THE EXTERNAL LOCATIONS OF HARPOON WOUNDS ON MINKE WHALES TAKEN IN ANTARCTIC COMMERCIAL WHALING OPERATIONS, 1978/79 SEASON

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Abstract *Animal Welfare 1996, 5:* 57-62

Observations on the external locations of harpoon wounds were made on 127 minke whales Balaenoptera acutorostrata *taken during Japanese commercial whaling operations in the 1978/79 Antarctic season. The numbers of wounds per whale did not vary between catcher boats, the average being 1.2. Although the cranio-thoracic region seemed to be the target of choice (bearing 60.5% of all wounds examined), the proportion of wounds in this region varied significantly between catcher boats, ranging from 43.6 to 75.7 per cent. It is suggested that this variation arose because to hit the cranio-thoracic region, the first section of the whale to surface, requires considerable skill on the part of the gunner.*

Keywords: *animal welfare, Antarctic, harpoon wounds, minke whale, whaling*

Introduction

At its 1992 meeting, the Humane Killing Working Group of the International Whaling Commission called for data on the areas of the body on which harpoon strikes were made in Antarctic whaling. Although the data specifically requested referred to the 1984/85–1986/87 seasons, I collected similar data during a short period of research on minke whales *Balaenoptera acutorostrata* on the factory ship *Nisshin Maru No 3* during the 1978/79 Antarctic season. The data are presented here for comparison with the more recent data set when it becomes available.

Material and methods

From January 16 to February 19 1979 I was based on the factory ship *Nisshin Maru No 3*, operating in the Antarctic south of 62°S and between the longitudes of 62 and 106° E. My principal objective was testing the efficiency of the recovery of .410 Discovery whale marks (internal tags normally fired from a shotgun into the back muscle of the free-swimming whale) that were secretly introduced into the carcase and processing plant (Best & Butterworth 1980). At the same time I also assisted the biologist Hidehiro Kato with his routine collections of biological material and made my own incidental observations (Best 1982).

Part of the data that I routinely collected from each whale examined was the position on the body on which harpoon wounds appeared. These wound sites were entered on a diagram of the lateral view of a minke whale reproduced on the data sheet.

Owing to the difficulties of thoroughly examining each carcase in the short time it was processed, the strategy adopted by Kato and myself was to select a 'target whale', and follow it right through the processing procedure before selecting another 'target whale'. Intervals between 'target whales' varied from 1 to 16, but were mainly (62%) two to four whales. There was no attempt to select for size or sex, so the sample can be considered random as regards any information on harpoon damage.

In total, data on harpoon wounds were collected from 127 minke whales (the only target species for the fishery). At the time four different catcher boats were operating, using 75mm guns and harpoons with 'cold' grenades, ie grenades which had been disarmed so that they could not explode (Best 1975) – the use of such grenades was banned from the 1982/83 season. The identity of the catcher boat taking each whale was established from special cuts that the catcher boat crew made in the tail flukes.

Size distribution data by sex for the Japanese Antarctic catch for the 1978/79 season were obtained from tables issued by the Bureau of International Whaling Statistics, Norway.

Results

The size distribution by sex of the whales examined is shown in Figure 1. There were 43 males and 83 females (and one of unknown sex), not significantly different from the proportion in the remainder of the Japanese Antarctic catch for that season (Chi-squared = 1.997, $df = 1$, $P > 0.10$). The males examined ranged from 6.7 to 9.1m in length, with an average of 8.1m, while the females ranged from 6.3 to 10.1m, with an average of 8.2m. The size distribution in the sample was not significantly different from that in the remainder of the Japanese catch for that season (males: Chi-squared = 9.592, $df = 5$, $P > 0.05$; females: Chi-squared = 14.518, $df = 8$, $P > 0.05$).

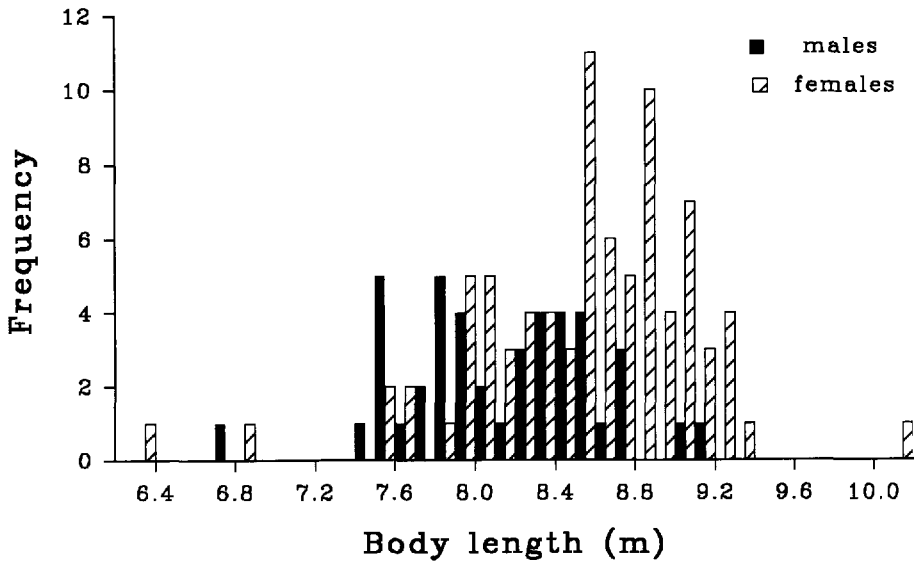

Figure 1 **Size distribution of the sample of minke whales examined for harpoon wounds, *Nisshin Maru No 3*, 1978/79.**

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The locations of the harpoon wounds are indicated in Figure 2. These have been traced onto one outline from the original data sheets. No distinction in recording was made between left and right sides of the whale, all data being entered on one outline.

Some individuals had clearly been struck by more than one harpoon, but as it was impossible to distinguish in what order the wounds were inflicted, they have all been entered on Figure 2, for a total of 152 wounds from 127 whales. Wounds inflicted by the electric lance, used to hasten death in animals not already killed by the harpoon(s), were clearly different.

There was no significant difference between catcher boats in the relative number of whales with single or multiple wounds (Chi-squared = 5.566, $df = 3$, $P > 0.10$), the average number of wounds per carcase ranging from 1.09 to 1.30 between boats.

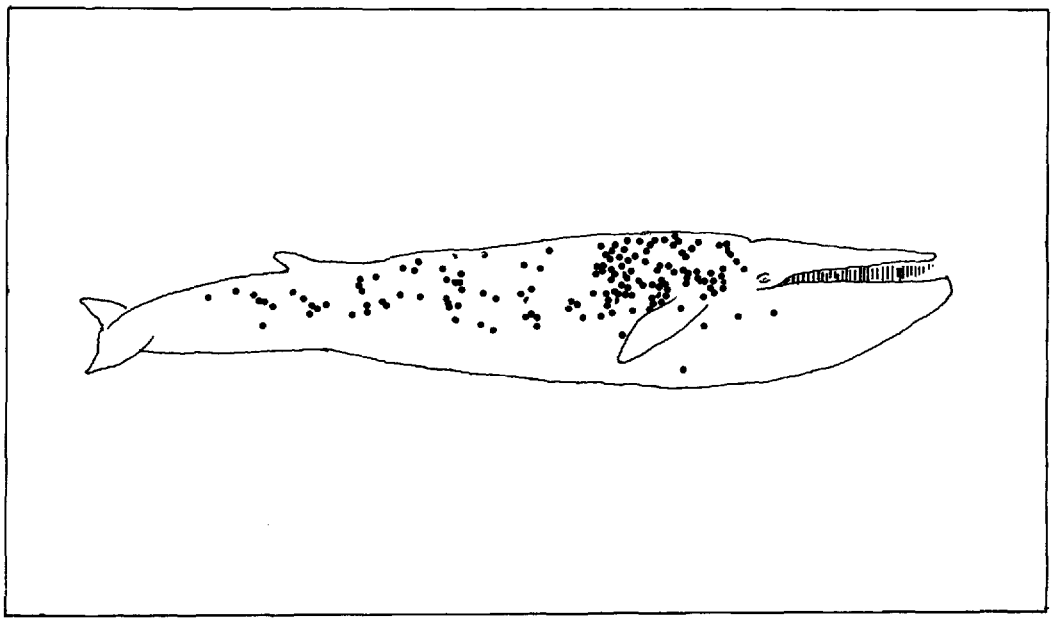

Figure 2 **Diagram of minke whale used to record positions of harpoon wounds, with sites of all recorded wounds illustrated.**

As a test of the 'accuracy' of the different catcher boats, the positions of the wounds were expressed as distances from the tip of the snout as measured on the diagram (for orientation purposes illustrated as distances from the tail in Figure 3). There were clearly differences between catcher boats: if the wounds are divided into cranio-thoracic (the anterior 40% of the body) and abdomino-caudal (the posterior 60% of the body), the proportions of wounds in these two regions differed significantly between catcher boats (Chi-squared = 10.787, $df = 3$, $P < 0.025$). The proportion in the cranio-thoracic region was 75.7 per cent, 71.4 per cent, 53.7 per cent and 43.6 per cent in catcher boats B, D, A and C respectively.

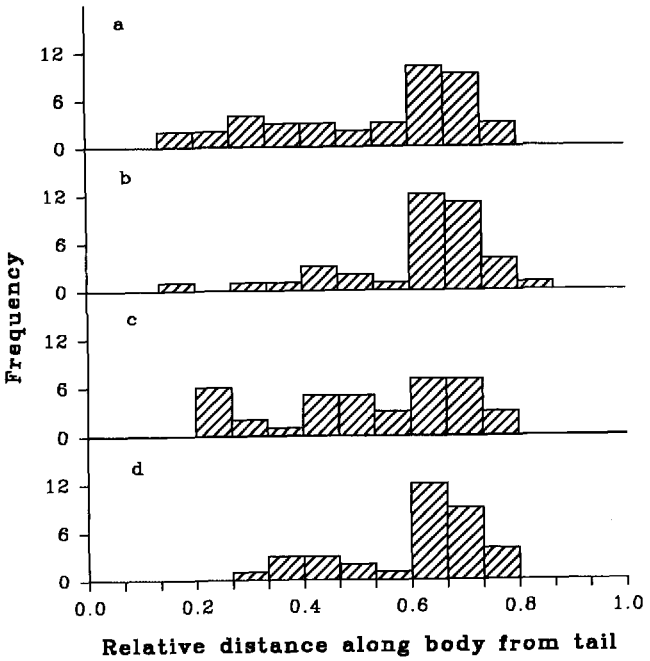

Figure 3 **Positions of harpoon wounds along whale's body (tail to left, head to right) for each catcher boats A – D.**

Discussion

The findings of this paper are subject to a number of caveats. Firstly, the 'cold' grenade harpoons tended to travel right through the carcase, making it difficult if not impossible to distinguish entry from exit wounds. Thus the positions of the wounds recorded may not necessarily refer to sites where harpoons struck. Secondly, the positions of the wounds bear only an approximate relationship to the sites in the body to which trauma was inflicted, because the angle of firing was rarely perpendicular to the longitudinal axis of the whale's body, more often in fact being from above and behind the whale as it swam away from the boat. Hence if anything the harpoons are more likely to have travelled anteriorly in the whale's body after entry, rather than posteriorly (and the wounds below the midline probably represent exit rather than entry wounds). Thirdly, the locations were recorded by eye on a schematic diagram rather than by direct measurement, so the records may not be very precise. Fourthly, the inability to distinguish wounds caused by first from second harpoons implies that the apparent accuracy of the gunners may be exaggerated, if it is easier to place the second harpoon more accurately. And lastly, the data collected refer to the use of 'cold' grenades in typical commercial whaling; more recent whaling has used harpoons equipped with explosive grenades and involved whaling under scientific permit, in which somewhat smaller animals are included in the catch. It is not clear how these changes may have influenced the distribution of harpoon wounds on the body; presumably the use of explosive grenades has promoted better placement of harpoons because of the potentially greater damage to meat, but the smaller size of some animals may have made this more difficult.

Animal welfare implications

The International Whaling Commission has been concerned about the humaneness of methods used to kill whales since at least 1959 (Wall 1961). A working definition adopted in 1980 stated that humane killing of an animal ideally 'means causing its death without pain, stress or distress perceptible to the animal', and 'Any humane killing technique aims first to render an animal insensitive to pain as swiftly as is technically possible. In practice this cannot be instantaneous in the scientific sense' (Anon 1981). Several studies have indicated that the position of the harpoon hit on the body was the most important factor in reducing the time-to-death, both for non-explosive and explosive harpoons (Donovan 1986). For experimental explosive harpoons, shots that struck the anterior 40 per cent of the body produced 'instant or near-instant' death in 62.5 per cent of minke whales, compared to 33.7 per cent for shots that struck the rear 60 per cent of the body (Kano & Hasui 1982).

It is clear from the data in this paper that the gunners' principal target was the cranio-thoracic region, which overall bore 60.5 per cent of the wounds detected. This would be the preferred target in attempts to kill the whale as quickly as possible (and, from the purely commercial point of view, to lessen the damage to meat). However, as the whale surfaces rostrum first, it is necessary for the gunner to have prior warning of the surfacing (or to have an extremely fast reaction time) if the harpoon gun is to be aimed and fired such that the harpoon strikes the desired target (Figure 4).

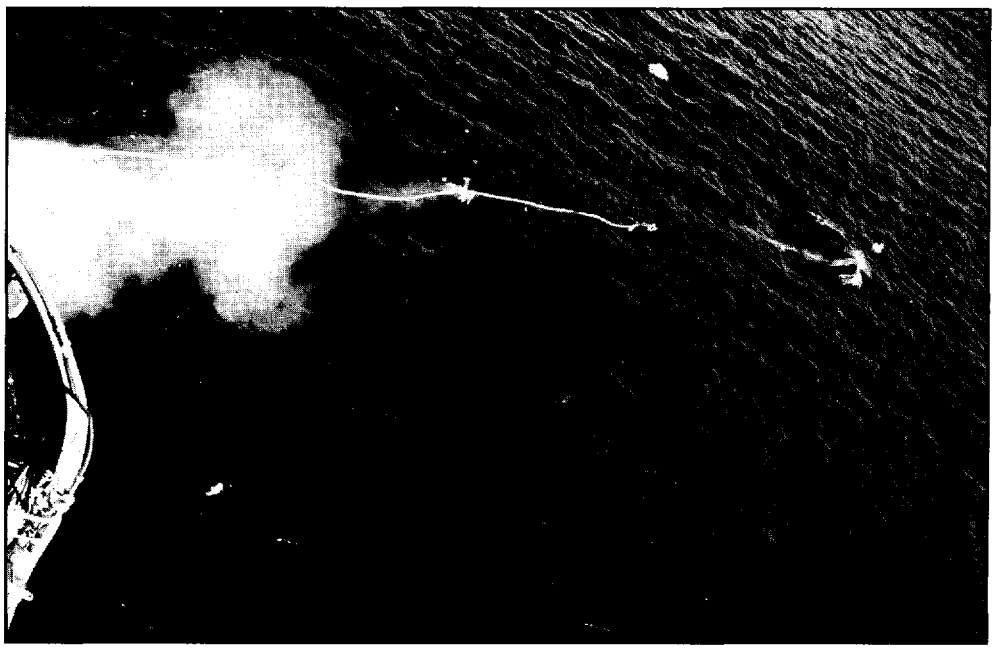

Figure 4 **A harpoon in flight towards a surfacing minke whale, Antarctic, 1978/79.**

A larger above-surface target is provided when the whale flexes its back before diving, and this also gives the gunner a longer time to aim after the whale surfaces, but such shots are

contra-indicated for both humane and commercial considerations. Because of the high levels of skill required, it is not surprising that differences exist in the apparent abilities of the gunners to hit the more difficult target, the cranio-thoracic region. Adequate selection and/or training of gunners would undoubtedly have a beneficial effect on the humaneness of any further harvesting of minke whales.

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