R1/6

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FRV CLUPEA 7CR82

CRUISE 7/82

REPORT
10 August - 1 September 1982

## OBJECTIVES

(1) To commission the new winch for the RCB.

(2) To film with the RCB the comparative escape rate of small fish from a diamond and square mesh codend.

(3) To compare drag characteristics, using instrumentation, of a typical diamond mesh trawl with that of the same trawl with one third of its twine area in square mesh.

(4) To film and observe with the RCB a rockhopper groundgear traversing smooth and rough ground.

(5) To film with the RCB contrast characteristics of a trawl constructed with alternative rows of black and white netting.

## NARRATIVE

"Clupea" was held up in Aberdeen from the 10 to 15 August while the new RCB winch was fitted. "Clupea" sailed from Aberdeen at 1420 on Sunday 15 August to a position approximately 10 miles due east of Aberdeen where performance trials were conducted on the new RCB cable winch. Mr Priestley was disembarked in Aberdeen at 1800 on Sunday.

At 1945 "Clupea" proceeded to North Sound, Orkney where trawling and RCB work commenced. On the evening of Monday 16 August "Clupea" berthed in Kirkwall to disembark Mr T Balfour the winch manufacturer who was on board for the winch trials.

The ships movements for the rest of the cruise were as follows:-

17/8 Copinsay trawling and RCB;

18/8 Copinsay and North Sound trawling and RCB;

19/8 Start Point trawling and RCB;

20/8 Copinsay bad weather dodging RCB survey for hard ground;

21 and 22/8 Weekend in Kirkwall;

23 and 24/8 Copinsay trawling and RCB;

25/8 Kirkwall bad weather no work;

26/8 North Sound bad weather no trawling RCB survey for hard ground;

27/8 Copinsay trawling and RCB;

28/8 Copinsay RCB performance data test;

29/8 Kirkwall weekend;

30/8 Copinsay trawling and RCB;

31/8 Copinsay trawling and RCB and then steamed to Buckie.

Arrived Buckie at 2030 on 31 August.

20 trawl hauls were made giving a total trawling time of 37 hours. A radio-caesium monitoring water sample was taken off Buckie at 57°49'N 2°58'W. Mr J Howard of Boris Net Co., Fleetwood spent from 24-27 August on board to observe the square mesh codend trials and the rockhopper groundgear in operation.

RESULTS

Objective (1). The new cable winch for the RCB was commissioned and its subsequent use during trawling operations was highly successful. Shooting or hauling time of the RCB and 310 meters of cable was about 5 minutes, compared to about 30 minutes for the old system. Some performance data for the vehicle and new cable are given in Figure 1. The deck handling of the RCB is greatly simplified and much safer with the new winch. The greatest benefit of the new system is its ability to heave in and pay out cable whilst maintaining rotor power on the RCB thus allowing runs up and down the full length of nets, sweeps and otterboards. For example the RCB can be moved from the wing end of a 600 HP North Sea trawl to the codline in 15-20 seconds, (ie 2.3m/sec). This manoeuvrability in conjunction with the camera pan and tilt unit considerably improves the ability to observe trawl and fish behaviour.

Objective (2). A pattern of behaviour emerged from the 17 hours of recorded film which indicated that small haddock (20-30cm) escaping from the 90mm diamond mesh codend seemed to be damaged and near exhaustion. The highest proportion of the observed escapes took place just in front of the densely packed swirling mass of larger fish in the end of the codend. The haddock would squeeze out of a partially open mesh by wriggling violently. After escape from the codend many of the fish seemed to be disorientated and swam very slowly in any direction. Others were more obviously exhausted floating belly up in the turbulence behind the codend.

As the haddock passed along the badly constricted central portion of the diamond mesh codend where the meshes were almost all entirely closed there were repeated unsuccessful attempts to escape. The fish jostled each other and banged and scraped repeatedly against each other and the netting. These features were more evident with large bags of haddock (ie more than 30-40 baskets).

Like the diamond mesh codend most escapes from the square mesh codend were observed just ahead of the fish collected at the end of the codend. There were few observations of escape from its front or middle sections. The escaping haddock always swam quickly through the open mesh and away from the codend. The meshes were always fully open down the entire length of the codend ensuring that the fish had a wide open tunnel down which to swim. There was no observed bumping or panic in groups of fish moving down the full length of the codend and there was almost no contact of the fish with each other or the netting.

Figure 2 gives a summary of the behaviour in the codends.

Objective (3). Due to the last time at the start of the cruise there was not enough time to start this objective.

Objective (4). A 12.2 meter rockhopper groundgear on a 600 HP North Sea Trawl was observed traversing sandy bottom and over one patch of hard ground consisting of sand interspersed with small groups of boulders standing about 0.3 to 0.8 meters high. Fishermen have reported that rockhopper groundgears ride over rough ground better than bobbins and that they catch more flatfish. Similar observations were made on this cruise although the number of hauls was limited due to lack of time. The recorded film is being further analysed in the Laboratory.

Objective (5). The 'black and white' net was not available for this cruise as it came fast and was lost on a wreck on the preceding "Explorer" cruise.

J.H.B. ROBERTSON
30 September 1982

Seen in draft: A. Mair

Performance data of RCB with 165mm ϕ rotors and 32mm ϕ towing cable

| [redacted] | 200m cable | 300m cable |
|---|---|---|
| Free Resting Depth (no power) | 36m | 56m |
| Time diving to | (From 36m)<br>40m 80 secs ( 50%) (power)<br>50m 108 secs ( 100%) (power) | (From 56m)<br>60m 69 secs ( 50%) (power)<br>75m 207 secs ( 100%) (power) |
| Time climbing to | (From 53m)<br>38m 41 secs ( 100%) (power)<br>30.5m 60 secs ( " )<br>*5.4m 180 secs ( " ) | (From 75m)<br>60.9m 27 secs ( 100%) (power)<br>38.1m 104 secs ( " )<br>*21.1m 270 secs ( " ) |

Ship speed = 2.9 knots
*minimum depth

Figure 1

Summary of haddock behaviour in and escaping from square and diamond mesh codends

| Mesh Type | Codend Length | Codend Circum | Escapes from codend: Front end | Middle Section | Rear End≠ |
|---|---|---|---|---|---|
| 90mm diamond | 12.2m | 120 meshes | very few - meshes partially open | none observed - meshes closed and netting constricted. fish bumping each other and netting constantly. | most escapes occurred - meshes partially open. quite a lot seemed totally exhausted and some belly up. survival rate unknown. |
| 90mm square | 12.2m | 120 meshes | very few - meshes fully open | none observed - meshes fully open. fish dropped back without trying to escape and without hitting other fish or netting. | most escapes occurred - meshes fully open. all fish swam quickly through meshes and strongly away from codend. |

≠ fish size range caught - diamond - 24-42cm
square - 27-45cm

Figure 2

(i) The codends were both constructed from double 3.5mm ϕ braided polyethylene