

## Book Reviews

### *The Behavioural Biology of Chickens*

CJ Nicol (2015). Published by CAB International, Wallingford, Oxon OX10 8DE, UK. 200 pages Paperback (ISBN 978-1-78064-250-5), Hardback (ISBN 978-1-78064-249-9). Price £33.75, €45.00, \$US65.00/£67.50, €90.00, \$US130.00.

When I was a child, we had chickens in the back of the garden. And, like many children, I was often fascinated by the way they behaved, and would wonder why they performed this or that behaviour. The title of this book suggested that maybe this would be the book I'd always wanted to have around as a child. Would it allow me to look up particular behaviours, and find out what they were all about? The answer, however, is 'probably not easily'. Although the book covers many aspects of domesticated chicken behaviour quite comprehensively, it is not laid out in such a way that would allow it to serve as a lay person's encyclopaedia of chicken behaviour. But, then again, this was probably never the intention of the author. Indeed, I soon realised that the title of the book was a bit misleading. Yes, the book describes the behavioural biology of chickens but, really, the focus of the book is chicken welfare, first and foremost.

For a researcher like me, who has only recently begun to become interested in poultry welfare science, this book was a great introduction to the field. I obtained many new insights: how chickens are currently housed commercially (which I knew a little about, but not much); that they were originally domesticated as 'sport' animals (think cock fights) or decorative animals (think peacocks) rather than as a food source; and that the ancestral species, the red jungle fowl (*Gallus gallus gallus*), was adapted to life in the dense jungle undergrowth (which I knew), which may have implications for how chickens feel in wide-open, free-range housing (which I had never thought about). Titbits of information like that put the whole field in a new perspective for me. Professor Nicol clearly knows the literature on chicken behaviour very well, and has made many important contributions to it herself. The book is a pleasure to read and a fount of information on the behaviour of domesticated chickens, and especially on the implications of the knowledge of this behaviour for the study and improvement of their welfare.

The author tries to cover all aspects of behaviour, from the history of poultry domestication and artificial selection (Chapter 1), through the sensory biology (Chapter 2) and neuroscience (Chapters 2 and 3), to development (Chapter 3), social and foraging behaviour (Chapters 5 and 6), and cognition (Chapter 7). She goes well beyond the poultry science literature *per se*, and delves into other fields of science where domesticated chickens have been studied, often more because of their convenience (they are easy to obtain birds that develop in large, easily accessible eggs, and are independent from hatching) than because of a specific interest in chickens *per se*. This approach adds

tremendous value to the book, because it brings together literatures that are not normally read together. This, in turn, provides new information even to those who feel that they understand the applied ethology of domestic chickens really well. Surprisingly (to me), she also references several online resources in the book, such as *Youtube* videos. Whilst this is common to see on websites, I had never seen this in books before. I wonder how current such references will remain, as time passes.

With my background in behavioural ecology and ethology, I was expecting a book with descriptions of chicken behaviour (a full ethogram from development through reproduction), discussions of the mechanistic basis of these behaviours, and discussion of their functions and similarities to the wild ancestor, the red jungle fowl. Then, at the end, in the two final chapters, I was expecting an application of this basic biology to chicken welfare, for both broiler chickens (Chapter 8) and laying hens (Chapter 9). However, this is not how the book is laid out at all. Yes, there is information about particular behaviours, about neural and endocrinological mechanisms and about functional approaches to behaviour, but almost from the very start, issues of welfare pervade the text. The author does not describe anything without immediately pointing out the implications of this information for the welfare of the animals. For example, in the chapter on Sensory biology (Chapter 2), she describes "Light preferences: spectrum, source and illuminance". This is done with an immediate reference to the lighting conditions in commercial housing and the possible implications for welfare. And it continues like that throughout the book, with every aspect of chickens' experiences immediately discussed in the context of the reality of commercial husbandry and the welfare implications.

I am sure that to the readers of *Animal Welfare*, this is welcome news. Here is a comprehensive, well-written book on the applied ethology and welfare of chickens, both broilers and laying hens. It has much information in one place that can be used by researchers and practitioners alike to at least start finding out about particular aspects of the environment, how chickens interact with it, and how this can be manipulated to improve the animals' welfare. The book is also very open about the current gaps in our knowledge, and the complications of measuring welfare and determining what constitutes better welfare in the animals. It's a great summary of our current knowledge and a great starting point for people who are new to the field.

That being said, sometimes it felt like this was a book written by a poultry welfare researcher for poultry welfare researchers. Don't get me wrong, the author has a very engaging writing style that is accessible to many people, including outside of the scientific establishment. She does her very best to explain complex issues of neuroscience and physiology in simple (yet not simplistic) language, and

succeeds brilliantly in doing so. However, when the discussion turns to chicken behaviour and to welfare, it becomes clear that the author is in her own comfort zone, and she starts taking some knowledge for granted in her readers. Throughout the book, I came across unexplained terminology that to an outsider might not be clear. Sometimes these terms would be explained later in the book (eg the term ‘pullets’ is finally explained at the start of Chapter 9), but sometimes the author just assumed that the readers would know what she was talking about. For example, I still don’t know what ‘beak clapping’ is (although I can take a guess). And if I had not been trained in ethology myself, I would not have known what a ‘displacement behaviour’ is. The book is also quite UK-centric. It of course makes sense that the author is most familiar with the UK poultry situation, and that she will use examples from that knowledge to illustrate her points. But then at times, UK-based acronyms (eg RSPCA) are used that may not be familiar to readers from other countries. Despite little details like that, however, the book remains easy-to-read and provides plenty of very useful and interesting information about chicken behaviour and welfare.

So who would I recommend this book to? It is clearly written with the promotion of chicken welfare in mind. I will therefore be sure to lend it to all my poultry welfare PhD students, as it is a great introduction not only to chickens as a species, but also to current practices in animal welfare science, and in chicken husbandry, something few people outside the industry itself know much about. I believe it will also be very useful for policy-makers, policy influencers, and the poultry industry itself, as it sets out different ways forward toward improving chicken welfare further in the future, while also taking into account chicken productivity. All in all, I really enjoyed reading this book and I’ve come out knowing much more about poultry than I did before. It should be on the shelf of every poultry welfare researcher and practitioner, worldwide.

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### **Nutrition and the Welfare of Farm Animals**

Edited by CJC Phillips (2016). Published by Springer, Tiergartenstrasse 17, 69121 Heidelberg, Germany. 247 pages Hardback (ISBN 978-3-319-27354-9). Price €66.99.

In 2011, the FAO held a meeting on the role of animal nutrition in the welfare of farm animals (FAO 2012). The following statement appeared in the subsequent report: “There is a need to educate nutritionists to understand animal welfare, including both physiological and psychological aspects, and to educate animal welfare scientists to better understand nutritional physiology, nutrient partitioning and the metabolic states underlying hunger.” This book tries to meet those needs, and it succeeds in giving animal welfare scientists a better appreciation of animal nutrition in the context of farming systems.

In particular, the strengths of the book are the overviews on: dairy cow nutrition, including feeding behaviour by de Vries; sub-acute ruminal acidosis; the impacts of chronic underfeeding in extensive farming systems by Hogan and Phillips; the effects of the environment on rangeland ruminants by Villalba *et al*; the description of pig welfare indicators by Widowski; and the review by von Keyserlingk *et al* on water intake and water quality. Tolkamp and D’Eath provide a novel commentary on hunger in broiler breeders and dry sows. They question whether feed restriction (to control body fatness, reduced fertility and the risk of prolapse) is any worse than providing larger amounts of a feed which has low digestibility. They do not come to any firm conclusions on this issue and perhaps the way ahead is to use mathematical modelling of the likelihood of satiety based on the effects of energy and protein intake on feeding motivation, while applying corrections for variations in gut fill and body size. Bertoni *et al* also made a notable contribution in describing the beneficial effects of dietary protein on immune responses during chronic endoparasitic infestation. This was followed by an account of the nutritional factors leading to metabolic and mineral disorders in dairy cattle. They offer some observations on the effects of plant secondary compounds such as saponins, caffeine, digoxin, polyphenols and condensed tannins on immune responses. Condensed tannins are thought to exert an anthelmintic effect by complexing with dietary protein, and this protects the protein from microbial degradation in the rumen. Instead, the protein passes relatively unchanged to the small intestine and subsequently contributes to immune responses. In a later chapter, Villalba *et al* identify four mechanisms that can explain the anthelmintic effect of condensed tannins, and the reader may be left confused about which is the main mode of action.

This is intended as an advanced book for researchers, teachers, government officials, international organisation officers, donors, extension workers, veterinarians and farmers, and so perhaps the early parts of the book could have given less space to stating the obvious. Putting this to one side, the main weakness of the book is the way that it leads into animal welfare features that could be linked to nutrition. The reader is relied upon to assume that the effects that are described have a bearing on animal welfare, and the welfare conclusions are by implication rather than explicit reasoning. In many cases the animal welfare implications are a raised risk of suffering from some of the consequences of incorrect feeding, and this was not explained where it was relevant. Perhaps there should also have been a section devoted to the forms of suffering that can occur when there is incorrect feeding. In broad terms, there may be some conditions, including some disease states (such as mild hypocalcaemia in dairy cows), where suffering is only marginal or is a risk if the disease becomes advanced or is accompanied by particular circumstances. This leads to the question, what do we include in the term ‘welfare’? Phillips deals with this in the opening chapter and his focus on the derivation and use of the word is helpful. Bienestar, bien-être, bemestar and wohlfahrt are used in various languages