

Development of animal welfare understanding drives change in minimum welfare standards

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Summary

The process by which societies adapt to increasing knowledge about the mental and physical capacities of animals and the ways in which they are affected by human activities has been described as a journey. Different countries and regions are at various stages of this journey, and will take a unique path, depending on their specific social and cultural dynamics. However, all participants are unified by an increasing awareness of, and concern for, animal welfare. This journey has been characterised by a number of landmark events, one of which was the release of the Five Freedoms concept. Although aspirational and abstract, as it did not outline specific practical goals, nonetheless this concept became a catalyst for moving animal welfare thinking in a new direction, and set up a number of important targets for research. This eventually led to a key shift in thinking from a focus on biological functioning and resources, to ways of assessing welfare outcomes in terms of animals' experiences, i.e. their affective states. Behaviour science played an important role in the interpretation of animals' affective experiences, receiving compelling support from parallel studies in affective neuroscience. An important aspect of our understanding of animal welfare is that affective states can be negative or positive. Enabling animals to perform specific behaviours at key times when they are needed is central to the achievement of positive affective states. Another important event has been the development of practical ways to shift the spectrum of affective states towards a positive balance and their incorporation into welfare codes and regulations. The recent focus on positive affective states does not mean that negative experiences should be given less attention. In fact, in those countries that are at the early stages of the journey, improving function and productivity may be the most effective way to promote some important aspects of animal welfare. For example, alleviating pain is a useful entry point. Finally, it is important that the pace of the journey, in terms of public awareness and shifts in understanding, be supported by high-quality science that is rigorously assessed and validated in its practical application to the management of animal welfare.

Keywords

Affective experiences – Animal protection – Animal welfare journey – Anti-cruelty – Biological functioning – Components of suffering – Positive welfare – Regulations.

The animal welfare journey

Taking practical steps to improve animal welfare in a country or its different regions may be conceived of in terms of a journey (1), in which the participants have reached

different stages. Some will be close to the beginning, some will be at intermediate stages and others will have travelled a substantial distance. Moreover, the complex dynamics of the major interacting factors that influence the journey will determine the precise route and speed of the journey in each country or region. These factors include socio-cultural

imperatives, religious precepts, ethical issues, economic constraints, the extent of political engagement, historical and current views on the place of animals in society, and what animal welfare is understood to mean (2, 3, 4, 5).

The motives for undertaking such animal welfare journeys are diverse, reflecting, as they do, the fact that different societies often attach different weights to the various influential factors just noted, and that each factor provides its own particular impetus for undertaking welfare initiatives. However, whatever the primary motives, it is clear that an overarching objective is to improve the welfare of animals that are in the care and/or control of people. Of course, this presupposes an understanding of what animal welfare is. Clarifying that is one of the roles of animal welfare science.

Animal welfare science emerged as a recognised discipline 30 to 35 years ago and is concerned with the acquisition and application of the knowledge required to characterise, maintain, restore and promote animal welfare (6, 7). It emerged as an amalgam of the fields of ethology, physiology, pathology, biochemistry, genetics, immunology, nutrition, cognitive-neural science and other sciences of veterinary relevance (7, 8). These disciplines provide animal welfare science with rigorous foundations that support its capacity to advance the multifaceted biological understanding required to improve animal welfare (7, 9). This understanding is well illustrated by the six General Principles for the Welfare of Animals in Livestock Production Systems, principles that were formulated by the World Organisation for Animal Health (OIE) to guide the development of specific standards for various animal species (9, 10).

Interestingly, no universally accepted definition of animal welfare has emerged (8, 11). A significant reason for this is that each advance in the scientific knowledge of body function that provides greater insight into how animals respond to and perceive their internal state and external circumstances has led to successive revisions of existing definitions (3, 7), a process which is expected to continue (8, 10). A major consequence of this continued evolution of understanding is that no animal welfare journey has a definitive endpoint. There are three main implications of this: first, it is necessary for participants on such journeys to keep up to date with developments in thinking that lead to validated new approaches designed to further enhance animal welfare; secondly, instead of aiming for a definitive destination, the primary goal of each journey should be a commitment to improve welfare management continuously into the future; and thirdly, these first two points apply to all such journeys, whether they are in their early, intermediate or advanced stages.

Although defining animal welfare has been problematical, it is possible to characterise its key features in ways that provide a framework for integrating both well-established

scientific knowledge and new findings, so that current welfare management practices can continually be updated (7, 12). One such characterisation was recently formulated by the OIE (13):

‘Animal welfare means how an animal is coping with the conditions in which it lives. An animal is in a good state of welfare if (as indicated by scientific evidence) it is healthy, comfortable, well nourished, safe, able to express innate behaviour, and if it is not suffering from unpleasant states such as pain, fear, and distress. Good animal welfare requires disease prevention and veterinary treatment, appropriate shelter, management, nutrition, humane handling and humane slaughter/killing. Animal welfare refers to the state of the animal; the treatment that an animal receives is covered by other terms such as animal care, animal husbandry, and humane treatment.’

Of course, such characterisations should be understood as provisional, as it is likely that validated new developments will require them to be updated periodically (8). Nevertheless, much of what is currently understood about animal welfare is so well established that it is now regarded as basic knowledge (7), and so will probably continue to be well aligned with most changes that may be anticipated in characterisations of welfare in the future. This is especially the case with knowledge in the nutritional, environmental and health domains of welfare (see below; 7).

From preventing cruelty to promoting welfare

A consistent trend in animal welfare journeys to date is that they are unidirectional and move towards increasing protection of, and concern for, animals. As they progress from early to more advanced stages, the focus of legislative instruments appears to shift from cruelty to welfare (6, 11, 14, 15, 16, 17, 18, 19). This is reflected in changes in the titles of relevant Acts of Parliament; for example, from ‘prevention of cruelty’ to ‘animal protection’ and then to ‘animal welfare’. Anticruelty Acts are concerned with preventing the worst treatment that animals may receive at human hands, both in terms of what is done to them (abuse) and what is not done for them (neglect). They also emphasise the suffering that such cruel treatment may cause. Animal Protection Acts usually retain these anticruelty provisions, but extend the compass to include ill treatment, which is perceived as being less severe than cruelty, but still unacceptable. Finally, Animal Welfare Acts usually retain these earlier provisions, which are predominantly reactive, but their primary focus is on proactive requirements for welfare to be maintained, as a minimum, at broadly acceptable levels, thereby requiring those responsible to exercise a ‘duty of care’ towards animals (6). The overall

trend discernible here is a shift from regulatory policing of acts of cruelty or ill treatment towards ensuring that owners, or those in charge of animals, take responsibility for maintaining, as a minimum, acceptable levels of welfare, but preferably higher than the minimum.

Numerous factors contribute to such changes. Four such changes considered here became apparent during a number of animal welfare journeys that are now well advanced. First, at least six decades of scientific investigation clarified key features of the mechanisms that underlie diverse facets of animal functionality, including the potential for animals to have different types of mental experiences (3, 7, 9, 20). Moreover, during the last three decades, scientific studies have also revealed that different management systems may have detrimental or beneficial welfare impacts on animals (3, 7, 9, 20). Secondly, responding in part to these science-based developments, stakeholders who had direct responsibility for the use of animals for human purposes (e.g. farmers), as well as others who benefited indirectly from such use (e.g. consumers), became progressively more aware of the capacity of animals to suffer or experience good welfare (3, 7). Thirdly, especially during the last 25 to 35 years, the application of science-based findings to the development of welfare-based standards or codes increasingly required scientists, veterinarians, regulators, farmers, animal advocates, lay people and others involved to make value judgements based on ethics (20, 21, 22). And, fourthly, the interactive evolution of these three factors alongside influential socio-cultural, religious, educational, economic, political and other views during the same period (2, 4, 5, 23) contributed to a more sophisticated understanding of animal welfare in its wider societal context, both among professionals directly involved with animals and among many members of the general public.

Those countries currently at earlier stages of the animal welfare journey may benefit from the experience of others ahead of them by adopting elements that would help to meet their particular needs and by adapting or developing alternatives to those that would not. The precise paths followed during this journey will be many and varied because, to be effective, the science-based strategies devised to manage animal welfare nationally, regionally and locally must be in harmony with the unique combination of socio-cultural, religious, educational, political, economic, practical and other salient influences that pertain in each country.

The increasing sophistication of animal welfare concepts

Between the 1820s and 1960s in Britain and aligned countries, such as New Zealand, the consequences of

animal cruelty and ill treatment were normally described generically, using the term 'suffering' (3, 6, 18, 19). Suffering was taken to represent exceptionally unpleasant states that were initially considered to include 'physical pain and mental cruelty' and, later, 'discomfort, stress and pain' (19). Apart from pain, these descriptors were fairly imprecise, but all of them clearly acknowledged the existence of subjective experiences in animals that, when severe, constituted states of suffering (7, 8, 11, 19). They also implicitly acknowledged that such experiences represented the negative impacts of human activities on the physical, physiological and health status of the animals.

This was reinforced when the well-known 'Five Freedoms', which were influenced by the 1965 Brambell Committee Report (24), were published in 1979 (25). The Five Freedoms importantly characterised animal welfare as multifaceted by incorporating subjective experiences, health status and behaviour. There was particular reference to thirst, hunger, fear, distress, discomfort, pain, injury, disease and behavioural expression (25). The Five Freedoms have the distinction of being the first detailed account of the broader dimensions of animal welfare as they were understood at that time, and they are still widely referenced today (8, 13).

Expressed as freedoms, however, they represented aspirational or idealised goals, which, in fact, are not practically achievable in the life of any animal (8). In addition, many of these goals were subjective experiences, and at the time were less well understood in animals and unable to be quantified. They were therefore of limited direct value for regulatory purposes. Nevertheless, they usefully highlighted specific areas upon which animal management, including resource inputs, should focus, in codes of practice designed to improve animal welfare, and many early and current codes still show clear evidence of this (e.g. 26, 27, 28, 29, 30, 31, 32).

It is worth noting in passing that the focal areas of the Five Freedoms were systematised in 1994 and called the 'Five Domains' by Mellor and Reid (33). These domains are nutrition, environment, health, behaviour and mental state (7, 8). The Five Domains model focuses on areas of potential welfare compromise and not freedoms. Also, in contrast to the Five Freedoms, the Five Domains model makes a clear distinction between the largely physical/functional disruptions or imbalances in the nutritional, environmental, health and behavioural domains and the often negative subjective experiences they generate within the mental domain. For example, dehydration or energy deficiency in the nutritional domain leads to thirst or hunger, respectively, in the mental domain. Similarly, respiratory compromise or traumatic injury in the health domain leads to breathlessness or pain, respectively, in the mental domain. The Five Domains paradigm has been used as a regulatory tool to systematically assess

the welfare impacts of all research, teaching and testing procedures conducted on vertebrates in New Zealand since 1997 (7, 8). Full details of this model may be accessed elsewhere (7, 8, 34, 35).

Returning to the Five Freedoms, their prominent focus was on negative subjective experiences, which cannot be measured directly (8, 10). The regulatory solution to this was to find management or resource inputs designed to minimise the potential for the unwanted physiological, health and behavioural states that lead to those experiences. Thus: freedom from thirst, hunger and malnutrition would be achieved by providing ready access to fresh water and a diet that maintained full health and vigour; freedom from discomfort and exposure by providing an appropriate environment, including shelter and a comfortable resting area; freedom from pain, injury and disease by preventing disease or by rapid diagnosis and treatment; freedom to express normal behaviours by providing sufficient space, proper facilities and company of the animal's own kind; and freedom from fear and distress by ensuring conditions and treatment which avoided mental suffering (25).

At that time, much of the advice on such management or resource inputs was based on animal-based science studies of, for example, nutritional problems, impacts of unsuitable environments, infectious diseases and causes of stress – studies that were predominantly conducted before direct scientific investigations of animal welfare began in the late 1980s (6, 7, 9). Most of these previous studies were focused on understanding body mechanisms and how they could be manipulated to improve the 'fitness' of farm livestock, judged, for example, by increased health, growth, reproductive success and milk, fibre or egg yields, and by decreased stress (7, 20, 36, 37). Thus, the primary focus was on the biological functioning of animals, rather than their related subjective experiences (8, 10), and this focus is reflected in the physical/functional terminology that dominates many animal welfare codes to this day (e.g. 26, 27, 28, 29, 30, 31, 32).

This strong early emphasis on management or resource inputs and biological functioning had the effect of 'playing down' welfare outcomes as reflected in the noxious experiences that animals may have had. Most of these experiences, apart from thirst, hunger, pain and fear, which were then widely accepted, continued to be referred to with non-specific terms, such as 'discomfort', 'distress' and 'suffering' (35). This approach was reinforced by a view held by many researchers at the time that animals may have a range of subjective experiences, but none could be studied validly using the scientific methods available (38). Nevertheless, behaviour science, when used to clarify the bases of animals' responses to circumstances of welfare concern, especially in intensive confinement systems, increasingly showed that meaningful interpretations could

only be provided by referring to the subjective experiences (described as feelings, emotions or affective states [23, 39, 40]) that animals may have (3). This approach, now known as the affective state orientation, became well established by the early 2000s (8, 23, 39).

Methodologically, the affective state orientation explored animals' preferences, aversions and motivations (3, 41, 42). While it initially focused on identifying and correcting animals' negative affective responses to their external circumstances, it also highlighted the concept that animals could experience positive affective states as well (3, 41). Welfare code initiatives related to these observations included the implementation of environmental enrichment, which was aimed at improving the animals' mental states; for example, by providing rooting straw and social contact for pigs confined indoors, and perches, nest boxes and scratch pads for layer hens kept in cages (41, 43).

According to the affective state orientation, an animal's welfare is good when it responds without negative experiences and/or with positive experiences during its interactions with other animals, people and the environment (23). Once articulated, this idea led to the recognition that an animal's welfare state represents the net balance between all the negative and positive affective states it has experienced before, or is experiencing at a particular time – in other words, its 'quality of life' (8, 25). It is apparent that the primary focus of this orientation is on the affective outcome for the animal.

Expanding the range of negative welfare states

The regulatory use of open-ended terms such as discomfort, distress and suffering has the advantage that a wide range of unpleasant affective states can be accommodated without specifying them (35). A disadvantage is that, without the guidance provided by a more specific list, affective states of significant welfare concern may be overlooked (35). The capacity for animals to experience a wide range of particular negative affects now has compelling support from the affective neurosciences (7, 10, 38, 44).

There are homeostasis-related negative effects – linked mainly to the physical/functional state within the body – that impel or drive animals to engage in specific behaviours that are crucial for their survival. Examples include gasping for breath, seeking and drinking water, finding and eating foods of different types, responding to ambient temperature extremes, and avoiding or limiting the extent of physical injury (10, 44). The associated specific affects, some of which have been referred to as different forms of 'hunger',

include breathlessness (air hunger), thirst, salt hunger, hunger for energy-rich nutrients, sensations of being chilled or over-hot, and acute pain (10, 44). Two other affects of this type may also be noted; namely, the sensations of urgency that accompany micturition or defecation, and exhaustion after severe sleep deprivation (10, 44). Negative affects that produce physical inactivity are also generated primarily by physical/functional states within the body and may enhance convalescence following events such as traumatic injuries, infections or toxin ingestion (7). These affects include feelings of debility, weakness, sickness, dizziness, nausea, breathlessness and persistent pain (7). Finally, situation-related negative affects reflect an animal's perception of its external circumstances (10, 44), so that in threatening, restricted or impoverished situations they may experience anxiety, fear, nervous vigilance, boredom, loneliness, isolation, helplessness, frustration or anger (10, 36, 38, 43). It is evident that the full list of these affects substantially increases the number originally specified in the Five Freedoms.

Increasing the focus on positive welfare states

Although the predominant initial purpose of science-based animal welfare initiatives was to minimise or eliminate negative affects (7), during the last 20 years the importance of positive experiences has become increasingly apparent (8, 14, 25, 39, 40, 45, 46, 47). Thus, the early, almost exclusive focus on negative states may now be regarded as minimalist, a view reinforced by the neurosciences-supported recognition that minimising homeostasis-related and inactivity-promoting negative affects can at best move net welfare states from being negative to neutral, and usually does not produce positive states (10).

In contrast, there is strong affective neurosciences support for the view that situation-related negative affects experienced, for example, in closely confined or impoverished environments can and should be replaced by positive affects that are integral to animals engaging in behaviours they find rewarding (10, 38, 48). These behaviours include exploring and hunting/foraging in stimulus-rich environments and engaging in interactive behaviours, such as bonding or bond affirmation, maternal nurturing and care, play, and sexual activity (10, 38, 43). These neurosciences-supported insights, recently incorporated into animal welfare science thinking (10, 48), strongly reinforce the long-standing behavioural science reasoning that underlies environmental enrichment initiatives (3, 41, 42, 43). On this basis, therefore, it has been suggested that giving animals opportunities to engage in rewarding behaviours is a crucial way to improve welfare by potentially replacing

the negative affects of anxiety, fear, nervous vigilance, boredom, loneliness, isolation, helplessness, frustration or anger with positive affects such as satiety, appetitive and consummatory satisfaction or reward, goal-directed engagement, curiosity, vitality, playfulness, calmness, contentment, affectionate companionability, and feelings of security (10, 35). It is important to reiterate that there is cogent neurosciences support for this proposition. Of course, in animal management terms, the minimisation of negative affective states must continue at the same time as initiatives are taken to promote positive states (10).

Evolution of codes during the welfare journey

In places where animal welfare journeys are in their initial stages today, the understanding of welfare in the general population would not be expected to be particularly sophisticated when judged against the latest, well-validated animal welfare science thinking available to regulators and animal welfare professionals such as veterinarians. This might hinder the introduction of animal welfare legislation, regulations and practices that require an understanding of the complex interactions between the different factors that underlie comprehensive welfare management. However, this need not prevent significant welfare improvements from being made. This is because addressing the types of nutritional, environmental and/or health problems that appear to be quite common at the beginning of many welfare journeys demonstrably improves the productivity of individual animals (7). This would be motivating for their owners and would offer opportunities to highlight the welfare benefits of decreasing the intensity of the associated negative affects (7, 49, 50).

A parallel approach might be to focus initially on the alleviation of pain as a way to instigate discussion about the recognition of subjective affective experiences in animals. Pain is chosen as it is among the most noxious affects recognised by people, and that may make it easier to explain how animals can also experience pain (49). Pain has many causes, including injuries of different types and numerous forms of disease-induced pathology (51, 52). There are also many different types of pain (51, 52), so focusing on its identification and management may help to highlight for laypeople a wider range of conditions of welfare concern than they may otherwise appreciate (50). That would then, over time, also provide opportunities to reinforce the importance of managing states that give rise to the other homeostasis-related and inactivity-promoting negative affects (49).

In countries whose welfare journeys began many decades ago, the progression from anticruelty through animal

protection to animal welfare legislation and regulations has clearly reflected the specific features of relevant scientific understanding that were well validated at each stage (19). Of course, our present well-validated science-based understanding of animal welfare is readily accessible (e.g. 2, 3, 7, 53, 54, 55). Moreover, it forms the basis of the twelve OIE animal welfare standards adopted since May 2005 by the World Assembly of OIE Delegates,

representing 178 countries (56, 57). The up-to-date science-based platform upon which these standards are based increases their credibility and thereby facilitates their use in legislative and regulatory initiatives that may be taken in those countries whose welfare journeys are at their earlier stages.

L'évolution des idées sur le bien-être animal, un facteur de changement pour la mise en place de normes minimales en la matière

D.J. Mellor & J.R. Webster

Résumé

Le processus conduisant les sociétés à s'adapter à l'évolution des connaissances sur les capacités mentales et physiques des animaux et sur la manière dont ces derniers sont affectés par les activités humaines peut être décrit comme un voyage. Chaque pays et région se trouve à une étape particulière de ce voyage, et le trajet que chacun d'eux décide d'emprunter est fonction de la dynamique sociale et culturelle dans laquelle il s'inscrit. Néanmoins, tous les participants à ce voyage sont unis et motivés par une prise de conscience et une préoccupation croissantes à l'égard du bien-être animal. Certains événements marquants ont balisé le chemin. L'un d'eux a été la diffusion du concept des « cinq besoins fondamentaux » des animaux. Bien qu'il s'agisse d'un concept ambitieux et abstrait qui ne décrit pas d'objectif concret, il a néanmoins servi de catalyseur pour ouvrir de nouvelles perspectives à la réflexion sur le bien-être animal et pour déterminer un certain nombre d'objectifs majeurs pour la recherche. À terme, ceci a conduit à un recentrage important, de l'examen des seules fonctions et ressources biologiques à la recherche de nouvelles manières d'évaluer le bien-être en termes de sensations et d'expériences éprouvées par les animaux, c'est-à-dire l'appréciation de leur état affectif. La science du comportement a joué un rôle important dans l'interprétation des expériences affectives des animaux, avec le soutien incontestable des recherches entreprises en parallèle dans le domaine des neurosciences affectives. Un aspect important de la perception que nous avons aujourd'hui du bien-être animal est la prise en compte du caractère positif ou négatif des états affectifs. La possibilité donnée aux animaux de manifester des comportements spécifiques aux moments clés où ils en éprouvent le besoin est une condition déterminante de l'émergence d'un état affectif positif. Un autre événement important a été la mise au point de modalités pratiques permettant de déplacer le spectre des états affectifs vers un équilibre positif, ainsi que leur intégration dans le corpus des codes et des réglementations applicables au bien-être animal. L'accent mis depuis quelques années sur les états affectifs positifs ne signifie pas que l'on puisse négliger les expériences négatives. En réalité, la recherche d'une meilleure productivité et d'une optimisation fonctionnelle peut être la manière la plus efficace de promouvoir certains aspects importants du bien-être animal dans les pays qui entament leur voyage. Par exemple, l'objectif de soulager la douleur est un point de départ fructueux. En fin de compte, il importe que les avancées dans ce voyage, en termes de prise de conscience publique et d'évolution des connaissances, soient soutenues par une science de qualité, dont les applications pratiques dans le domaine de la gestion du bien-être animal fassent l'objet d'une évaluation et d'une validation rigoureuses.

Mots-clés

Bien-être positif – Composantes de la douleur – Expériences affectives – Fonctions biologiques – Lutte contre la cruauté – Progrès du bien-être animal – Protection animale – Réglementation.

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Una mejor comprensión del bienestar animal induce cambios en las normas mínimas de bienestar

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Resumen

El proceso por el cual las sociedades se adaptan al creciente conocimiento de las capacidades psíquicas y físicas de los animales y de la influencia que tiene en ellas el proceder humano ha sido descrito como un «viaje». Cada país y región está en una determinada etapa de ese recorrido y seguirá su propia senda, dependiendo de cuál sea su dinámica social y cultural específica. Sin embargo, todos viajan alumbrados por un mismo faro: el de una creciente sensibilidad y preocupación por el bienestar animal. Este viaje tiene la impronta de diversos acontecimientos que constituyen otros tantos hitos, uno de los cuales fue la aparición del concepto de las «cinco libertades». Tal idea, aunque mera aspiración abstracta porque no conllevaba objetivos prácticos y concretos, no dejó de ejercer de catalizador para imprimir un nuevo rumbo al pensamiento sobre el bienestar animal y fijar una serie de importantes metas para la investigación. Todo ello acabó provocando un giro fundamental en la reflexión teórica, cuyo centro de gravedad se desplazó del funcionamiento y los recursos biológicos a la búsqueda de procedimientos para evaluar los resultados de bienestar desde el punto de vista de las vivencias del propio animal, esto es, de sus estados afectivos. La ciencia del comportamiento cumplió una importante función para interpretar las experiencias afectivas de los animales, con el concluyente apoyo de estudios paralelos procedentes de la neurociencia de la afectividad. Un aspecto importante de nuestra comprensión del bienestar animal estriba en que los estados afectivos pueden ser negativos o positivos. Permitir que los animales se conduzcan de determinada manera en ciertos momentos clave en que les resulta necesario es fundamental para lograr estados afectivos positivos. Otra etapa importante ha sido la definición de procedimientos prácticos para lograr que el espectro de estados afectivos gravite hacia un equilibrio positivo y la integración de esos procedimientos en códigos y reglamentos de bienestar. Pero la preeminencia que se otorga últimamente a los estados afectivos positivos no significa que las experiencias negativas merezcan menos atención. De hecho, en los países que estén en las primeras etapas del viaje, mejorar el funcionamiento y la productividad quizá resulte el modo más eficaz de fomentar ciertos aspectos importantes del bienestar animal. Una buena entrada en materia, por ejemplo, es centrarse en aliviar el dolor. Por último, es importante que el ritmo del viaje, por lo que respecta a la sensibilización pública y a la evolución de nuestra comprensión, se nutra y acompañe de ciencia de gran calidad, cuya aplicación práctica a la gestión del bienestar animal haya sido rigurosamente evaluada y validada.

Palabras clave

Anti-crueldad – Bienestar positivo – Componentes del sufrimiento – Experiencias afectivas – Funcionamiento biológico – Protección de los animales – Reglamento – «Viaje» del bienestar animal.

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References

1. Whay H.R. (2007). – The journey to animal welfare improvement. *Anim. Welf.*, **16** (2), 117–122.
2. Bayvel A.C.D., Rahman S.A. & Gavinelli A. (eds) (2005). – Animal welfare: global issues, trends and challenges. *Rev. sci. tech. Off. int. Epiz.*, **24** (2), 467–813.
3. Fraser D. (2008). – Understanding animal welfare: the science in its cultural context. Wiley-Blackwell, Oxford.
4. Spedding C. (2000). – Animal welfare. Earthscan Publications, London.
5. Turner J. & D'Silva J. (eds) (2006). – Animals, ethics and trade: the challenge of animal sentience. Earthscan Publications, London.
6. Mellor D.J. & Bayvel A.C.D. (2008). – New Zealand's inclusive science-based system for setting animal welfare standards. *Appl. anim. Behav. Sci.*, **113**, 313–329.
7. Mellor D.J., Patterson-Kane E. & Stafford K.J. (2009). – The sciences of animal welfare. Wiley-Blackwell, Oxford.
8. Green T.C. & Mellor D.J. (2011). – Extending ideas about animal welfare assessment to include 'quality of life' and related concepts. *N.Z. vet. J.*, **59**, 263–271.
9. Fraser D., Duncan I.J.H., Edwards S.A., Grandin T., Gregory N.G., Guyonnet V., Hemsforth P.H., Huertas S.M., Huzzey J.M., Mellor D.J., Mench J.A., Paranhos da Costa M., Spinka M. & Whay H.R. (2013). – The welfare of animals in production systems: general principles and the scientific study of animal welfare. *Vet. J.*, **198**, 19–27.
10. Mellor D.J. (2012). – Animal emotions, behaviour and the promotion of positive welfare states. *N.Z. vet. J.*, **60**, 1–8.
11. Keeling L.J., Rushen J. & Duncan I.J.H. (2011). – Understanding animal welfare. In *Animal welfare* (M.C. Appleby, J.A. Mench, I.A.S. Olsson & B.O. Hughes, eds), 2nd Ed. CABI, Wallingford, Oxfordshire, 183–199.
12. Mellor D.J. & Bayvel A.C.D. (2011). – The scientific assessment of animal welfare. In *Proc. of the First OIE Global Conference on Evolving Veterinary Education for a Safer World, 12–14 October 2009. World Organisation for Animal Health, Paris, 167–174. Available at: www.oie.int/doc/ged/D12079.PDF* (accessed on 23 January 2013).
13. World Organisation for Animal Health (OIE) (2012). – Chapter 7.1. Introduction to the Recommendations for Animal Welfare, Article 7.1.1. In *Terrestrial Animal Health Code, 21st Ed.* OIE, Paris, Available at: www.oie.int/index.php?id=169&L=0&htmfile=chapitre_1.7.1.htm (accessed in June 2013).
14. Bloom G. (2008). – Regulating animal welfare to promote and protect improved animal welfare outcomes under the Australian Animal Welfare Strategy (AAWS). In *Proc. of the AAWS International Animal Welfare Conference, 1 September, Gold Coast, Australia. Available at: www.daff.gov.au/animal-plant-health/welfare/reports/regulating_animal_welfare* (accessed in June 2013).
15. Food and Agriculture Organization of the United Nations (FAO) (2013). – Animal production and health. Gateway to farm animal welfare. Legislation. FAO, Rome. Available at: www.fao.org/ag/againfo/themes/animal-welfare/aw-resources/legislation/en/?no_cache=1 (accessed in June 2013).
16. Knierim U., Major E.A., Jackson W.T. & Steiger A. (2011). – Incentives and enforcement. In *Animal welfare* (M.C. Appleby, J.A. Mench, I.A.S. Olsson & B.O. Hughes, eds), 2nd Ed. CABI, Wallingford, Oxfordshire, 291–303.
17. Rollin B.E. (2004). – Animal agriculture and emerging social ethics for animals. *J. Anim. Sci.*, **82**, 955–964.
18. Wells N. (2010). – Animal law in New Zealand. Thomas Reuters, New York, 903–916.
19. Woods A. (2012). – From cruelty to welfare: the emergence of farm animal welfare in Britain, 1964–1971. *Endeavour*, **36** (1), 14–22.
20. Mellor D.J. (2013). – Production animals: ethical and welfare issues raised by production-focused management of newborn livestock. In *Veterinary and animal ethics. Proc. of the First International Conference on Veterinary and Animal Ethics, September 2011, London* (C.M. Wathes, S.A. Corr, S.A. May, S.P. McCulloch & M.C. Whiting, eds). Wiley-Blackwell, Oxford, 174–187. doi:10.1002/9781118384282.
21. Sandøe P. & Jensen K.K. (2013). – The idea of animal welfare: developments and tensions. In *Veterinary and animal ethics. Proc. of the First International Conference on Veterinary and Animal Ethics, September 2011, London* (C.M. Wathes, S.A. Corr, S.A. May, S.P. McCulloch & M.C. Whiting, eds). Wiley-Blackwell, Oxford, 19–31.
22. Woods A. (2013). – The history of veterinary ethics in Britain, ca. 1870–2000. In *Veterinary and animal ethics. Proc. of the First International Conference on Veterinary and Animal Ethics, September 2011, London* (C.M. Wathes, S.A. Corr, S.A. May, S.P. McCulloch & M.C. Whiting, eds). Wiley-Blackwell, Oxford, 3–18.
23. Fraser D. (2003). – Assessing animal welfare at the farm and group level: the interplay of science and values. *Anim. Welf.*, **12**, 433–443.
24. Brambell Committee (1965). – Report of the Technical Committee to Enquire into the Welfare of Animals Kept under Intensive Livestock Husbandry Systems. Command Paper 2836. Her Majesty's Stationery Office, London.

25. Farm Animal Welfare Council (FAWC) (2009). – Farm animal welfare in Great Britain: past, present and future. FAWC, London.
26. New Zealand Ministry of Agriculture and Fisheries (MAF) (1992). – Code of recommendations and minimum standards for the welfare of dairy cattle. MAF, Wellington.
27. New Zealand Ministry of Agriculture and Fisheries (MAF) (1996). – Code of recommendations and minimum standards for the welfare of sheep. MAF, Wellington.
28. New Zealand Ministry of Agriculture and Fisheries (MAF) (1997). – Code of recommendations and minimum standards for the welfare of bobby calves. MAF, Wellington.
29. New Zealand Ministry of Agriculture and Fisheries (MAF) (2005). – Animal welfare (broiler chickens: fully housed) code of welfare 2005. National Animal Welfare Advisory Committee, MAF, Wellington.
30. New Zealand Ministry of Agriculture and Fisheries (MAF) (2005). – Animal welfare (zoos) code of welfare 2005. National Animal Welfare Advisory Committee, MAF, Wellington.
31. New Zealand Ministry of Agriculture and Fisheries (MAF) (2010). – Animal welfare (dairy cattle) code of welfare 2010. National Animal Welfare Advisory Committee, MAF, Wellington.
32. New Zealand Ministry of Agriculture and Fisheries (MAF) (2010). – Animal welfare (pigs) code of welfare 2010. National Animal Welfare Advisory Committee, MAF, Wellington.
33. Mellor D.J. & Reid C.S.W. (1994). – Concepts of animal well-being and predicting the impact of procedures on experimental animals. *In* Improving the well-being of animals in the research environment (R. Baker, G. Jenkin & D.J. Mellor, eds). Australian and New Zealand Council for the Care of Animals in Research and Teaching, Glen Osmond, South Australia, 3–18.
34. Beausoleil N.J. & Mellor D.J. (2012). – Complementary roles for systematic analytical evaluation and qualitative whole animal profiling in welfare assessment for Three Rs applications. *In* Proc. 8th World Congress on Alternatives and Animal Use in the Life Sciences (ALTEX), Switzerland (S. von Aulock, FP. Gruber, P. Mayr, C. Rauter & G. Krummenacher, eds), Vol. I, 455–460.
35. Mellor D.J. (2012). – Affective states and the assessment of laboratory-induced animal welfare impacts. *In* Proc. 8th World Congress on Alternatives and Animal Use in the Life Sciences (ALTEX), Switzerland (S. von Aulock, FP. Gruber, P. Mayr, C. Rauter & G. Krummenacher, eds), Vol. I, 445–449.
36. Barnett J.L. & Hemsworth P.H. (2003). – Science and its application in assessing the welfare of laying hens. *Aust. vet. J.*, **81**, 615–624.
37. Webster J. (2005). – The assessment and implementation of animal welfare: theory into practice. *In* Animal welfare: global issues, trends and challenges (A.C.D. Bayvel, S.A. Rahman & A. Gavinelli, eds). *Rev. sci. tech. Off. int. Epiz.*, **24** (2), 723–734.
38. Panksepp J. (2005). – Affective consciousness: core emotional feelings in animals and humans. *Consciousness Cognition*, **14**, 30–80.
39. Duncan I.J.H. (2005). – Science-based assessment of animal welfare: farm animals. *In* Animal welfare: global issues, trends and challenges (A.C.D. Bayvel, S.A. Rahman & A. Gavinelli, eds). *Rev. sci. tech. Off. int. Epiz.*, **24** (2), 483–492.
40. Fraser D. & Duncan I.J.H. (1998). – ‘Pleasures’, ‘pains’ and animal welfare: towards a natural history of affect. *Anim. Welf.*, **7**, 383–396.
41. Fraser D. & Nicol C.J. (2011). – Understanding animal welfare. *In* Animal welfare (M.C. Appleby, J.A. Mench, I.A.S. Olsson & B.O. Hughes, eds), 2nd Ed. CABI, Wallingford, Oxfordshire, 183–199.
42. Kirkden R.D. & Pajor E.A. (2006). – Using preference, motivation and aversion tests to ask scientific questions about animals’ feelings. *Appl. anim. Behav. Sci.*, **100**, 29–47.
43. Mason G. & Rushen J. (eds) (2006). – Stereotypic animal behaviour: fundamentals and implications for animal welfare, 2nd Ed. CABI, Wallingford, Oxfordshire.
44. Denton D.A., McKinley M.J., Farrell M. & Egan G.F. (2009). – The role of primordial emotions in the evolutionary origin of consciousness. *Consciousness Cognition*, **18**, 500–514.
45. Fraser D. (1993). – Assessing animal well-being: common sense, uncommon science. *In* Food animal well-being. Purdue University Office of Agricultural Research Programs, West Lafayette, Indiana, 37–54.
46. Yeates J.W. (2011). – Is ‘a life worth living’ a concept worth having? *Anim. Welf.*, **20**, 397–406.
47. Yeates J.W. & Main D.C.J. (2008). – Assessment of positive welfare: a review. *Vet. J.*, **175**, 293–300.
48. Boissy A., Manteuffel G., Jensen M.B., Moe R.O., Spruijt B., Keeling L.J., Winckler C., Forkman B., Dimitrov I., Langbein J., Bakken M., Veissier I. & Arnaud A. (2007). – Assessment of positive emotions in animals to improve their welfare. *Physiol. Behav.*, **92**, 375–397.
49. Mellor D.J. (2011). – Animal pain and World Organisation for Animal Health (OIE) guidelines. *In* Proc. of the 1st OIE Global Conference on Evolving Veterinary Education for a Safer World, 12–14 October 2009, Paris. OIE, Paris, 175–180.
50. Mellor D.J. & Stafford K.J. (2001). – Integrating practical, regulatory and ethical strategies for enhancing farm animal welfare. *Aust. vet. J.*, **79**, 762–768.

51. Gregory N.G. (2004). – The physiology and behaviour of animal suffering. Blackwell Publishing, Oxford.
52. Mellor D.J., Thornber P., Bayvel A.C.D. & Kahn S. (eds) (2008). – Scientific assessment and management of pain. *OIE Tech. Series*, **10**, 1–1218.
53. Appleby M.C., Mench J.A., Olsson I.A.S. & Hughes B.O. (eds) (2011). – Animal welfare, 2nd Ed. CABI, Wallingford, Oxfordshire.
54. Grandin T. (ed.) (2010). – Improving animal welfare: a practical approach. CABI, Cambridge, Massachusetts.
55. Broom D.M. (2010). – Cognitive ability and awareness in domestic animals and decisions about obligations to animals. *Appl. anim. Behav. Sci.*, **126**, 1–11.
56. World Organisation for Animal Health (OIE) (2012). – Chapter 7.1. Introduction to the recommendations for animal welfare. In *Terrestrial Animal Health Code*. OIE, Paris. Available at: www.oie.int/index.php?id=169&L=0&htmfile=titre_1.7.htm (accessed in June 2013).
57. World Organisation for Animal Health (OIE) (2012). – Section 7. Welfare of farmed fish. In *Aquatic Animal Health Code*. OIE, Paris. Available at: www.oie.int/index.php?id=171&L=0&htmfile=titre_1.7.htm (accessed in June 2013).
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