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Animal welfare and the use of procedural documents: limitations and refinement

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Abstract

Increased scrutiny of animal welfare in wildlife management has seen a recent proliferation in the use of procedural documents (standard operating procedures, codes of practice etc.). Some procedural documents are presumed to represent 'best practice' methods, whereby adherence to prescribed inputs is explicitly purported to generate humane outcomes. However, the relationship between what is done to animals (*inputs*) and what they experience (*outputs*), as assessed by animal-based measures, has received little attention. Procedural documents are commonly developed in the absence of empirical animal-based measures, creating uncertainty in animal welfare outcomes. Prescribed procedures are valuable as guidelines for standardising methodology, but the development of 'welfare standards' that focus on desired thresholds for animal-based measures offers many advantages for improving animal welfare. Refinement of the use of procedural documents in wildlife management is required to ensure they generate desirable outcomes for animals, and do not preclude the development of improved methods.

Additional keywords: human dimensions, outcome assessment, policy development, stress, wildlife management.

Introduction

Over the past two decades, the attention devoted to animal welfare in wildlife management has increased markedly (Baker *et al*. 2016). An approach that has been popular for countering animal welfare concerns has been the development of procedural documents (standard operating procedures, codes of practice etc.). In the context of wildlife management, procedural documents commonly describe wildlife killing (Sharp 2011), capture (Petit and Waudby 2013) and marking operations (Department of Parks and Wildlife 2013). These documents have been developed by, and for, government bodies (e.g. wildlife management agencies; Department of Environment and Primary Industries 2014), private industry (e.g. fishing industry groups; South-East Trawl Fishing Industry Association 2007) and research institutions (e.g. universities; Griffith University 2013). The effects of these policies can be far-reaching, both in terms of the number of animals affected (potentially hundreds of thousands; Hampton *et al*. 2016*a*) and the way in which they are affected. Consequently, it is very important that procedural documents, including those used in wildlife management, are informed by current animal welfare science from their earliest stages of development.

In essence, procedural documents advocate a way in which operators should approach an animal manipulation task and provide detailed instructions to this effect. Some procedural documents are written with the primary aim of maximising efficacy or cost-effectiveness. Other procedural documents, especially those approved by large institutions, are prescriptive in their recommendations and are assumed to represent 'best practice', whereby adherence to prescribed minimum inputs is explicitly purported to generate humane outcomes (Sharp and Saunders 2004). However, this approach to animal welfare is based almost entirely on consideration of *inputs* (provision of resources) and gives little attention to *outputs*, the effect on the welfare state of the animals themselves (Main *et al*. 2001). To date, there has been little scrutiny on the animal welfare merits and weaknesses of the multitude of wildlife management procedures that have been written in the past two decades. The purpose of this paper is to describe the current use of procedural documents for addressing animal welfare concerns in wildlife management, and to suggest ways in which this may be refined.

Resource-based versus animal-based measures

Two different types of measures are commonly used to assess animal welfare in wildlife management: animal (or output)-based measures, and resource (or input)-based measures (Whitham and Wielebnowski 2009; Grandin 2010; Alpigiani *et al*. 2016). Animal-based measures provide direct evidence of what animals experience. They include physiological and behavioural parameters that allow inference regarding the *severity* of painful or stressful procedures, the *duration* of such procedures (Mellor and Littin 2004), and the frequency of adverse outcomes (e.g. injury during capture; Jacques *et al*. 2009). Resource-based measures, on the other hand, assess whether prescribed inputs are complied with (i.e. if the type of vehicle, firearm or chemical specified in the procedural document was used; Whitham and Wielebnowski 2009; Alpigiani *et al*. 2016).

Resource-based measures offer the attraction of inputs that can be considered to be prescriptive, objective and are easily measured through a checklist process derived from quality assurance schemes (Main *et al*. 2001), often referred to as 'compliance auditing' (RSPCA Australia 2002). This approach emphasises compliance with existing standards, so adherence is relatively easy to audit. However, because of this, they have limited capacity for allowing refinement and do not encourage continuous improvement or the innovative development of inputs with lesser welfare impacts (Grandin 2010).

In animal welfare science, assessments using animal-based measures are preferred in all contexts as they provide a direct assessment of what animals experience without assumptions regarding what inputs or procedures will maximise welfare (Main *et al*. 2001; Whitham and Wielebnowski 2009; Grandin 2010). Despite their disadvantages, resource-based assessments are often used by wildlife management agencies (Australian Capital Territory Parks and Conservation Service 2013; Mawson *et al*. 2016). Their attractiveness to bureaucratic institutions is understandable because they involve the use of simple checklists of inputs, and require few of the technical procedures often required to collect animal-based measures (e.g. measuring physiological parameters; Hampton *et al*. 2016*b*). If resource-

based measures are used to assess welfare, it is essential that they are evidence-based and use animal-based measures to demonstrate that they can achieve desired welfare outcomes under field conditions.

Evidence-based versus eminence-based approaches

There is often limited transparency in the origins of the recommendations made in many procedural documents used in wildlife management. Some documents are developed with a lack of scientific data (evidence) and may not cite any published peer-reviewed studies (e.g. Commonwealth of Australia 2008; Department of Environment and Primary Industries 2014). As such, the approaches they prescribe may only reflect the opinion or intuition of the author/s (Shine *et al*. 2015). For decades, medical fields have labelled this approach as being 'eminence-based' (Levin 1998). Eminence-based approaches are considered antiquated when compared with those that use empirical evidence ('evidence-based'; Bhandari *et al*. 2004). Although the study of animal welfare in wildlife management is a young field, there is increasing recognition that evidence-based approaches are required to validate existing methodologies (McMahon *et al*. 2012). This assurance is increasingly being sought by stakeholders in many animal industries, and is seen as being necessary to maintain community support, or a 'social licence' to operate (Fleming *et al*. 2016).

Validation studies

Validation studies use animal-based measures to ensure that resource-based measures are related to animal welfare outcomes (Whitham and Wielebnowski 2009; Nevarez *et al*. 2014). Validation studies have been very important for assessing the validity of newly developed welfare measures, such as faecal glucocorticoid levels (Buchanan and Goldsmith 2004; Touma and Palme 2005), or behavioural assessments (Fleming *et al*. 2016). Even small-scale validation studies have been particularly useful for assessing the welfare impacts of novel wildlife killing methods before they are considered for large-scale use (Daoust and Cattet 2004; Jansen 2011; Daoust *et al*. 2013; Mörner *et al*. 2013; Work and Balazs 2013; Hampton *et al*. 2014*a*; Sharp *et al*. 2015). Studies that use animal-based measures to

compare multiple alternative capture methods (e.g. for brolgas (*Antigone rubicunda*); Veltheim *et al*. 2015), or euthanasia methods (e.g. for American alligators (*Alligator mississippiensis*); Nevarez *et al*. 2014) are particularly informative for the identification of desirable methods. The collection of animal-based measures may be possible during many operations, at minimal additional expense (e.g. measuring the frequency of mortality in captured animals; Arnemo *et al*. 2006). Validation studies may confirm that inputs prescribed by procedures *do* or *do not* generate humane outcomes.

Compliant ≠ humane

There are a growing number of case studies where animal-based measures have demonstrated considerable adverse animal welfare impacts for procedures purported to generate humane outcomes. Among these, some studies have demonstrated a prolonged *duration* of suffering for animals subjected to prescribed procedures. One example is poisoning of European rabbits (*Oryctolagus cuniculus*) with the anticoagulant pindone (Sharp and Saunders 2012), which has been observed to cause haemorrhage-related functional impairment (laboured breathing, immobility etc.) for up to seven days before death (Fisher *et al*. 2016). Other studies have demonstrated a comparatively high *intensity* of suffering (via quantifying cortisol responses) from prescribed methods such as microchip implantation of lizards (Langkilde and Shine 2006). Many studies have also described high frequencies of adverse animal welfare events arising from the use of prescribed procedures. For example, after fertility control and translocation of koalas (*Phascolarctos cinereus*), as prescribed by procedure (Department of Sustainability and Environment 2004), a mortality rate of 37% was reported soon after animals were released (Whisson *et al*. 2012). To be properly examined, these outcomes must be compared with alternative management options; in many cases, improved welfare impacts have actually been demonstrated for methods that are not approved by procedures.

Non-compliant ≠ inhumane

Animal-based measures have challenged assumptions presented in many procedural documents regarding the welfare impacts of non-prescribed methods that are often assumed to be inhumane or deemed to be unacceptable. Such assessments have included novel methods of euthanasia, such as freezing of cane toads (*Bufo marinus*) (Shine *et al*. 2015), air rifle shooting of trapped brushtail possums (*Trichosurus vulpecula*) (Rouco *et al*. 2015), or carbon monoxide poisoning of birds (Tidemann and King 2009). Other, albeit small, empirical studies have demonstrated superior animal-based measures for capture methods (e.g. darting of feral cats (*Felis catus*); McGregor *et al*. 2016) that are not prescribed by procedural documents compared with those that are (e.g. leg-hold trapping; Sharp 2012). Similar animal-based studies have raised doubts about recommendations in procedural documents that prohibit animal marking methods, such as branding of pinnipeds (McMahon *et al*. 2006). Many of these methods are not available to wildlife managers despite the demonstration that the associated animal welfare outcomes are desirable, or at least are superior to approved procedures. Current oversight of procedural document use requires refinement to ensure that management methods that impose the lowest animal welfare impacts are always chosen.

Refinement of procedures

Of the '3 Rs' approach (replacement, reduction, refinement), which supports efforts to minimise animal welfare impacts in research, wildlife managers are most likely to be able to act on refinement (Petit and Waudby 2013). Refinement can be achieved through the use of animal-based measures to validate existing management methods and assess newly developed, and potentially superior, methods (Morriss and Warburton 2014). Compliance audits using resource-based measures can only ever assess adherence to a guideline. The welfare impacts associated with this adherence are beyond the scope of the audit, and as a result, the ways to develop more humane methods or refine procedures will often not be apparent (RSPCA Australia 2002). The assessment of programs through procedural compliance should not be seen as a robust way to measure animal welfare (Main *et al*. 2001), as it

offers very limited capacity for facilitating improvements in this area. Instead, approaches to regulation that focus upon animal-based outcomes may offer much greater potential for enabling refinement.

Welfare Studies

Previous studies have posed the question of whether regulators should prescribe the use of a limited number of methods thought to offer the 'best' welfare, or enforce a minimum standard that allows a range of methods (Reynolds 2004). Setting minimum standards for animal-based welfare measures is an approach known as the adoption of 'welfare standards' (Warburton and Hall 1995). Welfare standards offer the advantage of setting an achievable threshold for desirable animal-based measures without prescribing approved and non-approved approaches, thus encouraging innovation and improvement (Morriss and Warburton 2014). For example, in the context of euthanasia of pouch young during kangaroo (*Macropus* spp.) shooting, an appropriate welfare standard may be that >95% of animals should be rendered immediately insensible (Sharp *et al*. 2015). In contrast, currently approved resource-based measures prescribe that only blunt trauma to the base of the skull may be used (Commonwealth of Australia 2008), precluding development of innovative approaches (e.g. captive bolts) that may offer improved outcomes.

The adoption of welfare standards was used for the worldwide standardisation of lethal trap performance in the 1990s. International standards were developed for testing traps (International Organisation for Standardisation 1999) and these were adapted to set achievable thresholds for welfare performance (e.g. animals caught in lethal traps should be rendered permanently insensible in <3 min; Warburton *et al*. 2000; Morriss and Warburton 2014). The same approach has been used to form New Zealand's innovative 'incremental improvement' animal welfare strategy, which requires demonstrable progress towards welfare standards that are defined as desirable and considered attainable (Mellor *et al*. 2008). This approach is contrasted to the use of resource-based measures, whereby immediate compliance is required (Mellor and Stafford 2001). Many novel and innovative

wildlife management tools with improved welfare impacts and operational efficacy (e.g. self-resetting lethal traps for rodents; Carter *et al*. 2016) have evolved as a product of adopting welfare standards. However, sufficiently robust datasets that allow designation of appropriate welfare standards do not currently exist for many wildlife management methods (Hampton *et al*. 2016*b*). In these contexts, we suggest that incremental improvement can be achieved through reporting basic animal-based measures during operations (e.g. frequency of non-fatal wounding in shooting programs; Hampton *et al*. 2015) and ensuring feedback between managers and regulators.

An improved approach

Besides setting formal welfare standards (International Organisation for Standardisation 1999), other evidence-based approaches can be applied to allow incremental improvement of the outcomes produced by procedural documents. Currently there are few opportunities for feedback between field-based wildlife managers and policy makers (Hampton *et al*. 2016*a*). In contrast, animal ethics committees of research institutions often require researchers to report animal-based measures (e.g. frequency of mortality in captured animals; McMahon *et al*. 2013) during field studies. This process allows refinement of procedures that produce favourable welfare outcomes and discontinuation of those that do not (McMahon *et al*. 2013). Use of this 'iterative' feedback-refinement approach has been demonstrated to be effective for some large wildlife removal programs (e.g. for feral horses (*Equus caballus*); Greene *et al*. 2011; and feral camels (*Camelus dromedarius*); Hampton *et al*. 2016*a*). Even very basic reporting requirements, such as routine mortality assessments being undertaken after capture-related deaths (Arnemo *et al*. 2006), could aid refinement of many management procedures.

Collection of animal-based data during multiple operations, and analysis of large datasets, have the potential to improve existing methods through empirical evaluation of the effect of manipulable variables on animal-based outcomes (Hampton *et al*. 2015). Important variables may include the duration of pursuit before capture attempts (Jacques *et al*. 2009), jaw shape for lethal traps

(Warburton *et al*. 2000), or the identity of shooters (Hampton *et al*. 2014*b*). Wherever possible, animal-based measures should be collected to ensure that future management operations will be carried out with increased understanding of welfare impacts. This requires that procedural documents are regularly revised, rather than being finalised and remaining static for several years at a time (e.g. Commonwealth of Australia 2008). If these steps are not taken, and a knowledge-based ethic (Warburton and Norton 2009) is not applied, external stakeholders (e.g. animal welfare advocacy groups) will have legitimate cause to question the value of approaches that purport to represent 'best practice'. Resultant uncertainty surrounding welfare outcomes may lead to increased community opposition and ultimately threaten social licence for many management practices (e.g. helicopter shooting of feral horses; Chapple 2005).

Conclusions

The development of evidence-based procedural documents is undoubtedly beneficial for the advancement of animal welfare. However, the use of resource-based compliance audits of wildlife management programs, rather than the collection of animal-based measures, is inconsistent with a knowledge-based ethic. Addressing animal welfare concerns in wildlife management should not stop with the production of procedural documents. Despite the inconvenience of requiring empirical evidence to inform policies, animal welfare could be refined considerably by shifting focus from animal *inputs* to animal *outputs*.

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