A VETERINARY ANALYSIS OF A NOVEL APPROACH TO DOLPHIN SLAUGHTER USED IN THE ‘DRIVE HUNTS’ IN TAIJI, JAPAN

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Abstract
It is estimated that each year within Japanese waters up to 22,000 small whales, dolphins and porpoises (known collectively as 'small cetaceans') are killed in hunts that involve a range of techniques. The Taiji Fishing Cooperative, Japan has published the details of a new killing method which involves cutting (transsecting) the spinal cord. Analysis of video material of this method indicates that it does not immediately lead to death, and that the time to death data provided in the description of the method, based on termination of breathing and movement, is not supported by the available video data. Damage to the vertebral blood vessels and the vascular rete from insertion of the rod will lead to significant hemorrhage, but this alone would not produce a rapid death in a large mammal of this type. The method induces paraplegia (paralysis of the body) and death through trauma and gradual blood loss. This method of slaughter and killing does not conform with the recognized requirement for 'immediate insensibility' and would not be tolerated or permitted in any regulated slaughterhouse process in the developed world.

Introduction
It is estimated that each year within Japanese waters up to 22,000 small whale, dolphins and porpoises (known collectively as 'small cetaceans') are killed in hunts that involve a range of techniques. Most of these small cetaceans are killed in a direct hunt for Taiji's purposes, but others are taken in a particular category of hunt known as 'Drive hunts' or the drive fishery. The main species taken in the drive hunts include: common bottlenose dolphins (Tursiops truncatus); striped dolphins (Stenella coeruleoalba); Risso's dolphins (Grampus griseus) or short-finned pilot whales (Globicephala melaena). These animals are herded at sea using small fishing vessels, underwater noise (this is referred to as the Okino method) and driven into harbors or shallow coves which have been netted off and where they are then killed (Fig 1).

To date, little data on the animal welfare aspects of these drive hunts have been made available by the Government of Japan [1] and thus, independent assessment of the killing techniques used during these hunts and their efficacy has not been possible. In 2000, Iwasaki & Kai introduced a new killing method suggested as being an improved and more humane method of killing. Until the introduction of this new method, the primary tools used for slaughter were wooden wedges and spears, inserted at various points of the dolphin or whole body. According to information on the website of the Taiji Fishing Cooperative (Iwasaki & Kai, 2010), this new killing method, which is intended to sever the spinal cord at the juncture between the occipital and first cervical vertebra, was tested from December 2000 to February 2001. When the hunt was carried out in 2004, the technique was applied comprehensively to the killing of striped dolphins and, from December 2000, control of bleeding was achieved by driving a wooden wedge into the wound.

We analyzed videotape footage of a dolphin drive hunt involving striped dolphins (Stenella coeruleoalba) conducted in Taiji, January 2001. We compared our observations and analysis to a published assessment by Iwasaki & Kai (2010) and translated from Japanese into English in order to facilitate a comparison of data on kill methods and dolphin behavior. Independent observers have not previously assessed the killing methods used in the dolphin drive hunts in Taiji, Japan.

Methods
The video material was analyzed by one of the authors (AB), a veterinarian. The video footage used in this analysis was provided by an independent video journalist. Events and event intervals were documented, tabulated, and timed using the time base available on the video material.

'New' killing blade (transsecting knife) with wooden plug (Iwasaki & Kai, 2010). Wooden peg inserted into wound to stem bleeding

Results

Discussion & Conclusion
The results of our analysis of the killing methods utilized in the Taiji dolphin drive hunt provide strong evidence that the claims regarding the killing method described in Iwasaki & Kai (2010) are not substantiated, and stand in sharp contrast, to their descriptions and conclusions. Contrary to Iwasaki & Kai which published Time to Death (TTD) data ranging from an average of 13.7 to 25 seconds, our video analysis revealed prolonged TTD. This killing method cannot be considered as humane as it does not fulfill the recognized requirement for immediacy, and in fact may result in a prolonged aversive application of a violent and traumatic physical process followed by death by spinal paraplegia and blood loss. This method would not be recognized or approved as a humane or acceptable method of killing for mammals in any setting.

This method for killing highly developed mammals for commercial gain is in striking contrast to EU, US and existing Japanese legislation which aims to ensure the humane treatment of farm, domestic and laboratory animals. Dolphins are sentient, highly social mammals that exhibit advanced cognitive abilities. Our existing scientific knowledge and understanding of cetacean anatomy, physiology, social behavior and cognition should inform local and global fisheries and animal welfare policies on the treatment of these species.

Acknowledgements
The authors would like to acknowledge the assistance of the individuals who collected and provided video footage, still photographs and translations which enabled this analysis. More specifically, a special thanks to AtlanticBlue.de for providing the video footage from the most recent drive hunt season in Taiji and Elias Nobles, MD for providing the translation of the original document (Iwasaki & Kai, 2010) upon which this analysis is based.

Table 1. Video analysis – timing of events during use of the new killing device.

<table>
<thead>
<tr>
<th>Event</th>
<th>Description</th>
<th>Time from start of incident (s)</th>
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<tr>
<td>Initial contact, device inserted into wound</td>
<td>A section of the spinal cord was cut and severed. This is done to prevent the blood from escaping the body. This technique was shown to the sham animal at a time when the animal was clearly already suffering from ischemia. This method does not fulfill the recognized requirement for immediacy. The primary tool used for slaughter is a wooden wedge, inserted into the wound and driven into the body, resulting in a gradual blood loss and death. This technique does not conform with the recognized requirement for 'immediate insensibility' and would not be tolerated or permitted in any regulated slaughterhouse process in the developed world.</td>
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Figure 1. A drive hunt in progress. Dolphins are herded and trapped in the killing cove.