Notices from Research Services

ADD new STAFF
To add new staff and students to an existing protocol complete a New Co-Investigator Biomedical/Wildlife form found at https://services.anu.edu.au/research-support/ethics-integrity/animal-ethics-overview. The forms are listed as reference documents on the right hand side of the page.

Training Information

Rodent 3 Day Course—Introduction to Rodents
The APF offer a 3 day mouse and rat handling course. This covers a practical and theoretical component that is designed to help you gain confidence in handling animals and basic techniques.

Online Resources
There are a number of online resources available that complement the training you receive whilst at the ANU. A great new resource is Flair E-Learning. Currently offering: Anaesthesia Rodent Monitoring Modules Available at: http://flairelearning.com/

Focus On: Study Design & Statistics
Reduction: the emergence of efficient experimental designs By Terry Neeman
The three Rs: refinement, reduction and replacement. There has been a lot of focus on refinement and finding more humane ways to test animals, but the discussion regarding reducing the numbers of animals used is yet to follow. Why? There is an implicit in the word “reduction”, the assumption that reducing the numbers of animals will lead to underpowered studies. And if the researcher has already reduced the numbers of animals to 6 per group, how could she possibly hope to see any realistic result with fewer?

This is a naïve view. Reduction is really about efficient experimental design, that is, extracting the most information about a treatment effect with a given number of animals. Efficient experimental design is about minimising the variance of the effect estimate. Here is an illustrative example:

Researcher A is assessing the effect of a novel chemotherapy in slowing tumour growth in a mouse model. She has access to 12 mice, so with 6 mice to a cage and in each cage all animals receive either the experimental treatment or a control. She records maximum tumour diameter every day over a 4 week period, culling the animals when the tumour reaches 15 mm in diameter (Figure 1).

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She is pleased that under the experimental treatment, there is a slower tumour growth rate and higher survival. From a scientific perspective, she is unable to truly say whether the differences in outcome were due to the treatment received or a cage effect. The two effects are completely confounded. Statistically speaking, she has no independent replication. Any variation between mice within a cage is not relevant to treatment differences. From either perspective, the experiment contains NO useful information about the efficacy of the novel treatment.

The following week, Researcher A replicates the experiment with 12 more mice, using the same design and protocol. She is heartened by her observation that this set of outcomes showed a similar pattern to the first set of outcomes, and more than a little annoyed when the statistician informs her that because “cage” is the experimental unit, and the main comparison is between cages and not between mice, she has insufficient statistical power to see a statistically significant difference between the groups. It appears that more mice will be needed to confirm the results.

In a parallel universe, Researcher B is interested in exactly the same research question. He decides prospectively to use 24 mice based upon a survey of the literature and a sample size calculation. He understands that comparing treatments under homogeneous conditions can give more precise estimates of a treatment effect, so he uses 4 mice per cage, randomising 2 mice in each cage to the experimental treatment and 2 mice to the control treatment. He then has 6 cages where he can compare the outcomes between the two treatments. Unlike Researcher A, the treatment comparison is assessed within cages, rather than between cages. When there are large differences between cages, this design will be much more informative about treatment effects compared with Researcher A’s design. Even with only 12 mice (3 cages), Researcher B can get an unbiased measure of a treatment effect and its standard error (Figure 2).

Imagine also a worst-case scenario when something goes awry with one cage of mice. For Researcher A, losing one cage of mice means losing ALL information about one of the experimental conditions. In contrast, Researcher B still has 5 cages of data for measuring the effect of treatment.

The moral of the story is that experimental design matters. A well-designed experiment can provide unbiased and more precise estimates of a treatment effect compared with a poorly conceived experiment. Information content relative to animal numbers can be maximised.

Need help in experimental design? Speak to SCU
ANU Statistical Consulting Unit
https://services.anu.edu.au/business-units/statistical-consulting-unit

The ANU statistical consulting unit is a group of PhD statisticians who can help ANU researchers develop efficient experimental designs for their animal research projects. They are available for one-to-one statistical consulting on design and analysis aspects of your study. This service is available at no charge to ANU researchers, PhD students and honours students.

PIRATE CORNER
RESOURCES FOR THE 3 “RRRS!”
REPLACEMENT, REDUCTION, REFINEMENT

Below are a few handy resources when considering the 3 Rs
Institute of Laboratory Animal Resources—resources that promote excellence and responsible use of animals in research.

http://dels.nas.edu/ilar

Contact the APF: administration.heb@anu.edu.au and they will point you in the right direction