PREPARE for fish research

norecopa.no/FELASA/fish

Adrian Smith
adrian.smith@norecopa.no
@adrian_3R

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https://norecopa.no

aperitif.no

Norecopa: PREPARE for better Science

Thanks to many colleagues, including:

Aurora Brønstad, University of Bergen
Chris Noble, Nofima Tromsø
Gidona Goodman, University of Edinburgh
Susanna Lybæk, Norwegian Animal Protection Alliance
Tore Kristiansen, Institute of Marine Research, Bergen

Contributors to Norecopa's Refinement Wiki

The PREPARE guidelines, fish section:
Penny Hawkins and Chloe Stevens
Disclosure: lead author

What should we be preparing for?

- ✓ valid data (a true treatment effect)
- ✓ reproducible and translatable experiments
- ✓ best possible animal welfare
- ✓ health & safety (of animals and people)
- ✓ a culture of care
- ✓ communication of best practice to others

What can we learn from others?

travelandleisure.com/airlines-airports/what-happens-when-planes-hit-birds

Birdstrike
Both engines failed

15.25.33	-01.38	Kaptein	Cockpit	V one, rotate
15.25.38	-01.33	Kaptein	Cockpit	positive rate
15.25.39	-01.32	Styrmann	Cockpit	Gear up please
15.25.39	-01.32	Kaptein	Cockpit	Gear up
15.26.37	-00.34	Kaptein	Cockpit	Uh what a view of the Hudson today
15.26.42	-00.29	Styrmann	Cockpit	Yeah
15.27.07	-00.04	Kaptein	Cockpit	After takeoff checklist complete
15.27.10	-00.01	Kaptein	Cockpit	Birds
15.27.11	-00.00	Styrmann	Cockpit	Whoa
15.27.11	00.00			
15.27.12	+00.01	Kaptein	Cockpit	Oh ---
15.27.13	+00.02	Styrmann	Cockpit	Oh yeah
15.27.14	+00.03	Styrmann	Cockpit	Uh oh
15.27.15	+00.04	Kaptein	Cockpit	We got one rol... both of 'em rolling back
15.27.18	+00.07	Kaptein	Cockpit	Ignition, start
15.27.21	+00.10	Kaptein	Cockpit	I'm starting the APU
15.27.23	+00.12	Kaptein	Cockpit	My aircraft
15.27.24	+00.13	Styrmann	Cockpit	Your aircraft
15.27.28	+00.17	Kaptein	Cockpit	Get the QRH... loss of thrust on both engines
15.27.32	+00.21	Kaptein	Radio	Mayday mayday mayday. Uh this is Cactus fifteen thirty [sic] nine, hit birds. We've lost thrust on both engines. We're turning back towards LaGuardia.

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Communication!
Checklists!
Less than 3 minutes to do this in

no.wikipedia.org/wiki/US_Airways_Flight_1549

en.wikipedia.org

All 155 passengers and crew saved

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Surgical Safety Checklist

World Health Organization | Patient Safety
A World Alliance for Safer Health Care

Before induction of anaesthesia → **Before skin incision** → **Before patient leaves operating room**

(with at least nurse and anaesthetist) | (with nurse, anaesthetist and surgeon) | (with nurse, anaesthetist and surgeon)

Has the patient confirmed his/her identity, site, procedure, and consent?
- ☐ Yes

Is the site marked?
- ☐ Yes
- ☐ Not applicable

Is the anaesthesia machine and medication check complete?
- ☐ Yes

Is the pulse oximeter on the patient and functioning?
- ☐ Yes

Does the patient have a:

Known allergy?
- ☐ No
- ☐ Yes

Difficult airway or aspiration risk?
- ☐ No
- ☐ Yes, and equipment/assistance available

Risk of >500ml blood loss (7ml/kg in children)?
- ☐ No
- ☐ Yes, and two IVs/central access and fluids planned

☐ Confirm all team members have introduced themselves by name and role.

☐ Confirm the patient's name, procedure, and where the incision will be made.

Has antibiotic prophylaxis been given within the last 60 minutes?
- ☐ Yes
- ☐ Not applicable

Anticipated Critical Events

To Surgeon:
- ☐ What are the critical or non-routine steps?
- ☐ How long will the case take?
- ☐ What is the anticipated blood loss?

To Anaesthetist:
- ☐ Are there any patient-specific concerns?

To Nursing Team:
- ☐ Has sterility (including indicator results) been confirmed?
- ☐ Are there equipment issues or any concerns?

Is essential imaging displayed?
- ☐ Yes
- ☐ Not applicable

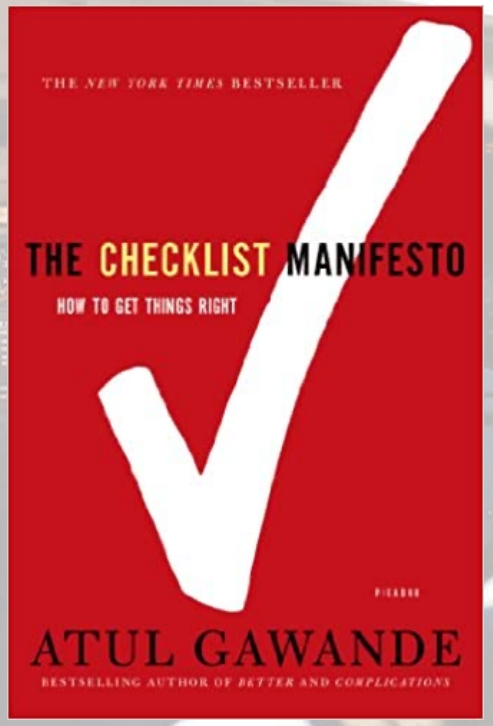
Nurse Verbally Confirms:
- ☐ The name of the procedure
- ☐ Completion of instrument, sponge and needle counts
- ☐ Specimen labelling (read specimen labels aloud, including patient name)
- ☐ Whether there are any equipment problems to be addressed

To Surgeon, Anaesthetist and Nurse:
- ☐ What are the key concerns for recovery and management of this patient?

This checklist is not intended to be comprehensive. Additions and modifications to fit local practice are encouraged.

Revised 1 / 2009

who.int/patientsafety/topics/safe-surgery/checklist/en



amazon.com/gp/product/0312430000

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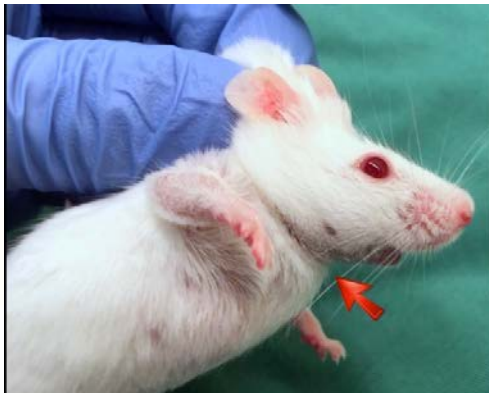

Sinus bradycardia
ventricular escape complexes

Labitt *et al.*, 26 February 2021

4 strains of mice, both sexes, 3 experienced handlers

Labitt RN, Oxford EM, Davis AK, Butler SD & Daugherity EK (2021): A Validated Smartphone-Based Electrocardiogram Reveals Severe Bradyarrhythmias during Immobilizing Restraint in Mice of Both Sexes and Four Strains. J. Am. Assoc. Lab. Anim. Sci.
doi: 10.30802/AALAS-JAALAS-20-000069

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Are we amateurs, by comparison?

The pathway to better research: from planning guidelines to reporting guidelines

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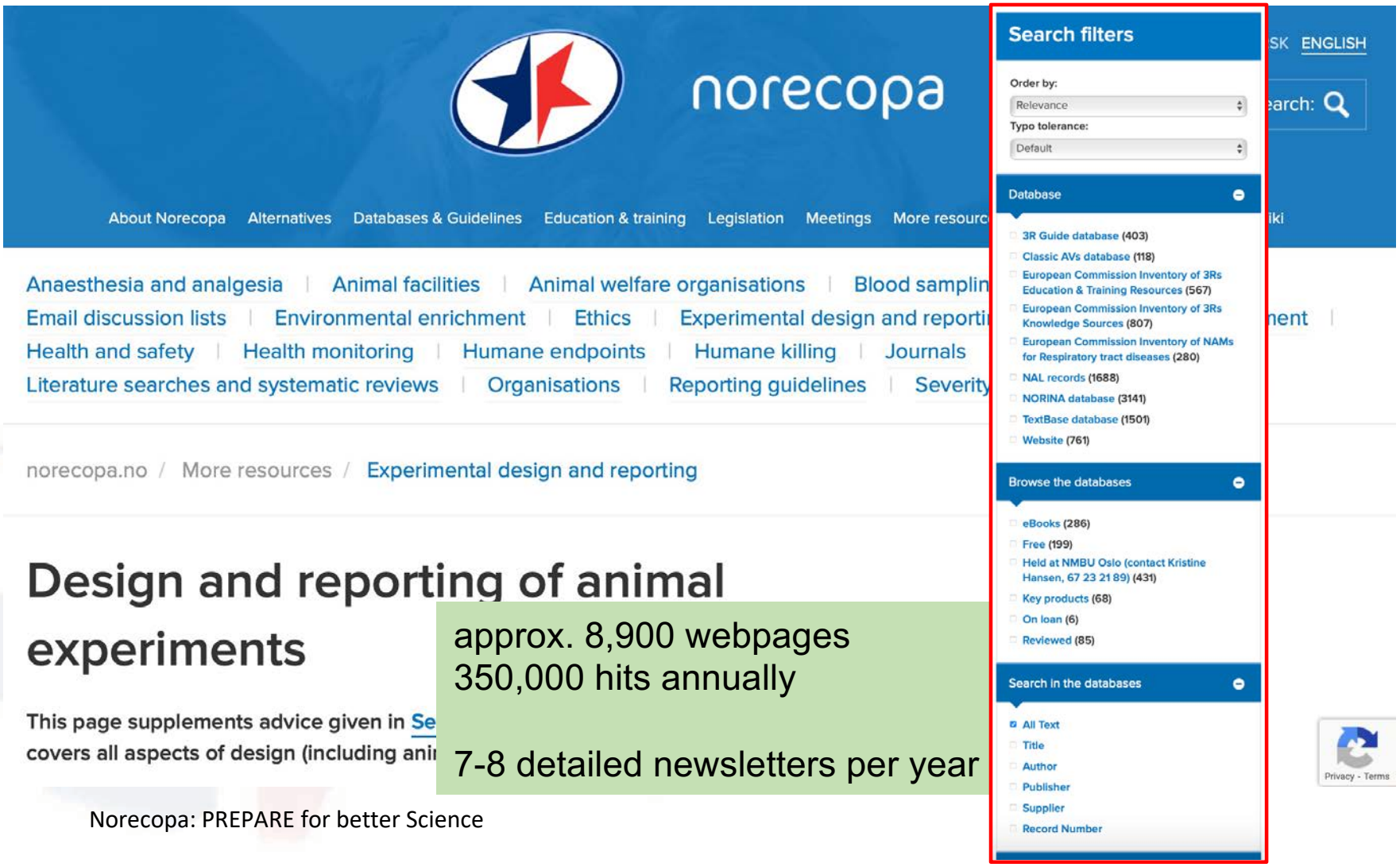
norecopa.no/PREPARE

norecopa.no : an updated overview of global 3R resources



approx. 8,900 webpages
350,000 hits annually

7-8 detailed newsletters per year

Prepare

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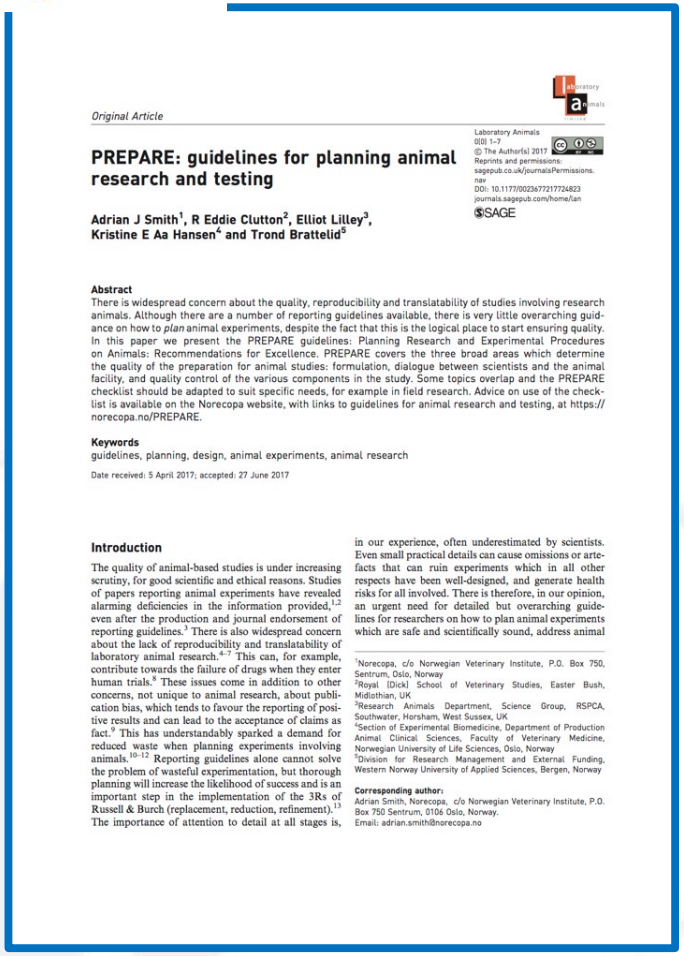

Original Article

PREPARE: guidelines for planning animal research and testing

Laboratory Animals
0(0) 1–7

DOI: 10.1177/0023677217724823
journals.sagepub.com/home/lan
SAGE

Adrian J Smith[1], R Eddie Clutton[2], Elliot Lilley[3], Kristine E Aa Hansen[4] and Trond Brattelid[5]

Abstract

There is widespread concern about the quality, reproducibility and translatability of studies involving research animals. Although there are a number of reporting guidelines available, there is very little overarching guidance on how to *plan* animal experiments, despite the fact that this is the logical place to start ensuring quality. In this paper we present the PREPARE guidelines: Planning Research and Experimental Procedures on Animals: Recommendations for Excellence. PREPARE covers the three broad areas which determine the quality of the preparation for animal studies: formulation, dialogue between scientists and the animal facility, and quality control of the various components in the study. Some topics overlap and the PREPARE checklist should be adapted to suit specific needs, for example in field research. Advice on use of the checklist is available on the Norecopa website, with links to guidelines for animal research and testing, at https://norecopa.no/PREPARE.

Keywords

guidelines, planning, design, animal experiments, animal research

Date received: 5 April 2017; accepted: 27 June 2017

Introduction

The quality of animal-based studies is under increasing scrutiny, for good scientific and ethical reasons. Studies of papers reporting animal experiments have revealed alarming deficiencies in the information provided,[1,2] even after the production and journal endorsement of reporting guidelines.[3] There is also widespread concern about the lack of reproducibility and translatability of laboratory animal research.[4–7] This can, for example, contribute towards the failure of drugs when they enter human trials.[8] These issues come in addition to other concerns, not unique to animal research, about publication bias, which tends to favour the reporting of positive results and can lead to the acceptance of claims as fact.[9] This has understandably sparked a demand for reduced waste when planning experiments involving animals.[10–12] Reporting guidelines alone cannot solve the problem of wasteful experimentation, but thorough planning will increase the likelihood of success and is an important step in the implementation of the 3Rs of Russell & Burch (replacement, reduction, refinement).[13] The importance of attention to detail at all stages is, in our experience, often underestimated by scientists. Even small practical details can cause omissions or artefacts that can ruin experiments which in all other respects have been well-designed, and generate health risks for all involved. There is therefore, in our opinion, an urgent need for detailed but overarching guidelines for researchers on how to plan animal experiments which are safe and scientifically sound, address animal

[1]Norecopa, c/o Norwegian Veterinary Institute, P.O. Box 750, Sentrum, Oslo, Norway
[2]Royal (Dick) School of Veterinary Studies, Easter Bush, Midlothian, UK
[3]Research Animals Department, Science Group, RSPCA, Southwater, Horsham, West Sussex, UK
[4]Section of Experimental Biomedicine, Department of Production Animal Clinical Sciences, Faculty of Veterinary Medicine, Norwegian University of Life Sciences, Oslo, Norway
[5]Division for Research Management and External Funding, Western Norway University of Applied Sciences, Bergen, Norway

Corresponding author:
Adrian Smith, Norecopa, c/o Norwegian Veterinary Institute, P.O. Box 750 Sentrum, 0106 Oslo, Norway.
Email: adrian.smith@norecopa.no

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Pre-published under Open Access on 3 August 2017, sponsored by the Universities Federation for Animal Welfare (UFAW), UK

https://doi.org/10.1177/0023677217724823

UFAW
Established 1926

Over 24,000 downloads from the journal website so far

PREPARE:

Planning **R**esearch and **E**xperimental **P**rocedures on **A**nimals: **R**ecommendations for **E**xcellence

PREPARE covers 15 topics:

Formulation of the study

1. Literature searches
2. Legal issues
3. Ethical issues, harm-benefit assessment and humane endpoints
4. Experimental design and statistical analysis

Dialogue between scientists and the animal facility

5. Objectives and timescale, funding and division of labour
6. Facility evaluation
7. Education and training
8. Health risks, waste disposal and decontamination

Methods

9. Test substances and procedures
10. Experimental animals
11. Quarantine and health monitoring
12. Housing and husbandry
13. Experimental procedures
14. Humane killing, release, reuse or rehoming
15. Necropsy

Items in pink are not typically highlighted in reporting guidelines

norecopa.no/PREPARE/prepare-checklist

PREPARE

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The PREPARE Guidelines Checklist

Planning Research and Experimental Procedures on Animals: Recommendations for Excellence

Adrian J. Smith[a], R. Eddie Clutton[b], Elliot Lilley[c], Kristine E. Aa. Hansen[d] & Trond Bratteli[d]

[a]Norecopa, c/o Norwegian Veterinary Institute, P.O. Box 750 Sentrum, 0106 Oslo, Norway; [b]Royal (Dick) School of Veterinary Studies, Easter Bush, Midlothian, EH25 9RG, U.K.; [c]Research Animals Department, Science Group, RSPCA, Wilberforce Way, Southwater, Horsham, West Sussex, RH13 9RS, U.K.; [d]Section of Experimental Biomedicine, Department of Production Animal Clinical Sciences, Faculty of Veterinary Medicine, Norwegian University of Life Sciences, P.O. Box 8146 Dep., 0033 Oslo, Norway; [e]Division for Research Management and External Funding, Western Norway University of Applied Sciences, 5020 Bergen, Norway.

PREPARE[1] consists of planning guidelines which are complementary to reporting guidelines such as ARRIVE[2].
PREPARE covers the three broad areas which determine the quality of the preparation for animal studies:

1. **Formulation of the study**
2. **Dialogue between scientists and the animal facility**
3. **Quality control of the components in the study**

The topics will not always be addressed in the order in which they are presented here, and the checklist can be adapted to meet special needs, such as field studies. PREPARE includes g... facilities, since in-house experiments are dependent upon their quality. The full version of t... website, with links to global resources, at **https://norecopa.no/PREPARE**.
The PREPARE guidelines are a dynamic set which will evolve as more species- and situation-specific guidelines are produced, and as best practice within Laboratory Animal Science progresses.

Three Rs!

Topic	Recommendation
(A) Formulation of the study	
1. Literature searches	☐ Form a clear hypothesis, with primary and secondary outcomes. ☐ Consider the use of systematic reviews. ☐ Decide upon databases and information specialists to be consulted, and construct search terms. ☐ Assess the relevance of the species to be used, its biology and suitability to answer the experimental questions with the least suffering, and its welfare needs. ☐ Assess the reproducibility and translatability of the project.
2. Legal issues	☐ Consider how the research is affected by relevant legislation for animal research and other areas, e.g. animal transport, occupational health and safety. ☐ Locate relevant guidance documents (e.g. EU guidance on project evaluation).
3. Ethical issues, harm-benefit assessment and humane endpoints	☐ Construct a lay summary. ☐ In dialogue with ethics committees, consider whether statements about this type of research have already been produced. ☐ Address the 3Rs (replacement, reduction, refinement) and the 3Ss (good science, good sense, good sensibilities). ☐ Consider pre-registration and the publication of negative results. ☐ Perform a harm-benefit assessment and justify any likely animal harm. ☐ Discuss the learning objectives, if the animal use is for educational or training purposes. ☐ Allocate a severity classification to the project. ☐ Define objective, easily measurable and unequivocal humane endpoints. ☐ Discuss the justification, if any, for death as an end-point.
4. Experimental design and statistical analysis	☐ Consider pilot studies, statistical power and significance levels. ☐ Define the experimental unit and decide upon animal numbers. ☐ Choose methods of randomisation, prevent observer bias, and decide upon inclusion and exclusion criteria.

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Topic	Recommendation
(B) Dialogue between scientists and the animal facility	
5. Objectives and timescale, funding and division of labour	☐ Arrange meetings with all relevant staff when early plans for the project exist. ☐ Construct an approximate timescale for the project, indicating the need for assistance with preparation, animal care, procedures and waste disposal/decontamination. ☐ Discuss and disclose all expected and potential costs. ☐ Construct a detailed plan for division of labour and expenses at all stages of the study.
6. Facility evaluation	☐ Conduct a physical inspection of the facilities, to evaluate building and equipment standards and needs. ☐ Discuss staffing levels at times of extra risk.
7. Education and training	☐ Assess the current competence of staff members and the need for further education or training prior to the study.
8. Health risks, waste disposal and decontamination	☐ Perform a risk assessment, in collaboration with the animal facility, for all persons and animals affected directly or indirectly by the study. ☐ Assess, and if necessary produce, specific guidance for all stages of the project. ☐ Discuss means for containment, decontamination, and disposal of all items in the study.
(C) Quality control of the components in the study	
9. Test substances and procedures	☐ Provide as much information as possible about test substances. ☐ Consider the feasibility and validity of test procedures and the skills needed to perform them.
10. Experimental animals	☐ Decide upon the characteristics of the animals that are essential for the study and for reporting. ☐ Avoid generation of surplus animals.
11. Quarantine and health monitoring	☐ Discuss the animals' likely health status, any needs for transport, quarantine and isolation, health monitoring and consequences for the personnel.
12. Housing and husbandry	☐ Attend to the animals' specific instincts and needs, in collaboration with expert staff. ☐ Discuss acclimatization, optimal housing conditions and procedures, environmental factors and any experimental limitations on these (e.g. food deprivation, solitary housing).
13. Experimental procedures	☐ Develop refined procedures for capture, immobilisation, marking, and release or rehoming. ☐ Develop refined procedures for substance administration, sampling, sedation and anaesthesia, surgery and other techniques.
14. Humane killing, release, reuse or rehoming	☐ Consult relevant legislation and guidelines well in advance of the study. ☐ Define primary and emergency methods for humane killing. ☐ Assess the competence of those who may have to perform these tasks.
15. Necropsy	☐ Construct a systematic plan for all stages of necropsy, including location, and identification of all animals and samples.

References

1. Smith AJ, Clutton RE, Lilley E, Hansen KEA & Brattelid T. PREPARE: Guidelines for Planning Animal Research and Testing. *Laboratory Animals*, 2017, DOI: 10.1177/0023677217724823.
2. Kilkenny C, Browne WJ, Cuthill IC *et al.* Improving Bioscience Research Reporting: The ARRIVE Guidelines for Reporting Animal Research. *PloS Biology*, 2010; DOI: 10.1371/journal.pbio.1000412.

Further information
https://norecopa.no/PREPARE / *post@norecopa.no* / @norecopa

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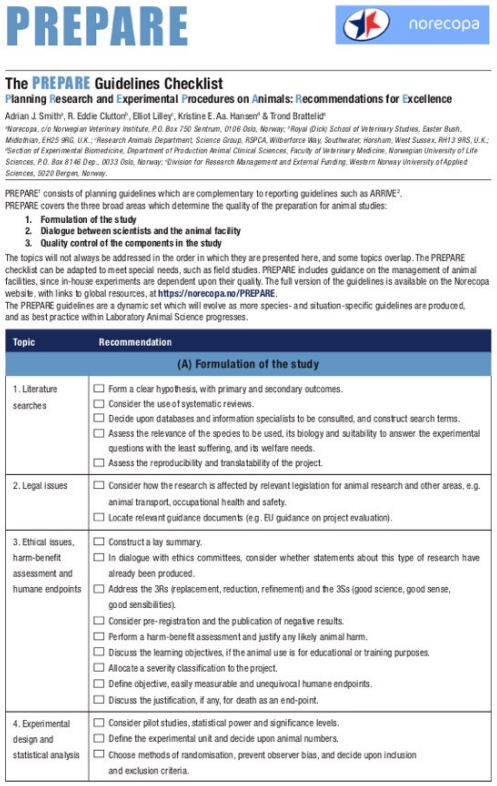
norecopa.no/PREPARE/prepare-checklist

Three versions of the checklist:

1. ***plain pdf file***
2. ***fillable pdf file***
3. ***shared online version***



PREPARE norecopa

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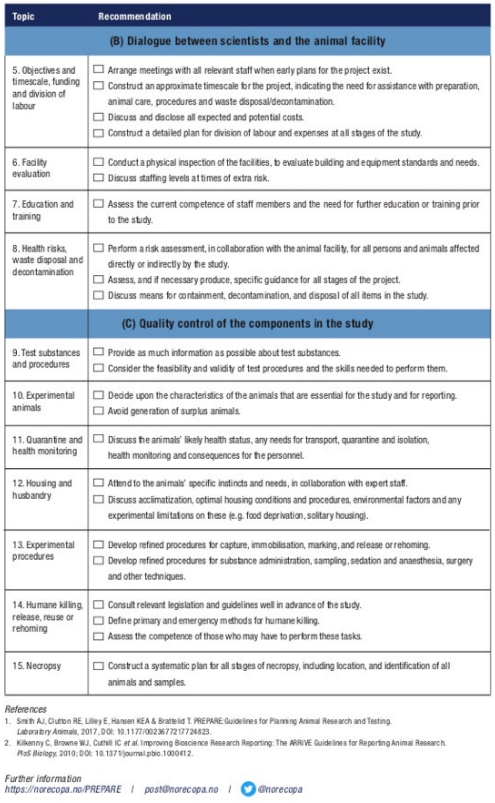

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Further information
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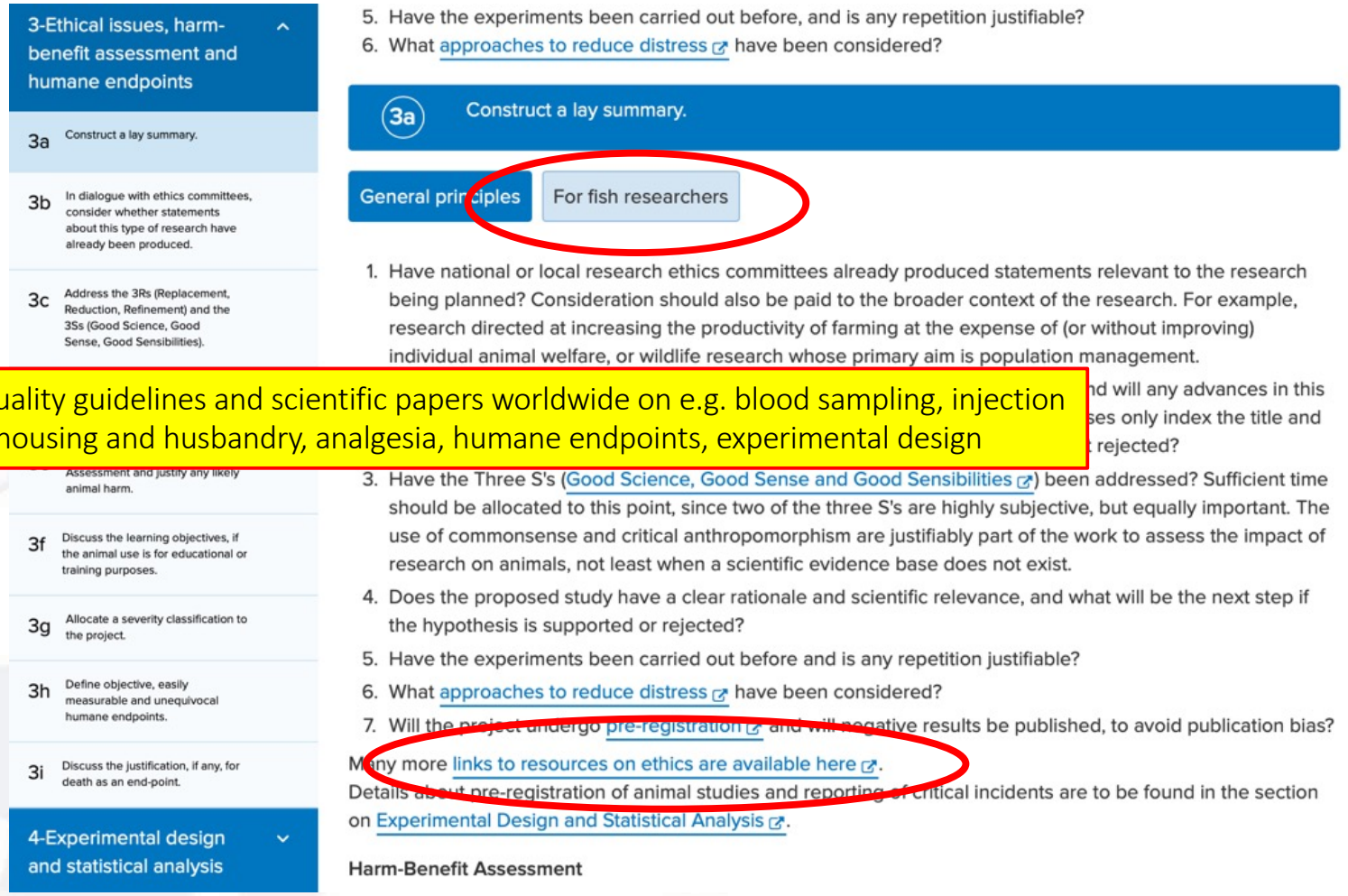

Links to quality guidelines and scientific papers worldwide on e.g. blood sampling, injection volumes, housing and husbandry, analgesia, humane endpoints, experimental design

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1c Decide upon databases and information specialists to be consulted, and construct search terms.

General principles | For fish researchers

The editors and chapter authors of textbooks about fish are obvious candidates to be information specialists when designing fish experiments. Other sources include:

- The Zebrafish Information Network (ZFIN) database on model organisms and their publications
- EBSCO *Fish, Fisheries and Aquatic Biodiversity Worldwide* (FFAB) database
- FishBase - a global information system on fin fishes
- SeaLifeBase
- Fish Pathogens Database
- Aquatic Sciences and Fisheries Abstracts (ASFA)
- AGRIS
- ECOTOX
- The Alternatives section in the part of the Norecopa website on fish
- Fishwise Professional database
- An overview of global marine databases and resource centres

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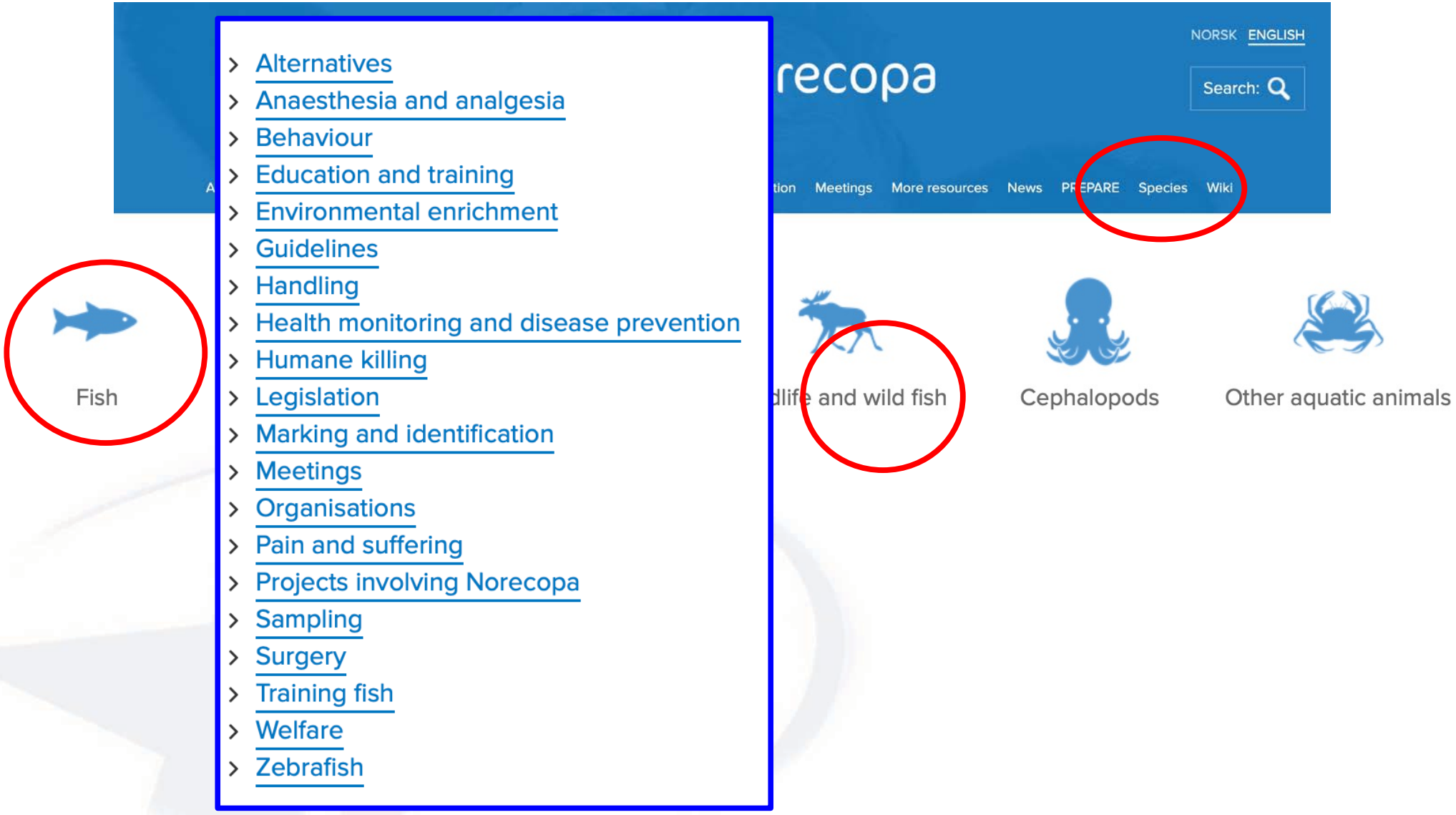

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https://norecopa.no/meetings

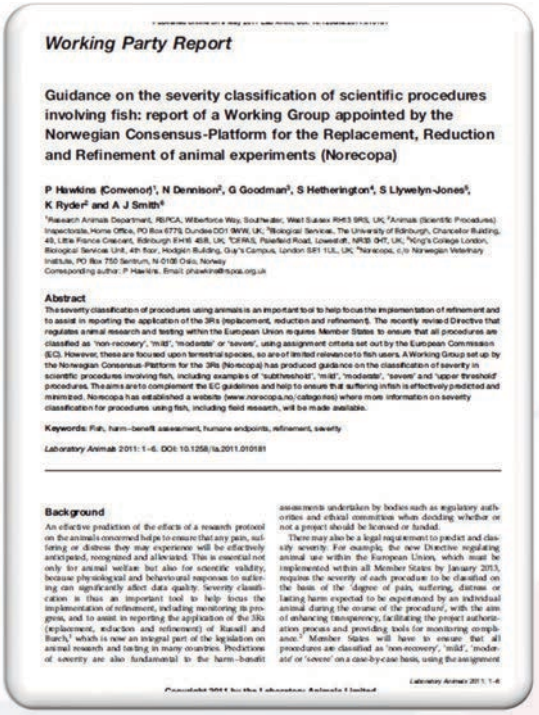
International consensus meetings

Harmonisation of the Care and Use of:

- *Fish (2005)*
- *Wildlife (2008)*
- *Fish (2009)*
- *Agricultural animals (2012)*
- *Wildlife (2017)*

All the presentations and consensus statements on the web: a lasting resource

From **3R-Guide** (400 guidelines for animal research and testing)
norecopa.no/3r-guide



Working Party Report

Guidance on the severity classification of scientific procedures involving fish: report of a Working Group appointed by the Norwegian Consensus-Platform for the Replacement, Reduction and Refinement of animal experiments (Norecopa)

P Hawkins (Convenor)[1], N Dennison[2], G Goodman[3], S Hetherington[4], S Llywelyn-Jones[5], K Ryder[2] and A J Smith[6]

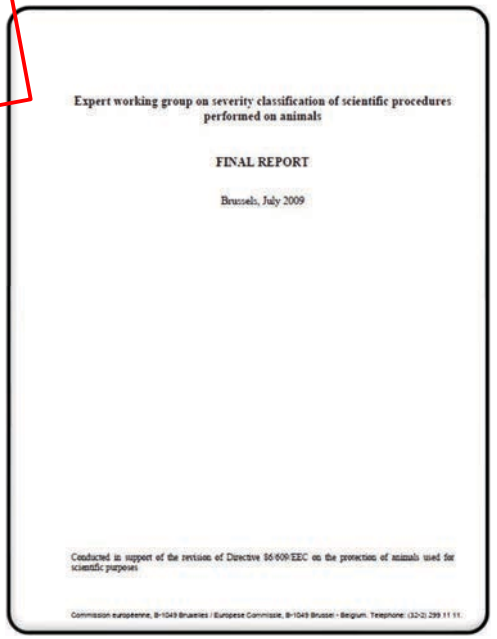
Abstract

Background

Wanted: Species-specific guidelines!

Guidance on the severity classification of procedures involving fish

Report from a Working Group
convened by Norecopa



Expert working group on severity classification of scientific procedures performed on animals

FINAL REPORT

Brussels, July 2009

Conducted in support of the revision of Directive 86/609/EEC on the protection of animals used for scientific purposes

http://ec.europa.eu/environment/chemicals/lab_animals/pdf/report_ewg.pdf

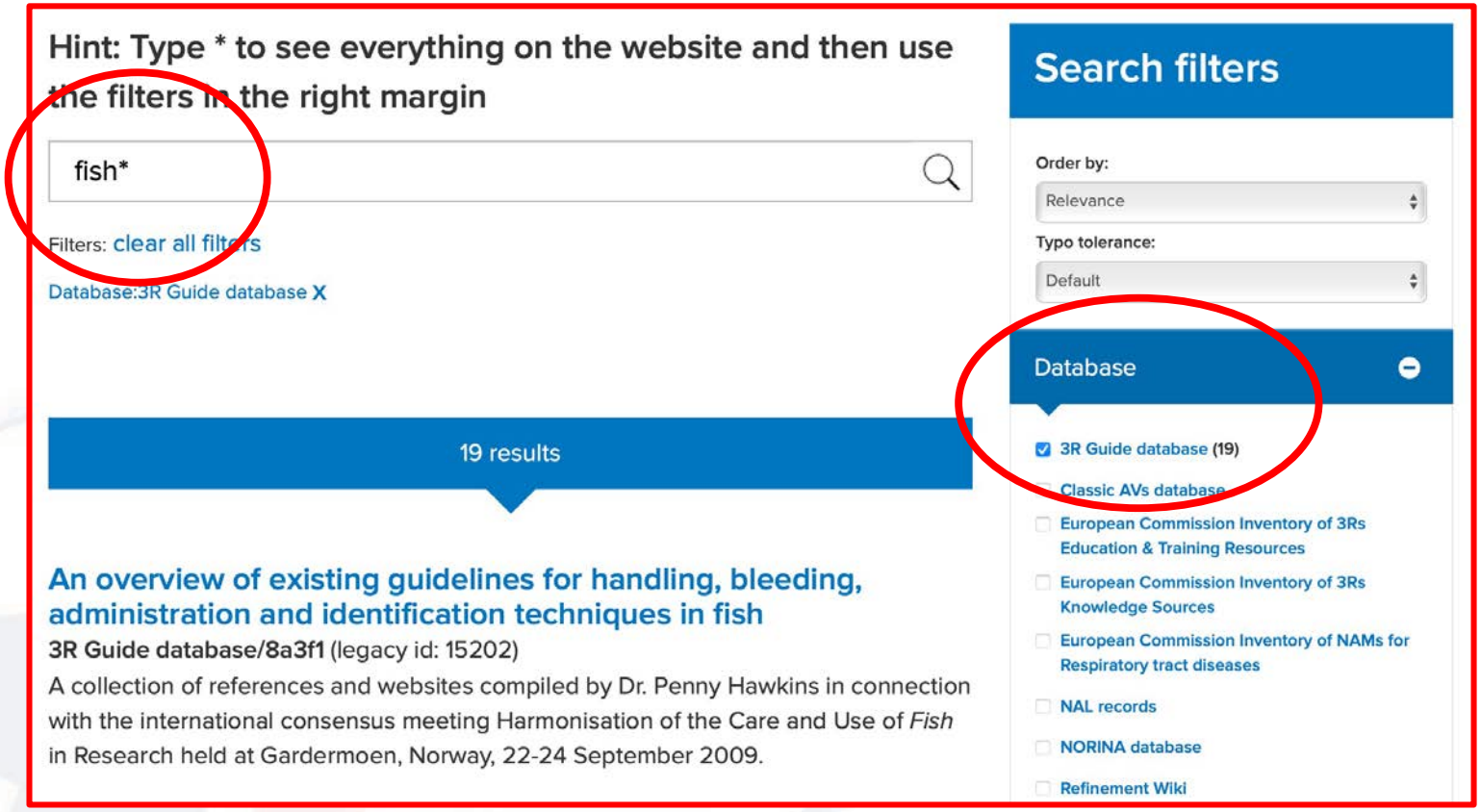
P Hawkins, N Dennison, G Goodman, S Hetherington,
S Llywelyn-Jones, K Ryder and AJ Smith

Laboratory Animals, 45: 219-224, 2011

norecopa.no/categories

From **3R-Guide** (400 guidelines for animal research and testing)

norecopa.no/3r-guide



TextBase:

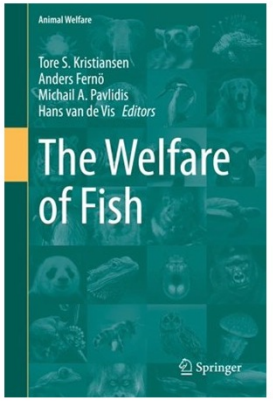
1,500 books related to LAS:

norecopa.no/textbase

The Welfare of Fish

By Tore S. Kristiansen, Anders Fernö, Michail A. Pavlidis & Hans van de Vis

Record number: ef2a0



This book investigates how fish experience their lives, their amazing senses and abilities, and how human actions impact their quality of life. The authors examine the concept of fish welfare and the scientific knowledge behind the inclusion of fish within the moral circle, and how this knowledge can change the way we treat fish in the future. In many countries fish are already protected by animal welfare legislation in the same way as mammals, but in practice there is still a major gap between how we ethically view these groups and how we actually treat them. The poor treatment of fish represents a massive animal welfare problem in aquaculture and fisheries, both in terms of the number of animals affected and the severity of the welfare issues.

Thanks to its interdisciplinary scope, this book should appeal to professionals, academics and students in the fields of animal welfare, cognition and physiology, as well as fisheries and aquaculture management.

List of chapters:

- A Brief Look into the Origins of Fish Welfare Science
- Ethics and the Welfare of Fish
- The Diverse World of Fishes
- Fish behaviour: Determinants and Implications for Welfare
- The Effects of Early Life Experience on Behavioural Development in Captive Fish Species
- Fish Brains: Anatomy, Functionality, and Evolutionary Relationships
- Inside the Fish Brain: Cognition, Learning and Consciousness; Awareness in Fish
- The Predictive Brain: Perception Turned Upside Down
- Can Fish Experience Pain?
- How Fish Cope with Stress?
- Individual Variations and Coping Style
- Assessing Fish Welfare in Aquaculture
- Welfare of Farmed Fish in Different Production Systems and Operations
- Ornamental Fish and Aquaria
- Fish as Laboratory Animals
- Catch Welfare in Commercial Fisheries
- Fish Welfare in Capture-Based Aquaculture (CBA)
- Fish Welfare in Recreational Fishing
- Impacts of Human-Induced Pollution on Wild Fish Welfare
- What Have We Learned?

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1a Form a clear hypothesis, with primary and secondary outcomes.

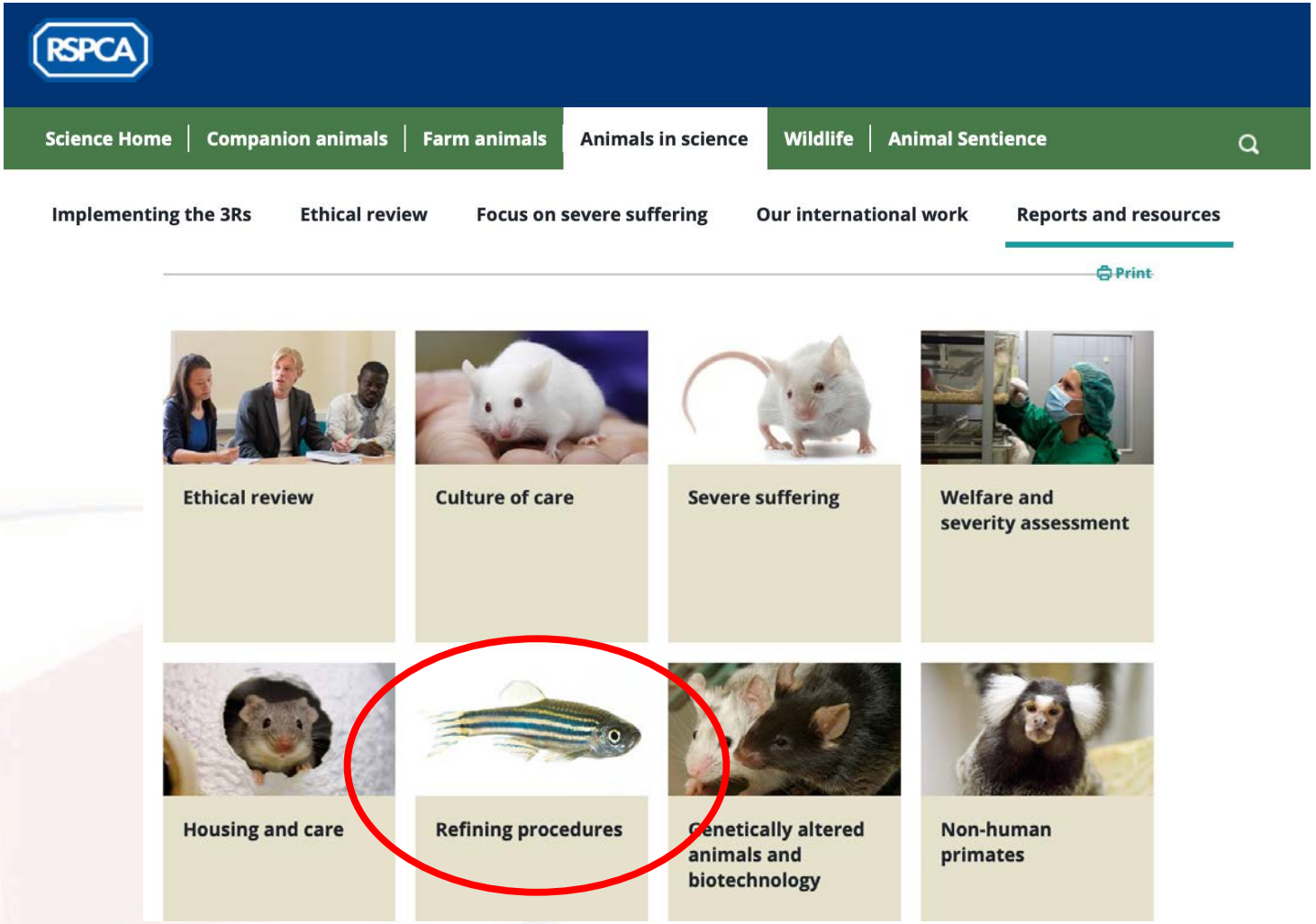
General principles | For fish researchers

There are approx. 100 textbooks about the care and use of fish in research in the TextBase database, which may be helpful when deciding upon the hypotheses in a fish experiment. The more general books include:

- The Laboratory Fish (ed. Ostrander, 2000)
- The Laboratory Zebrafish (Harper & Lawrence, 2010)
- Guidance on the housing and care of Zebrafish (*Danio rerio*) (Reed & Jennings, 2010)
- CCAC Guidelines: Zebrafish and other small, warm-water laboratory fish (2020)
- CCAC Guidelines on the Care and Use of Fish in Research, Teaching and Testing (2005)
- The Welfare of Fish (eds. Kristiansen *et al.*, 2020)
- The Physiology of Fishes (eds. Currie & Evans, 2020)

Books on more specific subjects are mentioned under the appropriate sections in PREPARE.

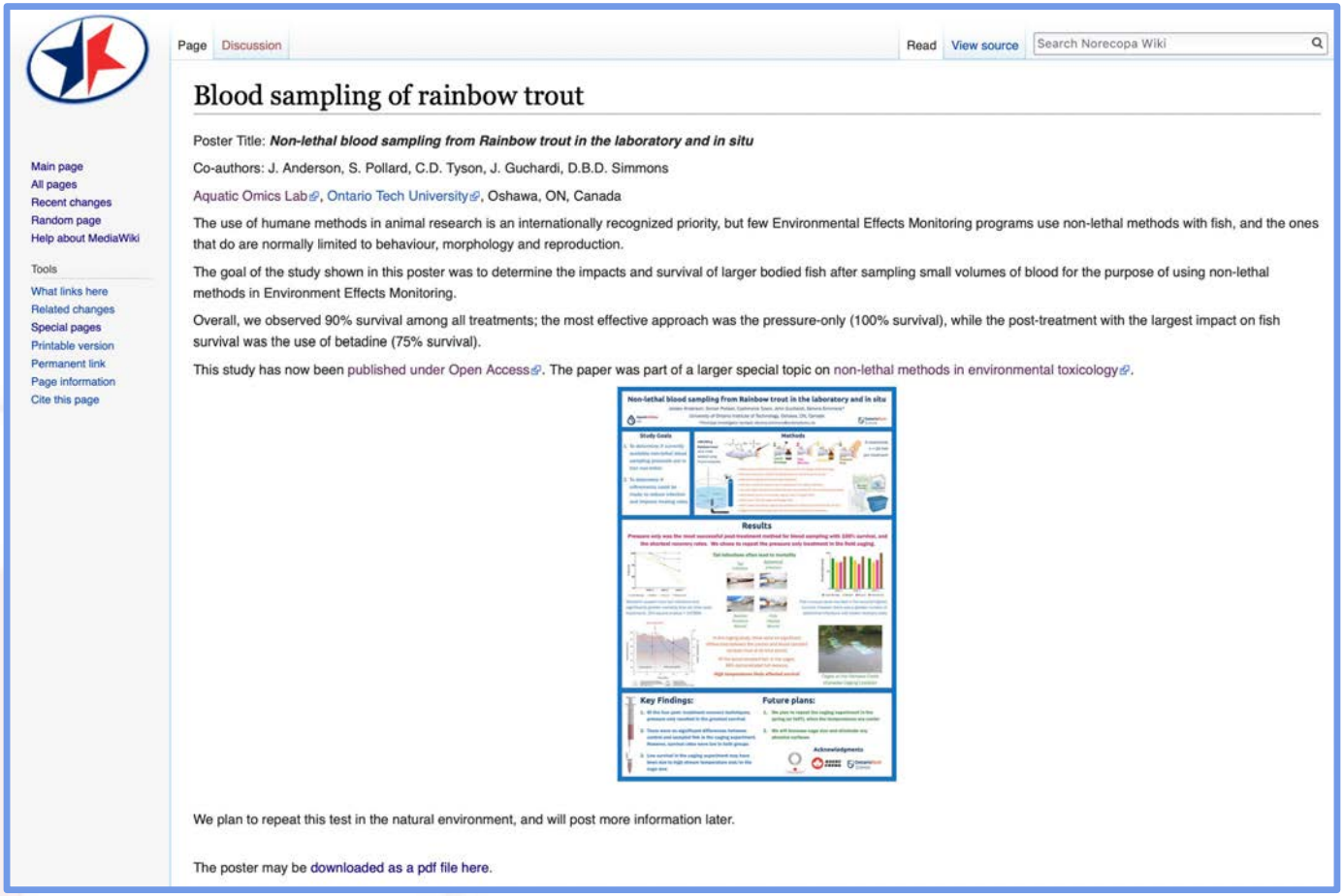
Resource hubs



science.rspca.org.uk/sciencegroup/researchanimals/reportsandresources

wiki.norecopa.no

Refinement Wiki



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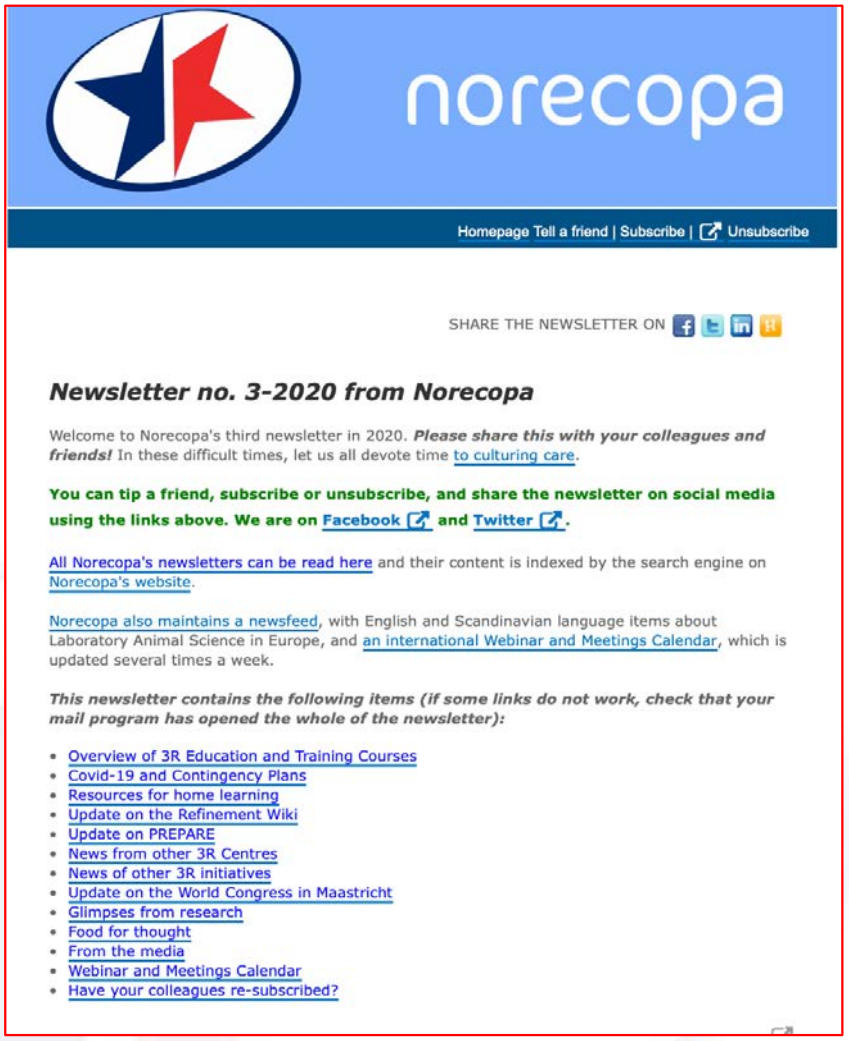
Refinement Wiki

- Acclimatisation
- Adrian Smith
- Alphaxalone
- Anaesthesia in neonates
- Analgesia
- Asepsis
- Blood sampling of hamsters
- Blood sampling of pigs
- Blood sampling of rainbow trout
- Breeding strategies for mice
- Clicker training
- Contingency plans
- Decapitation
- Detecting early onset of clinical signs in the mouse model of Covid-19
- Detection of pain and distress in mice
- EMLA cream
- Embryo transfer
- Experimental Autoimmune Encephalomyeltis (EAE)
- Facial expression analysis
- Food crunchers
- General discusson on use of analgesics
- Genotyping mice
- Habituation training
- High-fat diets
- Hot Bead Sterilisers
- Housing nude mice
- Housing research fish
- Humane endpoints
- Hydrodynamic gene delivery
- Intra-ocular injections
- Intranasal administration
- Intraperitoneal injection
- Intraperitoneal pentobarbitone
- Ketamine and alpha-2 agonist combinations
- Long-term anaesthesia in rodents
- Lumpfish
- Main Page
- Marble Burying Test
- Metabolic cages
- Minipumps
- Montanide adjuvant
- Mouse Grimace Scale
- Mouse handling
- Nest building material
- Oestrus suppression in ferrets
- Pneumocystis murina
- Recapping needles
- Rotarod Test
- Screening cell lines
- Sedation of cattle
- Splenectomy
- Sterilisation of instruments
- TTEAM and TTouch
- Tail vein injection
- Tramadol
- Transport stress
- Tumour cell implant into mammary fat pad
- Ulcerative Dermatitis in Mice
- Water quality
- Xenopus laevis
- Zebrafish swabbing



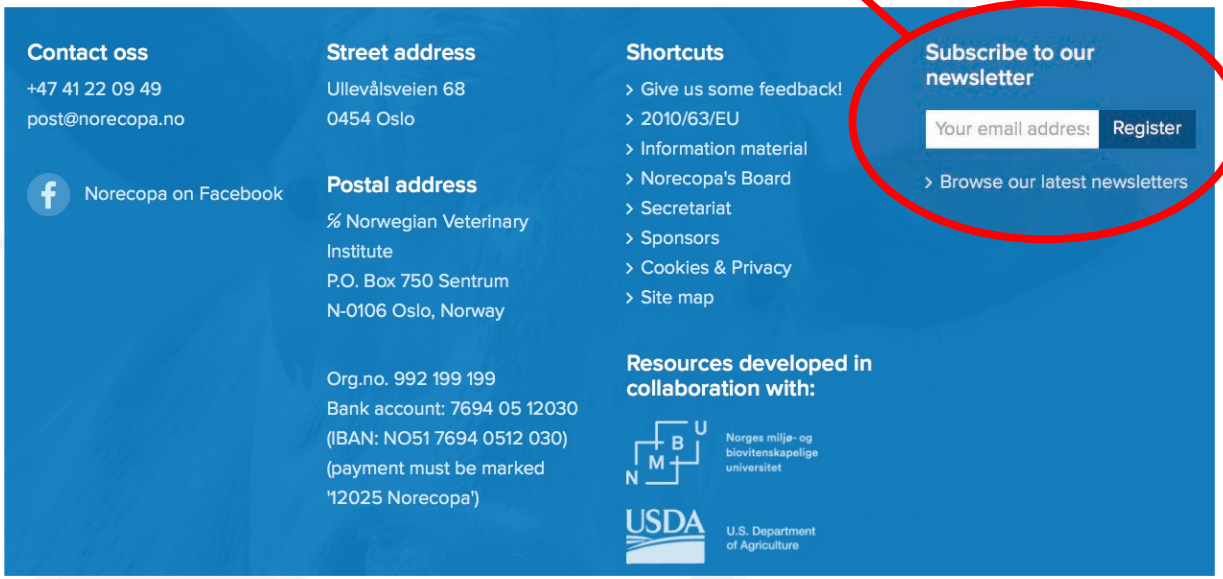
English-language newsletters

norecopa.no/news/newsletters

7-8 times a year

1,100 international subscribers

Newsletters



+ webpages for past meetings and recorded meetings

norecopa.no/meetings/meetings-calendar

Webinar and Meetings calendar

- AquaR2002: National Workshop on 3Rs in Aquaculture Research, Ås, 9 June 2022
- Practical Applications of Adverse Outcome Pathways, webinar, 9 June 2022
- Sex as a biological variable in biomedical research, Bern, 9-10 June 2022
- Swine in Biomedical Research, Madison, 10-14 June 2022
- Symposium: We have to talk about rodent surgery, Marseille, 12 June 2022
- 15th FELASA congress: Communication in Animal Research, Marseille, 13-16 June 2022
- LIVe2022 (Lung In Vitro event), Nice, 13-14 June 2022
- UK Home Office Licensee Training Course - Wildlife, online, 17-30 June 2022
- Do Octopuses have Feelings? The Question of Animal Sentience, London, 18 June 2022
- How to conduct a preclinical animal systematic review & meta-analysis, online workshop, 20-22 June 2022
- 2022 Animal Research Tomorrow (ART) Award Ceremony and Conference, 21 June 2022
- ESLAV/ECLAM Summer School on Anesthesia, Analgesia and Euthanasia, online (part A: 21-23 June 2022) & Bologna (part B: 8-9 September 2022)
- ONE - Health, Environment & Society - Conference 2022, Brussels and virtual event, 21-24 June 2022
- Ethics of Animal Behaviour and Welfare Research, virtual ASAB workshop, 21-22 June 2022
- Practical guide to developing a 3R strategy, webinar (Nikki Osborne), 22 June 2022
- Stress-reduced handling of rats and mice, virtual workshop, 22 June 2022
- Innovative Approaches in Cosmetic Testing, in Compliance with European Regulations, Genova, 22-23 June 2022

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we welcome more from you!

fish centres?

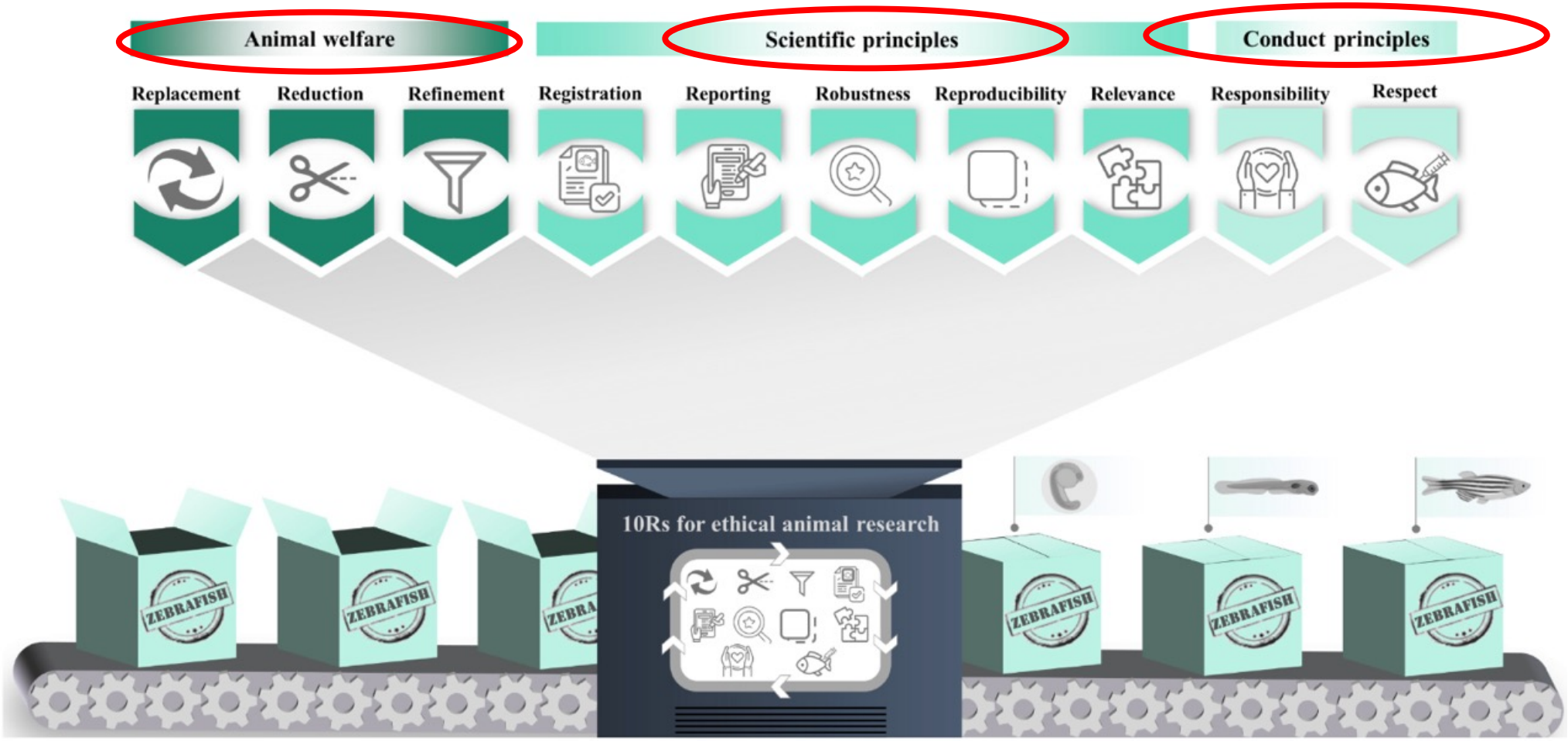
Centres

- Replacement
- Reduction
- Refinement
- ecopa

Associations

- ACURET
- AFLAS (includes South Korea)
- Culture of Care Network
- ecopa
- EU-NETVAL
- EU3Rnet
- FELASA
- FESSACAL
- Scand-LAS
- Concordat on Openness

Aryelle Canedo *et al.* (2022)
Zebrafish (Danio rerio) meets bioethics: the 10Rs ethical principles in research



revistas.ufg.br/vet/article/view/70884/38012

Thanks to Norecopa's main sponsors:

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- Laboratory Animals Ltd.
- Architect Finn Rahn's Legacy
- Nordic Society Against Painful Experiments (NSMSD)
- Norwegian Society for Animal Protection (Dyrebeskyttelsen Norge)
- Norwegian Animal Protection Alliance (Dyrevernalliansen)
- Novo Nordisk
- Sanofi
- Scottish Accreditation Board (SAB)
- Stiansen Foundation
- Universities Federation for Animal Welfare (UFAW)
- US Department of Agriculture (USDA)

Graphics: colourbox.com

Penny Hawkins (2021)

BOUILLABAISSE

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Building **O**n **U**nderstanding and **I**mplementing **L**ovely **L**ives for **A**quatic **B**eings **A**nd **I**nitiating **S**uper **S**cience & **E**thics

norecopa.no/FELASA/fish

Norecopa: PREPARE for better Science