

Broom, D.M. and Johnson, K.G. 2019. *Stress and Animal Welfare: Key Issues in the Biology of Humans and Other Animals, 2nd edn.* (pp. 230). Cham, Switzerland: Springer Nature. ISBN 978-3-030-32152-9. ISBN 978-3-030-32153-6 (eBook). <https://doi.org/10.1007/978-3-030-32153-6>

Preface to second edition

This book is about the science underlying stress and welfare in humans and in other animals. The progress in this area of science since the first edition of this book has been remarkable. We now have a much better understanding about the role of different brain and body mechanisms in coping with our everyday environment. Psychiatry and ideas about human welfare are more closely linked to general human medicine and animal welfare more closely linked to veterinary medicine. The number of publications about the scientific evaluation of animal welfare is now at least fifty times greater than thirty years ago. The links between stress research and welfare research have become ever stronger and the dramatic results of epigenetic and other research has changed our ideas about how life is controlled.

The idea that many characteristics of humans and other animals are solely genetic was eroded by the 1990s but recent research shows it to be false. Every characteristic of every animal is affected by both genes and environment. As explained in Chapter 1, it now seems that no stage of gene expression is unaffected by environmental factors. No behavioural, physiological or anatomical character is genetically determined, instinctive or innate, where these terms mean independent of environmental effects. Of course, some characteristics are more likely to be modified by environmental factors than others but no person can say that their anti-social behaviour, or other unwanted quality, is solely caused by their genes.

The welfare of parents during sperm and egg development is now known to have wide-ranging effects on their own functioning and to affect the functioning of the offspring. Stressed parents have less viable offspring and some effects continue in the subsequent generations. The mechanisms of the effects of stressful environments are much better known now, as are the links between welfare, immune system function and likelihood of disease. The ideas of one health and one welfare, emphasising that each term means exactly the same for humans and non-humans. and that health is an important part of welfare are now widely accepted.

Animal welfare science has developed at a rapid rate in the last thirty years. The new scientific discipline was developed and made applicable to everyday life by establishing key concepts and developing methods for evaluating welfare in a scientific way. There have also been parallel and overlapping developments in human stress and welfare studies. The use of the term stress has been refined and methodologies in human and

veterinary medicine further developed. The concepts provide bases from which deductions can be made, and structures to which emerging ideas can be attached. The upsurge of public interest in the welfare of animals and the demand for precise information so that proper action can be taken has occurred in all countries of the world. Psychiatry, and other treatment of people with stress and depression, have gradually become more mainstream subjects in human medicine. Teaching and a need for knowledge about stress and welfare are now widespread in human medicine, psychology, animal biology, veterinary medicine and animal production. There are also close links with ethics and other areas of philosophy, as well as with relevant areas of law and social science.

Associated with the identical use in humans and other species of concepts such as health, welfare, stress and pain, function in non-human species has been demonstrated to be closer to that in humans than was once thought. In each of the recent years, evidence for the similarities between humans and many non-human species in cognitive ability and capacity for having emotions and feelings has become stronger. The very small genetic differences between humans and other species also reinforce the idea that humans are not unique or special and that an understanding of function in one species is often helpful in others. Studies of animal welfare science and stress impacts in non-humans can greatly help to solve problems in humans and vice versa. The principles presented in this book are structured to refer to all animals, both human and non-human.

In Chapter 1, the need for careful scientific study of stress and welfare is explained. The reasons for some of the problems in understanding the concepts are discussed, and it is argued that there is a requirement for further analysis of the concepts, and especially for a better synthesis of current ideas. The use of the terms stress and welfare is clarified by deriving definitions for them related to the functioning and efficacy of the biological systems that animals use to both regulate their lives and deal with difficulties. These systems include a wide range of biological components including the feelings of the animals. This derivation is explained in Chapters 2 and 3. The definitions, based on established biological concepts and consistent with similar ideas in other disciplines, are described in detail in Chapter 4.

From this theoretical base, sound and practical approaches for assessing welfare are outlined. Chapter 5 provides an account of the responses of animals to short-term disturbances, while the responses to long-term disturbances are documented in Chapter 6. In Chapter 7 the use of animal preference studies to provide information relevant to the assessment of animal welfare is discussed. The question of how great a disturbance of homeostasis, or what level of stimulation an animal should be subjected to is partly a matter of biological judgement, since animals may manage better if exposed to a moderate level of stimulation, even if it is aversive, rather than being protected from stimulation entirely. But ethical considerations obviously also dictate that there must be a limit. A survey of the ethical issues involved and a guide to making ethical decisions about animal stress and welfare and putting it in a world context are presented in Chapter 8. Finally, the major arguments presented in the book are summarised in Chapter 9. The meanings of terms used in this book are listed in the Glossary, the references used in each chapter are listed at its end and a subject and author index is included.

As human society continues to evolve it changes the relationship between humans and other animals, but too often this has been to the detriment of those animals. Fortunately,

biological studies are uncovering ways of identifying, assessing and alleviating poor welfare. With this information, strategies can be developed to avoid unreasonable impositions on animals, as well as properly considering all other aspects of sustainability. One of the goals of the book is to help to establish a biological base from which can be developed codes of living in a modern and compassionate society.

Donald M. Broom

Preface to first edition.

Developing a new scientific discipline and making it applicable to everyday life depends upon establishing certain key concepts and evolving skills in using them. Key concepts provide bases from which deductions can be made, and structures to which emerging ideas can be attached. Since the upsurge of public interest in the welfare of animals, there has been much study of **welfare** and of **stress**, to which welfare is obviously related. This interest has extended across many scientific domains, from human medicine, animal biology, veterinary medicine and agriculture to psychology and philosophy.

The significance of the terms stress and welfare has stimulated a considerable amount of writing and no small amount of debate, especially because of their relevance to humans and domestic animals. We are now at a stage where there is a pressing need to build the terms into a conceptual scheme that is sufficiently sound to provide predictions, to allow new data to be added, and to be subjected to exacting tests.

From first principles, we believe there is no reason why the concepts of stress and welfare should be essentially different whether used for humans or for other animals, so the ideas developed will be structured to refer to all animals, both human and non-human. The examples and emphases will nonetheless principally relate to non-human animals, since that is the focus of this series of texts and the background of the authors. (Description of chapters follows).

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Animal Welfare

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Stress and Animal Welfare

Key Issues in the Biology of Humans and
Other Animals

Second Edition

 Springer