by the same directive. The information is useful in the US context and when transporting primates.

Chapter 3 concentrates on good practices in the transport of research animals with sections looking at stress during transportation, comparing and contrasting the effects of stress in rodents, primates and livestock, noting that the only good scientific evidence is based on research conducted with livestock. Basic physiological responses for all mammals in response to transport conditions are largely governed by the size of the animal and its thermal environment, quoting data on thermoneutral zones for a wide range of species. Livestock possess a wide thermoneutral zone compared to the more common research animals, which correspondingly affects their comfort zones and lower and upper critical temperatures. However, despite the scientific evidence, professional judgement is ultimately required to determine the safe ambient temperatures to which animals should be exposed during transportation. Such modifying factors include: humidity, stocking densities, the container characteristics, hair coat, prior adaptation, physiological status, food and water consumption, journey duration and potential temperature extremes. There are two tables in this chapter focusing on safe ambient temperature ranges for certain species. When animals cannot be transported in environmentally controlled vehicles then more frequent inspection of the animals is required for detection of signs of thermogenesis or heat loss. Useful sections then follow on space allocation, provision of food and water, social interaction, handling and preconditioning. The final sections on monitoring during transportation, emergency procedures and personnel training are too generalised to be useful.

The next chapter concentrates on biosecurity as defined by policies and measures taken to minimise the risk of introducing infectious agents into research populations (both animal and human) as zoonoses. Much of the data is available from other standard texts on zoonoses and CDC requirements for pathogens and toxins. However slightly out of context with this chapter are two excellent tables, adapted from IATA, that describe the characteristics of a good shipper and some recommendations for shipment of research animals between institutions. If all those planning journeys consulted these tables beforehand and combined this with the experience of the shipper much would be done to maximise welfare during transport. The remainder of the chapter discusses diseases of research animals and how to monitor their presence; information that can be obtained from other laboratory animal manuals.

Chapter 5 describes recommendations that are applicable to the US only, except for recommendation 5 which focuses on the co-ordination of transport between responsible individuals at the sending as well as the receiving establishments.

Appendix A summarises the regulations that pertain to the US Animal Welfare Act, again useful information but a pity other regulations had not been quoted to make this publication more internationally acceptable. Here, any instructions relating to rodents were absent reflecting the fact that this legislation does not cover research rats and mice. Appendix B discusses patterns of ground transportation of research animals in the USA, interesting data but not particularly relevant to the welfare of laboratory animals during transportation.

In summary, this is reference material that brings together the concepts behind factors that contribute to successful lab animal transportation and journey planning. It has many useful tables for reference, especially on the basic physiology of species and how they potentially interplay with transport conditions. The tables that relate to journey planning are well thought through; however the guidelines purport to be international by the brief inclusions of some EU regulations on animal transport.

This publication and the LASA guidelines (Lab Animals 2005) complement each other by the science behind transportation and practical recommendation respectively. It has a comprehensive reference section bringing together, in one publication, much of the useful reference material that relates to animals and their conditions of transportation.

This is a useful reference book for anyone involved in the shipping of animals whether for research purposes or more widely.

*Jeremy J Swallow*
*Sandwich, Kent, United Kingdom*

## *Animal Bioethics: Principles and Teaching Methods*

Edited by M Marie, S Edwards, G Gandini, M Reiss, and E von Borell (2005). Published by Wageningen Academic Publshers, PO Box 220, NL-6700 AE Wageningen, The Netherlands. 360 pp Paperback (ISBN 9076998582). Price €49, US$66.

This collection of 18 essays, written by 32 authors from 11 European countries, grew out of a collaborative project on the teaching of animal bioethics sponsored by the European Community Socrates Thematic Network for Agriculture, Forestry, Aquaculture and the Environment. The book is intended to facilitate the adoption of courses in animal bioethics in universities and professional schools. The first 5 chapters address fundamental philosophical, religious, and cultural issues relating to animal bioethics. Some of these chapters consider animal welfare explicitly; all have implications for animal welfare policy. The next 3 chapters consider matters of direct, practical relevance to the promotion of farm animal welfare. The remainder of the volume deals with the teaching of animal ethics and animal welfare to science, agriculture, and veterinary students. Most of the chapters in this last part of the book either focus directly on the teaching of animal welfare, or employ cases or issues relating to animal welfare to illustrate methods of teaching animal bioethics.

As the editors note, schools are faced, on the one hand, with a steadily increasing demand for courses in animal bioethics and animal welfare, and, on the other, with a paucity of published literature about how such courses can be taught.

There is still relatively little communication among current and prospective instructors. Moreover, uncertainty about how to teach these subjects is exacerbated by the fact that, as is noted in several of the book's early philosophical chapters, all the leading ethical theories relating to animals offered by classical or contemporary philosophers have shortcomings. Since the primary motivation for concern about animal welfare is ethical, weaknesses in general approaches to animal bioethics can result in ethically flawed approaches to animal welfare.

With one notable exception, the chapters in the first part of the book are unlikely to satisfy readers with philosophical training and do not provide a suitable introduction to animal bioethics to readers who are new to the subject. Most of these chapters do not do justice to the subtlety and complexity of the issues they consider. Some offer quick and superficial answers to questions as old as philosophy itself. For example, an essay by Monica Libell titled 'A mirror of myself? Monist and dualist views of animals' divides all major ethical theories relating to animals into two categories: 'dualistic' views, which assert that "humans are unique and decidedly different from animals" and 'monistic' positions, according to which humans and animals are "essentially the same, metaphysically and/or physiologically" (p 19). However, a central question in animal ethics concerns the ethical relevance of undeniable similarities and differences between humans and animals. Libell's contention that theories in animal ethics are either 'dualist' or 'monist' in these senses leads to imprecise and mistaken characterisations of some of these theories. For example, she classifies Peter Singer as a 'monist' because he thinks that merely being members of the human species does not entitle us to better treatment than animals. However, Singer also explicitly rejects the general proposition that humans and animals are the same. He states repeatedly in his writings that there are significant differences between the mental capacities of many humans and of many animals, and that, although humans and animals capable feeling pain are entitled to equal consideration, because of these differences, a typical human will often be entitled to better treatment than a typical animal. Vincent Pompe does a nice job presenting the wide array of competing approaches to animal ethics in a chapter entitled 'The animal issue: diversity in values and thoughts'. However, his suggested solution to fundamental disagreements among these approaches is that "in a pluralistic world the task of the philosopher or ethicist is not to produce justifications but to elaborate and guide the process of consensus finding" (p 94). Philosophy or ethics without justifications is not philosophy or ethics at all, it is not clear how philosophers would guide consensus without justifications, and general consensus is consistent with the most atrocious treatment of animals. Henk Verhoog's chapter on 'Animal integrity' is a thoughtful and challenging discussion that raises questions about all of the current leading definitions of animal welfare. He argues that allowing farm animals to cope with the conditions in which they are kept, or minimising their experiences of negative feelings, or even engineering their natures so that they would not mind conditions that would otherwise feel unpleasant, fails to capture a principle that many people find attractive: a varied, complex, self-directed life is as good for many animals as it is for humans, even if such a life sometimes involves productive inefficiency, stress, or discomfort. Verhoog also argues that merely by using an animal for food or as a research tool one tends to threaten its integrity by perceiving it as an instrumentality, as something other than a being with a potentially varied life of its own. Verhoog does not oppose all use of animals, but maintains that potential loss of integrity must be included as one factor to be considered in determining whether a given way of treating animals is ethically acceptable. It is not clear that the concept of 'integrity' captures all the elements of the idea that Verhoog develops. The idea seems to involve a range of certain capabilities and not just, as the term 'integrity' seems to imply, integration or smooth functioning of an animal's existing capabilities. If Verhoog is right (and I believe he is on to something very important), we may sometimes have an ethical obligation to provide farm and research animals environments that are not completely conducive to their 'welfare' – to allow them to be more of what they can be. This idea and its potential implications are worth further work by animal ethicists.

The second part of the book begins with an informative essay by Xavier Boivin and Pierre Le Neindre entitled 'The stockperson as a social partner to the animal? A stake for animal welfare'. The authors review and call for more research on positive and negative welfare effects of various practices by stockpersons. A chapter by animal advocate, Anne Vonesch on the efforts of consumer associations in Alsace to improve farm animal welfare, illustrates how consumers can play a role in improving the lives of farm animals, and illustrates the need for creativity and perseverance. Tadeusz Kuczynski and Stefan Mann discuss potential impediments to improving farm animal welfare from World Trade Organisation policies in a chapter on 'Trade regulations, market requirements and social pressures effects on introducing animal friendly livestock systems'. Using tools of economic analysis, they explore several methods of promoting farm animal welfare, including government subsidies for welfare-friendly husbandry systems.

The breadth of this portion of the book is illustrated by a partial list of chapter titles: 'Teaching animal bioethics: pedagogic objectives'; 'Teaching professional ethics: more than moral cognition alone'; 'Teaching animal welfare to veterinary students'; 'Teaching ethics to agricultural students: experiences from Denmark'; 'An introduction to Problem-Based Learning and its application to an animal bioethics curriculum'; 'The construction and application of cases in bioethics instruction' and 'The use of the reflective equilibrium method of moral reasoning in teaching animal and veterinary ethics'. The discussions in this part of the volume differ considerably regarding the kinds of



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approaches they endorse. For example, the authors who attempt to categorise general ethical attitudes employ different classification schemes with different terminology. There is apparent disagreement among some of the authors about whether students should play the predominant role in raising questions and articulating answers, or whether faculty should play the major role, and if so what kind of role. The essays also differ, sometimes markedly, regarding the extent to which students should be exposed to primary philosophical sources in animal bioethics. I have my own criticisms of some of the concepts and teaching methodologies described in these chapters, and other readers will doubtlessly have their own. Moreover, those of us who teach bioethics or animal welfare know that the kinds of courses we can offer and the issues we can cover sometimes depend highly on the existing general structure of our curricula, and on what we are allowed to do by our faculties and students. (For example, although I agree with several of the authors that considering ethics and welfare cases ideally should be accompanied by having students study philosophers like Descartes, Regan, and Singer, I do not have enough time to do this in my courses in veterinary ethics. Nor am I confident that many of my veterinary students would tolerate more than the superficial treatment of animal ethics that I have the time to give them). If one views these chapters not as presenting the final word on how to teach animal bioethics or animal welfare – but as contributions to a hopefully growing process of collegial discussions among a variety of teachers – one can gain a great deal from this portion of the book. Although I have taught animal ethics to veterinary students and undergraduates for well over 20 years, I discovered in these chapters many new possible teaching methods that I will now consider incorporating into my courses. This is the highest compliment an instructor can offer a book on the subject of teaching courses in his or her field.

An important feature of the book is that it is directed intentionally at issues relating to animal bioethics and animal welfare in Europe. European cultural values, laws, husbandry practices, and educational institutions form the background for all of the chapters. This means that some of the discussions may not be easily applied in other lands. For example, the authors of the chapter on stockpersons concede that large farms in the United States have too many animals to allow for some of the techniques discussed in their chapter. And some of the suggestions for governmental promotion of animal welfare may (at least at present) fall on deaf ears in the US and other countries in which legal regulation of farm animal welfare is minimal. However, its European emphasis is not a weakness of the book by any means. Indeed, I strongly urge instructors of courses in animal bioethics and animal welfare in Canada, the United States, and other countries to read the volume to learn more about developments in teaching these subjects in European universities.

In conclusion, this book is well worth the attention of educators and scientists with a serious interest in the teaching of animal bioethics or animal welfare.

*Jerrold Tannenbaum*
*School of Veterinary Medicine and School of Law*
*University of California at Davis, USA*

## *Cognitive Science: An introduction to Mind and Brain*

Edited by D Kolak, W Hirstein, P Mandik and J Waskan (2006). Published by Routledge, Abingdon, Oxon, OX14 4RN, UK. 233 pp Hardback (ISBN 9780415221009). Price £18.99.

Sentience is the fundamental aspect of animal welfare. As such, it is of merit for the animal welfarist to make acquaintance with issues of the mind and brain, of consciousness and cognition, and the title of this book tempts to offer this.

*Cognitive Science* is a human-oriented text which undertakes to examine "the various forms of cognitive activity that make human beings stand out so starkly against the backdrop of other biological entities". Covering, however, such areas as 'perception' and 'action and emotion', it is here reviewed for its possible relevance to non-human animals and their welfare. It is authored by four professors of philosophy and neuroscience from institutions in the USA. The present reviewer has taken a basic course in consciousness and cognition as part of postgraduate studies in animal welfare, so would likely be amongst those who would benefit from an introductory text on the subject. A commendation on the book's cover claims that it is "easy to follow" and will appeal to "undergraduates and experts alike".

The book begins by introducing the new discipline of cognitive science that has emerged in recent years, and celebrates its value as a collaborative, interdisciplinary field of endeavour; an approach that will be familiar to those in the animal welfare field. Encompassing such areas as cognitive neuroscience, artificial intelligence, linguistics, philosophy, cognitive neuropsychology, cognitive psychology and anthropology, the new science is hailed for having generated understanding that has "toppled traditional disciplinary paradigms and taken the academic community by storm". In the introduction, neuroscience receives special attention as cognitive science's "driving force", and the representational theory of mind is identified by the authors as the theme behind the arrangement of the chapters.

In chapter 1, 'Beginning concepts', the origins of cognitive science are considered, and short historical accounts provided therein of philosophy, neuroanatomy and physiology, experimental psychology, linguistics and artificial intelligence. The representational theory of mind is introduced and some theories of mental representation are described. The chapter is not always easy to understand, and fails in places to maintain the tone and level of detail of an introductory text.

Chapter 2, 'Windows on the brain and mind', examines some of the methods available to study the brain and mind, including neuroanatomy and neurophysiology, cognitive psychology and computer science. Approaches such as