Are we Car Salesmen, Boy Scouts or Airline Pilots? Preparing for robust and humane research

norecopa.no/WC11-PREPARE

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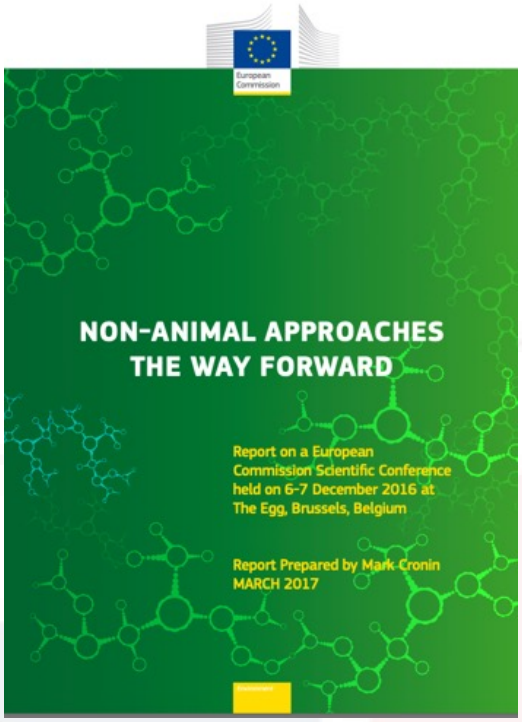
https://norecopa.no

The evolution of the PREPARE planning guidelines:



- Discussions and learning material on courses in Laboratory Animal Science from 1986 onwards
- Development of planning guidelines – too obvious to publish!
- European ?
- The realisation that the community was asking for planning guidelines, not just reporting guidelines
- Published ahead of print in August 2017

15 minutes to present 30 years of work...

norecopa.no/legislation/eu-directive-201063

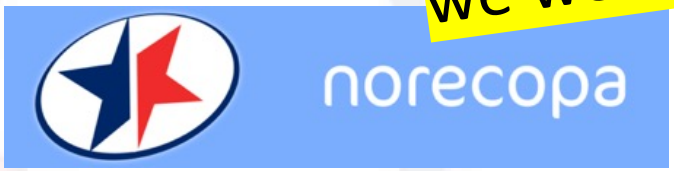
Norecopa

Norway's National Consensus Platform for the

Three Rs: Replacement, Reduction and Refinement

and a source of global 3R resources

we welcome more from you!

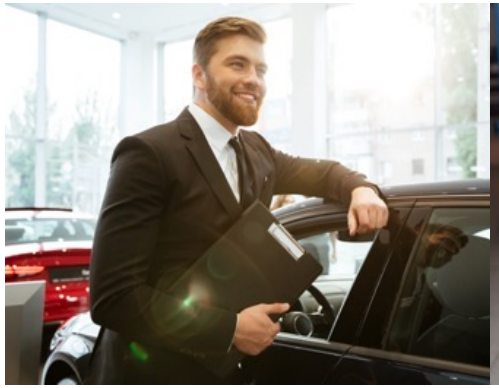


https://norecopa.no

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

approx. 8,500 webpages
300,000 hits annually

7-8 detailed newsletters per year



norecopa

Sales, Profit

Us: citations, impact factor, publication list

Integrity, Preparedness

Us: Research integrity, validity, reproducibility

Collaboration, Precision, Reliability, Safety

Us: the same!

PREPARE is all about quality assurance...

'Our long experience and modern coffee machines

*are your **guarantee of quality**'* **??**

Two frustrations

"We can solve the reproducibility crisis by

- courses in "Experimental Design" that focus primarily on the "mathematical" aspects (e.g. randomisation, experimental units, blinding, statistical methods)

- **better reporting"**

Reporting guidelines are not new…

e.g.

- Guidelines for specification of animals and husbandry methods when reporting the results of animal experiments, **1985** (GV-SOLAS)
- Reporting animal use in scientific papers, 1997 (Smith *et al.)*
- Animal definition: a necessity for the validity of animal experiments? 2000 (Öbrink & Rehbinder)
- Guidelines for reporting the results of experiments on fish, 2000 (Smith & Brattelid)
- ARRIVE Guidelines, 2010 (Kilkenny *et al.*)
- Gold Standard Publication Checklist (GSPC), 2010 (SYRCLE)
- Institute for Laboratory Animal Research, 2011 (NRC)
- Instructions to authors, in many journals
- ARRIVE 2.0 Guidelines, 2019 (Percie du Sert *et al.*)

Reporting

Planning

nature human behaviour

Perspective | Open Access | Published: 10 January 2017

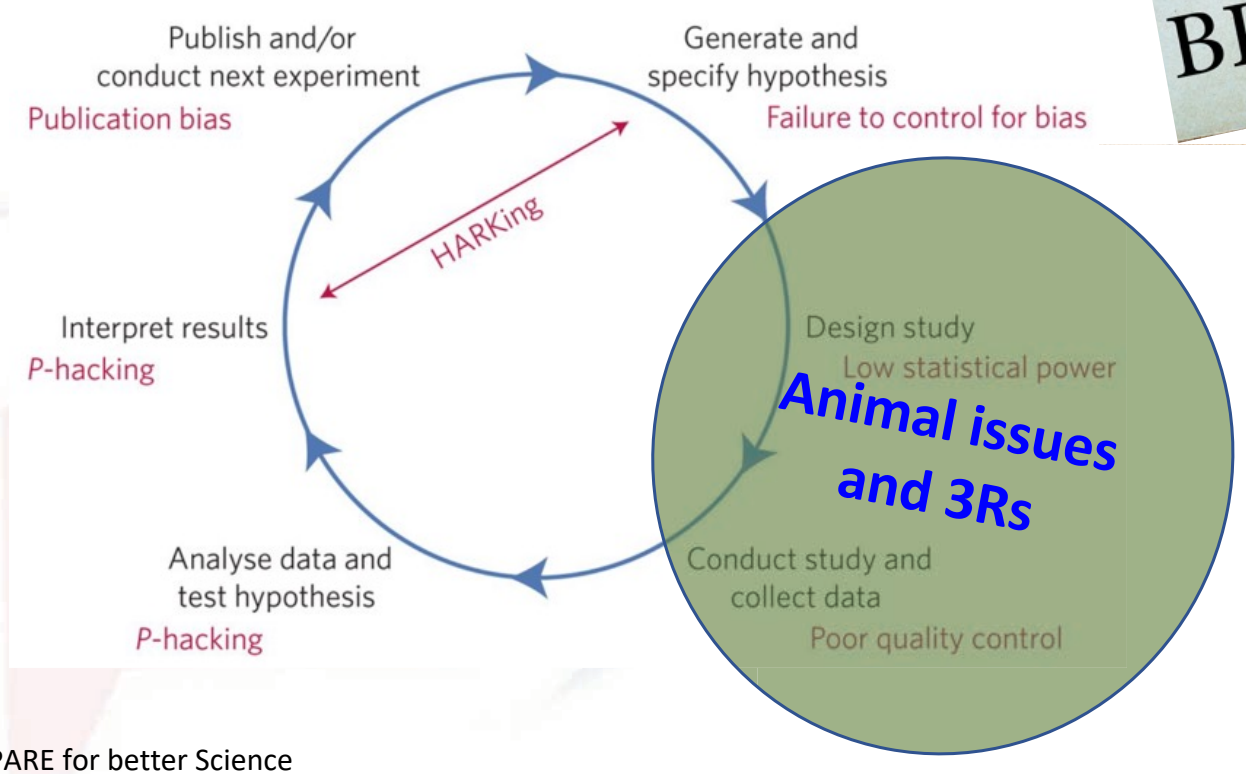
A manifesto for reproducible science

Marcus R. Munafò, Brian A. Nosek, Dorothy V. M. Bishop, Katherine S. Button, Christopher D. Chambers, Nathalie Percie du Sert, Uri Simonsohn, Eric-Jan Wagenmakers, Jennifer J. Wa

Nature Human Behaviour 1, Artic

Figure 1: Threats to reproducible science.

From: A manifesto for reproducible science



1994:

Neglected Factors in Pharmacology and Neuroscience Research: Biopharmaceutics, Animal Characteristics, Maintenance, Testing Conditions

By Claassen, Volkert

Record number: 13335 (legacy id: 6153)

The objective of this book is to indicate those variables which in general may need a better control. Examples, gathered from the literature, are presented to illustrate the impact that those neglected variables may have on various characteristics. The book presents a series of representatives studies from a broad field of interest so that insight can be obtained about the potential effects of these parameters in experimental outcomes. In this way, an impetus should be given to the critical consideration of test design and limitations of conclusions from experimental results. In part, the book is written as a reaction to frustrations endured during pharmacological research of many years' standing, and therefore the choice of examples from the literature is largely related to this discipline. As pharmacological research is to a large extent based on the other life sciences, this volume may be of interest to a much broader audience. This may certainly be the case for pharmacokineticists and toxicologists for whom drugs are the main object of study. This book may also help to improve test designs for biochemists and physiologists, not only when using drugs as tools in their experiments, but also to improve generally the control of animal characteristics and test conditions. This book is Volume 12 in a series entitled *Techniques in the Behavioral and Neural Sciences*.

Comments & References: First Edition. 496 pages. Paperback. A review is available in Laboratory Animals, April 1996, Volume 30 (2).

Review:

'This book is essential reading for anybody that wishes to take the problem of experimental variability seriously. There are no magic cures offered for experimental problems, but there are many explanations offered within this book. A worthwhile addition to any library.'

norecopa.no/textbase/neglected-factors-in-pharmacology-and-neuroscience-research-biopharmaceutics-animal-characteristics-maintenance-testing-conditions

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Aviation and Animal Research: Human Factors

A Pilot's Perspective

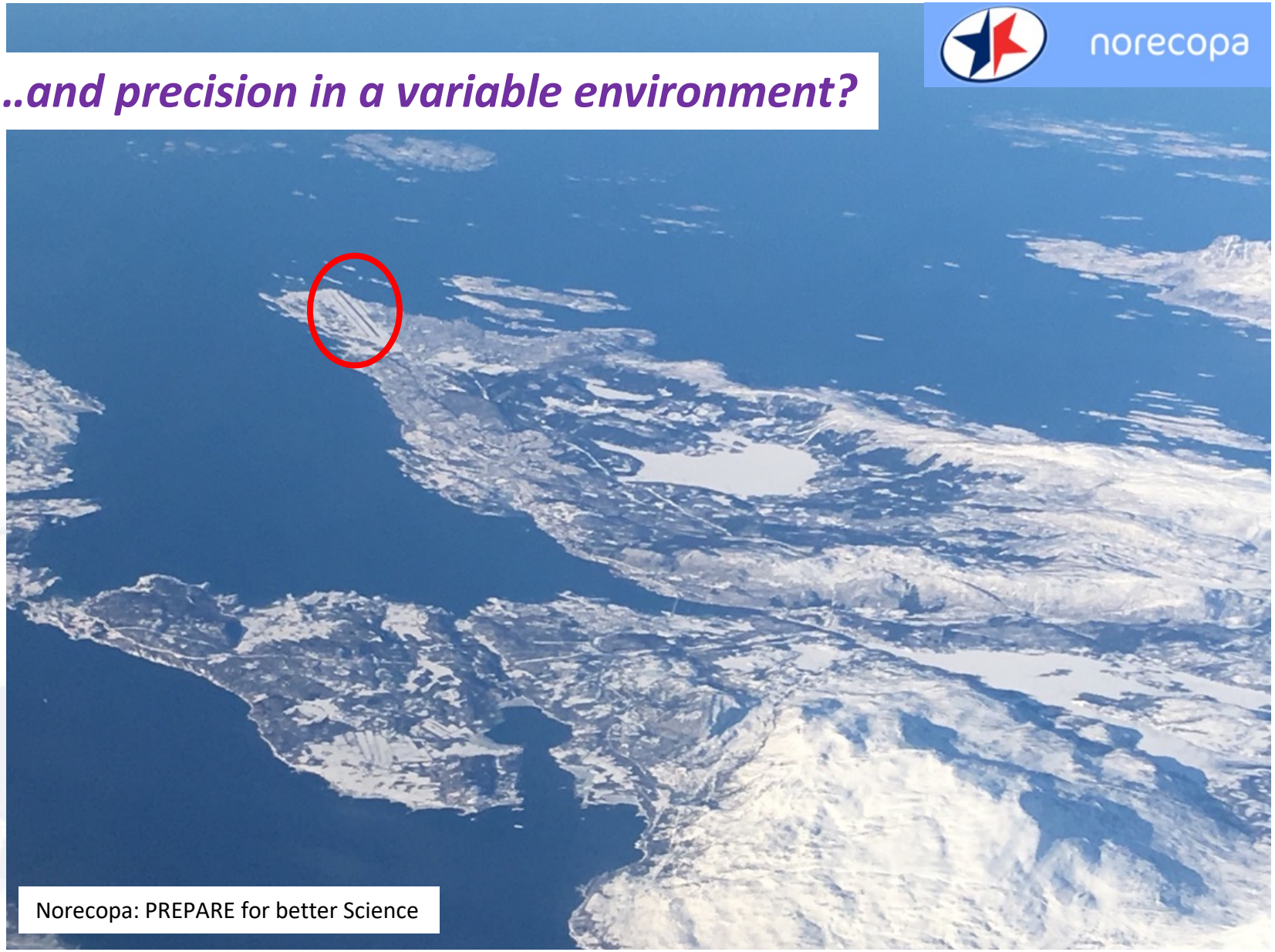
By Jake Hannabuss

Accident Rate for commercial flights is one fatal accident per 16 million flights

How do others achieve reproducibility?

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

…and precision in a variable environment?



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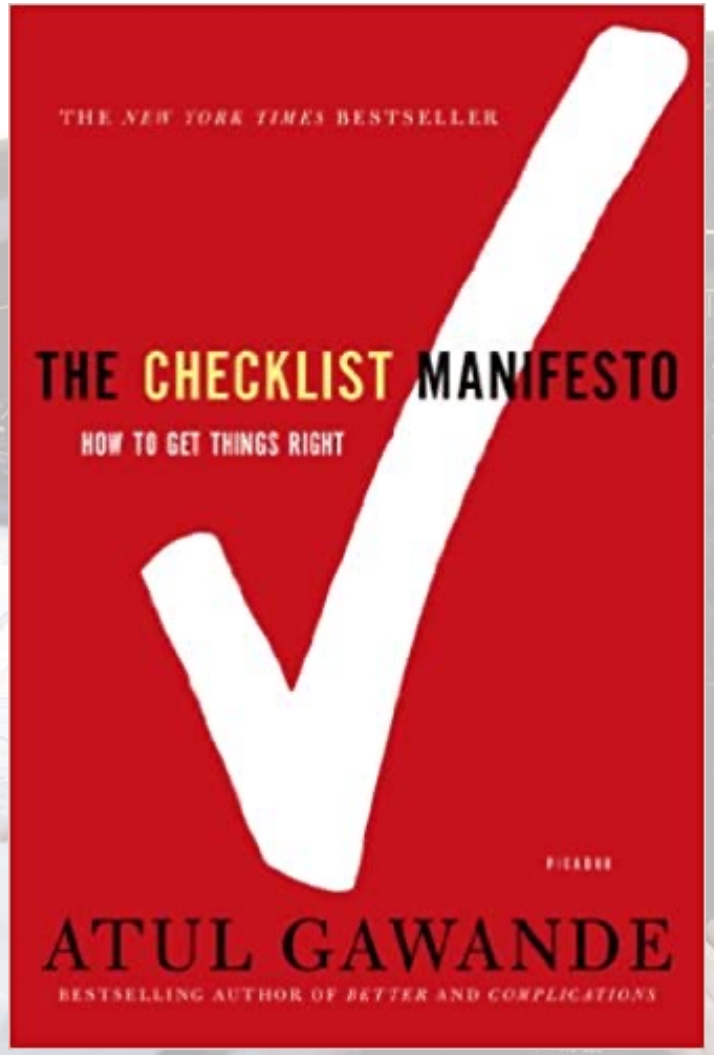
10-15 checklists even on short routine flights

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**"

Too late to read the checklists when you have ARRIVEd!

colourbox.com



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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	☐ **Confirm all team members have introduced themselves by name and role.**	**Nurse Verbally Confirms:** ☐ The name of the procedure
Is the site marked? ☐ Yes ☐ Not applicable	☐ **Confirm the patient's name, procedure, and where the incision will be made.**	☐ Completion of instrument, sponge and needle counts
Is the anaesthesia machine and medication check complete? ☐ Yes	**Has antibiotic prophylaxis been given within the last 60 minutes?** ☐ Yes ☐ Not applicable	☐ Specimen labelling (read specimen labels aloud, including patient name)
Is the pulse oximeter on the patient and functioning? ☐ Yes	**Anticipated Critical Events**	☐ Whether there are any equipment problems to be addressed
Does the patient have a:	**To Surgeon:** ☐ What are the critical or non-routine steps? ☐ How long will the case take? ☐ What is the anticipated blood loss?	**To Surgeon, Anaesthetist and Nurse:**
Known allergy? ☐ No ☐ Yes	**To Anaesthetist:** ☐ Are there any patient-specific concerns?	☐ What are the key concerns for recovery and management of this patient?
Difficult airway or aspiration risk? ☐ No ☐ Yes, and equipment/assistance available	**To Nursing Team:** ☐ Has sterility (including indicator results) been confirmed? ☐ Are there equipment issues or any concerns?	
Risk of >500ml blood loss (7ml/kg in children)? ☐ No ☐ Yes, and two IVs/central access and fluids planned	**Is essential imaging displayed?** ☐ Yes ☐ Not applicable	

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

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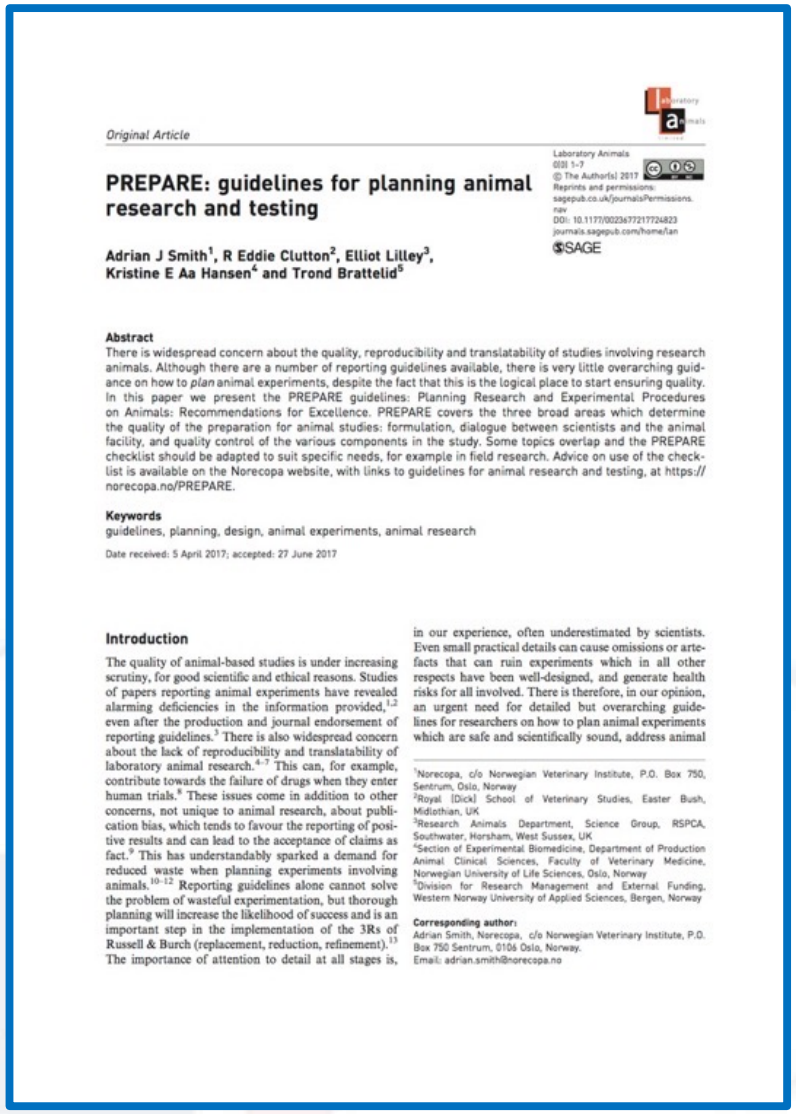
amazon.com/gp/product/0312430000



Original Article

PREPARE: guidelines for planning animal research and testing

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

Laboratory Animals
0(0) 1–7

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

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

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[5]Division for Research Management and External Funding, Western Norway University of Applied Sciences, Bergen, Norway

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All those who contributed to the development of PREPARE, and in particular the co-authors:

Eddie Clutton, Elliot Lilley, Kristine Hansen & Trond Brattelid

the responsibility for this presentation is mine alone

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

Over 19,000 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

Maybe the study should not go ahead

Systematic review of published research?

norecopa.no/PREPARE/prepare-checklist

PREPARE

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 Bratteliid[e]

[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 st

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 some topi
checklist can be adapted to meet special needs, such as field studies. PREPARE includes guidance on
facilities, since in-house experiments are dependent upon their quality. The full version of the guidelin
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.

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 ☐ 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
3. Ethical issues	☐ 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. ☐ 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	☐ Define the experimental unit and decide upon animal numbers. ☐ Choose methods of randomisation, prevent observer bias, and decide upon inclusion and exclusion criteria.

Three Rs!

Let us know if you would like another language!

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	☐ Conduct a physical inspection of the facilities, to evaluate building and equipment standards and needs. ☐ Discuss staffing levels at times of extra risk.
ation and	☐ Assess the current competence of staff members and the need for further education or training prior to the study.
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	☐ Avoid generation of surplus animals.
11. Quarantine and health monitoring	☐ Discuss the animals' likely health
	☐ 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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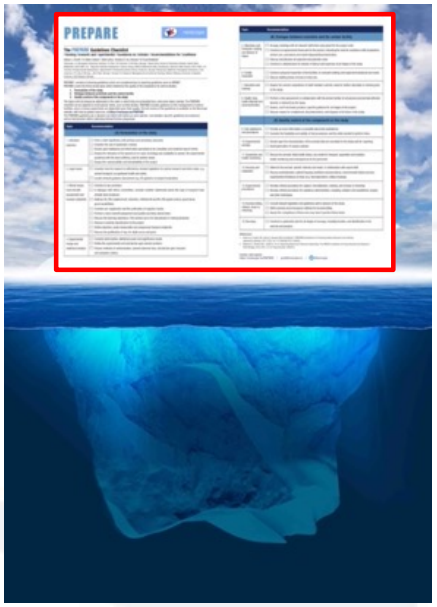
Items in pink are not typically highlighted in reporting guidelines

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

norecopa.no/PREPARE



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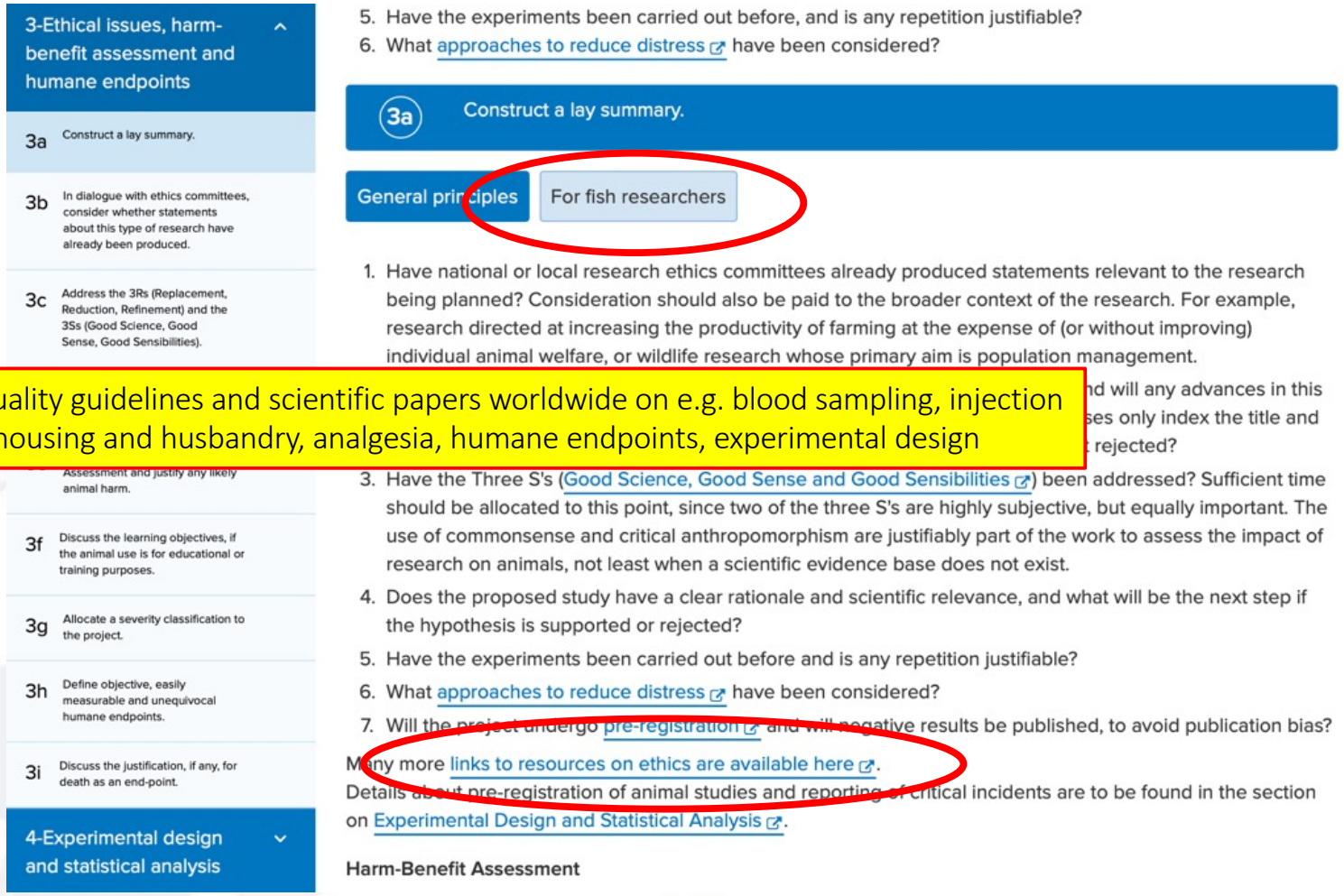
norecopa.no/PREPARE



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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A simple but effective Master Plan

Norecopa: PREPARE for better Science

A contract between the animal facility and the research group

The division of labour and responsibilities

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			

Program Description

A. Animal Care and Use Program

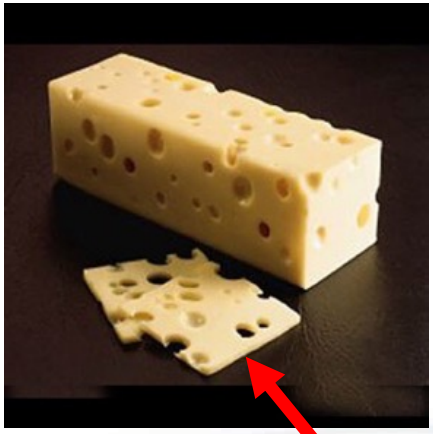
B. Animal environment, Housing and Management

C. Veterinary Care

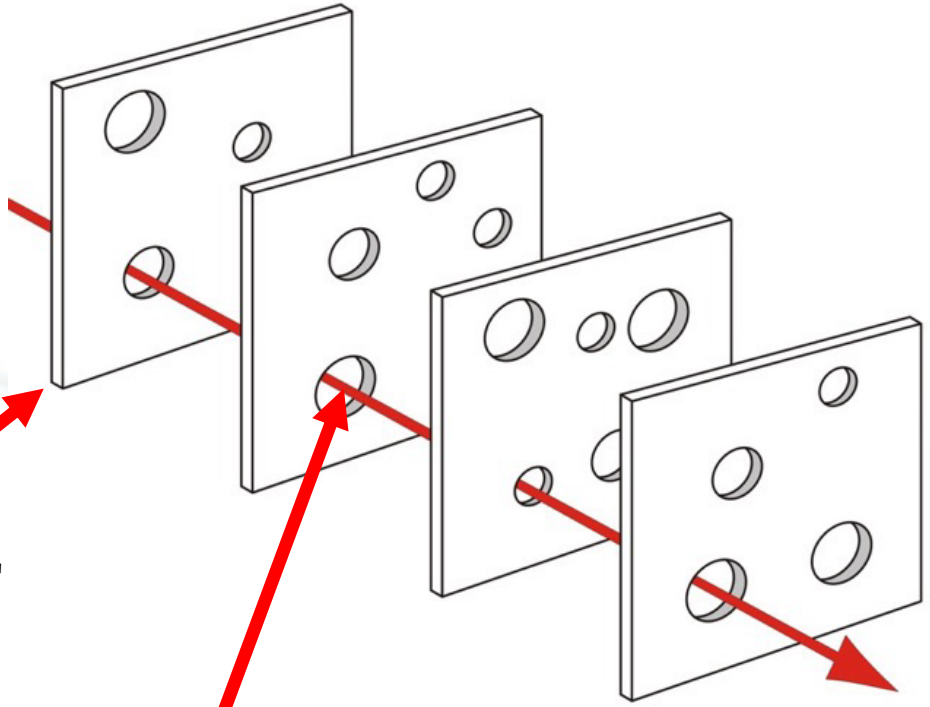
D. Physical plant

63 pages

Threat and Error Management



eaugallecheese.com/Swiss-cheese



"Layer of defence"
or redundancy

Weakness / hazard

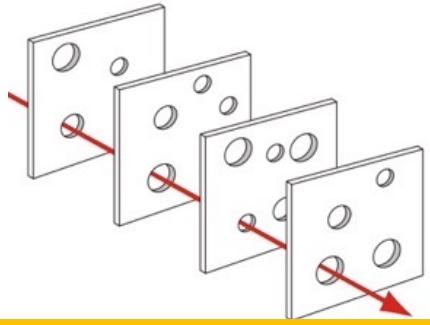
Loss

wikipedia.org/wiki/Swiss_cheese_model

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
  - allergic and anaph
  - bites
  - 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

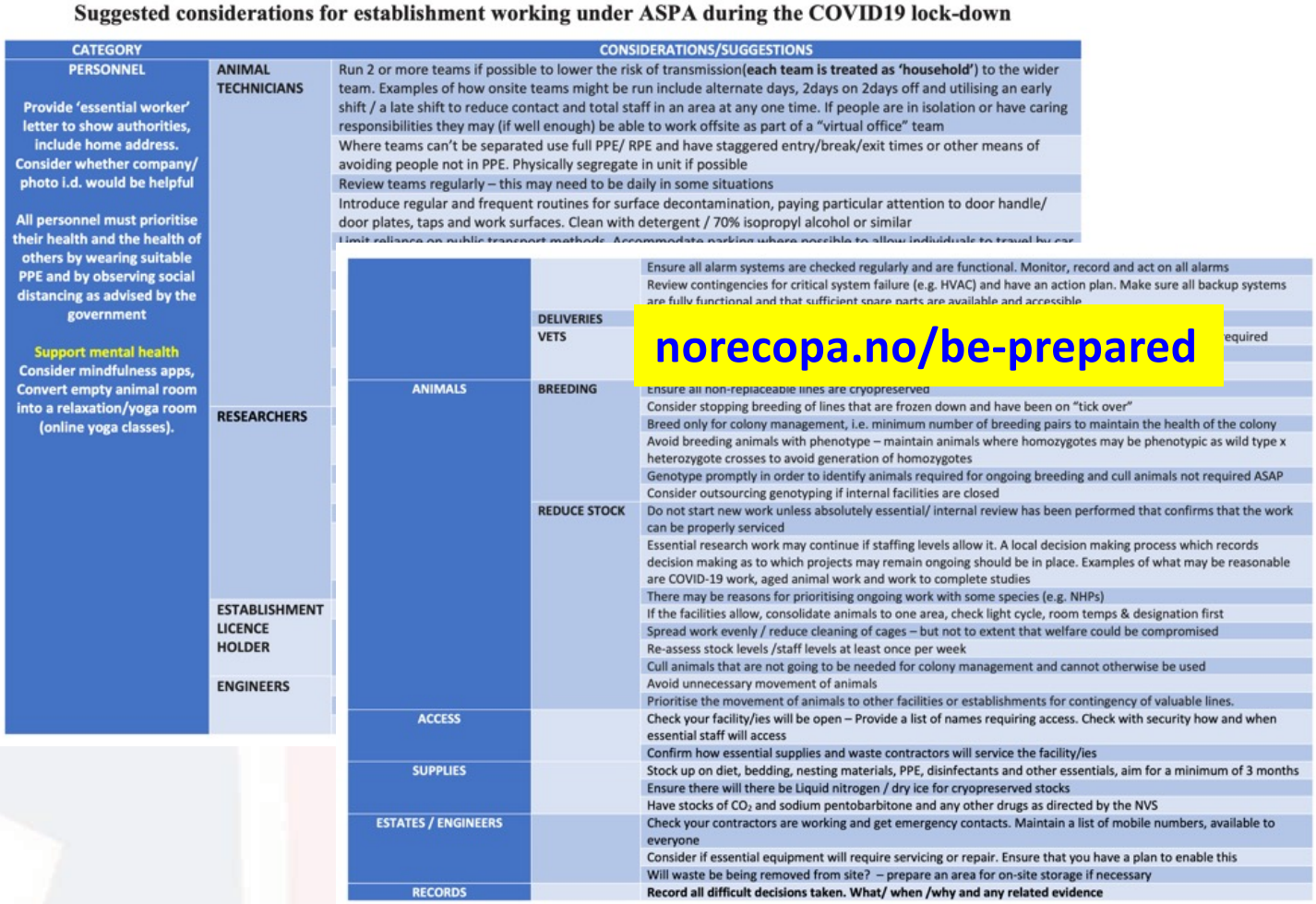
These need to be revised or supplemented in the light of Covid-19



Temporary staff at weekends and holidays

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

Good advice is emerging from the Covid-19 pandemic



Suggested considerations for establishment working under ASPA during the COVID19 lock-down

CATEGORY		CONSIDERATIONS/SUGGESTIONS	
PERSONNEL Provide 'essential worker' letter to show authorities, include home address. Consider whether company/ photo i.d. would be helpful All personnel must prioritise their health and the health of others by wearing suitable PPE and by observing social distancing as advised by the government Support mental health Consider mindfulness apps, Convert empty animal room into a relaxation/yoga room (online yoga classes).	ANIMAL TECHNICIANS	Run 2 or more teams if possible to lower the risk of transmission(**each team is treated as 'household'**) to the wider team. Examples of how onsite teams might be run include alternate days, 2days on 2days off and utilising an early shift / a late shift to reduce contact and total staff in an area at any one time. If people are in isolation or have caring responsibilities they may (if well enough) be able to work offsite as part of a "virtual office" team	
		Where teams can't be separated use full PPE/ RPE and have staggered entry/break/exit times or other means of avoiding people not in PPE. Physically segregate in unit if possible	
		Review teams regularly – this may need to be daily in some situations	
		Introduce regular and frequent routines for surface decontamination, paying particular attention to door handle/ door plates, taps and work surfaces. Clean with detergent / 70% isopropyl alcohol or similar	
		Limit reliance on public transport methods. Accommodate parking where possible to allow individuals to travel by car	
			Ensure all alarm systems are checked regularly and are functional. Monitor, record and act on all alarms
			Review contingencies for critical system failure (e.g. HVAC) and have an action plan. Make sure all backup systems are fully functional and that sufficient spare parts are available and accessible
		DELIVERIES	
		VETS	equired
	RESEARCHERS	ANIMALS	BREEDING	Ensure all non-replaceable lines are cryopreserved
				Consider stopping breeding of lines that are frozen down and have been on "tick over"
				Breed only for colony management, i.e. minimum number of breeding pairs to maintain the health of the colony
				Avoid breeding animals with phenotype – maintain animals where homozygotes may be phenotypic as wild type x heterozygote crosses to avoid generation of homozygotes
				Genotype promptly in order to identify animals required for ongoing breeding and cull animals not required ASAP
				Consider outsourcing genotyping if internal facilities are closed
			REDUCE STOCK	Do not start new work unless absolutely essential/ internal review has been performed that confirms that the work can be properly serviced
				Essential research work may continue if staffing levels allow it. A local decision making process which records decision making as to which projects may remain ongoing should be in place. Examples of what may be reasonable are COVID-19 work, aged animal work and work to complete studies
				There may be reasons for prioritising ongoing work with some species (e.g. NHPs)
	ESTABLISHMENT LICENCE HOLDER			If the facilities allow, consolidate animals to one area, check light cycle, room temps & designation first
				Spread work evenly / reduce cleaning of cages – but not to extent that welfare could be compromised
				Re-assess stock levels /staff levels at least once per week
	ENGINEERS			Cull animals that are not going to be needed for colony management and cannot otherwise be used
				Avoid unnecessary movement of animals
				Prioritise the movement of animals to other facilities or establishments for contingency of valuable lines.
		ACCESS		Check your facility/ies will be open – Provide a list of names requiring access. Check with security how and when essential staff will access
				Confirm how essential supplies and waste contractors will service the facility/ies
		SUPPLIES		Stock up on diet, bedding, nesting materials, PPE, disinfectants and other essentials, aim for a minimum of 3 months
				Ensure there will there be Liquid nitrogen / dry ice for cryopreserved stocks
				Have stocks of CO_2 and sodium pentobarbitone and any other drugs as directed by the NVS
		ESTATES / ENGINEERS		Check your contractors are working and get emergency contacts. Maintain a list of mobile numbers, available to everyone
				Consider if essential equipment will require servicing or repair. Ensure that you have a plan to enable this
				Will waste be being removed from site? – prepare an area for on-site storage if necessary
		RECORDS		**Record all difficult decisions taken. What/ when /why and any related evidence**

norecopa.no/be-prepared

lava.uk.net/viewtopic.php?f=3&p=80

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Contingency and redundancy

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

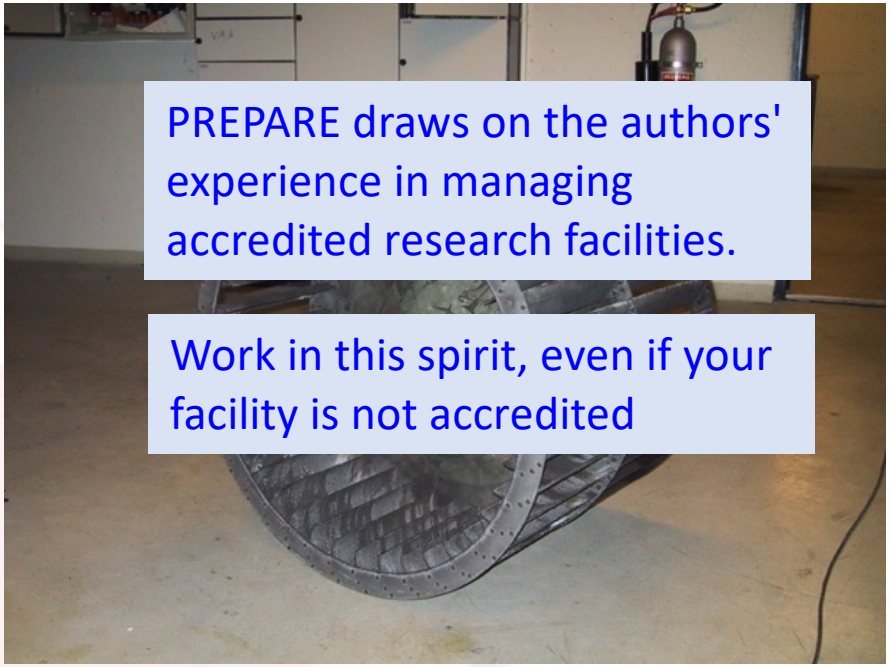


Photo: NMBU

CIRS-LAS Portal

Critical incident reporting system in laboratory animal science

Refine - Reduce - Replace

What if things go wrong?

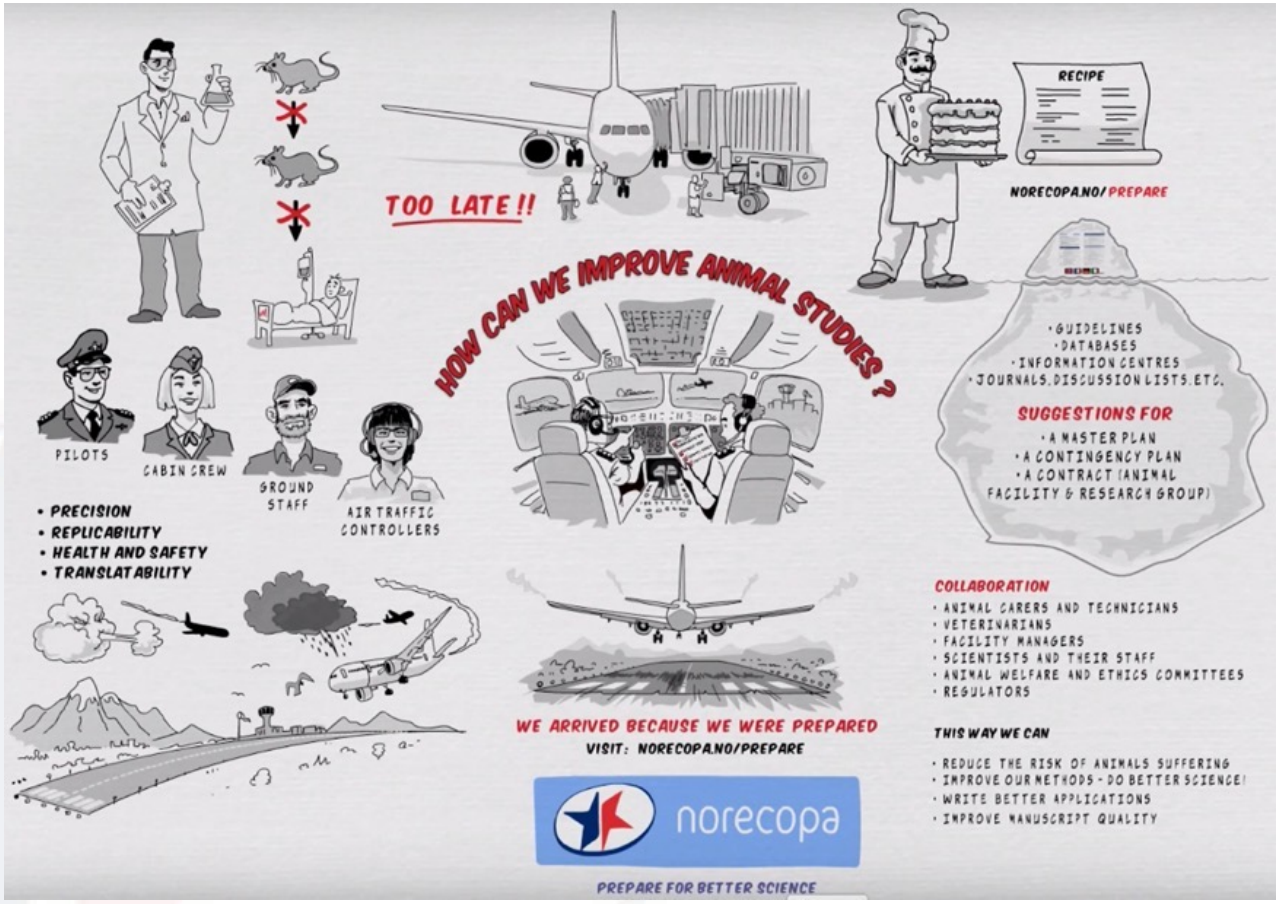
MUTUAL LEARNING from errors, near misses, critical or even adverse events occurring in the context of animal experimentation prevents unnecessary repetition of unsuccessful experiments

CRITICAL DISCUSSIONS on causes and approaches to solutions lead to an increase in animal welfare

OPEN DIALOGUE ensures transparency in laboratory animal science

vimeo.com/358069203 or norecopa.no/PREPARE/film

3-minute cartoon film



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Our hopes for PREPARE

- Uptake on a voluntary basis
- Interest from
  - funders
  - animal care & use committees
  - regulators
  - institutions
  - animal facilities
- Early career scientists
- Principal investigators

Endorsement doesn't necessarily mean compliance...

norecopa.no/PREPARE/endorsements


norecopa
"We ARRIVED, because we were PREPARED"
✓ Better Science
✓ Improved animal welfare
✓ Advancement of the 3Rs
✓ Safer working environment
NO
BRAINER
Norecopa: PREPARE for better Science

Thanks to Norecopa's main sponsors:

- Standing Committee on Business Affairs, Norwegian Parliament
- Norwegian Ministries of Agriculture and Fisheries
- Research Council of Norway
- 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

(Monday 23 August Session S200, 3.30-5.30 p.m.)
Norecopa norecopa.no/WC11

Friday 27 August Session S113, 3.00-5.00 p.m.
Wildlife research norecopa.no/WC11-wildlife

Tuesday 31 August Session S301, 6.30-8.30 p.m.
The Refinement Wiki norecopa.no/WC11-wiki

Feedback

English-language newsletters