

Is welfare all that matters? A discussion of what should be included in policy-making regarding animals

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Abstract

Policy-making concerned with animals often includes human interests, such as economy, trade, environmental protection, disease control, species conservation etc. When it comes to the interests of the animals, such policy-making often makes use of the results of animal welfare science to provide assessments of ethically relevant concerns for animals. This has provided a scientific rigour that has helped to overcome controversies and allowed debates to move forward according to generally agreed methodologies. However, this focus can lead to policies leaving out other important issues relevant to animals. This can be considered as a problem of what is included in welfare science, or of what is included in policy. This suggests two possible solutions: expanding animal welfare science to address all ethical concerns about animals' interests or widening the perspective considered in policy-making to encompass other important ethical concerns about animals than welfare. The latter appears the better option. This requires both a 'philosophy of animal welfare science', a 'philosophy of decision-making about animals', and greater transparency about what is included or excluded from both animal welfare science and the politics of animal policy.

Keywords: animal ethics, animal welfare, animal welfare science, death, integrity, policy-making

Introduction

In the last fifty years, many policies have been introduced that have regulated the use of domesticated non-human animals (Veissier *et al* 2008). Such policies may be partly based on concerns for human interests, such as economy, trade, environmental protection, disease control, species conservation, cultural traditions, religious beliefs and political expediencies (McGlone 2001; Millstone 2006). They may also be influenced by public pressure and media opinion.

But, some factors within the process of decision-making focus directly on concerns for non-human animals. These issues are not concerned with the instrumental value of animals to humans, but with some animal-based value. This might include ideas of 'intrinsic value', but typically focuses on the animals' interests in terms of what is good for the animal.

The evaluation of animal-based factors is mostly, if not solely, informed by the results of animal welfare science (Moynagh 2000; Horgan & Gavinelli 2006). In addition, because of the importance of animal welfare science, animal welfare scientists often have a personal advisory role to policy-making, such as in drafting scientific reports and charring committees (Veissier *et al* 2008).

Indeed, animal welfare research can even prompt the amendment of policies. The use of animal welfare science has consequently led to specific policies that have improved animal welfare standards (Millman *et al* 2004; Dawkins 2006; Blokhuis *et al* 2008). For example, the current EU Directive on slaughter was inspired by Scientific Opinions from the European Food Safety Authority (EFSA 2004; European Commission 2009).

In order to ensure all human interests are appropriately addressed, policy-makers can draw on insights from various disciplines, including economics, law, politics, sociology and ethics. Most concerns for human interests are addressed by one or more of these disciplines, and the use of multiple disciplines can provide complementary insights. In contrast, the concern for non-human animals tends to be informed solely by animal welfare science as mentioned above. The risk of using a single discipline to provide information on an issue is that any issues not addressed by that discipline are then ignored in policy-making.

The aim of this paper is to consider how animal-focused policy-making might consider concerns for non-human animals not currently assessed within animal welfare

science, such as concerns related to the death and integrity of the animal. The paper first identifies how using animal welfare science can limit what concerns are included in policies. It then considers two ways in which ethical concerns not investigated by animal welfare science might be included in policy. One way is to alter the methods used in animal welfare science but, as it will be argued, there are good reasons against changing animal welfare science to accommodate every ethical concern that policy might wish to include. According to our view, policy-making could improve if policy-makers used a wider range of insights into ethical concerns for animals. Either way, broadening the sphere of issues dealt with in policy-making requires more transparency from scientists and policy-makers about what concerns are included and excluded from their decision-making. This paper is not intended to make a specific case for the inclusion of death or integrity into legislation, but to provide illustrative examples of the potential dissonance between policy and ethical perspectives other than animal welfare science.

Different methods in animal welfare science

An obvious benefit with the current focus on animal welfare science comes from its ability to provide insights into issues concerning animals, especially in answering questions about what is or is not in an animal's interests (Röcklinsberg 2001). This ability is explicitly recognised within some policies (eg Council of Europe 1976, European Convention for the Protection of Animals Kept for Farming Purposes [ETS87], articles 3, 4.1, 4.2, 5). Various methodologies within animal welfare science have scientifically examined many issues, such as pain, stress, health, preferences and biological function, thereby providing useful information for policy-makers. These methodologies are analysed, critiqued and validated to improve their rigour, and many are now well established. Often different methodologies provide complementary perspectives, and the discipline as a whole can provide rigorously investigated and expert opinion for those issues which are amenable to its established methodologies.

This cluster of different but complementary methodologies has many advantages. It can help to satisfy desires for objective results, and quantifiable measures obtained through reliable methodologies may be expected to invite less controversy, at least among those who share the basic assumptions of animal welfare science (Millman *et al* 2004). The early use of narrower methodologies may also have helped the discipline's development by providing a 'ground-up' approach, where more observable and simple concepts are increasingly supplemented by more complex ideas.

Any single methodology in animal welfare science provides only one approach to assessing animals' interests. Each methodology is able to investigate certain concepts, and not others. So the use of certain methods can effectively entail that policy excludes concepts for which those methods are inappropriate. Concepts such as pain, which have been investigated by many animal welfare science methodologies, are applied in many policies (eg UK Animals

[Scientific Procedures] Act 1986). Concepts such as animals' needs, which have been a newer focus of investigation, have been included in more recent legislation (eg section nine of the UK's Animal Welfare Act 2006). Concepts such as death and integrity, which have not been studied by animal welfare science methodologies, are not included in policy, or are specifically excluded. For example, in the UK's Animal Welfare Act (2006), both section four (which deals with causing suffering) and section nine (which deals with failing to ensure an animal's needs are met) specifically do not apply to humanely killing animals. This omission is due to their prevalent methodologies being inappropriate to investigate such concepts. It seems as if the choices about which concepts are investigated, and which methodologies are used have significant effects on the scope of policy. Narrow methodologies may mean that policy excludes ethical issues which are considered important from within other disciplines and from the perspective of many citizens.

Therefore, even when considered as a single discipline, the concepts that animal welfare science discusses and analyses do not represent all relevant ethical concerns. Indeed, animal ethicists and lay people appear to have different understandings of animals' interests than animal welfare scientists (Regan 1983; Lassen *et al* 2006a,b). This limitation is not unique to animal welfare science: all sciences that examine ethically important issues can assess only a limited scope of issues that are important for policy-making (Hedlund 2007). As analogous examples from the human sphere: methods of assessing human quality of life cannot capture all that is relevant for a good human life; ecological biology cannot capture all relevant perspectives on how the environment should be protected (Gamborg & Gjerris 2009) and medical sciences do not assess all aspects of being healthy (Nordenfelt 2006).

Two concepts from the animal sphere are useful to show how ethically relevant issues are at risk of being left out of the policy-making process, if it only uses insights from animal welfare science with regards to the animal side of things: death and integrity. (As already stated in the *Introduction* there are obviously many human interests that also play a significant role in the policy-making process when it concerns regulation of animals. In this article, however, we focus solely on the issues that can be said to matter from the animal point of view). Death is an ethically important issue (Regan 1983; Sapontzis 1987). The public have demonstrated concern over the killing of 'spent' greyhounds (BBC 2006), badger culling (DEFRA 2006) and infectious disease control through widespread culling (Gerritzen & Lambooy 2004; Swabe *et al* 2004). It should be noted that the concern for the death of the animal as discussed here is not related to how this happens (painfully or humanely) or why (for food, research, disease control etc), but focuses solely on the fact that the life of the animal is ended by humans.

Similarly, integrity is a salient ethical issue (Gjerris & Sandøe 2006). Public concern for integrity is evinced by controversies over biotechnological or more conventional breeding manipu-

lations which violate the integrity of the animal without necessarily affecting its health or subjective experiences. One prominent example is the idea of breeding featherless broiler chickens (eg Cahaner *et al* 2003), which has received public criticism (eg Hitt 2002; Young 2002). The concept of integrity can be understood in many ways (Hauskeller 2007). Here, we take it to rest upon a pre-scientific understanding of the animal that does not reduce the animal solely to an object for human use but also sees it as another being-in-flesh as ourselves. This pre-scientific understanding involves a direct awareness of the animal as a complete living being, via our immediate experiences. This appreciation occurs before any attempt to consider how to interpret, change or use the animal. Evidently, we can utilise an animal, but we cannot breathe life into it. In essence *integrity* is the experience that the animal is whole, complete, full, finished, when we meet it. We cannot add to it, only take away (Løgstrup 1995; Abram 1996; Gjerris & Gamborg 2010).

Issues, such as these, have often been excluded from policy, or included in a manner very different from more familiar issues such as economic harms and benefits. For example, in the UK, the main Animal Welfare Act from 2006 excludes death if performed in an appropriate and humane manner and limits prohibited mutilations to those that affect sensitive tissues or bone structure, suggesting that the rationale is to prevent suffering rather than death, ie the core issue is not about integrity (Animal Welfare Act 2006).

Animal interests in policy-making

When looking exclusively at the factors that are relevant for the assessment of interests of the animal, two factors can determine which aspects are considered in animal welfare-based policy-making. The first is the focus of animal welfare science (or any other discipline used by policy-makers) in assessing animals' interests. The second is to what extent policy-makers rely on animal welfare science for information on animals' interests, relative to the other disciplines. These can be considered as two steps: the first determines which information is available from animal welfare science; the second determines how that information is used. It is useful to consider each of these steps in more detail.

The limitations of animal welfare science

As with any human intellectual endeavour, animal welfare science has focuses and boundaries. It does not investigate every issue from every perspective. Some issues, such as the stress of transport, the suffering during slaughter and abnormal behaviours in laboratory animal contexts, have been investigated to relatively large extents. Others have received less or no attention within the animal welfare science literature, such as the importance of the death of the animal in itself and the possible violation of the integrity of animals in biotechnological interventions. Such omissions can be considered as being due to limitations of scope (which animals are assessed, eg in terms of species and context) and limitations of method (which issues are investigated).

A limited research scope can be due to various contingencies. Some issues are not investigated because of limited funding, lack of interest or because the anticipated results

are too obvious to justify the economic expenses or the harms that the research would do the laboratory animals. Where concerns have not been studied due to limitations of scope, the methods could theoretically be applied to other contexts or animals. Two examples of such extension of established methodologies are the investigation of pain experiences of fish (Sneddon *et al* 2003; Chandroo *et al* 2004a,b, Huntingford *et al* 2006) and invertebrates (Eisemann *et al* 1984; Fiorito 1986; Morton *et al* 1990; Boyle 1991; Sherwin 2001; Seth *et al* 2005).

Limitations of method are more subtle. Not all concerns are amenable to assessment by the methodologies of animal welfare science. As already mentioned, any single methodology in animal welfare science provides only one approach to assessing animals' interests. Furthermore, animal welfare science is not a scientific discipline with universally agreed underlying values or an unambiguous methodology (Fraser 1997; FAWC 2005; Lund *et al* 2006). There can be disagreements between animal welfare scientists and the public, or between different scientists, about what animal welfare is (Sandøe & Simonsen 1992; Fraser *et al* 1997; Millman *et al* 2004). This is a matter of ethical values, epistemological assumptions and methodological principles which all underlie decisions about which concerns should be incorporated into animal welfare science (Tannenbaum 1991; Sandøe & Simonsen 1992; Fraser 1995, 1997; Fraser *et al* 1997; Sandøe *et al* 2004; Lassen *et al* 2006a,b). This is related to decisions about which disciplines should be used within scientific projects. Various fields, such as ethology, animal husbandry science, physiology, anatomy and veterinary science all include different concepts, and animal welfare science may draw upon their methodologies for different viewpoints. Consequently, several different paradigms contribute to an overarching or general idea of what constitutes animal welfare science. This makes it impossible to define *the* methodology of animal welfare science.

Consequently, methodologies can have different breadths of scope. An extremely narrow methodology might focus on only a limited range of concepts, such as health or pain (Gjerris *et al* 2006). But there are signs of a move towards broader paradigms that combine different methodologies (eg Mason & Mendl 1993; Fraser 1997; Lund & Röcklinsberg 2001). For example, McGlone (2001) suggested the adoption of a multi-disciplinary approach, including animal behaviour, physiology, anatomy and health and immunity in the animal welfare assessment.

Death and integrity as concepts are excluded from most current narrow methodologies, or at least only included in certain constrained ways. For example, a narrow methodology that focuses on pain would consider death and mutilations to have no welfare importance, except insofar as the method of death or mutilation is painful. They might, however, be considered within broader paradigms which consider the effects of death on living animals (eg 'grief') or use it as an indicator of other problems, such as disease (eg mortality rates), or in terms of the suffering involved (for example, concerns over suffering due to culling incidents

were a significant factor prompting the current EU slaughter regulations; European Commission 2009). An even broader methodology might consider death as depriving the animal of positive experiences (Sandøe *et al* 1997; Yeates 2009 *cf* Webster 1994). Similarly, integrity is also ignored in many animal welfare scientific analyses (eg NAS 2002; USFDA 2007; EFSA 2008), but a broader methodology may include some way to assess integrity, perhaps in terms of alterations to an animal's body shape or behaviour, as suggested in the Dutch discussion on how to make the concept of integrity practically workable in connection with the regulation on animal biotechnology (Hauskeller 2007).

Policy-making's focus on animal welfare science

We now turn to the question of how policy uses the insights of animal welfare science. In some cases, policy may be based almost entirely on the results of animal welfare science. For example, studies on animals' behavioural preferences underlie European policies requiring that laying hens should be given access to perches, litter and nests (Appleby 1998; EC 1999). Similarly, the results of ethological research have led to recommendations that laboratory rodents should be housed with nesting material and shelters (Baumans 2005; EC 2007).

Policy may also be based on other, non-animal-based ethical concerns. Human interests are considered, including public health, food safety, work place health and safety and more often than not economical concerns. Thus, policy is informed by disciplines, such as epidemiology, food science and economics. Environmental concerns are represented by ecological, biological and meteorological sciences. Politico-legal factors, such as respect for democratic process and subsidiarity, make policy-makers seek legal advice. These may be balanced with animals' interests, as in the UK Animals Act Report (Animal [Scientific Procedures] Act 1986).

But policies may also try to balance the information from animal welfare science alongside other sources of insight into ethical issues that concern the animals directly. Specifically, there may be other available insights into questions of what is in animals' interests. For example, if it is thought to be ethically relevant to ensure that animals have a certain lifespan, freedom of exercise and social contacts or achieve their '*telos*', then animal welfare science can provide only limited insights into whether a given policy might achieve these. More broadly, there are also other sources of insight into ethically relevant issues that relate to animals. Examples may include respect for the animal and its integrity, the ethical value of human-animal bonds or the consideration of its death. Animal welfare science cannot provide all available insights into all of these issues. They are certainly ethically relevant concepts, as described above. They may also be considered interests of the animals, insofar as it is good for an animal to have its integrity respected or to live longer (under certain conditions).

One example of a policy that does successfully incorporate elements from approaches other than scientific disciplines is the Danish legislation on the cloning and genetic modification of animals (Danish Ministry of Justice 2005). This

legislation was drawn up when there were already existing animal welfare protection laws in Denmark and the policies on biotechnologies could have similarly focused only on animal welfare concerns. But the political debate drew substantially on a report by the Animal Ethics Council of Denmark (The Ethical Council and The Animal Ethics Council 2001). The report and resultant policy stated that the subjective experiences of the animals are important, but also included concerns about the 'unnaturalness' of technologies and the possible violations of the integrity of animals. Except when animals are used for research purposes deemed of substantial societal value or educational purposes, the Danish legislation prohibits the use of biotechnologies even if the animals are expected to suffer no compromises to their welfare.

The effects of these focuses

Controversies over the scope of animal welfare science would not be a major problem if animal welfare science was purely a matter of intellectual interest. Their significance arises from the importance of animal welfare science in determining policies in relation to animals. They affect policy directly by determining what results are available to inform policy-makers. A focus on a particular area will allow evidence-based policy-making about that area. But where animal welfare science is unable to inform policy-makers, policies may be based on less accurate information, or be left open, vague or weak because stronger measures cannot be justified by the scientific evidence.

There is a further risk that non-scientists may assume that animal welfare science will include all issues they consider to be important for animals. For example, citizens may assume that animal welfare science includes concepts of death and integrity, when it does not. This can lead to misunderstandings. Indeed, if policy-makers and scientists are not explicit about the limitations of the research questions and their pre-understandings, this raises doubts about the transparency, validity and justification of the actual policy. This is especially important for concepts of animal welfare which have political usefulness for stakeholders. For example, definitions of welfare related to productivity (Curtis 2007) predispose scientific investigations to conclude that more intensive systems have higher welfare. This conclusion may be used to allay citizens' concerns despite the fact that the definition of welfare may not be what citizens take it to mean.

Considering also the effects of policy-making's focus on animal welfare science, we argue that each policy will be influenced by what weight animal welfare is given relative to other objectives on the political agenda as well as to how other disciplines are valued. A focus on animal welfare science can certainly be beneficial. As for quantitative methods within animal welfare science, scientific methodologies in general appear to have a unique objectivity. This is especially important in a field of policy-making that can otherwise be determined by polemical rhetoric and emotive opinions. Philosophical vestiges of positivism and modernism can even allow policy-makers to claim that

decisions are removed from any moral or emotional decision-making, and therefore beyond controversy (Blandford & Fulponi 1999). This effectively allows policy-makers to transfer some responsibility for their decisions onto animal welfare scientists. This has helped animal welfare science to gain its importance in representing the interests of non-human animals, and has led to tangible benefits to the animals themselves in areas where there has been sufficient scientific evidence.

However, a narrow focus on animal welfare science as an exclusive source of insight can lead to the subordination or exclusion of other perspectives which could be valuable. In extreme cases, a reliance on animal welfare science may lead to other insights being completely excluded. If so, then where there is a lack of scientific data, an over-reliance on animal welfare science could lead to an inability to formulate effective policy at all. Hence, there is a potential danger when animal welfare science is given this importance in determining policy. An over-reliance on animal welfare science can make policy-making partially or completely disregard other insights that could be potentially valuable. (In parallel, the exclusion of any consideration of human interests would also lead to policies being incomplete or inappropriate; McGlone 2001). Consequently, policy-makers need to utilise and balance insights from social sciences, economics, environmental science and legal analysis, alongside the insights from animal welfare science.

The case of invertebrates provides a good example. In the absence of conclusive scientific data, there are good reasons to delay policy-making until scientific results are available (Dawkins 2006). But there are also reasons to regulate in the absence of scientific information, such as concerns of urgency, biodiversity, risk and magnitude. The decision whether to await (and/or fund) further research is therefore an ethical decision. Thus, policy-makers concerned about concepts of animals' interests, such as death or integrity, cannot rely only on the results of animal welfare science. Similarly, while death may be excluded from animal welfare science, there are more ethical concerns related to death and integrity than those based solely on the potential suffering that they might involve. For example, death deprives an animal of fulfilling some of its interests (Sapontzis 1987) or may be considered as contrary to its right to life (Regan 1983).

Thus, a decision on how to use animal welfare science implies an ethical decision on how to handle these concepts in policy-making. A decision to rely entirely on animal welfare science would exclude the concepts of death and integrity; a decision to favour animal welfare science would entail downplaying the importance of such issues. This choice is not unique to policy concerning animals' interests. Environmental policy-makers must decide whether to base policy only on the insights of environmental sciences or other moral values (Gamborg & Gjerris 2009); doctors and medical health authorities must choose how to combine results of medical sciences and other ethical principles when investigating health and illness (Röcklinsberg 2009).

The decision how to use the results of animal welfare science is another question that cannot be answered by using animal welfare science methodologies. To say that policy-making should be based on science merely defers the basic problem of limitations of science: there still needs to be a non-scientific basis for this decision (Horkheimer 1947/2004). Also, this is an ethical decision (Hemsworth & Coleman 1998).

Paying attention to a wider scope of ethically relevant issues in policy-making would allow for more encompassing discussions between animal welfare scientists, policy-makers and other interested parties. Improved dialogue with other disciplines, such as philosophy, and other humanities might be expected to provide policy with stronger philosophical, ethical and political bases (Mephram 1996; Röcklinsberg 2006; Forsberg 2007; Padel *et al* 2009). Enhanced dialogue with the public might also make the process more democratically robust (Gjerris & Sandøe 2006), by eliciting the underlying discussions about values, while avoiding the political process turning into a discussion of the merits of different scientific advisors.

In light of the methodological limitations, a total reliance on animal welfare science could leave society with policies that only partly incorporate the concerns held by the public regarding the interests of animals. Moreover, frequently heard claims that current policies are based on 'sound science', does not automatically make it clear to lay-persons that only concerns within the animal welfare science paradigm have been taken into account: thus, people who are unaware of the scope of animal welfare science methodologies may erroneously assume that important concerns, such as death and integrity, are included in policy when in fact they are not.

Broadening the scope

There seems to be two ways in which animal-based policy might be expanded to include concepts other than those already addressed. One way would be to broaden animal welfare science to address other ethically important issues. A second way would be to expand policy-making so that it includes concepts that cannot be addressed by animal welfare science and uses a range of other disciplines. Both these options are worth considering in more detail.

Expanding perspectives in animal welfare science

If animal welfare science were to expand its scope into novel areas or use novel methodologies, this could provide for greater information for policy-makers. Policy-makers could perhaps therefore encourage or even direct animal welfare science to expand its scope and investigate ethically important areas. For example, animal welfare science could be made to adopt methodologies that conceptualise death as depriving the animal of positive experiences (Yeates 2009) or assess integrity, perhaps in terms of alterations to an animal's body-shape or behaviour.

Although this option may initially appear unpalatable for most scientists it is not without precedent for policy-makers to direct scientific research. It was a governmental report that

launched animal welfare science as a discipline, when the 1965 Brambell report to the UK Government called for research into the welfare of specific production animals in order to inform further policy (Mench 1998). Similarly, the inclusion of respect for natural behaviour in Sweden's Animal Welfare Act in 1988 led to studies on animal welfare in order to inform its implementation. More recently, the EFSA Opinion on the cloning of animals recommended further research to inform future policy (EFSA 2008) and the provision of funding is often based on policy decisions.

In addition, the methodologies of animal welfare science have expanded as the science has developed. The concept of animals' needs has been defined, analysed and applied in recent years (for recent reviews, see Young 1999; Bartussek 2001; Balcombe 2006; Weeks & Nicol 2006). More recently, methodologies have been suggested for assessing positive welfare (see Boissy *et al* 2007; Yeates & Main 2008) and quality of life (see Yeates & Main 2009). Novel methods to investigate animals' subjective experiences have also been developed (Würbel 2009), including consumer demand theory (Kirkden *et al* 2003), cognitive bias (Paul *et al* 2005; Mendl *et al* 2009) and qualitative behaviour assessment (Wemelsfelder *et al* 2001).

There is therefore a 'meta-issue' of what scope and methodologies are used in animal welfare science, and how animal welfare science should be influenced. Because this meta-issue is partly a matter of ethical-values choices of methodologies, it cannot be resolved using scientific methods. It must instead be addressed by a 'philosophy of animal welfare science', which allows conceptual analysis to inform the scientific discipline and policy-making. It should be noted that this philosophical analysis is underway. The animal welfare science literature is already engaged in a welcome process of self-reflection and critical analysis. This concerns both its limitations of scope (eg Sherwin 2001; Barnett 2007), and method (eg Fraser 2003; Lund *et al* 2006).

Reflections on this meta-issue suggest that limitations of scope might be legitimately addressed by policy-makers. For example, useful scientific data for policy-makers have been obtained by adapting established methodologies to study invertebrates (Eisemann *et al* 1984; Fiorito 1986; Morton *et al* 1990; Boyle 1991; Seth *et al* 2005). Such cases have involved limited controversy (except over funding priorities), because they use established scientific methodologies.

There are however good reasons against policy dictating extensions of animal welfare science where the lack of research is not contingent but methodological. One cannot merely pick and choose what is studied scientifically. In order to maintain its objectivity, scientific research must limit itself to matters that can be adequately addressed through the accepted methodologies within that science. If one wishes to include research subjects into a scientific discipline that cannot be examined through existing methodologies one either has to develop such methodologies or reconsider the appropriateness of including the subject into the discipline. So, even if society at large considers death or integrity to be extremely important, this

does not provide sufficient reason why animal welfare science should consider them if they are not suitable subjects for the existing methodologies or can be adequately examined through new methodologies. Such matters should instead be investigated within disciplines that contain appropriate methodologies. Since both death and integrity, as understood in this article, fall outside the scope of scientific methodologies and render themselves much more to philosophical interpretation, it would seem that this is not a solution to the problem.

An alternative option would be for animal welfare science to maintain its scientific integrity, but for animal welfare *scientists* to consider other issues when advising policy-makers. Scientists would then have to consider other concerns, such as the concepts' integrity and death, alongside their role as scientific advisors. But this is also an undesirable option. Firstly, one might expect scientists to prioritise scientific information over other insights, since they are likely to prefer scientific inquiry as a method of gathering information for decisions. Secondly, this solution could lead to policy-makers being confused about whether a scientist's opinion is based on scientific evidence or not. Thirdly, this would involve scientists providing insights from disciplines in which they have limited experience, perhaps at the expense of providing scientific data or the trustworthiness of their future advice. Fourthly, the role of experts from other disciplines, such as ethics and philosophy would be undermined.

Expanding perspectives in policy-making

An alternative and better option would be to expand policy-making regarding animals so that it can include issues from animal ethics that fall outside the methodologies of animal welfare science. This could be achieved by drawing on several disciplines, including those of ethics, philosophy and sociology and economics. Just as human interests are represented by many different disciplines, so too could animals' interests be. This would allow issues, such as death and integrity, to be included without sacrificing the scientific methodology of animal welfare science.

Such a multi-disciplinary approach would require policy-makers to draw together insights from different methodologies. This places the responsibility on policy-makers rather than animal welfare scientists. It prevents policy-makers from devolving responsibility for policies onto animal welfare science or scientists. This approach further requires that policy-makers themselves should understand the methodologies, limits and possibilities of the diverse disciplines involved in animal welfare legislation, so they can best use the diverse insights.

Thus, what is needed is a 'philosophy of decision-making about animals'. This would need to evaluate and prescribe how different concepts are considered, and how different methodologies and disciplines are used. It could be beneficially informed by other philosophical analyses of information and decision-making drawn from ethics, philosophy of science, jurisprudence and political philosophy.

However, expanding the perspectives used in policy-making may bring about two problems. It could be argued that concerns addressed by disciplines, such as ethics, lack the objectivity of animal welfare science. This would risk sacrificing the claims to objectivity that policy-makers have been able to make. This criticism could be met, however, through highlighting that these disciplines use an alternative definition of objectivity that goes beyond empirical definitions, for example by rules of reasoning when claiming ethical values, rules of logic and philosophical methodologies, such as conceptual analysis and reflective equilibrium. Such methodologies are not objective in the same way as scientific methodologies, but they relate to agreed rules about concepts and reasoning and may very well express ideas, thoughts and values that are inter-subjective and thus common to most stakeholders in the policy-making process.

The second problem is that the inclusion of other disciplines should not discount the usefulness of animal welfare science. There is a risk that other concepts are included by some method that ignores data and scientific insights. One example would be if policies were determined entirely by democratic process or consumer power, since consumers appear to frequently lack scientific information (McGlone 2001). There is also a risk that ethical controversies can be used as political tools to push for a certain policy or to obscure important scientific knowledge (Folker & Sandøe 2006; Hedlund 2007). It is therefore especially important that the 'philosophy of decision-making about animals' includes careful consideration of how other disciplines can be used to complement, rather than compete with, animal welfare science. The choice of concepts and methodologies within policy-making should be justified, a process parallel to the justification of method and scope within animal welfare science. Again, this is not a question that can be solved by scientific methods, but requires procedural rules. One of the challenges will be to figure out how to relate these additional concerns for the animal against the more traditional welfare interests. But, as the policy-making process already consists of weighing both animal and human interests this should not be an insurmountable problem.

With these caveats, the broadening of policy-making to include concerns, such as death and integrity, alongside animal welfare science seems a preferable solution to the above option of broadening animal welfare science. It would, however, require a change in what sources policy-makers consult, investment of resources into other disciplines alongside animal welfare science, and greater inclusion of politicians, sociologists, philosophers and ethicists in advisory groups. It remains to be seen whether there is political will to accommodate this change.

Increasing transparency in science and policy

Whether either or neither of the above options are chosen, it can be argued that animal welfare science and policy based on animal welfare science should be more open about which concerns they include and exclude. For example, if animal welfare science is transparent about the exclusion of death as a welfare issue, policy-makers and lay-people will be

aware that this is not addressed by animal welfare science. When the limitations of research questions is mirrored in policy without making the limits explicit, and when scientists and policy-makers' pre-understanding is left obscure, this raises doubts about the transparency, validity and even justification of the actual policy. By disclosing what animal welfare science is silent about, whether because of the lack of current knowledge or because an area of concern is outside the current paradigms and knowledge, policy may be able to attain more comprehensive, robust and socially acceptable outcomes. This need for transparency is true both for political and methodological perspectives used in policy-making (Mephram 1996; Frewer 1999; Marris 2001; Hodges 2003). Better information may also lead to greater acceptance of decisions (Gjerris & Sandøe 2006; Röcklinsberg 2006) and could facilitate decisions as to whether insights from other disciplines are needed.

This urge for transparency applies to all stages of scientific work. Funding applications should be clear about what questions the work can and cannot answer (Gonçalves & Delicado 2009). Scientific publications should be transparent about methodological assumptions and how data are interpreted within 'Discussion', 'Conclusion' and 'Implications' sections, which may be used to inform policy. When scientists give direct advice to policy-making through interpreting existing evidence, there should be transparency about the basis used for such advice, especially whether the lack of evidence represents 'evidence of absence', is due to a contingent lack of evidence or is because the question asked is one that is not amenable to being answered by animal welfare science's methodologies. Similar arguments would apply to other disciplines that inform policy-making. Similarly, policy-makers need to be clear how they use animal welfare science and other methodologies. Currently, the philosophical reflections within animal welfare science literatures are not always reflected in policy-making (Gjerris *et al* 2009). Policy-makers should be clearer about how their policies are generated, according to what decision-making ideal they have argued and on what values and description of the situation they rely (Röcklinsberg 2006). Furthermore, they should acknowledge when their decision-making has devolved responsibility to scientists and what this has involved or excluded. And, finally, there should be full transparency regarding which decisions are based on science, and the extent to which they include concerns that animal welfare science does not address such as death and integrity.

Animal welfare implications

The central implication of the considerations in this paper is that greater attention should be explicitly paid to other concerns alongside animal welfare science and concerns related to human interests when developing policies. There are convincing reasons against answering philosophical questions within animal welfare science. Such a solution would risk weakening the claim of methodological objectivity and the political force of animal welfare science in policy-making. This might be considered disadvantageous

insofar as it limits the power of animal welfare science to improve the welfare of animals. It is thus preferable to broaden the range of insights and disciplines used in policy-making. Explicitly considering other approaches to assessing animals' interests alongside animal welfare science can make policy more socially robust. This would be assisted by greater transparency in both scientific reports and policy-making, and the development of philosophies for animal welfare and of animal decision-making.

Any such expansions could bring about a reconsideration of the philosophy underlying animal welfare science, in terms of the ethical basis of particular paradigms and of the discipline as a whole. The implications of this for animals are difficult to predict. However, the implications for animal welfare science are likely to be that the discipline will become philosophically more informed, methodologically more flexible and consequently stronger and even more useful as a tool to inform policy-making with regard to animals.

Acknowledgements

The authors would like to thank Anna Olsson and the anonymous referees for useful comments on the paper.

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