Part I

General Fish Welfare
Chapter 1
What is Animal Welfare?

Alistair B. Lawrence

Introduction

Animal welfare in one sense is a commonly observed concern of humans to situations where animals appear to be suffering. Media coverage of diverse events such as the beaching of whales, participation in ‘blood sports’ and acts of direct cruelty to animals reflect this public interest in animal welfare. The Fish Veterinary Society (FVS) meeting, Fish Welfare, itself indicates that public concern for animal welfare which originally focused on mammals and birds, is now increasingly directed at other species including fish (Chandroo et al. 2004), and some invertebrates (Sherwin 2001).

In answering the question: ‘What is animal welfare?’ the development of animal welfare as a societal issue will be described first, focusing mainly on the UK. This historical perspective will provide a basis for evaluating the different explanations of why humans express concern for animal welfare. For example, we can ask whether the historical evidence supports the idea that animal welfare is a recently emerged phenomenon resulting from our greater wealth and hence freedom to consider issues that are not directly linked to our own survival. How science can be applied to address animal welfare issues of public concern will then be considered.

Animal welfare: the long view

Some of the most direct historical evidence of human attitudes to animals comes from the various ways that religion has dealt with animals, and human treatment of animals.

Animals and religion have been intertwined from the earliest records, with depictions of animal deities being found with the remains of prehistoric human society (Sax 1994). However, from these early beginnings, ‘modern’ religions have developed an almost bewildering variation in the moral status they allow animals. A conventional view of this complexity suggests that some religions, such as Jainism and Buddhism, allow animals a higher moral status than other religions (e.g.
Christianity, Judaism) which tend to see animals as being under human dominion and as lesser creatures (Maybury-Lewis 1992 cited in Preece & Fraser 2000, Raj 2004).

One interpretation of the variation in the moral status that religions allow animals, is that religions are influenced by different views on whether animals are sentient, where sentience refers to the capacity of animals to experience or ‘feel’ in a way that is analogous to human experience. Thus religions that give animals a higher moral status such Hinduism also see animals as sentient (Raj 2004). Christianity is interesting in this respect. Christian doctrine sees mental states as important in determining the moral status of a subject (Cohen & Rozin 2001). Yet, Christianity has been influenced by a diverse set of views on the mental states (sentience) of animals (Preece & Fraser 2000). This variety of views on animal sentience could explain in part the array of different views that Christianity has regarding animals’ moral status and the existence of animal souls (Waldau 2000).

The relationship between religious beliefs and attitudes, and actual behaviour to animals is similarly complex. For example, those religions that treat animals as soulless, such as Islam, also tend to promote compassion to animals (Alboga 2003). Furthermore, whilst religion is often seen as a factor influencing attitudes to animal welfare issues when assessed by survey (Hagelin et al. 2003), religion apparently does not influence the level of distress experienced on the death of a pet (Davis et al. 2003). Attitudes and behaviour on kibbutzim in Israel found that there was no less concern and action for dairy cow welfare on non-religious as opposed to religious kibbutzim (Rabbie 2000).

Moral philosophy involves the development of systematic approaches to determining ‘right’ or ‘wrong’ behaviour (Rawls 2000) and has had a major influence on the development of attitudes to animals. There has been a great diversity of philosophical writings regarding the moral status of animals. A significant part of this debate relates to the question of animals’ mental state or degree of sentience. On this issue, philosophers have spanned all possible views from those of Descartes, who saw animals as effectively inanimate, to others who regard animals as having the capacity to experience or ‘feel’ in a way that is qualitatively similar to humans. For example, the Scottish philosopher David Hume wrote in 1742 that: ‘animals undoubtedly feel . . . tho’ in a more imperfect manner than men’ (Hume 1987 (revised edition)). Perhaps the most famous early advocate for animals’ moral status was Jeremy Bentham (1789) who suggested that: ‘the question is not, can they reason nor can they talk but can they suffer’.

Early philosophers such as Hume and Bentham were influenced by emerging scientific evidence of the biological similarities between human and non-human animals which called into question the anthropocentric view that dominated at the time (Radford 2001). Scientific investigation of animals from the eighteenth century has continued to illustrate the extent of animals’ mental capacities and can be argued to provide scientific support for non-human animal sentience (Griffin 1992, Dawkins 1998). It is also important to acknowledge the important limitations
What is Animal Welfare?

of the scientific approach when applied to the issue of animal sentience (see next section).

The ensuing development of a more positive attitude to the moral status of animals was responsible for the first early steps to protect animals in law. As described by Radford (2001), the passing of early animal protection legislation coincided with the writings of Bentham and others and the beginnings of a changing attitude to animals’ moral status. Initially, legislation was focused on preventing direct acts of cruelty against animals (e.g. Martin’s Act, 1822, to protect animals in London’s markets of the day). The emphasis has been subsequently replaced by legislation aimed at protecting animal welfare in a broader sense. Animal protection legislation has increasingly gone beyond defining minimum standards, to defining how animals ought to be cared for, a process that continues to the present day in the form of the Animal Welfare Act (HMSO 2006), where the concept of a duty of care is extended beyond farm animals to all animal uses. Arguably one of the most significant aspects of current animal welfare legislation in the UK and Europe has been the acceptance in law that animals (or at least vertebrates) are sentient. For example, paragraph 10 of the Explanatory Notes to the Animal Welfare Bill reads that: ‘The Act will apply only to vertebrate animals, as these are currently the only demonstrably sentient animals’ (House of Commons 2005). However, Clause 1(3) makes provision for the appropriate national authority to extend the Act to cover invertebrates in the future if they are satisfied on the basis of scientific evidence that these too are capable of experiencing pain or suffering.

In the UK, the recent publication of the GB Animal Health & Welfare Strategy (AH&WS) in 2004 marks a critical step in the development of farm animal welfare policy (Defra 2004). The Health and Welfare Strategy builds on the historical basis of farm animal welfare concerns. It uses the ‘five freedoms’ (see FAWC 2005) to emphasise the wide scope of welfare issues affecting animals and the importance of both animals’ physical and mental well-being. However, it also highlights a policy shift from an almost complete reliance on regulation as the most effective mechanism to improve welfare in favour of non-legal approaches such as partnerships, shared responsibilities, prevention and an understanding of the costs and benefits of welfare improvements. The implementation of the strategy (e.g. SEERAD 2003) is increasingly aimed at encouraging a more proactive stance on health and welfare by the farming industry, and partnership with related support services such as local veterinary practices. There is now a distinctive trend towards countries developing similar health and welfare strategies, which place less emphasis on legislation as the main route to improving welfare. For example, the recently published EU Animal Welfare Action Plan aims to improve animal welfare over the next five years by promoting research and alternative approaches to animal testing, and introducing standardised animal welfare indicators (EU 2006).

In summary, the history of the debate over the moral status of animals informs us that this is a long-standing concern which stretches back many centuries pre-dating the modern era. It is not possible to argue therefore that concern for animal welfare
is simply a reflection of our current affluence and ready supplies of cheap food. It is also clear that concern for animal welfare is not necessarily a direct reflection of religiously motivated debate. In the UK, animal welfare concerns are more closely associated with the scientific and rational perspective of the relationships between humans and other animals that has developed since the eighteenth century. One important result of scientific research into animal behaviour and welfare has been to provide evidence of animals’ motivations, their mental capacities and by inference, support for animal sentience. This scientific support for animal sentience has provided the basis for EU and UK legislation that enshrines the concept of animal sentience in law. Scientific evidence relating to animal sentience may continue to be critical to further advancing the moral status of animals. Socio-economics research suggests that the moral characteristics we associate with an animal welfare issue are important in determining the moral importance we place on the issue and our consumer behaviour (Bennett et al. 2002). Recent work has also shown that belief in animal mind is an important predictor of attitudes to animals (Knight et al. 2004). For the future, this suggests that further scientific support for animal sentience should increase the moral importance of animal welfare through widening societal acceptance and belief in the animal mind. In some ways it is hard to see a limit to this process. Somewhat tongue in cheek, a recent New Scientist article foresaw a time when the moral complexities of our lives with animals had become so complex that it had led to humans living separate lives from animals that were then left to their own devices (New Scientist 2005). Coming back to the topic of the FVS meeting, fish welfare provides an excellent example of how interest in the welfare of fish has led to an increase in scientific activity in the area, as demonstrated by the contents of this publication. This research has in turn, helped lead to an increasing profile for fish welfare over a relatively short period of time and calls for their greater protection in law. On the basis of the recent past we might therefore expect in the future to see even greater pressure applied to the conditions applied to farmed fish, and to other welfare concerns associated with angling and the harvesting of wild fish.

Science applied to animal welfare

Science has long played a critical role in the development of concerns for animal welfare. As we saw earlier, the writings of philosophers such as Bentham and Hume coincided with a growth in scientific observations pointing to the many similarities between animal and human form and function (Rigotti 1986). The Brambell Committee which sat following the publication of Animal Machines (Harrison 1964) was strongly influenced by the science of the day including the growing understanding of animal psychology and behaviour (Brambell 1965). As already discussed, the developing legal status of vertebrates as sentient beings owes much to discoveries relating to the cognitive and emotional capacities of animals.
For animal welfare where there can be diverse opinions over sore issues such as the nature or even existence of animal sentience, science can potentially provide a rational evidence base from which to develop policy and interventions. However, inevitably there are important disagreements over the scientific approaches applied to animal welfare. As Keeling (2004) recently wrote: ‘scientists . . . tend to disagree on interpretation rather than emphasising similarities’. Fraser et al. (1997) attempted to produce a more consensual approach by identifying three main scientific philosophies, which have been used to address animal welfare issues. These are in summary that: (a) animals should live natural lives; (b) animals should feel well; (c) animals should function well. In the past, advocates of these different philosophies have disagreed over their relative importance. For example, McGlone (1993, cited in Fraser et al. 1997) wrote in support of the ‘functioning approach’ that: ‘I suggest that an animal is in a poor state of welfare only when its physiological systems are disturbed to the point that survival or reproduction are impaired’. In contrast, Duncan (1993, cited in Fraser et al. 1997) wrote in support of the ‘feelings approach’ that: ‘welfare is dependent on what animals feel’.

An exemplar can be used to demonstrate that these different approaches can provide complementary rather than opposing interpretations of welfare in a given situation. For this it is necessary to use an issue which has received a significant amount of scientific attention, and where there is sufficient data both to describe the use of these diverse approaches and to assess the interpretations that emerge when animal welfare is viewed from different scientific perspectives. One such issue is the widespread use of crates to house the parturient (farrowing) sow in order to protect piglets and to ease management of the sow and her newborn litter. These crates are also behaviourally confining and prevent the sow from turning her body. The scientific evidence on the impact of this close confinement on the sow can be arranged into the three scientific approaches identified by Fraser et al. (1997).

**Living natural lives**

The philosophy underlying this approach is that animals’ evolved adaptations will often be retained even in today’s domesticated strains and that these adaptations can come into conflict with the current conditions in which we keep animals. Evidence to explore this hypothesis comes from studies of the wild type of the species and from the domesticated strain under ‘natural’ or ‘confined’ conditions.

Wild boar sows are described as isolating themselves from the social group as parturition approaches, selecting a nest site and then constructing a nest from materials such as branches and grasses which they gather and carry from surrounding areas (Nowak 1991). Near the onset of parturition, the sow enters the nest to deliver her piglets, tending not to emerge until 4–7 days post-birth. Similar behaviour has been described in domestic sows under free-ranging conditions including sows which have been reared under intensive farming conditions (Stolba & Woodgush 1984, Jensen 1989). There is evidence that the nest-building behaviour that
Fish Welfare

precedes parturition is triggered by release of prostaglandins as part of the essential endocrine cascade associated with parturition in the pig (Gilbert et al. 2001). Sows which are housed in closely-confining parturition crates are often described as displaying ‘restless’ behaviour over approximately the same time period that nesting behaviour is expressed in free-ranging sows. Detailed behavioural analysis shows that pre-parturient crate-housed sows increase their activity levels and their pawing and nosing of the crate floor and fittings (Jarvis et al. 1997).

Taken together, these data suggest that parturient nest building in the sow is an adaptation that ensures better survival of the neonate piglet through protection against cold and predation and is triggered by specific hormonal changes that accompany the onset of parturition (Jarvis et al. 1999). Sows in crates are similarly stimulated by their physiology to express nest building but the crate so strongly restricts the behaviour that it is barely recognisable and is effectively a ‘redundant’ response in the crate environment (Fraser et al. 1997). This analysis raises the question of how the potential conflict between an animal’s biology (arrived at through the processes of natural selection) and the artificial conditions in which it is kept as a domestic animal might be reflected in its emotional and functional responses.

Feeling well

The need to consider the mental state (or ‘feelings’) of animals was clearly emphasised by the Brambell Committee (Brambell 1965), but has remained one of the most controversial aspects of the application of science to animal welfare. The range of views is extreme. Some scientists believe that this area cannot be addressed scientifically (Kennedy 1992), whilst others (Duncan 2005) suggest that animal feelings is the core issue that must be addressed if we are to fully incorporate the animals’ perspective into our assessments of animal welfare issues. The scientific investigation of animal feelings is clearly linked to our understanding of animal sentience, which as we have seen has become increasingly important in determining public attitudes to animal welfare.

A number of methods have been used to assess animal feelings in the context of animal welfare. All of these approaches have implicit or explicit assumptions, reflecting the intrinsic problem of measuring subjective (private) experiences in non-verbal animals. One approach is to allow animals to express their motivational preferences or choices and to assume that these expressed preferences reflect the animal’s subjective feelings (Hughes & Black 1973, Dawkins 1980). Development of preference testing has led to the concept that animals can express their motivational priorities (or ‘consumer demand’) if they are required to ‘work’ for access to resources (Mason et al. 2001). Arey (1992) used the consumer demand approach to assess the motivational priorities of sows in the pre-parturient period (Arey 1992). He showed that given the opportunity to work for access to food or straw, sows’ motivation for straw (presumably to nest build) approached equivalence to that for
access to food in the 24 hours preceding the onset of parturition. The assumptions underlying the consumer demand approach imply that sows’ feelings will reflect their motivational state, with sows experiencing positive feelings when able to nest build during the nest-building phase, and correspondingly negative feelings when denied the opportunity to nest build.

**Functioning well**

The concept that animal welfare can be assessed through effects on biological functions is primarily based on the extensive literature of the effects of animal and human ‘stress’. Since the early work of Weiss and others (e.g. Weiss 1972) began to demonstrate the impact of psychological stress on disease states, studies have shown the wide-ranging effects of stress on growth, reproduction, the immune system and behaviour. In the context of animal welfare, research has often focused on the physiological pathways involved in mediating stress effects as a means of indicating stress and by inference, poor welfare. The most widely studied of these pathways has been the hypothalamic–pituitary–adrenal (HPA) axis which in vertebrates is highly sensitive to a range of environmental ‘stressors’.

There is good evidence in the sow that confinement in crates during the nest-building phase is ‘stressful’ given its effects on the HPA axis. For example, parturient sows in crates show increased adrenocorticotropic hormone (ACTH) and cortisol concentrations during the nesting phase relative to controls able to nest build in open pens (Jarvis et al. 1997), a difference which disappears once the nesting phase is over and parturition starts (Jarvis et al. 2004). It is also clear through the comparison of ACTH and cortisol concentrations across treatments that the activation of the HPA axis in crated gilts is not solely a response to the onset of parturition (Jarvis et al. 1997).

There is debate over the wider significance to welfare of increased HPA activation. It is not always clear where the threshold lies with respect to ‘normal’ adjustments of physiological systems such as the HPA axis, and more significant perturbations that may indicate an increased risk to mental or physical health (Mendl 1991). One way of resolving this is to demonstrate that a stressor has not only affected systems such as the HPA axis, but that there are also significant effects on biological functioning. In the case of the parturition crate, evidence suggests that abnormal maternal behaviour, in the form of biting at and direct physical attacks (‘savaging’) by the sow on her piglets, is triggered by the crate environment as savaging is much more common in that environment (Jarvis et al. 2004). Jarvis et al. (2006) found that female offspring of sows that were socially stressed during pregnancy developed characteristics of stress hypersensitivity in terms of their brain development, and physiological response to stressors. These prenatally stressed offspring showed a tendency to bite at and attack their piglets when housed in farrowing crates, suggesting that the crate environment was sufficiently stressful to trigger abnormal maternal behaviour in these stress sensitive animals.
Taken together, this evidence provides a coherent picture of the welfare implications of parturition crates and at the same time generally illustrates the application of different scientific approaches to a welfare issue. The animal’s evolutionary background can be important in dictating its response to even highly intensive farming conditions. In the case of the domestic sow, the motivation to nest build has evolved because of its advantages to piglet survival. The physiological basis of the behaviour makes it an unavoidable aspect of the parturition process even when sows are housed in behaviourally-confining crates. Animal feelings, although a controversial subject, can be approached scientifically given certain assumptions. For example, ‘preference testing’ and ‘consumer demand’ approaches assume a close correspondence between animal motivations and feelings. Studies in the sow have shown that there is an increasing motivational priority to nest build in the 24 hours that precede parturition. We can assume that the sow experiences positive emotions when allowed to express her nesting motivation and negative emotions when the motivation is thwarted as in the parturition crate. We might predict that these emotional responses would be reflected in terms of their wider impacts on biological functioning for example through activation of ‘stress’ sensitive pathways such as the HPA axis and on functional outcomes such as health, production and behaviour. Indeed, in the case of the parturient sow, the thwarting of nesting behaviour by the crate (and the assumed negative emotional state that results) is associated with increased indications of physiological stress. Furthermore, there is evidence that this stress may be involved in triggering abnormal maternal behaviour in the form of physical attacks by the sow on her piglets. Similarly in mink, which have evolved a partially aquatic lifestyle, research has demonstrated a high motivational priority for access to water, and that where that motivation is thwarted (as it often is when mink are farmed for fur), there are clear indications of physiological stress (Mason et al. 2001).

These studies show a clear correspondence between the different approaches used in applying science to welfare issues, demonstrating that some farming methods can interfere with evolved (motivated) behaviours causing significant perturbations to physiological systems, and to biological functioning. It is often assumed in welfare studies that important mediators of such effects are the animals’ feelings. In the example of the parturient sow, we might assume that the thwarting of nest building by the crate induces a state of ‘frustration’ and that it is the (mental) state of frustration which underlies the (physical) functional responses (e.g. HPA activation, abnormal maternal behaviour).

It has to be acknowledged that other welfare issues have proved more difficult to interpret given the lack of correspondence between the different scientific approaches used in their assessment. For example, there has been much concern over the welfare effects of food-restricting breeding populations of pigs and poultry (broiler breeders). In broiler breeders a number of studies have failed to find a consistent set of relationships between behaviour and physical and physiological
responses to food restriction (e.g. de Jong et al. 2003). One reason for this may be that we have yet to fully understand the evolutionary ‘rules’ that animals use to govern their food intake which makes it difficult to interpret when animals might be experiencing different levels of hunger (Lawrence et al. 2004). These more intransigent problems indicate the continuing need to develop the theoretical and philosophical basis upon which we base the application of science to animal welfare.

Summary

Concern for animal welfare requires that we become sensitive to the possibility of animal suffering. This process of sensitisation is not a recent phenomenon and seems in Europe to have its origins in part from scientific understanding of the similarities between animals and humans. There is indeed recent evidence that the belief in animal minds and sentience can positively influence attitudes to animals including fish and invertebrates. Increasingly positive attitudes to animals in Europe have resulted in development of both animal welfare legislation and animal welfare strategies, the latter promoting non-legislative approaches to improving animal welfare. There is also increasing evidence that the concern for animal welfare is becoming a global issue. The World Animal Health Organisation (OiE) has recently responded to the increasing concern for animal welfare by developing an interest in global animal welfare issues including the setting of international standards for trade (OiE 2004). Linked to this socio-political activity has been a realisation that science can provide objective information on animal suffering. From an embryonic state in the 1960s, animal welfare science has grown enormously as a result of increasing research investment from governments and industries affected by animal welfare issues. The central driver behind animal welfare research has been to develop scientific approaches that can be used to ‘represent’ the animal’s perspective. In the past there has been considerable debate over the most appropriate approach for assessing welfare from the animal’s point of view. There are examples where different scientific approaches can be seen to give convergent welfare assessments such as in the case of the parturient sow and farmed mink. However, there are also examples where science has failed to provide a systematically coherent assessment of welfare, which indicates that there is still a need to develop a more robust theoretical basis to animal welfare science.

The FVS meeting provided a number of examples where fish welfare issues are being addressed through the application of approaches previously developed to assess welfare in other species especially in the areas of pain and stress. Given the growing economic importance of fish farming, the increasing public sensitivity to welfare issues in species other than mammals and birds, and the very interesting comparative biology opportunities provided by fish, it seems very likely that research in fish welfare will grow in importance and influence. In the future we can
expect fish welfare research in its turn to provide insights that can be applied more generally to welfare research in other species.

References


What is Animal Welfare?


Fish Welfare


