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AGE OF ATLANTIC HALIBUT LARVAE (Hippoglossus hippoglossus L.) AT FIRST FEEDING.

by

T. Harboe, T. Næss, K. E. Naas, H. Rabben and L. H. Skjolddal.

Institute of Marine Research
Austevoll Aquaculture Research Station.
N-5392 Storebø, NORWAY.

ABSTRACT

Halibut larvae at different age (150 to 315 day-degrees) were transferred to outdoor startfeeding tanks each with two internal plastic bags (100 litre). The larvae were fed wild zooplankton. One bag was sampled after 24 hours, and the other after nine days. Numbers of larvae with food in the gut, without food in gut and dead larvae, were counted for each larval age tested. The results showed that some larvae captured prey at an age of 150 day-degrees. However, at this age few larvae were alive after nine days. The fraction of larvae with food in the gut increased during the period tested. Survival after 24 hours and after nine days were highest when first feeding took place at a larval age of approximately 230 day-degrees.

INTRODUCTION

Atlantic halibut larvae, Hippoglossus hippoglossus, have a yolk sac period of approximately 47 days at a temperature of 7 °C (330 day-degrees). At this age the yolk sac is absorbed and if not fed, the larvae die 7 to 10 days later. Introduction of prey organisms for halibut larvae has usually been at a larval age of 250 day-degrees and even later (Berg and Øiestad, 1986, Rabben et al., 1986, 1987, Naas et al., 1987). The age the larvae are capable of ingestion and digestion of food particles, has been an item of discussion. Both functional jaws and development of most organs are completed when there is still much yolk sac left (Blaxter et al., 1983, Lønning et al., 1982, Pittman et al., 1987). Of this reason it has been considered to begin start feeding at an earlier age of the larvae. Start feeding at an earlier age will reduce the production time for halibut fry, and make a production line less vulnerable. In earlier startfeeding experiments of halibut larvae, a very high mortality (90%) has normally occurred during the first 24 hours of the experiments. This mortality can be due to 1) stress when the larvae have been introduced to light and prey organisms, 2) lack of optimal startfeeding systems (tank type, water quality, light intensity) or 3) start feeding at a too early or late larval age. The present study was conducted to establish a practical time for onset of feeding.

MATERIALS AND METHODS

Eggs were stripped from one female, and fertilized with sperm from one male. After 9 days in hatchery, the eggs were transferred to three 5 m^3 silos (Rabben et al. 1987). All silos had identical conditions during the larval incubation (water flow, darkness, oxygen, number of larvae). Water temperature during the yolk sac stage was 7 °C. Larvae were sampled from the silos by attracting the larvae to a low intensity light source at the surface, for about 10 minutes. Four hundred larvae were taken out from the silos at each larval age examined (157, 186, 210, 233, 286 and 317 day-degrees).

The larvae were transferred to first feeding units at daytime. The first feeding units were black plastic bags (100 litre, 1m depth) floating in a water bath. The temperature was close to 12°C. The experiment was conducted outdoor, and the larvae were exposed to natural daylight. The water was taken from a 280 m^3 tank, which was filled with water from 50m depth, and fertilized to create a phytoplankton bloom (see Næss et al., 1990). Wild zooplankton ($80\mu m < x < 240\mu m$) were administered to the bags at a concentration of 500 ind. pr. litre, before the larvae were transferred. Two hundred larvae were released in each bag. Two bags were incubated at each larval age tested. The larvae from one bag were sampled after 24 hours, and from the other after nine days. Immediately after sampling, the larvae were examined under a dissecting microscope. Number of live larvae with and without food in the gut, and number of dead larvae was recorded.

RESULTS AND DISCUSSION

Highest number of larvae that had ingested food after 24 hours was found at a larval age of 230 daydegrees (fig. 1). At this age survival after 24 hours and 9 days was also high. The fraction of larvae with food in the gut increased with increasing larval age. However, survival after 24 hours and 9 days decreased with increasing larval age. Blaxter et al. (1983) suggested that halibut larvae are able to ingest and assimilate food 28 to 35 days post hatching at 5 °C. Pittman et al. (1987) suggested that halibut larvae were capable of capturing and digesting prey after about 250 - 300 day-degrees. Pittman et al. (1989) found that the length of the swimming period and the swimming speed for halibut larvae, reached a maximum level 25 to 30 days post hatching at 5-6 °C. Our findings show that halibut larvae can capture prey at 157 day-degrees, which is in agreement with Blaxter et al. (1983). However, the results indicate that optimal age for first feeding of halibut larvae is around 230 day-degrees. The total survival both after 24h and 9 days was high, and the fraction of larvae that had captured prey after 24h was also high. This is somewhat earlier than Pittman et al. (1987) suggested, but close to what Lein (1990) found.

Light intensity at the surface varied between the times for onset of first feeding, and this may have interfered with the results. However, a wide light intensity gradient occurred in the bags due to the algal suspension. The larvae was observed by daytime, and the vertical distribution seemed good. No aggregation at the surface or near the bottom was observed.

The study indicates that halibut larvae are capable of capturing prey as early as 157 day-degrees. However, the optimal age for first feeding of halibut larvae is close to 230 day-degrees after hatching.

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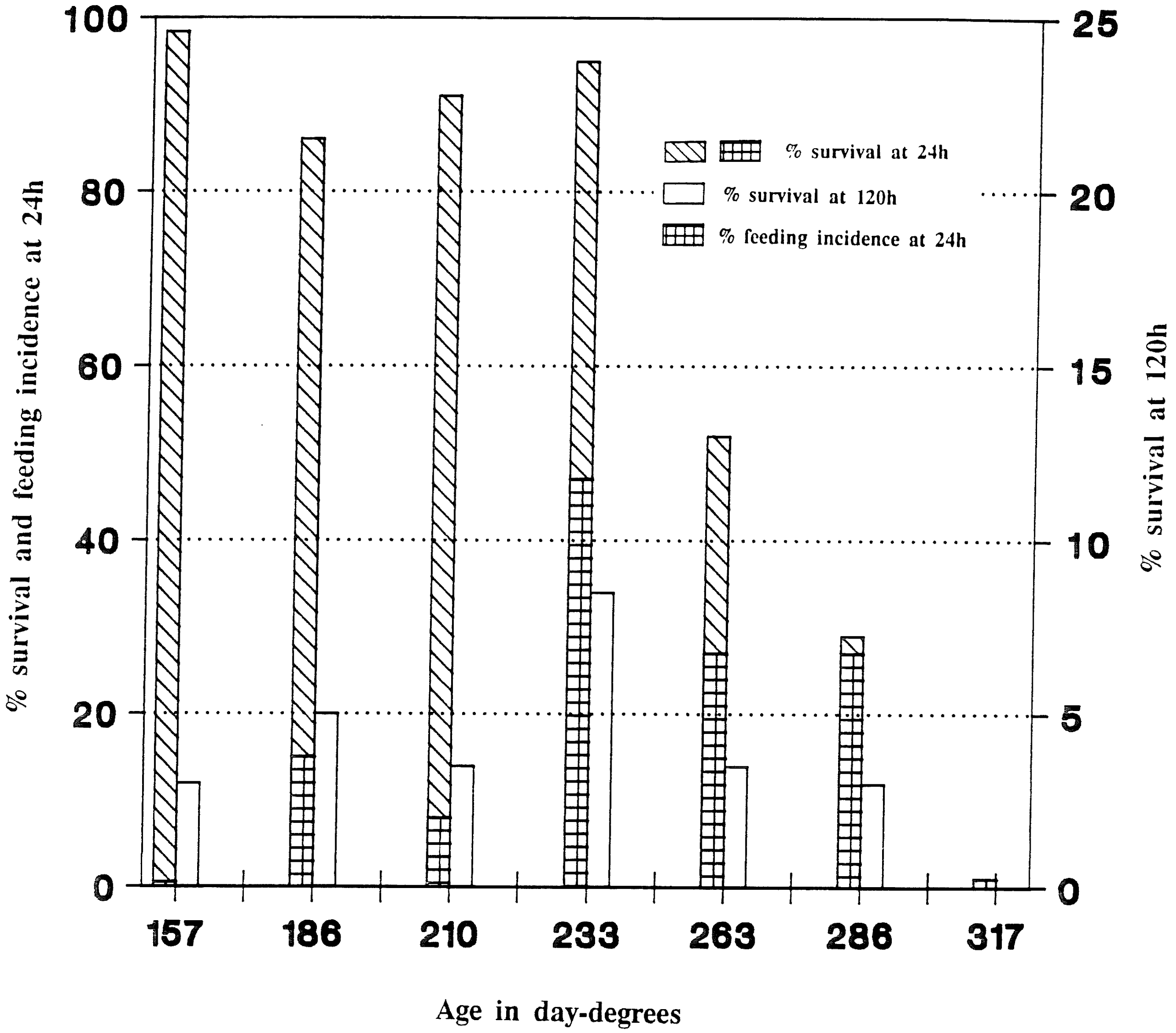

Figure 1. First feeding of halibut larvae when offered food at different age.