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The discarding problem is a rather complicated one, because apart from economic factors such as the different and sometimes varying demands of the domestic markets, the different methods of handling of the fish on board according to type of vessel, etc., differences within the fisheries according to species forming their main objectives, biological factors as, e.g. differences in the size-composition of local stocks, and seasonal variations are involved. We know, for example, that during the winter-fishery off Labrador cod often was discarded regardless its size, when the crews of our trawlers, due to cold and stormy weather, were not able to gut the fish on deck, and therefore only kept the redfish which can be stored on ice without being gutted.

Even the term "discards", it is felt, might nowadays be misleading to some degree, since a constantly growing proportion of non-marketable fish is turned into fishmeal by modern ships. In order to assess the amount of small fish destroyed by the fisheries, therefore it might be preferable to deal not only with the discarded fish, i.e. that part of the catch given back to the sea, but also to include the fish converted into fishmeal.

With this in mind, we produced the attached table showing the results of our fisheries in 1961, broken down by the three ICNAF subareas 1, 2 and 3 fished by our trawlers.

No direct observations on board have been made during 1961. However, since 1959 the skippers of the German trawlers had to report additionally on fishing area and fishing days the guessed amount of non-marketable fish either thrown back into the sea or converted on board into fishmeal. A first report on the results has been given by Lundbeck in 1960 (1).

In 1961 348 (76,5%) of a total of 455 trips to the convention area (i.e. all trips to only one subarea, no mixed trips) give information on by-catch, ranging from zero or three baskets up to the maximum of 9000 baskets = 450 t (one salting trip). On 23,5% of the forms for catch statistics no figures for non-marketable catch are given, but we do not know the reasons; whether there were no substantial by-catches at all in these 107 trips, or otherwise

the skippers forgot to insert the figures. In the German statistics for 1961 we find 116 trips more to the convention area, but these were calculated from "mixed" trips working either in 2 or 3 of the convention's subareas or in one of its subareas and off East Greenland or Iceland. The given or non given figures on by-catch of these "mixed" trips have not been used.

Before treating the table, some remarks ought to be made here on the discarding practice. According to the German market demands, the greatest part of all cod smaller than 50 cm and half of those between 50 and 55 cm is discarded or processed in some ways. Redfish smaller than 36-38 cm, for the most part, are discarded. Only in periods with very small supply, small redfish and cod can be sold at the German markets. Special conditions are met within the "salt-fisheries". Here, only cod is kept for human consumption, all other species being turned into fishmeal or given back to the sea, except on board factory ships, where so far as possible these fish are frozen. Usually on factory ships fish are filleted and quick-frozen or gutted and stored on ice. Sometimes, depending on the size-composition of the catches, also fish somewhat smaller than normally landed may be used for filleting. All halibut, striped and spotted wolffish are kept. Very small fish and thrash species are turned into fishmeal, together with offal from the filleted fish so far as the capacity of the plants (up to 20 tons a day) goes, the rest being discarded.

No by-catches have been landed from the ICNAF-Area, except 3 tons from Newfoundland. For the discarded fish there is no real chance to survive with the possible exception of some flatfishes, smaller skates and rays, and a few other thrash species.

In the table figures are given for the 3 subareas, each divided into 3 categories according to type of vessel:

1. factory ships (trawlers with freezing and fishmeal plant)
2. fishmeal trawlers (trawlers with fishmeal plant)
3. trawlers (ordinary trawlers without fishmeal plant)

The total non-marketable catch (discards and/or fish processed to fishmeal) ranges between 11,5% and 24,0% of the total catch or 13,0% and 31,5% of the total landings. The by-catch is lowest in subarea 1, it amounts, however, to about twice as much in subareas 2 and 3, because here cod as well as redfish are in general smaller than off Greenland.

Looking over the figures for by-catch of the 3 categories of trawlers, we find a striking difference in the 3 subareas. Off

Greenland the skippers of the ordinary trawlers without fishmeal plant obviously tend to avoid fishing grounds stocked with small fish. Their percentage of non-marketable fish is nearly half of that of the fishmeal trawlers and only roundabout one third of the percentage caught by the factory ships. Off Labrador and off Newfoundland we find no similar relation. Here, in all 3 types of trawlers the percentage of by-catch is nearly equal. The reason may be, that off Greenland it is possible for a skilful skipper to find grounds with older and bigger fish, but off Labrador and Newfoundland, where fish on the whole is much smaller, there does not exist such a possibility.

The difference in size of fish in subarea 1 on the one hand and in subareas 2 and 3 on the other hand is bigger than is suggested by the figures, for nearly all 49 trips for salting cod in 1961 came from subarea 1, and on these trips the by-catch is far higher (redfish, halibut etc.). As could be shown by Meyer (2 and 3), the minimum by-catch can be calculated from the fishmeal landings of the salting trawlers. In 1961 18,5% of the total catch or 22,7% of the total landings were at least non-marketable. In 1960 the figures were 19,4% and 24,0% respectively.

The percentage of discards in the strict sense varies from 12,2% and 31,3% of the non-marketable catch or 2,5 and 7,0% of the total catch respectively, between subareas. Again it is lowest in subarea 1 and highest off Labrador. The species mainly represented in the discards are cod and redfish. Therefore, with the continuing trend to replace the conventional trawlers by factory ships and fishmeal-trawlers, the need for a more successful protection of small cod and redfish will become more urgent than it may seem to be now. From the standpoint of German market demands the introduction of bigger mesh sizes could be supported. The fishmeal plants on board of the factory ships were not projected in order to fish for smaller fish. The capacity of the plants is calculated more or less for the processing of the great amounts of filleting waste (redfish 2/3, cod 3/5 of the whole fish!). There are already some clever skippers fishing very satisfactorily with bigger mesh sizes, and we know that in other nations there is the same tendency, for a successful skipper knows that a big by-catch is of no great use, but only brings a lot of work for his already overburdened crew.

References

- (1) Lundbeck, J.: Calculation of the Non-Marketable Parts of German Trawler Catches 1959. - Intern. Council Explor. Sea, C.M. 1960, Statist. Comm. No. 105, 1960.
- (2) Meyer, A.: Die deutsche Salzfischproduktion 1960. - AFZ-Jahresheft der deutschen Fischwirtschaft (AFZ 13 (1/2): 62-65, 1961.
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