

Canadian Council on Animal Care
Conseil canadien de protection des animaux

Good Animal Practice in Science
Bonnes pratiques animales en science



Global update on guidelines for fish research

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Guidelines and Three Rs Programs Director

Harmonisation of the Care and Use of Fish in Research

Gardermoen, Norway September 22-24, 2009

Overview

- Guidelines documents
- Access to latest knowledge
- Health and welfare monitoring
- Environmental needs
- Animal use reporting
- Three Rs



Harmonisation of the Care and Use of Fish in Research 23-26th May 2005



**Harmonisation of the Care and Use
of Fish in Research**

Report from an international consensus meeting

23rd – 26th May 2005

Gardermoen, Norway

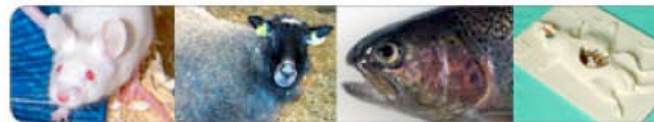


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NORWEGIAN CONSENSUS-PLATFORM FOR
REPLACEMENT, REDUCTION AND REFINEMENT OF ANIMAL EXPERIMENTS

Need Species Specific Guidelines That Take Into Account the Differences Between Research Disciplines





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Guidelines and other resources on the Care and Use of Fish in Research, Page 1

By Adrian Smith (Professor)

- **Revised version of Appendix A** of the "European Convention for the protection of animals used for scientific purposes". The revision came into force on 15 June 2007 and contains species-specific guidelines for a number of fish species.
- Wootten R (2005) **Species-specific provisions for fish** in the European Convention for the protection of animals used for experimental and scientific purposes (presentation at a meeting in Oslo in May 2005)
- Griffin G (2005) **Canadian Guidelines** for the care & use of fish in research, teaching and testing (presentation at a meeting in Oslo in May 2005)
- Guidelines on: the care and use of fish in research, teaching and testing (2005) Canadian Council on Animal Care (CCAC)
- Johansen R., Needham JR, Colquhoun D., Poppe TT & Smith AJ. (2006): Guidelines for health and welfare monitoring of fish used in research. *Laboratory Animals* 40(4): 323-340
- Guidelines for the Use of Fishes in Research (2004) American Fisheries Society (AFS)
- Ostrander GK (2000) *The Laboratory Fish*. Academic Press, Baltimore, USA.
- Poole T (1999) *UFAW Handbook on the Care and Management of Laboratory Animals. Volume 2: Amphibious & Aquatic Vertebrates & Advanced Invertebrates*. Blackwell Science.
- **Information Resources on Fish Welfare**, compiled by AWIC (Animal Welfare Information Center, United States Department of Agriculture)

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Entire website

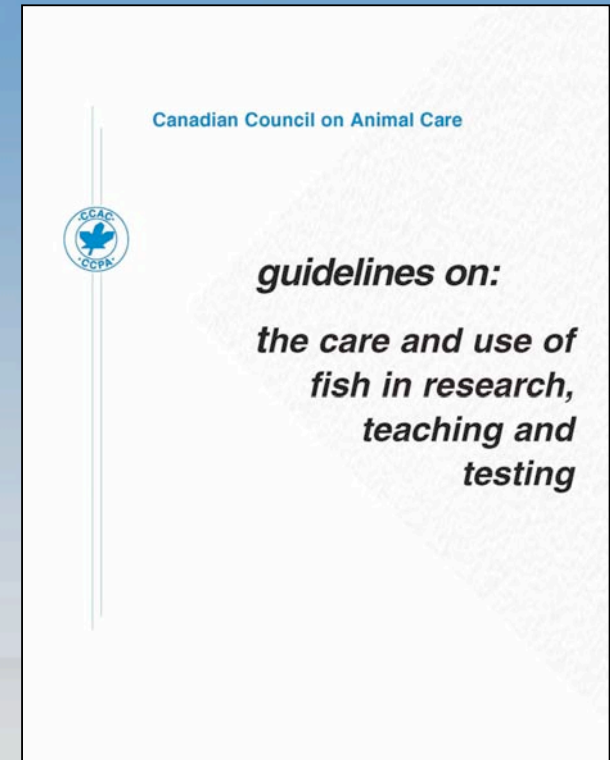
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<http://oslovet.veths.no/dokument.aspx?dokument=148>

Guidelines Documents

- *Guidelines for the Use of Fishes in Research* (UFRC, 2004)
- *CCAC guidelines on: the care and use of fish in research, teaching and testing* (2005)
- The European Convention for the Protection of Vertebrate Animals Used for Experimental and Other Scientific Purposes (ETS –123) Appendix A– *Guidelines for Accommodation and Care of Animals* (EC, 2007)
- *Acts and Regulations Concerning the care and use of Fish in Norwegian Research* (Johansen, Knudsen & Smith, 2005)



Need for Easy Access to the Latest Knowledge

- ◆ Best practice for the care and use of fish in research
- ◆ Health and welfare monitoring
- ◆ Good clinical practice
- ◆ Ability of fish to feel pain
- ◆ Knowledge of environmental needs
- ◆ How to apply the Three Rs



Need for More Standardized Models of Fish Research

- “Fishes should come from hatcheries with **defined health status** and preferably **known genetic history**. Hatcheries should be encouraged to develop husbandry and management practices consistent with those used in the production of other laboratory animals.” (CCAC, 2005)
- “Farmed fish should be procured from **reputable suppliers** and as far as possible have a **verified health status**.” (Appendix A, 2007)



Health Monitoring



- Aquatic Animal Health Code, 2006

and

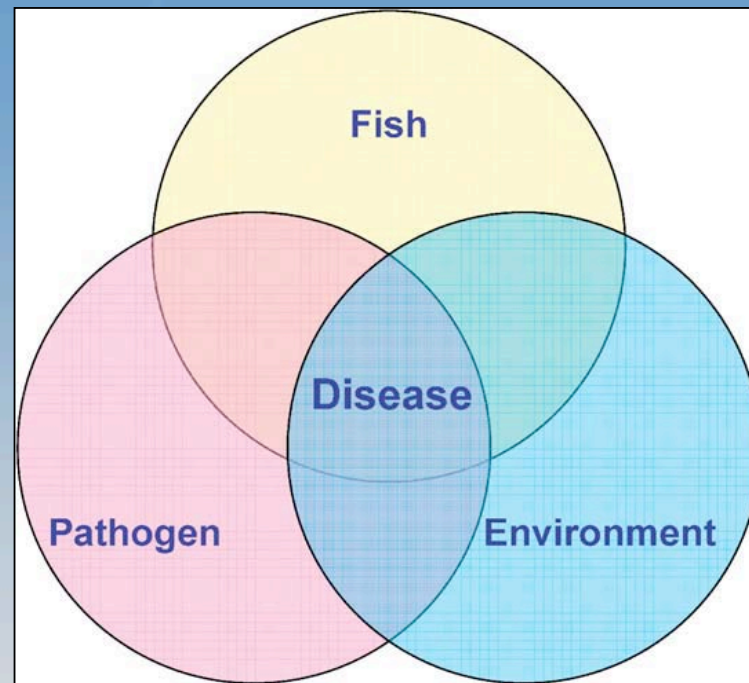
- Manual of Diagnostic Tests for Aquatic Animals

- ◆ Includes general recommendations on disease prevention and control

- Animal welfare was first identified as a priority in the *OIE Strategic Plan 2001-2005*



Standardization of Health and Welfare Monitoring



Johansen R, Needham JR, Colquhoun DJ, Poppe TT and Smith AJ (2006) Guidelines for health and welfare monitoring of fish used in research. *Laboratory Animals* 40: 323-340

Health and Welfare Monitoring

- Guidelines for health and welfare monitoring of fish used in research
(Johansen, R, Needham JR, Colquhoun DJ, Poppe TT & Smith AJ (2006) *Laboratory Animals* 40: 323 -340
 - ◆ Comprehensive checklist for reporting results
 - Selection of fish
 - Quarantine
 - Environment
 - Holding facilities
 - Handling procedures
 - Pathogens
 - Non-infectious diseases
 - Welfare
 - Interpretation in relation to experimental aims



Standardization of Care and Housing of Fish



Standardization of Care and Housing of Fish

- Laboratory culture systems are based upon a variety of designs, ranging from a few aquaria to large systems with a full complement of aquaria, raceways, and ponds. The numerous fish species have a variety of requirements; therefore, the laboratory should be **designed to be flexible** and to **accommodate all species** of potential interest (UFRC, 2004)
- Aquatic environments should be designed to meet the **established physical and behavioral requirements** of the fishes in terms of shelter, social grouping, overhead cover and lighting (CCAC, 2005)
- Investigators and animal care staff should acquaint themselves with the **characteristics of the proposed experimental fish species**, to ensure that appropriate facilities and husbandry procedures are in place before animals are obtained (Appendix A, 2007)




Species Specific Information


- Where the environmental requirements of fish are not well known, as far as possible the holding conditions should be designed to approximate the source environment (CCAC, 2005)
- Species-specific guidance is available in the background document elaborated by the Group of Experts. Further advice on the requirements of these and other species should be sought from expert specialists and care staff to ensure that any particular species needs are adequately addressed (Appendix A, 2007).

- rainbow trout
- Atlantic salmon
- tilapiine
- cichlids
- zebra fish

- sea bass
- Atlantic halibut
- Atlantic cod
- turbot
- African catfish




Replacement ♦ Reduction ♦ Refinement
Good Animal Practice in Science


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ADDITIONAL RESOURCES
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 ● **Species-Specific Resources**
 Amphibians
 Bats
 Birds

Species-Specific Resources
 This section of the Three Rs microsite contains all references from the site that provide species-specific information.

Fish

CCAC resources

- Ackerman P.A., Morgan J.D., & Iwama G.K. (2005) *Anesthetics. (Supplement to the CCAC Guidelines on: the care and use of fish in research, teaching and testing).*
 - This document provides detailed information on the characteristics of the major anesthetics used on fishes, essential parameters for their application, including optimum and lethal doses, as well as induction and recovery times. Possible physiological effects and cautionary notes are also given.
- Canadian Council on Animal Care (CCAC) (2005) *CCAC guidelines on: the care and use of fish in research, teaching and testing* 87pp. Ottawa ON: CCAC.

Online articles

- Diseases of Aquatic Organisms (2007) *Welfare of Aquatic Organisms, theme issue. Diseases of Aquatic Organisms* 75 (2).
- Fisheries and Oceans Canada (DFO) (2004) *Blood Sampling of Finfish*. Canada Department of Fisheries and Oceans animal-user training template 4.
- Fisheries and Oceans Canada (DFO) (2004) *Marking and Tagging of Finfish*. Department of Fisheries and Oceans animal-user training template 6.
- Huntingford F.A., Adams C., Braithwaite V.A., Kadri S., Pottinger T.G., Sandøe P. & Turnbull J.F. (2006) *Current issues in fish welfare. Journal of Fish Biology* 68:332-372.

http://www.ccac.ca/en/alternatives/species-resources_ressources-especes/fish_poissons.html

Standardization of Environmental Factors



- Water quality
 - ◆ Oxygen, carbon dioxide, nitrogen compounds, pH, salinity
- Light regimes
- Temperature
- Noise



Need for More Knowledge and Debate on the Ability of Fish to Feel Pain

- UFRC (2004) reduction of stress most important
- CCAC (2005) precautionary approach
- ETS-123 (2007) presumed

“This Convention applies to any animal used or intended for use in any experimental or other scientific procedure where that procedure may cause pain, suffering, distress or lasting harm.”



Questions About Sentience and Other Troubling Issues That Lurk in Turbid Water

- Bekoff, M. (2007) Aquatic animals, cognitive ethology, and ethics: questions about sentience and other troubling issues that lurk in turbid water. *Welfare of Aquatic Organisms. Diseases of Aquatic Organisms*, 75(2): 87-98.
 - ◆ Available at:
<http://www.int-res.com/abstracts/dao/v75/n2/>

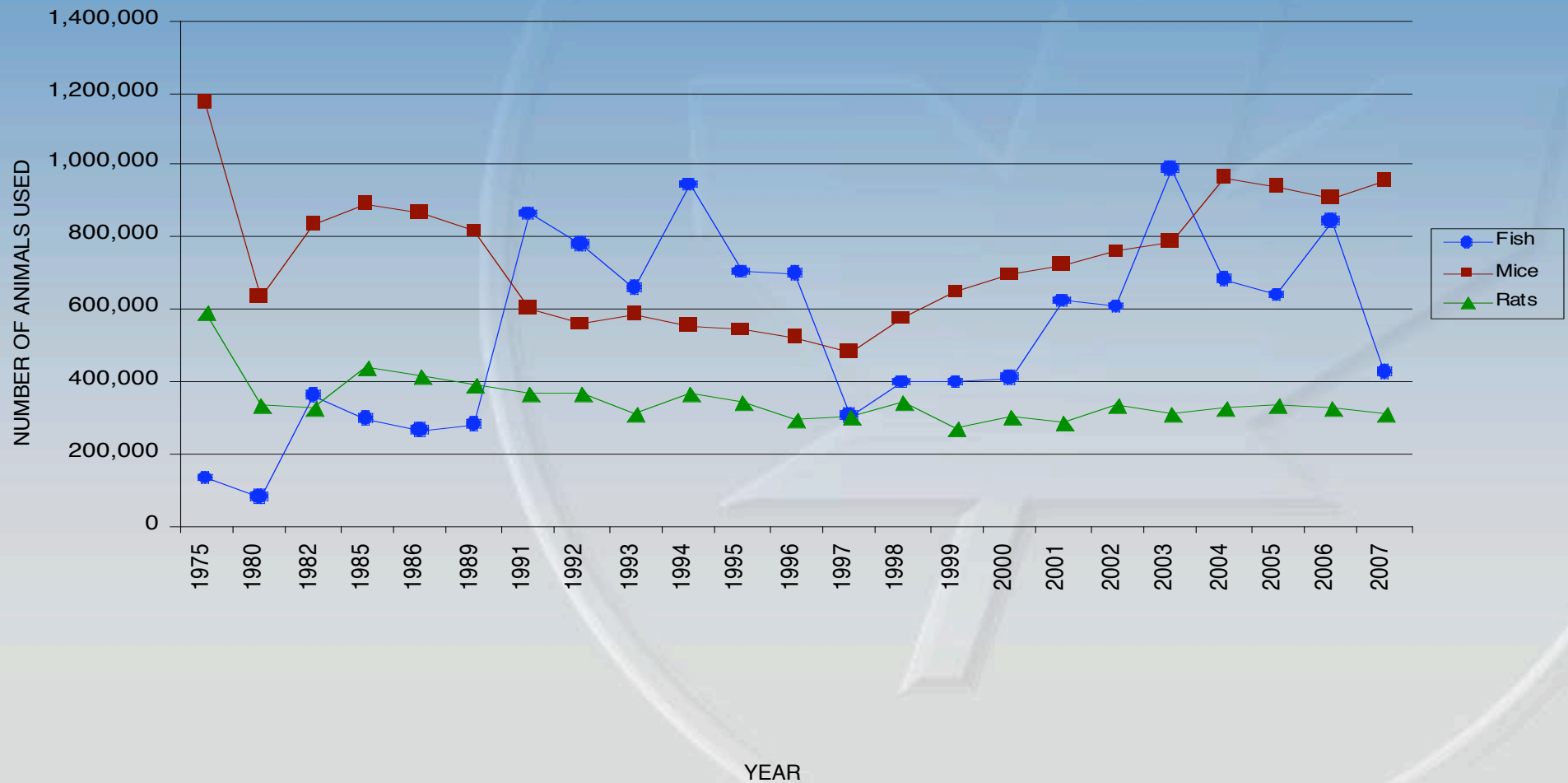


Need for Harmonization of Reporting Systems

- US – currently no requirements to report numbers of fish used for experimental purposes
- CCAC – fish use reported in the same manner as other vertebrate animals, according to purpose of animal use and categories of invasiveness
- EU Directive – statistics on fish use currently reported



Patterns of Animal Use



Challenges to Reporting

- Expert working group on severity classification of scientific procedures performed on animals (Brussels, July 2009)
- Applying the information gained from animal impact categorization systems – case study of Canada's Categories of Invasiveness (Griffin et al., submitted)



Importance of Reporting Animal Use

- Educate animal users about concepts for humane animal experimentation
- Use as a tool for ethical review
- Inform the public about the numbers of animals that potentially experience each category
- Provide data to inform national policies on animal use in science



Animal Use Reporting of Fish

- Challenges
 - ◆ When to start counting (first feeding?)
 - ◆ What to count – all procedures? Procedures causing pain, suffering, distress or lasting harm?
- Better statistics will help in implementation of the Three Rs



Implementation of the Three Rs



'We can do experiments with trout in large numbers at very low cost, **about 5% of what a rodent study would cost.** For most studies of carcinogens, exposing 2,000 rodents would be a huge project. For us, working with 2,000 trout is a pilot study.'
(Understanding animal research, 2009)



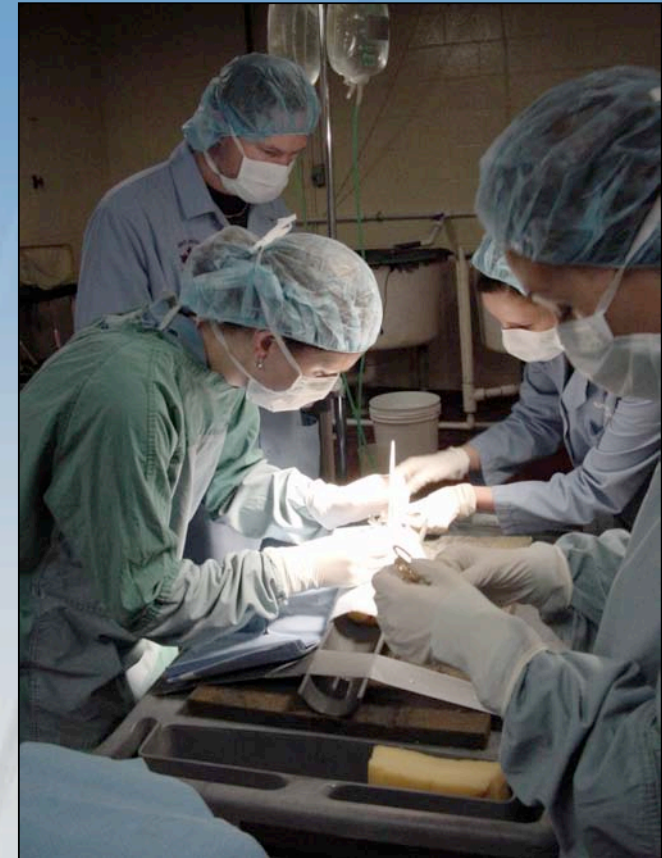
Three Rs

- Husbandry
- Minimization of pain and distress
- Experimental design, statistical analysis
- Replacement



Endpoints / Monitoring

- In any study where there is expected morbidity and mortality, the criteria for early euthanasia should be defined
- A list of parameters should be established to permit objective assessment of health status
- Frequency of monitoring should allow for the timely removal of fish, before severe morbidity occurs



Experimental Design

- UFRC, 2004
 - ◆ Field studies require different experimental designs
 - ◆ Early life stages large numbers
 - ◆ Replicates
 - ◆ Consult a statistician
- CCAC, 2005 and ETS –123
 - ◆ Appears in other places
- Health fish prerequisite for reliable data



Fish Testing

- Fish toxicity testing (OECD Tg 203)

- ◆ <http://www.ccac.ca/en/alternatives/ATM-table-MRE/type01.php>

Conventional test method	Alternative Test Method				Information Last Updated
	Name & Description	Validation Status	Regulatory Status	Effect or Potential Effect on Animal Use	
Acute Aquatic Toxicity					
Fish Acute Toxicity (OECD TG 203)	Upper Threshold Concentration (UTC) Step-Down Approach (a tiered testing strategy to be implemented with OECD TG 203) Description and references	EU: Endorsed as a valid testing strategy by ESAC	EU: Accepted for the assessment of acute aquatic toxicity for hazard classification (2006)	Reduction (Reduces the number of fish used by 65%)	April 2009
	Fish Embryo Toxicity (FET) Test Description and references	OECD: Presently assessing validation	OECD: Draft new Test Guideline	Replacement (relative replacement meaning replacing more sentient animals with animals that current scientific evidence indicates have a lower potential for pain perception)	April 2009

Vaccine Testing

- ECVAM workshop on Three Rs approaches in the production and quality control of fish vaccines (Halder M. et al. 2008)



Conclusion

- Species specific information still needed
- Single location
- Pain and distress important in terms of animal impact





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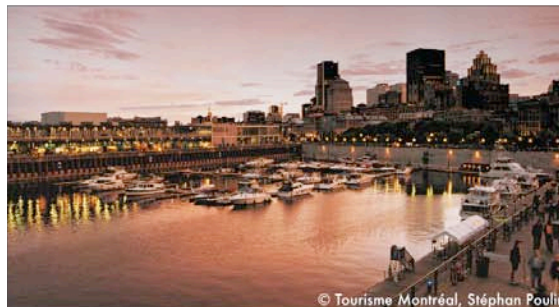
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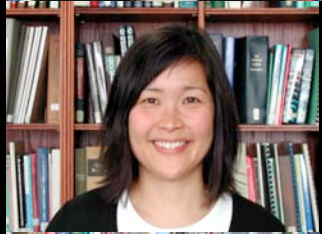
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M  ntréal



Thank you!

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