Home Office

NON-TECHNICAL SUMMARY

Research into infectious fish disease

Project duration

Years **3**
Months **3**

Project purpose

- (a) Basic research
- (b) Translational or applied research with one of the following aims:
  - (i) Avoidance, prevention, diagnosis or treatment of disease, ill-health or abnormality, or their effects, in man, animals or plants.
  - (iii) Improvement of the welfare of animals or of the production conditions for animals reared for agricultural purposes.

Key words

Fish, Disease

Retrospective assessment

> The Secretary of State has determined that a retrospective assessment of this licence is required, and should be submitted within 6 months of the licence's revocation date.

Objectives and benefits

Description of the project's objectives, for example the scientific unknowns or clinical or scientific needs it's addressing.

What is the aim of this project?

To better understand, diagnose, control and prevent fish diseases, thus improving production and welfare of farmed fish and protecting wild aquatic life.

There are two main sub-objectives:

a) To improve understanding of aquatic animal disease (host susceptibility, infectivity, and pathogenicity);

b) To develop and apply methods examining the efficacy of substances for therapeutic and/or diagnostic use

Potential benefits likely to derive from the project, for example how science might be advanced or how humans, animals or the environment might benefit - these could be short-term benefits within the duration of the project or long-term benefits that accrue after the project has finished.

What are the potential benefits that will derive from this project?

With the ongoing depletion of wild fish stocks, fish farming is increasingly a critical sector for aquatic food security. Despite major advances over the last 40 years, infectious diseases continue to be a major constraint, reducing productivity, fish welfare and resource use efficiency. Fish farms are usually in contact with the surrounding river/sea environment, meaning infections can move easily between farmed and wild stocks. Research to understand diseases and develop control methods (e.g. prophylactic treatments, vaccines, disease resistant strains, environmental epigenetic influences) is integral to assuring the future sustainability of aquaculture. The UK has a high aquatic health status, which is under constant threat from emerging and introduced diseases. Government policy is to eradicate any notifiable diseases disease by slaughter and disinfection if possible. This policy requires reliable validated diagnostic methods and an understanding of disease risks to wild fish populations. Maintenance of the UK’s aquatic biosecurity and compliance with national and EU legislation on aquatic disease requires knowledge of aquatic disease supported by long-term programmes of diagnostic tool development, disease monitoring, disease control and prophylaxis. These form the statutory and scientific basis of the aquatic animal disease research programmes for wild and farmed fish covered by this licence.

Species and numbers of animals expected to be used

What types and approximate numbers of animals will you use over the course of this project?

We seek authority to work with any fish species because fish from different environments and continents contribute to food security. In terms of wild fish disease research, we are likely to use endemic species. We seek authority to use a maximum number of 99,000 fish over a 5-year period; however, this number is expected to be much lower as it includes a large contingency in case a fish disease outbreak occurs requiring additional investigations

Predicted harms

Typical procedures done to animals, for example injections or surgical procedures, including duration of the experiment and number of procedures.

In the context of what you propose to do to the animals, what are the expected adverse effects and the likely/expected level of severity? What will happen to the animals at the end?

One main procedure is used in four of the six protocols in this licence; this involves pathogen challenge, i.e. controlled exposure to pathogens. By nature of the serious pathogens of interest, the potential adverse effects are generally severe. One of the protocols also employs environmental stressors in early development stages to induce heritable phenotypic changes independent of changes in the genome with potential for future developmental abnormalities. The actual adverse effects are managed by defined humane endpoints implemented by intensive monitoring which involves both direct visual checks and desktop observations of live videos from in-tank underwater cameras. To our knowledge, we are the only research facility employing such remote monitoring to manage fish welfare.

Application of the three Rs

1. Replacement

State why you need to use animals and why you cannot use non-animal alternatives.

The development of disease or resistance is difficult to study without a whole animal model as it involves multiple tissues and organs. The early parts of our investigations are conducted in nonanimal models; however, the infection, pathogenesis, host immune response, treatment and vaccination responses require complex metabolic, anatomical and immunological mechanisms that cannot yet be modelled in vitro or in surrogate invertebrate species.

2. Reduction

Explain how you will assure the use of minimum numbers of animals.

Every effort is made to minimise the numbers of animals used in studies: statisticians advise on the numbers required to achieve meaningful results, animal husbandry experts advise on fish social needs and the ethics committee (AWERB) scrutinises each study plan. Members of the AWERB include scientists, veterinary surgeons, animal husbandry experts and lay people; they all have the power to veto study plans.

3. Refinement

Explain the choice of species and why the animal model(s) you will use are the most refined, having regard to the objectives. Explain the general measures you will take to minimise welfare costs (harms) to the animals.

We want to have the ability to work with any fish species, of interest to both conservation and food production. The main tool we will employ to refine prospective severe procedures and minimise

suffering is **close monitoring**.

Fish are typically sourced from our own breeding establishment to ensure disease-free, high quality animals acclimated to experimental tank conditions. Externally sourced fish are health screened on arrival and quarantined to ensure a good health status and acclimation before use. We have a dedicated, high-tech aquarium facility, with monitoring and call-out alarms (water temperature, flow, depth). Named persons oversee staff training and performance, care of fish, and dissemination of information. Close links with the international fish research community ensures we are aware of any developments in fish care and biosecurity. Consideration is given to all aspects of the environment (including enrichment) e.g. space, water quality and current, conspecific density, lighting, shading, refuges and diet. We have a dedicated team of specialist aquarists complemented by long-standing experience in fish husbandry. Stock and experimental fish are closely monitored and interventions (including veterinary treatments) are implemented wherever possible. We believe we have a strong institutional culture of care and have review processes to identify where improvements in care can be made.