Chapter 7

Some Thoughts on The Impact of Trapping on Mammal Welfare with Emphasis on Snares

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Abstract—All vertebrate animals, including wild mammals considered to be pests or food and fur resources, have the capacity to feel pain, fear, and to suffer in other ways. If they are to be trapped, the impact on their welfare should be assessed scientifically and traps should be evaluated using criteria comparable with those used for all other animal treatment. The term humane has been used for many years in science and law in relation to the management and killing of domestic animals, and should be used in the same way in relation to capturing and killing wild animals. Snares do not operate humanely, either as restraining or as killing traps as the pain, fear, mortality and morbidity of animals caught in snares is high. Animals left in snares are susceptible to thirst, hunger, further injury and attack by predators, especially if in the trap for many hours or days. The magnitude of poor welfare when animals are caught in snares varies but is always high in comparison with all other regulated killing. Snares are inherently indiscriminate and commonly catch non-target animals, including protected species, so can have negative effects on conservation efforts. The regulation and monitoring of the use of snares, including the methods used to kill animals that are alive after snaring, is probably impossible. Some methods of pest control and other capture and killing of animals have such extreme effects on the welfare of the animals that, regardless of the potential benefits, their use is never justified. The use of snares is in this category.

The concepts of welfare and humane trapping

Welfare, like all other biological terms, has the same meaning for human and non-human animals. The welfare of an individual is its state as regards its attempts to cope with its environment (Broom 1986, 1991), and this includes feelings and health. Welfare is a characteristic of an individual animal at a certain time. The state of the individual can be assessed so welfare will vary on a range from very good to very poor. Welfare concerns how well the individual fares, or goes through life, and quality of life means welfare, although normally referring to a period of more than a few days (Broom 2007, 2022).

Non-human animals are sometimes killed to: 1) provide a human resource such as food, 2) prevent destruction of a resource by an animal that we might call a pest, 3) prevent spread of disease, 4) provide human entertainment, or 5) benefit the animal itself by preventing suffering. Where the killing is under human control, every person has an obligation to avoid causing pain, suffering or other poor welfare to the animal during the processes leading to death. We use the word humane for...
such killing and it has been used in science and legislation for many years. While much of this usage refers to treatment of companion and farmed animals, it is also used for humans, laboratory animals and wild animals. There is only one biology, and biologically-relevant words, especially those that are used scientifically, should mean the same whether referring to humans or to any particular group of animals (Tarazona et al. 2020; Broom 2022). Humane is an absolute term, so the action is either humane or not, and cannot be somewhat humane. Humane means treatment of animals in such a way that poor welfare is avoided. This has been written as: “welfare is good to a certain high degree” to emphasise that humane is not a relative term but should be used when welfare is above a defined threshold level, explained in the detailed wording as avoidance of pain and suffering (Broom 1999, 2022; Broom and Fraser 2007). According to generally accepted principles, for example EU legislation and American Veterinary Medical Association guidelines (commercial slaughter, disease control, veterinary procedures), humane killing implies that: (i) the treatment of the animals in the course of the killing procedure does not cause poor welfare; and (ii) if there is stunning, the stunning procedure itself results in instantaneous insensibility or, if the agent causing insensibility or death is a gas or injectable substance, no poor welfare occurs before insensibility and then death. This may be achieved because the stunning or killing agent is not detectable by the animal. Shooting that causes instantaneous unconsciousness and then death would therefore be humane. If there are several minutes of extreme pain or fear, for example in a killing trap, a snare or a restraining trap, neither the action of capturing nor the trap or snare could be called humane. In order to assess whether or not a trap is humane, scientific assessment of welfare and whether or not an individual is unconscious is needed. This evidence may indicate that one trap results in better welfare than another, and shows how much better the welfare is.

Assessing the welfare of trapped animals

Animal welfare science has developed rapidly in recent years, and a wide range of measures are available to evaluate the welfare of animals such as those caught or otherwise affected by snares or other traps (Broom and Johnson 2019; Broom 2022). Many of these measures indicate anxiety, distress, fear, pain and other negative feelings. All of the animals considered in this paper are sentient so capable of feeling pain and it is now appreciated in studies of the welfare of humans and other sentient animals (Broom 2014) that fear is often worse than pain. Information about the needs of wild animal species can be used in identifying factors that cause problems to trapped species and, in the absence of detailed information about needs, a general guide such as the five domains approach may be helpful (Sherwen et al. 2018). Some of the welfare indicators listed below have been used in assessing the welfare of trapped animals but others are more difficult to use or less valid for wild animals. Measures of behaviour include: activity levels, immobility, postural changes, vocalization, digging, pacing, chewing, lunging, self-mutilation and other escape behaviours. Physiological measures include: levels of cortisol and other hormones in the blood, levels of muscle enzymes in the blood, levels of blood cells as markers of the stress response (e.g., neutrophils), markers of the inflammatory response (e.g., acute phase proteins), markers of exposure or food and water deprivation (e.g., changes in haematocrit or blood proteins), heart rate, and body temperature. Health measures include: extent of body damage (physical injuries), indicators of exertional or capture myopathy and effects of exposure (e.g., freezing of extremities).

When assessing welfare during a procedure likely to have negative effects, such as handling by a human, abattoir slaughter, or capture in a trap, the magnitude of poor welfare is a function of the duration of the effects and the severity of the effects. This is shown in Figure 1 which can also be used for the magnitude of good welfare as a function of duration and intensity.

The scoring of how much pain is caused by injuries received by trapped animals has, in the past, under-rated the severity as compared with scoring by laboratory and domestic animal scientists (Baumans et al. 1994; Broom 1999; Broom and Johnson 2019; Proulx et al. 2020). The extent of injuries and distress experienced by a trapped animal is strongly influenced by the length of time it is restrained in the trap. Long restraint time can lead to the development of dehydration (Powell 2005;
Marks 2010), starvation, effects of exposure (e.g., hypothermia), and capture myopathy. It can also cause stress by disrupting natural behaviour and motivational systems (Schütz et al. 2006; Sharp and Saunders 2008). Females may be prevented from returning to their offspring, who will subsequently die of starvation. The rate at which welfare becomes poorer in a trapped animal varies with species, climatic conditions and condition of the trapped animal. Many guidelines about checking restraining traps are much too long (Proulx and Rodtka 2019), for example once every 24 h will lead to considerable worsening of welfare for most animals. Powell and Proulx (2003) recommended that restraining traps should be checked at least twice daily, and more often if weather conditions are poor.

Figure 1. When the severity of poor welfare is plotted against time, the upper plot shows an animal that is killed by a method involving prolonged pain and other poor welfare while the lower plot shows an animal that is killed by a method that has a much more rapid effect. The magnitude of poor welfare is the area under the curve (modified after Broom 2001, 2014).

Snares

The basic principle of a snare is to put a loop, now usually made of wire, in a place where a target animal is likely to put its head or foot. The remainder of the snare mechanism is intended to either hold the animal until the snare can be revisited or to kill it. The target animals for most snares are mammals, for example canids, felids or rabbits, but birds and non-target mammals may also be
caught. The snare may be set in a baited area or on a trail. An anchor mechanism is used to minimise the chances that the trapped animal moves away taking the snare with it. Killing snares are less likely to be set if pet animals, farm animals, conserved species or humans may be caught. The size of the loop is designed for a target species but a neck snare for one species may catch the same or a different species by the leg. As explained by Proulx et al. (2015), manual killing neck snares have a self-locking tab so that when the animal’s head moves forward, the loop can tighten but not loosen. In power killing neck snares, 1 or 2 springs provide the energy necessary to tighten the noose. Self-locking snares can have an ever-tightening action leading to severe injuries or death due to crushing, ischaemia, necrosis of tissues, or asphyxia. Guthery and Beasom (1978) found that 65 coyotes (Canis latrans) and 60 non-target animals were caught in killing snares that had a swivel but no stop. Snares were checked daily. Fifty nine percent of coyotes were caught by the neck, and the remainder by other parts of the body (flank, leg, neck, foot). Of the catch, 52% of animals were dead and 48% were alive when the snare was checked. Although some animals caught in a killing snare could become unconscious and die within a few minutes, as Proulx et al. (2015) explain, many live for several hours or days after being caught, sometimes because they were caught by the body or leg. Neither manual nor power killing neck snares reliably rendered the majority of snared target animals unconscious within 5 min. A long list of non-target mammals and birds were caught and most would have taken longer to die than the target species.

The animal welfare indicators used in studies of animals caught in snares have mainly been measures of injuries, mortality rate and delay before death. A few studies have measured emergency behavioural and physiological responses at the time of capture (e.g., Marks 2010; Proulx 2018) and, in animals that were released, behaviour after release as an indicator of degree of aversion and disturbance (e.g., Gese et al. 2019). It is sometimes said that the extent of poor welfare caused by a killing trap or snare is less than by some attacks by a predator or by starvation. However, most predators kill faster than a trap or snare and humans interacting with individuals of other species have an obligation not to cause them to have poor welfare (Broom 2022).

Foot snares, which are used less commonly in many countries, are placed horizontally and are designed to close upon the animal’s leg or legs in order to restrain it (Powell and Proulx 2003). Some neck and foot snares are not designed to kill but are free-running and have a stop. A free-running snare is supposed to loosen when the animal stops pulling against it. The free-running mechanism is easily disrupted and prone to failure since any kink, twist, rusting, fraying, or entanglement of the wire in vegetation or branches may prevent the snare from being free-running (Frey et al. 2007; McNew et al. 2007; Murphy et al. 2009). A swivel may prevent this, but in practice a swivel placed near the anchor point of the snare can become jammed with vegetation and fail to work. Murphy et al. (2009) studied European badgers (Meles meles) trapped in stopped restraints and found that 62% of restraints after use had some degree of twisting, unravelling or fraying. Damaged restraints were associated with an increased risk of injury. Free-running snares may become self-locking and contribute to the death of the animal. A stop on the snare is set to prevent the wire loop from tightening to less than a certain diameter. However, there is variation in size of target animals and in non-target animals that are caught, sometimes by other parts of their bodies (Frey et al. 2007). Injuries can be particularly severe when the snare catches diagonally across from the shoulder to the axilla (Murphy et al. 2009). A stop may prevent injury in the target species, caught as intended, but not if caught around other parts of the body or in non-target species that differ in size, amount of subcutaneous fat, or behavioural response to restraint.

Muñoz-Igualada et al. (2010) tested 2 cable restraining trap systems to capture red foxes (Vulpes vulpes) in Spain. The Spanish Snare is made from multi-strand steel cables that end in a simple loop, and includes a stop that prevents the snare from closing smaller than 8 cm in diameter. Another restraining snare, the Wisconsin Restraint, is built with a 180° bend relaxing-type lock on aircraft cable, and incorporates 2 swivels, a break-way S-hook, and a stop that prevents the loop from closing to less than 6.5 cm in diameter. The snares were anchored to a branch or to the ground, and were either set in gaps in a 1-km-long pile of brush and branches or in fauna trails. All were checked daily.
in the morning and captured foxes were necropsied by a pathologist and scored for injury according to ISO (1999). Of fox captures, 35% were around the body rather than the neck, and 9.4% had a “severe injury” score. In another study, Marks (2010) found that foxes trapped in leg-hold snares had similar haematological and biochemical responses to those found by Kreeger et al. (1990) for foxes caught in leg-hold traps. In a comparative study of wolves (Canis lupus) in Minnesota (Gese et al. 2019), some individuals were caught, in order to attach a radio-collar, using padded leg-hold traps while others were caught in cable-restraint stopped neck snares. After release, the wolves caught in the neck snares travelled faster initially but a shorter distance before resuming more normal behaviour than wolves caught in a padded leg-hold trap. Although both trapping methods were aversive, the padded leg-hold trap had greater impacts. Using a different minimum loop size for the capture of coyotes, Wegan et al. (2014) found that there were few injuries and no mortalities in coyotes caught with cable neck restraint neck snares so this study also suggests that such snares are not the worst for welfare of the methods of trapping. All of these studies follow Etter and Belant (2011) in comparing the cable neck restraint snares with leghold traps. However, leghold traps would not be permitted in many countries of the world because they have such negative effects on welfare, even if padded to some extent.

There is less evidence concerning leporids but in a Scottish Government study of rabbits (Oryctolagus cuniculus) caught in snares without a stop, 14% were dead the day after capture (Science and Advice for Scottish Agriculture 2008). Rabbits in traps, which are likely to be similarly affected to those in snares, had 4 times higher cortisol than shot rabbits (Hamilton and Weeks 1985). The proportion of non-target species caught in snares set for foxes ranged from 21% to 69% (Chadwick et al. 1997; Harris et al. 2006; Muñoz-Igualada et al. 2010). The species included cats (Felis catus), dogs (Canis lupus familiaris), sheep (Ovis aries) and protected wildlife such as capercaillie (Tetrao urogallus), other birds, badgers, Eurasian otters (Lutra lutra), deer (Cervidae) and hares (Lepus europaeus).

If an animal is caught in a snare, the plot of intensity of poor welfare against time, calculated as shown in Figure 1, will vary according to the design and the way in which the animal is caught. If an individual caught around the neck in a killing neck snare struggles immediately and tightens the snare loop so that breathing is not possible, time to unconsciousness will be a few minutes. There will be a high level of fear and pain but, if the individual becomes unconscious and dies, the period of very poor welfare may last for 3-5 min and the magnitude of poor welfare calculated as the area under the curve would be approximately 3-5 times the severity of effect. If the period before unconsciousness is much longer before unconsciousness and death, for example for one of the reasons explained by Proulx et al. (2015), the magnitude of poor welfare would be much greater. If the snare is not a killing snare, the fear will be just as great but the pain may be less. However, the duration is very likely to be much greater than the mean for a killing snare, as explained in the studies quoted above, so the magnitude of poor welfare would be greater. None of these magnitudes of poor welfare would be permitted for any other regulated killing procedure.

Discussion and Conclusions

Mammals considered to be pests, or trapped for food or fur, have the capacity to feel pain and fear and to suffer just like humans or any other vertebrate animal. Their welfare should be scientifically assessed. However undesirable the impact of these animals on humans, whenever control methods are considered, their effects on the welfare of affected animals should be carefully considered. Where there are adverse effects of a species considered to be a pest, a cost-benefit analysis comparing these with the extent of poor welfare of the pest and non-target animals caused by the control method may be reasonable. However, some control, capture and killing methods have such extreme effects on an animal's welfare that, regardless of the potential benefits, their use is never justified (Sandøe et al. 1997; Broom 1999).

In Iossa et al.’s (2007) review of animal welfare standards of killing and restraining traps, it was reported that few studies had evaluated the impact of snares on welfare in the same way as has been done for some other types of restraining traps. Injuries from snares, such as pressure necrosis of
tissues, can be difficult to detect because they may not be obvious until after release. Also reports of misuse are frequent and even when set and used correctly, neck snares commonly catch non-target species and these can have high morbidity and mortality. Subsequent work summarised by Proulx et al. (2015) found, firstly, that the best killing neck snares generally caused poor welfare for less time than the widely used snares without self-locking mechanisms but, secondly, that even these snares seldom killed target animals within 5 min and were unselective as they killed or injured large numbers of non-target mammals and birds. Proulx et al. (2015) commented on the illogicality of international agreements that did not include snares when snares are being used in some countries in ways that cause more long-delayed deaths and hence worse welfare than leg-hold traps or cage traps. They recommended that, unless neck snares killed all trapped animals quickly, the use of snares should be phased out. A review by Harris et al. (2006) recommended that the use of all neck snares should be banned. The difficulty of enforcing the frequency of checking even the best snares and traps so that any suffering that is still occurring does not continue for more than 12 h (Proulx and Rodka 2019) means that sales of snares and use of snares will always result in a very large amount of poor welfare in the animals trapped.

Based on the scientific literature summarised above and by Rochlitz et al. (2010), the following conclusions are reached.

• Killing and restraining snares are easy to use but are often not checked for 12 or more hours and do not then operate humanely.

• Killing and restraining snares are inherently indiscriminate and commonly catch non-target, including protected species.

• When left without checking for 12 or more hours, the best killing traps cause a smaller magnitude of poor welfare than restraining traps but neither manual nor power killing neck snares reliably kill the majority of snared target animals within 5 min.

• Restraining snares can cause severe injuries, pain, suffering, and death in trapped target and non-target species, and mortality and morbidity is higher than with some other restraining traps, such as box traps.

• Animals left in snares are susceptible to adverse weather conditions, thirst, hunger, further injury and attack by predators, especially if in the trap for many hours or days.

• It is difficult to assess the severity of injury in an animal when it is caught in a snare without careful veterinary pathology study, and if the animal escapes or is released, it may subsequently die from injuries or from exertional myopathy over a period of days or weeks.

• Methods used to kill animals caught in snares, but still alive when the snare is checked, are not regulated, and may not be humane.

• The monitoring of correct snare use is probably impossible.

• It is the opinion of the author that the negative effects of killing and restraining snares on target and non-target animals are so great that the use of snares should not be permitted.
Acknowledgements

I thank Dr. Irene Rochlitz and Dr. Gareth Pearce for discussions and substantial contributions to a Cambridge University Animal Welfare Information Service report on this subject. I also thank the 3 reviewers of this paper for helpful advice on how to improve the paper.

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