and cost effective service from planning and conduct of studies to data analysis and report preparation. We undertake regulatory studies in compliance with Good Laboratory Practice (GLP). We have extensive aquarium facilities at

the Niall Bromage Freshwater Unit at Buckieburn and Marine Environmental Research Laboratory at Machrihanish. There is also a specialist aquarium for vaccine and therapeutic trials at the Institute of Aquaculture.

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Institute of Aquaculture

Diagnostics



Electron microscopy is used both for research and complex diagnostic cases

The Veterinary Diagnostics group work with individuals, companies and organisations to develop and provide total health management, ensuring high standards of veterinary care and attention. We have a core of veterinary and technical staff with many years experience in the provision of service to aquatic animals and have full access to the resources of the Institute of Aquaculture. Central to the service is a high level of expertise in fish pathology, supported by a range of other diag-

nostic tools. These include:

- Histopathology
- Bacterial recovery and identification
- Bacterial sampling of environmental samples
- Virology using cell culture or molecular screening using both RNA and DNA
- Parasite identification using light, confocal and electron microscopy
- Option for further investigation using immunological tools such as IHC, ELISA and

western blot, or molecular tools such as PCR, molecular typing and sequencing

The group are also able to offer a range of support services for veterinary care. These include:

- Efficacy testing of viral disinfectants
- Provision of health certificates
- In vitro testing of antimicrobial compounds
- Production of autogenous vaccines

“We aim to provide a dedicated and leading role in the support of worldwide aquaculture and fisheries”

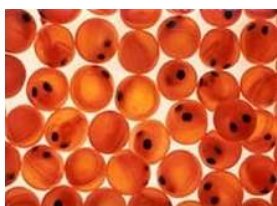
Immunology

A range of services are offered through the Immunology group to support veterinarians, fish health professionals, feed and vaccine companies. These include:

- Haematology (total cell counts, leukocyte differential counts and packed cell volume)
- Serum lysozyme activity
- Macrophage activity (phagocytic and respiratory burst activity)
- Serology including specific, non-specific and total IgM (e.g. After vaccination or to look at pre-exposure to viruses in broodstock) and cytokine analysis

The group are also able to provide analytical support to contract research projects, for instance using Real Time PCR or microarray analysis to help identify and investigate the expression of immune genes.

Genetics & reproduction



Improving the quality of stock and optimizing production cycles

The Genetics and Reproduction Group focuses on the management of broodstock and the production of fish as a controllable and sustainable resource. This involves studies of the control of maturation and puberty, the development and management of programmes of selective breeding, the mechanisms involved in sex differentiation and gender control, and basic research on important traits and

genes. All of these areas combine the use of the newer techniques of molecular biology and genomics with whole animal studies of physiology and function, in particular where they are relevant to commercial culture. This engagement with fundamental science allows the group to offer a number of services to the aquaculture industry including:

- Supply of tilapia fry (including

YY males or mixed sex red and wild-type strains)

- Melatonin analysis
- Cortisol analysis
- Light scanning and maturation assessment for salmon farmers
- Use of ultrasound to sex broodstock
- ATPase analysis to monitor smoltification
- Consultancy

Lab, aquarium & field services 2010

Nutrition

The Nutrition Analytical Service (NAS) offers a wide range of analytical skills that provide advice and analysis to the aquafeed, fish farming and processing, agricultural and food producing sectors. The NAS also provides a service for the analysis of human and animal clinical samples, especially blood fatty acid analysis

The NAS is located within the Institute's Lipid Nutrition Group, which is internationally recognised as a centre of excellence for lipid research. The newly refurbished laboratories are

equipped with modern HPLC, LC/MS, GC, GC/ mass spectrometry and GC/MS/MS equipment as well as state-of-the-art facilities for the automated extraction and purification of organic contaminants from complex matrices. Analysis offered includes:

- Oil/fat content of feeds, fish & raw materials
- Lipid class analysis
- Fatty acid analysis by gas chromatography
- Branched chain, CLA, trans fatty acids by GC & GC/MS

- Acid, peroxide and anisidine values of oils and feeds
- Cholesterol & fatty alcohols
- TBARS
- Ethoxyquin
- Carotenoid & xanthophylls pigments
- Fat soluble vitamins (A, D & E) & vitamin C
- Prostaglandins
- Protein, moisture, fibre, ash, total carbohydrate, energy
- Amino acids
- Dioxins, PCBs, PBDEs
- Emamectin benzoate



The Nutrition Analytical Service is working to the ISO 17025 quality system

Environment

The Environmental Services group predominantly but not exclusively serve the aquaculture sector, helping clients to fulfill their statutory and regulatory needs. This can include regular monitoring of sediment and water quality and advice on site developments to providing support to key environmental decisions.

Environmental Services is staffed

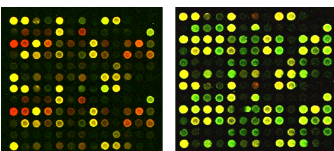
by a small, dedicated and experienced team of scientists and technicians who have been providing environmental survey services to the aquaculture industry, water authorities and private clients since 1984. Much of our work comes from the Scottish aquaculture sector, but increasingly we are developing services used by UK, European and other international clients. Our comprehensive range of services

include:

- Water quality analysis
- Biological sediment analysis
- Hydrography assessment
- Intertidal assessment
- Support to EIA and SEA
- Fish counting
- Sub-contracted services (supporting your activities)
- Commercial research
- Slice analysis

“We are committed to providing comprehensive, reliable and cost effective services to enable you to fulfil your welfare, environmental and regulatory needs”

Molecular ecotoxicology



Modern molecular tools can be applied to a wide range of problems in aquaculture, including environmental issues such as analysis of pollution and hydrocarbon taints in fish, detection of long-term and intermittent pol-

lutants, and assessment of the effects of leachate from landfill sites.

The group use PCR and Real Time PCR, micro-array hybridizer and fluorescent slide scanning technology to detect gene activity in response to environmental pollutants.

Associated consultancy includes environmental risk assessments, advice on pollutant detection

methods and investigations into pollutant sources.

Opportunities exist for contract research that seeks to understand the mechanism of susceptibility and resistance to environmental pollution in fish with the aim of developing better tools for assessing impacts or developing biomarkers for environmental monitoring.



Working with industry

Expert Advice & Services - Worldwide

The Institute of Aquaculture is the leading international centre in its field and is the largest of its kind in the world. Research focuses on fundamental questions relating to strategies for sustainable aquaculture, whether in modern commercial markets or in feeding poor communities in developing countries. Research, teaching and consultancy services focus on areas such as environmental interactions, aquatic animal reproduction, genetics, health and nutrition, production systems, markets and economics. A wide variety of courses are offered at degree level and above, including new options for distance learning and continuing professional development.

Read more at
www.aqua.stir.ac.uk

Training and collaboration

The Institute of Aquaculture offers a wide range of short course modules for continuing professional development. These are available as 2-week on-campus courses or from September 2010, as 7-week distance learning courses. Options include:

- Practical feed production
- Aquatic animal reproduction & genetics
- Aquatic animal production systems
- Aquaculture in practice
- Aquaculture systems engineering
- Epidemiology & health control
- Aquatic animal biology & health
- Sustainable shrimp aquaculture
- Business & financial management
- Aquatic animals & the environment
- Advanced environmental management
- Biodiversity & sustainable aquaculture
- Ecotoxicology
- Livelihoods & aquatic resource management
- Policy planning & management
- Geographic information systems

There is also an annual 3-day course in fish health management designed for fish farm staff.

The Institute is always open to collaborations and has many international linkages such that work requiring facilities and expertise not immediately available at the Institute of Aquaculture can be arranged through other partners. We are also keen to strengthen our links with industry through academic/industry exchange schemes and more recently the provision of facilities on-campus for commercial organizations to work more closely with Institute staff.



Large scale marine facilities available at Machrihanish