

# The University of Newcastle

## Animal Care and Ethics Committee

### Methodology Document

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<b>Document Name:</b>	Reduction, Replacement, Refinement- Implementing the 3Rs	
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<b>Document Contact:</b>	Manager, Animal Welfare and Training	

## 1. Overview

This document is intended to provide information on the expectations of the Animal Care and Ethics Committee with respect to the implementation of the 3Rs (replacement, reduction, refinement) in animal research and teaching at the University of Newcastle.

## 2. Guidelines

### 3.1 REPLACEMENT, REDUCTION, REFINEMENT (3Rs)

The UoN ACEC recognises the need for animals to be legitimately used in research and teaching at this University, however the ACEC requires that the numbers of animals used for this purpose and any adverse effects on their welfare be kept to a minimum. Methods of minimising animal numbers and adverse impacts were first clearly defined in 1959 by Russell and Birch as: **R**eplacement, **R**eduction and **R**efinement (3Rs). Effective implementation of the 3Rs will minimise the numbers of animals used in research and teaching and minimise the harm done to them without compromising scientific and teaching outcomes.

#### 3.2.1 Replacement

Replacement of animals in research and teaching refers to the substitution of insentient material or minimally sentient organisms for living animals. Researchers are obligated to keep up to date with current alternatives and to implement these wherever possible.

Methods that may be considered include:

- Critical analysis of existing data in order to determine which experiments are really necessary.

- Mathematical and Computer models in research.
- Audiovisual and physical models in teaching.
- The use of human cell preparations.
- The use of in vitro systems based on animal tissues or cells.
- Toxicogenomics- use of 'gene chips' in toxicity testing.
- Use of minimally sentient organisms (micro organisms, invertebrates, plants, embryonic or larval forms)

In preparing a proposal to use animals in research or teaching an investigator/ teacher must have fully considered whether animals need to be used at all, investigated all possible current alternatives and must justify why alternatives are not being used if they are available. When submitting an application to the ACEC, the investigator/ teacher will be asked to document the search for alternatives that has been carried out and justify why alternatives cannot be used.

The "Resources" section of this document provides links to a number of websites and publications featuring alternatives to animals in research and teaching.

### **3.2.2 Reduction**

The aim of 'reduction' is to use the minimum possible number of animals to obtain the information required, however this must not be at the expense of greater suffering to any one individual animal.

The ACEC will consider the following elements in any research proposal:

1. *Elimination of unnecessary repetition of experiments.*
2. *Statistical validity of animal numbers.* Animal numbers should neither be too few nor too many. Using too few animals to reach a valid conclusion means those animals have been wasted. Experiments must be designed to reduce the number of animals to the minimum possible through techniques such as sharing control groups between experimental groups, and reducing within group variation (see point 4.). The numbers of animals within groups and the number of experimental groups must be minimised.
3. *Sharing of animals and animal tissue.* This is an appropriate mean to reduce the numbers of animals used within an institution provided it is not associated with increased suffering in any individual animal. The use of multiple tissues from a single animal after death to achieve multiple research aims (either within or across research teams) is especially encouraged by the ACEC.
4. *Use of the appropriate species, strain and sex of animal.* The within group variation should be minimised by ensuring that animals within a group are as similar as

possible in terms of genetic strain, microbiological status, physical condition and social environment.

5. *Design of experiments so that animals act as their own controls.*

The ACEC relies on peer review of research proposals to determine whether they are statistically sound, scientifically valid and eliminate unnecessary repetition of experiments.

### **3.2.3 Refinement**

Refinement refers to the adoption of strategies to eliminate or reduce pain and distress in animals used in research and teaching.

Possible strategies include:

1. Adoption of the minimal possible survival times after the induction of painful diseases or states.
2. Monitoring of animal health status and adoption of endpoints sufficient to allow withdrawal of animals immediately after undesirable effects are evident.
3. Modification of techniques so that painful or stressful conditions are minimised eg, the minimum amount of irritant substance is injected or minimisation in the amount of food or water deprivation imposed for the minimum possible period of time.
4. Use of analgesics wherever possible.
5. Ensuring species specific behavioural requirements are satisfied through the provision of suitable housing, group housing in social species, and enriched environments.

Knowledge is rapidly expanding in this area and investigators are expected to remain abreast of current methods of refinements and implement these where possible to reduce harm to the animal used in their research protocols.

## **3.2 SUMMARY**

When applying to the ACEC to use animals for research or teaching applicants must be aware of current methods used to replace the use of animals in research, including cell culture, computer modelling, audiovisual aids and the use of less sentient organisms (micro organisms, plants, invertebrates). They must use these alternatives wherever possible and must justify to the ACEC why these alternatives are not suitable for their proposed research using animals. Applicants must use the minimum number of animals possible to achieve their research or teaching aims and should consult a statistician to ensure that only the numbers required to achieve significance are used. Applicants must be aware of current knowledge about minimising variability between animals, and design

studies in which, as far as possible, animals may act as their own controls. The maximum amount of information must be gathered from each animal through collection of multiple tissues and gathering data for more than one experiment concurrently. Applicants must also be aware of and implement currently recognised methods of reducing pain and distress in animals in their research protocols. They must have current knowledge about the species they are using and ensure that animals are housed in a manner that ensures that species specific behavioural needs are satisfied unless alternate housing is specifically approved by the ACEC.

### **3. Essential Supporting Documents**

- Animal Research Policy
- Animal Care and Ethics Committee Procedures
- Animal Care and Ethics Committee Guidelines (pending)
- ACEC Document:11. Animal Ethics methodology. (pending)

### **4. Resources.**

1. Russell, W.M.S. and. Burch, R.L. "The Principles of Humane Experimental Technique" 1959. [http://altweb.jhsph.edu/pubs/books/humane\\_exp/het-toc](http://altweb.jhsph.edu/pubs/books/humane_exp/het-toc)
2. ATLA Alternatives to Laboratory Animals. Journal published by FRAME (Fund for the Replacement Animals in Medical Experiments.) Copies available from the Animal Welfare and Training Unit.
3. ALTEX Journal- Alternatives to Laboratory Animals: <http://altweb.jhsph.edu/altex/>
4. FRAME website: <http://www.frame.org.uk/index.php>
5. Altweb: John Hopkins Centre for Alternatives to animal testing: <http://altweb.jhsph.edu/>
6. Animal Ethics Infolink website- 3Rs: <http://www.animaethics.org.au/three-rs>
7. AltTox- Non animal methods for toxicity testing: <http://alttox.org>
8. NC3Rs- National Centre for the Replacement, Refinement and Reduction of Animals in Research: <http://www.nc3rs.org.uk/>
9. ECVAM- European Centre for the Validation of Alternative Methods: [http://ecvam.jrc.it:8080/dbalm\\_prepub/](http://ecvam.jrc.it:8080/dbalm_prepub/)

10. Alt ZEBET- Centre for Documentation and Evaluation of Alternatives to Animal Experiments:

[http://www.bfr.bund.de/en/animalt\\_zebet\\_database\\_for\\_alternative\\_methods\\_to\\_animal\\_experiments-62822.html](http://www.bfr.bund.de/en/animalt_zebet_database_for_alternative_methods_to_animal_experiments-62822.html)