

Harmonisation of the Care and Use of Fish in Research

Gardermoen, 22 – 24 September 2009

A consensus document from the participants

Introduction

An international consensus meeting was held in September 2009 at Gardermoen, Oslo, to discuss the care and use of fish in research. A total of 61 participants from Norway (43), Great Britain (10), Sweden (4), Canada (1), The Netherlands (1), Singapore (1) and the USA (1) attended the meeting.

The meeting was organised by Norway's Consensus-Platform for Replacement, Reduction and Refinement of Animal Experiments, Norecopa (www.norecopa.no). It was a sequel to a similar consensus meeting arranged in May 2005

(<http://oslovet.veths.no/dokument.aspx?dokument=153>).

The specific aims of the meeting were:

- to provide a forum for dialogue between stakeholders (regulators, industry, researchers and animal welfarists)
- to increase focus on "the 3Rs" (*Replacement, Reduction, Refinement*) of Russell & Burch (http://altweb.jhsph.edu/publications/humane_exp/het-toc.htm)
- to further harmonisation and best practice in fish care and use
- to investigate whether progress has been made since the consensus meeting held in May 2005
- to identify tasks for Norecopa to work with in the area of fish research and testing.

This document summarises the participants' views on fish research and the potential for implementation of the 3Rs in this field. It is a consensus document that has been circulated to all participants for approval.

Specifically, the document summarises:

1. *The participants' perception of the current status in fish research as regards implementation of the 3Rs, expressed in terms of strengths and opportunities.*
2. *Tasks identified by the participants that still remain to be undertaken by those involved in or connected with fish researcher and Norecopa, respectively.*

1. Strengths of fish research

1. Much of fish research benefits the species on which it is being performed. This increases the welfare of fish in other settings.
2. There is likely to be a general acceptance in society for some degree of fish research, for example to increase food production or where fish are used as comparative models in medical research.
3. Fish are useful vertebrate models for biomedical research. Many species have short reproductive cycles and embryonic forms that allow visualisation of their developmental stages.
4. Fish research can increase people's knowledge of and respect for the world around them. This can have a number of benefits, including improvements in the conservation of wild populations.
5. The fish research sector is relatively recent and rapidly expanding, with much expertise available in the scientific literature and on the Internet, including specialist user groups and discussion forums.

2. Opportunities for further implementation of the 3Rs within fish research

1. Greater awareness should be raised of the animal welfare and scientific benefits of applying the 3Rs in animal research and testing. Greater emphasis on the 3Rs could be included in applications for fish research.
2. The debate as to whether fish can feel pain is clouded by our incomplete understanding of the physiology of nociception and pain perception in all species. Beliefs that fish do not feel pain can have negative consequences for their welfare. These include acceptance of death or morbidity as an endpoint, lower standards of care, and less questioning of necessity and justification than in mammalian research. There may be educational opportunities to help explain that fish, in common with other vertebrates, should be given the benefit of the doubt with respect to their ability to feel pain and to suffer.
3. There are few specific guidelines for the care and use of fish species, including those most commonly used, and little obvious progress has been made since the first consensus meeting in 2005.

4. There is often more of an emphasis on populations rather than individual animals within fish research and testing. This can have negative welfare consequences for individuals.
5. Capture and selection of individual animals is often difficult to achieve and may be more distressing than the research procedure itself, as it often involves removal of the animals from their natural environment. Development and implementation of best practices for catching and handling fish are needed.
6. The numbers of fish required for regulatory purposes (e.g. vaccine development and testing) should be reassessed based on good science and advanced statistical methods.
7. There is a general lack of research on the welfare implications of procedures used in fish research. For example, little has been done to quantify the stress of capture and handling, the effects of telemetry devices, aversiveness of anaesthetic agents or recovery from surgical procedures.
8. There are specific problems with assessing the welfare of fish. It can be difficult to observe them and interpret their behaviour, especially when large numbers are housed together.
9. Knowledge of positive welfare indicators for fish is sparse. Validation of both positive and welfare indicators is challenging, due to the resources that are required to perform proper scientific evaluation studies. Progress is best achieved by using those indicators that exist, and evaluating them as they are used.
10. There are currently very limited options in the research environment for publishing good protocols, as well as sharing negative results, which means that other researchers may continue to use suboptimal procedures. Reporting the outcome of fish experiments, including details of housing and husbandry, enabling comparison with the predicted result in the original project application, would be helpful in promoting good practice.
11. Information is needed on identifying techniques that would cause the least pain, suffering or distress within individual projects. Guidance is especially needed relating to capture, blood sampling, marking for identification, anaesthesia, administration of substances and humane killing. This would ideally be based on research, but where this is not available, details of practices which have been used successfully and are believed to be humane could be described.
12. Expansion of funding for high quality fish research including studies designed to implement the 3Rs, would encourage developments.

3. Tasks for those involved in or connected with fish research

There is considerable scope for all stakeholders to work together and improve the implementation of the Three Rs in fish research and testing, and also to encourage questioning of the necessity and justification for fish use. Examples of positive initiatives recommended by the participants are:-

- 1, Commitment and collaboration between all stakeholders to research, understand and meet the requirements necessary to promote good welfare of fish used in research and testing.
2. Regular meetings of relevant experts to exchange information and discuss issues relating to the necessity and justification of fish use, harm-benefit assessments and the application of the 3Rs.
3. Greater production and dissemination of protocols, guidelines and information on a wide range of species and types of fish research, with input from all stakeholders including regulators, researchers, relevant industries (e.g. telemetry device manufacturers), veterinarians, animal technologists and care staff, and welfare organisations.
4. More widespread use of those welfare indicators that already exist, and work to develop and promote better indicators.
5. Application of precautionary principles where knowledge is lacking, accepting that fish share many of the physiological characteristics seen in terrestrial vertebrates.
6. The development and availability of sufficient training courses specifically designed for fish researchers, with input from researchers, veterinarians, regulators, animal technologists and care staff.

Within the various stakeholder groups, fish researchers (either in general or those working in specialised fields) can make a major contribution to reducing the impact of research and testing on fish. For example:

1. Fish behaviourists can use preference, motivational and avoidance tests to develop better methods for determining optimal water quality and environmental enrichment.
2. In vaccine studies, researchers can develop methods that can lead to replacement of some animal use with *in vitro* studies, reductions in the numbers of fish used in studies that must be performed *in vivo*, refinement of administration methods and improved implementation of humane endpoints.
3. In some fields, it may be possible to consider new techniques such as the use of telemetry or imaging as possibilities for refinement, but these should be used in such a way that pain, suffering or distress is minimised.

4. Tasks for Norecopa

Norecopa should:

1. arrange further meetings on a regular basis where all stakeholders are represented.
2. be an arena for discussion of the improvement of all aspects of fish use, including necessity, justification, ethical issues, guidelines and implementation of the 3Rs.
3. assist in international efforts to produce and publish species-specific guidelines for the care and use of the most commonly used fish species, such as the recommendations in Appendix A of ETS 123.
4. collect, review and stimulate the production of guidelines, checklists, welfare assessment schemes and protocols for fish research, recommending those that represent best practice for all of the above issues.
5. communicate and liaise with the Norwegian Animal Research Authority, the Norwegian Research Council and international bodies on all of the issues mentioned in this document.
6. promote discussions between regulators and the fish vaccine industry to replace, reduce and refine the number of animals used for vaccine development and testing.
7. seek consensus and then issue position statements based upon scientific evidence on controversial or central aspects of the care and use of fish in research, e.g. identification methods.
8. inform the general public of the current situation in fish research, to enhance understanding of research and increase focus on fish welfare in society.