Improving animal welfare and scientific quality:

Guidelines for planning animal studies

norecopa.no/UFAW

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https://norecopa.no

This presentation (10 minutes):

A quick overview of ***the need for*** planning guidelines

After the break:

15 minutes + 10 minutes Q&A:

A quick overview of ***available tools*** to improve animal welfare and scientific quality

Norecopa

Norway's National Consensus Platform for the

Three Rs: Replacement, Reduction and Refinement

and a source of global 3R resources

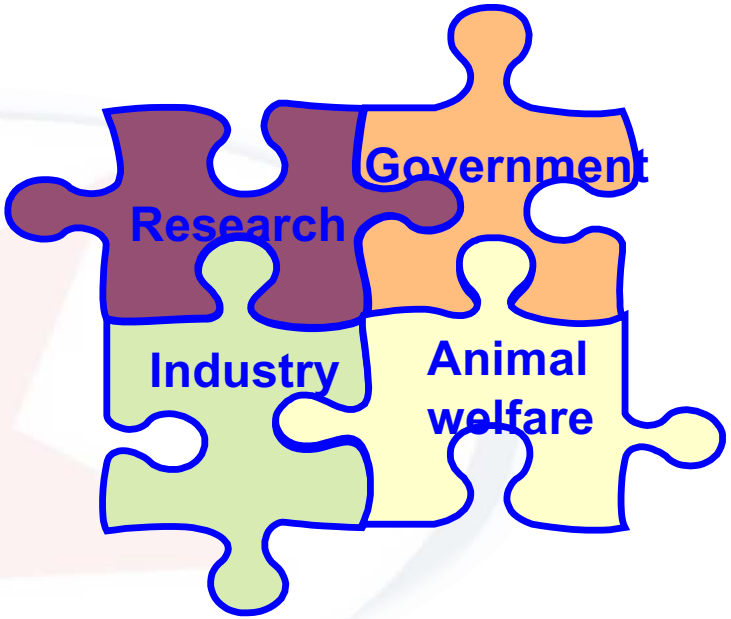
https://norecopa.no

Norecopa: PREPARE for better Science

European Consensus-Platform for Alternatives

ecopa.eu

Recognises National Consensus Platforms with all 4 stakeholders in their governing bodies:



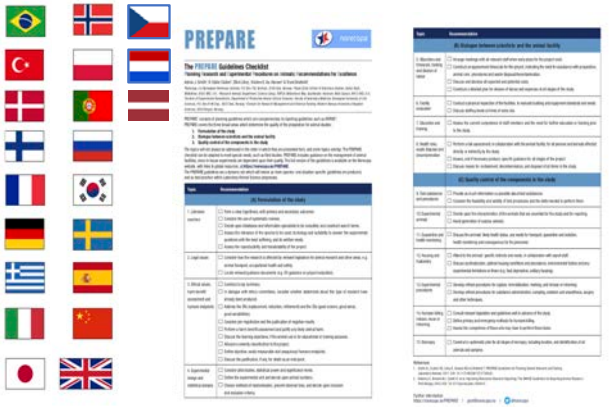
'Science informs, motivates and facilitates advances in animal welfare by providing a strong evidence base for changing attitudes and practices, and by creating practical and effective solutions to welfare problems'

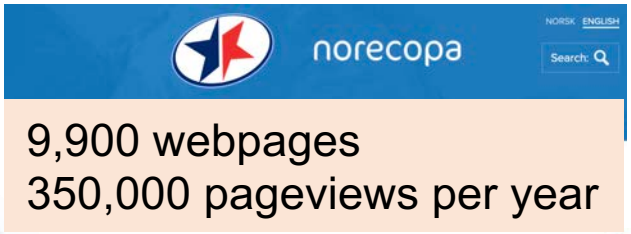
Norecopa aims to do precisely this.

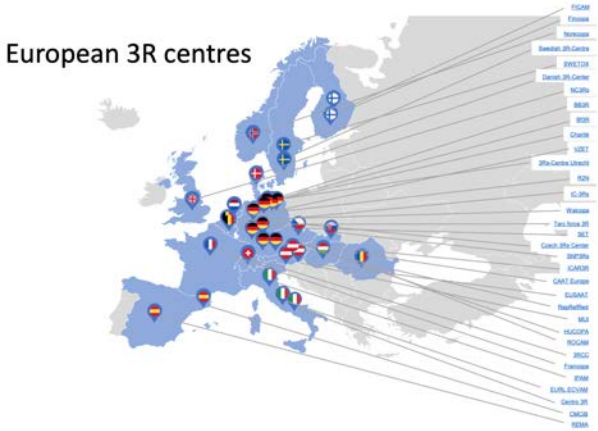
- Norecopa's PREPARE guidelines provide an overview of the topics to be considered when planning animal experiments
- Norecopa's website provides global resources for addressing these topics, including a Refinement Wiki
- Norecopa hosts the website for the European Network of 3R Centres

+ Attention to human welfare:

- International Culture of Care Network
- Covid-19: contingency plans, coping with compassion fatigue, and resources for home learning







Why do we need to focus on planning guidelines? My personal view

- I have managed animal facilities, supervised animal research, held courses in lab animal science, and helped write legislation, since the early 1980's
- There are increasing concerns that we have a "reproducibility crisis": poor internal and external validity of animal studies
- One of the greatest challenges to reproducibility lies within the animals themselves and the way in which they are used
- I suspect that many scientists are unaware of the size of this challenge, or they assume that the animal facility is dealing with it

nature human behaviour

Perspective | Open Access | Published: 10 January 2017

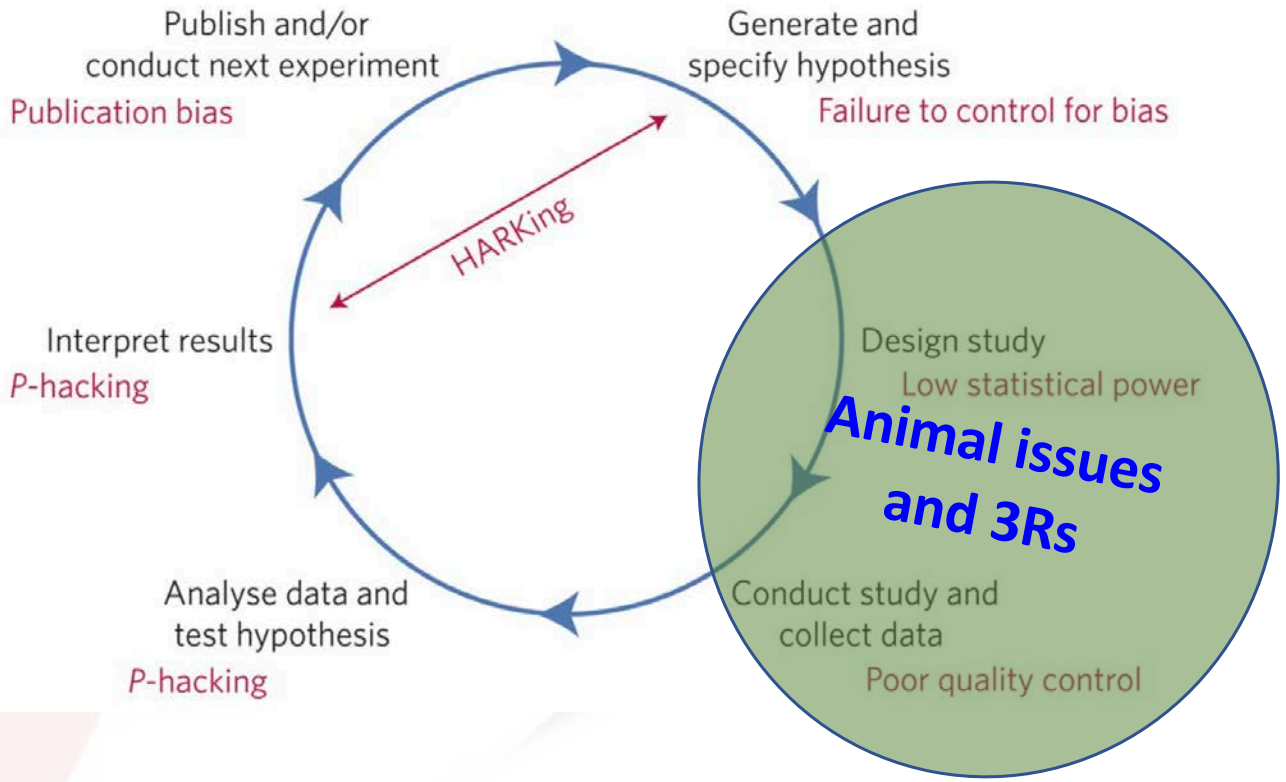
A manifesto for reproducible science

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

Nature Human Behaviour 1, Artic

Figure 1: Threats to reproducible science.

From: A manifesto for reproducible science



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)

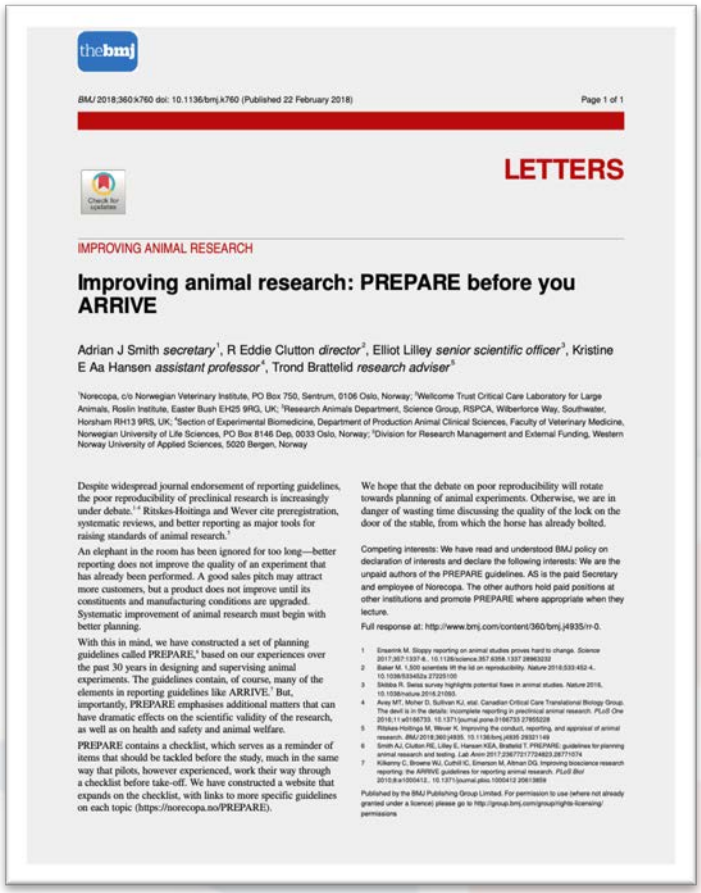
- **better reporting**

reddit.com

Reporting guidelines are not new…and they have not solved the reproducibility crisis

e.g.

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



thebmj

BMJ 2018;360:k760 doi: 10.1136/bmj.k760 (Published 22 February 2018) Page 1 of 1

LETTERS

IMPROVING ANIMAL RESEARCH

Improving animal research: PREPARE before you ARRIVE

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Despite widespread journal endorsement of reporting guidelines, the poor reproducibility of preclinical research is increasingly under debate.[1-4] Ritskes-Hoitinga and Wever cite preregistration, systematic reviews, and better reporting as major tools for raising standards of animal research.[5]

An elephant in the room has been ignored for too long—better reporting does not improve the quality of an experiment that has already been performed. A good sales pitch may attract more customers, but a product does not improve until its constituents and manufacturing conditions are upgraded. Systematic improvement of animal research must begin with better planning.

With this in mind, we have constructed a set of planning guidelines called PREPARE,[6] based on our experiences over the past 30 years in designing and supervising animal experiments. The guidelines contain, of course, many of the elements in reporting guidelines like ARRIVE.[7] But, importantly, PREPARE emphasises additional matters that can have dramatic effects on the scientific validity of the research, as well as on health and safety and animal welfare.

PREPARE contains a checklist, which serves as a reminder of items that should be tackled before the study, much in the same way that pilots, however experienced, work their way through a checklist before take-off. We have constructed a website that expands on the checklist, with links to more specific guidelines on each topic (https://norecopa.no/PREPARE).

We hope that the debate on poor reproducibility will rotate towards planning of animal experiments. Otherwise, we are in danger of wasting time discussing the quality of the lock on the door of the stable, from which the horse has already bolted.

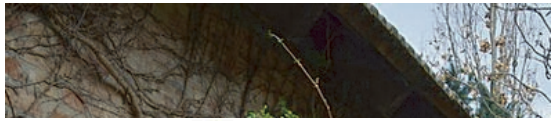
Competing interests: We have read and understood BMJ policy on declaration of interests and declare the following interests: We are the unpaid authors of the PREPARE guidelines. AS is the paid Secretary and employee of Norecopa. The other authors hold paid positions at other institutions and promote PREPARE where appropriate when they lecture.

Full response at: http://www.bmj.com/content/360/bmj.j4935/rr-0.

1 Ensernik M. Sloppy reporting on animal studies proves hard to change. *Science* 2017;357:1337-8. 10.1126/science.357.6358.1337 28963232
2 Baker M. 1,500 scientists lift the lid on reproducibility. *Nature* 2016;533:452-4. 10.1038/533452a 27225100
3 Shibba R. Swiss survey highlights potential flaws in animal studies. *Nature* 2016. 10.1038/nature.2016.21093.
4 Avey MT, Moher D, Sullivan KJ, etal. Canadian Critical Care Translational Biology Group. The devil is in the details: incomplete reporting in preclinical animal research. *PLoS One* 2016;11:e0166733. 10.1371/journal.pone.0166733 27855229
5 Ritskes-Hoitinga M, Wever K. Improving the conduct, reporting, and appraisal of animal research. *BMJ* 2018;360:j4935. 10.1136/bmj.j4935 29321149
6 Smith AJ, Clutton RE, Lilley E, Hansen KEA, Brattelid T. PREPARE: guidelines for planning animal research and testing. *Lab Anim* 2017:2367727717724823.28771074
7 Kilkenny C, Browne WJ, Cuthill IC, Emerson M, Altman DG. Improving bioscience research reporting: the ARRIVE guidelines for reporting animal research. *PLoS Biol* 2010;8:e1000412. 10.1371/journal.pbio.1000412 20613859

bmj.com/content/bmj/360/bmj.k760.full.pdf

Are we wasting time discussing the quality of the lock on the door of the stable from which the horse has already bolted?



pixcove.com

Norecopa: PREPARE for better Science

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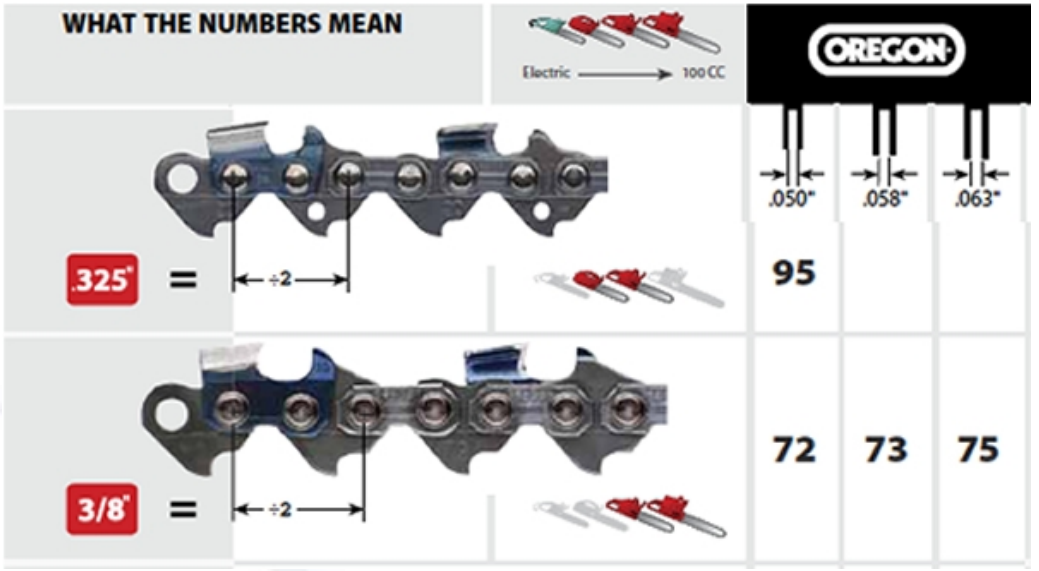
The easy parts of design and reporting:



arborist101.com

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

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Critical issues behind the scenes that may not get reported:

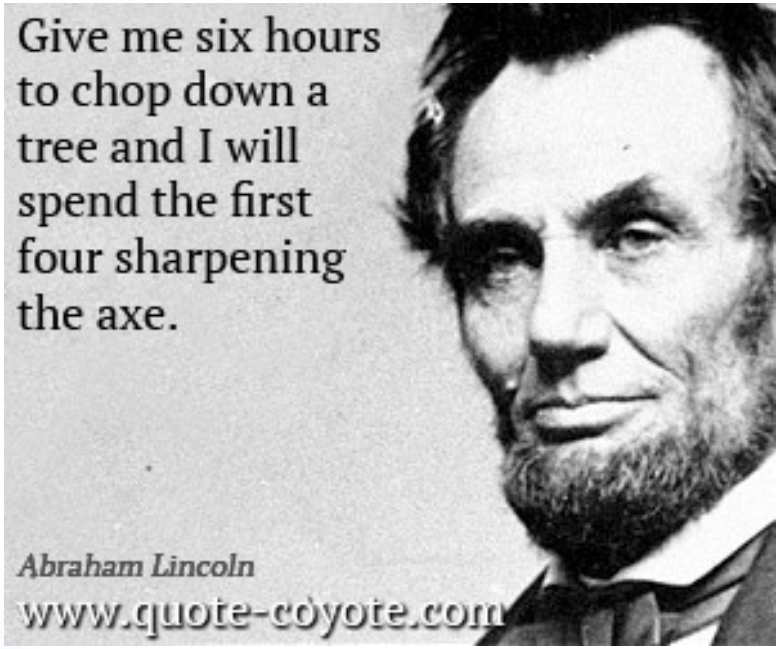
- Experience of the workers
- Inspection for signs of rot and to decide felling direction
- Additional equipment (winch, chains, straps, wedges)
- Routines and equipment for sharpening the chain
- Clearing-up and transport of logs
- **Health and safety precautions – clothing, onlookers**
- **Division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

These issues start long before the actual work

'Measure twice, think three times, cut once'

Luc Noyez *NHJL* **18,** 60 (2010) doi.org/10.1007/BF03091738

leaderonomics.com



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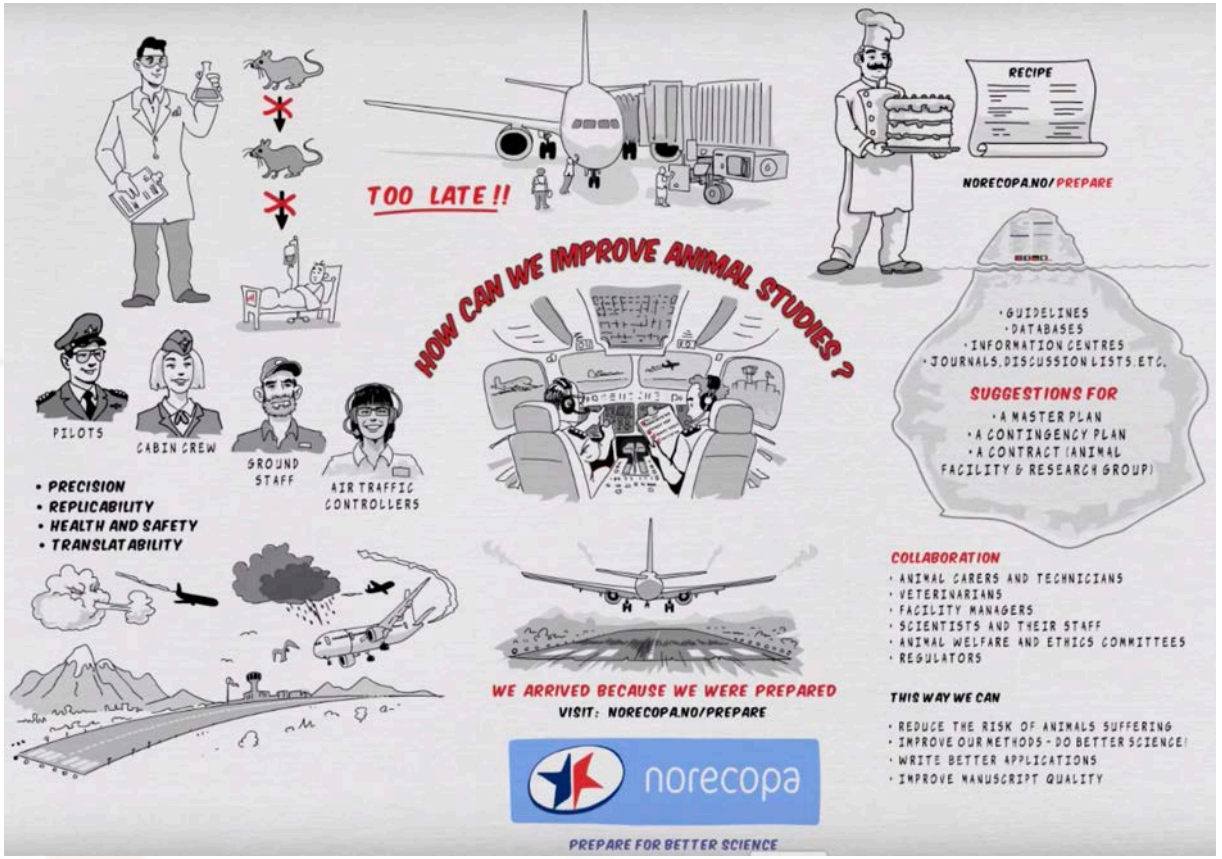
norecopa.no/PREPARE/film

3-minute cartoon film



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Workshop

Improving animal welfare and scientific quality:

Guidelines for planning animal studies

norecopa.no/UFAW

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https://norecopa.no

How do they do it?
reproducibility and precision in a variable environment…

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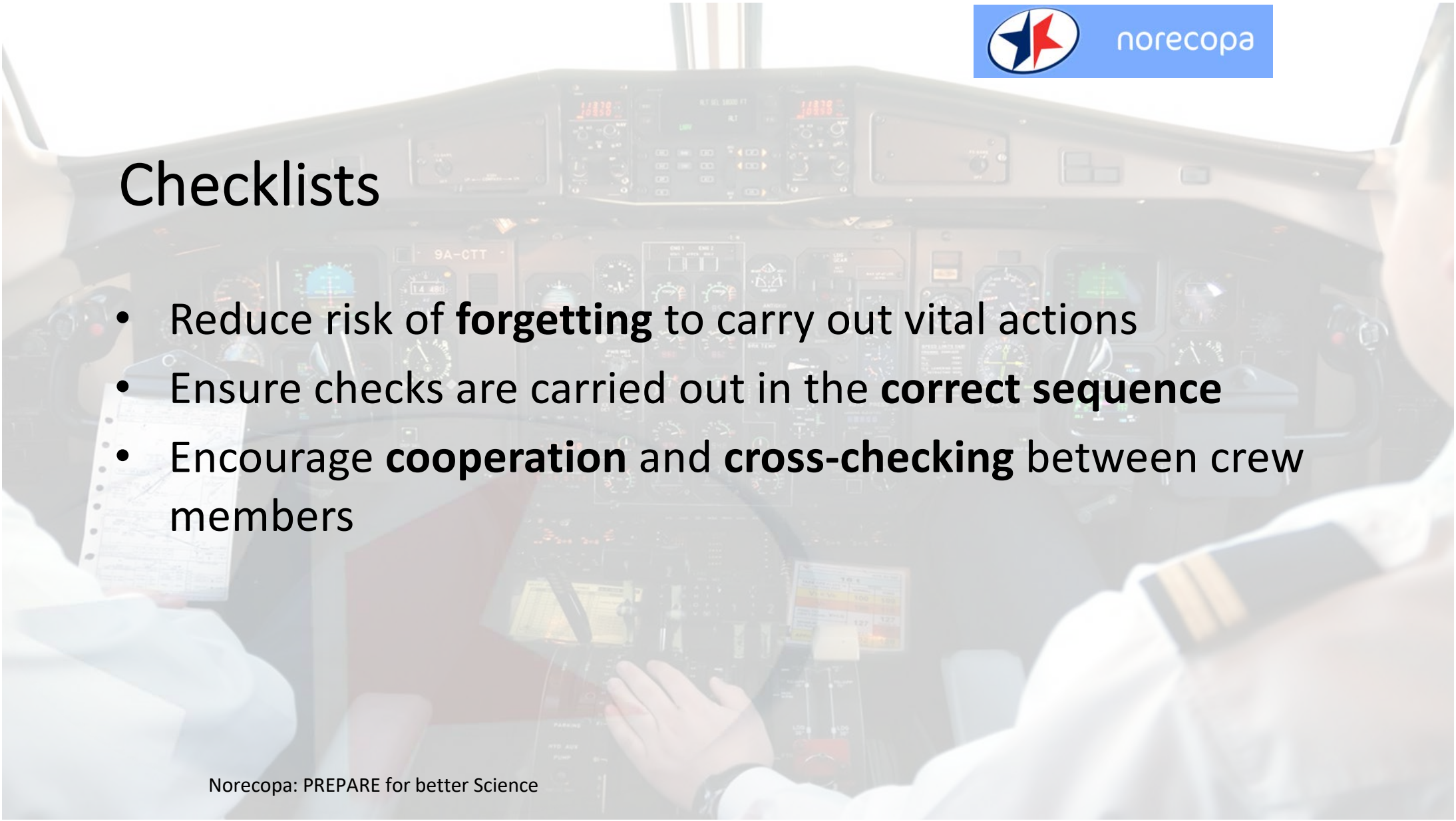
10-15 checklists even on short routine flights

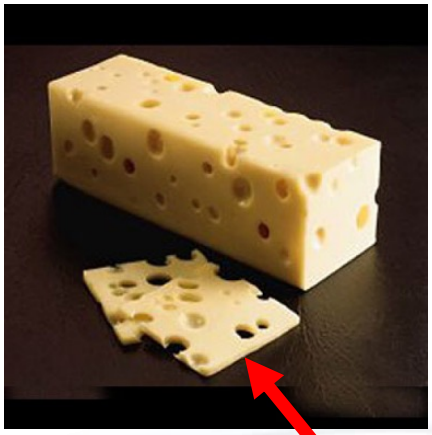


Checklists

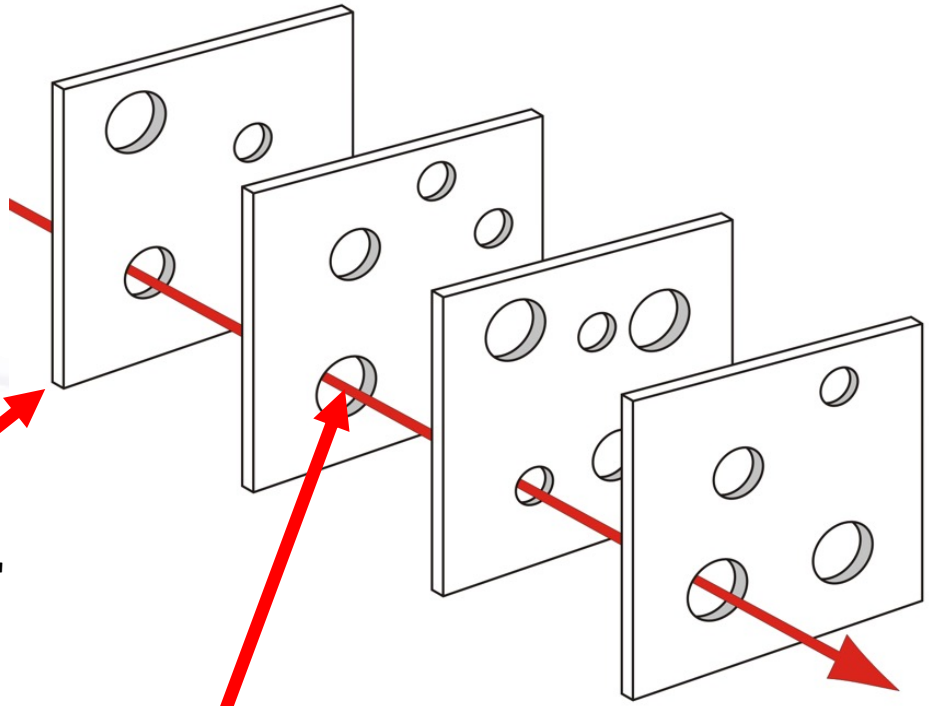
- Reduce risk of **forgetting** to carry out vital actions
- Ensure checks are carried out in the **correct sequence**
- Encourage **cooperation** and **cross-checking** between crew members

Too late to read the checklists when you have ARRIVEd!

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)*

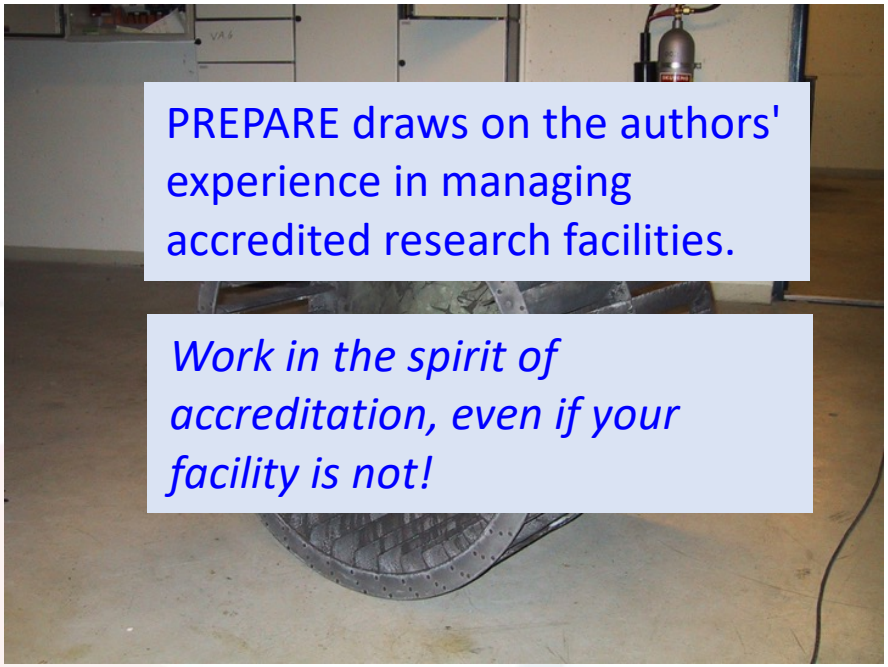
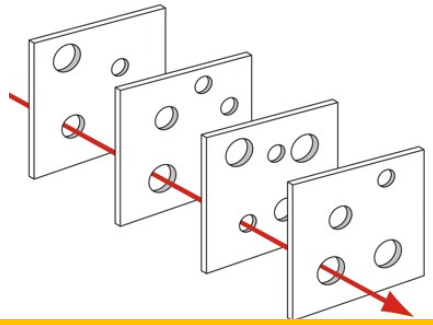


Photo: NMBU

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

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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
			Cull animals that are not going to be needed for colony management and cannot otherwise be used
	ENGINEERS		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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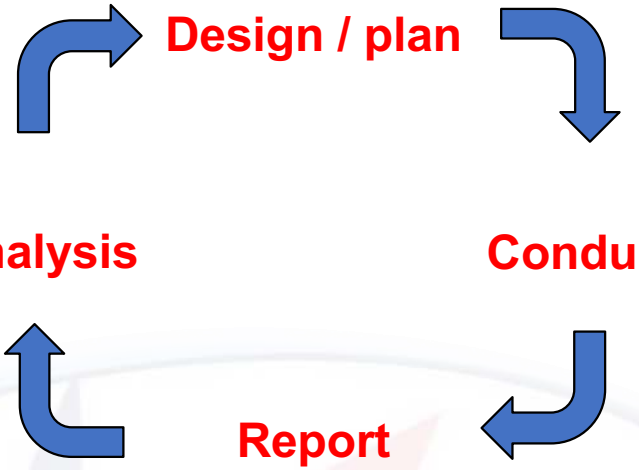
Choose: "We've always done it this way" or a learning spiral



Identify and ensure the quality of (at least) the critical points in the experiment: critical for scientific validity and animal welfare

CIRS-LAS Portal

Critical incident reporting system in laboratory animal science

Refine
Reduce
Replace

Operating principles

Recent incidents

Injury of the mesentery by vertebral kyphoplasty

Mouse neonates exposed to CO2

Animal escapes during transportation

Kidney damage in mouse after surgery on heating mat

Soft tissue implant in rabbit

A simple but effective Master Plan

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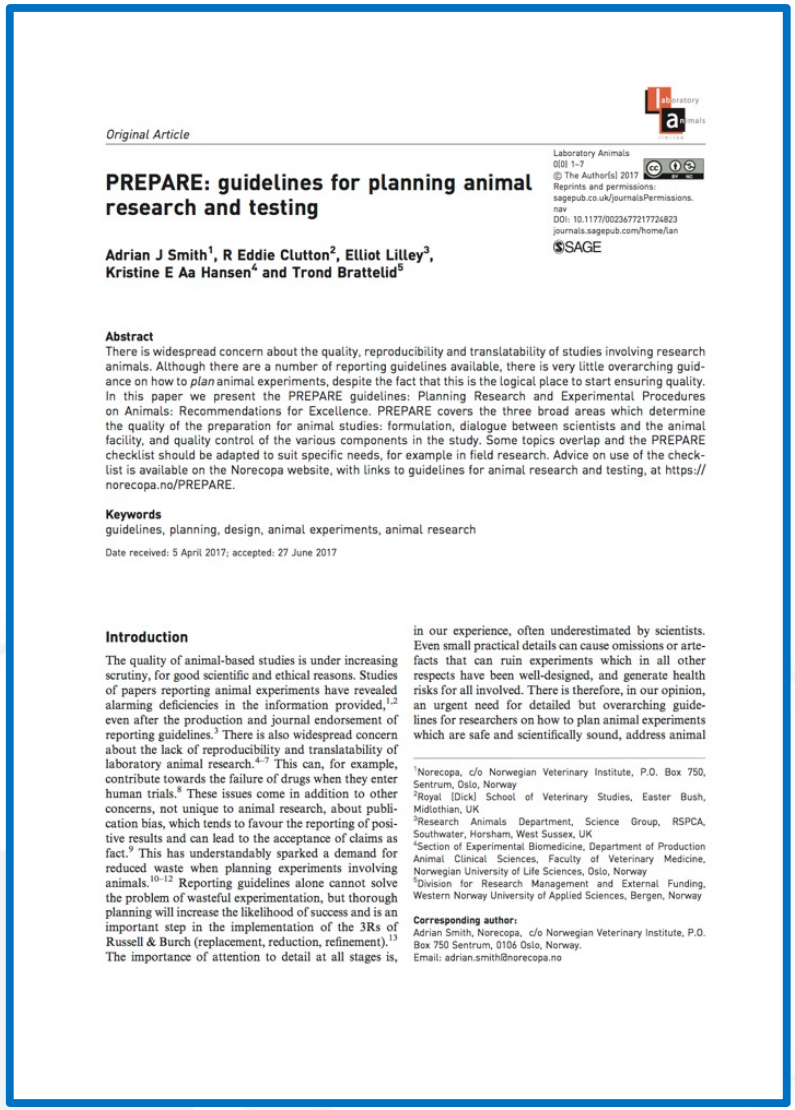
A contract between the animal facility and the research group

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			



Original Article

PREPARE: guidelines for planning animal research and testing

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Laboratory Animals
0(0) 1–7

DOI: 10.1177/0023677217724823
journals.sagepub.com/home/lan
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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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Over 12,000 downloads from the journal website so far

Also downloadable from

norecopa.no/PREPARE

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 Brattelid[e]

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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 guideline
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.

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	☐ 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

Norecopa: PREPARE for better Science

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

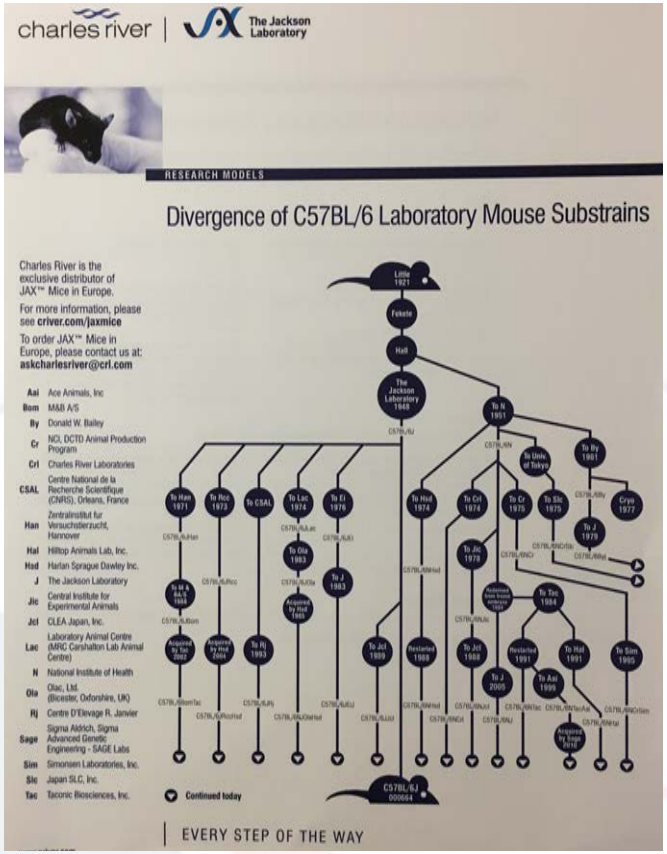
norecopa.no/PREPARE

norecopa.no/PREPARE

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

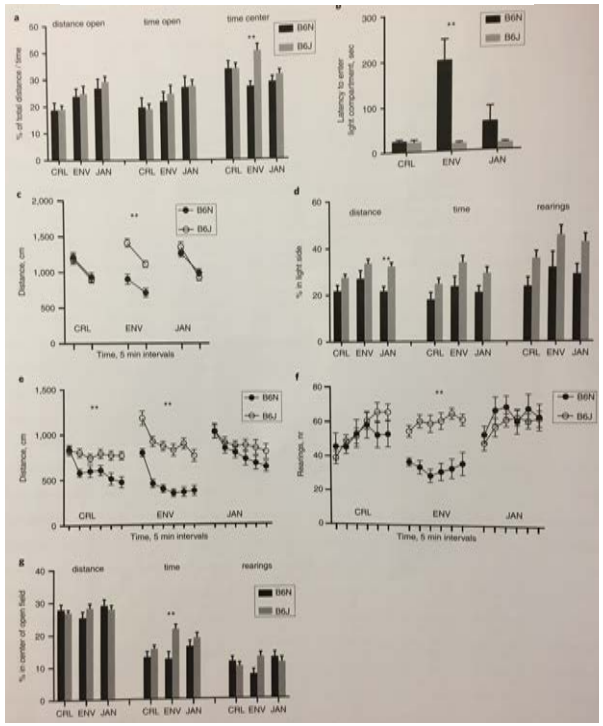
Some of the common animal-related issues…

The C57BL/6 mouse



Åhlgren & Voikar (2019): Behavioural differences between /6J and /6N mice

nature.com/articles/s41684-019-0288-8



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we are what we eat...

norecopa

Diet-Induced Metabolic Syndrome in Rodent Models

A discussion of how diets made from purified ingredients influence the phenotypes of the MS in commonly used rodent models.

Angela M. Gajda, MS, Michael A. Pellizzon, Ph.D., Matthew R. Ricci, Ph.D. and Edward A. Ulman, Ph.D.

Pellizzon and Ricci *Nutrition & Metabolism* (2018) 15:3
DOI 10.1186/s12986-018-0243-5

Nutrition & Metabolism

Laboratory Animal Diets:

A Critical Part of Your In Vivo Research

Most all of us are aware that certain dietary choices can increase or decrease the likelihood of developing certain diseases. Our diets can also change our metabolism as well the levels of circulating factors (hormones, lipids, etc.) which may be markers for disease risk. What is often overlooked is the fact that these concepts also apply to laboratory animals, making diet a critical part of study design.

Matthew R. Ricci, Ph.D. and Edward A. Ulman, Ph.D.

PERSPECTIVE Open Access

The common use of improper control diets in diet-induced metabolic disease research confounds data interpretation: the fiber factor

Michael A. Pellizzon* and Matthew R. Ricci

Currently no FELASA guidance on nutrition (a working group has been convened)

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Contingent suffering

animalcaresystems.com

(not just the direct suffering caused by the procedure)

Fear, boredom and discomfort

Caused by, for example:

Transport, or changes in housing, husbandry and social groups

Single-housed male mice show symptoms of what in humans would be characterised as depression

http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0111065

Stress caused by capture and handling

INDEPENDENT

News › Science

Scores of scientific studies based on mice thrown into doubt because they wer

Mice pic
naturall

't act

Ian Johnstor

https://www.nc3rs.org.uk/how-to-pick-up-a-mouse

Stress caused by capture and handling

http://bitly.com/scruff-technique

Artefacts caused by poor administration techniques

Photo: NMBU

- *Are you sure that your injection ends up in the same place each time?*
- *Are the injections painful?*
- *Are they realistic? (intramuscular injections in small animals)*

"All I need is a blood sample…"

medipoint.com/html/for_use_on_mice.html

theodora.com/rodent_laboratory/blood_collection.html

Photo: NMBU

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

Carol M. Newton (1925-2014)

National Library of Medicine

The three S's

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

https://norecopa.no/3S

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, guinea-pig,

ferret and mink

Visibility! Not necessarily in a high-impact journal.

norecopa.no/education-training/films-and-slide-shows

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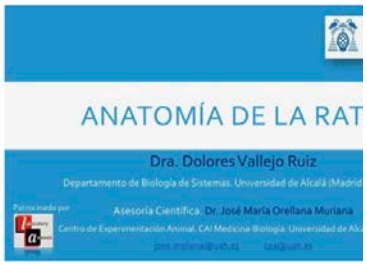
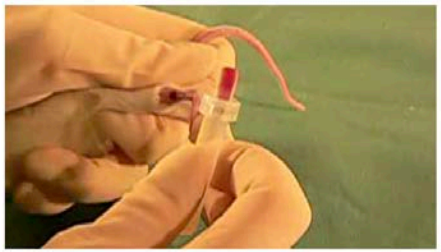
Rat s.c. injection
Norecopa | 1,380 views

Rat i.p. injection (method 2)
Norecopa | 1,280 views

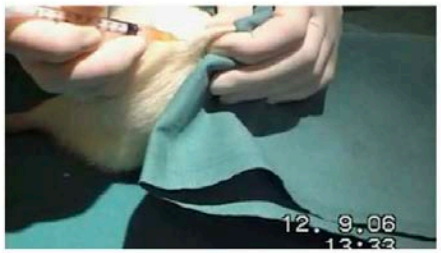


Anatomia de la rata
Norecopa | 977 views

Testing anaesthetic depth in the chicken
Norecopa | 598 views



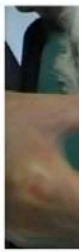
Blood collection from the saphenous vein in the mouse
Norecopa | 6,777 views



Subcutaneous injection in the rat - Technique 1
Norecopa | 2,249 views

Blood san
Norecop

Blood san
Norecop



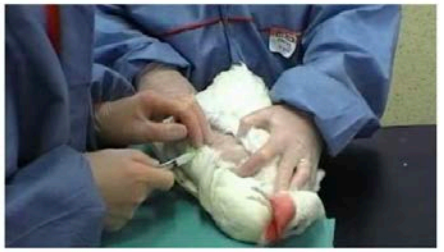
Blood san
Norecop

Blood sampling from the pig
Norecopa | 3,914 views

Intravenous injection in a rabbit
Norecopa | 2,025 views

Lifting a rabbit
Norecopa | 2,420 views

Subcutaneous injection in the rabbit
Norecopa | 1,479 views



Subcutaneous injection in the chicken
Norecopa | 1,806 views

Immobilisation of the rabbit
Norecopa | 2,072 views

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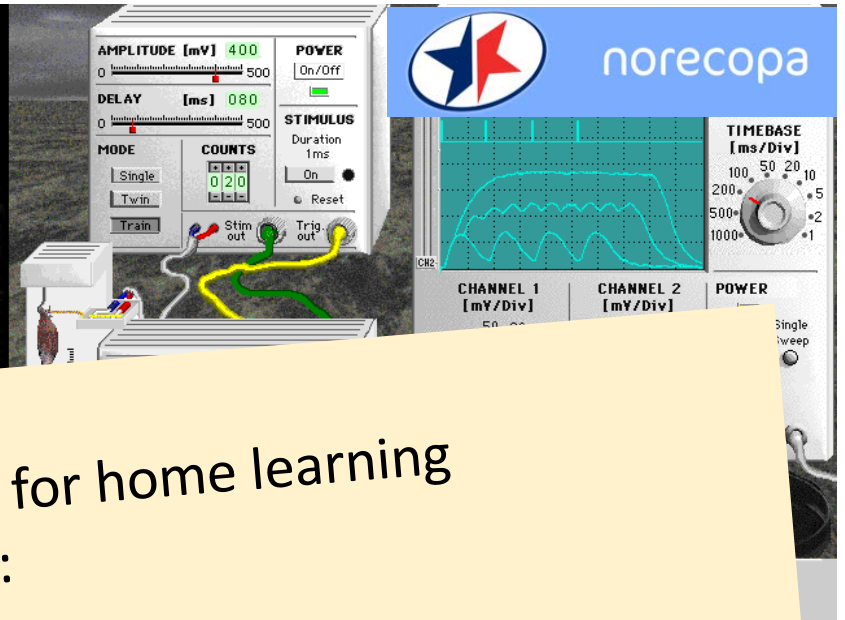
norecopa.no/NORINA



NEW:
overview of resources suitable for home learning
during the Covid-19 pandemic:

norecopa.no/norina-database/resources-for-home-learning

rescuecritters.com

limbsandthings.com

PREPARE encourages scientists to collaborate with animal carers and technicians from Day 1

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

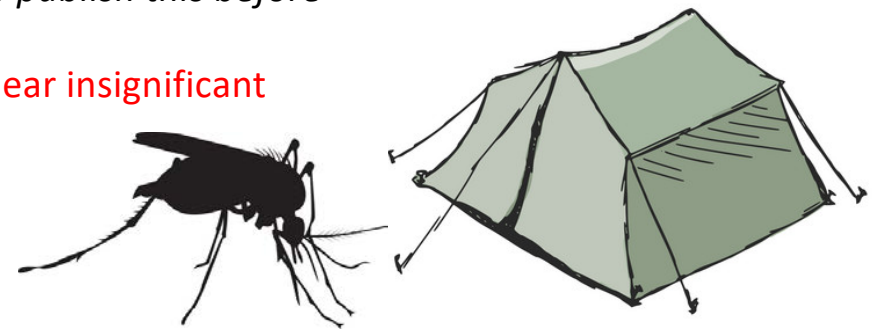
NASA

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 be appear insignificant
- until they occur simultaneously

We need a Culture of Care!



The International Culture of Care Network

norecopa.no/coc

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!

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

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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[6] and A J Smith[6]

[1]Research Animals Department, RSPCA, Wilberforce Way, Southwater, West Sussex RH13 9RS, UK; [2]Animals (Scientific Procedures) Inspectorate, Home Office, PO Box 6779, Dundee DD1 9WW, UK; [3]Biological Services, The University of Edinburgh, Chancellor Building, 49, Little France Crescent, Edinburgh EH16 4SB, UK; [4]CEWAS, Pirbright Road, Lowestoft, NR33 0HT, UK; [5]King's College London, Biological Services Unit, 4th floor, Hodgkin Building, Guy's Campus, London SE1 1UL, UK; [6]Norecopa, c/o Norwegian Veterinary Institute, PO Box 750 Sentrum, N-0106 Oslo, Norway
Corresponding author: P Hawkins. Email: phawkins@rspca.org.uk

Abstract

The severity classification of procedures using animals is an important tool to help to cue the implementation of refinement and to assist in reporting the application of the 3Rs (replacement, reduction and refinement). The recently revised Directive that regulates animal research and testing within the European Union requires Member States to ensure that all procedures are classified as 'non-recovery', 'mild', 'moderate' or 'severe', using assignment criteria set out by the European Commission (EC). However, these are focused upon terrestrial species, so are of limited relevance to fish users. A Working Group set up by the Norwegian Consensus-Platform for the 3Rs (Norecopa) has produced guidance on the classification of severity in scientific procedures involving fish, including examples of 'subthreshold', 'mild', 'moderate', 'severe' and 'upper threshold' procedures. The aims are to complement the EC guidelines and help to ensure that suffering in fish is effectively predicted and minimized. Norecopa has established a website (www.norecopa.no/categories) where more information on severity classification for procedures using fish, including field research, will be made available.

Keywords: Fish, harm–benefit assessment, humane endpoints, refinement, severity

Laboratory Animals 2011; 1–6. DOI: 10.1258/la.2011.010181

Background

An effective prediction of the effects of a research protocol on the animals concerned helps to ensure that any pain, suffering or distress they may experience will be effectively anticipated, recognized and alleviated. This is essential not only for animal welfare but also for scientific validity, because physiological and behavioural responses to suffering can significantly affect data quality. Severity classification is thus an important tool to help focus the implementation of refinement, including monitoring its progress, and to assist in reporting the application of the 3Rs (replacement, reduction and refinement) of Russell and Burch,[1] which is now an integral part of the legislation on animal research and testing in many countries. Predictions of severity are also fundamental to the harm–benefit assessments undertaken by bodies such as regulatory authorities and ethical committees when deciding whether or not a project should be licensed or funded.

There may also be a legal requirement to predict and classify severity. For example, the new Directive regulating animal use within the European Union, which must be implemented within all Member States by January 2013, requires the severity of each procedure to be classified on the basis of the 'degree of pain, suffering, distress or lasting harm expected to be experienced by an individual animal during the course of the procedure', with the aim of enhancing transparency, facilitating the project authorization process and providing tools for monitoring compliance.[2] Member States will have to ensure that all procedures are classified as 'non-recovery', 'mild', 'moderate' or 'severe' on a case-by-case basis, using the assignment

Laboratory Animals 2011; 1–6

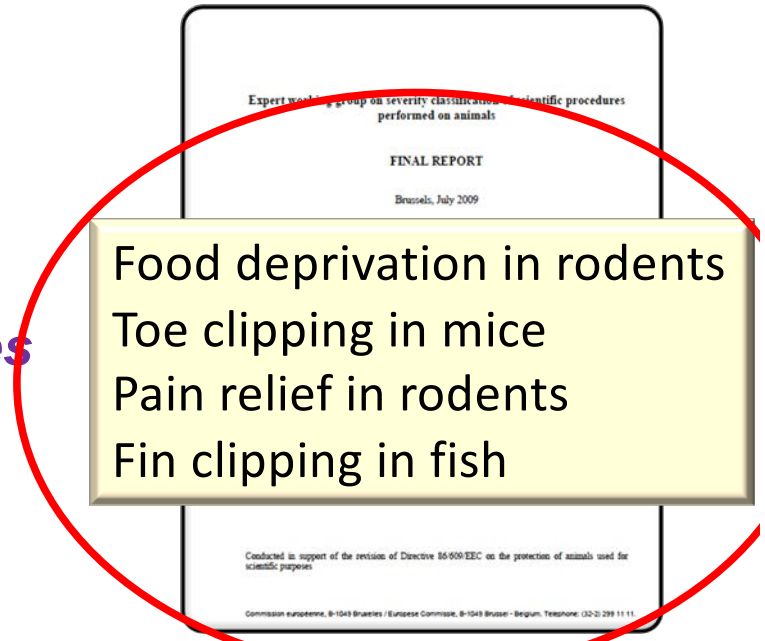
Guidance on the severity classification of procedures involving fish

Report from a Working Group
convened by Norecopa

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



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

Commission européenne, B-1049 Bruxelles / Europese Commissie, B-1049 Brussel - Belgium. Telephone: (32-2) 299 11 11

Food deprivation in rodents
Toe clipping in mice
Pain relief in rodents
Fin clipping in fish

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

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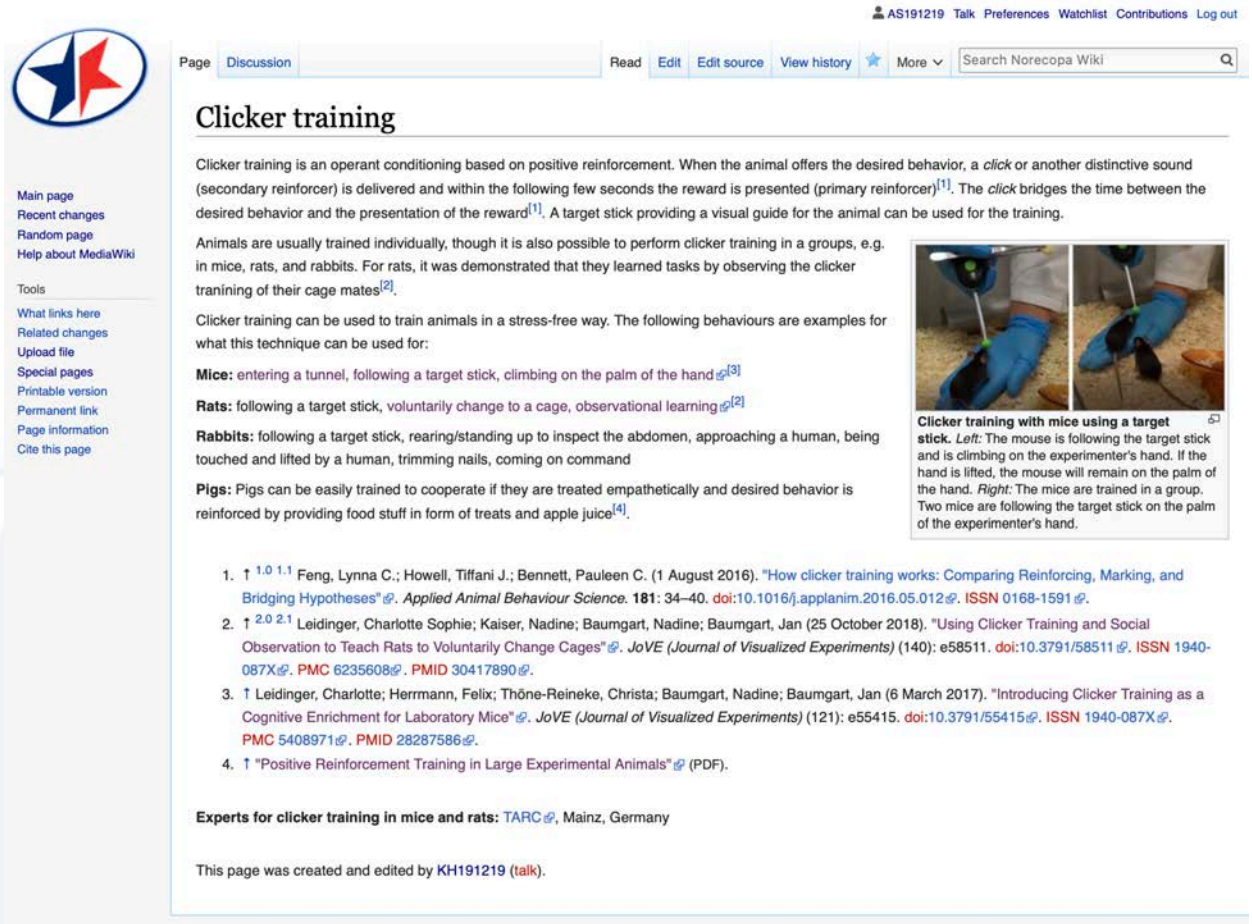
wiki.norecopa.no



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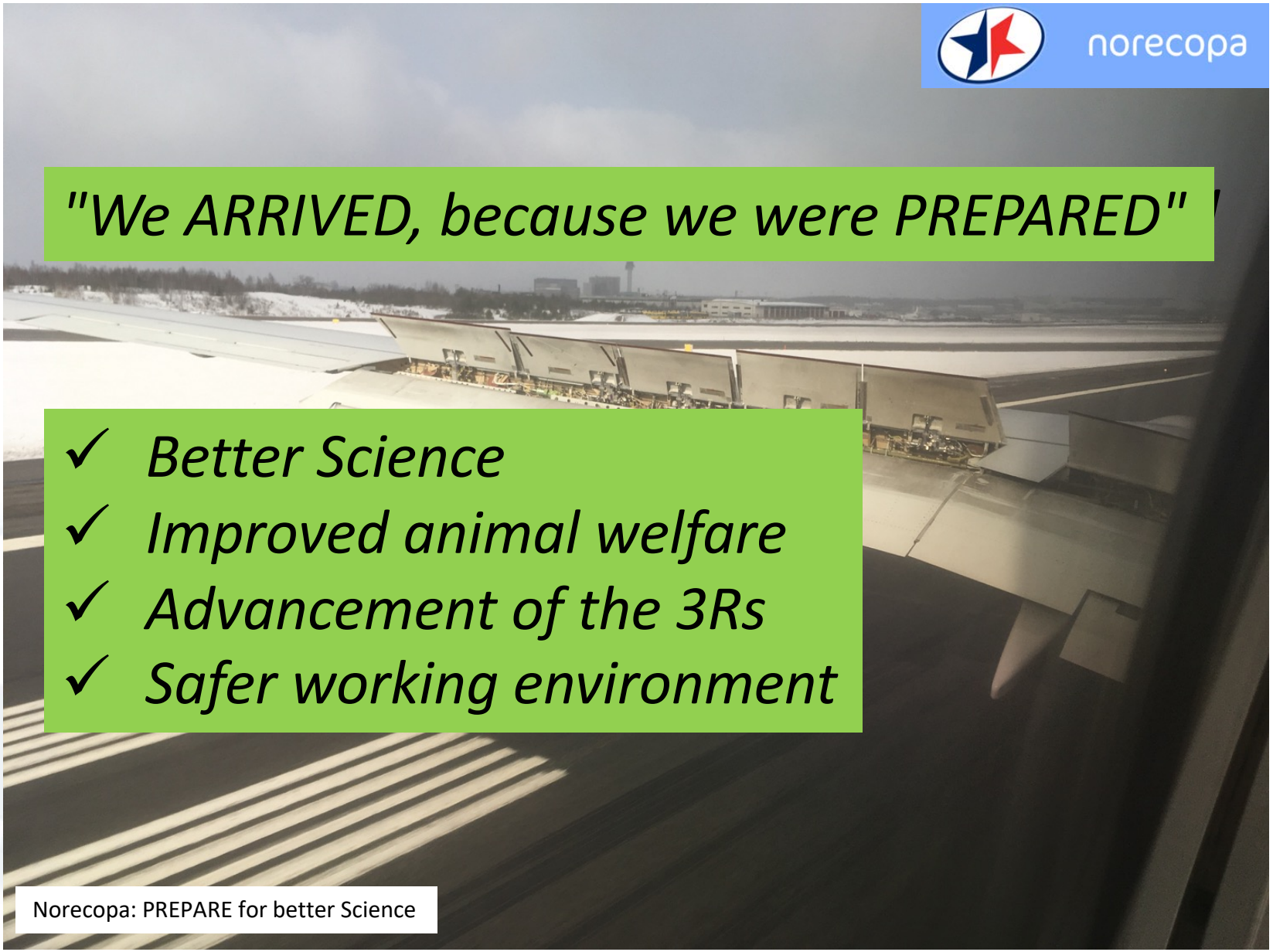
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"We ARRIVED, because we were PREPARED"
✓ Better Science
✓ Improved animal welfare
✓ Advancement of the 3Rs
✓ Safer working environment
Norecopa: PREPARE for better Science

norecopa.no/meetings/meetings-calendar

Pdf files of 80+ presentations held at Norecopa's meetings

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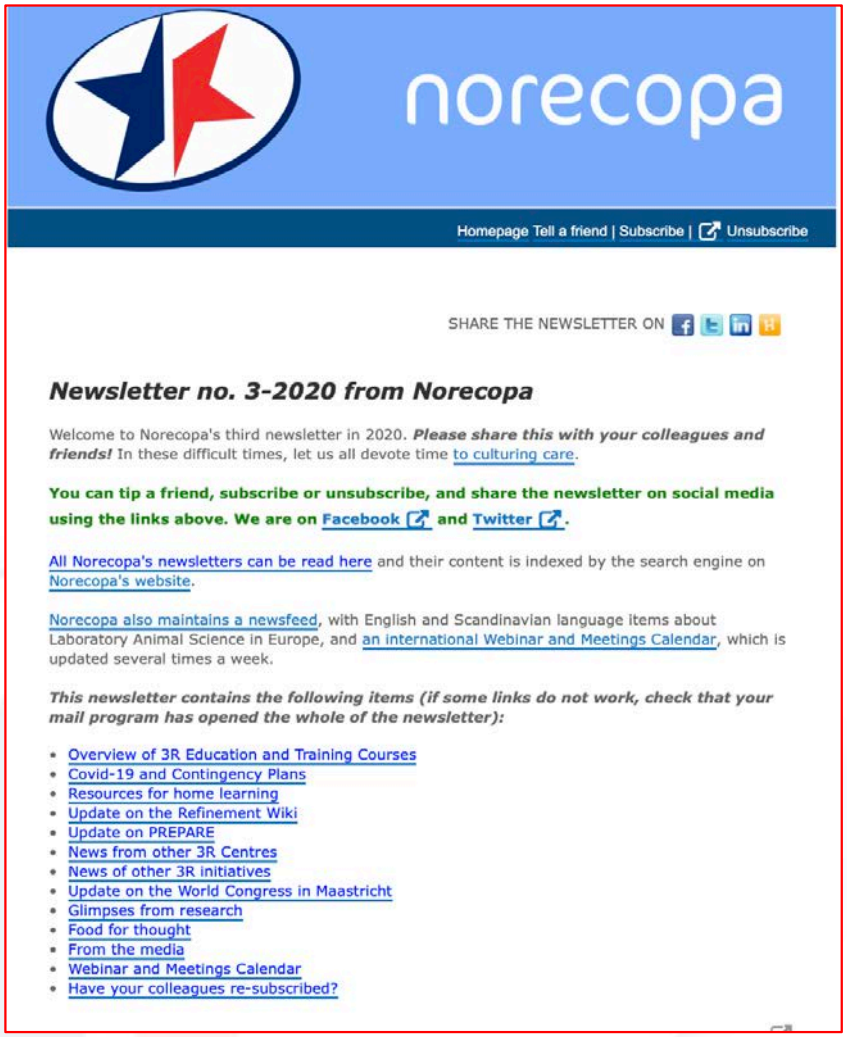

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norecopa.no/news/newsletters

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norecopa.no/UFAW

Illustration photos: colourbox.com

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