PREPARE for Better Science:

Guidelines for animal research and testing

Adrian Smith

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norecopa.no/Ljubljana

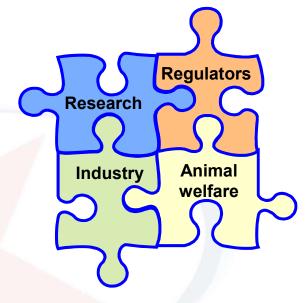


https://norecopa.no

Norecopa is Norway's National Consensus-platform,

working to advance all the three R's:

Replacement, Reduction and Refinement



Established in 2007

Norecopa: PREPARE for better Science

Its Board represents:

norecopa.no

40-slide powerpoint presentation about the 3Rs



The 3Rs of Russell and Burch:

Replacement, Reduction & Refinement

Available at <u>norecopa.no/3Rs</u>

With some material from:

Smith AJ & Richmond J (Forthcoming). The Three-Rs. In: *The UFAW Handbook on the Care and Management of Laboratory and Other Research Animals*. 9th edition. Richardson CA and Golledge HDR (eds).

Oxford: Wiley-Blackwell.

English and Spanish





Disclosures about resources which will be mentioned

- Webmaster for the Norecopa site information about global guidelines
- Lead author of several databases on the Norecopa site
- Lead author of the PREPARE guidelines
- Manager of the Refinement Wiki



"...better science"?

- Implementation of all three Rs
- valid data (a true treatment effect)
- reproducible and translatable experiments
- best possible animal welfare
- health & safety (of animals and people)
- a culture of care in the research group
- communication of best practice to others



colourbox.com



Are we amateurs in the areas of precision, reproducibility and translatability? How do others achieve precision and reproducibility...?



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







15.25.33	-01.38	Kaptein	Cockpit	V one, rotate	
15.25.38	-01.33	Kaptein	Cockpit	positive rate	
15.25.39	-01.32	Styrmann	Cockpit	Gear up please	
15.25.39	-01.32	Kaptein	Cockpit	Gear up	
15.26.37	-00.34	Kaptein	Cockpit	Uh what a view of the Hudson today	
15.26.42	-00.29	Styrmann	Cockpit	Yeah	
15.27.07	-00.04	Kaptein	Cockpit	After takeoff checklist complete	
15.27.10	-00.01	Kaptein	Cockpit	Birds	
15.27.11	-00.00	Styrmann	Cockpit	Whoa	
15.27.11	00.00				
15.27.12	+00.01	Kaptein	Cockpit	Oh	
15.27.13	+00.02	Styrmann	Cockpit	Oh yeah	
15.27.14	+00.03	Styrmann	Cockpit	Uh oh	
15.27.15	+00.04	Kaptein	Cockpit	We got one rol both of 'em rolling back	
15.27.18	+00.07	Kaptein	Cockpit	Ignition, start	
15.27.21	+00.10	Kaptein	Cockpit	I'm starting the APU	
15.27.23	+00.12	Kaptein	Cockpit	My aircraft	
15.27.24	.00.10	Styrmann	Cockpit	Your aircraft	
15.27	+00.17	aptein	Cockpit	Get the QRH loss of thrust on both engines	
15.27.32	+00.21	Kaptein	Radio	Mayday mayday mayday. Uh this is Cactus fifteen thirty [sic] nine, hit birds. We've lost thrust on both engines. We're turning back towards LaGuardia.	

Norecopa: PREPARE for better Science

no.wikipedia.org/wiki/US_Airways_Flight_1549







Hudson River, 2009

en.wikipedia.org

All 155 passengers and crew saved



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 all those involved (crew members and ground staff)
- Make sure that everyone is "on the same page"





Rapid evacuation by trained cabin crew saved many lives







The PREPARE guidelines encourage 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



We must collaborate to bridge the knowledge gaps and encourage recognition of all the players in animal research & testing





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



animats. Although there are a number of reporting guidelines available, there is very little overarching guid-ance 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 Animats: Recommendations for Excellence. PREPARE covers the three broad areas which determine the quality of the preparation for animal studies; formulation, disloque 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://

guidelines, planning, design, animal experiments, animal research

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

rine quanty or animar-osses studies is under increasing secretary, for good scientific and ethical reasons. Studies respects have been well-designed, and generate health of papers reporting animal experiments have revealed alarming deficiencies in the information provided, "a urgent need for detailed but overarching guideven after the production and journal endorsement of lines for researchers on how to plan animal experiments." even aner the production and journal emoryement of reporting guidelines. There is also widespread concern which are safe and scientifically sound, address animal aboratory animal research.^{4,7} This can, for example, contribute towards the failure of drugs when they enter contribute towards the failure of the fa about the lack of reproducibility and translationary of laboratory animal research. "This can, for example, contribute towards the failure of drugs when they enter burnan trials." These issues come in addition to serve a serverum. Outs. Nerwey burnan trials. These issues come in addition to make the 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." This has understandably sparked a demnats at fact." This has understandably sparked a demnats at fact." This has understandably sparked a demnats at fact." This has understandably sparked a demnats and a fact. "This has understandably sparked a demnats as fact." This has understandably sparked a demnats as fact." This has understandably sparked a demnats animals. "In the case of the sparked and the spa

in our experience, often underestimated by scientists Even small practical details can cause omissions or arte The quality of animal-based studies is under increasing facts that can ruin experiments which in all other



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 30,000 views/downloads from the journal website so far

> Also downloadable from norecopa.no/PREPARE



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

Adrian J. Smith*, R. Eddie Clutton*, Elliot Lilley*, Kristine E. Aa. Hansen* & Trond Brattelid*

Planning Research and Experimental Procedures on Animals: Recommendations for Excellence

Noverige on Novembra Memory Institute, P.O. Box 17 Berlann, 1976 Date Morrow, "Rayed Date School of Hemory Statists, Earlie Bade, Machinan, 1955 Bill, D.C., "Assessed memory begreinted, Source Date, 1950'A, Millerton Hilly, Satists, 1951 Common, 1965 Satists, 1965 Satists

and exclusion criteria.

Discuss the learning objectives, if the animal use is for educational or training purposes.

Define objective, easily measurable and unequivocal humane endpoints

Choose methods of randomisation, prevent observer bias, and decide upon inclusion

The PREPARE Guidelines Checklist

Sciences, 5020 Bergen, Norway.

1. Literature

2. Legal issues

harm-benefit assessment and

humane endocents

4. Experimental design and

statistical analysis





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Ar	Augustian design of the study o	o, Health risks, wade disposal and decontamination	Perform a risk, assessment, in collaboration with the animal facility, for all persons and animals affected ownessy or womenly 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.	
	шкогatory Animali Science grog resses.		(C) Quality control of the components in the study	
pic	Recommendation: (A) Formulation of 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.	
	Form a clear hypothesis, with primary and secondary outcomes. Gonster the use of posternatio reviews.	10. Experimental animals	☐ Avoid generation of surplus animals.	
	Assess the relevance of the species to be used, its biology and suitability to answer the experimental questions with the trast authority, and to written receip. Assess the reproducibility and translatibility of the project.	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.	
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 milerant guidance documents ing. Bl guidance on project evaluation.		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 bases in g. food deprivation, svillary housing.	
Ethical issues, arm-benefit isesument and	Construct a lay summary. In dislogue with ethics committees, consider whether statements about this type of research have already been produced.	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.	
amane endpoints	Address the 3%s peptacement, reduction, refinement) and the 3%s (good science, good sense, good sense), good uses the 3%s (good science, good sense, good sense), good uses the 3%s (good science, good sense, good sense), good sense, go	1.4. Humane killing, release, reuse or returning	Consult relevant legislation and guidelines well in advance of the study. Define primary and emergency methods for humans killing. Assess the competence of those who may have to perform these tasks.	

(B) Dialogue between scientists and the animal facility

Construct a detailed plan for division of labour and expenses at all stanes of the study

Construct an approximate timescale for the project, indicating the need for assistance with preparation,

5. Objectives and Arrange meetings with all relevant staff when early plans for the project exist.

Discuss and disclose all expected and potential costs.

animal care, procedures and waste disposal/decontamination.

timescale, funding

- Andrean Code

 1. South AL, Clurtun RE, Lillay E, Raman KEA & Brathald T, MEPARE Guidelines for Planning Annual Research and Testing,
 Lidoroute Annuals, 2017, DOI: 10.1171/00287721/272423.

 2. Khanny C, Brasse KL, Cubbli C, et al. Improving Sociation on Research Reporting: The ARMVE Guidelines for Reporting Annual Research.

 Pad Beology, 2010, DOI: 10.1171/journalspoin.1006112.

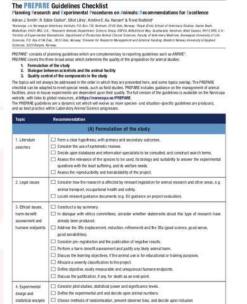
Construct a systematic plan for all stages of necropsy, including location, and identification of all

animals and samples.

Further information https://norecopa.na/PREPARE | past@norecopa.na | Omorecopa

Three versions of the checklist:

1. plain pdf file



and exclusion criteria.



Tepic	Recommendation		
	(B) Dialogue between scientists and the unimal facility		
5. Objectives and timescale, funding and division of labour	☐ An image needings with all relevant staff when early plans for the project exist. ☐ Control of an approximate Removale for the project, relecting the need for residence with preparative animal care, providence and was		
6. Facility evaluation	Conduct a physical inspection of the facilities, is evaluate builting and equipment standards and need Discuss stating levels at times of extra risk.		
7. Education and training	Assess the current competence of staff members and the need for further education or training to the study.		
8. Health risks, waste disposal and decontamination	Perform a risk assessment, incottaboration with the animal facility, for all persons and animals affected directly or indescribly by the index). Assess, and if occurrancy produce, opcording indirection all stages of the project. Discuss measure for ordinatement, opcordinations, and disposal of all terms in the shady.		
	(C) Quality control of the components in the study		
9. Test substances and procedures	Provide as much information as goslatile about test substances. Consider the feasibility and wiskilty 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 mositoring	Discuss the animals' Skely health status, any needs for transport, quarantine and isolation, treath monitoring and consequences for the personnel.		
12. Housing and husbandry	Aftend to the avienual specific indirectly and reveals, in collaboration with expert staff. Discuss addinastization, optimal incurring conditions and procedures, environmental factors and any experimental limitations on these in a, find depression, selfany bossing.		
13. Experimental procedures	Develop witned procedures for capture, immobilisation, marking, and release or rehoming. Develop witned procedures for substance administration, sampling, redistion and parenthesia, surgery and other techniques.		
14. Humane killing. release, reuse or reforming	Consult relevant legislation and guidelines well in advance of the study. Define privacy and ceres gency methods for humans killing. Assess the competence of those who may have to perform these basks.		
15. Neuropay	 Construct a systematic plan for all stages of recorage, including location, and identification of all animals and samples. 		

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 Jailburgh S, Marines 2011; DO: 1117 (RCS)2017 DV 278453.
 Killenny E, Brawer RC, Catelli K. et al. Improving Sections Research Reputing. The MRYE Surptime for Reporting Annies Research.

 And Balletin 2010: DOI: 10.1176/contraction.0004000.

Further information https://norecops.no.PREPARE / post@norecups.no / @@norecops

Three versions of the checklist:

2. fillable pdf file

norecopa.no/PREPARE-Word

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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 Brattelid^e

*Norecopa, c/o Norwegian Veterinary Institute, P.O. Box 750 Sentrum, 0106 Oslo, Norway; *Royal (Dick) School of Veterinary Studies, Easter Bush, Middothian, EH25 9R6, U.K.; 'Research Animals Department, Science Group, RSPCA, Wilberforce Way, Southwater, Horsham, West Sussex, RH13 9RS, U.K.; '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; 'Division for Research Management and External Funding, Western Norway University of Applied Sciences, 5020 Bergen, Norway.

PREPARE¹ consists of planning guidelines which are complementary to reporting guidelines such as ARRIVE². PREPARE covers the three broad areas which determine the quality of the preparation for animal studies:

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

The topics will not always be addressed in the order in which they are presented here, and some topics overlap. The PREPARE checklist can be adapted to meet special needs, such as field studies. PREPARE includes guidance on the management of animal facilities, since in-house experiments are dependent upon their quality. 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.

Formulation of the study

2.2	pothesis, with rimary and secondary outcomes.
Text stored in th	le file
Consider the use	of systematic reviews.
Decide upon dat	abases and information specialists to be consulted, and construct search
erms.	

Three versions of the checklist:

3. online version

norecopa.no/PREPARE/Mychecklist

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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 Brattelid^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.

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norecopa.no/PREPARE

- 3-Ethical issues, harmbenefit assessment and humane endpoints
- 2 Construct a lay summary.
- 3b In dialogue with ethics committees, consider whether statements about this type of research have already been produced.
- 3c Address the 3Rs (Replacement, Reduction, Refinement) and the 3Ss (Good Science, Good Sense, Good Sensibilities).

- 5. Have the experiments been carried out before, and is any repetition justifiable?
- 6. What approaches to reduce distress r have been considered?



 Have national or local research ethics committees already produced statements relevant to the research being planned? Consideration should also be paid to the broader context of the research. For example, research directed at increasing the productivity of farming at the expense of (or without improving) individual animal welfare, or wildlife research whose primary aim is population management.

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

nd will any advances in this ses only index the title and rejected?

- Assessment and justify any likely animal harm.

 3. If Discuss the learning objectives, if the animal use is for educational or training purposes.

 4. [39] Allocate a severity classification to the project.
 - 3h Define objective, easily measurable and unequivocal

humane endpoints.

- 3i Discuss the justification, if any, for death as an end-point.
- 4-Experimental design and statistical analysis

- 3. Have the Three S's (Good Science, Good Sense and Good Sensibilities (3)) been addressed? Sufficient time should be allocated to this point, since two of the three S's are highly subjective, but equally important. The use of commonsense and critical anthropomorphism are justifiably part of the work to assess the impact of research on animals, not least when a scientific evidence base does not exist.
- 4. Does the proposed study have a clear rationale and scientific relevance, and what will be the next step if the hypothesis is supported or rejected?
- 5. Have the experiments been carried out before and is any repetition justifiable?
- 6. What approaches to reduce distress r have been considered?
- 7. Will the project undergo pre-registration of and will consider results be published, to avoid publication bias?

M my more links to resources on ethics are available here ...

Details a... of pre-registration of animal studies and reporting a critical incidents are to be found in the section on Experimental Design and Statistical Analysis &.

Harm-Benefit Assessment

PREPARE is closely linked to

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





norecopa.no / Meetings / Meetings Calendar

norecopa.no/meetings/meetings-calendar

Webinar and Meetings calendar

Links to past meetings can be accessed here (Many of these links will eventual out, but they still give a useful overview of organisers and locations of relevant meetings within laboratory animal science, and it is often possible to contact th organisers for more information).

N.B. For information about courses in laboratory animal science, click here.

June 2023

- ▶ Course for wildlife scientists (designed for UK licensees), online, 12-22 June 2023
- ▶ Statistical Analysis Course: for in vivo and in vitro scientists @, online, 12-14 June 2023
- ▶ LAWTE conference , online/Pittsburgh, 12-14 June 2023
- ▶ Introduction to the role of the Named Veterinary Surgeon , location to be announced, 13-14 June 2023
- ▶ Creating the right environment for animal care , webinar series, 7, 14 & 21 June

Cro-LASA meeting , Ljubljana, 15 June 2023

f rigorous and reproducible animal research , webinar (Hanno

- ▶ Guide to refinement for fish species ☑, webinar (Chloe Stevens), 16 June 2023
- ▶ Göttingen Minipigs Academy: Veterinary Management, Welfare and Culture of Care , Dalmose, 19 June 2023
- Assessment, Prevention and Alleviation of Pain and Distress in Laboratory Animals Workshop , online, 19-23 June 2023
- ▶ Recent Advances in Animal Welfare Science IX: Virtual UFAW Conference , online,
- ▶ Frontiers Forum Deep Dive: Organoid Intelligence ☑, online event, 21 June 2023
- ▶ 3Rs Training Webinar: Flying Monkeys and the Polio Vaccine 🗷 (Tom Quick), 21 June 2023

+ webpages for past meetings and recorded meetings



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.
- > <u>TextBase</u>: 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 cites on the Norecopa website.

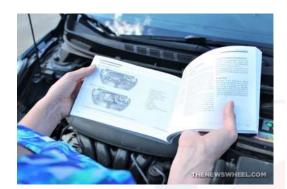
Norecopa: PREPARE for better Science

norecopa.no/databases-guidelines

links to over 70 other databases

norecopa.no/3RGuide

Links to over 400 guidelines



A good practice guide to the administration of substances and removal of blood, including routes and volumes

3R Guide database/c6721 (legacy id: 15079)

This paper provides the researcher in the safety evaluation laboratory with an up-to-date, easy-to-use set of data sheets to aid in the study design process whilst at the same time affording maximum welfare considerations to the experimental animals.

A guide to defining and implementing protocols for the welfare assessment of laboratory animals

3R Guide database/68ba4 (legacy id: 15065)

Eleventh report of the BVAAWF/FRAME/RSPCA/UFAW Joint Working Group on Refinement

A guide to the care and use of native Australian mammals in research and teaching

3R Guide database/502ff (legacy id: 15377)

The Guide supports implementation of the Australian Code for the care and use of animals for scientific purposes (8th edition, 2013) and ensures that the specific and unique needs of Australian native mammals are met when these animals are used for scientific purposes.

AAALAC Position Statements

3R Guide database/ef566 (legacy id: 15155)

In connection with its work of accreditation of animal care and use programmes, AAALAC International has issued position statements on a number of key elements in such a programme.



colourbox.com



TextBase:

1,500 books related to Laboratory Animal Science:

norecopa.no/textbase

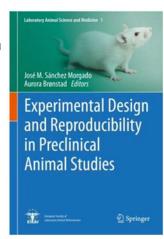
Experimental Design and Reproducibility in Preclinical Animal Studies

By José M. Sánchez Morgado & Aurora Brønstad (Eds.)

Record number: 8619d

This book provides grounds on how to plan and conduct animal experiments that can be reproduced by others. It touches on factors that may impact the reproducibility of animal studies including: the animal genetic background, the animal microbial flora, environmental and physiological variables affecting the animal, animal welfare, statistics and experimental design, systematic reviews of animal studies, and the publishing process.

The book addresses advanced undergraduates, graduate students and all scientists working with animals.



norecopa.no/textbase/experimental-design-and-reproducibility-in-preclinical-animal-studies



The Refinement Wiki





Susanna Louihimies

wiki.norecopa.no

Born from the knowledge that a lot of good ideas on refinement circulate on discussion forums, but never get published.

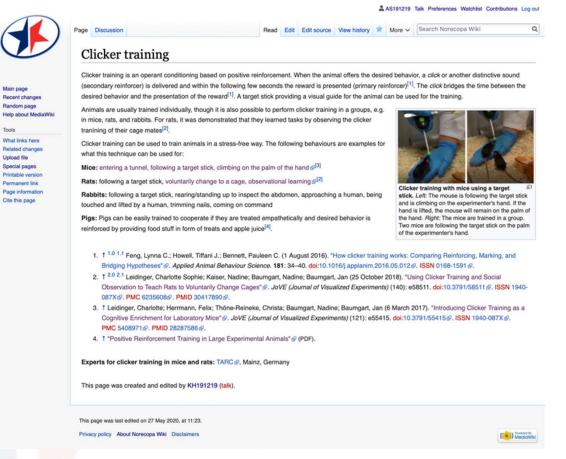
Designed to be

- a portal for rapid publication and dissemination of these ideas
- a place to identify experts on specific refinement techniques



wiki.norecopa.no

Return to homepage



Pages created (June 2023)

wiki.norecopa.no



- Acclimatisation
- Adrian Smith
- Alphaxalone
- Anaesthesia in neonates
- Analgesia
- Asepsis
- · Blood sampling of hamsters
- Blood sampling of pigs
- · Blood sampling of rainbow trout
- · Breeding strategies for mice
- Clicker training
- Contingency plans
- Decapitation
- Detecting early onset of clinical signs in the mouse model of Covid-19
- · Detection of pain and distress in mice
- EMLA cream
- Embryo transfer
- Experimental Autoimmune Encephalomyeltis (EAE)
- Facial expression analysis
- Food crunchers

- · General discusson on use of analgesics
- Genotyping mice
- · Habituation training
- High-fat diets
- Hot Bead Sterilisers
- Housing nude mice
- Housing research fish
- Humane endpoints
- Hydrodynamic gene delivery
- · Intra-ocular injections
- Intranasal administration
- Intraperitoneal injection
- Intraperitoneal pentobarbitone
- Ketamine and alpha-2 agonist combinations
- Long-term anaesthesia in rodents
- Lumpfish
- Main Page
- Marble Burying Test
- Metabolic cages
- Minipumps
- Montanide adjuvant

- Mouse Grimace Scale
- Mouse handling
- · Nest building material
- Oestrus suppression in ferrets
- Pneumocystis murina
- Recapping needles
- Rotarod Test
- Screening cell lines
- Sedation of cattle
- Splenectomy
- · Sterilisation of instruments
- TTEAM and TTouch
- Tail vein injection
- Tramadol
- Transport stress
- · Tumour cell implant into mammary fat pad
- Ulcerative Dermatitis in Mice
- Water quality
- Xenopus laevis
- Zebrafish swabbing

norecopa.no/PREPARE/film

3-minute whiteboard film









EU / National



Facility



Project



Procedure

https://environment.ec.europa.eu/topics/chemicals/animals-science_en



Animals in science

EU actions for the protection of animals used for scientific purposes

PAGE CONTENTS

Overview

Objectives

Law

The "Three Rs"

EU networks

Implementation

Tools

Related links

Contact



https://environment.ec.europa.eu/topics/chemicals/animals-science_en#implementation







Program Description

- A. Animal Care and Use Program
- B. Animal environment, Housing and Management
- C. Veterinary Care
- D. Physical plant

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III. Veterinary Care A. Animal Procurement and Transportation	
A. Animal Procurement and Transportation Animal Procurement Transportation of Animals	
Animal Programment	29
Animal Procurement Transportation of Animals B. Preventive Medicine	29
B. Preventive Medicine	29
1. Animal Biosecurity	29
Quarantine and Stabilization Separation by Health Status and Species C. Clinical Care and Management	29
3. Separation by Health Status and Species C. Clinical Care and Management 1. Surveillance, Diagnosis, T.	29
C. Clinical Care and Management 1. Surveillance, Diagnosis, Treatment and Control of Disease.	30
Surveillance, Diagnosis, Treatment and Control of Disease Emergency Care	30
2. Emergency Care	30
2. Emergency Care 3. Clinical Record Keeping 4. Diagnostic Resources 5. Drug Storage and Control	30
5. Drug Storage	31
4. Diagnostic Resources 5. Drug Storage and Control D. Surgery.	32
5. Drug Storage and Control D. Surgery	32
2. Surgical Facilities	32
Pre-Surgical Planning Surgical Facilities Surgical Procedures Aseptic Technique Intraoperative Monitoring	32
4. Aseptic Technique	33
Aseptic Technique Intraoperative Monitoring	33
	33
	34

63 pages

www.aaalac.org/program-description



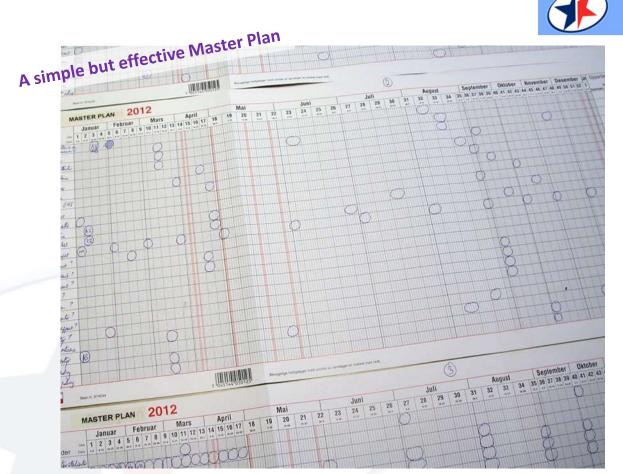
A contract between the animal facility and the research group

- Division of labour, responsibilities and cost
- Clarifying all stages of the experiment
- Ensuring that all necessary data are recorded



	Animal	Researcher	Not
	facility		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:	-1	1	
Free-range, shelf, cabinet, isolator			
Cage type and size			
Number and method of distribution of animals per cage			





norecopa.no/more-resources/master-plan-and-sops



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

Many of these needed revision in the light of Covid-19 norecopa.no/be-prepared

- 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

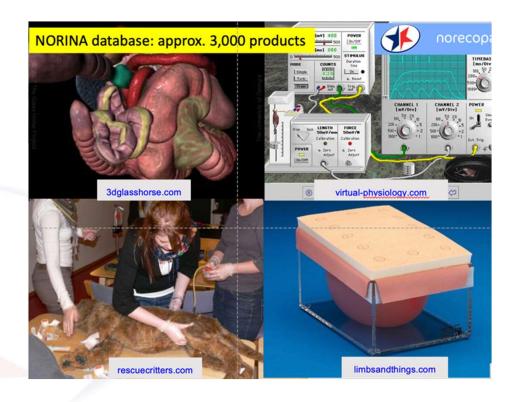
https://norecopa.no/prepare/6-facility-evaluation/master-plan-and-sops/contingency-plan

Temporary staff at weekends and holidays



Procedure





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





Rat s.c. injection



Testing anaesthetic depth in the chicken

№ Norecopa 598 views



Blood sampling from the pig



Subcutaneous injection in the rabbit



Rat i.p. injection (method 2)

Norecopa | 1,280 views



Blood collection from the saphenous vein in the mouse $\begin{tabular}{l} \& \end{tabular}$ Norecopa \mid 6,777 views



Intravenous injection in a rabbit

Norecopa | 2,025 views



Subcutaneous injection in the chicken





Anatomia de la rata

Norecopa | 977 views



Subcutaneous injection in the rat - Technique 1



Lifting a rabbit

Norecopa | 2,420 views



Immobilisation of the rabbit
Norecopa | 2,072 views



researchanimaltraining.com

Articles v

eModules V

Log in

Training resources for animal research



National Legislation (EU1)

Understand the national and international legal and regulatory framework within which projects involving animals are constructed and managed and of the legal responsibilities of the people involved.



Ethics, Animal Welfare and the 3Rs (EU2)

Identify the ethical and welfare issues raised by the use of animals in scientific procedures and understand the basic principles of the 3Rs.



Basic and Appropriate Biology (EU3)

Discover the basic principles of animal behaviour, care, biology and husbandry.



Animal Care, Health and Management (EU4)

Examine information on various aspects of animal health, care and management including, environmental controls, husbandry practices, diet, health status and disease.



Recognition of Pain, Suffering and Distress (EU5)

Identify the normal condition and behaviour of experimental animals and differentiate between a normal animal and one which is showing signs of pain, suffering or distress.



Humane Methods of Killing (EU6.1)

Learn the principles of humane killing including descriptions of the different methods available and information to help you compare the methods permitted to determine the most appropriate method.



Minor Procedures without Anaesthesia (EU7)

An introduction to the theory relating to minor procedures and information about appropriate methods of handling, restraint, appropriate techniques for injection, dosing and sampling relevant to the species.



Anaesthesia for Minor Procedures (EU20)

Guidance and information for individuals who, during their work with animals, will need to apply sedation or short-term anaesthesia for a brief period and mild pain level procedure.

eModules



eModule - Recognition and Prevention of Pain, Suffering and Distress (EU5)



eModule - Humane Methods of Killing (EU6)

procedures and projects (level 1) (EU10)

eModule - Design of



eModule - Design of procedures and projects (level 2) (EU11)



eModule - The Severity Assessment Framework (EU12)



eModule - Anaesthesia for Minor Procedures (EU20)



eModule - Pre-Anaesthetic Preparations (EU21-1)



eModule - Choosing an Anaesthetic (EU21-2)



eModule - Anaesthetic Monitoring and

Intraoperative Care (EU21-

eModule - Anaesthetic Breathing Systems, Airway Management and Neuromuscular Blocking Agents (EU21-4)



eModule - Anaesthetic Management and Preventing Problems (EU21-



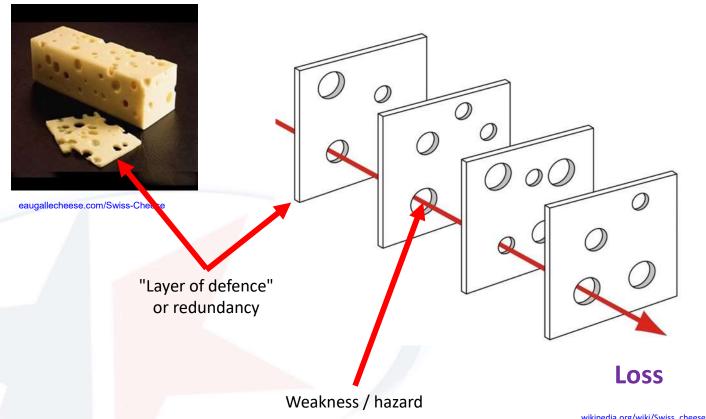
Anaesthetic Care (EU21-6)



eModule - Project Evaluation (EU25)



Risk Assessment - Threat and Error Management



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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)

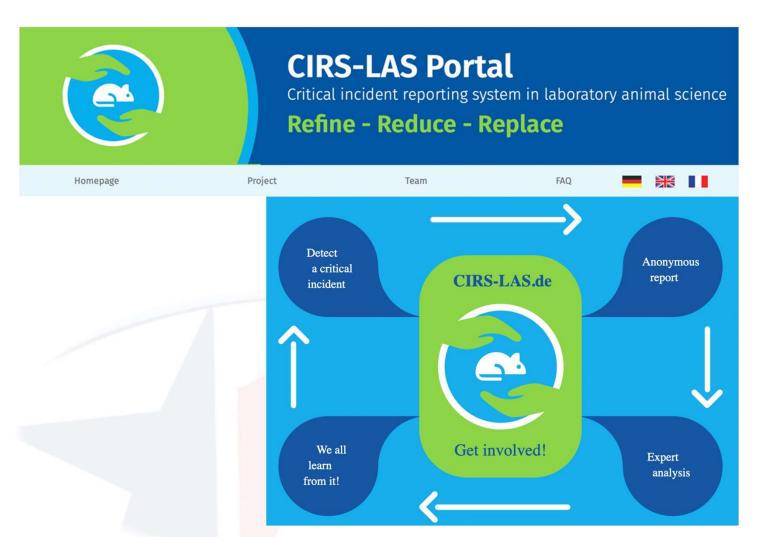


Photo: NMBU



wikipedia

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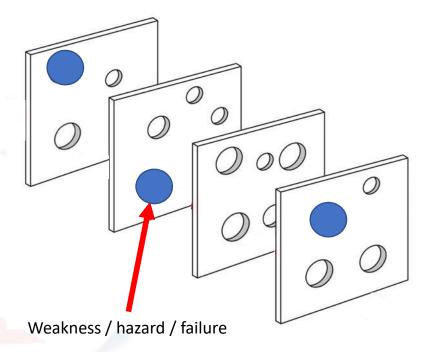


Again: Look to the aviation industry!

When things go wrong, they write procedures so they don't happen again



eaugallecheese.com/Swiss-Cheese



Norecopa: PREPARE for better Science

wikipedia.org/wiki/Swiss_cheese_model



Culture of Care – helps honest discussion between scientists and facility staff



"because we've always done it that way"

"as often as necessary"

"there are no alternatives"

Closely related is a Culture of Challenge (Louhimies, 2015):

Look for the acceptable, rather than choosing the accepted.





Culture of Care

The International Culture of Care Network norecopa.no/coc

A 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

Regular meetings

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



Regular refresher/update meetings for all organis

Special events

about their science, and about techniques and ani care within the project

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



Building communication into existing processes

Each study has a prestart and wash-up meeting involving everybody

shared at external user



Three Rs improvements reported to AWERB &



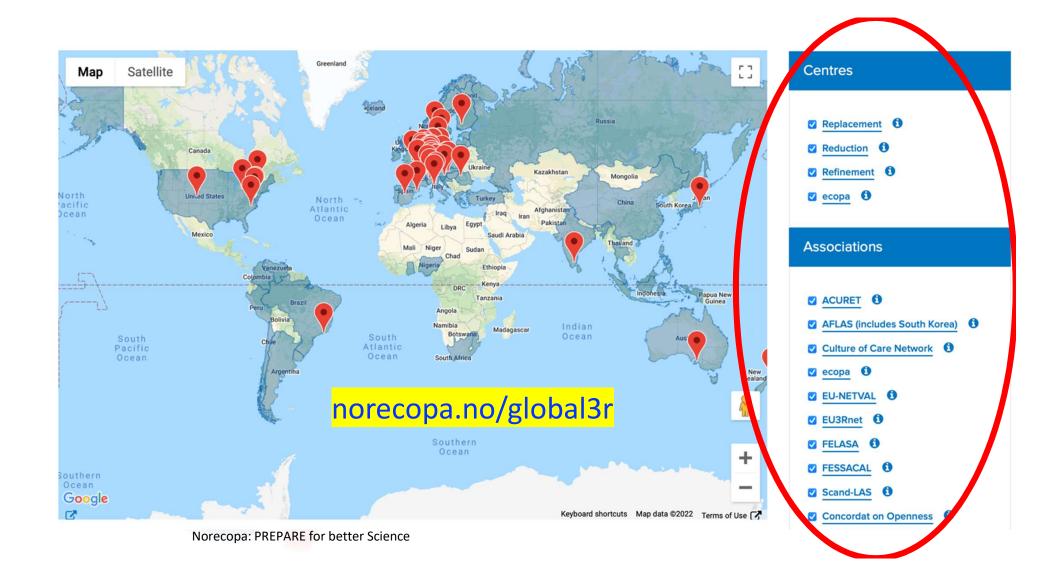
Other ideas

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









The ARRIVE guidelines 2.0

This section of the website provides detailed explanations about each item of the guidelines. Use the left-hand side menu to navigate to each item.

To facilitate a step-wise approach to improving reporting, the guidelines are organised into two prioritised sets:

ARRIVE Essential 10

These ten items are the basic minimum that must be included in any manuscript describing animal research. Without this information readers and reviewers cannot assess the reliability of the findings.

Recommended Set

These items complement the Essential 10 set and add important context to the study described. Reporting the items in both sets represents best practice.

arriveguidelines.org



The pathway to better science





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norecopa.no/PREPARE *and* ivd-utrecht.nl/en/news/better-animal-research-through-open-science-1



We cannot improve our research by

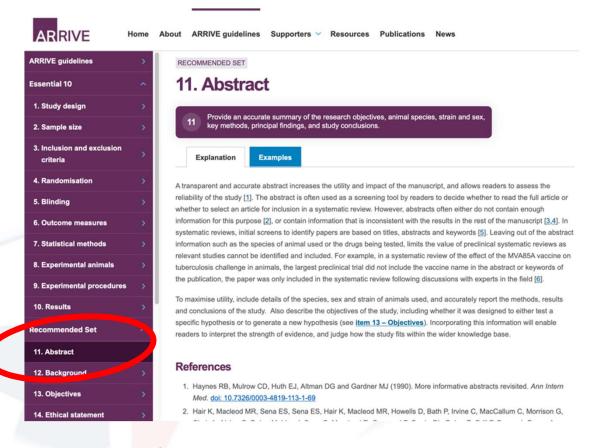
better reporting alone...

we need reporting **and** planning guidelines



reddit.con

arriveguidelines.org





ARRIVE

There are three broad areas which need to be considered when planning animal studies:

- 1. The suitability of the species or strain at a model of the target organism
- 2. The ethical issues surrounding their use: Thoosing the right animal for the right reason' . The large increase in use of genetically altered lines has created increasing concern about the suitability of these animals is models of human conditions .
- Characterisation of the animals. Items to be considered, in collaboration with the supplier, include:
- > Species, strain, line and phenotype (with an explanation of any genetic modifications)
- > Age, developmental stage, sex and weight
- > Stage of oestrous cycle and any previous breeding history
- Any necessary pre-treatment (e.g. castration for this
- Name and address of the supplier/breeder method of capture and transport
- > Health status (e.g. germ-free, gnotobiotic, SF
- Re-use of animals, which should be justified legislation
- > Any plans for release or re-homing, which m

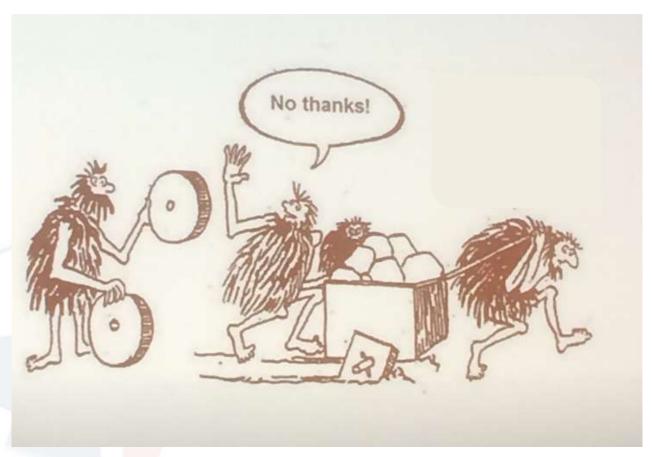
More resources

- > Examples and references r from the NC3Rs
- > Intermation on inbred strains of mice and rats []
- > Strategies to minimise genetic drift and maximise experimental reproducibility in mouse research [3]
- > Mouse Locator, UK 🗗
- > The Collaborative Cross panel of inbred mouse strains @
- > Nude mice more than what meets the eye 🗷
- > The Rat Guide 🗗
- > Rat Behavior and Biology 🗷



BUT: we must "Publish or Perish"





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Scientist: "Why change a method that has been funded and published before?"



So the path to better science also involves the funders and the ethical review bodies

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













Dyrebeskyttelsen Norge









norecopa.no/poster

Free to download, use and distribute!

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Adrian Smith, Norecopa, c/o Norwegian Veterinary Institute, P.O. Box 64, 1431 Ås, Norway adrian.smith@norecopa.no

What's the problem?

Preclinical in vivo research needs to be reproducible and translatable, while maximising the animals' welfare and replacing them with alternatives wherever possible. This can be summed up in the 3Rs of Russell & Burch:



Scientists are usually well aware of *reporting* guidelines when publishing research. These are important, but a sub-standard study, like a burnt cake, cannot be improved by a better description. Guidelines for *planning*, although not mandatory, are of great help in designing better experiments.



What can Norecopa offer?

Norecopa maintains a comprehensive database of resources for scientists, which include:

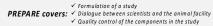


- over 9,000 searchable webpages of quality 3R resources, with filters to facilitate searching
- the PREPARE guidelines for planning animal experiments, with a checklist in over 30 languages links to recordings of webinars covering all aspects of animal research
- an International Webinars & Meetings Calendar
- a collection of over 400 guidelines for planning and conducting animal research
- an English-language newsletter with the latest developments within the 3Rs
- the NORINA database of alternatives to animal use in education and training a slide set describing the 3R concept in detail: norecopa.no/3Rs

Examples of Norecopa's resources:













WIKL.NOTECODA.NO

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Nordisk, the Norwegian Animal Protection Alliance (Deverenalliansen), the Norwegian Society for Protection of Animals (Dyrebeskyttelsen Norgel, the Research Council of Norwestes

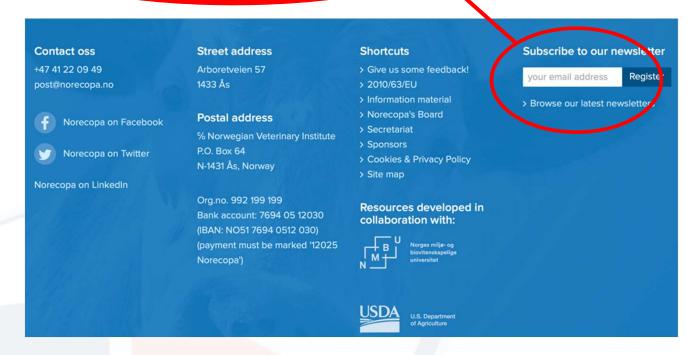
Laboratory Animals tidt, the Repost Society for the Prevention of Cruebty to Animals (SPCAL), Sonofi, the Scottish Accreditation Board, the Stinssen Foundation, the Ulwinder

Federation of Animal Welfare (UFAW) and the US Department of Agriculture (USDA).



norecopa.no/Ljubljana

English-language newsletters



Thank you for listening!