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Capture and killing of small cetaceans in the Faroe Islands is inhumane and offers little scope for improvement

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The capture and killing of free-living small cetaceans in the Faroe Islands is described. After being driven on-shore by motor vessels, the animals are killed without pre-stunning using officially-prescribed methods that involve severing the spinal cord and the associated blood vessels using a long-handled lance. The claim that this induces near instantaneous unconsciousness and death lacks supporting evidence: it is believed that the animals are simply paralyzed, not immediately rendered unconscious. The cervical and spinal arterial circulation of cetaceans differs from that of terrestrial mammals and it is likely the spinal lance does not completely destroy the supply of oxygenated blood to the brain. In conclusion, the entire process from driving the animals onto the shore, to restraint and to killing stranded cetaceans is very likely to be detrimental to their welfare. Detailed studies would be necessary to determine the veracity of the claimed efficacy of the process. A bespoke humane killer may improve welfare at the time of killing but its development is considered challenging.

KEYWORDS

dolphins, whales, humane killing, cetaceans, anatomy, unconsciousness, hunting

1 Introduction

The Faroe Islands Grindadráp involves capturing and killing groups of long-finned pilot whales *Globicephala melas*. Less frequently, cetacean hunting involves bottlenose dolphins *Tursiops truncatus*, and Atlantic white-sided dolphins *Lagenorhynchus acutus*.

The process is explained in Mamzer (2021): Groups of small cetaceans are driven into bays or fjords using powered vessels where, after being stranded in the shallows the animals are captured, killed and then butchered for distribution amongst the community. The Grindadráp is a culturally important event and represents a source of protein for the islanders. It has attracted widespread international criticism (for example: Sea Shepherd, 2024) primarily because of the way the animals are driven, captured and killed and because of the perceived threat to the species involved. It is worth noting that the conservation status of

the three exploited species is considered to be of 'Least Concern' (International Union for the Conservation of Nature, 2024).

The Grindadráp has changed little in several hundred years although powered vessels have replaced rowing boats. The process is under the control of the Faroe Islands government and in recent years refinements have been introduced: Only designated bays and fjords may be used, and capture and killing must be done in accordance with the North Atlantic Marine Mammal Commission's (NAMMCO) *Instruction Manual on Pilot Whaling* (NAMMCO, 2014).

The Faroe Islands government and advocates for the Grindadráp have made various animal welfare claims about the refinements. This article examines the process from initial observation of the whales and dolphins through to the point of killing. Gaps in the evidence are identified. Where appropriate suggestions for research are made.

Once a pod of cetaceans has been observed and the community alerted, '*the Faroese interrupt all their activities and run to motorboats, which are then used to lead* [sic] *the animals to the beach where the whales will be killed. Participants do their best to push all the present animals ashore, with no nets, just using noise, boats, and manpower*' (Mamzer, 2021).

For the purposes of this article, restraint covers the period between the whale or dolphin being driven into the shallows to when killing begins. According to Mamzer (2021), '*Once the animals are forced to the beach, people enter the water and attach to the whales' blowholes metal hooks tipped with a metal ball on one side and ropes attached to them on the other side. The hooks are used to pull the animal into the sand.*' It takes several people to drag the whale into water shallow enough to allow the animal to be killed.

Once the animals are stranded, the whale or dolphin is killed. There is no pre-stunning. The method is prescribed in the NAMMCO manual:

'Killing with the spinal lance shall be performed by stabbing the lance in the midline between the blowhole and the dorsal fin at one hand's breadth behind the blowhole. The blade of the spinal lance must be perpendicular to the line between the blowhole and dorsal fin. The stab must be made perpendicular relative to the surface or be directed at a backward angle of approximately 10 degrees. Immediately after the severing of the spinal cord the lance must be moved to both sides in order to ensure that the surrounding blood vessels in the spinal canal are cut' (NAMMCO, 2014).

The NAMMCO manual states that correct use of the spinal lance will sever the spinal cord and destroy the cervical and spinal *retia mirabilia*.[1] It is claimed that the effects are, respectively, paralysis and rapid death (NAMMCO, 2014).

The spinal lance and killing method were developed by the Faroe Islands government veterinary service; it is claimed that when used correctly death ensues in 1–2 seconds (Olsen, 2011). The NAMMCO manual claims that '*Once the spinal cord has been severed in this way, the whale lies completely paralyzed and unconscious*' (NAMMCO, 2014).

2 The drive hunt

Most small cetaceans are social animals with family members forming strong bonds. Observations of the drive hunt show that the pod strives to stay together as the animals are driven close to the shore. The noise of motor boats and from other sources combined with shallow water is likely to disrupt communications with each other and possibly their ability to echolocate. This may be more of a stressor for typically deep-water species whose echolocation capability is not adapted to shallow waters.

It is impossible to draw a direct comparison of the Grindadráp with the herding of farmed animals, particularly cattle and sheep, species selected over generations for their herding. However, principles designed for the driving and handling of farmed animals may be relevant. For example, the UK Government's guidance for animals in red meat slaughterhouses requires:

'when moving animals you must not frighten, excite or mistreat them. You must:

- *move every animal with care – lead animals individually if it's necessary.*
- *only use a guiding instrument on an animal for short periods of time'* (UK Government, 2023).

Practices adopted for herding red deer *Cervus elaphus*, a species of undomesticated terrestrial mammal and one less easily herded than cattle or sheep, may be of relevance. The New Zealand deer industry body advises that '*proficient handling of deer requires good stock sense, involving plenty of patience, an understanding of deer behavior and psychology, and great powers of observation*' (Deer Industry New Zealand, 2014).

These standards, developed for terrestrial mammals, farmed or undomesticated, are not easily transferable to free-living whales and dolphins. However, guidance which encourages sympathetic handling, and avoiding haste and overcrowding is compelling.

The literature on stress in marine mammals is extensive but there are no direct studies on the impact of the drive hunt (Atkinson et al., 2015). However, evidence from other studies suggest the drive is likely to be a strong stressor. Studies of the capture of bottlenose dolphins suggest that stress responses to the '*calmest conditions of capture we could employ*' were significant and that '*dolphins which have been in captivity for many years, and are handled routinely elicit a significant stress response when manipulated*' (Thomson and Geraci, 1986). A similar conclusion was drawn from studies in captive harbor porpoises *Phocoena phocoena* (Desportes et al., 2007). Efforts to bring a proportion of the population of the critically-endangered vaquita *Phocoena sinus* into captivity were abandoned when an individual appeared distressed during capture and another died of capture myopathy (Rojas-Bracho et al., 2018). An assessment of the likely stress on dolphins caught in fisheries

1 A *rete mirabile* (plural: *retia mirablia*) is a complex of arteries and veins lying close to each other, found in some vertebrates. In cetaceans it is believed that this array minimizes blood pressure differentials when deep diving, thus protecting the brain without reducing the pressure pulses.

concluded that there was circumstantial evidence of severe distress but '[obtaining] *direct measurements of the effects of stress on animals killed in the fishery* [is difficult]. *To obtain this type of information, large sample sizes of specimens incidentally killed in tuna purse-seine nets must be collected* [with appropriate controls]' (Curry, 1999).

It is concluded that the drive hunt in the Grindadráp falls short of the accepted handling standards used for other mammalian species, free-living or captive. The combination of noise and disorientation, the unfamiliar environment, the breaking-up of social groupings and the chase and capture are likely to cause considerable stress. A similar conclusion was reached for the similar drive hunt in Taiji, Japan: '*data detailing the negative impacts of chase, herding and handling (capture) of small cetaceans renders these hunts inherently inhumane* […]' (Vail et al., 2020).

3 Restraint and handling

The largest pilot whales weigh up to 3.5 tons and are up to 6 meters in length. Even when the animal is still in water deep enough to support it, it is likely to be distressed after having been driven into shallow water and after having visual and auditory communication interrupted by the presence and noise of motor boats. Once stranded and with the weight of its body no longer supported by water, it is likely that the animal will experience considerable discomfort and pain.

The NAMMCO manual acknowledges that use of the blowhole hook requires care: '*The blowhole hook is not inserted into the nostrils but in one of the two pocket-like formations, vestibular air sacs, which are located on either side of the blowhole between the skull and the skin. Although the surrounding tissue is solid and will withstand considerable strain, the use of the blowhole hook should be kept to a minimum*' (NAMMCO, 2014). Butterworth (2023) considered '*that it is likely that enforced prevention of breathing by partial or complete obstruction of the blowhole and alteration to the function of the blowhole (to keep water out) will be a profound stressor for the animal*'. Irrespective of where it is placed, the blowhole hook as the primary means of dragging the animal into the shallows is likely to cause pain and distress. This conclusion is supported by Strahan et al. (2020) which demonstrates that the greatest skin sensitivity in the bottlenose dolphin is around the blowhole (along with the rostrum and melon). It is concluded that the use of the hook as described will negatively affect the animal's welfare.

4 The killing method

The method of killing differs from other captive mammals - by convention and by law. For example, EU law reflects best practice and requires farmed animals to be stunned (that is, unconscious and insensible to pain – although there are exemptions) before being slaughtered. Unless the animal is rendered unconscious and killed simultaneously, the animal must remain unconscious until death ensues, for example, by exsanguination (European Union Council Regulation (EC) No 1099/2009). The NAMMCO manual appears to apply a similar approach:

> "The overriding principle pertaining to any killing is that it is carried out as quickly and painlessly as possible with due respect to the safety, as well as taking into account the purpose of the slaughter, such as if the animal is intended for human consumption" (NAMMCO, 2014).

The NAMMCO manual includes the following claim:

> 'Given this particular arrangement of blood vessels and nerve system in the cervical region, one can conclude that one incision will disconnect the two systems. When the spinal cut is performed either with a knife or with the spinal lance, the spinal cord is cut and the whale is paralyzed and lies completely still. At the same time the blood supply to the brain is disconnected and the whale becomes unconscious and dies instantly' (NAMMCO, 2014).

There are two elements of mammalian physiology that renders this latter statement unsafe. First, cardiac muscle has an intrinsic rhythm. Although the rate and strength of contractions are controlled, in part, by the central nervous system (CNS), cardiac muscle will continue to beat regularly even when isolated from CNS control. Unless blood supply to the brain is otherwise interrupted, severing the spinal cord on its own will not affect blood supply to the brain. Second, the respiratory system does not operate independently and has no intrinsic rhythm. That is, when the respiratory system is isolated from the CNS, breathing will cease – for example, when the upper part of the spinal cord is severed. Severing the spinal cord means all skeletal muscle including those of the thorax will be paralyzed - breathing and hence respiration will cease. Cutting off the blood supply to the brain means that the brain will rapidly be starved of oxygen leading to unconsciousness (but see below).

However, the assertions that death is instantaneous (NAMMCO, 2014) or that animals are killed in 1–2 seconds (Olsen, 2011) following the use of the spinal lance rely on unproven assertions:

4.1 The spinal lance is consistently effective in cutting the spinal cord

In the absence of a detailed study this cannot be claimed with confidence. A report into the use of a similar device in Japan suggested that bony protuberances and complex joints between the cervical vertebrae and which lie ventral to a thick layer of blubber are likely to hinder the passage of the device (Butterworth et al., 2013).

4.2 The spinal lance is effective in destroying the blood supply to the brain

Unlike terrestrial mammals, in cetaceans the primary supply to the brain is via the intercostal and dorsal thoracic arteries, originating from the brachiocephalic trunk and the descending aorta supplying blood to the thoracic, cervical and spinal *retia mirabilia* and ultimately the cranial circulation. The carotid arteries do not supply the brain in cetaceans (Cozzi et al., 2017). If the spinal lance passes between the occiput and the atlas, then it is likely that the spinal *rete mirabile* will sustain substantial damage. However, the spinal *rete mirabile* is complex and diffuse. Evidence that damage is consistent and sufficient to destroy the blood supply in every case is lacking. Further, the cervical *rete mirabile* lies ventral to the cervical vertebrae within the fascial planes of the cervical musculature and surrounds the cervical vertebrae (Cozzi et al., 2017; Rowlands et al., 2021). Destroying this would require the spinal lance to pass a substantial distance between the vertebral bodies. Photographs in the NAMMCO manual (NAMMCO, 2014) and Olsen (2011) do not appear to show the blade passing ventral to the vertebral bodies meaning the cervical *rete mirabele* may remain largely intact. Although the contribution that the cervical *rete mirabele* makes to the blood supply to the brain is unknown, the continuing supply of blood to the brain from the cervical *rete mirabele* cannot be discounted.

4.3 Irreversible unconsciousness and death are immediate

Olsen (2011) defines time-to-death as *'the average time from start of the incision until the final convulsion'*. The average time to death is given as 1–2 seconds. This assumes that the time to death and the cessation of convulsions are the same. If the spinal cord has been cut then cessation of convulsions may be indicative of paralysis rather than death. The animal remaining conscious for an unknown period after the spinal cord has been severed, particularly if the interruption of the blood supply to the brain is incomplete, cannot be discounted. Other indicators of the loss of consciousness such as the loss of the palpebral reflex are more reliable. Hence, the assertion that death (recorded as a cessation of convulsions) takes place in an average time of 1–2 seconds cannot be supported.

4.4 The same procedure is applicable to different species

The NAMMCO manual states that '*the whale is killed by stabbing the spinal lance at one hand's breadth behind the blowhole*' (NAMMCO, 2014). This instruction is the same for all species despite the fact that the Atlantic white-sided dolphin may be half the length and a tenth the weight of a long-finned pilot whale. Although Olsen (2011) asserts that the spinal lance is suitable for other small species of cetacean there is no mention of where the implement should be placed in these species. This poorly worded instruction means that for smaller species the spinal lance may be placed in the wrong position.

Concerns about the humaneness of killing are further exacerbated when considering that the mandated check on the consciousness of the animal after the use of the spinal lance (that is, whether a palpebral reflex can be elicited) is not routinely observed (Butterworth, 2023).

5 Conclusion

The entire process of the Grindadráp is inherently inhumane: From the beginning of the drive through to the animals being driven into shallow water and then dragged onto the beach the whole process will almost certainly be highly distressing. This conclusion is reinforced when one takes into account the likely disorientation from the noise and the other activities of the hunters, and the likely distress from being isolated from its social group.

Severing the spinal cord is prohibited in the EU as a means of restraint for farmed animals and it is not considered a suitable killing method. The practice compares to the Spanish *corrida de toros* or bullfight - a traditional practice widely condemned from start to finish as inhumane and where the final act is severance of the spinal cord.

The assertion that severing the spinal cord with the spinal lance causes instantaneous or near-instantaneous death (Olsen, 2011; NAMMCO, 2014) cannot be substantiated since it merely paralyses the animal without rendering it unconscious. Taking into account the anatomy of the head and neck of cetaceans, the ability of the spinal lance to consistently interrupt the supply of blood to the brain and induce instantaneous or near-instantaneous unconsciousness cannot be substantiated. It is concluded that the technique to kill whales and dolphins is inhumane.

Amending the process to make the drive hunt and subsequent killing humane appears to be impossible. It is difficult to envisage a humane process which involves driving, capturing and killing cetaceans at the current scale.

Testing the assertion that the spinal lance is consistently effective in both cutting the spinal cord and destroying the entire blood supply to the brain would entail, in the first instance, the detailed examination post-mortem of a representative sample of killed cetaceans.

Testing the assertion that unconsciousness and death is instantaneous or near-instantaneous after the use of the spinal lance would be a technical challenge. Such a study would be of questionable value given the current knowledge of mammalian anatomy and physiology – the very knowledge that has led to the prohibition of similar methods in other species.

Developing a humane method of killing is likely to be difficult. The current system where there is no pre-stunning is unacceptable and the introduction of some system which involves either stunning or stun-kill before exsanguination is essential. The use of firearms to kill is obviously impractical when many people are present although their use for killing stranded cetaceans has been explored (International Whaling Commission, 2013). However, some form

of modified captive-bolt pistol may be worth considering although development and deployment represents a technical challenge.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material. Further inquiries can be directed to the corresponding author.

Author contributions

AS: Writing – original draft, Writing – review & editing.

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Conflict of interest

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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