

the reductive, restrictive ‘comparative psychology’ of Skinnerian methods that the book’s first chapter moves on from (although perhaps the phrase ‘comparative psychology’ needs rescuing). It might even move forwards from the (quasi) Morganesque assumptions of animal stupidity. This might, instead, be a richer, fuller — and doubtless more accurate — psychology based on a genuine balance-of-probability.

This is the third edition of an invaluable book in a rapidly developing field. So, we look forward to a fourth. Perhaps that might expand its readership further. For example, given the importance of ethological findings for ethical questions, the book might more explicitly link to ethical questions. This might help ethicists to gain an informed understanding of the empirical aspects of their views (philosophers have a danger of feeling they can make factual statements with limited reference to recent literatures).

Another potential development is a broadening of content. In the future we will need to consider wild animals’ behaviour in more detail, particularly as local or global human activity impacts upon their developmental and ecological responses. Perhaps future issues will have to consider applications of ethological theories to ecological, land use and environmental decisions.

In any case, we look forward to finding the sequel as useful and enjoyable as this version.

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Advances in Agricultural Animal Welfare: Science and Practice

Edited by JA Mench (2018). Published by Woodhead Publishing, The Officers’ Mess Business Centre, Duxford CB22 4QH, UK. 288 pages Hardback (ISBN: 978-0-08-101215-4). Price £136.00, \$US170.00.

Scientific publishers recognise that there is a small but satisfactory market for expensive books on animal welfare and a ready supply of authors willing to contribute their chapters for free. *Advances in Agricultural Animal Welfare* is one such book. It is primarily aimed at libraries and individuals in universities, research establishments and government who need detailed, up-to-date, comprehensively referenced information to guide their understanding of the science that underpins the welfare of agricultural animals and the education, legislation and codes of practice that should underpin their humane management.

The true welfare of a sentient animal is, of course, something that is perceived by the animal itself as it seeks to cope with the stimuli and challenges that it encounters in its environment. Its ability to cope will depend on the nature and strength of these challenges and the repertoire of behavioural and physiological mechanisms that determine its capacity to respond. While our aim must be to promote animal *well-being*, welfare is an outcome that we can only deduce from a broad range of observations and measurements drawn from many disciplines. Any book that addresses these issues is best when it explores the interfaces between the necessary disciplines.

At its best, this is such a book. The editor, Joy Mench, has wisely chosen to aim for review in depth of a limited selection of topics of importance in relation to the science and practice of animal agriculture. Part 1 selects two hot topics in animal welfare science; cognition and genomics. Chapter 1, from Becca Franks, considers how cognitive processes affect welfare outcomes. Cognition is defined as “the mental actions and processes that enable the acquisition, processing, storage and use of information”. Within this definition she reviews evidence that reveals the cognitive sophistication and problem-solving abilities of hens and pigs, explores effects of environmental enrichment, and considers their impact on predictability and expectations. This leads to consideration of the extent to which cognitive development affects emotional state (and thereby welfare). She concludes that improved opportunity to seek cognitive stimulation has to be good for welfare but cautions that an individual that has experienced a cognitively enriched life is likely to be more distressed by return to a barren existence. This has clear implications for management practices, eg in pig farming.

Chapter 2, by Per Jensen, reviews aspects of genetics and genomics in the context of animal welfare. After a very brief review of the impact of domestication and some elementary genetics, he proceeds to consideration of some of the more exciting top-down (welfare to genes) and bottom-up (genes to welfare) approaches to the application of genomics to animal production and animal welfare. The top-down approach looks first for phenotypic differences in behaviour or physiology that impact on welfare then uses genetic mapping techniques to identify, if possible, genetic regions, eg quantitative trait loci (QTL) linked to these traits. This approach describes correlations rather than cause and effect but can offer useful pointers for breeding programmes. The bottom-up approach involves manipulating the genotype at a promising locus to test what effect it may have on the phenotype. This does not necessarily require experimental manipulation of the genome but can be achieved through selective breeding; an approach that offers some promise for the reduction of behavioural problems in hens. The final section briefly explores epigenetic effects, eg the extent to which behavioural responses to stress in chickens can be transferred to their offspring via changes in the gene expression profile in the hypothalamus. To my mind, this is a particularly valuable chapter since it points to what may be achieved by bringing together the disparate sciences of genomics and animal behaviour.

Part 2 is entitled ‘Animal welfare and sustainability of animal agriculture’. These are two of the big issues of the day but do not always sit comfortably alongside one another. The first chapter, ‘Animal ethics’, in common with many philosophical treatises, consists mostly of a history of what has been said already by other philosophers so can hardly be called an advance. The next chapter is entitled ‘Animal welfare and environmental issues’. This first considers the environmental impact of animal farming systems (methane, ammonia, particulates etc) and illustrates

the extent to which some of these have been reduced relative to output of food in the USA, mainly through increasing the productivity of individual animals. The drive to sustainable intensification has the potential to exacerbate welfare problems as perceived by the animals and by the people. Lameness, infertility and reduced active life in dairy cows are cited as examples of this conflict. No real solutions are offered for this dilemma, but it is put forward as a case for serious attention. The third chapter in this section is given the broad title of ‘Animal welfare and food safety’ but concentrates specifically on the extent to which stress can affect the bacterial population and immune system within the gastrointestinal tract of animals and the impact that this can have on the health of the animals and the safety of food from animals especially when these stresses occur in the run-up to slaughter. This is a good, comprehensive review of a very important topic.

Part III considers ways by which advances in science can be translated into policy and practice. The first chapter by Joy Mench makes the very important point that at this stage of our knowledge of farm animal welfare, some of the most useful research can be done on farms rather than in research establishments, since for many of the big questions the farm or production establishment is the unit of assessment and the individual animals provide the data set. I strongly support her assertion that well-designed, commercial scale, experimental studies are most likely to lead to practical solutions to complex endemic environmental problems, such as lameness in poultry and cattle. David Fraser explores the bridge between welfare science and farm practice and describes how scientific evidence can and should contribute to legal standards and codes of practice. Much of these might seem self-evident to welfare scientists but perhaps it needs to be said. The final chapter in this section considers the role of US veterinarians in animal welfare education, policy, politics and research. In the author’s own words “the veterinary profession in the United States has lagged behind other parts of the world (especially the United Kingdom and the European Union)” but is now catching up. I guess that is good news.

Part IV examines animal welfare standards in different areas of the world, in particular, those of the World Association for Animal Health (OIE). This is largely descriptive. It examines the extent to which these standards have succeeded in achieving minimally acceptable standards for farm animal welfare in Asia, Oceania and South America. It does not explore the (to me) more promising issue as to the extent welfare standards on individual farms and production units can be enriched through properly monitored, non-governmental independent schemes. (The RSPCA ‘Freedom Food’ scheme is just one of many).

The final section, somewhat misleadingly titled ‘Emerging issues’, addresses two unrelated topics. The first is ‘Slaughter without stunning’. It reviews the evidence relating to issues such as time to loss of consciousness and considers strategies to minimise distress at and preceding the neck cut. It recognises that many Islamic authorities

permit reversible stunning but does not risk asking why the dictates of shechita should not consider non-injurious, reversible, gaseous narcosis (eg using argon) as a humane gesture to poultry. The final chapter, ‘Urban agriculture’ looks at the history and revival of backyard farming in the USA and considers the pros and cons for animal health, welfare and food safety. It sits oddly with the rest of the book, but it is a good read.

The strength of a multi-authored *Advances* book written for those already reasonably well informed and active in any field is determined by the extent to which it has something new to say: ie it brings together a lot of brand new good science, it explores synergies between disparate scientific disciplines or it reveals new approaches to best practice. About half the chapters in this book do this well.

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A Practical Approach to Animal Welfare Law, Second Edition

N Sweeney (2017). Published by 5M Publishing Ltd, Benchmark House, 8 Smithy Wood Drive, Sheffield S35 1QN, UK. 318 pages Paperback (ISBN: 9781910455807). Price £35.95.

Laws are essential for protecting the welfare of animals. This is a feature not only of modern society, but of ancient ones too. As readers of the Old Testament will recall, for example, the ancient Israelites were prohibited from severing a limb from a live animal (Genesis 9:4), failing to afford cattle a day of rest (Exodus 20:10; 23:12), and muzzling oxen while they are threshing (Deuteronomy 25:4). There were also positive duties of care: an Israelite was required to feed his animals before himself (Deuteronomy 11:15) and to relieve animal suffering (Deuteronomy 22:4).

Laws are, however, of limited benefit without observance and enforcement; things which are, in turn, dependent on the law’s requirements being known by people who are in a position to ensure those things. Good animal welfare depends on veterinarians, livestock farmers, breeders, local authority officers, slaughterers, transporters and police officers having a ‘working knowledge’ of animal welfare laws relevant to their activities.

Equipping such persons with such knowledge is not easy. Animal welfare legislation is complex, may vary, as between the different constituent countries of the UK, and may be replete with concepts (such as ‘suffering’, ‘responsibility’ and ‘neglect’) which require explanation. Against that background, how are ‘people in the field’ — ie people who are responsible for ensuring and enforcing animal welfare on a day-to-day basis — to be provided with the knowledge and understanding of animal welfare law which they need? Noël Sweeney’s book, now in its second edition, seeks to provide a practical answer in a practical way. Appropriately entitled *A Practical Approach to Animal Welfare Law*, it deliberately avoids getting bogged