

SEAWATER QUALITY AND SUMMER MORTALITIES OF ATLANTIC SALMON FARMED IN FRANCE

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Introduction

Every summer, since 1983, important mortalities of Atlantic salmon smolts occur in net pen farmings in Brittany (France) (Harache and Gaignon, 1986). These mortalities, ranging from 30 to 87 % of stock, are in the way of the economic development of this activity. They take place between mid-June and the end of July. Most of the smolts are sluggish and without appetite. Looking for a viral or bacterial aetiology by the veterinary services was often unfruitful. In order to investigate a possible role of environment, a set of parameters was monitored and compared in two farming sites displaying very different mortality rates.

Materials and methods

Both experimental sites are located near Brest Harbour and are separated by only 10 km. In one site (A) a raft of several net pens suffer heavy losses of smolts every summer (30-80 %). The other one (B) is ashore, and the rearing volume is a tank (7 m³) where summer mortalities are generally under 5 %. From 6/3/88 to 7/21/88, several environment parameters were monitored in A and B along with fish losses. Temperature, salinity and dissolved oxygen (DO) were recorded. For other parameters (NH₃, turbidity, bacteria total counts and UV-B transmission), samples were taken daily.

Results

As in previous years, the 1988 fish mortalities (fig. 1) are very different between these sites, respectively : 17.3 % (A) and 0.7 % (B).

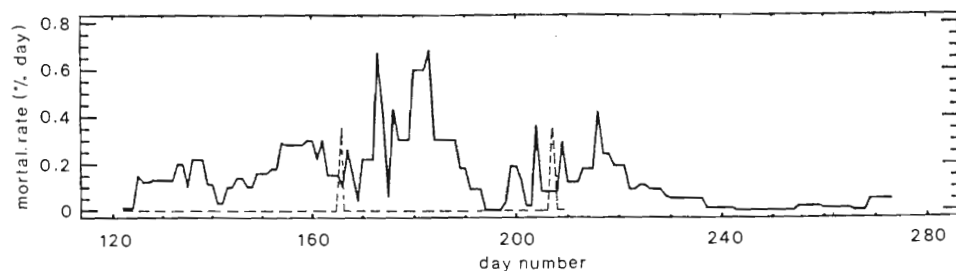


Fig. 1. Mortality rate during summer 1988 in site A (-) and B (---).

In both of the sites, all the environmental parameters displayed very closed absolute values and daily ranges. Only differences of NH₃ and DO minimum were noticeable, and surprisingly, these parameters were more favorable to smolt survival in the site A (fig. 2). Other parameters may thus be involved.

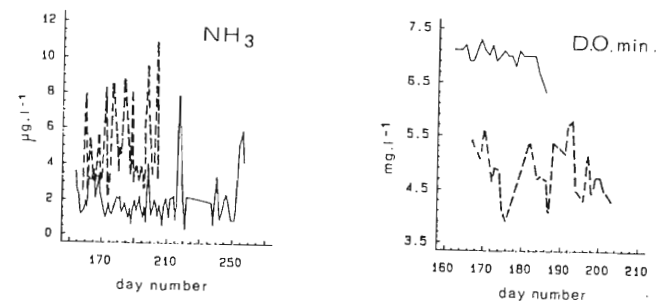


Fig. 2. Unionized ammonia and dissolved oxygen minima in site A (-) and B (---).

Concerning the environment, in B, the higher contents of NH₃ than in A were probably due to food wastages which tended to lay down on the tank bottom between two cleanings, while they passed across the net bottom of A. The lower DO minima in B have probably the same origin ; despite its low level, this parameter allows a very high survival rate. The hypothesis of Mc Ardle and Bullock (1987), involving sunburns, was not verified : in B, the transmission percentage of UV-B per meter was always < 4 (mean = 2) ; cages were 3.5 m deep, and fish did not display the characteristic grey patch on their head.

Generally the increases of summer mortality rates are concomitant with periods of bright sunny weather and flat sea. Similar observations were made by Mc Ardle and Bullock (1987). In A site, several rearing pens were shaded by plastic sheets during three seasons, but the smolts mortalities were not significantly different from those of non-shaded pens.

Conclusion

Several environment parameters can be discarded from being a main cause of summer mortalities of smolts reared in floating cages in Brittany, *e.g.* temperature, salinity, DO, NH₃, turbidity, total bacteria, and sunburn. An indirect role of irradiance seems to be a promising way of investigation.

References

- Harache Y. and J.F. Gaignon. 1986. L'élevage du saumon atlantique. La Pisciculture Française 86:63-68.
 Mc Ardle J. and A.M. Bullock. 1987. Solar ultraviolet radiation as a causal factor of "summer syndrome" in cage-reared Atlantic salmon, *Salmo salar* L.: a clinical and histopathological study. Journal of Fish Diseases 10:255-264.