

PREPARING, CARING, SHARING and FLAGGING: tools for animal care staff



norecopa.no/CALAS

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<https://norecopa.no>

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Norecopa

Norway's National Consensus Platform for the
Three Rs: Replacement, Reduction and Refinement
and a source of global 3R resources



<https://norecopa.no>

The views expressed in this presentation are my own and not necessarily those of Norecopa

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[Fish 2005](#) | [Wildlife 2008](#) | [Fish 2009](#) | [Agricultural animals 2012](#) | [Field research 2017](#) | [Past webinars and meetings](#) | [Webinars and Meetings Calendar](#) | [An informal guide to arranging a scientific meeting](#) | [Presentations](#) | [Recorded webinars](#) | [Nordic webinars](#) | [Research Animals and Ethics, 26 May 2021](#)

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norecopa.no/meetings/meetings-calendar

Webinars and Meetings Calendar

- > [CALAS/ACSAL Annual Symposium](#), virtual event, 4, 7, 11 & 18 June 2021
- > [Coherence or correspondence? What truths are we seeking in reproducibility?](#), webinar (Stephen Senn), 7 June 2021
- > [Norecopa's Annual General Meeting and 3R-prize \(in Norwegian\)](#), 8 June 2021
- > [Introduction to microbiological monitoring in rodent facilities](#), 9 June 2021
- > [Animal Research: C...](#) [...ing Course](#), 9-10 June 2021
- > [... Infectious Disease](#), webinar (James Klenner), 9 & 14 June 2021
- > [Berlin 3R seminar series: Education and Training](#), 10 June 2021
- > [3D cell cultures, bioprinted cancer rafts and their potential importance in experimental cancer research](#), webinar (Anna Sebastyan), 10 June 2021
- > [Human placenta: medical waste or value for tissue engineering](#), webinar (Johannes Hackethal), 10 June 2021

+ webpages for past meetings and recorded meetings

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norecopa.no/global3R



Centres

- [Replacement](#) ⓘ
- [Reduction](#) ⓘ
- [Refinement](#) ⓘ
- [ecopa](#) ⓘ

Associations

- [AFLAS \(includes South Korea\)](#) ⓘ
- [Culture of Care Network](#) ⓘ
- [EU3Rnet](#) ⓘ
- [FELASA](#) ⓘ
- [FESSACAL](#) ⓘ
- [Scand-LAS](#) ⓘ

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Databases & Guidelines

Published lists of resources are difficult to search and quickly become outdated. Lists on a website are easier to search, but do not enable the use of filters or intelligent search engines.

Norecopa has therefore constructed four databases, which together with all the text on this website can be searched simultaneously using the search field at the top of every page.

- > [3R Guide](#): a global overview of **databases, guidelines, information centres, journals, email lists, regulations and policies** which may be of use when planning experiments which might include animals. [A quick overview of all the guidelines can be accessed here.](#) Norecopa has written several of these, including [the PREPARE guidelines for planning animal research and testing.](#)
- > [NORINA](#): a global overview of audiovisual aids and other items which may be used as **alternatives or supplements to animals in education and training** at all levels from junior school to University, including [dissection alternatives](#) and surgical simulators.
- > [TextBase](#): a global overview of **textbooks and other literature within laboratory animal science** and related topics.
- > [Classic AVs](#): a subset of NORINA covering **audiovisual aids that are based on older technology.**

These databases are updated regularly. [Please give us feedback](#) if you discover errors or omissions.

The Norecopa website also includes four other collections:

- > [NAL](#): a collection of literature references relating to [the 3Rs](#) from the US National Agricultural Library
- > European Commission datasets:
 - ▶ [3Rs Knowledge Sources](#): over 800 resources collected by the Commission in 2016
 - ▶ [3Rs Education and Training Resources](#), over 560 items collected in 2018
 - ▶ [Non-animal models for respiratory tract diseases](#), over 280 models identified in a literature review of over 21,000 publications

Here is [an alphabetical global list of all the databases](#) cited on the Norecopa website.

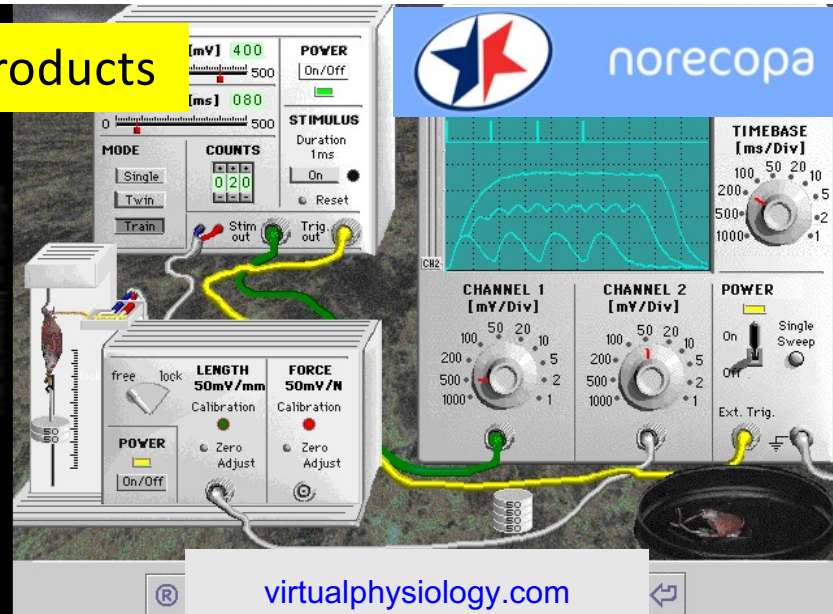
norecopa.no/databases-guidelines

links to over 70 other databases

NORINA database: approx. 3,000 products



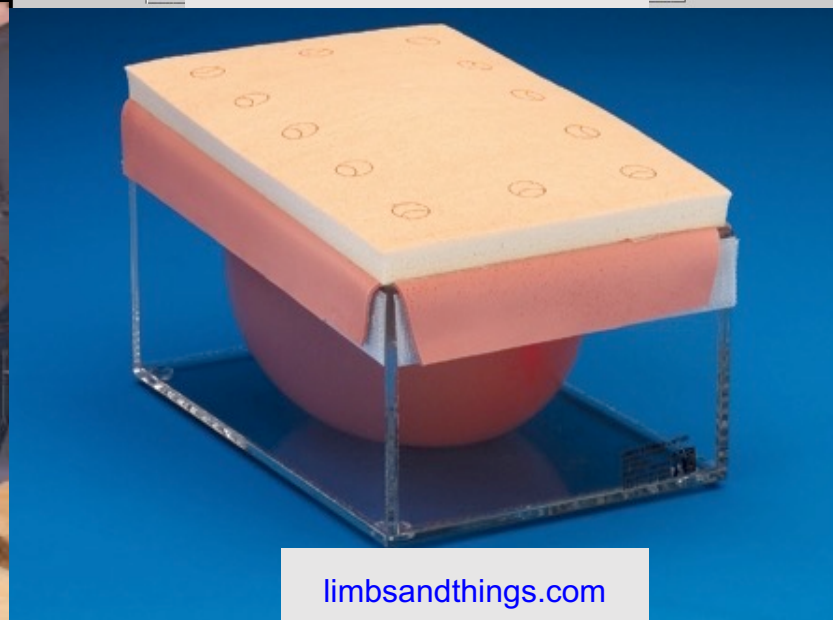
3dglasshorse.com



virtualphysiology.com



rescuecritters.com



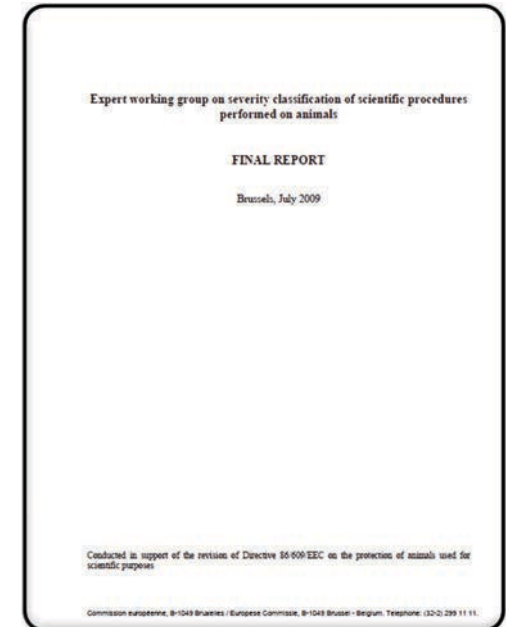
limbsandthings.com

From **3R-Guide** (380 guidelines for animal research and testing)
norecopa.no/3r-guide



Guidance on the severity classification of procedures involving fish

Report from a Working Group convened by Norecopa



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

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norecopa.no/categories

A manifesto for reproducible science

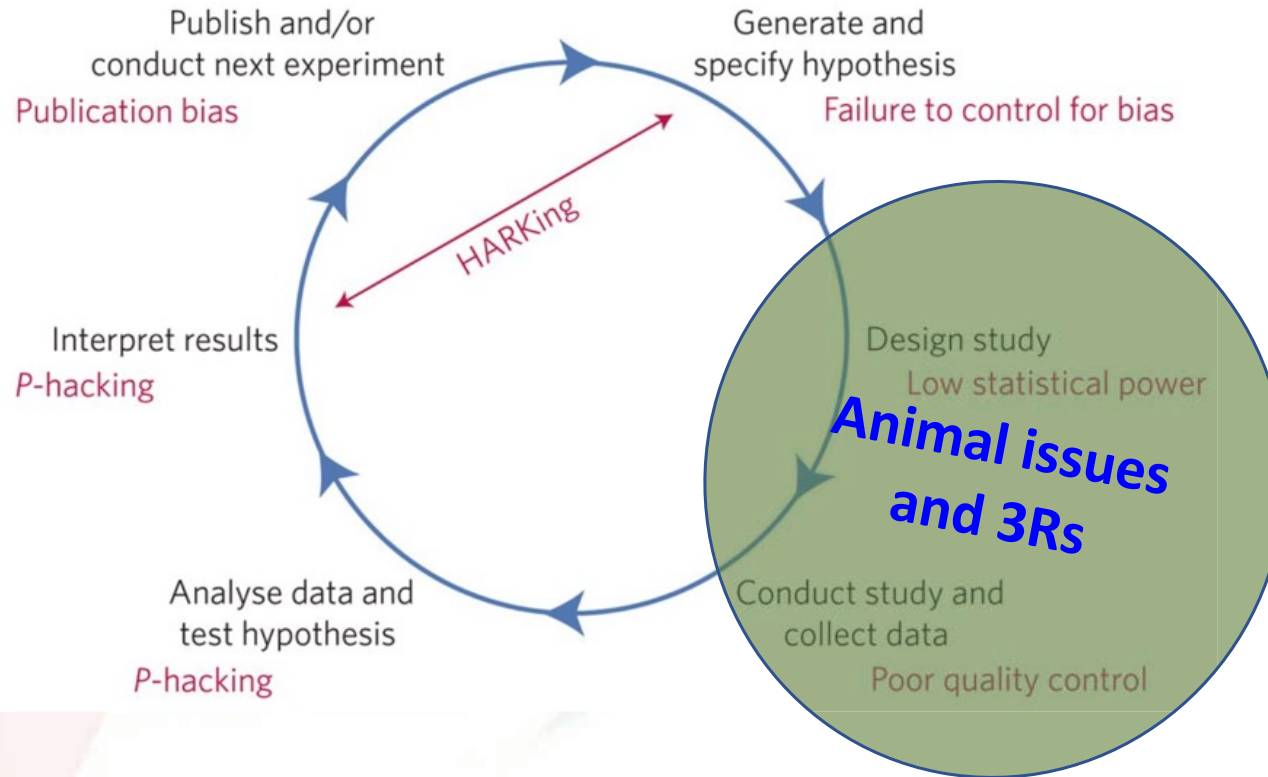
Marcus R. Munafò , Brian A. No-
Button, Christopher D. Chambers,
Jan Wagenmakers, Jennifer J. Wa

Nature Human Behaviour 1, Artic

33k Accesses | 518 Citations |

Figure 1: Threats to reproducible science.

From: A manifesto for reproducible science





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Two frustrations:

'We can solve the reproducibility crisis by'

- courses in "Experimental Design" that focus on the "mathematical" aspects (e.g. randomisation, experimental units, blinding, statistical methods) and ignore the animal/human-related issues
- **better reporting**



[reddit.com](https://www.reddit.com)



Reporting

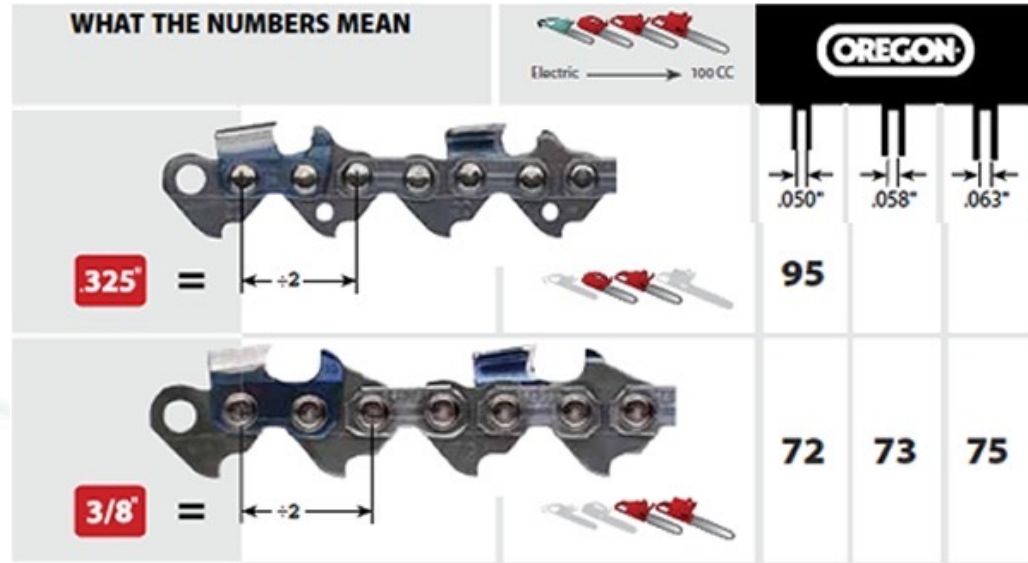
Planning



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The easy parts of design and reporting:



arborist101.com

- Chainsaw
 - Blade characteristics
 - Sparkplug type
 - Petrol/oil mixture
 - Service history
- Angle of cut in tree
- Length of tree logs



stihl.no

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Critical issues behind the scenes that may not get reported:

- Experience of the workers
- Inspection for signs of rot and to decide felling direction
- Additional equipment (winch, chains, straps, wedges)
- Routines and equipment for sharpening the chain
- Clearing-up and transport of logs
- Health and safety precautions – clothing, onlookers
- **Division of labour and costs**

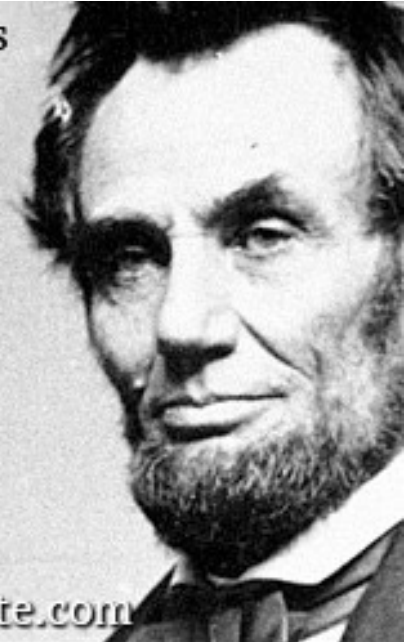
Starts long before the actual work.



leaderonomics.com

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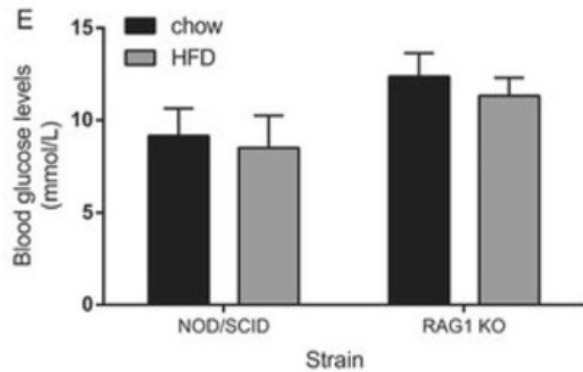
Give me six hours
to chop down a
tree and I will
spend the first
four sharpening
the axe.



Abraham Lincoln

www.quote-coyote.com

The scientist



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The mouse

Breeding

New social groups

Transportation

Acclimation to research facility

Allocation to experimental group

Adaptation to new diet

Handling and immobilisation

Blood sampling

often also:

injections, gavaging, surgery

pain and distress

developing illness and death

One example: scruffing mice

Both sexes and 4 strains of mice, 3 experienced handlers



Baseline

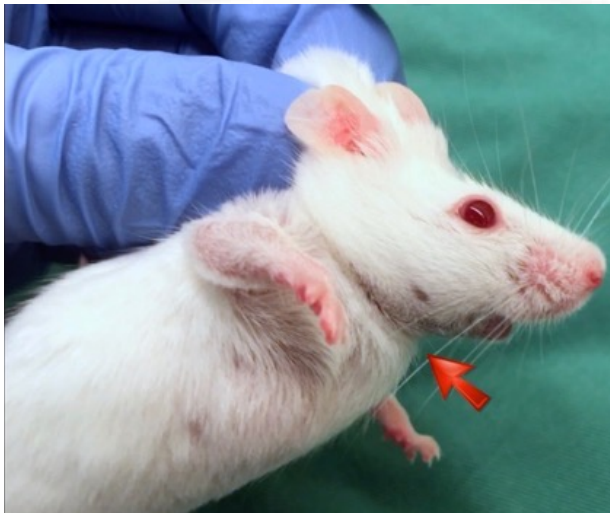


Immobilizing
Sinus bradycardia, VEC

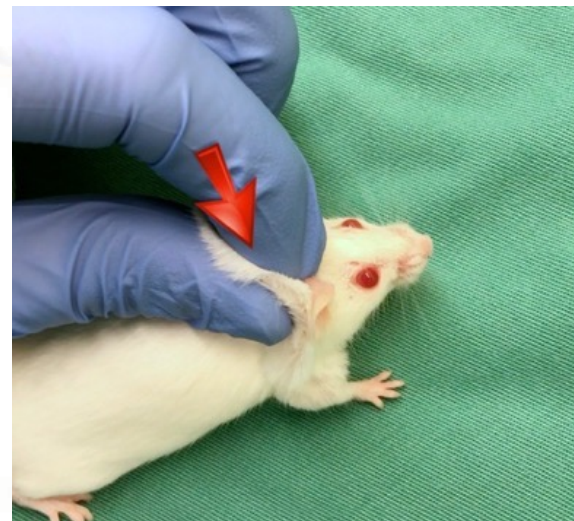


Reprinted with permission. Labitt RN, Oxford EM, Davis AK, Butler SD, Daugherty EK. 2021. A Validated Smartphone-based Electrocardiogram Reveals Severe Bradyarrhythmias during Immobilizing Restraint in Mice of Both Sexes and Four Strains. J Am Assoc Lab Anim Sci 60:201–212. DOI: 10.30802/AALAS-JAALAS-20-000069

norecopa.no/scruff



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Three fingers better than two

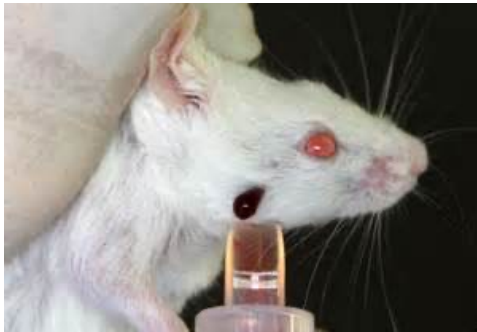
Artefacts caused by poor administration techniques



Photo: NMBU

- *Do injections always end up in the same place?*
- *Are the injections painful?*
- *Are they realistic? (intramuscular injections in small animals)*

'A simple' case: a researcher wants a blood sample



medipoint.com/html/for_use_on_mice.html



[theodora.com/rodent_laboratory/
blood_collection.html](http://theodora.com/rodent_laboratory/blood_collection.html)



photo:NMBU

vimeo.com/486368886

The best blood sampling techniques are those where you can:

- ✓ see the blood vessel
- ✓ regulate the amount of blood you remove
- ✓ stop the bleeding easily (including internal bleeding)
- ✓ avoid damage to the surrounding tissue
- ✓ collect samples rapidly, to avoid artefacts due to mechanical stress, temperature changes, differing lengths of sampling time

Sometimes we have to make choices without scientific evidence...

Carol M. Newton (1925-2014)



National Library of Medicine

The three S's

- *Good Science*
- *Good Sense*
- *Good Sensibilities*

<https://norecopa.no/3S>

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How do other professionals achieve good reproducible results?



<https://www.meonuk.com/runway-markings-explained>



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...and precision in a variable environment?



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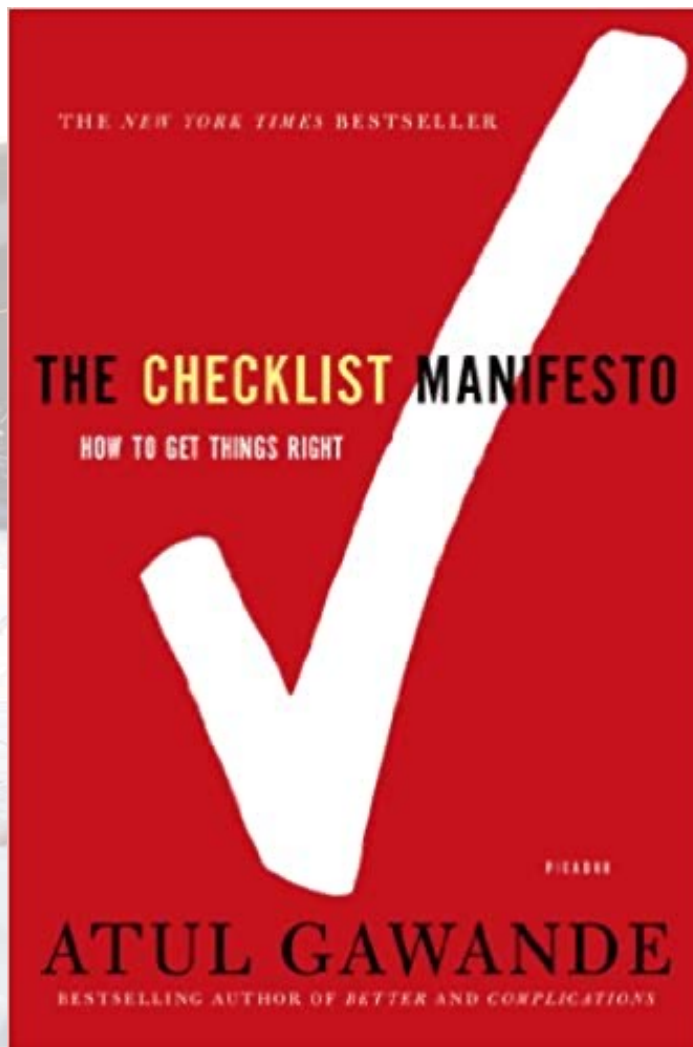
10-15 checklists even on short routine flights



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Checklists

- Reduce risk of **forgetting** to carry out vital actions
- Ensure checks are carried out in the **correct sequence**
- Encourage **cooperation** and **cross-checking** between crew members
- Make sure that everyone is "**on the same page**"



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amazon.com/gp/product/0312430000



Surgical Safety Checklist



Before induction of anaesthesia

 →

Before skin incision

 →

Before patient leaves operating room

<p><i>(with at least nurse and anaesthetist)</i></p> <p>Has the patient confirmed his/her identity, site, procedure, and consent? <input type="checkbox"/> Yes</p> <p>Is the site marked? <input type="checkbox"/> Yes <input type="checkbox"/> Not applicable</p> <p>Is the anaesthesia machine and medication check complete? <input type="checkbox"/> Yes</p> <p>Is the pulse oximeter on the patient and functioning? <input type="checkbox"/> Yes</p> <p>Does the patient have a:</p> <p>Known allergy? <input type="checkbox"/> No <input type="checkbox"/> Yes</p> <p>Difficult airway or aspiration risk? <input type="checkbox"/> No <input type="checkbox"/> Yes, and equipment/assistance available</p> <p>Risk of >500ml blood loss (7ml/kg in children)? <input type="checkbox"/> No <input type="checkbox"/> Yes, and two IVs/central access and fluids planned</p>	<p><i>(with nurse, anaesthetist and surgeon)</i></p> <p><input type="checkbox"/> Confirm all team members have introduced themselves by name and role.</p> <p><input type="checkbox"/> Confirm the patient's name, procedure, and where the incision will be made.</p> <p>Has antibiotic prophylaxis been given within the last 60 minutes? <input type="checkbox"/> Yes <input type="checkbox"/> Not applicable</p> <p>Anticipated Critical Events</p> <p>To Surgeon: <input type="checkbox"/> What are the critical or non-routine steps? <input type="checkbox"/> How long will the case take? <input type="checkbox"/> What is the anticipated blood loss?</p> <p>To Anaesthetist: <input type="checkbox"/> Are there any patient-specific concerns?</p> <p>To Nursing Team: <input type="checkbox"/> Has sterility (including indicator results) been confirmed? <input type="checkbox"/> Are there equipment issues or any concerns?</p> <p>Is essential imaging displayed? <input type="checkbox"/> Yes <input type="checkbox"/> Not applicable</p>	<p><i>(with nurse, anaesthetist and surgeon)</i></p> <p>Nurse Verbally Confirms:</p> <p><input type="checkbox"/> The name of the procedure</p> <p><input type="checkbox"/> Completion of instrument, sponge and needle counts</p> <p><input type="checkbox"/> Specimen labelling (read specimen labels aloud, including patient name)</p> <p><input type="checkbox"/> Whether there are any equipment problems to be addressed</p> <p>To Surgeon, Anaesthetist and Nurse:</p> <p><input type="checkbox"/> What are the key concerns for recovery and management of this patient?</p>
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This checklist is not intended to be comprehensive. Additions and modifications to fit local practice are encouraged. Revised 1 / 2009 © WHO, 2009

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

Too late to read the checklists when you have ARRIVED!



colourbox.com

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Encourage scientists to collaborate with animal carers and technicians from Day 1

- you have a right to know and will be more motivated
- you know the possibilities (and limitations) in the animal facility
- you possess a large range of practical skills and are good at lateral thinking
- you know the animals best
- the animals know you best
- lack of involvement creates anxiety, depression and opposition to animal research, as well as limiting creativity which might improve the experiments



Original Article

PREPARE: guidelines for planning animal research and testing

Adrian J Smith¹, R Eddie Clutton², Elliot Lilley³, Kristine E Aa Hansen⁴ and Trond Brattelid⁵

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 Norecoba website, with links to guidelines for animal research and testing, at <https://norecoba.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

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<https://doi.org/10.1177/0023677217724823>



Over 18,000 downloads from the journal website so far

Also downloadable from norecoba.no/PREPARE

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PREPARE:

Planning Research and Experimental Procedures on Animals: Recommendations for Excellence

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



PREPARE



The PREPARE Guidelines Checklist

Planning Research and Experimental Procedures on Animals: Recommendations for Excellence

Adrian J. Smith¹, R. Eddie Clutton², Elliot Lilley³, Kristine E. Aa. Hansen⁴ & Trond Bratfeldt⁵

¹Norecopa, c/o Norwegian Veterinary Institute, P.O. Box 750 Sentrum, 0706 Oslo, Norway; ²Royal (Dick) School of Veterinary Studies, Easter Bush, Midlothian, EH25 9RG, U.K.; ³Research Animals Department, Science Group, RSPCA, Wiberforce Way, Southwater, Horsham, West Sussex, GU10 2PH, U.K.; ⁴Section 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; ⁵Division for Research Management, Norwegian University of Life Sciences, 2020 Bergen, Norway.

PREPARE consists of planning guidelines which are complementary to the ARRIVE guidelines. PREPARE covers the three broad areas which determine the quality of research: 1. Formulation of the study 2. Dialogue between scientists and the animal facility 3. Quality control of the components in the study

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 appear in this checklist, since in-house experiments are dependent upon their own specific circumstances. The full version of the guidelines is available on the Norecopa 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	<input type="checkbox"/> Form a clear hypothesis, with primary and secondary outcomes. <input type="checkbox"/> Consider the use of systematic reviews. <input type="checkbox"/> Decide upon databases and information specialists to be consulted, and conduct search terms. <input type="checkbox"/> Assess the relevance of the species to be used, its biology and suitability to answer the experimental questions with the least suffering, and to welfare needs. <input type="checkbox"/> Assess the reproducibility and translatability of the project.
2. Legal issues	<input type="checkbox"/> Consider how the research is affected by relevant legislation for animal research and other areas, e.g. animal transport, occupational health and safety. <input type="checkbox"/> Locate relevant guidance documents (e.g. EU guidance on project evaluation).
3. Ethical issues, harm-benefit assessment and humane endpoints	<input type="checkbox"/> Construct a lay summary. <input type="checkbox"/> In dialogue with ethics committees, consider whether statements about this type of research have already been produced. <input type="checkbox"/> Address the 3Rs (replacement, reduction, refinement) and the 3Ss (good science, good sense, good health/benefits). <input type="checkbox"/> Consider pre-regulation and the publication of negative results. <input type="checkbox"/> Perform a harm-benefit assessment and justify any likely animal harm. <input type="checkbox"/> Discuss the learning objectives, if the animal use is for educational or training purposes. <input type="checkbox"/> Provide a severity classification to the project. <input type="checkbox"/> Define objective, easily measurable and unequivocal humane endpoints. <input type="checkbox"/> Discuss the justification, if any, for death as an end point.
4. Experimental design and statistical analysis	<input type="checkbox"/> Consider pilot studies, statistical power and significance levels. <input type="checkbox"/> Define the experimental unit and decide upon animal numbers. <input type="checkbox"/> Choose methods of randomisation, prevent observer bias, and decide upon inclusion and exclusion criteria.

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

References

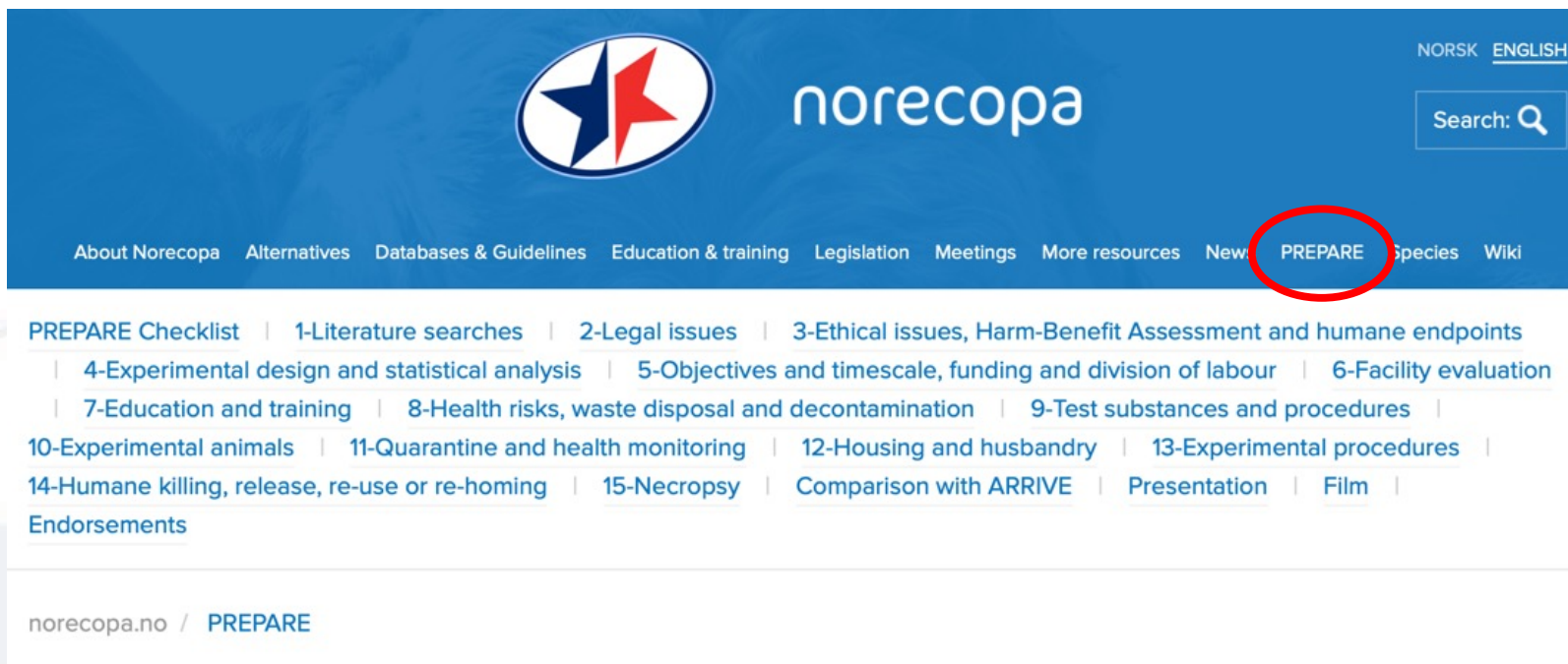
1. Smith AJ, Clutton RE, Lilley E, Hansen KEA & Bratfeldt T. PREPARE Guidelines for Planning Animal Research and Testing. *Laboratory Animals*, 2017. DOI: 10.1177/0023677217724823.
2. Kilkenny C, Browne WJ, Cuthill IC et al. Improving Bioscience Research Reporting: The ARRIVE Guidelines for Reporting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

Further information

<https://norecopa.no/PREPARE> | post@norecopa.no | [@norecopa](https://twitter.com/norecopa)

In addition to the checklist, much more information is available on:

norecopa.no/PREPARE



The screenshot shows the norecopa website header with the logo and navigation menu. The 'PREPARE' menu item is circled in red. Below the header, a list of links for the PREPARE checklist is displayed, including items 1 through 15, as well as 'Comparison with ARRIVE', 'Presentation', and 'Film'. The breadcrumb trail at the bottom of the page reads 'norecopa.no / PREPARE'.

NORSK [ENGLISH](#)

Search:

[About Norecopa](#) [Alternatives](#) [Databases & Guidelines](#) [Education & training](#) [Legislation](#) [Meetings](#) [More resources](#) [New](#) **PREPARE** [Species](#) [Wiki](#)

[PREPARE Checklist](#) | [1-Literature searches](#) | [2-Legal issues](#) | [3-Ethical issues, Harm-Benefit Assessment and humane endpoints](#)
| [4-Experimental design and statistical analysis](#) | [5-Objectives and timescale, funding and division of labour](#) | [6-Facility evaluation](#)
| [7-Education and training](#) | [8-Health risks, waste disposal and decontamination](#) | [9-Test substances and procedures](#) |
[10-Experimental animals](#) | [11-Quarantine and health monitoring](#) | [12-Housing and husbandry](#) | [13-Experimental procedures](#) |
[14-Humane killing, release, re-use or re-homing](#) | [15-Necropsy](#) | [Comparison with ARRIVE](#) | [Presentation](#) | [Film](#) |
[Endorsements](#)

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The screenshot shows the norecopa website header with the logo and navigation menu. The PREPARE Checklist is highlighted, listing 15 items. Item 3, 'Ethical issues, Harm-Benefit Assessment and humane endpoints', is highlighted in yellow. Below the checklist, the breadcrumb 'norecopa.no / PREPARE' and social media icons are visible.

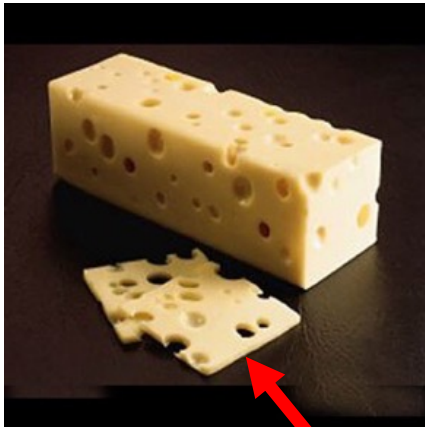
Harm-Benefit Assessment

Harm-Benefit assessment, an evaluation of the likely sources and level of suffering of a planned procedure, followed by an assessment of the potential benefits of the research weighed against these harms, lies at the heart of [legislation in the EU](#) and elsewhere. [A framework for severity assessment and severity classification](#) must be established and justified. The likely adverse effects of each procedure should be described, along with their likely incidence and methods of recognising them, with indications of how these effects can be mitigated by implementing refinement. This necessitates the involvement of personnel with the relevant expertise to recognise, assess and reduce animal suffering, especially severe suffering. [Guidance on this is available on the RSPCA website](#). Specific justification of all unavoidable animal suffering must be provided. An estimate must be made of the maximum amount of pain, distress or lasting harm to which an individual can be

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

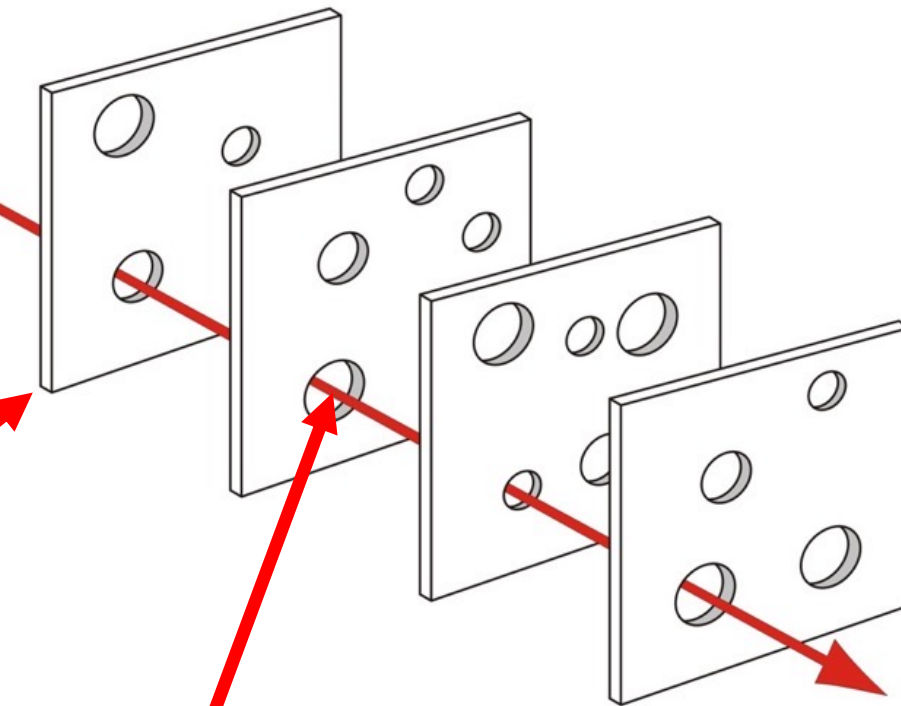
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Threat and Error Management



eaugallecheese.com/Swiss-Cheese

"Layer of defence"
or redundancy



Weakness / hazard

Loss

wikipedia.org/wiki/Swiss_cheese_model

Contingency and redundancy

Anything that can go wrong, will go wrong (Murphy's Law)
when it's least convenient (Sod's Law)



Photo: NMBU



norecopia

A simple but effective Master Plan

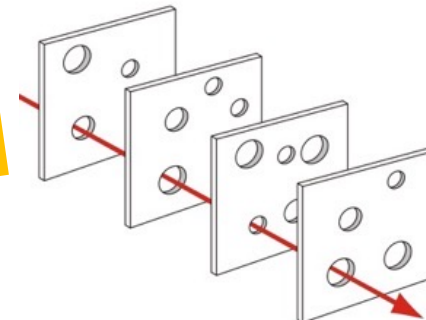


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A Contingency Plan, based upon risk assessment

- Access to emergency services (police, fire, medical and veterinary help, security guards, personnel transport in cases of acute illness)
- Means of communication with staff members at all levels
- SOPs for acute illness, including
 - serious haemorrhages
 - fainting

These need to be revised or supplemented in the light of Covid-19
norecopa.no/be-prepared



Temporary staff at weekends and holidays

- corrosive injuries
- and forms for reporting such injuries
- Firefighting, evacuation of personnel and animals
- Access to specialist services (e.g. ventilation system, plumbing, electrical installations, suppliers of equipment)
- Routines in cases of power failure, water leaks and (if applicable) natural disasters such as flooding
- Routines for emergency killing of animals
- Routines in cases of threats to the facility or personnel

<https://norecopa.no/prepare/6-facility-evaluation/master-plan-and-sops/contingency-plan>

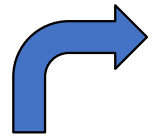
A contract between the animal facility and the research group

Division of labour, responsibilities and cost

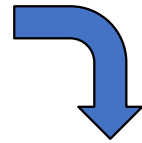
Clarifying all stages of the experiment

Ensuring that all necessary data are recorded

	Animal facility	Researcher	Not applicable
Animal:			
Arrival date			
Species			
Strain/stock and substrain			
Supplier (full name and address) or bred on the premises			
Number and sex			
Age, weight, stage of life cycle on arrival			
Pre-treatment (surgical or medical) from supplier			
Quality (e.g. SPF, germ-free, gnotobiotic, conventional)			
Acclimation time before the start of the experiment			
Time and duration of fasting (with/without water and bedding)			
Environment:			
Type of housing: barrier/conventional			
Temperature (mean ± variation)			
Light schedule			
Relative humidity (mean ± variation)			
Number of air changes in the animal room/cabinet per hour			
Environmental enrichment			
Housing:			
Free-range, shelf, cabinet, isolator			
Cage type and size			
Number and method of distribution of animals per cage			



Design



Analysis

Conduct



Reporting



**Identify and ensure the quality of (at least)
the critical points in the experiment:**

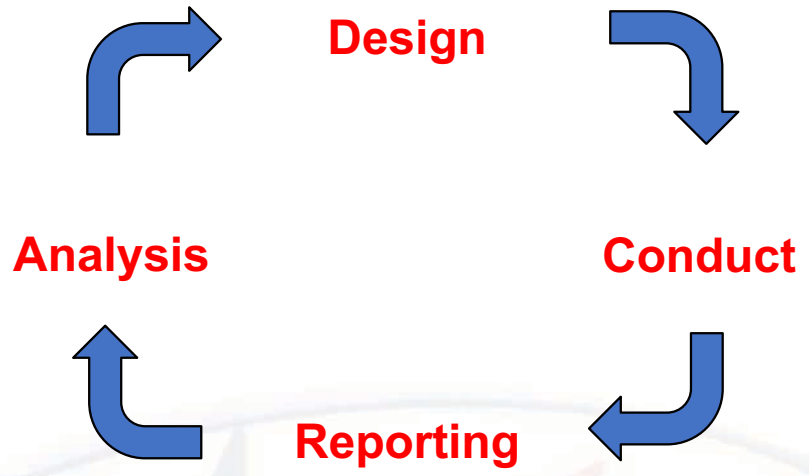
for scientific output and animal welfare



vimeo.com/358069203 or norecopa.no/PREPARE/film
 3-minute cartoon film



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Space Shuttle, NASA



NASA



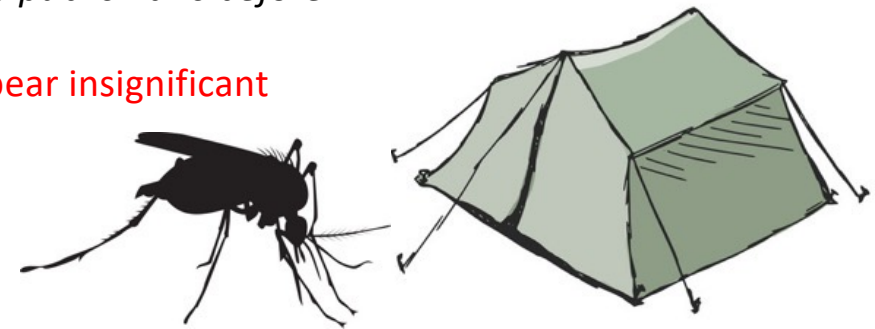
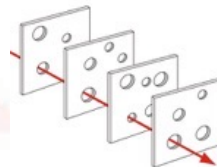
cbsnews.com



no.wikipedia.org

- Complex machines/animals create *known or unknown unknown interactions*
- *Design weaknesses* (which the engineers knew about!)
- *External pressure to launch* (political, media) - "Publish or perish"
- *Management decisions* (pushing the safety envelope):
"We've got away with it before" / "We've managed to publish this before"
- A combination of many factors, each of which may appear insignificant until they occur simultaneously

We need a Culture of Care!





A Culture of Care

A demonstrable commitment, throughout the establishment, to improving:

- animal welfare
- scientific quality
- care of staff
- transparency for all stakeholders, including the public

It goes beyond simply complying with the law!

Communication and the Culture of Care

Penny Hawkins, RSPCA Research Animals Department
on behalf of the International Culture of Care Network*

Effective two-way communication between scientists and animal technologists is essential for a good Culture of Care
The European Commission suggests the 'development of formal and informal communication channels, for mutual benefit with respect to science and animal welfare'
Here are some examples from International Culture of Care network members

Regular meetings

Scheduled meetings for scientists, animal technologists, vets, unit managers and AWERB members



Regular refresher/update meetings for all organised by NTCO



Special events

Duo-talks: researcher talks about their science, and animal technologists talk about techniques and animal care within the project



ELH organises an **informal meeting** for all, in which anyone can raise welfare issues



Building communication into existing processes

Each study has a **pre-start** and **wash-up** meeting involving everybody



Three Rs improvements **reported to AWERB & shared** at external user meetings

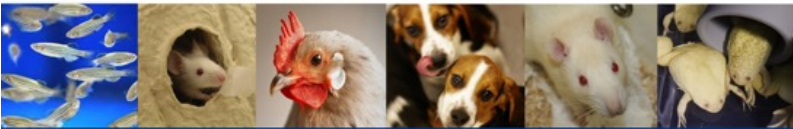


Other ideas

A **'boxless' event:** anyone can submit 'out of the box' ideas to improve practice



A **staff survey** for all e.g. how much do you agree with statements such as *'in our group we listen to each others' ideas about animal welfare'*

*norecopa.no/culture-of-care

The International Culture of Care Network

A Quick Start Guide and more resources

norecopa.no/CoC



"because we've always done it that way"

"as often as necessary"

"there are no alternatives"

Closely related to a culture of care is the concept of a **Culture of Challenge**

(Louhimies, 2015)


Look for the acceptable, rather than choosing the accepted



Why is 3R literature hard to find?

- Bibliographic databases are often not used adequately (poor overlapping between the databases)
- Too few scientists are aware of the specialist 3R-databases
- Scientists rarely use "3R" words when they write titles/abstracts/keywords for their papers
- Databases rarely flag 3R-papers with explicit thesaurus terms
- We have no single "Journal of Alternatives"




norecopa.no/prepare/1-literature-searches



How to construct a literature search

Alice Tillema, Medical Library, Nijmegen

<http://libguides.ru.nl/norecopa>

  Radboud University  Radboudumc
university medical center

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Clicker training

Clicker training is an operant conditioning based on positive reinforcement. When the animal offers the desired behavior, a *click* or another distinctive sound (secondary reinforcer) is delivered and within the following few seconds the reward is presented (primary reinforcer)^[1]. The *click* bridges the time between the desired behavior and the presentation of the reward^[1]. A target stick providing a visual guide for the animal can be used for the training.

Animals are usually trained individually, though it is also possible to perform clicker training in a groups, e.g. in mice, rats, and rabbits. For rats, it was demonstrated that they learned tasks by observing the clicker training of their cage mates^[2].

Clicker training can be used to train animals in a stress-free way. The following behaviours are examples for what this technique can be used for:

Mice: entering a tunnel, following a target stick, climbing on the palm of the hand^[3]

Rats: following a target stick, voluntarily change to a cage, observational learning^[2]

Rabbits: following a target stick, rearing/standing up to inspect the abdomen, approaching a human, being touched and lifted by a human, trimming nails, coming on command

Pigs: Pigs can be easily trained to cooperate if they are treated empathetically and desired behavior is reinforced by providing food stuff in form of treats and apple juice^[4].



Clicker training with mice using a target stick. *Left:* The mouse is following the target stick and is climbing on the experimenter's hand. If the hand is lifted, the mouse will remain on the palm of the hand. *Right:* The mice are trained in a group. Two mice are following the target stick on the palm of the experimenter's hand.

- ¹ ^{1.0} ^{1.1} Feng, Lynna C.; Howell, Tiffani J.; Bennett, Pauleen C. (1 August 2016). "How clicker training works: Comparing Reinforcing, Marking, and Bridging Hypotheses". *Applied Animal Behaviour Science*. **181**: 34–40. doi:10.1016/j.applanim.2016.05.012. ISSN 0168-1591.
- ² ^{2.0} ^{2.1} Leidinger, Charlotte Sophie; Kaiser, Nadine; Baumgart, Nadine; Baumgart, Jan (25 October 2018). "Using Clicker Training and Social Observation to Teach Rats to Voluntarily Change Cages". *JoVE (Journal of Visualized Experiments)* (140): e58511. doi:10.3791/58511. ISSN 1940-087X. PMC 6235608. PMID 30417890.
- ³ Leidinger, Charlotte; Herrmann, Felix; Thöne-Reineke, Christa; Baumgart, Nadine; Baumgart, Jan (6 March 2017). "Introducing Clicker Training as a Cognitive Enrichment for Laboratory Mice". *JoVE (Journal of Visualized Experiments)* (121): e55415. doi:10.3791/55415. ISSN 1940-087X. PMC 5408971. PMID 28287586.
- ⁴ "Positive Reinforcement Training in Large Experimental Animals" (PDF).

Experts for clicker training in mice and rats: TARC, Mainz, Germany

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This page was last edited on 27 May 2020, at 11:23.

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3R improvements are often not highlighted in the scientific literature



http://www.theodora.com/rodent_laboratory/blood_collection.html



photo:NMBU

SCID-Hu mice immunized with a pneumococcal vaccine produce specific human antibodies and show increased resistance to infection.

Saphenous vein puncture for blood sampling of the mouse, rat, hamster, gerbil, guineapig, ferret and mink

Annelise Hem¹, Adrian J. Smith² & Per Solberg¹

¹Laboratory Animal Unit, National Institute of Public Health, PO Box 4404 Torshov, N-0403 Oslo and

²Laboratory Animal Unit, Norwegian School of Veterinary Science, PO Box 8146 Dep., N-0033 Oslo, Norway


© Laboratory Animals Ltd. *Laboratory Animals* (1998) **32**, 364–368

Summary

A method is described for blood collection from the lateral saphenous vein. This enables rapid sampling, which if necessary can be repeated from the same site without a need for new puncture wounds. The method is a humane and practical alternative to cardiac and retro-orbital puncture, in species where venepuncture has traditionally been regarded as problematic.





Keywords Saphenous vein; blood sampling; mouse; rat; hamster; gerbil; guineapig; rodent; ferret; mink

Not necessarily a high-impact journal



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- [Covid-19 and Contingency Plans](#)
- [Resources for home learning](#)
- [Update on the Refinement Wiki](#)
- [Update on PREPARE](#)
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- [News of other 3R initiatives](#)
- [Update on the World Congress in Maastricht](#)
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