

In Confidence

Cruise Report

FRV Clupea

5-22 July 1977

Objectives

1. To investigate the effect of sea bed conditions (hard to soft ground) on the drag of bottom trawls.
2. To compare the engineering performance of the following gears:-
 - a. the standard North Sea trawl
 - b. a larger mesh version of the North Sea trawl (5½ in mesh throughout) and
 - c. the Aberdeen 40 ft trawl.

Narrative

Clupea sailed from Buckie on the afternoon tide of 5 July. For the remainder of this first week, performance measurements on the standard North Sea trawl were carried out using tows in the Chad Deeps (Moray Firth) and latterly off Auskerry.

On Friday 8 July a severe fastener occurred resulting in the loss of the net, bobbin string and some of the instrumentation which was being used to record the performance of the gear. The cause of this fastener was precisely located, a wreck not indicated on the available charts, and several attempts were made to recover the lost equipment with grappling gear. After the weekend which was spent in Kirkwall, further attempts at recovery were made on 13 July, but without success and the gear testing programme was resumed, the Aberdeen 40 ft trawl having been rigged in the meantime. Clupea returned to Buckie for the second weekend, arriving in the late evening of 14 July.

On the morning of 18 July the tension measuring instruments were calibrated in-port and the large mesh North Sea trawl was rigged. The ship sailed from Buckie that afternoon. Performance measurements were made on this recently developed trawl, first on the Chad grounds and later using tows in the Buchan Deeps area. Clupea arrived in Aberdeen to end this cruise on the evening of 21 July.

Results

Comprehensive sets of performance measurements were obtained at various towing speeds from 2 - 3.5 knots for each of the three gears tested, and in each case the gear was used on two types of seabed ie moderately soft mud and coarse sand. One tow was made on very soft mud but the standard flat otterboards used for all the tests are not suitable for this type of ground. An interesting oscillatory effect in the warp tensions was observed on this softest ground, when the tensions rose steadily to a peak around 3 tons per warp, then they fell back quickly to half this value with a period of about 2 minutes. This effect was no doubt caused by the increased ground shearing force to which an otterboard is subject on mud compared with harder soils, leading to the board spread increasing to a critical point where one board is pulled clear of the ground so that the spread collapses.

In one of the areas originally selected as having suitable tows, east of the Orkney Islands in 30-40 fathoms of water, large quantities of the seaweed Aspero coccus sp were found on the grounds. Unfortunately the trawl picked up such quantities of this weed, clogging the meshes right to the forward parts of the net, that a noticeable increase in gear drag and a reduction in the spread (at the same towing speed) occurred over the two hour duration of a haul. This problem did not arise on further offshore tows where the water depth was 45 fathoms or more.

For the same gear the increase in total drag (measured in the warps) between towing on mud and coarse sand was typically 25%, but most of the increase was probably contributed by the otterboards. It was not immediately apparent from the tensions recorded on load cells attached directly to the net whether such a variation is significant for the net and ground gear alone in comparison with other sources of variability in gear performance data, and further analysis especially to fully correct the results for tide will be necessary to clarify this point.

D N MacLennan

9 August 1977

Seen in Draft: G Geddes A Mair