

Book Reviews

Do Fish Feel Pain?

V Braithwaite (2010). Published by Oxford University Press, Great Clarendon Street, Oxford OX2 6DP, UK. 208 pp Hardback (ISBN 978-0-19-955120-0). Price £14.99, US\$29.95.

Some years ago I was asked if crustaceans felt pain. I then wondered how one might infer pain in animals that are taxonomically far removed from humans. As a starting point, I read the then recently published papers on fish pain by Braithwaite and colleagues. These were influential in my subsequent work and in the work of others on various taxa. Investigations that use mammals or birds are often based on preconceived ideas but, with fish, Braithwaite started with a virtual clean sheet. Clear definitions and approaches were required and this book describes how they were developed. In particular, the idea that noxious stimuli may be detected and adaptive responses may be made but without any particular unpleasant feeling or emotion, termed 'nociception' is discussed. The unpleasant emotion subsequent to that perception is what we call 'pain'. Thus, simply devising experiments that indicate reactions to electrical, thermal, mechanical or chemical stimuli do not by themselves allow an inference of pain. Rather, we expect a set of criteria to be fulfilled for the observations to be consistent with pain. These criteria are nicely described and experimental approaches are discussed in a very readable style. It notes the discovery of sensory systems in fish that are similar to those in mammals. It further investigates if there are associated prolonged changes in behaviour that could not easily be described as reflexes. In particular, it examines if there are extended shifts in attention after a potentially painful experience. Braithwaite reviews studies from other laboratories and builds up a mass of evidence that appears to suggest pain rather than just nociception in fish. She also examines work on other 'lower' animals, such as molluscs and arthropods, which often appear to have some of the same features that might be interpreted as being 'beyond simple nociception'. She attempts to draw a line between different taxa that may or may not experience pain.

The book goes well beyond a description of work on fish. It looks at a variety of experiments that investigate sentience in animals and how animals might be asked if they are aware of what they know. Work on affective states is covered and this will be a surprise to readers unaware of this area. It considers cognitive abilities of fish and again these may surprise some readers. The book ends with a consideration of how the new insights into fish abilities and feelings might be applied. Fish are already protected in terms of scientific investigations within the UK and many other countries. The number of fish that might be negatively affected in laboratories, however, might be considered as a drop in the ocean compared to those used in aquaculture and capture fisheries. Braithwaite reviews how aquaculture is beginning to include welfare considerations into rearing,

grading and killing but also notes how capture fishing has barely considered fish welfare (but has reacted to concern about inadvertent killing of birds, turtles and cetaceans). She suggests that these industries, dealing with vast numbers of fish every day, should change and how new methods to improve welfare could be introduced.

The text is written in a popular style and makes for an excellent read. Scientists and lay persons alike will learn much. However, I have a couple of niggles. First, having carefully defined nociception as the perception of a noxious event and pain as an internal emotional experience associated it seems odd to use phrases such as 'pain perception' or 'anatomy to perceive pain'. I suggest that animals might perceive stimuli, such as potential or actual damage caused by thermal, electrical, mechanical or chemical application via the nociceptive apparatus but then the subsequent pain is best described consistently as an experience or emotion, not a perception. Second, after considering if invertebrates experience pain and drawing the line, the question is asked: "Would we really wish to accord welfare consideration to earthworms"? I suggest that should depend purely on the scientific evidence of the ability of the animal to suffer rather than the convenience or inconvenience of applying welfare concerns to a particular taxon. Please note that I am not on a campaign to promote the rights of earthworms! Rather, I suggest that we should consider objectively each taxon with respect to their ability to suffer in the same way that fish have been considered.

So do fish feel pain? Braithwaite's conclusion is 'yes, they do'. Some might agree, others may say 'possibly', others will claim definitely not. Will reading this book change minds? I suspect that the 'possibly' group might be persuaded but I doubt if it will affect many commercial or recreational fishers. However, I urge all involved with fish or animal welfare to read the book. It is both readable and informative. I congratulate the author.

Robert W Elwood
School of Biological Sciences,
Queen's University, Belfast, UK

Mastitis Control in Dairy Herds, Second Edition

R Blowey and P Edmondson (2010). Published by CAB International, Wallingford, Oxon OX10 8DE, UK. 272 pp Hardback (ISBN 978-1-84593-550-4). Price £39.95, US\$75.00, €55.00.

Mastitis Control in Dairy Herds, Second Edition by Blowey and Edmondson is a comprehensive compilation of topics related to the risk factors, clinical characteristics, therapy, and control of intramammary infections in dairy cattle. This book masterfully works its way through the overall subject area of mastitis and its control. The book is not referenced in the manner often used in scholarly books intended for agricultural or veterinary students, or as a scientific manuscript. However, the authors of the sources of the key tables