

section interesting and easy to read and in many cases familiar. The chapters on risk assessment in the second section will be of interest to those interested in this aspect of animal welfare but may not interest the general animal welfare reader. The final chapter is a warning to those who believe that food safety and high animal welfare always go hand-in-hand and adds to the complexity of risk assessment in the production of safe food from animals.

This book is essential reading for people involved in animal welfare assessment and regulation worldwide as it describes how the EU is moving towards animal welfare risk assessment and management. This activity has implications for everyone involved with production animals worldwide and, in particular, personnel working in countries that export meat, egg or milk products to the EU as the latter will probably use the success of risk assessment and management of animal welfare within Europe as a means of defending its importance as a trade issue at the WTO. The description of how animal welfare is managed in Sweden is particularly important as it describes the intensity of data collection and regulation which may become standard in other countries that can afford such practices.

The assessment of animal welfare risks is a field of scientific endeavour in its infancy and this is, to my knowledge, the first textbook to focus on the subject. Many of us may criticise the methodology being used but risk assessment is necessary if we are to manage animal welfare issues efficiently and economically. The Swedish model is probably too intensive, politically unacceptable and expensive for many countries but the work being undertaken by the EFSA is admirable and, hopefully, will lead, probably after several iterations, to methodologies that are acceptable to scientists, regulators, legislators and the public, and are affordable. This book will encourage discussion internationally about the process and the authors and particularly the editors are to be congratulated on their product.

In conclusion this is a very useful book. I read it from cover-to-cover but I suggest readers take time and enjoy particular chapters or sections piecemeal. I will certainly use it as a resource and I recommend it to anyone interested in the welfare of production animals.

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Meat Science, 2nd Edition: An Introductory Text

PD Warriss (2010). Published by CABI, Wallingford, Oxon OX10 8DE, UK. 240 pp Paperback (ISBN 978-1-84593-593-1). Price £35.00.

Ten years after the publication of the first edition, a second edition of *Meat Science* is now available. Some additions have been made, and recent developments in technology and new knowledge in biology have been included.

This is a traditional textbook, and it is obvious that it is aiming at undergraduate and, to a certain extent, also post-graduate students wanting to learn more about meat, and about how animals are turned into meat products. Each

chapter starts with a 'box' of questions. The answers to these questions are then given in the chapter. This layout emphasises the teaching aspect of the book, and may give a 'secondary school' impression to non-student readers.

The book includes information on carcass composition, meat chemistry, meat quality and hygiene. The book is written with an obvious UK perspective, but most of the content is nevertheless valid also in other countries, especially within the European Union.

From an animal welfare perspective, the most interesting chapters are the ones dealing with live animal handling, stunning and slaughter, and the chapter on animal welfare in general. The chapter on stunning and slaughter gives a very useful introduction to current commercially practiced stunning methods and the main principles upon which these are based. The chapter doesn't go into much technical detail, but to a person previously unfamiliar with the different options and methods available, the information provided will form a solid base for further reading.

With respect to handling and ante mortem inspection, the content of the text is fine but, in my view, far too short. The handling of animals at slaughterhouses with respect to unloading facilities, driving and coercion methods, lairage design and mixing of groups has a large effect not only on animal welfare but also on the meat quality. This is valid both in terms of stress-related meat quality effects and in relation to possible injuries leading to downgrading or rejections. Thus, this section could have been more extensive. The effects of live animal handling on meat quality are handled in a later chapter, but more emphasis could have been put on the prevention of such problems by proper lairage design and proper training of staff.

The ante mortem inspection procedure is mentioned, but no reference is given in this chapter to the regulatory framework of the European Union, the so-called 'Hygiene Package' (EC 852, 853 and 854/2004), which governs the work of the official veterinarians at the slaughterhouses. A more thorough review of the standard tasks and duties of these official veterinarians would have been useful, both for veterinarians-to-be and for other groups, to increase understanding of the role of the official vet. A reader can easily get the impression that ante mortem inspection is mainly about identifying cases of anthrax and foot-and-mouth disease, which is rarely the case. The importance of ante mortem inspections to discover possible animal welfare-related problems on farm or during transport could have been elaborated on.

The specific chapter about animal welfare has a wide and general approach. It takes the reader through the basic definitions of animal welfare, introducing, for example, the classical Duncan and Broom definitions. A couple of examples of different animal welfare concerns related to meat animals, such as caesarean sections due to oversized calves in dairy cows bred to Belgian Blue bulls, and leg weakness in broilers, are mentioned. Furthermore, husbandry practices, such as castration, debeaking and tail docking are discussed from an animal welfare perspective.

There is also a section on measuring animal welfare, relating to different indicators of animal welfare, but also bringing up the use of legislation to regulate minimum standards for animal housing and management. The concepts of stress and pain and the animals' physiological responses to these experiences are introduced. The chapter ends with a more general discussion about ways of promoting an improvement in animal welfare; by changing public opinion, by legislation and codes of practice and on financial incentives. In the section on legislation the UK focus becomes apparent, although some references to EU legislation are also made. However, more emphasis on the new EU regulation on the welfare of animals at the time of killing (including slaughter), which was adopted in September 2009, would have been highly relevant in this context — it is only referred to as a 'proposal in 2008'. Neither is the previous EU Directive on animal welfare at slaughter discussed. The chapter on animal welfare is a useful introduction for someone who is not previously familiar with the basic concepts of animal welfare or the main issues related to farm animal welfare. For a book on meat science, however, the section specifically related to animal welfare during marketing and slaughter is remarkably short.

In summary, this book is a well-written introduction to a number of different aspects of meat science, where the emphasis is on meat composition, quality and hygiene, rather than on animal welfare.

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Chronic Pain in Small Animal Medicine

SM Fox (2010). Published by Manson Publishing Ltd, 73 Corringham Road, London NW11 7DL, UK. 160 pp Hardback (ISBN 978-1-84076-124-5). Price £50.00.

This aim of this book is a noble one. One of the most important ethical responsibilities of all veterinary surgeons is the relief of pain. Many available texts deal with the management of acute pain, but effective treatment of chronic pain has received relatively little attention in comparison. Chronic pain is often an unpredictable condition, lasting beyond the time necessary for healing and often resistant to conventional therapy, and the stated aim of the book is to go beyond a simple 'recipe book' approach to treatment. Never before has the subject been covered in a single volume. There are six contributors, all recognised experts in the fields of anaesthesia, surgery and pain management, although the author of each chapter is not made clear.

The book is divided into three sections, with three chapters in each section. Section 1 covers the physiology of pain and pathophysiology of osteoarthritic and cancer pain. Section 2 covers the various drug classes available, whilst Section 3 explores the multimodal management of pain in a variety of disorders. There is also a useful glossary and a very comprehensive list of references for each chapter. A list of abbreviations is also given, but frustratingly some of those used in

the text do not appear on the list. Three case studies are also included, although these relate to orthopaedic pain only and this part could have been considerably enhanced by including management of chronic pain resulting from other disorders, such as nerve injury and cancer.

The first section on the physiology and pathophysiology of pain is well-written, but could have been improved considerably by a chapter on pain assessment. Without proper (and preferably objective) measurement of pain and its associated behaviours, it is impossible to assess efficacy of the various analgesic drugs and their combinations. References are given, but a summary of current knowledge would have been welcome. In addition, it would have been extremely useful, and added significantly to the book's appeal, if a separate chapter on the logistics of establishing a pain clinic in practice had been included.

In the second section, the chapters on non-steroidal anti-inflammatory drugs and nutraceuticals are excellent and give a comprehensive overview of their use and drawbacks. Considering the huge market for NSAIDs (approx \$US150 million in 2009 according to this book), it is absolutely vital that all veterinarians in small animal practice have a sound knowledge of their mechanisms of action, indications and side-effects. It is a pity that robenacoxib is not mentioned, but this is likely a result of the inevitable delay between chapters being written and ultimate publication. Unfortunately, Chapter 4 (covering all other analgesic drugs) is potentially misleading, possibly as a result of over-enthusiastic 'cutting and pasting'. For example, the use of epidural morphine is referred to in the section on intra-articular opioid delivery, and butorphanol is cited as a partial agonist in Table 26, but as a mixed agonist/antagonist in the text. Gabapentin is cited as a 'classic' NMDA antagonist, which is simply not the case (even more confusing because its mode of action under the anti-convulsant subheading is correctly cited as a blocker of the $\alpha 2\delta$ subunit of voltage-gated calcium channels). There are also some irritating spelling errors: carbamazepine is incorrectly written as 'carbamazepine' several times (page 129), and atipamezole as 'antipamezol' (Table 27). These errors should have been spotted either by the copy editor or by the authors in the galley proof stage and are a pity because they give the impression that some chapters have been thrown together rather hastily.

The book is illustrated lavishly throughout, although some of the figures are not labelled particularly well: for example, Figure 7 has nearly twenty abbreviations, many of which are not included in the list of abbreviations at the beginning of the book. Undoubtedly, more detailed figure legends would have enhanced understanding of sometimes difficult concepts. Occasionally, one is left with the impression that some of the figures have been inserted simply to break up the text, eg how does a picture of the molecular structure of lidocaine add to the understanding of its mechanism of action?

Despite the comments above, however, this is a useful book and I believe anyone with an interest in management of pain, and chronic pain in particular, should buy it. A sound understanding of pathophysiology and pharmacology should help a logical, knowledge-based approach to