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Trials with new whale killing equipment in Faroese whaling

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Introduction

The traditional method used to kill pilot whales, *Globicephala melas*, in the drive hunt in the Faroe Islands is by a transverse incision with a knife (traditionally known as a whaling knife) with a 16-18 cm long blade (F*ig.1*). The incision is made a hand's-breadth behind the blowhole and severs the spinal cord, *medulla spinalis*, and its surrounding blood vessels. This method is efficient and renders the whale unconscious within a few seconds after the incision is made. It is easy to confirm that the incision is done properly because when the spinal cord is severed the whale makes a violent final convulsion and lies completely motionless afterwards. Other killing methods have been considered, including shooting with rifles. However, given the circumstances in which whale drives take place, involving many people both in boats and on the beach, such methods are far too dangerous. Systematic evaluation of time-to-death using the whaling knife has been carried out (*Olsen 1999*). The average time from start of incision until the final convulsion was found to be 36.1 seconds when the traditional method of securing whales with an iron gaff was used and 29.2 seconds when the blow hole hook was used to secure the whales. Killing methods, killing times and animal welfare in general have always been subject to discussions amongst Faroese whalers and authorities.

The following description is the result of an idea and initiative from one whaler which generated further new ideas during a period of trials with five versions of new piece of equipment. Another whaler suggested a sixth version of this equipment with some additional refinements. This has created much interest amongst whalers, and the aim is to have this new equipment adopted into the whaling regulations so that shall become mandatory for whalers to take through a training program and receive a licence for permission to use this equipment.

Fig. 1: Traditional Faroese whaling knife Photo: H. Joensen

Trials with a spear

In 1998 a whaler (Kristian J. Glerfoss) presented the author with new equipment he had created with a double-edged blade, like a spear, 25 cm in length, with a double-handed 30 cm-long shaft (F*ig. 2*). This spear was intended to pierce down to the spinal cord in a single thrust, so the killing time could be reduced from the above-mentioned average of

30 seconds to 1-2 seconds. It would also enhance safety for the whalers, as injuries occur with the use of the traditional whaling knife. In agreement with the Ministry of Fisheries it was decided to test this new spear to see if it would function in practice as intended. The further trials have taken several years, mainly because it has often been difficult to get to whale drives in time, as the beaching and killing is very swift and often completed in less than ten minutes and also because new ideas have developed to further adapt the equipment as it was being tested.

Fig. 2: New spear, first version Photo: B. Hanusson

The author has tested this equipment in cooperation with its inventor. Changes and modifications have been made in accordance with experiences from trials in accessible drive hunts over the years. The equipment has been tested in many hunts and on more than 200 whales. The first trial took place on 14 March 1999 and most recently on 28 May 2011.

Trials and development, first version

The first trial was carried out by the author on 14 March 1999 in the whaling bay of Sandágerði, when four whales were killed with this spear (F*ig. 3*). The incision was made in the median line between the blowhole and the dorsal fin, one hand's -breadth behind the blowhole, aiming at the space between the *foramen magnum* and the *atlas*. This was very easily done. It could be recognized when the spinal cord was severed, based on the violent final convulsion of the whale, as well as the gushing of blood from the wound (F*ig. 4*).

In one instance it was observed that the spear hit the occipital bone and had to be directed slightly backwards to reach the spinal cord. One of the whales was very large, 20 skinn, (see *Bloch D. 1992*), so that the spear was too short and had to be thrust hard to reach the spinal cord. The general impression amongst observing whalers was that this was very efficient equipment that should be subject to further trials.

Fig. 3: New spear, first whale

Photo: K. Glerfoss

Fig. 4: New spear, second whale

Photo: K. Glerfoss

Trial with a spear, second version

The first adjustment made was to elongate the spear's blade. The distance from the skin surface down to the spinal cord was measured on the largest whales (20 skinn). This distance is app. 30 cm and it was decided to make a new spear with a blade length of 35 cm. Another adjustment was to equip the spear with two handles at right angles to each other (F*ig 5*). This made the spear safer to handle, as the spear could be directed and positioned with one hand and thrust with the other hand.

Fig. 5: New spear, second version **Photo: J.Olsen**

The next trial was done on 25 July 1999 in the whaling bay of Bø, and the spear functioned as intended. Four whales were killed with this spear and the results were very positive. It also happened that the tip of the spear hit the occipital bone, but could be directed backward and down to cut the spinal cord. After this killing it was suggested to shape the pointed end as a droplet in order to prevent the spear from hitting the occipital bone, allowing it instead to slide along this bone down to severe the spinal cord.

Trial with a spinal lance, third version

When the inventor made the suggested amendment he also made a fundamental change to the blade. It was considered unnecessary to have a long double-edged blade to cut down to the spinal cord. Instead, it was made with a fluke-shaped blade mounted on a slim shaft (*Fig. 6, Fig. 7, Fig. 8 and Fig. 9*), thus making it even safer to use. The fluke was mounted on the shaft in such a way that the end of the shaft extended to approximately 1 cm from the tip of the fluke. With this amendment this new equipment is no longer shaped as a spear, but more like a lance and the future name will be "*spinal lance*" in Faroese "*mønustingari*".

Fig. 6: New lance, third version **Photo: B. Hanusson**

Fig. 7: New lance, third version **Photo: B. Hanusson**

Fig. 8: New lance, third version **Photo: B. Hansen**

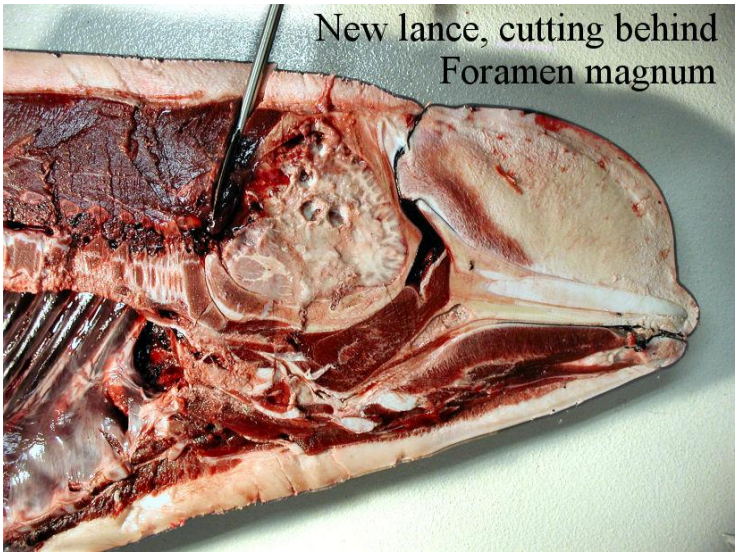

Fig. 9: New lance, third version **Photo: B. Hanusson**

Users' acceptance of the new equipment

The testing of this new equipment continued over the following years. When the author was quite satisfied with the design of the spinal lance, some whalers were instructed in its use and, assisted by the author, were given the opportunity to test it. They found it quite acceptable and felt that it was easy and safe to handle and allowed the killing to be carried out without complication.

Trial with spinal lance, fourth version

After this initial period, the Ministry of Fisheries funded the production of 8 more of these lances in 2005. During the trial with the third version it was observed that in some whales the lance did not cut the most ventral blood vessels even if the fluke reached all the way across the *foramen magnum*. Instead of being cut the ventral vessels were pressed sideways when the lance hit them. The reason for this was that the tip of the lance

had a too pointed shape; see *Fig. 7* and *Fig. 8*. With the production of these 8 new lances, becoming the fourth version, (*Fig. 10, upper item*) the tip of the lance was made more curved to prevent that the blood vessels were pressed sideways unsevered when the lance passed behind *foramen magnum.* The lances were made available at different whaling bays so that trained whalers could have the opportunity to test them after having received instructions from the author site before the killing started.

Fig. 10 : New lance, 4th version upper, 3rd version lower

Photo: J. Olsen

Since this initiative, several experienced whalers have tested the spinal lance. There is great variation in how many whales each whaler has killed, depending primarily on how many whale drives there have been in the different districts and also on how many whales there were in each single drive. It has also been difficult to record the exact number of whales each whaler has killed with the new spinal lance, because everything happens very quickly and it is not always possible for the whaler to record how many whales he has killed while the killing is taking place.

The author has killed 80-90 whales with the spinal lance. The duration of the killing was estimated to be 1-2 seconds and most of the whales were killed in the first attempt. Some were killed in the second attempt, and this was mainly with the spear versions. With this second attempt it means that the tool is not withdrawn but directed more backwards.

Monitoring the killing time by means of stop watches has been considered. However, as the killing time using the spinal lance consists of the time from the start of the thrust until the spinal cord and the surrounding vessels are cut, the duration is too short (estimated at 1- 2 seconds) to allow reliable measurement of the killing time by stop watch.

By means of a questionnaire it has been possible to get responses from seven hunters who have tried this new lance. They were all experienced hunters who have participated in many hunts. There was great variation in how many whales they have killed, varying from two to fifty. The total figure is c. 135 whales. The killing was completed in the first attempt for c. 127 of these whales. For eight whales a second attempt was necessary. For all the whalers the duration of the killing process was estimated to be 1-2 seconds for each attempt.

All of these whalers were of the opinion that this new equipment was much easier to handle and much safer to use than the traditional whaling knife.

Further trials and development

At this stage of the trials, a draft paper was presented to the NAMMCO Committee on Hunting Methods in 2008. The committee members discussed and commented on this paper. The question was raised as to whether it was possible to severe the spinal cord and its surrounding blood vessels which pass through the *foramen magnum* and into the brain with a single incision of the spinal lance. Initially, the understanding was that this incision would have such an impact on the brain that the whale would be instantaneously unconscious and dead even if not all the vessels were severed. But as this question was raised, steps were taken to further investigate the anatomical features and dimension of *foramen magnum* on heads of dead pilot whales of different size, which were available at that time, (*Fig. 11 and Fig. 12*). The transverse diameter of the *foramen magnum* varies from app. 4.5 cm for the smallest pilot whales (2 skinn), *(Fig.13)* to app. 7.5 cm for the largest pilot whales (20 skinn), *(Fig.15)*.

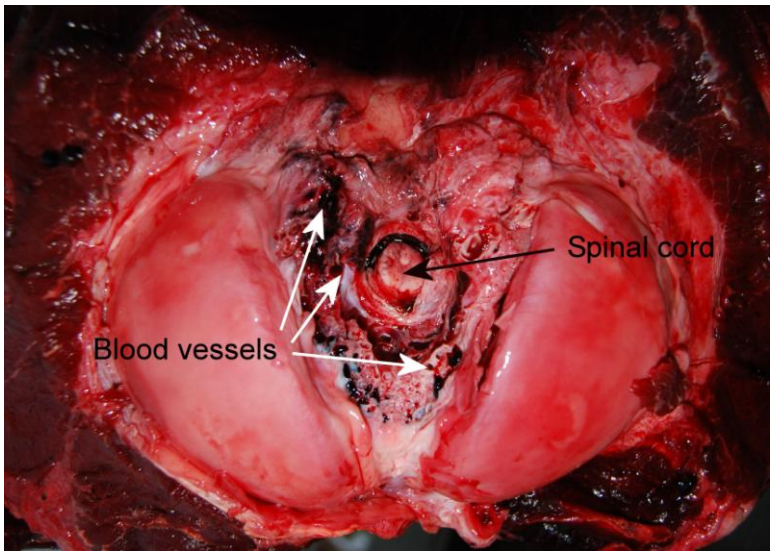

Fig. 11: Foramen magnum with spinal cord and surrounding blood vessels

Photo: B. Hanusson

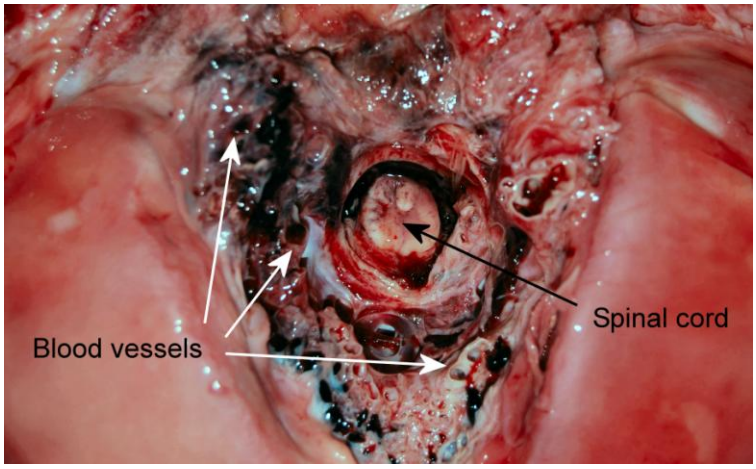

Fig. 12: Enlarged details from Fig. 11 **Photo: B. Hanusson**

Fig. 13: Foramen magnum of small pilot whale

Photo: B. Hanusson

Fig. 14: Foramen magnum of medium pilot whale

Photo: B. Hanusson

Fig. 15: Foramen magnum of large pilot whale

Photo: J. Olsen

Trial with spinal lance, fifth version

The dorso-ventral diameter of the *foramen magnum* is approximately the same size as the transverse diameter. These measurements reveal that the breadth of the spinal lance has to be at least 7.5 cm to ensure that both the spinal cord and the surrounding vessels can be severed in a single incision. This has been considered and the conclusion is that if this should be done, it will be necessary to have two lances: one for larger whales and one for smaller whales. It would not be possible to use a broad lance of 7.5 cm for smaller whales, as the space between the occipital condyles will be too narrow for the broad lance to reach the spinal cord. Instead, the inventor made a new version, becoming the fifth version, where the length of the cutting edges is 10 cm and the breadth of the lance is 4.8 cm. See fig.16, upper item. With this version it is possible to cut both the spinal cord and surrounding blood vessels of smaller whales, (*Fig. 16*). For the larger whales the spinal cord and surrounding blood vessels can be cut by moving the lance to both sides, (*Fig. 17*). This can be done in direct continuation of the primary incision and will only marginally prolong the killing time for the larger whales. It is also preferable to having to switch between different lances during the beaching depending on the size of the whale. See fig.17 and fig.18.

Fig. 16: New lance. 3rd version, bottom, 5th version, top Photo: J. Olsen

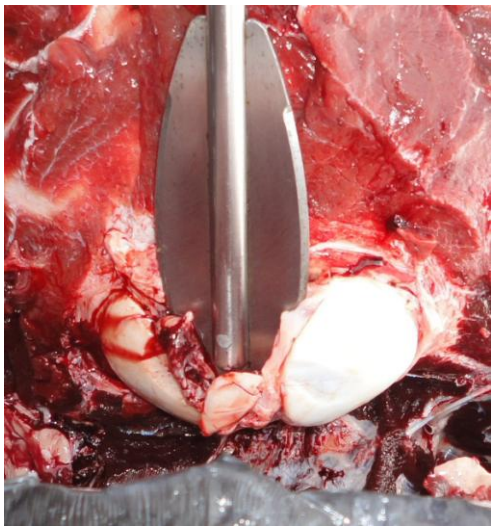

Fig. 17: Lance cutting spinal cord, small whale

Photo: B. Hanusson

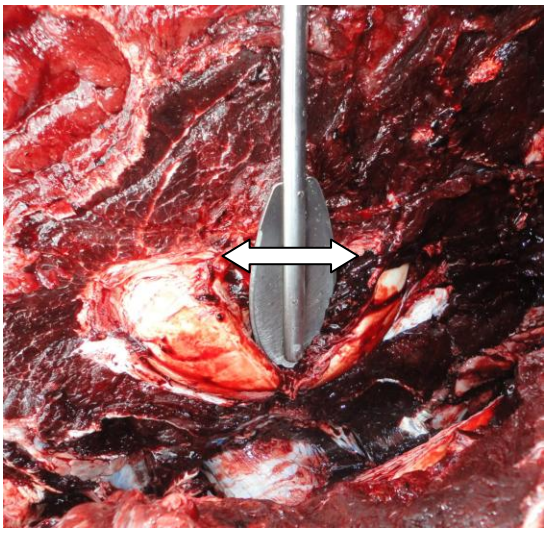

Fig. 18: Lance cutting spinal cord, large whale

Photo: B. Hanusson

Trial with spinal lance, sixth and final version

At this point the understanding was that we had reached our goal in developing this new spinal lance, but an inventor, Jóannes Niclasen, in 2010 raised a new idea to make the spinal lance even safer to use. He constructed a sheath that is mounted on the shaft of the lance and can slide along the shaft and cover the blade of the lance in a locked position, (*Fig. 19*), with a mechanism to unlock the sheath (*Fig. 20*), when the lance is positioned on the back of the neck of the whale, and when the lance is thrust towards the spinal cord, the sheath slides towards the handle of the lance. The sheath can also be locked in the opposite position near the handle. Locked in this position, the sheath can be used as a handle making it possible to use both hands to thrust the lance towards the spinal cord. There are two benefits with this sixth version compared with to the previous versions. First of all, the lance can be stored safely when it is not in active use, and secondly the

lance can be positioned more accurately behind the blow hole because it can be positioned with one hand in contact with the skin surface.

Fig. 19: New lance 6th version, sheath locked

Photo: B. Hanusson

Fig. 20: New lance 6th version, sheath unlocked

Photo: B. Hanusson

Fig. 21: New lance 6th version, blade details

Photo: B. Hanusson

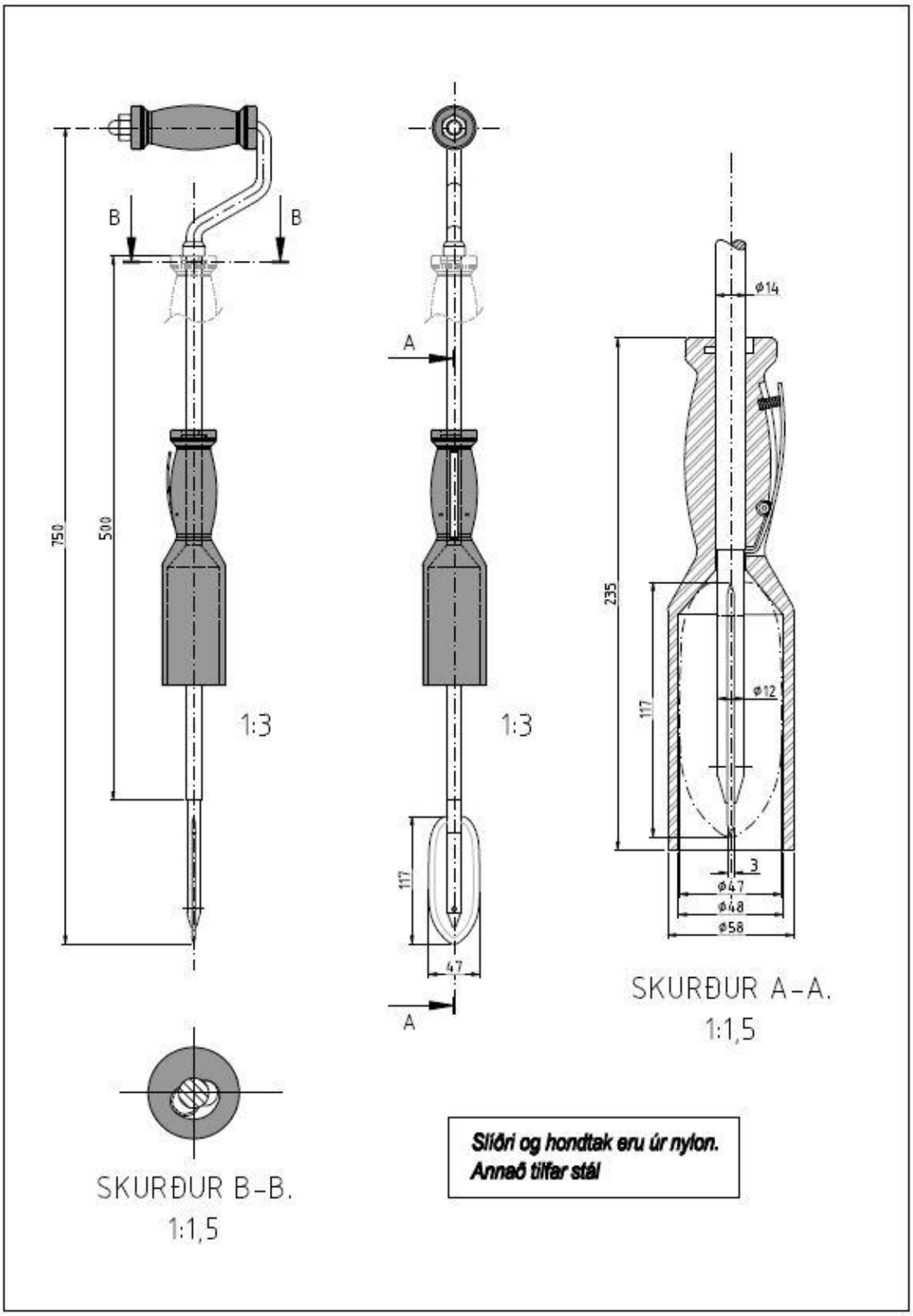

Fig. 22: New Lance 6th version, technical drawing by H. Durhuus

Killing of other species of small cetaceans with the new spinal lance

It has been possible to kill other small cetaceans with this new lance. For white-sided dolphins, *Lagenorhynchus acutus*, the anatomical features of the occipital region are similar to those of pilot whales; i. e. the occipital bone has the same convex shape in both species, (*Fig.23*).

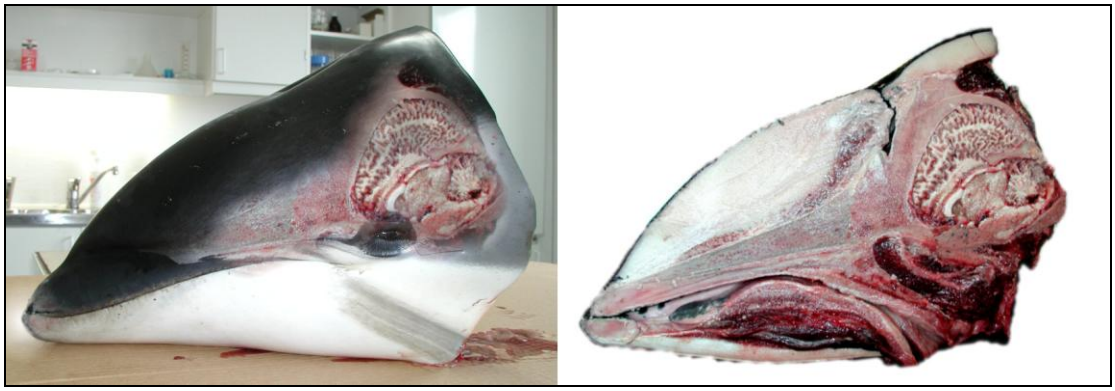

Fig. 23: Head of white sided dolphin, showing skull and brain details **Photo: B. Hanusson**

New spinal lance used to kill a stranded bottlenose whale

In one instance in 2005 where a stranded bottlenose whale, *Hyperoodon ampullatus*, could not be killed with a rifle, the author tested the third version of the new spinal lance instead. In the first attempt the lance was too short and couldn't reach the spinal cord. After a deep cut (app. 10 cm) into the blubber and its removal, it was possible to severe the spinal cord and its surrounding vessels. Since this test, the Ministry of Fisheries has funded the production of two spinal lances with a longer, 50 cm shaft and a broader fluke, for use in killing stranded bottlenose whales which cannot be refloated and where rifles cannot be used safely.

It should be added that it is more complicated to use this spinal lance on bottlenose whales than on pilot whales because of differences in the anatomic structure in the atlanto-occipital region. The occipital condyles in bottlenose whales protrude far more caudally so the lance will not hit the spinal cord if it slides along the occipital bone but will hit the occipital bone. In August 2009 this lance was used to kill two stranded bottlenose whales and both whales were killed on the first attempt. The positioning of the lance was according to the traditional method, which is by placing the elbow at the blow hole and directing the arm backwards, positioning the lance in the midline behind the fingertips.

Conclusion

After having performed the trials with this hunting equipment, which now goes by the name of spinal lance (in Faroese: Mønustingari), the following remarks can be made:

The killing method is in principle the same with the spinal lance as with the traditional whaling knife, i.e. severing of the spinal cord and its surrounding blood vessels at the space between the *foramen magnum* and the *atlas*.

The killing time i.e. the time used to cut from the skin surface at the back of the neck down to the spinal cord will be reduced from an average of 30 seconds to 1-2 seconds.

The new lance is much safer equipment to use than the traditional knife, presumably resulting in far fewer injuries amongst whalers during whale drives.

A whaler using this spinal lance will be accompanied by a second whaler who will be responsible for cutting the blood vessels on the ventral side of the neck to ensure that the whale is properly bled.

The spinal lance can also be used to kill other small cetaceans.

Finally, a separate, especially designed version of the spinal lance can be used to euthanize stranded bottlenose whales when a rifle cannot be used.

Acknowledgments

The author wishes to thank the inventors of this new equipment for their patience in making the changes and adjustments during the development period. I also wish to thank the whalers for their positive interest in testing this new equipment and especially the whalers who took the time to answer the questionnaire. Finally, I also wish to thank those who provided the photos included in this paper.

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