

example, leg health in broilers, immune function later in life or brain development. Also, topics like ‘at what stage of development does an embryo suffer?’ and sexing of embryos are addressed.

The next chapter focuses on the important effects of early life experiences on the later adaptability of the laying hen. Research in this area is reviewed addressing effects of rearing conditions on, for instance, adult behaviour, musculoskeletal and neuromuscular development and health. This may be specifically relevant for laying hens housed in more complex housing systems where they are supposed to use the three-dimensional space.

The next two chapters review electrical stunning and gas and low atmospheric stunning, respectively. Detailed information is given about measures of unconsciousness, the pros and cons of the different methodologies and the current status of development of alternative stunning methods.

The third part of the book deals with on-farm welfare assessment with one chapter focusing on the application of outcome based measures mainly referring to three poultry assessment systems: Welfare Quality®, Assurewel and AWIN. Together with information on actual application of outcome-based measures and the opinion of users, this chapter gives a good overview. The other chapter in this part focuses on the individual animal: behaviour of birds that are sick or in pain. It also addresses decision-making and methods relating to euthanasia.

Some continuing welfare challenges in poultry production come up for discussion in part four. This includes a chapter on skeletal problems in laying hens, which doesn’t simply provide basic information on bone growth but also a lot of detail on keel-bone damage. In another chapter the various aspects of feather-pecking and cannibalism are highlighted, asking the question ‘can we really stop beak-trimming?’ Another question addressed in this part of the book is about stocking density and space requirements and how to assess these needs (including factors that complicate this).

Basic background and evolutionary principles of social behaviour are provided in a further chapter. It makes clear that a basic understanding of social behaviour is crucial to implementing management strategies that reflect the nature of the birds’ social behaviour and allow optimal welfare. The information here is fairly dense. A specific chapter addresses the welfare issues in turkey production, such as fearfulness, injurious pecking, stress related to transport, foot-pad dermatitis and leg abnormalities as well as factors affecting these issues.

In a chapter on sustainability of laying hen housing systems, hen welfare is put in the larger perspective of environment, food safety, worker health and safety and economics. Although it has some overlap with earlier chapters, this is an interesting contribution.

The fifth and last part of the book highlights some emerging issues. One chapter deals with pest management. It rightly stresses that parasites affect animal welfare and control

approaches and options should be included in discussions about the adoption or change of production systems. The chapter provides an excellent introduction to this relevant area.

Genetic approaches to improve resistance to viral and bacterial diseases and heat stress are reviewed in the next chapter. The continued development of new technologies increases efficiency and accuracy of genomic approaches over classical genetic approaches and important contributions to poultry welfare are expected.

The increase of backyard poultry-keeping is another emerging issue and is considered in the following chapter. Various welfare concerns related to housing and management, health and biosecurity and behavioural problems are addressed. But also challenges related to food safety, municipal regulations and access to information and veterinary resources are discussed.

The last chapter is on mass depopulation and gives an excellent overview of the different methods and their welfare impacts.

The contributing authors are all well-respected experts in their area and the chapters generally maintain a high standard of information, including new and recent results and with ample references. The book is very useful for students in poultry welfare science, but established scientists and practitioners will also find it interesting reading. The photographs and figures are relevant and generally of good quality.

I consider *Advances in Poultry Welfare* a most welcome and relevant contribution to the assessment and improvement of poultry welfare.

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### **Advances in Cattle Welfare**

Edited by CB Tucker (2018). Published by Woodhead Publishing, The Officers’ Mess Business Centre, Royston Road, Duxford CB22 4QH, UK. 282 pages Hardback (ISBN: 978-0-08-100938-3). Price £138.

Worldwide cattle production systems are growing in size and intensity in response to growing demand for milk and beef, principally in developing countries. This is suspected of having adverse effects on the animals’ welfare, to the concern of the public in much of the developed world at least. This book attempts to address the latest developments in assessing and monitoring cattle welfare. Most of these are in Europe, and the Western focus of this book is slightly regrettable when 55% of the world’s cattle are in Asia and Africa alone (FAOSTAT 2018).

The book contains laudable attempts to identify and describe cattle needs from a scientific perspective — do they need access to pasture, how much space do they need and what for? This begs the question: what can be done about declining welfare in ever-intensive cattle units worldwide? A chapter by Schutz *et al* acknowledges that

half of the Western world's 12 or so main methods of keeping cattle and calves do not provide for basic needs of diet and space, including indoor feedlots, calf pens and veal crates. Ironically, it is the European pasture-based systems, where most of the research is being conducted, that provide for welfare best. However, the true decline in cattle welfare is addressed in a chapter on disease by Rachel Toaff-Rosenstein. There, the failure of producers to recognise, record and act on the growing disease problems of mastitis, dystocia and respiratory disorders in adult cows, and the high (in comparison to other livestock) mortality rates in heifers and calves is described. It is reported that heifer mortality in the first year has an average of 8% in USA, Norway and Holland, with some herds reaching 36%. These problems are attributed to growing intensification, reduced time available for herdspeople to monitor each animal and a poor cost-benefit ratio for treatment of diseases. Use of pain relief for this very reason is minimal. To an impartial observer the evidence points to a deterioration in cattle welfare standards. There has been relentless growth of beef cattle feedlotting systems, most recently in SE Asia, which lacks the necessary resources, a growing cattle trade worldwide involving long-distance transport, increasing numbers of cattle in India and the horn of Africa, where there is intense competition for the resources they need, and the worldwide growth of intensively housed dairying systems for cows producing physiologically challenging levels of milk for three-quarters of their adult life.

The title *Advances in Cattle Welfare* does not reflect the reality of declining welfare and the addition of the word 'science' to the title would have better reflected the content, since copious evidence is provided as to new scientific measures that can be used to assess, and hopefully eventually improve, cattle welfare.

The book opens, sensibly enough, with an overview of cattle production systems, which is mostly a description of American systems. It briefly acknowledges that cows are sometimes kept on pasture, but the emphasis for dairy cows is on permanently housed cows fed intensively processed diets to maximise milk output. Most of the world's dairy cows live in developing countries, and a third in India alone. There the welfare problems are very different to the ones described for permanently housed cows: typically centred around inadequate nutrition and water availability, consumption of toxic materials from waste dumps, lack of veterinary care, ectoparasites, and poor transport and slaughter facilities. The beef cattle production systems described are also predominantly American, focusing on feedlots, and there is no mention of the integrated beef and dairy systems that predominate in the developing world, or cattle used for work, as they still are in many of the least developed countries.

A later chapter by Cook provides an authoritative review of welfare assessment schemes, which perhaps necessarily focuses on 'both sides of the Atlantic' because of the paucity of data from outside these boundaries. Cook advocates for more meaningful scoring systems to identify extreme cases, for whom welfare is very poor, for example, distinguishing severe lameness from mild lameness, as well as simplifying scoring systems to improve their diagnostic accuracy. Christoph Winkler provides further information on cattle welfare assessment and identifies a pathway to improvement of cattle welfare, but again with a focus on Western systems of production.

Without doubt 'improved methods of assessment' is one of the main areas in which dairy cow welfare science has significantly advanced in recent years, largely through European efforts. However, whether the results of this major endeavour can be used to actually improve dairy cow welfare in the face of increasing intensification remains uncertain. In Western countries improvements may be possible by governments setting standards that can be meaningfully applied, and producers modifying systems so that they cause fewer welfare problems. If this doesn't happen, the major food retailers will have a most important role in managing welfare standards through setting specific standards as conditions of supply through the use of accreditation schemes. However, most people agree that the worst farms in terms of cow welfare should be prevented from supplying any food retailer, and this can only be done by government legislation.

This book does not address the welfare of cattle during transport and slaughter, but we know that worldwide long-distance transport is increasing and that this final period in the life of cattle is when some of the worst suffering takes place. Cattle welfare is likely to be best served by education of consumers and this where the research is needed on how to best get the message across to consumers in developing countries so that lessons are learnt from the mistakes of the West. However, it must be acknowledged that this book is a useful summary of progress in assessment and measurement of some of the farm-based problems in Europe and North America. One hopes that similar efforts will be made to improve welfare in other parts of the world. If not, or perhaps regardless, cattle meat and milk products will face growing competition from alternatives.

## Reference

**FAOSTAT** 2018 FAOSTAT. <http://www.fao.org/faostat/en/#data/QL>

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