emphasis on the United Kingdom may occasionally tax the patience of non-British readers. The multitude of practical wisdom and insights would make this a valuable book for animal welfare campaigners and concerned citizens, but they would need to tolerate occasional passages that assume an understanding of phenotypic correlations, megajoules of heat production and other technical matters. Perhaps the exact target audience is rather like the author himself: scientifically trained British people involved in the practical improvement of animal welfare. Nonetheless, almost anyone involved in animal welfare policy and reform would profit from reading it.

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Physiology and Behaviour of Animal Suffering

NG Gregory (2004). Published by Blackwell Publishing Ltd, 9600 Garsington Road, Oxford OX4 2DQ, UK. 280 pp Paperback (ISBN 0 632 06468 4). Price £39.99.

Animal suffering is, self-evidently, a cause of concern to compassionate people and the notion of suffering becomes especially abhorrent when the suffering is seen to arise as a consequence of human acts and omissions regarding the animals 'in our care'. We have a legal obligation not to cause 'unnecessary suffering', although a rather fuzzy understanding of what should, or should not, be categorised as necessary. We have a larger moral responsibility to minimise animal suffering in any circumstances, irrespective of our own perceived need to use an animal, for example, for food or for a scientific procedure. Those whose business it is to care for animals, whether as farmers, animal technicians or veterinary surgeons, have a professional responsibility to acquire the competence necessary to recognise the many and various things that may cause an animal to suffer and the physiological and behavioural signs that indicate that an animal is in distress.

Neville Gregory's new book *Physiology and Behaviour of Animal Suffering* directly addresses this need for professional competence in identifying the causes and signs of suffering in animals. It opens with a simple definition of suffering as "an unpleasant state of mind that disrupts the quality of life", then poses (but does not attempt to answer) the much more difficult question, namely "What are the criteria that determine whether a particular species has the capacity to suffer?" He makes the statement that "cognition is presumably a prerequisite for suffering", an assumption that owes more to Descartes than Bentham, then speculates at what stage in evolution did animals acquire the ability to learn from experience, concluding that animals as primitive as the earthworm can learn, if only subconsciously.

Chapters 2–4 deal with the nature of physiological stress and distressing emotional states, such as fear, anxiety, deprivation and depression. Here, and throughout the book, the description of each category of stressful situations or responses includes a comprehensive list of almost all possible things that may be included within that category. For example, the section on 'Restraint Stress' (pp 19-21) lists 16 methods ranging from the obvious (eg yoking) to the exotic (eg birdlime traps and glue boards). The section 'Ways in which Animals Express Pain' (pp 99-102) begins with a list of 13 bullet points describing over 40 possible behavioural and physiological signs that may be associated with the sensation of, and emotional response to, pain. These lists are useful both as an aid to diagnosis for the veterinarian (etc) seeking evidence of suffering and for the inspector on the look-out for possible causes of suffering, either in the context of a possible prosecution, or in the course of a routine welfare inspection of a farm, laboratory or other commercial establishment.

The majority of the book (about 80%) deals with specific, potential causes of stress and suffering: discomfort, exercise, heat and cold, hunger and thirst, trauma and pain, sickness and disease and, finally, dying. This is a big list, and inevitably the treatment of physiological changes associated with these conditions tends to be rather slight. In the chapter 'Sickness and Disease', for example, inflammation, cytokines, cancer, stress and immune function are covered in four pages. The chapter on pain is good. The novel element and strength of Gregory's approach to these subjects is his focus on the consequences of actions that we deem 'necessary', for example, mutilations such as castration and tail docking, the slaughter of farm animals, the shooting of wild animals. His comprehensive coverage of the ways in which our actions may cause pain, suffering, distress or lasting harm provides an authoritative source from which to form judgements as to the acceptability or otherwise of certain practices and address the general principle of minimising suffering.

So far, so good. The author's definition of suffering simply as "an unpleasant state of mind" is sufficient within the context of the Animal (Scientific Procedures) Act (1986) and his subsequent comprehensive lists identify those things *likely* to cause 'pain, suffering, distress or lasting harm'. What it does not address, however, is the nature of suffering itself; ie how a particular individual member of a sentient species may feel when faced by one or more of the insults that Gregory lists, nor what its motivation may be to action designed to deal with the insult. There is no mention of Marian Dawkins' pioneering approach to the investigation of animal suffering and animals' motivation to avoid disruption of the quality of their life. I am sure this omission is deliberate but it should not go unchallenged because it leaves too many loose ends.

The fundamental problem with the definition "an unpleasant state of mind" is that it leaves the word 'mind' undefined and so ignores the extent to which the capacity of a sentient animal to suffer is determined by its innate emotional and cognitive capacities and the way in which they may be modified by experience. In Chapter 2, for example, fear and anxiety are described separately as sources of suffering. There is no discussion of the extent to which fear, a natural acute response to an acute threat, may progress either to

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habituation, if the animal learns to cope, or to chronic anxiety or depression, if it learns that it is unable to cope.

The big practical problem arising from the decision not to consider the impact of genotype and experience on how an animal feels is that it fails to make the distinction between stress and suffering. While we all have an obligation to minimise suffering, we cannot and should not seek to protect animals from all stress. The welfare of an animal is determined by its success or otherwise in coping with the threats to its quality of life. An animal that learns to cope with a specific stress is less likely to suffer. Suffering (by my definition) occurs when an animal discovers that it cannot cope (or has difficulty in coping) with the stresses of life because the stresses are too severe, complex or prolonged, or because it is constrained from carrying out the actions it is motivated to make to meet its physiological and behavioural needs.

I would suggest that a title change to '*Physiology and Behaviour of Animals under Stress*' would be more appropriate. Those seeking guidance concerning more philosophical questions such as "What is suffering?" "How can we help animals to cope with stress?" and "When does suffering become unacceptable?" will have to look elsewhere. Nevertheless, this is a very good book, packed with evidence that may be used to identify possible causes of stress and clinical signs associated with the consequences of stress.

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What Animals Want: Expertise and Advocacy in Laboratory Animal Welfare Policy

L Carbone (2004). Published by Oxford University Press Inc, 198 Madison Avenue, New York 10016, USA. 291 pp Hardback (ISBN 0 19 516196 3). Price £20.00.

This book is a scholarly examination of the development and impact of laboratory animal welfare legislation in the USA. It is the result of extensive research by the author, but this is no dry, academic treatment: with his decades of experience as a laboratory animal veterinarian, Larry Carbone knows at first hand what he's talking about. This interesting and readable book contains a balanced presentation of the range of views and arguments presented by the various groups who have an interest in the way in which animals are used in scientific research, and the ways in which those views and arguments have been used to shape US laboratory animal welfare legislation and its application over the past 50 years. As the author shows, these interests are often personal or political, and are not necessarily in the best interests of millions of animals used in scientific research each year.

In Chapter 1, which takes the form of a useful introduction to the rest of the book, the author outlines his approach to his subject — an approach that blends history, philosophy, science and sociology. He also declares his purpose in writing the book, hoping "to argue convincingly: that science is but one of several legitimate ways of knowing about animals; that veterinarians can and should be advocates for animals; that political, social, professional, and philosophical factors shape this advocacy potential and must be reckoned with; that these same human factors profoundly shape what we think we know about animals and what matters to them; and that animal welfare is bigger and more complicated than simply keeping animals fed, free of infections, free of pain, and free of pathology — something best described with words like 'fun', 'happy', 'fulfilled', and 'thriving'".

Thus having orientated the reader, Chapter 2 describes — for those who are unfamiliar with the animal research environment — what an animal experiment is, what kinds of animals are found in laboratories, what people are found there, and under what regulations and supervision they work. Chapter 3 provides a brief tour of some of some of the major philosophical treatments of animal ethics, and the knowledge claims brought to these arguments. Chapter 4 discusses the significance of animal species in laboratory animal policy debates, in which the welfare of certain species has been much more strongly advocated than that of others. Chapter 5 describes the shift in US legislation from design standards (such as cage sizes) to performance standards, the latter offering flexibility to research establishments but requiring better knowledge of what animals actually want and need.

The development of the role of the laboratory animal veterinarian, initially responsible for the 'care' of laboratory animals but not their 'use', is presented in Chapter 6, and sets the scene for the author's explanation, in Chapter 7, of the concept of pain and its importance in eroding the division between the responsibilities for animal welfare of the scientists and of the veterinarians. When the veterinarian was given responsibility for minimising pain during experimental procedures, the care/use divide that had separated the jurisdictions of veterinarian and scientist became blurred. The author asserts that "pain has dominated animal welfare policy debate over the past three decades, overshadowing other forms of poor welfare (psychological distress, boredom, anxiety, unhappiness) and even casting killing and death into the background as minor concerns", but also explains how "scientists and veterinarians have shifted their concept of pain over the years, from the purely physical nociceptive model…to something that recognises the essentially subjective, experiential, and emotional aspects of animal pain", and that pain "opened the door to serious discussion on animals' inner experiences".

Chapter 8 introduces the animal protectionists to the battle between veterinarians and scientists, to decide who should be the animals' advocates, and reviews this contest of moral authority. Chapter 9 is devoted to a case study of rodent killing by decapitation in a hand-operated guillotine — "a controversy about pain". Following a detailed examination of the scientific evidence, Carbone reminds us that "when strong political and policy implications ride on