

How animals communicate quality of life: the qualitative assessment of behaviour

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Abstract

The notion 'quality of life' (QoL) suggests that welfare in animals encompasses more than just an absence of suffering; it concerns the quality of an animal's entire relationship with its environment, of how it lives its life. Judgements of such quality are based on the integration of perceived details of how animals behave over time in different contexts. The scientific status of such judgements has long been ambiguous, but in recent decades has begun to be addressed by animal scientists. This paper starts with a brief review of qualitative approaches to the study of animal behaviour, which tend to address characteristics such as individuality, personality, and emotionality. The question then arises whether such characteristics involve a subjective, experiential aspect, and identify animals as sentient beings. The second half of this paper argues that taking the integrative nature of qualitative judgements seriously enables a 'whole animal' perspective, through which it becomes possible to view behaviour as a dynamic, expressive body language that provides a basis for assessing the quality of an animal's experience (eg contented, anxious). Judging this quality is a skill that requires knowledge of species-specific behaviour, experience in observing and interacting with animals in different contexts, and a willingness to communicate with animals as sentient beings. A substantial body of research indicates that this skill can function reliably in a scientific context, and can be applied usefully as a practical welfare assessment tool. Thus qualitative approaches to the study of animal behaviour should make an important contribution to the growing interest in animal QoL.

Keywords: animal emotion, animal personality, animal sentience, animal welfare, qualitative behaviour assessment, quality of life

Introduction

'Quality of life' (QoL) is a rich, complex notion that takes us beyond asking whether or how the environment causes animals stress or suffering. It reflects a more positive, dynamic approach, which inquires what animals like or prefer doing and what opportunities they have to fulfil these interests. Welfare in this context encompasses more than just the absence of suffering, it concerns the quality of an animal's entire relationship with its environment, of how it lives its life. This paper is concerned with whether and how we can address this quality, particularly in a scientific context. The term 'quality' has many meanings, but basically it tends to refer to a general characteristic, an overall impression we have of something. That impression is often evaluated in terms of how good we think something is, and so 'quality' also often means excellence. Our perception of quality tends not to depend on quantity — it is not necessarily true that the more there is of something the better it gets. For example, if animals are provided with greater levels of stimulation in their environment, leading to higher levels of activity, this does not necessarily mean that their welfare improves. What matters to quality is *how* things are done, their style; quality is a dynamic notion. Rather than the amount of attention we pay to companion animals, for example, what matters is *how* we do this, the quality of that attention.

To address such quality is a judgement that involves the integration and weighing up of everything we perceive and of the context in which we perceive it. Typically such judgements are made by human observers and rely on our ability for complex perception and interpretation. But herein lies the catch for a scientific approach to quality — in their primary reliance on human perception/interpretation, judgements of quality are vulnerable to various forms of personal bias and are easily seen as just somebody's personal view. Given the risks of such subjective connotation, judgements of quality have, certainly within the animal sciences, traditionally been kept outside the scientific domain. Yet discarding such judgements from scientific methodology creates tension; we cannot stop ourselves from making qualitative judgements in our daily lives, yet there are very few, if any, formal channels through which we can apply these in our scientific work.

In the social sciences this situation has certainly changed over previous decades. Qualitative research approaches are now part of most standard social science text books (eg Punch 2005), and fields of social inquiry specifically aimed at the constructive scientific use of human qualitative judgements are growing (eg Strauss & Corbin 1998). However, in the biological sciences the status of such judgements remains very much unresolved. The central question

addressed in this paper is therefore whether and how qualitative judgements of how animals behave and live — ie their QoL — can be made and used in a scientifically acceptable way. The paper will start with a brief review of the use of qualitative judgements of behaviour in animal science, followed by a summary of our own research in this area and by some suggestions for further research.

The use of qualitative judgements of behaviour in animal science

Joan Stevenson-Hinde was a pioneer in the scientific application of qualitative judgements of animal behaviour (Stevenson-Hinde & Zunz 1978). She used this approach to address the quality of ‘individuality’ in behaving organisms: “When observers spend hours recording behaviour, they end up not only with behavioural data, but with clear impressions of individuals” (Stevenson-Hinde *et al* 1980, p 66; Stevenson-Hinde 1983). Her main interest was in child development, but she also applied her experience in this field to rhesus monkeys, whom she described for example as ‘confident’, ‘sociable’, or ‘excitable’ (Stevenson-Hinde *et al* 1980). The generation of such descriptors, she said, is a form of ‘subjective assessment’ due to the active role of the human observer: “the observer is an active instrument, filtering, cumulating, weighting, and integrating” (Stevenson-Hinde *et al* 1980, p 66). Further development of this approach was taken up by Julie Feaver and colleagues, who applied the descriptors used by Stevenson-Hinde to the study of domestic cats (Feaver *et al* 1986). In the view of these authors, these descriptors capture the quality of an animal’s ‘overall pattern of behaviour’, which they interpret as its ‘behavioural style’. They agree with Stevenson-Hinde that human observers play an active role in the perception of these patterns, but they do not think that this sets qualitative assessments apart from conventional ethogram-based recordings of behaviour as subjective. Conventional recordings, too, Feaver and colleagues contend, inevitably involve judgements on the part of the observer (eg deciding precisely when a behaviour starts or stops), and in this respect are as subjective as those involving observers’ judgements of behavioural style. Qualitative types of assessment differ from more conventional methods only in that they involve observation of behaviour over a longer period of time. This difference, according to Feaver and colleagues, is precisely where their potential value lies, “because the observer has played a computationally powerful role in filtering, accumulating and integrating information” (Feaver *et al* 1986, p 1024).

The idea to judge the behavioural style of individual animals over a longer period of time has in recent decades blossomed into a field of study concerned with animal temperament and personality (Gosling 2001). Measurement of these behavioural qualities takes place by means of rating scales that scientists have developed for different species along the phylogenetic scale, ranging from fish (Brown *et al* 2005) and snakes (Dutton & Andersson 2002) to hyenas (Gosling 1998), bears (Fagen & Fagen 1996) and great apes (Weiss *et al* 2006). These scales are often applied and tested

by animal caretakers and owners, who, having observed the animals over long periods of time, tend to know them well. There is plenty of evidence from this work that ratings of temperament and personality are reliable and useful, for example in investigating breeding success in individual animals in zoos (Carlstead *et al* 1999), or re-homing success in kennelled dogs (Normando *et al* 2006). However, the scientific and moral implications of ascribing qualities of ‘individuality’ and ‘personality’ to animals across the phylogenetic scale are controversial (Midgley 1983; Sharpe 2005). The existence of individual differences in animals is undisputed, but the concern is that attributing personality to animals may open the door to an anthropomorphic, distorted view of them as semi-human creatures (Serpell 2003). And indeed, truly regarding animals as individuals with personality would have a profound effect on how we view them. Animals would no longer be merely ‘organisms’ or ‘complex survival systems’; they would become somebody, personal beings with their own character, who can be our companions and to whom we give names (Hearne 1986). For the general public, such qualities form the basis for empathy and shared relationships, and are primary criteria for attributing animals with sentience. The public does not distinguish clearly between personality and emotionality, but regards both qualities as expressions of the sentience we share with animals in a ‘community of subjects’ (Arluke & Sanders 1996).

The question is whether the qualitative perception of animals as sentient beings provides an authentic, legitimate perspective that could potentially receive scientific support, or whether it merely reflects a muddled anthropomorphic projection of human values (Keeley 2004). It should be noted, first of all, that the public has good reason to perceive personality and emotionality as continuous. In human psychology, this continuity is well recognised; personality is in fact often defined as an emotional profile that persists over time. Plutchik (1980), for example, developed the so-called ‘Emotions Profile Index’ (EPI), which presents a theory of human personality in terms of interacting emotional styles of behaving and responding. Although originally developed for human beings, the EPI has also been successfully applied to the study of baboons and chimpanzees in Gombe national park, the home-base of Jane Goodall (Buirski *et al* 1978). In her world-famous accounts of the chimpanzee community in Gombe, Goodall (1990) provides in-depth profiles of individual chimpanzees, in which descriptions of their daily behaviour patterns, emotional experiences and personality characteristics are intimately interwoven. Likewise, Buirski and colleagues contend that the EPI descriptors they apply in their study (eg ‘shy’, ‘affectionate’) truly reflect the animals’ emotional states, and not just ‘temperament traits’ or ‘responsiveness styles’, as scientists often prefer to label such qualitative terms. Following on from this view, they suggest that the EPI may be directly relevant to the study of primate welfare, providing “meaningful emotional dimensions” for assessing the animals’ welfare state (Buirski *et al* 1978, p 210). More recently, the connection between personality and subjective

well-being in great apes has been investigated by King (1999) and Weiss *et al* (2006). Anthropologist Barbara Smuts (2001) contemplates the many years spent living with a troop of wild baboons in East Africa, and, addressing her perception of them as sentient, expressive individuals, describes how “the baboons treated me as a social being, and to gain their trust I had to learn the troop’s social conventions and behave in accordance with them. This process gave me a feeling for what it means to be a baboon. Over time, I developed a sense of belonging to their community, and my subjective identity seemed to merge with theirs” (Smuts 2001, p 1). Similar accounts of lives and experiences shared with individual animals or with communities of animals are for example given by Moss (1988; wild elephants), Shapiro (1990; companion dog), and Thomas (1995; feral dogs), and are also discussed by Bekoff (2006a,b).

Thus there exist various scientific approaches and studies that support a qualitative perspective such as that held by the public, in which individuality, personality and emotionality are regarded as continuous expressions of sentient experience. However, such approaches may find acceptance for primates and perhaps for socially sophisticated mammals such as wolves, dogs and elephants, but what about fish, octopuses, lizards, mice, and the many other species for which personality traits have been described — are we willing to view these traits as evidence of emotional experience? Are we willing to assume that bold fish and octopuses *feel* bold, or that a nervous python *feels* nervous? I think it is fair to say that for many if not most scientists this goes too far; by and large, the bridge between personality and emotionality in animals has not been crossed. This should not come as a surprise perhaps if we realise that if we were to cross this bridge, the implications for our relationship with animals would be enormous. Seeing animals fundamentally as personal sentient beings would dramatically increase our emotional and moral sensitivity to the plight of captive animals, forcing us to question more strongly than ever the moral boundaries of our dominion (Scully 2002). However, while opening the floodgates to such concerns may be considered problematic, a qualitative approach to the study of animal behaviour may also open doors to novel ways of addressing these concerns.

There have been various pioneers who, in line with Buirski’s original suggestion, have begun to use qualitative judgements of behaviour as part of their welfare-assessment protocols, to detect shifts in an animal’s habitual style of behaving. Morton and Griffiths (1985), for example, in their seminal paper “The recognition of pain, distress and discomfort in laboratory animals”, use terms such as ‘quiet’, ‘docile’, ‘anxious’, and ‘aggressive’ as indicators of compromised welfare. Kessler and Turner (1997, 1999) developed a seven-level ‘cat stress score’ to assess the effect of housing in catteries on cat welfare, using terms such as ‘relaxed’, ‘tense’, ‘fearful’, and ‘terrorised’, to indicate progressive levels of disturbed welfare. Wiseman-Orr and colleagues (Wiseman-Orr *et al* 2006) report that dog owners use terms such as ‘anxiety’, ‘fear’, ‘restlessness’, ‘sociability’, and ‘playfulness’, to identify changes in their dogs associated

with chronic pain. Our own work on the qualitative assessment of farm animal behaviour is described in more detail below (Wemelsfelder *et al* 2000, 2001). No doubt there are other examples to be found of scientists using qualitative terminologies to address an animal’s welfare state. The question is whether these scientists are happy to regard these terminologies as direct descriptors of their animals’ experience. The people asked to actually make the assessments — the caretakers, laboratory technicians or pet owners — mostly firmly believe this to be the case. The scientists sometimes do as well, but tend to prefer to remain cautious in their interpretation, leaving it open whether qualitative indicators describe behaviour, experience, or both. Science generally still feels circumspect about the status and validity of ‘subjective assessments’; the role of the human observer and his/her integrative perceptive powers in developing a truthful understanding of our world remains ambiguous and poorly understood (Anderson 2007).

The scientific validation of qualitative judgements of animal behaviour

Acknowledging the ‘whole animal’

The brief review presented above suggests that to address the question of animal sentience, it is important that we consider (amongst other things) the status attributed to our ability to make integrative judgements. Do we assume integration to take place purely in the mind of the observer, while continuing to regard animals as aggregated systems of physical parts and motivations as represented in conventional mechanistic animal models? Or should we accept as real what our minds tell us, and acknowledge that animals truly *are* integrated beings rather than just appearing that way to us? Clearly, the relationship between appearance and reality is a deep philosophical conundrum that cannot be addressed adequately in this brief paper (see eg Anderson 2007). However, it is not self-evident why we should regard ‘integration’ as a subjective property of the human mind, and ‘fragmentation’ (as practiced by mechanistic science) as an objective property of the natural world (Dutton & Williams 2004). Our practical, day-to-day relationships with animals would be unworkable if we did not recognise and address them as whole, expressive individuals, and it is therefore questionable whether we can justify withholding that wholeness from them in our theories. Even in scientific laboratories, distanced from daily life, the success of experimental studies often depends on the ability of scientists or caretakers to develop an empathetic and cooperative relationship with the experimental animals (Wieder 1980). Similarly, investigations into the language skills of great apes essentially depend on the active engagement and communication with those animals before, during and after the teaching procedures (Segerdahl *et al* 2005). Thus the practical necessity of relating to animals as sentient beings renders it quite meaningless, if not duplicitous, to theoretically disallow that status. If we rely on qualitative judgements in daily life, but then ban those judgements from science, we risk creating an artificial separation of scientifically constructed and personally experienced realms of

understanding (Midgley 1983). It seems preferable to recognise that, as noted in the Introduction, judgements of quality are inherently vulnerable to various forms of personal bias, and learn to deal with this constructively. It is not given that qualitative judgements are detrimental to science; if deliberately and conscientiously applied through the use of formal methodologies, such judgements may well open up novel ways of gaining access to both human and animal experience (Wemelsfelder 1997; Goodwin 1999).

What then are the implications of acknowledging as real the presence of the 'whole animal'? Primarily, to address animals as whole beings is to perceive more than just 'behaviour'; it is to first and foremost perceive a 'beholder', an agent, who performs 'behaviour' in a certain manner, with a certain expression (Wemelsfelder 1997; Wemelsfelder & Birke 1997). Animals can execute any behaviour in different ways; they can for example walk around in a manner that is relaxed, curious and lively, or, by contrast, tense, agitated and distressed (Fagen *et al* 1997). Thus, focussing on the whole animal, behaviour is seen no longer just as physical movement, but is evaluated in a larger context, and acquires an expressive, psychological quality (Bavidge & Ground 1994; Wemelsfelder 1997; Segerdahl *et al* 2005). It becomes a 'body language', which communicates *what it is like to be* that animal at a given moment in time (cf Nagel 1974). Recognition of this expressive quality is in line with, and encompasses, previous qualitative approaches addressing the individuality, personality and emotionality of animals, as discussed above. However, it goes further than those approaches in providing a more direct, dynamic and detailed analysis of an animal's experience. Body language is more than a pattern of movement or a behavioural style that can be identified over time; it is a psychological dimension that is immediately present and available for assessment, allowing us to judge the quality of an animal's experience directly and in considerable detail. As such, it identifies animals as sentient in all that they do.

Of course it is not new to discuss the expressive features of animal behaviour. There always has been much interest in these features in the classical ethological literature, particularly in the field of animal communication (eg Hinde 1972). Ethologists working in this field tend to assume that the effect of 'signalling systems' on other animals is basically automatic (ie evolved through natural selection) and not accompanied by subjective awareness. However, that expressive features evolved through natural selection does not preclude the possibility that the animal experiences them subjectively. The key point in conceiving of this, as argued above, is to acknowledge the integrated, 'whole animal' nature of expressive features, which endows these features with a psychological connotation and is vital for accurately interpreting their meaning. If one were to lift expressive features out of their whole-animal context and assess them as separate indicators of experience, they would lose their psychological connectedness and it would become much easier to make anthropomorphic mistakes (Wemelsfelder 2001). A classic example is to

interpret pictures of open-mouth grinning in primates similarly to human laughter, as an expression of friendly enjoyment (Foley 1935), whereas in primates this facial expression tends to signal a mixture of fear and anger (Van Hooff 1972). However, if one was shown the animal interacting with its surroundings, rather than an isolated image of its face, this mistake would be much less likely to occur. It is not the *grin* that is the body language; it is *how* the animal *grins*, how its whole body moves, that makes the grin an expression of fear, or anger, or something else. We must focus on the whole animal if we are to properly judge the expressive meaning of features of behaviour, whatever feature it is.

One may wonder whether it is at all feasible to apply this approach to species which are far removed from us on the phylogenetic scale. However, scientists and naturalists working with such animals often report that after long years of observing their way of behaving under a wide variety of circumstances, these animals' expressions tend to gain transparency in increasing detail (eg Lorenz 1975). The understanding of these animals' body language may well remain incomplete, but that is not to say that it is indirect, or arbitrary. It is good to realise that the danger of misinterpretation is equally of concern for more conventional methods of measurement. Extensive experience is needed to correctly discriminate categories of behaviour and measure these categories reliably. Is the animal feeding, exploring or trying to escape, is it playing or attacking? This may be easy to judge in some species but not in others. However, this does not make the use of these categories indirect; it means that their use is an acquired skill. For both qualitative and quantitative methods of assessment, experienced, skilled judgement lies at the heart of their effective use.

Developing and testing of formal methodology

The question thus arises whether qualitative judgements of animal body language can function reliably in a scientific context. At the Scottish Agricultural College we have spent 10 years putting this question to the test, with a small team of people and the help of many colleagues and students. In the context of the present paper we can provide only the briefest of summaries of this research and its main outcomes. Our first task was to develop a suitable methodology for investigating people's ability to make qualitative assessments of animal behaviour. It seemed important in this context not to work with pre-fixed lists of descriptors, as are commonly used in animal temperament and personality studies, but to ask observers to generate their own descriptors based on close observation of animals in various test situations. Only such a procedure would require observers to integrate and judge the animals' expressions for themselves, and not be biased by provided terms. Thus we developed a two-phase experimental procedure, based on an existing Free Choice Profiling (FCP) methodology used in food and consumer science (Oreskovich *et al* 1991). This method had not previously been applied to the study of animal behaviour, but seemed highly suited to our goals. Generally we worked with groups of 10–15 observers

(familiar with farm animals), to whom we showed video clips of animals in various settings, and then asked them at the end of each clip to write down adjectives which they thought adequately described how the animals had behaved. Having thus generated a list of descriptors for the observed animals' expressions, observers would then be asked to watch the same video material again, and use their personal terminologies to quantitatively score the intensity of perceived expressions, eg how shy or lively they thought an animal was. Observers were asked to stick to their own personal descriptors throughout each study, and to refrain from discussing their terms with others. To analyse the generated observer scores, we applied a multivariate statistical technique called Generalised Procrustes Analysis (GPA). This technique does not depend on the use of fixed variables, and enabled us to calculate the degree of agreement between observers and to identify the commonly perceived dimensions of behavioural expression underlying the observers' separate assessments (for further experimental and statistical details of this methodology, see Wemelsfelder *et al* 2000, 2001).

Over 10 years of research we have carried out over 60 FCP trials, involving mostly pigs, but also dairy and beef cattle, sheep and poultry. In all of these studies, we invariably found significant agreement between observers in the interpretation of the animals' behavioural expressions, regardless of these observers' professional background. Observers could also repeat their assessments with high levels of accuracy (Wemelsfelder *et al* 2001; Rousing & Wemelsfelder 2006). To test the effect of environmental background on observer assessments we digitally projected behaving animals against both indoor and outdoor backgrounds, and found that this did not unduly affect the observers' characterisations of the animals (Wemelsfelder *et al* unpublished data 2003). We originally started our programme of study with individual animals (Wemelsfelder *et al* 2000, 2001); however, as animals on farms are mostly kept in groups, we also tested this approach for animal groups and found that observers could reliably judge the expressive quality of larger groups of animals (Wemelsfelder & Farish 2002). The behaviour shown in the videos used at the FCP trials was frequently also analysed quantitatively using conventional ethograms, and we persistently found good and meaningful correlations between qualitative and quantitative assessments of behaviour (Wemelsfelder *et al* 2003; Rousing & Wemelsfelder 2006). In addition, we recently completed a large three-year study in which qualitative assessments were demonstrated to also correlate well with physiological measures such as heart rate and heart rate variability (Wemelsfelder *et al* unpublished data 2006). The persistent coherence of observers' qualitative assessments with quantitative measures of behaviour and physiology is important in demonstrating that these assessments have biological validity, and are not just unreliable 'subjective' perceptions. Moreover, it indicates that qualitative judgements fulfil an important interpretative role: they complement quantitative measures by providing empirical information on an

animal's welfare experience that is not available from the quantitative measures themselves (Wemelsfelder & Farish 2004). In recent years, other scientists also have successfully used FCP methodology to apply qualitative behaviour assessment for the benefit of the study of animal welfare, for example with horses (Napolitano *et al* 2007) and dogs (Walker *et al* unpublished data 2007), and with social interactions in dairy cattle (Rousing & Wemelsfelder 2006).

Thus, there exists a substantial body of research that supports the scientific validity of assessing the expressive body language of farm animals. This in turn opens the door to the application of this approach as a practical animal welfare assessment tool (Wemelsfelder & Lawrence 2001). We explored this potential in a recent collaboration with the UK State Veterinary Service (Wemelsfelder 2005). A group of experienced veterinary inspectors was given training in qualitative behaviour assessment and subsequently taken on a tour of commercial UK pig farms, ranging from intensive indoor to extensive outdoor systems. At each farm, the inspectors were asked to stand for 10 min in front of several pig pens, observing the spontaneous behaviour of all pigs in these pens. After 10 min, they were asked to score the pigs' body language on the basis of personal terminologies previously developed from video. We were interested to investigate whether the inspectors would agree in their qualitative assessments of pigs in different farming systems, and whether they found this approach a useful addition to their expertise. Analysis of the gathered data showed that the inspectors indeed showed good agreement in their assessments, and together identified a shift in behavioural expression occurring as the pigs' housing conditions became more confined and less stimulating. The relaxed, contented, playful expression typical of pigs in outdoor and straw-based systems changed into a more irritable, anxious, bored way of behaving in slatted- and solid-floor systems with small, barren pens. One inspector commented that prior to our study he would have judged pigs to be either healthy or unhealthy, but that he had now become aware that pigs, although healthy, could nevertheless lead frustrated and unhappy lives in some housing systems. Because he had not been forced to accept this, but had made this observation using his own descriptors, he felt confident to discuss it with farmers to try to improve the situation. Thus this study indicated that highly experienced veterinary inspectors, given the freedom to generate their own descriptors, felt comfortable using terms such as 'contented', 'joyful', 'frustrated' or 'aimless', and were able to use these terms as scoring tools for identifying the effect of housing conditions on the welfare of pigs (Wemelsfelder 2005).

Discussion and animal welfare implications

The research work reviewed above suggests that when we take the time to closely observe animals and the quality of their expressions, we can develop greater insight into their welfare and QoL. Are the animals contented, sociable, playful, or do they appear irritable, unsettled, uncomfortable, or withdrawn into themselves? These seem important questions, not just for farm animals, but for all animals

under our care. The development of approaches allowing us to consider such questions should contribute significantly to improving the welfare of these animals.

Animal caretakers should be well-placed to use qualitative terminologies to address their animals' QoL, and indeed many professionals do. In some cases, formal use of such judgements is encouraged, but in other cases caretakers avoid explicitly discussing them for fear of appearing unscientific. However, in dealing with such tensions it is crucial to realise that good judgement is a skill that requires practice, experience and training. If one is not sufficiently familiar with a particular species, or with a particular individual, it is possible to misinterpret or overlook particular expressions. Knowledge of species-specific behavioural repertoires, and extensive experience in observing and interacting with individuals in different contexts, is required to accurately judge the meaning of animal body language. In developing this skill it is particularly important to adopt a 'whole animal' perspective, and always judge observed details of posture and behaviour in light of the entire animal's interaction with its surroundings. Such a perspective requires engagement with the animal's situation, and is essentially built on relationship and empathetic communication. The skill to communicate effectively with the animals in one's company is ancient and does not need scientific validation to prove its worth. However, if this approach is to be used in a scientific context, or as a formal practical assessment tool, it does need validation and support of a reliable methodology. The growing interest in qualitative approaches to the study of animals, as reviewed in this paper, should support these goals.

Acknowledgements

Many thanks to Marianne Farish, Emily Patterson-Kane, Sheena Robson and Alistair Lawrence for their assistance with, and support of, the Qualitative Behaviour Assessment research at SAC. I am also grateful to Tony Hunter of Biostatistics Scotland for his expert assistance with the application of GPA, and to the State Veterinary Service for their support of and participation in the on-farm pig welfare study. Thanks also to one anonymous reviewer for his/her comments. The financial support of the Scottish Executive Environment and Rural Affairs Department, and The Department for Environment, Food and Rural Affairs, is gratefully acknowledged.

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