Response from the Royal Society of Biology
to the Department for Environment, Food and Rural Affairs' consultation on the draft Animal Welfare (Sentencing and Recognition of Sentience) Bill.

07 February 2018

The Royal Society of Biology (RSB) is a single unified voice, representing a diverse membership of individuals, learned societies and other organisations. We are committed to ensuring that we provide Government and other policy makers, including funders of biological education and research, with a distinct point of access to authoritative, independent, and evidence-based opinion, representative of the widest range of bioscience disciplines.

Summary and recommendations

- We welcome Government's commitment to high standards of animal welfare in the UK.
- Clause 1 of the draft Bill is problematic, both in relation to the degree of uncertainty of its meaning, and because it proposes to open any potentially-relevant Ministerial policy or implementation decision to scrutiny via the courts. We recommend careful reconsideration of the mechanisms by which Ministers will be accountable for their decisions in support of welfare-relevant policy.
- The provisions laid out in Clause 2 of the draft Bill could be considered separately, as this could be done without delay, by an amendment to section 32 of the Animal Welfare Act 2006 (AWA), through delegated legislation.
- We recommend that all relevant Governmental departments are actively engaged in discussion regarding the development of this draft Bill and that conflict with extant legislation, including the Animals in Scientific Procedures Act 1986 (ASPA) and AWA, is avoided carefully.
- We recommend that the wording of this draft Bill is edited to follow the established working precedent of other statutes, and that it lists those taxa in its scope, by adopting the notion of 'protected animal'. We suggest a definition of 'protected animal' based on current legislation in the main body of our response below, paragraph 3.2.
- We recommend the draft Bill contain a clause that grants to a responsible national authority (the Minister) the power to update the list of protected animals. The minister's decision should be informed by scientific evidence of relevant biological parameters and should involve expert consultation.

- We consider that the policy scope of this draft Bill, as currently worded, should be restricted to those cases where protected animals come under human control, either permanently or temporarily. We propose a legal use of the term 'protected animal' to define the species covered by the proposed Bill and the specific situations in which they are living.

- We also recommend that the draft Bill be reworded to provide clarity on the policy areas affected and reference to all relevant Acts governing specific policies, including the ASPA and AWA.

1. Background and position

1.1 The Royal Society of Biology welcomes this opportunity to comment on the draft Animal Welfare Bill. To develop our response we collected views and evidence from our membership with specific expertise in the science of animal welfare, research and farming. Much of this expertise is represented in the Animal Science Group[1], a special interest group of the Royal Society of Biology.

1.2 We recommend that Clause 1 of the draft Animal Welfare Bill, which places a duty on Ministers of the Crown to have regard to 'the welfare needs of animals as sentient beings in formulating and implementing government policy', as well as an obligation to have regard to matters affecting public interest while discharging that duty, be reconsidered and revised.

1.3 We have considered the aims and any unintended consequences that relate to Clause 1 of the draft Bill carefully, in light of its difference from other relevant acts pertaining to animal welfare in the UK. In this response, we do not seek to address the legal technicalities of the draft Bill, leaving that to the relevant experts, and we are aware that some very valuable commentary has already been produced[2]. However, we do not believe that recourse to legal challenge in the courts of Ministers' policy and implementation decisions with implications for animal welfare is the correct way to achieve the policy objective of improved animal welfare. There is a real risk of delay in policy development for fear of unnecessary litigation. At the same time, we value the aim of ensuring a fair and strong legal framework for the welfare of animals. We are aware that standards of welfare do vary across the different instances where animals come under human control. Decisions pertaining to animal welfare in these contexts are complex and require balance across several, occasionally conflicting, factors. In developing or implementing policy, it is fundamentally important that scientific data, peer-reviewed studies and evidence is taken carefully into consideration. In this response, we focus on science advice to policy on animal welfare and point to several difficulties about the potential use of definitions in the present draft Bill. We comment on the policy scope of the draft Bill and, crucially, the potential for conflict with extant statutes pertaining to animals and their welfare.

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[1] For further information about the Animal Science Group, a special interest group of the Royal Society of Biology, see: https://www.rsb.org.uk/policy/groups-and-committees/asg

[2] Written evidence to the Environment, Food and Rural Affairs Committee inquiry on draft Animal Welfare Bill by Sir Stephen Laws (17 January 2018). http://data.parliament.uk/writtenevidence/committeeevidence.svc/evidencedocument/environment-food-and-rural-affairs-committee/draft-animal-welfare-sentencing-and-recognition-of-sentience-bill-2017/written/76671.pdf

1.4 We welcome the proposal made in Clause 2, to amend the existing Animal Welfare Act (AWA) 2006, in relation to the mode of trial and maximum penalty for certain animal welfare offences (under section 32 of AWA 2006). Since we recommend that Clause 1 is reconsidered and revised, we therefore recommend considering an amendment to section 32 of AWA 2006 through delegated legislation to achieve the objective laid out in Clause 2 of the draft Animal Welfare Bill.

2. Definition of sentience

2.1 To provide a scientific definition of sentience, suitable to use in court, is particularly challenging. The word sentience has a variety of possible meanings and inherits a significant philosophical legacy, spanning much of the history of western thought on human minds and those of other animals. The broad definition, such as provided by the Oxford English Dictionary (OED)[3], and its use in a judicial setting, would require that a judge be able to arbitrate on what sentience should mean in each context under consideration, which is not desirable. Current scientific knowledge can inform but not define sentience, which is a position that warrants improvement. We would emphasise that these are areas in which improved knowledge is specifically needed and capacity and resource for greater research focus overdue.

2.2 It is not clear whether sentience per se is intended to define the set of animals to come under the draft Bill as proposed, if so we would argue against this. We propose, following the established and working precedent of other statutes, that the set of species to be protected under the draft Bill be stated with the caveat that a responsible authority will be granted the right to update the list (see section 3 below). The field is not sufficiently advanced to confer a clear-cut science-based assessment of sentience across the animal kingdom in order to codify animals to be considered under the draft Bill as it stands. The inclusion of any new species (in addition to a preliminary set) should, nonetheless, be informed by scientific evidence on a number of biological parameters such as expression of pain in animals, and should involve expert consultation[4] rather than hoping to rely on a prescriptive, or tick-box definition of sentience, that will lack current consensus and would be at best, based on patchy science. We provide a very short survey of the biology related to emotional states and cognition in animals in appendix 1.

[3] Sentient = Able to perceive or feel things.

[4] An example of such expert consultation is provided by the Scientific Panel on Animal Health and Welfare (AHAW) that produced an opinion on 'Aspects of the biology and welfare of animals used for experimental and other scientific purposes' to inform the drafting of Directive 2010/63/EU for the use of animals in research. The report is available at https://www.efsa.europa.eu/en/efsajournal/pub/292

3. Definition of animal

3.1 We recommend a more specific and legal definition of animal, in keeping with extant UK Statutes[5],[6] and EU legislation[7]. The OED definition roughly approximates a biological definition of animals (as in kingdom *Animalia*)[8]. This last definition would pertain to all animal species, including earthworms, comb-jellies and others, which lack the neuroanatomical, physiological and behavioural complexity that would currently provide the basis for enhanced protection and welfare.

By analogy with other Acts, such as ASPA 1986, we therefore recommend adoption of the **notion of** '**protected animals**' in any future Animal Welfare (Recognition of Sentience) Bill. The value of adopting this terminology is that it will require clarity in the definitions of which animals will be included and on what grounds they will be included. In addition, the list of 'protected animals' can be extended by the relevant authorities, after considering scientific evidence and receiving a variety of expert opinions.

3.2 **An animal, for the purpose of this Bill, could be defined as:**

1. **any living non-human vertebrate, including:**
   - **(a) independently feeding embryonic and larval forms; and**
   - **(b) embryonic forms of a mammal, bird or reptile as from the last third of their normal gestational development or incubation.**
2. **any living cephalopod;** (we provide further detail on this point in Appendix 2).
3. **additional living members of species specified by the appropriate national authority (the Minister) when satisfied that scientific evidence and expert input on evidence of pain, suffering, behavioural and neurological complexity warrants special protection under the Act.**

3.3 We also advise that the definition of an 'animal' in scope of this draft Bill should not only specify the taxa to be protected but also whether they come under human control (either permanently or temporarily).It follows that the context(s) in which a protected animal should be considered as under human control must be defined as clearly as possible to avoid confusion or uncertainty. (See paragraph 4.2 of this response for further information).

3.4 In appendix 2, we discuss briefly the status of some invertebrate species, currently protected by existing Acts, such as cephalopods, and others, like decapod crustaceans, for which a scientific

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[5] Animal Welfare Act 2006, 1. Animals to which the Act applies. Available at http://www.legislation.gov.uk/ukpga/2006/45/section/1

[6] Animals (Scientific Procedures) Act 1986 Amendment Regulations 2012. 1. Protected animals. Available at: www.gov.uk/government/uploads/system/uploads/attachment_data/file/619140/ConsolidatedASPA1Jan2013.pdf

[7] Directive 2010/63/EU on the protection of animals used for scientific purposes. Article 1.3. Available at http://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32010L0063&from=EN

[8] Animals are eukaryotic, multicellular organisms (at least for most of their life-cycles), that obtain their food by eating rather than photosynthesizing and have at least one self-powered mobile stage in their life-cycles. See Arthur, W. (2014). Evolving animals. The story of our kingdom. Cambridge: Cambridge University Press, pp. 1-7

debate is ongoing about their inclusion as protected species. We also touch upon the problem of the inclusion of embryonic forms as protected animals.

4. Definition of the welfare needs of animals

4.1 We would recommend that the proposed Bill as drafted adopts the five needs for protected animals defined in AWA 2006, Section 9.2, as a good basis for ensuring welfare:

i. Need for a suitable environment
ii. Need for a suitable diet
iii. Need to be able to exhibit normal behaviour patterns
iv. Need for housing with or apart from other animals
v. Need to be protected from pain, suffering, injury and disease

These needs are mirrored in the 'five freedoms' developed by the Farm Animal Welfare Council (FAWC), for ensuring animal welfare in the context of the livestock industry:

i. Freedom from Hunger and Thirst - by ready access to fresh water and a diet to maintain full health and vigour.
ii. Freedom from Discomfort - by providing an appropriate environment including shelter.
iii. Freedom from Pain, Injury or Disease - by prevention or rapid diagnosis and treatment.
iv. Freedom to Express Normal Behaviour - by providing sufficient space, proper facilities and company of the animal's own kind.
v. Freedom from Fear and Distress - by ensuring conditions and treatment that avoid mental suffering.

Since the introduction of the five freedoms in 1965, FAWC has examined the effectiveness of British policy on farm animal welfare and, more recently, proposed that "an animal kept in full compliance with the law should have a life worth living" [9]. This concept is of course very difficult to quantify, and must be weighed against the welfare and needs of other human and animal communities. We would therefore advise DEFRA to consider the recommendations included in this report, as part of a wide ranging review of evidence and expert consultation, when structuring a framework that will seek to broadly define the 'welfare need of animals'.

4.2 Scope of 'animal welfare needs[10]': this definition should apply to animals under human control and for which a responsible person can be identified[11]. These could include farmed animals,

[9] Please see Appendix 3 for a very brief summary of FAWC position on animal welfare from their 2009 report 'Farm Animal Welfare in Great Britain: Past, Present and Future'. Available at https://www.gov.uk/government/publications/fawc-report-on-farm-animal-welfare-in-great-britain-past-present-and-future

[10] The legal obligations related to welfare of animals coming under human control exist within a framework of certain rights due to the animals (e.g. a right to suitable feed and water) and corresponding duties by humans (e.g. a farmer feeding the animal), under whose responsibility the animal lies

[11] In a way akin to Animal Welfare Act 2006, Section 9. Available at https://www.legislation.gov.uk/ukpga/2006/45/section/9

companion animals, and wild animals when they are caught and kept under human control (certain gamebirds released in the wild for shooting[12], wild caught animals moved to enclosures[13], animals in public exhibits). In consideration of the fact that the European convention for the protection of animals kept for farming purposes will no longer apply after exit day, we recommend that DEFRA continues to support research on the developments of husbandry systems for agriculture and aquaculture to advance welfare and management[14].

5. Policy scope of the draft bill

5.1 **We recognise Government's commitment to improve and harmonise standards pertaining to animal welfare across a variety of policy sectors. In pursuing this goal, the present draft of the Bill – with its general, over-arching policy commitments – must explicitly refer to and harmonise with extant statutes. It must not only avoid introducing conflict in interpretation due to a lack of clarity of its legal terms but also ensure that all regulated work under existing Acts can continue, recognising the high level of welfare consideration currently applied.**

i. We note that currently several existing pieces of legislation work together in harmony to define and protect certain categories. We strongly recommend that dialogue with the relevant Government departments ensures that exemptions granted by other Acts, such as ASPA, 1986[15] or the Veterinary Surgeons Act, 1966[16], will be safeguarded.

ii. The proposed Bill should make clear how it relates and harmonises to various Acts pertaining to wildlife, specifically, animals living in the wild. As mentioned in 4.2, there are intermediate cases where wild animals come under temporary human control that warrant consideration in relation to this Bill.

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[12] For an expert opinion about the welfare of gamebirds, please see: Farm Animal Welfare Council, (2008). '*Opinion on the Welfare of Farmed Gamebirds'*. Available at https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/325047/FAWC_opinion_on_the_welfare_of_farmed_gamebirds.pdf

[13] For an expert opinion about the welfare of farmed and park deer, please see: Farm Animal Welfare Council, (2013). '*Opinion on the Welfare of Farmed and Park Deer'*. Available at https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/324515/FAWC_opinion_on_the_welfare_of_farmed_and_park_deer.pdf

[14] Article 20 (Research), Recommendation concerning farmed fish of the Standing Committee of The European Convention For The Protection Of Animals Kept For Farming Purposes. Available here: https://www.coe.int/t/e/legal_affairs/legal_co-operation/biological_safety_and_use_of_animals/farming/Rec%20fish%20E.asp#TopOfPage

[15] Exemptions for domestic and wild animals in scientific procedures as specified by The Animals (Scientific Procedures) Act 1986, Schedule 2, Paragraph 25. Available at https://www.legislation.gov.uk/uksi/2012/3039/schedule/2/made#text%3Dexempted%20species

[16] Exemption to Section 19 Restriction of practice of veterinary surgery by unqualified persons, subsection 1 for any procedure duly authorised under the Animals (Scientific Procedures) Act 1986. Available at https://www.legislation.gov.uk/ukpga/1966/36/crossheading/restriction-of-practice-of-veterinary-surgery

5.2 The policy scope of this draft Bill ultimately should be restricted to those cases where protected animals (defined as suggested in paragraph 3.2) come under human control. We recommend that DEFRA should reword this draft to clearly state all affected policy areas (some of which we listed in paragraph 4.2), while referring to the corresponding Acts governing specific policies, in order to provide legal clarity.

5.3 The Animals (Scientific Procedure) Act 1986 governs the use of animals in research and underpins our internationally leading welfare standards and science output. ASPA provides a good example of how to approach some of the definitions touched on in this draft Bill – that of 'protected animal' for example - and it devises a framework of harm and benefit analysis that guides Ministers in balancing consideration of animal welfare and public interest in granting licenses to conduct experiments involving animals. The benefit for society stemming from work regulated under ASPA is extensive, not only in economic terms but also because it underpins advancements in health treatments for humans and animals alike, and fundamental knowledge. Studies on certain species are not currently in scope of ASPA[6] or are granted through exemptions to other relevant Acts (see paragraph 5.1). The proposed Bill should not act to undermine them.

5.4 We support a goal of strengthening the legal framework for animal welfare in the UK. Regarding the conduct of research involving animals we believe that good science and good welfare go hand in hand. In order to achieve progressive change, whenever matters of animal welfare and use of animals are involved, there should be wide-ranging and evidence-rich discussions, comprising different voices.

6. Level of regard to public interest when implementing policies on animals

6.1 In relation to our previous point, we recognise the breadth of interests relevant to management of animal welfare. We agree that a variety of views should be considered in reaching a decision that impacts all of society. However, the method used to achieve this and to 'pay due regard to public interest', is key. Government must balance popular opinion with individual and minority group rights and welfare to ensure economic and societal stability. Key to the debate and development of policy is the good use and development of scientific knowledge and expertise.

6.2 We recommend that Government's decision making-process is as transparent as possible and puts evidence at the centre, recognising the fact that values play a part in the debate. In the process of policymaking, evidence should be weighted in a way that acknowledges its strength and grounding in good data, strong studies, and reliable sources, all within a sound ethical framework. We recommend a broad consideration of public interest, for example by considering results from surveys about consumers' attitudes and public dialogues; opinions by technical expert working groups, advisory groups, non-governmental organisations, the private sector and stakeholder groups (such as patient groups)- all weighing the potential consequences of action and inaction.

6.3 As highlighted by the OIE (World Organization for Animal Health), "animal welfare is a complex, multi-faceted public policy issue that includes important scientific, ethical, economic and political dimensions"[17]. The development of policies on animal welfare requires involvement of many stakeholders. As stated above, a clarification of the relevant dimensions of what constitutes the public interest should help in maintaining a balanced and evidence-based approach to decision making in this field. Government may wish to consider public information and engagement campaigns and initiatives about animal welfare, in order to ensure that citizens are well equipped to form balanced judgements, and that the range of societal concerns and interests are well known[18].

6.4 Education of the public, the consideration paid to trusted and independent expert opinion in Government decision-making process, and an intelligent use of public engagement are central to informing public perception, particularly around the use of animals in research and food production. We recommend that Government, through the making and implementation of policy, support a respectful, open, informed and balanced debate about the needs of animals and humans, alike.

7. Overall approach taken by DEFRA in drafting this Bill

7.1 We value Government's commitment to improve animal welfare standards in the UK. We believe the mechanisms to enact it are yet to be clearly defined. We agree with the recommendations recently published by the House of Commons Select Committee on Environment, Food and Rural Affairs Committee[19] that the use of legislation to reinforce a policy commitment, especially if drafted in the current form, is extremely problematic and should be revisited, in both form and substance. The mechanism by which a Minister could be held accountable to this broad policy commitment should be considered carefully, especially whether judicial proceedings could be an efficient and effective mechanism.

7.2 We would recommend Government pauses to analyse the best way forward. Current commitments under Article 13 of the Treaty on the Functioning of the European Union[20] states a

[17] Animal welfare at a glance by the World Organisation for Animal Health, available at http://www.oie.int/fileadmin/Home/eng/Media_Center/docs/pdf/Fact_sheets/AW_EN.pdf

[18] The latest EU strategy for the protection and welfare of animals (2012-2015) remarked the fact that animal welfare is both a societal and consumer concern. However, in relation to food, public concern about animal welfare is "*only one of the factors affecting consumers' choice and often this aspect does not come into play since consumers are not always well informed about the methods of production and their impact on the welfare of animals. Ultimately consumer decisions are driven mainly by price and directly verifiable characteristics of food products*", in EU Strategy for the Protection and Welfare of Animals 2012-2015 - Communication from the Commission to the European Parliament, the Council and the European Economic and Social Committee (2012). Available at http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A52012DC0006

[19] House of Commons Environment, Food and Rural Affairs Committee 'Pre-Legislative Scrutiny of the draft Animal Welfare (Sentencing and Recognition of Sentience) Bill' (2017). Available at https://publications.parliament.uk/pa/cm201719/cmselect/cmenvfru/709/709.pdf

[20] Article 13 states '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

very general principle in an international treaty that sets out the EU's constitutional basis. This draft Bill has a very different approach. We would welcome consideration of whether the Ministerial Code that sets out the standards of conduct of ministers could be an appropriate place to discuss these duties also.

7.3. However, if passing new legislation is judged as the best course of action, then we recommend the approach in the body of extant statutes that deal with animal welfare and their example in setting out the species and taxa of 'protected animals', as well as all the areas of policy to which the legislation applies. Additionally, any Act following presentation of the Bill derived from this draft in Parliament might aim to resolve all possible conflicts emerging in relation to the other Acts relating to animal welfare.

7.4 Definitions should be clear and without doubt of intention. We consider that the definition of sentience does not lend itself to much clarity. If Government wishes to introduce the concept of sentience onto the statute book then, rather than a problematic definition, we propose a criterion for it within a clause in the definition of protected animal, akin to what is observed in AWA (2006)[21]. This clause should allow the national authority (the Minister) to update the list of protected animals based on expert input and scientific evidence about the degree to which that species displays evidence of pain and suffering, their behavioural and neurological complexity.

8. Maximum sentences for animal cruelty

8.1 This draft Bill also increases the maximum penalty for animal welfare offences in the Animal Welfare Act 2006 from six months to five years' imprisonment. It is reasonable that sentencing should take into account the level of harm caused and the degree of intent behind the actions, and impart a greater penalty for offences entailing more serious transgressions on either count. We noted earlier that this action could proceed through secondary legislation and proceed at a pace not tied to reconsideration of the remainder of this Bill.

The Society welcomes the Department's consultation on Animal Welfare (Sentencing and Recognition of Sentience). We are pleased to offer these comments which have been informed by specific input from our members and Member Organisations across the biological disciplines. The RSB is pleased for this response to be publicly available. For any queries, please contact the Science Policy Team at Royal Society of Biology, Charles Darwin House,12 Roger Street, London, WC1N 2JU. Email: policy@rsb.org.uk

and regional heritage'. Available here: http://www.lisbon-treaty.org/wcm/the-lisbon-treaty/treaty-on-the-functioning-of-the-european-union-and-comments/part-1-principles/title-ii-provisions-having-general-application/155-article-13.html

[21] Animal Welfare Act 2006, 1. Animals to which the Act applies. Available at http://www.legislation.gov.uk/ukpga/2006/45/section/1

Appendix: Member Organisations of the Royal Society of Biology

Full Organisational Members

Academy for Healthcare Science
Agriculture and Horticulture Development Board
Amateur Entomologists' Society
Anatomical Society
Association for the Study of Animal Behaviour
Association of Applied Biologists
Bat Conservation Trust
Biochemical Society
British Andrology Society
British Association for Lung Research
British Association for Psychopharmacology
British Biophysical Society
British Ecological Society
British Lichen Society
British Microcirculation Society
British Mycological Society
British Neuroscience Association
British Pharmacological Society
British Phycological Society
British Society for Cell Biology
British Society for Developmental Biology
British Society for Gene and Cell Therapy
British Society for Immunology
British Society for Matrix Biology
British Society for Medical Mycology
British Society for Nanomedicine
British Society for Neuroendocrinology
British Society for Parasitology
British Society of Plant Breeders
British Society for Plant Pathology
British Society for Proteome Research
British Society for Research on Ageing
British Society of Animal Science
British Society of Soil Science
British Society of Toxicological Pathology
British Toxicology Society
Daphne Jackson Trust
Drug Metabolism Discussion Group
Fisheries Society of the British Isles
Fondazione Guido Bernardini
GARNet
Genetics Society
Heads of University Centres of Biomedical Science
Institute of Animal Technology
Laboratory Animal Science Association
Linnean Society of London
Marine Biological Association
Microbiology Society
MONOGRAM – Cereal and Grasses Research Community
Network of Researchers on Horizontal Gene Transfer & Last Universal Cellular Ancestor
Nutrition Society
Quekett Microscopical Club
Royal Microscopical Society
SCI Horticulture Group
Science and Plants for Schools
Society for Applied Microbiology
Society for Experimental Biology
Society for Reproduction and Fertility
Society for the Study of Human Biology
Systematics Association
The Field Studies Council
The Physiological Society
The Rosaceae Network
Tropical Agriculture Association
UK Environmental Mutagen Society
UK-BRC – Brassica Research Community
University Bioscience Managers' Association
Zoological Society of London

Supporting Organisational Members

Affinity Water
Association of the British Pharmaceutical Industry (ABPI)
AstraZeneca
BioIndustry Association
Biotechnology and Biological Sciences Research Council (BBSRC)
British Science Association
CamBioScience
Envigo
Ethical Medicines Industry Group
Fera
Institute of Physics
Ipsen
Medical Research Council (MRC)
MedImmune
Pfizer UK
Porton Biopharma
Procter & Gamble
Royal Society for Public Health
Syngenta
Understanding Animal Research
Unilever UK Ltd
Wellcome Trust
Wessex Water
Wiley Blackwell

Appendix 1: *Sentience in non-human animals, a short note on the problem of definition*

Our analysis of animals – and the inference of their emotional states – relies on measuring physiological and behavioural correlates, such as behavioural rates and durations, physiological responses, hormone and neurotransmitter concentrations, brain activity in the amygdala and other areas. These correlates can be measured also in humans. Many animals, humans included, display qualitatively identical behaviours such as immediate response to threat or behaviour such as avoidance of learned threat. How animals achieve the goals of threat avoidance or reward seeking, which are key to survival, can be remarkably similar; they can do this through conserved biological mechanisms (homology), or through distinct biological implementations (convergent evolution), with very different degrees of sophistication and adaptability. Animal diversity is extensive and some animals are relatively simple, with a limited repertoire of behaviours and restricted ecological niche; others show complex brain structures, extremely adaptive behaviours, ample learning capacities, complex social interactions and wide ecological niches. To decipher the underlying brain processes that accompany such diversity is a significant and still-pending research endeavour. We should not leap to draw simple comparisons between different species, and should be especially cautious of anthropomorphisation. Science-based assignment of complex sentience to animals still requires development. Even in humans, there can be multiple routes to actions: some that are associated with conscious experiences while others are not, and these involve different neuronal circuits and can be hard to discern by superficially observing behaviour alone[22]. A wealth and a variety of data - behavioural, molecular, physiological and neurobiological – will eventually allow us to chart the similarities between animal species with more clarity. This may provide new ways of looking at sentience in non-human species, and allow definite sets of criteria to be assigned, but this is not yet a reality.

However, if we leave aside the problem of defining sentience in scientific terms, biology still remains the key discipline if we want to define the degree of complexity that should grant enhanced protected status to certain non-human animals. In paragraph 2.2 in the main body of our response, we advise that the draft Bill should be reworded to bring under scope protected animal species as **informed by scientific evidence and expert consultation.** In the process of such expert consultation, and in the current context, we propose that evidence for expression of pain in animals should be a prime consideration, together with additional evidence for complexity of brain structure, behaviours, learning capabilities, tests of 'concept formation', self-recognition, 'meta-cognition' (knowing when you know something), optimistic and pessimistic cognitive bias, responsivity to certain neuroactive compounds, among other aspects[23,24,25], in order to weigh arguments. We would like to emphasise that UK statutes already consider pain and suffering as key determinants in granting protection to animals:

[22] Dawkins, M.S. (2017). Animal welfare with and without consciousness. Journal of Zoology, Volume 301, Issue 1, pages 1–10

[23] Kirkwood, J. K. (2006). The distribution of the capacity for sentience in the animal kingdom. In J. D'Silva & J. Turner (Eds.), Animals, ethics and trade: the challenge of animal sentience (pp. 12-26). London: Earthscan.

[24] Kirkwood, J. K., & Hubrecht, R. (2001). Animal Consciousness, Cognition and Welfare. Animal Welfare, 10(1), 5-17.

[25] Hubrecht, R. (2014). The welfare of Animals in Research: Practice and Ethics. Oxford: John Wiley & Sons, pp. 99-104;

Statute	Reference to pain/suffering
Animal Welfare Act 2006	Explanatory notes to Section 1: Animals to which the Act applies The Act will apply only to vertebrate animals, as these are currently the only demonstrably sentient animals. However, section 1(3) makes provision for the appropriate national authority to extend the Act to cover invertebrates in the future if they are satisfied on the basis of scientific evidence that these too are capable of experiencing pain or suffering.
Animals (Scientific Procedures) 1986 (ASPA)[26]	Preliminary, Regulated procedures, Section 2.1 Subject to the provisions of this section, "a regulated procedure" for the purposes of this Act means any procedure applied to a protected animal for a qualifying purpose which may have the effect of causing the animal a level of pain, suffering, distress or lasting harm equivalent to, or higher than, that caused by the introduction of a needle in accordance with good veterinary practice.

To distinguish between basic reflex responses (avoidance of potentially aversive stimuli displayed by virtually all animals as escape reflexes), simpler forms of nociception (pain perception) or more complex responses - which involve more sophisticated forms of learning, decisions, use of cognitive resources and lead to long-term changes to an animal's behaviour and motivations – researchers adopt a variety of tests and indices[27]. Single indices or measurements alone are not very informative but taken together provide insight into the level of complexity and specificity involved in the processing of noxious stimuli – a basis to suggest that an higher-order process, like the perception of pain, may be taking place. Finally, despite the fact that the study of pain has important bearings on the consideration of animal welfare, we note that the behavioural repertoire of animal emotions is broader than the expression of pain or suffering and includes those positive emotional states, normally associated with rewards. To truly ensure and safeguard the welfare of animals, positive emotions, as well as negative emotions, should be considered (see paragraph 4.1 within the body of our response, for our recommendations in relation to this).

[26] Particularly, in the case of ASPA, consideration for potential pain and suffering play a central role within the framework of the harm-benefit analysis that is used to grant licences to carry out experiments on animals.

[27] A recent and authoritative review of pain in non-human animals is provided in: Sneddon, L.U. et al. (2014). Defining and assessing animal pain. Animal Behaviour, 97, pp. 201-212. Table 1 gives experimental criteria to assess pain in animals, and Table 2 summarises the type of evidences known for species belonging to different taxonomic groups

Appendix 2: *On the definition of protected animals and inclusion of species under the Bill*

Some **invertebrates** are currently listed as protected animals in UK legislation and we would recommend the inclusion of cephalopods (members of the molluscan class Cephalopoda, containing about 700 known species[28]) as protected animals under the current draft Bill, also in keeping with UK legislation (e.g. ASPA 1986, 2012 amended version). Whilst more research into the welfare of these animals is needed, a recent authoritative guide to the care and welfare of cephalopods was developed as a joint initiative between CephRes, FELASA and the Boyd Group UK. We refer to their published guidelines[29] for a set of general principles of good practice, which represents the present state of knowledge and a starting point for future developments.

There is debate about the scientific basis for the inclusion of decapod crustacean among a proposed list of animal species to be in scope of such a proposed Bill, based on published data on pain processing in these species[30]. At this stage, we would recommend convening a working group to review the evidence and inform a discussion and decision on their inclusion within the scope of this draft Bill as proposed.

Embryonic forms of protected animals: the point of embryonic development after which embryos should be protected should be specified as part of the definition of protected animals coming under the scope of the proposed Bill (3.2 of our response). Pre-natal mammalian forms are not mentioned in the current AWA and some advisers view this with concern[31]. On the contrary, ASPA protects embryos of a mammal (as well as a bird or reptile) in the last third of their normal embryonic development. The embryonic developmental stages that are included in the definition of protected animals as part of the proposed Bill should align with extant pieces of legislation.

In reaching a consensus on those animals protected under the proposed Bill, **we would recommend combining the most inclusive definition, which is the one present in ASPA, 1986 and Directive 2010/63/EU with our proposed definition of protected animal** in paragraph 3.2 in the body of our response.

Consideration about the developmental stage of protected cephalopods under the draft Bill: currently not much is known about the development of nociceptors and their afferents to the brain, in these species. The only data available in relation to pain processing comes from studies on adult cephalopods. Embryos of cephalopods do not have fully developed higher brain centres that would be implicated in the processing of pain. The application of guidelines used for fish in research settings would imply that cephalopod hatchlings would need to be protected from a few days after

[28] Regarding the taxonomy of cephalopods, please see http://tolweb.org/Cephalopoda
[29] Fiorito, G et al. (2015). Guidelines for the Care and Welfare of Cephalopods in Research – A consensus based on an initiative by CephRes, FELASA and the Boyd Group. Laboratory Animals, 49(S2), pp. 1-90
[30] See paragraph on arthropods: decapods in Sneddon, L.U. et al. (2014). Defining and assessing animal pain. Animal Behaviour, 97, pp. 207-208
[31] Campbell, M.L.H, Mellor, D.J. and Sandoe, P.E. (2014). How should the welfare of fetal and neurologically immature post-natal animals be protected? Animal Welfare Volume 23(4) Pages 369-379. Available at: http://www.ingentaconnect.com/content/ufaw/aw/2014/00000023/00000004/art00001)

hatching, when they independently feed as zooplankton. This would present great practical difficulties because at this stage the hatchlings are microscopic and invisible to the naked eye.

Appendix 3: *Widening discussion and review of the principles of animal welfare*

The concept of a 'good life for the animal' is a key staple of the FAWC **2009 report '**Farm Animal Welfare in Great Britain: Past, Present and Future'. This concept is predicated upon Banner's principles[32], the ever-increasing knowledge about the biology of the farmed animals and the development of more robust welfare indicators[33]. The value of this approach is to put the animals at the centre and build policies based on evidence from animal welfare studies. In order to achieve a 'life worth living', it is not enough to simply avoid unnecessary suffering and provide for the basic needs of the animals, but also to enhance, whenever possible, the positive experiences for which corroborating evidence exists - e.g. through certain wants[34]. An assessment of the physiological and emotional states of an animal - through their behavioural manifestations - should be carried out regularly, throughout an animal's life. The integrated sum of positive and negative experiences over an animal's lifetime, together with a framework for comparing how different practices impact on the animal's health and well-being, will help responsible authorities to establish whether the criteria are met.

[32] As reported in the FAWC 2009 report, the three principles are: "1) harms of a certain degree and kind ought under no circumstances to be inflicted on an animal; 2) any harm to an animal, even if not absolutely impermissible, nonetheless requires justification and must be outweighed by the good which is realistically sought in so treating it; and 3) any harm which is justified by the second principle ought, however, to be minimised as far as is reasonably possible".

[33] Importantly, the FAWC report acknowledges that: "Even so, what is taken as a life worth living today may not be the case in the future as new scientific information becomes available or societal concerns change: Government should therefore periodically review the basis of the proposed classification of an animal's quality of life." Page 19

[34] "Achievement of a life worth living requires provision of an animal's needs and certain wants, and care by all involved. Wants are those resources that an animal may not need to survive or to avoid developing abnormal behaviour, but nevertheless improve its quality of life. They may well stem from learned behaviours so that once an animal has become accustomed to their provision then withdrawal may lead to an adverse mental experience. They may also be innate such as space to play, to groom or engage in other normal behaviours. Giving an animal a life worth living therefore requires skilled and conscientious stockmanship above all else, together with good husbandry, considerate handling and transport, and humane slaughter." FAWC report, (2009). Page 15