

### **Are We Pushing Animals to Their Biological Limits? Welfare and Ethical Implications**

Edited by T Grandin and M Whiting (2018). Published by CABI, Nosworthy Way, Wallingford, Oxon OX10 8DE, UK. 248 pages Paperback (ISBN: 978-78639-054-7). Price £45.00.

The central aim of this multi-authored book is to examine the science and ethics of management practices, conventional animal breeding, new techniques for genetic modification and pharmaceuticals used to enhance the performance of farm animals, create new strains of mice and rats for use in scientific procedures and change the appearance of dogs and cats.

The title, *Are We Pushing Animals to Their Biological Limits?* is rather misleading since it only really applies to the chapters dealing with the food animals. A more accurate, though less immediately appealing, title would be: *A Scientific Examination of the Manipulation of Animals for the Benefit of Humans, Whether On-Farm, in the Laboratory or the Home and an Ethical Examination of the Balance between Potential Harms to the Animals and Benefits to Ourselves.*

The topics considered in the individual chapters can be grouped into two categories. The first reviews the impact on animal welfare of management and techniques for 'enhancement' of the food animals, (including fish). This category, which clearly addresses the title *Are We Pushing Animals to Their Limits?* occupies four chapters, on poultry, dairy cattle, fish and working horses.

The greater part of the book is primarily concerned with the science and ethics of the genetic modification of animals, whether for food, science, sport or companionship. The question here is not whether we are working them too hard but whether the benefits for us can be justified in terms of the potential harms to them. If we are to apply this question to specific cases we owe it to the animals to acquire a reasonable understanding of the nature of these scientific procedures and their effects (if any) on animal welfare.

The first chapter in the 'Are we pushing animals too hard?' section has nothing at all to do with science. Upjohn and Wells describe and illustrate in painful detail the abuse of working horses and donkeys but follow this with constructive and practical approaches to improving their welfare. They make it clear that the problem is not primarily a consequence of poverty, but of ignorance and lack of compassion. These things can be, and in many cases have been, resolved through education.

The chapters on poultry and dairy cattle carefully review the welfare consequences of the drive for ever-increased productivity through genetic selection, nutrition and management, measured in terms of problems, such as lameness, susceptibility to disease and disturbance of normal behaviour. There is little in these chapters that has not been published elsewhere but they are well written and serve as a good introduction to the evidence relating to some very important issues.

The chapter on aquaculture, or fish farming, by Huntingford, Turnbull and Kadri entitled 'Methods to increase fish production: welfare and sustainability implications' is one that I found particularly informative and fascinating, although I must concede that this reflects, in part, my lack of prior knowledge in this area. However, the fish story is especially relevant in the context of this book because many species in the intensive environment of a fish farm have been particularly receptive to manipulation of the processes of growth and reproduction. These include the acceleration of growth rates through selective breeding or transgenesis to increase production of growth hormone. Successful manipulations of the reproductive system include the creation of monosex and triploid populations, both of which can result in faster growth and bigger fish through delayed maturity. The welfare implications of these practices are given careful consideration. The authors do, however, omit to make the rather obvious point that the manipulations designed to produce faster growing, bigger animals for slaughter are inherently less likely to create welfare problems for fish that live in a weightless environment than for mammals (eg pigs) and birds (eg broiler chickens) that need the strength to support their own weight during growth and development.

Osborne, Morton and Prins address welfare concerns in genetically modified laboratory mice and rats. They describe the techniques available for genetic modification, including virus-mediated gene transfer, knock-out and knock-in of specific genes and gene editing. Harms are considered both in terms of the processes involved in establishing the GM strain and the possibly deleterious consequences for the physiology and behaviour of the established phenotype. According to a UK Home Office report, 15% of procedures involved moderate suffering, the remaining 85% were rated as mild. All procedures for the production of GM mice are covered by the Animals (Scientific Procedures) Act that categorises them according to the 'risk of suffering'. So defined, all established populations of GM within the mild category are at risk, but some may not suffer at all. This chapter explores, in some depth, societal and ethical concerns (not necessarily the same thing). It will, I believe, be especially useful to those charged with difficult decisions with regard to the just implementation of the harm:benefit analysis in specific situations.

Two chapters consider the things we do to our pets, largely or entirely for our own satisfaction. These include the selective breeding, gene editing and cloning of dogs and cats. Some practices, eg the creation of extremely brachycephalic dogs like the bulldog and especially the pug for 'cosmetic' reasons are obviously harmful. I find the obsessive desire of dog (and increasingly cat) breeders to mess around with the natural beauty of these species to be profoundly depressing. Some years ago, I was scanning an expensive 'coffee-table' book on cat breeds. Finally, I came across a picture I liked, namely the British Blue. This was described in the caption as 'almost as beautiful as a moggie'. I rest my case.

The key word that defines this book, one considered directly by most authors, is ‘enhancement.’ Since the procedures used to achieve enhancement are always defined and applied by humans, it follows that the nature of enhancement is nearly always designed for our benefit, whether defined by commerce (farm animals) human health (lab animals) or cosmetic appearance (designer dogs and cats). The question posed by May and others is ‘What has been the effect of the enhancement designed, at least primarily, for our benefit on the animal? Has it been beneficial?’ There are some good examples of this, especially our increasing success in the use of genetic techniques to confer resistance to specific diseases. One can also include expensive surgical procedures designed to restore quality of life in crippled dogs. Has it been harmful? Increased prevalence of lameness in dairy cows and broiler chickens, increased prevalence of respiratory disorders in brachycephalic dogs are conspicuous examples of this. Has the effect on physiology and behaviour been negligible? (so far as we can see). On ethical grounds I would argue that these procedures are only of concern if harmful to the animal. However, I write as one whose professional concern is restricted to the welfare of the animals. Whether or not the decision to spend several thousand dollars to clone a favourite cat (or to cash in to the tune of several thousand dollars to carry out the procedure for a client) is beyond my brief. The more difficult problems arise when it is necessary to make borderline decisions regarding the harm:benefit analysis (harms to the animals vs benefits to society or individuals). These are critical issues in public and private ethics that call for informed decisions on a case-by-case basis. There is much in this book that can lead us to these informed decisions.

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### **Understanding Animal Behaviour**

R Putman (2018). Published by Whittles Publishing, Dunbeath, Caithness KW6 6EG, UK. 192 pages Paperback (ISBN: 978-1-84995-330-6). Price £18.99/US\$24.95.

Professor Rory Putman’s book *Understanding Animal Behaviour* is aimed as an accessible introduction to the fascinating world of animal behaviour for non-academics. As an emeritus chair in Behavioural and Environmental Biology (Manchester Metropolitan University) and visiting Professor at University of Glasgow and Utrecht he is well qualified for this endeavour. His passion and enthusiasm for the subject comes across from the outset, together with his ability to relate topics to the reader. Given his experience as an educator, it is no surprise to learn that the material for this book has evolved from his lectures and teaching on the topic. With non-academics as the target audience, I therefore aimed to read it from the perspective of an interested lay person. This was an enjoyable task. Reviewing the book over a Christmas holiday, I found it transported me back to my initial introduction to the study of animal

behaviour as a student who had discovered this captivating subject. It was great to revisit classic examples conveyed in a way that was easy to understand. Another highlight that further brings the book to life are the beautiful illustrations (over 80 drawings) produced by Rory’s wife, Catherine Putman, a wildlife artist.

The book is split into two broad parts, the first considering the ‘how’ of animal behaviour in terms of mechanisms, while the second considers the ‘why’ in terms of adaptive significance. As ethologists well-schooled in Tinbergen’s four questions the structure used makes good sense. There is a logical flow with part 1 containing manageable, well-written, concise chapters on what is meant by animal behaviour, behavioural reflexes, linking responses to co-ordinate more complex behaviour, receiving stimuli and analysing the incoming information, motivation, ‘unpredictable’ behaviour, learning, and behaviour genetics. Part 2 discusses the adaptiveness of behaviour and optimising returns, social organisation and social behaviour, reproductive behaviour and strategies, mate behaviour and mate choice, co-operative breeding and altruism, territoriality and aggression, and animal navigation. Reflecting on this section, I could see how the animal navigation chapter could also fit nicely into the ‘how’ of proximate mechanisms, as this occupies a lot of the chapter contents.

The book culminates in an excellent question and answer chapter, ‘If we could talk to the animals.’ Reading these questions made me smile, as I routinely receive similar ones during lectures. The author provides thoughtful comprehensive answers, including to some very difficult and challenged topics (eg animal emotion) to which there are no clear and succinct answers! Adding to his thoughts on animal emotions, I would also have introduced the reader to cognitive bias testing and its growing influence in both fundamental and applied ethology.

An additional asset of this book, and an important one to learn when studying behaviour, is that there is typically no single explanation for the occurrence of a particular behaviour. This can be challenging for students more familiar with other scientific disciplines, and the structure and examples chosen throughout this book nicely illustrate the multiple layers of explanation. Importantly, although aimed at educating an interested lay audience, the author does a very good job of conveying how behaviour is studied using a rigorous scientific approach. By outlining examples with clear hypotheses, manipulated explanatory variables and measured behavioural response variables, the author clearly dispels perceptions that ethology is about simply observing animal behaviour and making speculative inferences. By providing readers with a firm foundation for understanding animal behaviour, the book also has important implications for applied ethology and welfare. For example, the chapters on motivation and ‘unpredictable’ behaviours, including redirected and displacement activities, are excellent, introducing ideas including motivational conflict and frustration. This sets the scene for readers to understand how environmental conditions and contexts could result in the development of behaviour (eg stereotypy) indicative of a welfare problem.