

# ANIMAL SENTIENCE

AN INTERDISCIPLINARY JOURNAL ON ANIMAL FEELING

Rowan, Andrew N; D'Silva, Joyce M; Duncan, Ian J.H.; and Palmer, Nicholas  
(2021) *Animal sentience: history, science, and politics*. *Animal Sentience* 31(1)

DOI: 10.51291/2377-7478.1697



This article has appeared in the journal *Animal Sentience*, a peer-reviewed journal on animal cognition and feeling. It has been made open access, free for all, by WellBeing International and deposited in the WBI Studies Repository. For more information, please contact [wbisr-info@wellbeingintl.org](mailto:wbisr-info@wellbeingintl.org).

**Call for Commentary:** *Animal Sentience* publishes [Open Peer Commentary](#) on all accepted target articles. Target articles are peer-reviewed. Commentary articles are editorially reviewed. There are submitted commentaries as well as invited commentaries. Commentary articles appear as soon as they have been reviewed, revised and accepted. Target article authors may respond to their commentaries individually or in a joint response to multiple commentaries.

## Animal sentience: history, science, and politics

Andrew N. Rowan<sup>1</sup>, Joyce D'Silva<sup>2</sup>, Ian J. Duncan<sup>3</sup>, Nicholas Palmer<sup>2</sup>

<sup>1</sup>WellBeing International

<sup>2</sup>Department of Animal Sciences, University of Guelph, Canada

<sup>3</sup>Compassion in World Farming, UK

**Abstract:** This target article has three parts. The first briefly reviews the thinking about nonhuman animals' sentience in the Western canon: what we might know about their capacity for feeling, leading up to Bentham's famous question "can they suffer?" The second part looks at the modern development of animal welfare science and the role that animal-sentience considerations have played therein. The third part describes the launching, by *Compassion in World Farming* (now called *Compassion*), of efforts to incorporate animal sentience language into public policy and associated regulations concerning human treatment of animals.



[Andrew N Rowan](#), former professor at Tufts Cummings School of Veterinary Medicine where he established the Tufts Center for Animals and Public Policy, former CEO of Humane Society International (HSI), and currently President of WellBeing International. [Website](#)



[Joyce D'Silva](#), Chief Executive of *Compassion in World Farming* from 1991 to 2005, has spoken and published widely on the welfare of farm animals and has provided evidence and advice to governments on the genetic engineering and cloning of animals as well as sustainable farming and food in the context of Climate Change. [Website](#)



[Ian J. H. Duncan](#), Professor Emeritus, Department of Animal Sciences, Guelph University, Canada, is a pioneer in the development of animal welfare science. He has spent much of his scientific career developing methods of "asking" farm animals what they feel about the conditions in which they are kept and the procedures to which they are subjected. [Website](#)



[Nick Palmer](#), current head of *Compassion in World Farming* in the UK, served formerly as MP for Broxtowe in the UK from 1997 to 2010 and as Director of Policy at *Cruelty Free International*. A lifelong supporter of animal protection, during his time in Parliament Nick was vice-chair of the All-Party Animal Welfare Group. [Website](#)

## **Introduction**

In European and North American thought, the concept of sentience as applied to discussions of animal welfare is most notably represented in utilitarian philosopher Jeremy Bentham's famous sentence that has become a foundational concept in considerations of animal welfare, "The question is not Can they reason? nor, Can they talk? but Can they suffer?" (Bentham, 1789).

If one examines the growth of animal protection organizations, the number of laws addressing animal cruelty, and the changing role of companion animals, then human-animal relationships have improved in the last two centuries. However, if one instead examines the consumption of animals for food and research and the decline in wild animal populations, then it is just as clear that the lot of animals has worsened considerably since Bentham penned his famous phrase. Nonetheless, there are some positive signs of improving human-animal relations in the past fifty years (See Irwin, 2003). In particular, we wish to examine the growth in attention to animal sentience, specifically in legislative and public policy documents, in various regions of the world.

### **1. History of the Concept of Animal Sentience**

A detailed examination of history reveals that some acceptance of animal sentience has existed for hundreds of years, at least for mammals. By the time of the Renaissance, there is good evidence from the writings of Leonardo da Vinci, Erasmus, Thomas More, Montaigne, Shakespeare, Francis Bacon, and others that animal sentience was accepted as part of secular knowledge (Preece, 2002, Thomas, 1983). Many of the great artistic works of this age also portray people treating animals as if they were sentient. But, of course philosophers did not follow the views of the masses and there is a clear line of philosophic argument for non-sentience from Aristotle through Thomas Aquinas and Rene' Descartes to Immanuel Kant and Carruthers today (Carruthers, 2008).

Of all the philosophers, Descartes is usually singled out for special blame for introducing the idea of animals as 'automata'. However, in a more considered review of Descartes' works, Kenny (1970) translates Descartes as saying "Similarly of all the things that which dogs, horses and monkeys are made to do, are merely expressions of their fear, their hope, or their joy; and consequently, they can do these things without any thought." Furthermore, Harrison (1992) concludes that Descartes (but not his disciple Malebranche) is unjustly blamed for concluding that animals do not feel. While present-day scholars continue to argue about what Descartes really believed, the fact that he was a vivisectionist and did not treat animals as if they were sentient, suggests that he thought that 'fear', 'hope' and 'joy' were in some way unfelt emotions. Some authors have termed these "unconscious emotions" (e.g., O'hman et al., 2000; Winkielman and Berridge, 2004; Berridge 2022) but a "felt" emotion could hardly be "unconscious" however one would define "unconsciousness."

During the Enlightenment, the arguments of Aristotle, Aquinas, Descartes and Kant that animals were non-sentient were challenged. For example, the Scottish philosopher David Hume wrote "Is it not experience, which renders a dog apprehensive of pain, when you menace him or lift up the whip to beat him?" (Hume, 1739). However, as stated above, it

was Bentham, the English social reformer, who came up with the key question (Bentham 1789).

There also seems to have been wide acceptance of sentience within the scientific community of the early 19th century. For example, the English veterinarian, Youatt, wrote that animals have senses and emotions; they demonstrate sagacity, docility, memory, association of ideas and reason; they also have imagination and the moral qualities of courage, friendship and loyalty (Youatt, 1839). Surprisingly, in making these statements, Youatt did not claim to be proposing anything very novel; he wrote as if these were commonly accepted facts. He also emphasised that, with regard to sentience in human beings and animals, “. . .the difference between them in one of the most essential of all points, is in degree, and not in kind”. [Feelings can vary in quality – e.g., seeing versus hearing versus smelling – and in intensity (e.g., warm, hot, very hot) but they do not vary in “feelingness.” They are either felt or not felt.]

By the middle of the 19th century, Spencer (1855) had postulated that ‘feelings’ are adaptations. He suggested that feelings combine with memory and reason to form a flexible mechanism by which an animal can react adaptively to environmental change. Then, following Darwin, feelings came to be viewed as adaptations to pressures of natural selection. For example, the physiologist and psychologist Romanes (1884) wrote that “Pleasures and Pains must have been evolved as the subjective accompaniment of processes which are respectively beneficial or injurious to the organism, and so evolved for the purpose or to the end that the organism should seek the one and shun the other.”

It was commonly accepted by scientists 129 years ago that animals were sentient. This was also the common-sense view held by the public. However, through much of the 20<sup>th</sup> century, behavioural scientists eschewed any study of animal feelings. The reason is that a branch of psychology called “Behaviourism” had a huge effect on the way that behavioural scientists thought about the mind and feelings through the first 70 years of the 20th century (Braat et al, 2020)

The seeds were sown by William James, the American philosopher and psychologist, one of the founders of functionalism (Buxton 1984) and an early influence on behaviorist tendencies. He wrote “Consciousness... is the name of a nonentity, and has no right to a place among first principles. Those who still cling to it are clinging to a mere echo, the faint rumour left behind by the disappearing ‘soul’ upon the air of philosophy . . . It seems to me that the hour is ripe for it to be openly and universally discarded” (James, 1904). Following this, Watson founded the discipline of Behaviourism and wrote “The behaviourist sweeps aside all medieval conceptions. He drops from his scientific vocabulary all subjective terms such as sensation, perception, image, desire and even thinking and emotion” (Watson, 1928).

Behaviourism flourished in North America through much of the 20th century. As late as 1975, Skinner wrote “We seem to have a kind of inside information about our behaviour—we have feelings about it. And what a diversion they have proved to be! . . .Feelings have proved to be one of the most fascinating attractions along the road of dalliance” (Skinner, 1975).

James, Watson and Skinner were powerful figures, and their influence was widespread, to the extent that there was little consideration of animal feelings in North American schools of psychology. Of course, there were notable exceptions. For example, [McDougall \(1926\)](#) proposed a theory of motivation based on feelings. He suggested that an animal's subjective experiences such as fear, sexual desire, and maternal tenderness, which he called 'emotions', could motivate activities such as escaping from danger, courtship and copulation, and caring for young. [Young \(1959\)](#) was another scientist who suggested that affective subjective states have a central role in regulating and directing behaviour.

Even the European-founded discipline of ethology was influenced by behaviourism; ethologists generally restricted their considerations to observable behaviour. However, their use of terms such as 'hunger', 'pain', 'fear' and 'frustration' ([McFarland, 1981](#)) suggests that affective states were still guiding their thinking on behaviour, even though the subjective component was not openly discussed.

This pattern was broken by Griffin when he gave a paper on subjective feelings at the International Ethology Conference in Parma, Italy in 1975, and published a book on the topic a year later ([Griffin, 1976](#)). Since then, animal sentience has become an important topic in its own right. There has been an ever-increasing flow of publications (e.g. [Radner and Radner, 1989](#); [Ristau, 1991](#); [Damasio, 1999](#)) addressing the issue either directly or indirectly. In 2012, a group of prominent international scientists signed the Cambridge Declaration on Consciousness asserting that animals possess consciousness and are aware to the degree that humans are ([Low et al, 2012](#)). In addition, it is probable that our understanding of animal sentience has had an effect on how we deal with animal welfare.

## **2. Sentience and animal welfare science**

Scientific investigations into animal welfare gradually increased in the late 1960s, following the publication of Harrison's (1964) book "Animal Machines" and the follow-up British Government investigation published as the so-called "Brambell Report" ([Command Paper 2836, 1965](#)). It was generally assumed in these early studies of sentience that welfare would be intimately connected with the physiological stress response (e.g., [Bareham, 1972](#); [Bryant, 1972](#); [Wood-Gush et al., 1975](#); [Freeman, 1978](#)). An animal that was stressed would have poor welfare and an animal that was not stressed would have good welfare.

Assessing welfare was expected to be simply a matter of finding a reliable indicator of stress. However, it is worth pointing out that it was the suffering of animals in intensive agriculture, in biomedical research and in product testing that spurred Harrison to write her book. It was not just the fact that these animals were stressed that troubled her; it was the fact that they were sentient and could feel stressed. The Brambell Committee also acknowledged that sentience was important. They stated, "Welfare is a wide term that embraces both the physical and mental well-being of the animal. Any attempt to evaluate welfare, therefore, must take into account the scientific evidence available concerning the feelings of animals that can be derived from their structure and functions and also from their behaviour" ([Brambell, 1965](#)). The Brambell Committee also realised that an understanding of sentience is an essential part of assessing welfare.

Through the 1980s, triggered by the publication of Marian Dawkins's (1980) book "Animal Suffering," behavioural scientists gradually accepted the importance of feelings in their investigations into animal welfare problems. There was a progression from a position in which feelings were seen as a necessary component of welfare (Dawkins, 1980, 1990; Duncan, 1981, 1987; Duncan and Dawkins, 1983) to one in which feelings are the only thing that matters (Duncan, 1996, 2004) although this is not a universal view among scientists.

Acceptance of the fact that welfare is all to do with feelings brings with it a huge, almost insurmountable problem, which is that it is very difficult (and maybe impossible) to prove conclusively that any organism is sentient. Subjective feelings are just that—subjective—and are available only to the animal experiencing them.. Subjective feelings are just that—subjective—and are available only to the animal (or human) experiencing them. Fortunately, in the animal welfare debate we do not need to know *exactly* what an animal is experiencing. Some indication of how positive or negative the animal is feeling would already be extremely useful. For example, if we are considering a chicken that we suspect is frightened, we do not need to know if it is experiencing precisely what a human being experiences when being threatened by a criminal with a gun or being trapped in a burning building.

To assess the chicken's welfare, all we need to know is whether or not it is experiencing something negative. If the chicken is experiencing negative feelings, it would also be helpful to know how negative these feelings are. Although it is impossible to measure feelings directly, it is possible to obtain some indication of what an animal is feeling by indirect means; these methods will be discussed briefly. However, before moving on to methods, it is important to make a distinction between cognition and feeling. Cognition usually refers to mental processes such as perception, memory, learning, computational skills, expectation, etc. -- in other words, processes that have evolved to help the animal deal with the external world in a flexible way.

Feeling, on the other hand, gives animals information about their internal environment. Humphrey (1986, 1992) has suggested that feeling may be similar to an "inner eye" that allows the animal awareness of certain inner states such as fear and pain. In any investigation into how animals feel, it may be necessary to involve cognitive processes (Can an animal learn to avoid a frightening stimulus? Can an animal remember a rewarding experience?). There may also be interesting interactions between emotions and cognition (Paul et al., 2005). However, it should be remembered that it is animals' awareness of what is happening that is crucial for their welfare, and in investigations into welfare we should be striving for measures (albeit indirect measures) that give some indication of how positive or negative the animal feels (Dawkins, 1993).

### **Feelings and welfare assessment**

It is possible to investigate feelings by indirect methods such as preference and motivational testing and by understanding animal communication. Preference testing was pioneered by Hughes and Dawkins, both working with domestic fowl (e.g., Hughes and Black, 1973; Hughes, 1975, 1977; Dawkins, 1976, 1977, 1978). According to this method, animals are given a choice regarding certain aspects of their environment, and we assume that they will choose those aspects that are in the best interests of their

welfare. There are certain pitfalls to be avoided when using preference tests. However, these have been thoroughly discussed and the precautions that need to be taken to avoid errors have been well elucidated (Duncan, 1978, 1992; Dawkins, 1983; Fraser and Matthews, 1997). There is no doubt that, for all their limitations, preference tests give a good first indication of what animals feel about various aspects of their environment.

A preference test, however, is only the first step in investigating how animals feel about their environment; it is also necessary to infer how important a particular choice is. Even a consistent choice in one direction may not be important for the animal, if, say, neither choice results in suffering. But a choice may also represent the lesser of two evils, with the animal suffering from either option. For these reasons, it is necessary to measure the strength of the preference as a follow-up to preference testing.

There are various methods being used to measure strength of preference, with an economic analogy often used to describe them (Mason et al., 1998). For example, we can “increase the price” of the commodity that the animal is choosing. This is done by seeing how hard animals will “work” to obtain their preferred choice. Obstruction tests, in which animals have to push past an obstacle or push open a weighted door to reach their preferred choice, is a common method (e.g., Duncan and Kite, 1987; Nicol and Guildford, 1991; Mason et al., 2001). Operant responding is another method to measure motivation (e.g., Dawkins and Beardsley, 1986). It is ironic that the operant conditioning chamber or “Skinner box” developed by behaviourists who campaigned so strongly against giving any consideration to feelings (Skinner, 1975), is now being used to investigate these same subjective feelings in an indirect way. Rather than “increasing the price” of a commodity, it is also possible to investigate motivation by reducing an animal’s “income”, although this is rather stretching the economic argument. The time that animals have available to perform their various activities can be regarded as “income”. The available time can be reduced until there is insufficient time for the animal to perform their full repertoire of behaviour. When this point is reached it is assumed that animals will perform the activities that are really important to them and that other, less important activities will be omitted.

Of all the stimuli or states of suffering in animal agriculture, pain is probably responsible for a bigger reduction in welfare than any other (see, for example, Benson, 2004). Many farm animals are injured through living in ill-designed environments. For example, sows housed in dry sow stalls often have pressure sores on their hips from lying on hard surfaces, hens in battery cages often have hyperkeratosis of their feet pads from continually slipping on sloping floors, and dairy cows often have feet and hock injuries from standing and lying on hard surfaces. Injuries also arise from social interactions, such as fighting, tail-biting and feather-pecking. In addition, there are many surgical interventions, such as castration, tail-docking, dehorning, teeth-trimming, beak-trimming, de-snooding, de-toeing, all carried out without analgesic or anaesthetic cover. Then there are painful procedures, carried out for identification purposes, such as ear-tagging, ear-notching and branding. Finally, the poultry and swine sectors are running into fast-growth problems such as skeletal weaknesses, and the dairy sector is experiencing metabolic problems, all of which could be painful (Benson, 2004).

Asking animals whether they are experiencing pain may be more of a challenge than asking them about other feelings. We can use an animal’s avoidance tendencies as a

measure of their fear, and we can use their tendency to approach as a measure of how motivated they are to gain access to some environmental feature. But how can we ask animals if they are in pain? Looking very carefully at the behaviour of animals with and without analgesics can give some indication (e.g., [Duncan et al., 1990](#); [Molony and Kent, 1997](#)). In an important development of this method, it has been found that broiler chickens are capable of self-administering a painkilling drug. When given a choice between two feeds, one of which contained a painkiller, lame broiler chickens ate more of the drugged feed than did broilers with no lameness. Moreover, the walking ability of the lame birds was improved by this self-administered treatment ([Danbury et al., 2000](#)).

In the first 20 years of the 21<sup>st</sup> century the idea of investigating animal sentience has developed and expanded considerably (e.g., [Webster, 2006](#), [Webster 2006a](#)). In a recent major review [Marino and Merskin \(2019\)](#) have shown that domestic sheep, long considered fairly simple animals, have considerable cognitive abilities and a wide range of complex emotions. Another possible route for gaining information about what animals may be feeling has been through an understanding of their systems of communication. For example, [Weary and co-workers](#) were able to assess the severity of pain experienced by piglets during castration by carefully analysing their vocalizations ([Weary et al., 1998](#); [Taylor and Weary, 2000](#)). A recent paper takes this idea further and describes how artificial intelligence systems have been used to decode pig vocalizations as signals for the pigs experiencing positive or negative states ([Briefer et al, 2022](#)).

### **Future research needs**

As illustrated above, there has been considerable progress in developing methods to ‘ask’ animals how aversive they find the common states of suffering such as pain, fear, frustration and deprivation. One state of suffering requiring further research is boredom. A start has been made (e.g., [Wemelsfelder, 1993](#); [Burn, 2017](#); [Meagher et al. 2017](#); [Meagher & Robbins 2021](#)), but much research remains to be done.

There is an emerging view that welfare should be more than just the absence of suffering (e.g., [Mench, 1998](#); [Mellor et al, 2020](#)). The presence of pleasure adds much to the quality of life of human beings. Why should pleasure not also be important for animals? Pleasure may also be important to counteract the unavoidable negative states that occur when animals are handled, injected or transported. Investigations into states of pleasure have lagged behind and need to be expanded, although a start has been made. For example, it has been suggested that states of suffering and states of pleasure have evolved to solve two very different types of problem ([Fraser and Duncan, 1998](#)). Negative feelings may have evolved to solve “need situations” where there is an immediate threat to fitness from not performing certain behaviours (drinking when thirsty, fleeing when a predator approaches, etc.). Positive feelings, on the other hand, may have evolved to motivate certain behaviour in “opportunity situations” in which all the animal’s essential needs are taken care of, and the cost of performing the behaviour is low (the pleasure of social grooming, the pleasure of playing, etc.). Some supporting evidence is emerging. For example, there is some evidence that dust-bathing in domestic fowl, previously thought to be a need-driven behaviour pattern which would result in negative feelings if prevented, actually occurs in “opportunity situations” and leads to a state of pleasure ([Widowski and Duncan, 2000](#)). There now needs to be a much wider investigation into

pleasure, particularly the applied aspects of pleasure, to balance some of the recent fundamental studies (e.g., [Spruijt et al., 2001](#); [Berridge, 2003](#); [Coria-Avila et al. 2022](#)).

We also need more research on the question of where on the phylogenetic scale sentience emerges. There is considerable agreement that vertebrates are sentient, but controversy persists. The physiological and behavioural evidence that fish are sentient is overwhelming ([Chandroo et al., 2004](#)). Yet [Rose \(2002\)](#), contests this on the basis of neuro-anatomical evidence and [Key \(2016\)](#) It is when we consider the invertebrates, however, that the debate becomes intense.

There is little doubt that the cephalopods are sentient. They show emotional behaviour, exhibit surprise when their expectations are not met, and construct a fairly detailed cognitive map of their world ([Wells, 1962](#)). There has been some research showing simple learning and memory in sea snails (Aplysia) ([Bailey et al., 1996](#); [Abel et al., 1998](#)) and in fruit flies (Drosophila) ([Belvin and Yin, 1997](#)). However, whether this implies sentience is still open to debate. [Griffin \(1976\)](#) certainly thought that there was enough evidence to conclude that honeybees (*Apis mellifera*) were sentient. Several papers on invertebrate sentience have appeared in this journal ([Klein & Barron, 2016](#); [Reber 2016](#); [Mather 2019](#); [Mikhalevich & Powell, 2020](#)). Very recently, a report on invertebrate sentience was released by Birch and colleagues ([Birch et al, 2021](#)) who have been providing advice to the UK government as they consider their new bill on animal sentience (see the discussion of policy issues at the end of [Birch et al's](#) review as well as [Crump et al. \(2022\)](#) in this journal).

More investigation is also required into the ontogeny of sentience. In the past it has often been considered acceptable to carry out fairly invasive procedures, such as castration or de-horning, without anaesthetic or analgesic cover on very young animals with the assumption that they are less sentient than older animals. There can, of course, be good arguments (some of them welfare arguments) for carrying out these procedures on young animals; the animals may be easier to restrain, the healing process may be quicker, and the animals may be less likely to remember the procedure. However, the crucial question is whether the animals are less sentient, and to date we have little information on this topic. Moreover, we should also be considering the welfare of animals during fetal development (cf. [Mellor & Diesch, 2006](#)). How sentient are they? There will obviously be huge differences in the development of sentience between the young of a precocial species (born fully developed), such as sheep, and those of an altricial species (where the neonate is not fully developed and requires extra care and feeding by the parents) such as mink (*Mustela vison*). The matter will be further complicated by the fact that various components of sentience are likely to develop at different rates. Thus, a late fetal lamb may be aware of maternal vocalisations that may be comforting, or a domestic chick a few days before hatching may be aware of changes in temperature that could be disturbing, whereas some visual or olfactory awareness may only develop later.

### **3. *Compassion in World Farming and Advocacy for Animal Sentience***

Ruth Harrison (1964) called attention to the increasing use of intensive animal production systems to produce animal products for the marketplace. Her book had a major impact in stimulating the British Government to set up the Brambell Commission in 1965 (Brambell Report, 1965). The Commission has been justifiably lauded for its influence on improving

farm animal welfare but there was another development in the 1960s in England that has arguably been just as influential as Harrison's book, namely, the founding of *Compassion in World Farming* (referred to here as *Compassion*) by the Hampshire dairy farmer, Peter Roberts (D'Silva, 2006). In the 1960's, Roberts had come under pressure from agricultural officials to set up an intensive broiler chicken farm. However, with support from his wife, Anna, he refused to do this because, as Anna said, "What about the poor chickens?" These events heightened the couple's concern for animal suffering and Roberts began to travel with his cull cows to the slaughterhouse to ensure that they were slaughtered humanely.

Roberts also began to lobby the major animal welfare organisations to campaign against industrial farming, in particular, battery cages for laying hens, and "factory farming" in general. However, his pleas fell on deaf ears. As a result, the couple decided in 1967 to establish their own organization: *Compassion in World Farming*. In the early years, much of their work involved street campaigning and manning stalls at major events. In this way, Roberts came to know Peter Singer, then a young philosopher studying at Oxford, who helped out at one such stall in Oxford. They kept in touch. Undoubtedly Peter Singer's seminal book "Animal Liberation," (Singer,1975), as well as *Victims of Science* (Ryder, 1975), another book in the same year by a member of the Oxford group of young animal advocates (e.g., Godlovitch, Godlovitch & Harris, 1971; Singer, 1982; Garner & Okulye, 2020) influenced Roberts's thinking about animals and animal welfare.

During the 1980s, *Compassion* was increasingly concerned at the entrenchment of factory farming as *the* method of farming animals for profit. This led Peter Roberts to taking a veal crate farm in Sussex to court in 1984. The crates housed dairy calves (usually males, therefore unwanted for milk production) for their entire short lives, unable to turn round and fed a diet of low-iron reconstituted milk powder. They were never given roughage, so their rumen digestive system did not develop, and the low-iron milk diet kept their flesh pale because consumers reportedly preferred "white veal." The veal farm was owned by a friary belonging to the Norbertine Friars. While the backs of the crates were open, the calves were chained by the neck, so they could not reverse out of their crates nor walk around (Anon, 1984).

The lawsuit claimed that the restriction of the calves was unlawful under existing UK legislation (Agriculture (Miscellaneous Provisions) Act of 1968). At the time, the Act made it "an offence to cause, or knowingly to allow livestock to suffer unnecessary pain or unnecessary distress whilst they are on agricultural land". The lawsuit claimed that the calves were being subjected to both pain and distress and called witnesses to support their claim (Anon, 1984). But the Friars also called witnesses – in their case they turned to the local RSPCA Inspector who said he could find nothing wrong with the calves or the housing. The case in the Magistrates Court was lost but it was appealed, and, to their credit, the RSPCA paid for the Appeal. However, the case was lost on appeal as well (D'Silva, 2006).

This could have been a minor case, an oddity reported only in the local press and possibly some legal publications. But it made the front pages of national newspapers and was also featured on the BBC National News. The UK Ministry of Agriculture, the Catholic Cardinal in Britain, and even the Pope were inundated with letters from *Compassion* supporters and other animal-lovers throughout the country. Veal became something of a dirty word in Europe (Metz & Groenestein, 1991).

*Compassion* continued to lobby the Minister of Agriculture and Members of Parliament but were unaware of what was happening behind the scenes where the architects of agricultural policy were taking note of public concerns. In 1986, following the outcome of the court case, the government announced it was holding a conference on farm animal welfare at the National Agricultural Centre at Stoneleigh. By then, one of the authors of this target article (JD'S) was working for *Compassion*, having joined the organization in 1985. *Compassion* felt that the organization should have representation at the conference, but Roberts, the founder, chose not to attend. The Ministry of Agriculture contacted *Compassion* and urged Roberts to come to the conference. After further arm-twisting, Roberts agreed to be present.

The reason for the pressure became evident at the conference when the Junior Minister of Agriculture, Donald Thompson MP, opened the proceedings. Suddenly, he unexpectedly announced that the government intended to ban veal crates by 1990, with a three-year phase-out from 1987. *Compassion's* Peter Roberts then understood why he had been pressured to attend the conference. The government presumably wished to acknowledge, indirectly, the influence of *Compassion's* court case and subsequent lobbying (D'Silva, 2006).

The legislation was passed, veal crates were banned in the UK in 1990, and the legislation was incorporated into the Welfare of Farmed Animals (England) Regulations 2000. The British legislation was followed eighteen years later by a similar, although not identical, ban on the use of veal crates throughout the European Union (Council Directive 2008/119/EC).

### **Lobbying for Animal Sentience Language in Law & Regulations**

In 1988, Roberts expressed disgust to one of the present authors (JD'S) at the inclusion of "live animals" in a long list of "Agricultural Goods and Products" in the text of the Treaty of Rome (under which the EU was organized). He then decided that *Compassion* had to launch a campaign to get animals recognised as "sentient beings" in the EU. At the time, *Compassion* consisted of seven staff located in a small English market town but, with Roberts leading the way, the organization embarked on a project to change the wording in the Treaty of Rome, the governance document for the EU.

In reviewing its options, *Compassion* decided to organise a petition to the European Parliament and to seek support from other animal welfare organisations to gather signatures and support the campaign. However, the major animal welfare societies in the UK indicated no interest in the project but several smaller groups based in other EU countries agreed to translate the petition and gather signatures in their own countries. As this effort was launched before the days of "click on" petitions, signatures had to be gathered on paper by approaching individuals through the post or by standing in the street and asking members of the public for their support. At the time, *Compassion* itself had around 7,000 members who were asked to help collect signatures in the UK.

To everyone's surprise, by 1991 over 1 million signatures in a variety of languages had been collected and posted to *Compassion's* office. This made it the largest petition ever presented to the European Parliament at the time. The petitions were then packed into

boxes and two newer members of staff, Philip LyMBERY (now *Compassion* CEO) and Peter Stevenson, drove the boxes in a van to Strasbourg, where the European Parliament was meeting that month. One of us (JD'S) was allowed to speak at the Parliament's Intergroup on Animal Welfare (D'Silva 2006). Accompanied by both a Conservative and a Socialist Member of the European Parliament, the petition was presented to the then President of the Parliament, the Spanish MEP, Enrique Baron Crespo (D'Silva 2006).

In the European Parliament, there was an established Petitions Committee that carefully considered all the petitions submitted to the Parliament. The petition was eventually endorsed by this Committee and then, in 1994, it was endorsed by the full European Parliament (Smith & Dauncey, 2007).

In the UK, *Compassion* continued to lobby both the Conservative government and, importantly, the Labour Opposition, finding a more sympathetic ear and voice within the Labour Party and their Agriculture spokesperson, Elliot Morley MP. On the day of the Prime Ministers' meeting, *Compassion* held a march in Amsterdam with supporters from all over the EU who had helped with the petition. The new Treaty of Amsterdam (1997) included a Protocol (an annex to the Treaty) that recognised animals as "sentient beings".

The Protocol reads as follows:

*"Protocol on protection and welfare of animals THE HIGH CONTRACTING PARTIES, DESIRING to ensure improved protection and respect for the welfare of animals as sentient beings, HAVE AGREED UPON the following provision which shall be annexed to the Treaty establishing the European Community, In formulating and implementing the Community's agriculture, transport, internal market and research policies, the Community and the Member States shall pay full regard to the welfare requirements of animals, while respecting the legislative or administrative provisions and customs of the Member States relating in particular to religious rites, cultural traditions and regional heritage."*

The inclusion of language in the Treaty of Amsterdam recognizing the sentience of animals was not unprecedented. Apart from the Brambell Report (1965) that had also explicitly recognized the sentience of farm animals, there had been other developments regarding the sentience of animals in European legislation. For example, Germany, Austria and France had all addressed animal "dignity" or sentience in their national animal protection legislation prior to 1997 (Blattner, 2019; Gimenez-Candela, 2018). The German and Austrian laws and documents did not specifically state that animals are sentient; instead, they addressed the issue by stating that "animals are not things" ("nicht sachen") and that they can experience positive and negative feelings. But the laws still allowed animals to be treated as "things" unless such treatment was specifically prohibited by other legislative language (Gimenez-Candela, 2018).

The Protocol created clear legal obligations to pay full regard to the welfare requirements of animals and, for the first time in any legislation, referred to them as sentient beings. It did not outlaw any of the new intensive farming systems, such as keeping hens in battery cages or pregnant sows in narrow stalls, but it did change *the ground* on which campaigners could lobby for change. Agriculture Ministers or their staff could no longer

say that animal welfare did not matter. Campaigners could point out that it was now a requirement to “pay full regard to the welfare requirements of animals”.

In 2005, *Compassion* held an international conference in London “[From Darwin to Dawkins: The Science and Implications of Animal Sentience](#)”. Five hundred people attended from over fifty countries. The proceedings were divided between two publications: a special edition in October 2006 of the journal *Applied Animal Behaviour Science* (Webster, 2006) and, also in 2006, a book published by Routledge (Turner & D’Silva, 2006).

Compassion in World Farming continued to lobby both the European Commission and various EU Agriculture Ministers over the next decade. When another revision to the Treaty governing the EU was up for consideration – namely, the Treaty of Lisbon (2007) – there was sufficient pressure for the Prime Ministers to elevate the Protocol to its own Article in the Treaty. Extra categories were also added, so that the wording now reads:

*“In formulating and implementing the Union's agriculture, fisheries transport, internal market, research and technological development and space policies, the Union and the Member States shall, since animals are sentient beings, pay full regard to the welfare requirements of animals, while respecting the legislative or administrative provisions and customs of the Member States relating in particular to religious rites, cultural traditions and regional heritage.”*

## **Developments since the Treaty of Lisbon**

To the surprise of some, the next official endorsement of animal sentience occurred in Africa when Tanzania's Animal Welfare Act of 2008 (Tanzania Animal Welfare Act, 2008) recognised animal sentience, although the legislation linked good animal welfare to productivity, rather than as a good in its own right. In Chile, law 20380 on the Protection of Animals 2009 recognised that animals are sentient beings, though they are still defined as ‘moveable assets’ in the Chilean Civil Code. In the USA, the state of Oregon amended its animal cruelty laws in 2013 declaring that “animals are sentient beings capable of experiencing pain, stress and fear” (Or. Rev. Stat. §167.305 (1) (2017).

In 2012, an international group of cognitive scientists, neurophysiologists and computational scientists were attending the [Francis Crick Memorial Conference on Consciousness in Human and non-Human Animals](#) at Churchill College in Cambridge, UK. Several of those present decided to draft a “Declaration” on consciousness which was then publicly proclaimed and signed by some of the conference participants in the presence of Stephen Hawking in the Balfour Room of the Hotel du Vin in Cambridge. The statement, now known as “[The Cambridge Declaration on Consciousness](#),” includes the following:

“The absence of a neocortex does not appear to preclude an organism from experiencing affective states. Convergent evidence indicates that non-human animals have the neuroanatomical, neurochemical, and neurophysiological substrates of conscious states along with the capacity to exhibit intentional behaviors. Consequently, the weight of evidence indicates that humans are not unique in possessing the neurological substrates that generate

consciousness. Nonhuman animals, including all mammals and birds, and many other creatures, including octopuses, also possess these neurological substrates.”

Although the Cambridge Declaration was not signed by all or most of the attendees at the Crick Memorial Conference, it has been [widely cited](#) and has likely supported further developments regarding animal sentience in public policy.

In 2015, several regions and countries passed legislation affirming that animals are sentient beings. Quebec passed legislation according to which animals are no longer “moveable assets” under the new law but “sentient beings with biological needs” – needs that may no longer be “compromised” (LegisQuebec, 2021). In the French Rural Code, kept domestic animals were already recognized as sentient beings but the Civil Code still considered animals to be property. In 2014, an amendment was introduced to change the legal status of animals and, the following year, the Civil Code was amended to describe animals as “living beings endowed with sentience” (Lawyers for Animal Protection-EU, 2015). New Zealand also formally recognised sentience in its Animal Welfare Act (Ministry for Primary Industries, 2015). The New Zealand National Animal Welfare Advisory Committee (NAWAC) stated that animal sentience means “that animals have emotions, feelings, perceptions, and experiences that matter to them. These can be negative (such as pain or boredom) as well as positive (such as pleasure or comfort.”

In 2016, Colombia recognized animals as sentient beings in its animal welfare legislation (Contreras, 2016). The new law recognized animals to be sentient beings and introduced new penalties for animal abuse. The new sanctions included prison sentences and fines and are, according to Contreras, the most stringent in all of Latin America for the crimes of animal abuse and abandonment.

In 2019, the Australian Capital Territory (ACT) passed The Animal Welfare Legislation Amendment Bill (Kotzmann, 2020). The Act recognises that animals are sentient, having the ability to “subjectively feel and perceive the world around them.” The ACT is the first jurisdiction in Australia to recognize animal sentience explicitly and Kotzmann argues that while this recognition is largely symbolic, it is a welcome development that holds promise to improve animal protection (see also Orzechowski, 2015).

Some countries do not formally mention “sentience” but do refer to the animal having mental as well as physical states. These countries include Indonesia, Norway, Switzerland and Turkey. The [Animal Protection Index](#) run by World Animal Protection is a useful guide on where countries stand on the sentience issue – and on other animal welfare issues.

### **The UK Sentience Debate Post-Brexit**

After the Brexit referendum to leave the European Union, the British Government adopted existing European legislation wholesale (with some exceptions) to avoid chaos in the transition to home rule in the UK. The announced intention was to use the European legislation as a starting point and then, at leisure, to amend the legislation for UK purposes reflecting the new ability for the UK to act without gaining agreement with

the EU. However, the government ran into political problems when it came to the Lisbon Treaty's declaration regarding animal sentience.

Declarations of this kind are common in European legislation but unusual in British law. The British Government initially proposed not to adopt this text at all, suggesting that recognition of animal sentience was already implicit in British law, for example in the Animal Welfare Act (Ares 2019). This recognition, however, merely reflected practical guidance that had preceded the formal recognition of sentience in European law. The government's position on the sentience issue led to considerable public controversy (Magee & Petkov, 2021), since the suggestion that animal sentience would be less explicitly recognised after Brexit had never featured in the referendum debate, and many of Brexit's supporters were as dismayed by the loss of "animal sentience" language as were Brexit's opponents (e.g., McCulloch, 2019). The Government reconsidered its position and promised that the gap formally recognizing animal sentience would be filled by the time that Britain actually left the EU.

This promise was not kept, partly due to the pressure of other legislation but mainly because Ministers were still debating how an animal sentience provision might be implemented. Eventually, it was decided to try to improve on the European declaration. Not only would sentience be recognised, but a permanent [Animal Sentience Committee](#) would be established that could challenge Ministers who seemed to be failing to give proper consideration to the needs of animals. If challenged by the Sentience Committee, the Minister would be required to make a statement to Parliament, with the accompanying embarrassment and potential political controversy that might follow.

However, the Government was anxious to avoid the potential for judicial review of every law passed by Parliament on the real or spurious contention that it had not shown sufficient consideration of animal welfare. The Government's proposed solution has been to incorporate any challenges into the normal political process. For example, when any government policy is being (or has been) formulated, the Animal Sentience Committee may produce a report on the extent to which the government has taken "due regard to the ways in which the policy might have an adverse effect on the welfare of animals as sentient beings." The bill also requires a formal response to any such report from the relevant departmental minister.

The [Animal Welfare \(Sentience\) Bill](#) made its way through parliament and received the Royal Assent (I.e., became law) on April 28, 2022 (DEFRA, 2022). Recently, the Government also announced that the Animal Sentience Bill would be extended to include not just vertebrates but also two invertebrate groups – the cephalopod mollusks (octopodi, squids and cuttlefish) and the decapod crustaceans (crabs, lobsters, shrimp and crayfish) (Baker, 2021). The driving force behind this expansion to include some invertebrates, as noted earlier in this target article, was the new report by Birch et al (2021) from the London School of Economics (see Crump et al, 2022).

The Animal Sentience Bill applies only to England and Wales because animal welfare issues are now the responsibility of the devolved parliaments in Scotland and Northern Ireland. However, for issues like trade which is reserved to the parliament in Westminster (not devolved to the parliaments in Scotland and Northern Island), the bill gives the Animal Sentience Committee the ability to consider whether a particular trade

policy takes due regard of animal sentience for the UK as a whole. The British bill contains no declarations but does establish a process to address animal sentience. The EU Lisbon Treaty has a declaration but not yet a process to implement the declaration's presumed intent.

## Conclusions

The debate over animal sentience in the UK is driving change that could have a lasting impact on how humans treat and view animals. These developments take the original Lisbon Treaty declaration that animals are sentient beings to new policy positions. The UK is not the only country exploring the extent of animal sentience and its implications for society. Spain has recently recognized that animals are sentient in a new law (Jane, 2021) and South Korea is discussing the issue (Jane, 2021a). Meanwhile, Robertson and Goldsworthy (2022) explore the legal implications of these and other moves and argue that acceptance of animal sentience in law should be based not just on how to avoid negative experiences for animals but also on how humans can provide domestic animals with positive experiences. The American Bar Association also includes a major report on animal sentience on its website (Anon, 2020).

Acceptance of the fact that the commonly farmed species are sentient, and that it is possible to gain information about what animals are feeling by indirect means, has greatly advanced animal welfare science in the past 25 years. A growing body of evidence has been assembled about states of suffering experienced by farm animals and other domestic animals, including the experience of pain, fear, frustration and deprivation. Research is also needed on states of pleasure as well on where in phylogenesis and when in ontogenesis sentience emerges.

So far, however, there has been little evidence that the various declarations that animals are sentient in other countries and regions have had much direct impact on animal protection legislation or on how animals are actually being treated. Nevertheless, it is very unlikely that incorporating animal sentience language in legislation would be harmful to the interests of animals in any way. For example, it is possible that the campaign in the EU to end the caging of farm animals could succeed (Dullaghan, 2020) in the next decade and that, if it does, the sentience language will have played a role. Nevertheless, it is not possible to conclude today that the declaration that animals are sentient in the Treaty of Lisbon has had any specific effect in improving animal treatment in the EU.

**Co-Authors' Declaration of Interests:** One of the co-authors of this paper (NP) is a current member of staff of *Compassion* (formerly *Compassion in World Farming*) and another co-author (J D'S) was CEO of *Compassion* from 1991-2005 and still does consultancy work for the organization. Two co-authors (ANR & IJD) are animal welfare scientists who have only limited connections with *Compassion*. We (ANR and IJD) would like to express our admiration for the substantial impact that *Compassion* has had on the farm animal welfare debate and for its successful campaign to insert "animal sentience" language into the EU governing Treaty. Whereas *Compassion* undoubtedly received considerable assistance from many animal advocates in Europe, it is the opinion of ANR and IJD that it should be recognized as the organization that conceived of the importance of sentience language and then successfully campaigned to have animals recognized as sentient beings in EU legislation. ANR invited JD'S to assist in the development of this target article and JD'S added NP as a co-author.

**Call for Commentary:** *Animal Sentience* publishes [Open Peer Commentary](#) on all accepted target articles. Target articles are peer-reviewed. Commentary articles are editorially reviewed. There are submitted commentaries as well as invited commentaries. Commentary articles appear as soon as they have been reviewed, revised and accepted. Target article authors may respond to their commentaries individually or in a joint response to multiple commentaries.

## References

- Abel, T., Martin, K.C., Bartsch, D., Kandel, E.R., 1998. Memory suppressor genes: Inhibitory constraints on the storage of long-term memory. *Science* 279, 338–341.
- [Agriculture \(Miscellaneous Provisions\) Act](#). 1968.
- Anonymous 1984. [Ex-worker speaks out on veal farm](#). West Sussex County Times November 23, 1984.
- Anonymous, 2020. [Enshrining Animal Sentience into Law: Global Developments and Implications](#).
- Ares, E. 2019. [Animal Sentience and Brexit](#). UK Parliament Briefing Paper #8155.
- Bailey, C.H., Bartsch, D., Kandel, E.R., 1996. Toward a molecular definition of long-term memory storage. *Proc. Natl. Acad. Sci. U.S.A.* 93, 13445–13452.
- Baker, H. 2021. [Octopuses, squids and lobsters could become 'sentient beings' in the UK](#).
- Bareham, J.R., 1972. Effects of cages and semi-intensive deep litter pens on the behaviour adrenal response and production in two strains of laying hens. *Br. Vet. J.* 128, 153–163.
- Belvin, M.P., Yin, J.C., 1997. Drosophila learning and memory: recent progress and new approaches. *Bioessays* 19, 1083–1089.
- Benson, G.J., 2004. In: Benson, G.J., Rollin, B.E. (Eds.), *Pain in Farm Animals: Nature, Recognition, and Management*. Blackwell Publishing, Ames, Iowa, pp. 61–84.
- Bentham, J., 1789 (1970). *An Introduction to the Principles of Morals and Legislation*. Eds J.H. Burns & H. L. A. Hart, p. xliii. Athlone Press, London.
- Berridge, K. 2022. Brain Bases of Delight, Desire and Dread. *Biological Psychiatry*, 91(9), S47.
- Berridge, K.C., 2003. Pleasures of the brain. *Brain Cogn.* 52, 106–128.
- Birch, J, Burn, C, Schnell, A, Browning, H & Crump, A. 2021. [Review of the Evidence of Sentience in Cephalopod Molluscs and Decapod Crustaceans](#). LSE Consulting, London.
- Blattner, C.E. 2019. The recognition of animal sentience by the law. *J. Animal Ethics* 9:121-136.
- Buxton, M. 1984. The influence of William James on John Dewey's early work. *Journal of the History of Ideas*, 45(3), 451-463.
- Brambell Report 1965. *Report of the Technical Committee to Enquire into the Welfare of Animal Kept under Intensive Livestock Husbandry Systems*. Her Majesty's Stationery Office, London, Command Paper 2836.
- Briefer, E. F., Sypherd, C. C. R., Linhart, P., Leliveld, L., Padilla de la Torre, M., Read, E. R., ... & Tallet, C. (2022). [Classification of pig calls produced from birth to slaughter according to their emotional valence and context of production](#). *Scientific Reports*, 12(1), 1-10.
- Broom, D.M. 2014. *Sentience and Animal Welfare*. CABI: Wallingford, UK
- Bryant, M.J., 1972. The social environment: behaviour and stress in housed livestock. *Vet. Rec.* 90, 351–359.
- Burn, C.C. 2017. [Bestial boredom: a biological perspective on animal boredom and suggestions for its scientific investigation](#). *An. Behav.* 130:141-151.

- Carruthers, P. 2008. *Human and Animal Minds: The Consciousness Questions Laid to Rest*. Oxford University Press: Oxford.
- Chandroo, K.P., Duncan, I.J.H., Moccia, R.D., 2004. Can fish suffer? Perspectives on sentience, pain, fear and stress. *Appl. Anim. Behav. Sci.* 86, 225–250.
- Chile 2009. [Law 20380 on the Protection of Animals, 2009](#). Article 2 states that animals should be “respected and protected as living sentient beings that are part of nature.”
- Contreras, C. 2016. [Sentient Beings Protected by Law. Analysis of Recent Changes in Colombian Animal Welfare Legislation](#). *Global J. An. Law.* No. 2, 1-19.
- Council Directive 2008/119/EC, 2008. [Council Directive 2008/119/EC of 18 December 2008 laying down minimum standards for the protection of calves](#).
- Coria-Avila, G. A., Pfaus, J. G., Orihuela, A., Domínguez-Oliva, A., José-Pérez, N., Hernández, L. A., & Mota-Rojas, D. 2022. The Neurobiology of Behavior and Its Applicability for Animal Welfare: A Review. *Animals*, 12(7), 928.
- Crump, A, Browning, H., Schnell, A., Burn, C. & Birch, J. 2022. Framework for evaluating evidence of sentience: Applied to decapod crustaceans. *Animal Sentience* 31(1), In press.
- Damasio, A., 1999. *The Feeling of What Happens: Body Emotion and the Making of Consciousness*. Vintage Random House, London.
- Danbury, T.C., Weeks, C.A., Chambers, J.P., Waterman-Pearson, A.E., Kestin, S.C., 2000. Self-selection of the analgesic drug Carprofen by lame broiler chickens. *Vet. Rec.* 146, 307–311.
- Dawkins, M.S., 1976. Towards an objective method of assessing welfare in domestic fowl. *Appl. Anim. Ethol.* 2, 245–254.
- Dawkins, M.S., 1977. Do hens suffer in battery cages? Environmental preferences and welfare. *Anim. Behav.* 25, 1034– 1046.
- Dawkins, M.S., 1978. Welfare and the structure of battery cages: Size and cage floor preferences in domestic hens. *Br. Vet. J.* 134, 469–475.
- Dawkins, M.S., 1980. *Animal Suffering*. Chapman and Hall, London.
- Dawkins, M.S., 1983. The current status of preference tests in the assessment of animal welfare. In: Baxter, S.H., Baxter, M.R., MacCormack, J.A.C. (Eds.), *Farm Animal Housing and Welfare*. Martinus Nijhoff, The Hague, pp. 20–26.
- Dawkins, M.S., 1990. From an animal's point of view: motivation, fitness, and animal welfare. *Behav. Brain Sci.* 13, 1–61.
- Dawkins, M.S., 1993. *Through Our Eyes Only? The Search for Animal Consciousness*. W.H. Freeman, Oxford.
- Dawkins, M.S., Beardsley, T.M., 1986. Reinforcing properties of access to litter in hens. *Appl. Anim. Behav. Sci.* 15, 351–364.
- DEFRA 2022. [Animal health and welfare bills receive Royal Assent](#), UK Department for Environment, Food and Rural Affairs, 28 April, 2022.
- D’Silva, J. 2006. [Obituary: Peter Roberts: Founder and director of Compassion in World Farming](#). *The Guardian*, 23 November.
- Dullaghan, N. 2020. [Will the EU announce by 2024 going cage-free?](#)
- Duncan, I.J.H., 1978. The interpretation of preference tests in animal behaviour. *Appl. Anim. Ethol.* 4, 197–200.
- Duncan, I.J.H., 1981. Animal rights—animal welfare: a scientist’s assessment. *Poult. Sci.* 60, 489–499.
- Duncan, I.J.H., 1987. The welfare of farm animals: an ethological approach. *Sci. Prog. (Oxford)* 71, 317–326.
- Duncan, I.J.H., 1992. Measuring preferences and the strength of preference. *Poult. Sci.* 71, 658–663.

- Duncan, I.J.H., 1996. Animal welfare defined in terms of feelings. *Acta Agri. Scand., Sec. A, Anim. Sci., Suppl. 27*, 29–35.
- Duncan, I.J.H., 2004. A concept of welfare based on feelings. In: Benson, G.J., Rollin, B.E. (Eds.), *The Well-Being of Farm Animals: Challenges and Solutions*. Blackwell, Ames, Iowa, pp. 85–101.
- Duncan, I.J.H., Dawkins, M.S., 1983. The problem of assessing ‘well-being’ and ‘suffering’ in farm animals. In: Smidt, D. (Ed.), *Indicators Relevant to Farm Animal Welfare*. Martinus Nijhoff, The Hague, pp. 13–24.
- Duncan, I.J.H., Kite, V.G., 1987. Some investigations into motivation in the domestic fowl. *Appl. Anim. Behav. Sci. 18*, 387–388.
- Duncan, I.J.H., Beatty, E.R., Hocking, P.M., Duff, S.R.I., 1990. An assessment of pain associated with degenerative hip disorders in adult male turkeys. *Res. Vet. Sci. 50*, 200–203.
- Fraser, D., Duncan, I.J.H., 1998. ‘Pleasures’ ‘pains’ and animal welfare: toward a natural history of affect. *Anim. Welf. 7*, 383–396.
- Fraser, D., Matthews, L.R., 1997. Preference and motivation testing. In: Appleby, M.C., Hughes, B.O. (Eds.), *Animal Welfare*. CAB International, Wallingford, Oxon, pp. 159–173.
- Freeman, B.F., 1978. Stress in caged layers. In: Sørensen, L.Y. (Ed.), *First Danish Seminar on Poultry Welfare in Egg-Laying Cages*. Danish National Committee for Poultry and Eggs, Copenhagen, pp. 55–65.
- Garner, R., & Okuleye, Y. 2020. *The Oxford Group and the Emergence of Animal Rights: An Intellectual History*. Oxford University Press
- Godlovitch, S., Harris, J., & Godlovitch, R. 1971. *Animals, Men and Morals*. Gollancz.
- Griffin, D., 1976. *The Question of Animal Awareness*. Rockefeller, New York.
- Harrison, R., 1964. *Animal Machines*. Vincent Stuart, London.
- Hughes, B.O., 1975. Spatial preference in the domestic hen. *Br. Vet. J. 131*, 560–564.
- Hughes, B.O., 1977. Selection of group size by individual laying hens. *Br. Poult. Sci. 18*, 9–18.
- Hughes, B.O., Black, A.J., 1973. The preference of domestic hens for different types of battery cage floor. *Br. Poult. Sci. 14*, 615–619.
- Hume, D., 1739. In: Selby Bigge, L.A. (Ed.), *A Treatise of Human Nature*. Clarendon Press, Oxford.
- Humphrey, N., 1986. *The Inner Eye*. Faber and Faber, London.
- Humphrey, N., 1992. *A History of the Mind: Evolution and the Birth of Consciousness*. Springer-Verlag, New York.
- James, W., 1904. Does “consciousness” exist? *J. Philos. Psychol. Sci. Meth. 1*, 477–491.
- Jane, A. 2021. [Spain recognizes animals as sentient beings in new law.](#)
- Jane, A 2021a. [South Korea to legally recognize animals as sentient beings.](#)
- Kenny, A., 1970. *Descartes’ Philosophical Letters*. Clarendon Press, Oxford.
- Klein, C & Barron, AB. 2016. [Insects have the capacity for subjective experience.](#) *Animal Sentience 9(1)*,
- Kotzmann, J. 2020. Recognising the Sentience of Animals in Law: A Justification and Framework for Australian States and Territories. *Sydney Law Rev 42(3)*, 281-310.
- [Lawyers for Animal Protection-EU](#). 2015.
- LegisQuebec 2021. [Animal Welfare and Safety Act, Chapter B-3.1.](#)
- Marino, L & Merskin, D. 2019. [Intelligence, complexity and individuality in sheep.](#) *Animal Sentience 25(1)*. Doi.10.51291/2377-7478.1374
- Mason, G., McFarland, D., Garner, J., 1998. A demanding task: using economic techniques to assess animal priorities. *Anim. Behav. 55*, 1071–1075.
- Mason, G., Cooper, J., Clarebrough, C., 2001. Frustrations of fur-farmed mink. *Nature 410*, 35–36.

- Mather, J. 2019. [What is in an octopus's mind?](#) *Animal Sentience* 26(1). Doi. 10.51291/2377-7478.1370
- McDougall, W., 1926. *An Introduction to Social Psychology* (revised edition). John W. Luce and Co, Boston.
- McFarland, D., 1981. *The Oxford Companion to Animal Behaviour*. Oxford University Press, Oxford.
- Meagher, RK., Campbell, DLM. & Mason, GJ. 2017. Boredom-like states in mink and their behavioral correlates: a replicate study. *Appl. An. Behav. Sci.* 197, 112-119.
- Meagher, R. K., & Robbins, J. 2021. Parallels to Boredom in Nonhuman Animals. In A. Elpidorou (ed.) *The Moral Psychology of Boredom*, 267. Rowman & Littlefield.
- Mellor, D.J. and Diesch, T.J. 2006. Onset of sentience: the potential for suffering in fetal and newborn farm animals. *Applied Animal Behaviour Science* 100, 48- 57.
- Mellor, DJ, Beausoleil, NJ, Littlewood, KE, McLean, AN, McGreevy, PD, Jones, B & Wilkins, C. 2020. [The 2020 Five Domains model: Including human-animal interactions in assessments of animal welfare](#). *Animals* 10(10), 1870.
- Mench, J.A., 1998. Thirty years after Brambell: whither animal welfare science? *J. Appl. Anim. Welf. Sci.* 1, 91-102.
- Metz, J.H.M. & Groenestein C.M. 1991. [New Trends in Veal Calf Production](#). Proceedings of the International Symposium on Veal Calf Production, Wageningen, The Netherlands.
- Mikhalevich, I, & Powell, R. 2020. [Minds without spines: Evolutionarily inclusive animal ethics](#). *Animal Sentience* 29(1). Doi.10.51291/2377-7478.1527
- Ministry for Primary Industries. 2015. [Animal sentience: Their Emotions, Feelings, and Experiences of Life](#).
- Molony, V., Kent, J.E., 1997. Assessment of acute pain in farm animals using behavioural and physiological measurements. *J. Anim. Sci.* 75, 266-272.
- Nicol, C.J., Guildford, T., 1991. Exploratory activity as a measure of motivation in deprived hens. *Anim. Behav.* 41, 333-341.
- O'hman, A., Flykt, A., Lundqvist, D., 2000. Unconscious emotion: Evolutionary perspectives, psychophysiological data and neuropsychological mechanisms. In: Ekman, P., Davidson, R.J. (Eds.), *Cognitive Neuroscience of Emotion*. OUP, Oxford, pp. 296-327.
- Orzechowski, K. 2015. [The Importance of Sentience in Animal Legislation](#).
- Paul, E.S., Harding, E.J., Mendl, M., 2005. Measuring emotional processes in animals: the utility of a cognitive approach. *Neurosci. Biobehav. Rev.* 29, 469-491.
- Preece, R., 2002. *Awe for the Tiger Love for the Lamb: A Chronicle of Sensibility to Animals*. UBC Press, Vancouver.
- Radner, D., Radner, M., 1989. *Animal Consciousness*. Prometheus Books, Buffalo, New York.
- Reber, Arthur S. 2016. [Caterpillars, consciousness and the origins of mind](#). *Animal Sentience* 11(1). Doi.10.51291/2377-7478.1124
- Ristau, C.A. (Ed.), 1991. *Cognitive Ethology: The Minds of Other Animals*. Lawrence Erlbaum Associates, Hillsdale, New Jersey.
- Robertson, I & Goldsworthy, D. 2022. Recognising and defining animal sentience in legislation: A framework for importing positive animal welfare through the five domains model. *Monash Univ. Law Rev.* 48(1), 1-22.
- Romanes, G.J., 1884. *Mental Evolution in Animals*. AMS Press, New York (reprinted 1969).
- Rose, J.D., 2002. The neurobehavioral nature of fishes and the question of awareness and pain. *Rev. Fish. Sci.* 10, 1-38.
- Ryder, R. D. 1975. *Victims of Science: The Use of Animals in Research*. Davis-Poynter, London.
- Singer, P. 1975. *Animal Liberation*. The New York Review of Books (Distributed by Random House), New York.
- Singer, P. 1982. [The Oxford vegetarians – a personal account](#). *Int. J. Study Animal Problems* 3:6-9.

- Skinner, B.F., 1975. The steep and thorny path to a science of behaviour. In: Harre, R. (Ed.), *Problems of Scientific Revolution*. Oxford University Press, Oxford.
- Smith, E. & Dauncey, G. 2007. *Building an Ark*, pp. 234-5. New Society Publishers, Gabriola, BC, Canada.
- Spencer, H., 1855. *The Principles of Psychology*. Longmen, Brown, Green and Longmans, London.
- Spruijt, B.M., van den Bos, R., Pijlman, F.T.A., 2001. A concept of welfare based on reward evaluating mechanisms in the brain: anticipatory behaviour as an indicator for the state of reward systems. *Appl. Behav. Anim. Sci.* 72, 145–171.
- [Tanzania Animal Welfare Act, 2008.](#)
- Taylor, A.A., Weary, D.M., 2000. Vocal responses of piglets to castration: identifying procedural sources of pain. *Appl. Anim. Behav. Sci.* 70, 17–26.
- Treaty of Amsterdam, 1997. [Animal Sentience Protocol](#) on page 110 of the Official Journal C340, 10/11/1997.
- Treaty of Lisbon, 2007. [Article 13.](#)
- Turner, J. & d’Silva, J. (Eds.). 2006. *Animals, Ethics and Trade: The Challenge of Animal Sentience*. Routledge, London.
- Watson, J.B., 1928. *Behaviorism*. Routledge and Keegan Paul, London.
- Weary, D.M., Braithwaite, L.A., Fraser, D., 1998. Vocal responses to pain in piglets. *Appl. Anim. Behav. Sci.* 56, 161–172.
- Webster, J. 2006. [Animal sentience and animal welfare: What is it to them and what is it to us?](#) *Appl. Anim. Behav. Sci.* 100(1-2): 1-13.
- Webster, J. (Ed) 2006a. Sentience in animals. *Appl. Anim. Behav. Sci.* 100(1-2): 1-152.
- [Welfare of Farmed Animals \(England\) Regulations 2000.](#)
- Wells, M.J., 1962. *Brain and Behaviour in Cephalopods*. Heinemann, London.
- Wemelsfelder, F., 1993. The concept of animal boredom and its relationship to stereotyped behaviour. In: Lawrence, A.B., Rushen, J. (Eds.), *Stereotypic Animal Behaviour: Fundamentals and Applications to Welfare*. CAB International, Wallingford, UK, pp. 65–95.
- Widowski, T.M., Duncan, I.J.H., 2000. Working for a dustbath: are hens increasing pleasure rather than reducing suffering? *Appl. Anim. Behav. Sci.* 68, 39–53.
- Winkielman, P., Berridge, K.C., 2004. Unconscious emotion. *Curr. Direc. Psychol. Sci.* 13, 120–123.
- Wood-Gush, D.G.M., Duncan, I.J.H., Fraser, D., 1975. Social stress and welfare problems in agricultural animals. In: Hafez, E.S.E. (Ed.), *The Behaviour of Domestic Animals*. 3rd ed. Williams and Wilkins, Baltimore, pp. 182–200.
- Youatt, W.H., 1839. In: Preece, R. (Ed.). 2003. *The Obligation and Extent of Humanity to Brutes, Principally Considered with Reference to the Domesticated Animals*. Edwin Mellen Press, Lewiston, New York.
- Young, P.T., 1959. The role of affective processes in learning and motivation. *Psychol. Rev.* 66, 104–125.