

third chapter in Part VI introduces the breeding biology of ratites, game birds and minor poultry species, and does not fit in with the theme of ‘managing the environment’.

Despite the positive effect on health and reproduction efficiency, there is substantial evidence that feed restriction, especially during rearing, has adverse effects on broiler breeder welfare. In Part VII, a chapter providing an exhaustive review on feed restriction is included, which highlights not only the science behind restricted feeding but also potential approaches to lower its welfare consequences. As a nutritionist, it is pleasing to see two well-written chapters on the nutritional requirements of breeding poultry are included. In particular, models described for protein utilisation in breeders are useful.

The title of Part VII (health and welfare) is misleading because the three chapters in this section deal only with health aspects. The first two chapters give an overview of vaccination and immune protection of the neonatal chick. In the final chapter, the author describes and discusses various potential strategies to managing current disease challenges in breeders. Although welfare-related issues have been covered under different topics, a separate section on this critical aspect would have been a valuable addition. However, this criticism aside, the editor must be congratulated for compiling an up-to-date overview of this extremely complex area.

My overriding conclusion is that this is a necessary and essential book about the biology of breeding poultry. The extensive bibliography, with citations up to 2007, is provided after each chapter for readers requiring further information on the areas covered. A detailed index is appended and will be useful to locate specific terms. This book will be of great value to researchers, university teachers, technicians and students of poultry science. Those involved in the commercial industry will also find it useful because of the wealth of information provided.

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The Behaviour and Welfare of the Horse, Second Edition

AF Fraser (2010). Published by CAB International, Wallingford, Oxon OX10 8DE, UK. 256 pp Hardback (ISBN 978-1-84593-629-7). Price £75.00.

The Behaviour and Welfare of the Horse is the second edition of the popular text *The Behaviour of the Horse*. The new, revised edition builds on the foundations set down in book one and continues to be a comprehensive information source on all aspects of domestic horse behaviour. A common and welcome theme throughout this book is the emphasis the author places on the practice of using behaviour to inform and guide management practices. For example, Fraser states in Chapter 1: “It follows that horse welfare is axiomatic, that the management of each horse should be in accord with its particular individualism and, therefore, that knowledge of equine behaviour in general is fundamentally required in modern horse care”.

The text naturally reflects the author’s considerable knowledge and expertise within the fields of veterinary health, ethology, welfare and horse husbandry. Much of the content from the previous edition has been updated and expanded in line with the broader animal welfare literature. Frequent references are made to the horse’s behavioural needs alongside the author’s opinions on the humane treatment of the horse. Of particular relevance to readers with an interest in welfare are the comments on specific welfare issues added at the end of many of the chapters.

The seven sections in the first edition have been reorganised into 16 chapters, each with more images, tables and bullet points improving readability and navigation. In addition, a useful Glossary of terms has been added which aids reference.

The first three chapters focus on behavioural development and the biological basis of behaviour. Chapter four is titled ‘Behavioural homeostasis’ and introduces equine maintenance behaviour and its relevance to behavioural well-being. The following five chapters then examine in detail ingestive behaviour, body care, kinetic behaviour, spatial factors and finally, rest, work and transportation. New to the second edition are advice sections on feeding, grooming and the housing of equines. Whilst this practical advice is an interesting addition it does not appear to fit succinctly with the ethos of the preceding chapters that are concerned primarily with behaviour and welfare. Furthermore, the advice presented is often traditional and not necessarily in line with methods that reflect best practice and current research. For example, straw is described as “the best bedding for horses” and indeed preference tests have shown that horses will choose straw over shavings or paper (Mills *et al* 2000). However, there was no mention of the drawbacks of a straw bed on respiratory health.

The chapters titled ‘Breeding function’, ‘Mare/foal dynamics’ and ‘Foal function and welfare’ will appeal to anyone with an interest in breeding and stud management. Breeding function contains valuable information on the sexual behaviour of the mare and stallion during in-hand and free-range breeding. Two insightful chapters on the mare and the foal then follow and include detailed information on the mare’s normal behaviour pre and post parturition, the behaviour of the neonate and the development of the foal through to weaning. There is a strong emphasis on foal well-being during weaning and the importance and benefits of early training on later life experiences.

The function and importance of play behaviour on development are highlighted in the following chapter alongside a balanced discussion on the significance of social behaviour and its importance to well-being. Fraser concludes this section nicely by commenting on the impact that the social group has on development and states that “young horses need the company of other horses to learn how to be completely equine”.

The following section examines the influence of humane control and husbandry on health and well-being throughout the lifetime of the adult horse. The majority of this chapter

is dedicated to detailing and evaluating methods of restraint and pharmacological control. Additional topics covered include the stages of training, handling and protection against illness. One notable omission from this discussion is an evaluation of the use of the bit during equitation. However, Fraser acknowledges this by directing the reader towards other sources of comprehensive information that directly discuss horsemanship.

The penultimate chapter covers disordered behaviour and stress. The content has been revised to include the neurochemical basis of stress. Substantial attention is paid to the influence management practices can have on the development of abnormal behaviour and detailed descriptions of different types of oral and locomotor stereotypies are provided. The discussion then moves on to what Fraser terms abnormal reactions during handling and training, such as bolting, biting and kicking. The section concludes with a relevant insight into behavioural expressions indicative of pain, suffering and depression.

The final chapter, titled 'Equine culture and protection' summarises many of the main arguments raised in the previous chapters. Fraser lists 30 of the main arguments that relate to the horse's strategy for living or 'equine culture' and then periodically refers to them by number throughout the rest of the discussion which, in my opinion, does hinder navigation throughout the chapter.

One general criticism of this text is that many interesting points are raised without a clear indication of the relevant source of the information, leading one to conclude, possibly falsely, that this is purely author opinion. For a text aimed primarily at an academic audience, I would have expected more references to original work. Nevertheless, Fraser's writing style is fluid and interesting and will appeal to a range of audiences, including veterinarians, animal scientists and horse owners or carers alike that wish to broaden their knowledge of equine behaviour and inspire them to improve the lives of the equines within their care. As Fraser states in his final chapter: "No longer can the horse be viewed as a beast of burden in developed countries. No longer can the horse be regarded merely as a periodic plaything or recreational item. It is deserving of some natural time of its own, some quality of equine existence".

Reference

Mills DS, Eckley E and Cooper JJ 2000 Thoroughbred bedding preferences, associated behaviour differences and their implications for equine welfare. *Animal Science* 70: 95-106

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International Zoo Yearbook No 44

Edited by FA Fiskén (2010). Published by The Zoological Society of London, Regent's Park, London NW1 4RY, UK. 464 pp Softback. Price £127.00.

The *International Zoo Yearbook* (IZYB) was first published in 1960 by the Zoological Society of London to provide an authoritative channel for the international exchange of

information about zoos. The work carried out by zoos is increasingly dependent on co-ordinated effort and shared results, not only amongst themselves but also with laboratories, conservation centres and similar bodies engaged in the study and preservation of wildlife. The *International Zoo Yearbook* has been both the medium and the reflection of this changing outlook.

This volume is the 44th, and it continues the tradition, following the same general style and layout of previous editions. It is divided into three sections, the first of which is devoted to a special subject with articles usually commissioned by the Editor. In this volume, the subject is 'Bears and Canids'. The second section includes original articles on various aspects of captive husbandry and management, including reproduction, breeding and behaviour all under the general title of 'The developing zoo world'. The third section is a reference section listing data and survey results collated from information in the annual questionnaires returned from zoos and aquaria around the world.

The IZYB begins with a guest essay entitled 'African zoos: partnering a necessary renaissance' by Dave Morgan who is the Executive Director of the African Association of Zoos and Aquaria. This article reflects on the range of zoos in Africa and argues for the need for these to be encouraged and improved. It is particularly interesting because the author presents an honest review of the contradictions and controversies that these institutions face. For instance, he argues that although the continent boasts the world's largest densities of free-ranging wild animal populations, the increasing level of urbanisation currently taking place emphasises the need for zoos. However, he also points out some other less palatable truths about them — in particular their predilection for animal acquisition from the wild and poor operational practices. Both have significant welfare implications for the animals concerned but, as Morgan points out (p 3), "despite the best efforts of animal welfare and animal rights NGOs to have them closed down, they continue to exist". In addition, African zoos attract very high visitor numbers, they are legally mandated, they promote goodwill in their communities and infer the concept that animals and ecosystems have inherent value. Consequently, Morgan argues for an acceptance of both the existence of African zoos and the need for active involvement and engagement to assist them to overcome their capacity and resource challenges. In so doing, both animal welfare and conservation objectives of zoos are more likely to be realised.

The first section of the IZYB then focuses on 'Bears and Canids', and comprises 15 articles which reflect current research and progress within the captive management of these animals. The first article is particularly useful in that it provides an overview of the history of bears and canids in zoos and then introduces the important issues relating to their captive management. As such, it helps to provide a framework for the articles to follow and to put into perspective much of what we have taken for granted regarding these species. For instance, despite being amongst the most