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The Productivity in some Regions of the Sea.

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For the year 1910 dr. A.C. Johansen made some calculations of the weight-yield per ha. of fishery in various waters. As will be seen from the table shown at the meeting, the yield has since then undergone an increase in nearly all regions. It is still far lower in the Baltic proper (where it is about 4.5 kg. per ha.) than in the other regions and amounts to between one eighth and one seventh of that in the Belts, as was also the case in 1910. Johansen stated a marked decline from the North Sea to the Baltic proper, corresponding to the decrease in salinity, and thought it might be due to the fact that the nutrient value of the water decreased together with the salinity. Johansen also supposed that the lowest productivity would be recorded in water with a salinity of 5-10%, this being the boundary zone between freshwater and salt-water fish in which, on the whole, neither of them comes to good.

The variations in the weight-yield per ha. of fishery inside the Skaw correspond with the variations in the production of phytoplankton stated by Steemann Nielsen (Medd. Komm. Ser. Plankton. Vol. III, 4. 1940).

It must be borne in mind that the yield of the fishery in a special area is often to some extent affected by migration of fish feeding in other regions. Thus the catch of herring in the Belts and off Rügen is influenced by the immigration of herring having fed in the Kattegat or the Belt Sea.

In the Belts and the Kattegat-Skagerak the yield per ha. is now equal to that in the North Sea.

In the Limfjord it shows an immense increase to ca. 140 kg. per ha. which is due chiefly to the development of the mussel-fishery, although the yield per ha. of fish and crawfish is also a little larger than that in the North Sea and amounts to 37 kg. per ha. A considerable mussel-fishery was carried out in the Belts in 1950, yielding 3.3 kg. per ha. For the Ringkøbing Fjord, which is mostly closed by lock-gates, the figure is double that stated for the North Sea.

The increase in productivity is no doubt to a certain degree due to the climatic change which has caused a greater inflow of saline water into the Baltic and an increase of the temperature of the water. The change of climate has entailed an increase of the

stock of cod in the waters inside the Skaw, the more pronounced the nearer we come to the Baltic, and a similar improvement has undoubtedly taken place also in the total fish stock exploited by the fishery.

Intensified fishing activities have contributed to the increased yield.

Will it be possible to effect a further increase
of the yield of the fishery in the
Baltic-Belts?

It might be imagined that it would be possible to effect a further increase of the yield by intensifying the fishery still more. Such action would hardly constitute an immediate danger to the power of reproduction of the fish stock as the number of larvae of flatfish and undersized fish has so far shown no decline although the fishing activities have been intensified.

However, a further intensification of the fishery cannot be expected to involve a perceptible increase of the yield of such species as are exploited at present. The fishing activities are now so intensive in the Belt Sea and the western part of the Baltic proper that a further increase would undoubtedly entail such a depletion of the stock of the larger market categories that it would more or less counterbalance the larger yield of the smaller market-categories.

During recent years the fishing intensity in the Belts and the western part of the Baltic proper has attained such a height that the yearly reduction of a number of commercial, demersal fish is now about 80 per cent. This means that most of them are taken shortly after having reached the size stipulated for commercial fish and a long time before they have grown so old that their growth-rate is appreciably reduced.

It would, therefore, be possible to improve the yield of the fishery by raising the minimum size stipulated for commercial fish. This also applies to the Baltic proper, although the poorness of this area must be ascribed chiefly to the scarce production of phytoplankton.

At some grounds the density of the stocks of commercial fish in the Baltic proper is equal to that in e.g. the North Sea but there is no doubt that particularly in the inner half of the waters it must, on the whole, be considerably less. Fairly large grounds cannot be exploited by means of trawl on account of rough bottom, and in some areas the contents of oxygen are too low. The duration of the ice-cover is an additional disadvantage in the North East Baltic.

Nevertheless, the growth-rate of the cod is not conspicuously lower in the Baltic than in the more saline waters; this applies

also to plaice and flounder until the area around Bornholm. No doubt the long winter is a most important cause of the lower growth-rate. The nutritional conditions may vary very much from one year to another, and sometimes the cod may be very meagre.

Although it cannot be expected that it will be possible to increase the yield per ha. in the Baltic proper so as to render it equal to that in e.g. the Belts, there can be no doubt that here too it can be improved appreciably in case the size-limits be raised.

The weight-yield of uncultivated land with wild grass may be calculated to about 100-150 kg. cattle a year per ha. Only in areas where the mussels can be exploited the weight-yield of the sea has reached the same height.

The value of the yield in the Belts is about 24 sh. per ha. In the Ringkøning Fjord it is about 32 sh. per ha. of which the fish give about 28 sh.