



The Design and Statistical Analysis of Animal Experiments

By *Dr Simon T. Bate, Dr Robin A. Clark*

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Written for animal researchers, this book provides a comprehensive guide to the design and statistical analysis of animal experiments. It has long been recognised that the proper implementation of these techniques helps reduce the number of animals needed. By using real-life examples to make them more accessible, this book explains the statistical tools employed by practitioners. A wide range of design types are considered, including block, factorial, nested, cross-over, dose-escalation and repeated measures and techniques are introduced to analyse the experimental data generated. Each analysis technique is described in non-mathematical terms, helping readers without a statistical background to understand key techniques such as t-tests, ANOVA, repeated measures, analysis of covariance, multiple comparison tests, non-parametric and survival analysis. This is also the first text to describe technical aspects of InVivoStat, a powerful open-source software package developed by the authors to enable animal researchers to analyse their data and obtain informative results.

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Editorial Review

Review

"At last, a readable statistics book focusing solely on preclinical experimental designs, data and its analysis that should form part of an in-vivo scientist's personal library. The author's unique insight into the statistical needs of preclinical scientists has allowed them to compile a non-technical guide that can facilitate sound experimental design, meaningful data analysis and appropriate scientific conclusions. I would also encourage all readers to download and explore "InVivoStat", a powerful software package that both my group and I use on a daily basis."

Darrel J. Pemberton, Janssen Research and Development

"This book provides an indispensable reference for any in-vivo scientist. It addresses common pitfalls in animal experiments and provides tangible advice to address sources of bias, thus increasing the robustness of the data. ... The text links experimental design and statistical analysis in a practical way, easily accessible without any prior statistical knowledge. The statistical concepts are described in plain English, avoiding overuse of mathematical formulas and illustrated with numerous examples relevant to biomedical scientists. ... This book will help scientists improve the design of animal experiments and give them the confidence to use more complex designs, enabling more efficient use of animals and reducing the number of experimental animals needed overall."

Nathalie Percie du Sert, National Centre for the Replacement, Refinement and Reduction of Animals in Research

"This book will transform the way biomedical scientists plan their work and interpret their results. Although the subject matter covers complex points, it is easy to read and packed with relevant examples. There are two particularly striking features. First, at no point do the authors resort to mathematical equations as a substitute for explaining the concepts. Secondly, they explain why the choice of experimental design is so important, why the design affects the statistical analysis and how to ensure the choice of the most appropriate statistical test. The final section describes how to use InVivoStat (a software package, assembled by the authors), which enables researchers to put into practice all the points covered in this book. This is an invaluable combination of resources that should be within easy reach of anyone carrying out experiments in the biomedical sciences, especially if their work involves using live animals."

Clare Stanford, University College London

About the Author

Simon T. Bate is a Principal Statistician at GlaxoSmithKline, supporting pre-clinical research. He has spent over 12 years supporting the design and statistical analysis of animal experiments, including drug discovery research, toxicology studies and safety assessment. He presents many statistics courses around Europe, including the statistics module of the British Association for Psychopharmacology's Pre-Clinical Certificate.

Robin A. Clark is a Senior Analyst Programmer at Huntingdon Life Sciences, Alconbury. Originally qualified as a marine ecologist, he is now a software architect producing data collection and statistical applications for the pharmaceutical industry. Robin produced the Windows™ GUI and designed the system architecture for InVivoStat.

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