

A hypothetical strategy for the objective evaluation of animal well-being and quality of life using a dog model

DB Morton

School of Biosciences, University of Birmingham, Edgbaston, Birmingham B15 2TT, UK
Correspondence: d.b.morton@bham.ac.uk

Abstract

In this paper I describe a hypothetical strategy for assessing poor and good welfare with the aim of making a judgement about an animal's quality of life. The concepts discussed here may also contribute to the notion of what makes 'a life worth living'. The strategy involves attributing scores to positive and negative aspects of an animal's well-being, using predefined categories and a simple scoring rote, and then summing these scores into an overall welfare score. The strategy incorporates a mathematical calculation that has certain mathematical biases to help ensure that any animal suffering is not excessive. I draw attention to some limitations of the proposed strategy and stress that such mathematical scoring systems cannot be used simplistically. Nevertheless, the proposed strategy could be refined, tested and validated to assist decision-making by those with a duty of care to the animal concerned.

Keywords: animal needs, animal wants, animal welfare, assessment, quality of life

Introduction

This paper addresses the issues of what makes a life worth living and how to practically make a judgement on quality of life (QoL), possibly with a view to euthanasia. In contrast with human medicine, it is generally considered acceptable to kill animals humanely if they are suffering (although human euthanasia is now being legalised in many countries). This paper is based on one written more than 20 years ago (Morton & Griffiths 1985) describing how to assess pain and distress, ie poor welfare, in animals, and also on the work of Frank McMillan, who is at the forefront of such work (see eg McMillan & Lance 2004). Several recent papers, notably by a group at Glasgow University (eg Wiseman *et al* 2001; Wiseman-Orr *et al* 2004), have focussed on the impact of chronic pain on QoL, but in this paper I propose a hypothetical strategy for a more holistic QoL assessment that relates not only to pain but to all causes of animal suffering (eg distress, boredom, frustration, fear). The assessment strategy also takes into account positive aspects of QoL, such as contentedness, happiness, and pleasures. Assessment of QoL is essential in determining whether a life is worth living. The strategy I describe below has not been validated in any scientific way, and is, therefore, a hypothesis at present, requiring further development in a practical setting.

QoL can be defined in various ways and is usually directly related to the negative welfare of an animal (Dawkins 1980; Broom 1986; Duncan 1993, 1996) but, more recently, it has been described in terms of the balance between positive (reward, satisfaction) and negative (stress) experiences or states (see Wiepkema 1985; Dawkins 1990; Fraser 1995; Spruijt *et al* 2001). In humans, QoL has been defined as the difference between the patient's expectation and the reality

of his or her condition (Carr *et al* 2001). This definition seems inapplicable to animals because we cannot ask them about their expectations, even if we can make some attempt to measure their reality. Thus, a person dying of cancer in a hospice, who has what might seem an impoverished life, may in fact be relatively content because s/he has accepted their condition, and so their QoL is acceptable to them. Another patient who has not made the mental adjustment of 'accepting' their condition may be very frustrated and so have a poor QoL, as they are still 'fighting' their condition. There are interim states, as well as oscillations between states; also, of course, humans are more self-aware than animals, and can think more deeply about their future and their choices of action. However, if we were not able to communicate with such persons, but only to observe them, how would we then determine their emotional state? This is the problem we have with animals (and also humans who are unable to self-report, such as infants). Pet owners may recognise emotional states in their animals, but determining those private inner (mental) feelings in animals, as well as in other humans, is difficult. Veterinarians will recognise signs that indicate poor health but not necessarily how an animal is coping with its disability. Ethologists, too, have an important role to play in this assessment, by observing an animal's behaviour and comparing it to that of an animal in full health and vigour. To make a judgement about QoL, observers must rely on some notion of 'normality' for that individual animal, or for the breed, or the species, and in some cases must also consider whether it is still fit for purpose, ie how it is used (eg lap dog *versus* hunting dog). If one is making a judgement about whether a particular therapy has been successful, a before/after comparison may be made, in addition to other criteria.

The assessment of QoL requires *individual* assessment, even when considering groups of animals; a group is simply a collection of individuals, from which an extrapolation is made to the group. Interactions between owner, environment and animal all affect measures of QoL: animals are likely to be more responsive in a familiar environment and with those humans that they know and trust. Another important factor in QoL assessment is change over time: QoL after successful surgery may be poor during the recovery phase (eg with inadequate post-operative pain relief, distress and anxiety) but, in the longer term, QoL may be much improved. Some surgical procedures may have less obvious benefits for the individual but facilitate a method of husbandry, such as the various procedures carried out on farm animals (eg castration, tail-docking and invasive identification methods). The neutering of companion animals has mixed benefits in this regard.

In this paper, I propose a strategy that involves objective scoring of observable signs. I then suggest some subjective interpretations of these observations that could be used to make an overall assessment of QoL. How the result of this overall assessment is interpreted (eg whether the measured QoL can be considered acceptable or not), and who should make this interpretation, are subsequent issues influencing the fate of the animal and the manner in which we discharge our duty of care. While the principles involved in this assessment should apply to any species, the model animal I have in mind is the pet dog. Humans can probably make better judgements for animals with which they have a close bond. In essence, the strategy evaluates observable signs of good well-being and poor well-being, with overall QoL being defined as a 'sum' or balance of the two. Some poor welfare states may be acceptable if they are of short duration or if an animal can tolerate them, whereas others may be so painful or distressing that they cannot be outweighed by good welfare states. To try to make an overall assessment that reflects the degree to which an animal is experiencing a life worth living, an overall balance of good over poor welfare that is sustained over time is a key issue. Other key issues are the intensity and duration of the emotional states involved, and how well an individual animal is coping. Secondary factors that should not be ignored include the support system for the animal in terms of its care (eg good nursing), play, time spent attending to it, quality of its environment, and so on.

Quality of life throughout an animal's life

Our aim in carrying out QoL assessments is to maximise QoL throughout the life of an animal. This will require making assessments around the time of birth, around the time of death, and in between, when QoL of healthy animals may be affected by their environment, their use by humans, and disease and treatment.

The QoL of neonates is difficult to assess as their behaviour is very limited and their nervous system is still maturing. Upcoming DNA technologies will permit us to predict a poor QoL resulting from diseases that the animal will or could develop at some point in its life. In those cases, a judgement will have to be made regarding the best interests

of the animal over its lifetime, and euthanasia before it develops the disease, or perhaps a humane endpoint when signs of the disease develop, should be decided upon. Some congenital deformities (eg commonly occurring breed-specific anatomical abnormalities in dogs) may have an impact on QoL; again, a judgement will have to be made on whether that animal will have a life worth living. Other diseases, such as fading puppy syndrome, are untreatable at present; unless some novel therapeutic approach is discovered, then the affected puppy will most likely die of dehydration, and euthanasia would be a humane option.

Common insults to neonatal animals' QoL are the routine surgical procedures (eg castration, tail-docking) that are carried out on farm animals with no anaesthesia or analgesia and on companion animals with anaesthesia but not usually with adequate post-operative analgesia (NB removal of dew claws and cosmetic docking of puppies is normally carried out without anaesthesia or analgesia). The experience of pain at this time of life has a significant impact on QoL, because the immaturity of neonatal animals' nervous systems (specifically, the lack of development of the descending inhibitory pathways in the spinal cord [Fitzgerald & Anand 1993; Fitzgerald & Koltzenburg 1996; Fitzgerald 1997]) makes neonatal animals more likely to suffer greater levels of pain and distress at the time of surgery than adults. Animals may experience moderate pain for some days after surgery (Mellor & Malony 1995; Mellor & Stafford 1999), and residual hypersensitivity at the site of surgery may persist for several months, thereby increasing the adverse effects of the surgical procedure. There is evidence for a lowering of the pain threshold in human babies six months after circumcision (Taddio *et al* 1995), in chickens after debeaking (Gentle 1986), and in mice after tail-tipping (Dharia J & Wells DJ, personal communication 2007). Even though these young animals appear to return to 'near normal' relatively quickly, careful studies have revealed long-lasting effects on the animals' sensation of pain, emphasising that our recognition of pain and distress in neonates is very crude and poorly developed.

After weaning (itself likely to be a traumatic, unnatural process, as, for most farm and companion animals, it is carried out rapidly and earlier than in nature), healthy animals may be kept in impoverished conditions (eg small barren cages or pens) and, sometimes, in social isolation. In animals' natural/wild state, they have evolved and adapted to a range of environmental niches and habitat conditions that expose them to varying odours (vegetation and other animals), tastes (fruits, prey meats, grasses), sights (colours [for those animals that have colour vision], other animals, plants), noises (weather conditions, vocalisations by other species eg birds), and tactile sensations (soft and hard surfaces, rain, snow, grass, soil). All of this information is sensed and processed by their peripheral and central nervous systems. Animals may also possess cognitive abilities that enable them to be aware of the availability of space to run freely and to play with little restriction, a sense of territory, a sense of threat from predators, and also a sense of pleasure from being able to choose food and to play. Of course, they also have the possibility of being killed

by predators or dying of starvation. How different, then, are the lives of some animals, such as those kept for research or in intensive farming conditions, living indoors under carefully controlled conditions of heat, light, noise, and smell, on their own in a small metal or plastic cage. In addition, farm and laboratory animals in particular may be placed in unnatural groupings and at high stocking densities, leading to aggressive behaviours. Sometimes they develop stereotypic behaviours as a result of boredom and frustration. Even when animals have never experienced 'natural' states, many of their instincts seem to be 'hard wired': wild birds in captivity and hatched in incubators will show escape behaviours at times of migration; males will seek females and *vice versa*; parturient animals will try to build nests in the absence of any substrate, etc. Breeding animals in captivity, even for hundreds of years, has not diminished these drives nor the ability of domesticated animals to revert to 'wild-type' behaviour given the right environment (eg release into the wild [Berdoy 2003]).

Many of the traditional systems of animal husbandry and use cause poor welfare, including single-housing of animals (eg rabbits, sows and veal calves) and housing of hens, rabbits and parrots in small cages. The use of iron bits and shoeing in horses is being questioned (see Cook *et al* 2007, p 166, this issue; <http://www.bitlessbridle.com>). Some of the evidence that these traditional systems cause poor welfare stems from relatively new scientific paradigms for assessing animals' needs, such as preference testing and measurement of how hard animals will work to obtain a preferred environment or to avoid an aversive one. These behavioural tests supplement physiological assessments of distress, fear and pain, through measurement of endocrine hormone release and end-organ responses (eg heart rate, blood pressure, muscle tone, pupil dilatation). In some cases, behavioural assessments supplant physiological measures as they can be interpreted as the final expression of how an animal feels about its environment.

Disease has the potential to affect QoL throughout an animal's lifetime. Animals that are unhealthy because of infectious or non-infectious diseases will usually have poor welfare. Good health is a fundamental part of good welfare, but good health *per se* does not equate to good welfare. This is an important point, as many veterinarians still consider welfare and health synonymous. The definition of 'health' may or may not include mental health — usually it does not in animals.

Establishing the effectiveness of a treatment depends on determining whether the treatment has restored the animal's QoL to its former level and, if it has not, whether the animal's current and predicted QoL are acceptable. This before/after comparison may be confounded by several factors such as how observant those making the 'before' assessments have been. Moreover, with some animals (eg strays), we have no biography (ie life history, behaviour responses and conditioning) with which to determine 'before'. While the assessment of QoL is important for determining the effectiveness of existing therapies and whether an animal is responding to treatment, it is even more important for new and innovative treatments where the outcomes are less certain. QoL scores can be built in to help make such

decisions regarding effectiveness of treatment as well as to establish humane endpoints for the animals concerned.

QoL scores at the end of life could allow us to ascertain whether euthanasia is an appropriate course of action. Again, this decision will often be heavily influenced by the animal's recent QoL and particularly by its predicted QoL. One question is whether the animal has a life worth living: is its QoL acceptable to itself as well as to its owners? In making such judgements, it is vital to be objective. QoL scores can be used to clearly inform all those involved at a very difficult and emotional time in a transparent way.

A proposal for scoring quality of life

Basic scoring guide

First, a list of observations likely to be helpful in assessing QoL must be established. It may be possible to prepare an observation list of general signs that will be useful for all animals, but it may not be possible for all ages (neonatal, end of life), or for all states (eg different husbandry and care conditions, diseases, experimental therapeutic surgery, pregnancy), or for all species or strains or individuals. However, these variables can usually be taken into account by a knowledge of what is 'normal'. The attending veterinarian should be skilled in identifying objective clinical signs of poor health in disease states and measuring the range of an animal's physiological responses. The owner, carer (eg nurse, stockperson, handler etc) and behaviourist will help to determine the range of normal relevant behaviours and responses, and will provide other information to help determine an animal's emotional state.

There are four main areas in which signs may be classified:

- (1) Behaviour (from a distance)
- (2) Appearance and posture (from a distance)
- (3) Appetite (observed or body weight)
- (4) Provoked behaviours (interactions with humans and other animals)

In scoring negative welfare these areas are supplemented by a further category (making 5 in all):

- (5) Clinical signs of ill health (mental or physical)

However, in assessing positive welfare, clinical signs are replaced by two other scoring categories (making 6 in all):

- (5) Good health
- (6) Resources

Conducting a scoring session

A scoring session would be conducted by, first, observing signs in the undisturbed animal (from a distance), such as its natural/unprovoked behaviour, appearance, posture, respiratory rate and pattern. The animal can then be observed at closer range, when it will inevitably start to interact with the observer, thereby making it possible to observe its responsiveness to a stimulus or to score its provoked behaviour. This can then be followed by a more hands-on examination of the animal (weighing, assessing body condition, hydration, responsiveness by touching sensitive areas such as injuries, measuring temperature, heart and respiratory rates).

Table 1 Observable categories and examples of some signs indicative of positive well-being.

Category	Examples
Behaviour (O)	Acts normally for the species eg with cohorts, carries out normal behaviours such as grooming, sleeping, does not show stereotypies.
Appearance and posture (O,V)	Alert and confident, tail held and moved in an appropriate way, unafraid.
Appetite (O)	Eats well, licks bowl, wants more, likes treats.
Provoked behaviours (O)	Interacts and plays with others (eg humans, cohorts, inanimate objects), is energetic (eg chases around after birds, tree leaves, prey), is inquisitive/curious (eg exploring in park), is confident and enjoys interacting in a friendly way with humans and other animals, shows appropriate vocalisation, smiling, tail wagging (dogs), tends to be non-aggressive, seeks affection, eager to please, shows affection for compatible animals and humans, likes going for walks (dogs), learning tricks, energetic (eg chases balls), normally obedient if trained.
Good health (pre-requisite) (O,V)	No clinical signs of disease (ie animal seems unaware of any ill health).
Resources (O)	Shares its pen/den/box non-defensively, has choices and freedom to choose (eg untethered, can run when it wants to, go outside when it chooses, ie it has some control over its environment). Able to form relationships and attachments with others.

Scoring categories with major contributors in parentheses. O, owner or carer; V, veterinarian.

Table 2 Scoring rote for each of the observable categories indicative of positive well-being.

Score	Observation
0 to 3	Shows good health. Most of its essential needs, and a few wants, are being met. Could have better welfare with more attention and resources.
4 to 8	Shows good well-being in 2 to 3 categories. All needs, and a considerable number of wants, are being met; fair degree of positive welfare; animal's care and husbandry has potential for improvement.
9 to 12	Shows good well-being in all categories. Good to excellent positive welfare with all needs, and most wants, being met. A (very) happy animal.

It is important that all signs can reliably be scored consistently by different observers. Regular observation of animals over several days or weeks (or even hours in some cases) will be important to determine whether the state of the animal has deteriorated, improved or remained stable. Although the cause of an abnormal sign (eg atypical behaviour or physiology) may vary, it is the impact on the animal that matters. Scoring holistically — using a range of signs — will, therefore, be more revealing of the overall impact on an animal and its ability to cope. Some observable signs can be

quantified (eg body weight, body temperature, heart rate, some behaviours), whereas others cannot (eg posture [recumbent, 'hang-dog', hunched], appearance [closed eyes, disturbed pelage eg ruffled fur or feathers], behaviours [play, grooming, yawning, stretching], and clinical signs [respiration deep/shallow/laboured, diarrhoea, coughing, convulsions]). Such unquantifiable or qualitative signs can be scored as either present or absent, but it is often also possible to grade them into some form of severity. For example, a painful foot may cause an animal to limp, but a limp can vary from being only just detectable to causing severe lameness and inability to bear any weight on that leg. An indication of positive well-being would be keenness to go for a walk; of negative well-being, reluctance or refusal to move and respond.

Signs can be scored as present (+) or absent (–) (or, if unsure, as +/-). All unquantifiable signs are reduced to an observation that can be scored in this binary way, to avoid misinterpretation and subjective evaluation and to leave little room for observer error.

In a small on-line survey I carried out in 2006 with David Cavill, who has a column in *Our Dogs* (a newspaper for owners of show dogs and breeders), we obtained the following typical responses. Interestingly, the responses could be scored in a binary way quite easily (see underlines), lending weight to the proposed binary scoring system.

“Stopped eating, drinking and purring. Uninterested in things”

“Never got up out of this bed, breathing was difficult, never ate after op”

“Slept more, ate less, wanted less attention”

“She just stopped moving around, stopped barking at the door, didn't bother with her usual trick of picking up a toy to greet the guest”

“Go off their legs and cannot go for walks with other dogs, not being able to play”

“After operation she became so energetic, new lease of life, came alive again. Adopted most recent puppy and mothered it ever since”

“Dog off lead and running, sniffing, exploring, tail going when petted, tickled and played with”

“His whole demeanour changed when I turned into leader from sullen, ignoring attitude to lively attentive and friendly”

Scoring positive well-being of an individual

There is little previous experience in the literature of positive welfare scoring but, in principle, it should be no different from negative welfare scoring. Just as certain observations can indicate poor welfare, others can indicate good welfare eg contentment and happiness. It is important to note that, because each animal is an individual with its own biography and character, observations of the same emotional state may differ between animals (eg expressions of pleasure by vocalisation, tail and body movements). Notwithstanding that, there are a few general assessment criteria that are likely to apply to all animals, a key one being that the animal is in good health. There is an assumption that the animal is in good health and so there will be no clinical signs of ill health, but general signs of good welfare that are likely to apply to

all animals include good appetite (although some may be fussy, hence the importance of individual assessment), activeness, play when young, responsiveness to humans and other animals, and behaviours that suggest a positive emotional state (eg wagging tails in dogs, purring in cats). There are some general characteristics that are typical for the species or breed; for example, working spaniels are very active and go into hedgerows to seek out game, terriers go down holes and dig, and other breeds have been selected for docility to become lap dogs, or to follow scents, to guard, and so on. These breed characteristics can become useful sources of additional criteria by which to assess poor and good well-being, and to provide some sort of reference point or benchmark for assessment in a particular breed. With regard to the 'Resources' category, it is impossible to define a single best practice for promoting good welfare and so a range of open-ended options and good practice have yet to be developed, but this is where I suspect current practices by nurses and carers will reveal a lot of novel information.

In this proposed system, positive well-being is assessed using six categories (see Table 1), with a score of between 0 and 2 being allocated to each, giving a maximum of 12 points (see Table 2). This scoring system is subject to development and validation, which should come through use of the proposed system in a practical setting.

I have separated animals' 'needs' and 'wants' (see Table 2), although there is much debate about what they really are. 'Needs' I define as those things that animals require to keep them in good health, such as a nutritionally adequate diet, potable water, and exercise for the normal development of body and brain. 'Wants', on the other hand, are over and above needs and help define a life worth living, ie they contribute to an animal's QoL.

Scoring negative well-being of an individual

In principle, the degree to which an animal is suffering and is experiencing poor welfare can be measured by how far its condition has deviated from normality in each of the five categories listed above (see Morton & Griffiths 1985 for a more detailed analysis). For example, an animal that has a raised temperature of 4°C above normal is likely to be suffering more than one with only a 1°C rise. Similarly, an animal that has lost 25% of its bodyweight may have poorer welfare than one with only a 5% loss. 'Normality' can be either that for the individual animal where that information is available or, if not, for the breed or species. For the evaluation of treatment, a before/after comparison is ideal. There also has to be some concept of what is 'normal' for that animal under the circumstances in which it lives. Thus, normality for animals in the wild, in a zoo, or in a research laboratory will all be very different.

For each of the five categories a score from 0 to 4 can be given with a notional qualitative interpretation: no change from normal (0); a slight change (1); a significant and clearly noticeable change (2); an obvious change of significant severity for the animal eg pain, distress (3); and, a change that is clearly very abnormal and indicative of

Table 3 Observable categories and examples of some signs indicative of negative well-being.

Category	Examples
Behaviour (O)	Sleep time increased, malaise, eating pattern changed, reduced mobility (lameness), abnormal and unusual behaviours eg stereotypies, vocalisations.
Appearance and posture (O,V)	Stance, sunken dull eyes, depressed, starey coat.
Appetite (O,V)	Eating less, taking longer to finish meal, reduced bodyweight, less enjoyment of food.
Provoked behaviours (O,V)	Change in responsiveness, eg pain responses, interactive game play, change in temperament.
Clinical signs (V)	Increase in body temperature, respiratory rate, heart rate, cough, neural signs eg fits, senses affected eg loss of sight or hearing, presence of diarrhoea, poor body condition.

Scoring categories with major contributors in parentheses. O, owner or carer; V, veterinarian.

Table 4 Scoring rote for each of the observable categories indicative of negative well-being.

Score	Observation
0	Normal range (for that animal).
-1 to -5	Slight changes from normal.
-5 to -10	Moderate changes from normal that would give rise to serious concern.
-11 to -15	Substantial changes from normal that are treatable and are being treated with a good chance of success.
-16 to -20	Animal likely to be in severe pain and distress; treatment not effective; death may occur over next few days. Any treatment that is futile (ineffective).

serious physiological or behavioural perturbations reflecting major adverse effects (4). As there are five categories, a maximum of 20 points can be given. Table 3 shows the five categories for assessment of negative well-being, and Table 4 shows a suggested numerical scoring rote.

Overall assessment of quality of life

In order to weigh up the balance of good and poor welfare, the former are considered mathematically positive and the latter negative. The scores are then summed to give an overall QoL score (see Table 5 for guidelines on interpreting overall positive and negative summated scores). But it should be noted that these scores cannot be added up in a linear mathematical way. Thus a score of -10 is not reflective of a QoL that is five times worse than that of an animal scoring -2; correspondingly for scores of +2 and +10. Moreover, the overall negative score is deliberately biased to be high (with a maximum positive score of 12 but a maximum negative score of -20) so that attention is drawn to an animal that is in unrelieved and possibly unrelievable

Table 5 Guide to interpreting overall positive and negative summated scores.

+3 to +12	Has a life worth living to varying degrees and an acceptable QoL that could be improved.
0 to +3, in good health and no negative welfare score	QoL not acceptable, would benefit from more attention and efforts to promote its well-being.
-10 to +3 with a maximum negative welfare score of -10 being compensatable	Despite the negative welfare score the animal may still have potential for an acceptable QoL. No negative score of -6 or more should be allowed to persist (eg for longer than three days). Treatment being given is likely to be effective with a good prognosis.
-11 to -15 or more	Serious cause for concern. Requires a regular review of treatment and prognosis. Not normally compensatable by a positive welfare score.
-16 to -20	Exit plan required

intense pain or distress, or other suffering. These compensation arrangements have been put in place to deal with the various conditions that may yield a raised negative score but also a raised positive score that, when summated, give an overall acceptable QoL. Thus a score of -10 could arise from a +4 and a -14 but the animal may have a good chance of recovery and what is needed is more attention to the animal's medical treatment. A +3 could arise from a -5 and a +8, ie the animal has an acceptable QoL even though it has some disease, such as diabetes, which would give it a high negative welfare score, and yet it is coping with its condition. Much will depend on the circumstances, such as the nature of the disease, the resources, and the interplay between the scoring categories, and we therefore need to be aware that a more detailed look is often required. That is why simple mathematics can be misleading. Consequently, these various mathematical safety nets have been built in to allow for factors such as the nature of the disease and its prognosis, alleviative treatments that are not working, or treatments that are futile because they are not addressing, and may never be able to address, the root cause (see Table 5).

The QoL score could be considered to be independent of the potential for improvement — from the animals' perspective, it is its current QoL that is important, not its potential for an improved QoL. However, the prognosis is of overriding importance, just as for an animal that has already undergone a failed treatment, the chance of success with further treatments may be lower. It is with this in mind that the two lower categories, -11 to -15 and -16 to -20, are included. The score will then reflect the likelihood of success with further treatments — the more negative the score, the less chance of success, with information coming from some evidence database (eg recent research, standard texts, experience).

Advantages and disadvantages of the scoring strategy

Some of the advantages of this strategy for scoring negative welfare states, such as pain and distress, are considerable and are listed below. In principle, the same advantages should apply for the proposed scoring of good welfare.

- Subjective assessments of welfare by animal care staff and owners are avoided.
- Promotes a more fruitful dialogue, facilitating evidence-based opinion.
- Promotes closer observation of animals by all, and particularly at the times that are critical for the animal (eg if an animal is showing signs of pain, analgesia can be given).
- Helps experienced persons illustrate to less experienced persons why the welfare and hence the QoL of an animal is good or poor.
- Consistency of assessment is increased as scoring options are limited; specific guidance on how to score can be made available.
- Single signs as well as combinations of signs can be used to indicate overall welfare assessments.
- Helps to measure the impact of a treatment procedure and to indicate humane endpoints whether the treatment is experimental or routine.
- Helps to determine the (in)effectiveness of any therapy intended to relieve adverse effects or promote well-being.

This assessment should be carried out under the guidance of an experienced person, who should take responsibility for ensuring good management practices. This experienced person should ensure that appropriate score sheets are in place, that staff are trained in their use, and that staff are able to recognise the clinical signs and interpret them clearly into humane endpoints or other actions (eg calling in the veterinarian). The experienced person should also ensure that staff who are not familiar with the procedures (eg weekend/holiday rota staff) are informed about the animals. Importantly, also, the score sheets should be continually updated; some animals may show novel signs that need to be taken into account, and some superfluous or unreliable signs may need to be removed.

The disadvantages are that some clinical signs that are being scored (eg heart-rate, lameness), in specific circumstances, may be irrelevant in determining good or poor well-being. Heart rate may reflect excitement or an underlying heart pathology, lameness a non-painful skeletal deformity. Other signs may reflect neither state (eg being alive) or may simply be irrelevant under the circumstances (eg coat thickness or colour); or, the sign may be irrelevant for some individual animals (eg ability to hunt, to play with a ball) but important for others. Some signs may be interpreted as indicating a poor state but actually indicate a good state (eg stereotypic behaviours may actually help an animal to cope better with an adverse environment). Another disadvantage is that the state of an animal may change unpredictably in between observation times, or a wrong diagnosis may impact on the potential for recovery from a disease, leading to an inaccurate QoL assessment based on a false prognosis.

Conclusions and animal welfare implications

This proposed hypothetical framework is, as yet, untried and unvalidated in terms of its usefulness for any species. It needs considerable fleshing out that will only come with experience of using of the system in practice, and I hope that others will do so. The necessary next steps, which will include guidance notes, evaluation in practice, and validation, will need to be clearly defined before the scoring system can be used. Even if the scoring system is not found to be successful, I believe that the discussion generated by these assessments of good and poor welfare will help owners/carers in determining an animal's QoL, supplemented by advice from veterinarians and other experts. This journey will be valuable in its own right and will help to highlight points of agreement and disagreement.

Acknowledgements

I would like to thank the referees who commented on the early drafts of this paper, and the editorial suggestions made by EA Roberts are particularly gratefully acknowledged.

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