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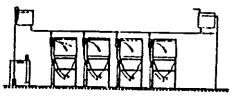
PRODUCTION EXPERIMENT OF HALIBUT FRY (HIPPOGLOSSUS HIPPOGLOSSUS) IN SILOS



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ABSTRACT.

Silos with conical bottoms and a volume of approx. 3.5 m3 are tested as storing units for halibut yolk-sac larvae.

The silos were run in three different ways: A: Stagnant water with a saltplug till day 10 and later slow upwelling, B: Continuous upwelling and C: Stagnant with saltplug.

High survivals in the silos with constant renewal of water (as a slow upstream) were observed.

A negative effect of the saltplug on yolk-sac larvae the second week after hatching was clearly demonstrated.

INTRODUCTION.

The atlantic Halibut (Hippoglossus hippoglossus, L) is regarded as one of the species with the highest latent capacity as a future farmed fish in Norway. The growth of wildfish in captivity have been reported to be good (Rabben and Huse, 1986) and the first artificially reared fry have been weaned and fed to 3-400 g in one year (Rabben and Berg, unpubl.)

A reliable method for massproduction of halibut fry is still the most important result to be achieved. The last years both intensive and more extensive techniques have been tried in rearing experiments.(Rabben et.al. 1986, Naas et.al.1987, Pitman et.al.1987).

The best result so far was reached in 1986 in plastic bag-experiments (Berg and Øiestad, 1986).

A further optimization of this technique implies an arrangement for both temperature control and water renewal. (Berg et.al. 1987).

As an alternative method that will combine the believed volume and shape advantages of the plastic bags with a possibility of environmental control, prototypes of landbased silos were constructed prior to the 1987 trials.

This report presents the first preliminary results from these experiments .

MATERIALS AND METHODS.

The silos (6 in number) are made of GRP and arranged as shown in fig.1.

They were placed indoors and supplied deepwater filtered through sand (10µm), cartridge (5µm) and uv-treated. The egg-material for the rearing trials were partly obtained from the broodstock at the

research-station, and partly from A/S Mowi which had fish that spawned later in the season.

To each silo approx. 5000 eggs at 75-80 day degrees were added and hatched in the silos two or three days after being transferred.

The temperature and salinity were monitored. Every third day dead, moribund or heavy larvae were drained out and counted/examined. As a routine the flow was stopped and 4 % saltwater filled into the bottom of the cone. After approx. 5 min. the waste material was concentrated in this saline water and could be drained through the bottom valve.

The water flow in the silos with upstream was regulated according to the changing buoyancy of the larvae and varied between 2 and 8 litres/minute.

The stagnant silos had a 10 cm surface layer of brackish (1.5 %) water which was renewed once a week.

RESULTS AND DISCUSSION.

The survival in the different setups are presented in fig.2.

A high survival to functional stage in the silos with continous renewal of water, was the promising result. The slow upstream is believed to have two positive functions: 1. give the larvae a lift at the time of increased buoyancy, thus keeping them away from the bottom, 2. improve the waterquality by continuous supply of clean water.

An increasing mortality in the silos with stagnant water was stopped when a slow upwelling was started. This indicates quite strongly that the sinking of larvae into the saltwater in the cone, will damage the larvae, either because of osmoregulation problems, heavy microbial load or both.

A negative effect of turbulence causing physical stress (Opstad and Raae, 1986) was not observed. In the low range of flow applied in this experiment, the watercurrent in the silos was close to laminar and probably too low to cause stress.

The high mortalities in the stagnant silos were occuring the second week after hatching. By frequent renewal of the saltplug, it was observed that a high portion of the larvae was still alive when trapped in the saline water. The most likely explanation is that the larvae at this age start an active osmoregulation which implies drinking of seawater and secretion of salt especially over the gill-surface. At this time the larvae will be susceptible to elevated salinity which leads to a high salt concentration in the body fluids. A saltplug will according to this line of argument be lethal to larvae at the start of active osmoregulation.

The temperature at different depths is shown in fig. 3 and 4.

In the silos with stagnant water a thermal stratification was established. The silos with continuous flow had a temperature that was homogenous in all layers except the upper surface.

The inlet of water, velocities,, shape of silo,filter surface-area and outlet are some of the factors that will strongly influence the flow patterns in the tanks. These factors will need careful consideration in the further optimization process of these units. During this experiment it was clearly seen that the distribution of larvae could be most easily manipulated by a small change in the flow.

The, at times, worringly high temperatures that occured in the surface water, were not seen to cause any damage or discomfort to the yolk sac larvae. This is in some contrast to earlier findings where 8-9 0C are believed to be the upper temperature the yolk sac larvae are able to tolerate. Most likely the improved waterquality in this experiment have significantly reduced the effect of microorganisms which probably have been the most dominant cause of mortality in previous experiments.

These prototypes are believed to be a first generation landbased rearing units which can be developed into rational tanks for mass-production of halibut larvae ready for firstfeeding.

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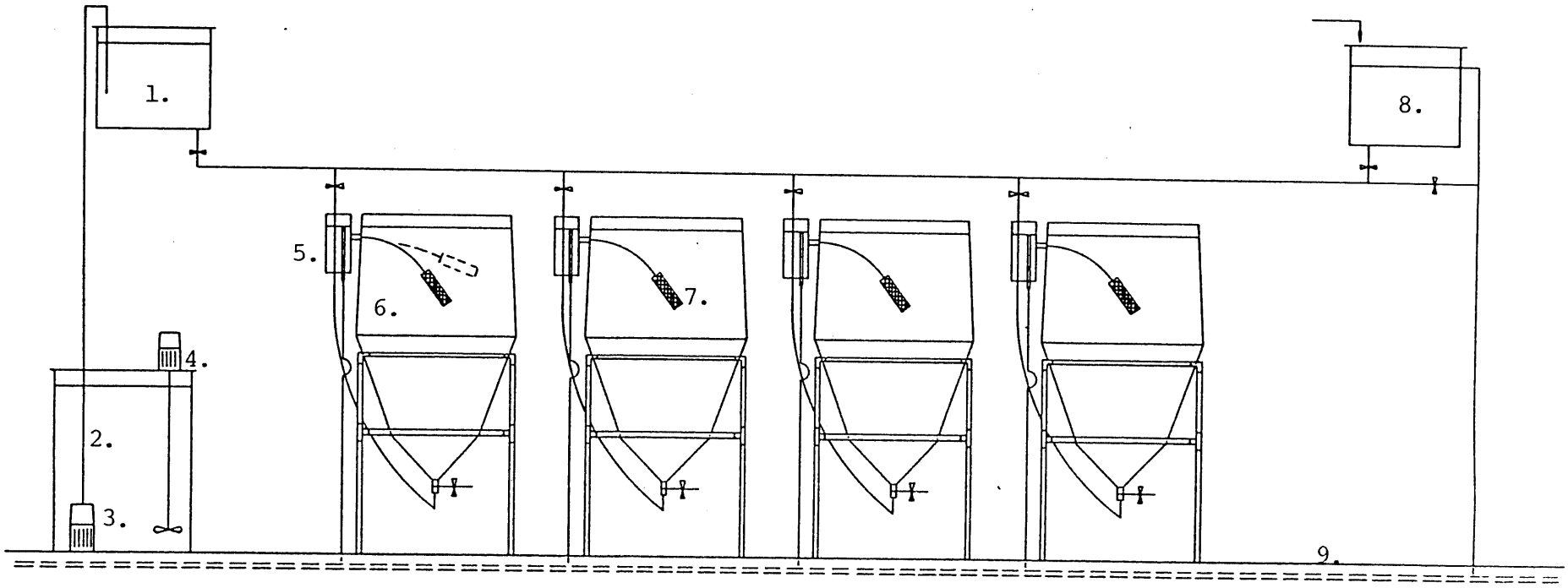

Fig. 1. Diagram of experimental setup. 1. Leveltank 40 ‰ Saline water, 2. Mixing tank 40 ‰ water, 3. Submerged pump, 4. Mixer, 5. Level regulator, 6. Silo, 7. Overflow sieve, 8. Level tank deepwater, 9. Discharge pipe.

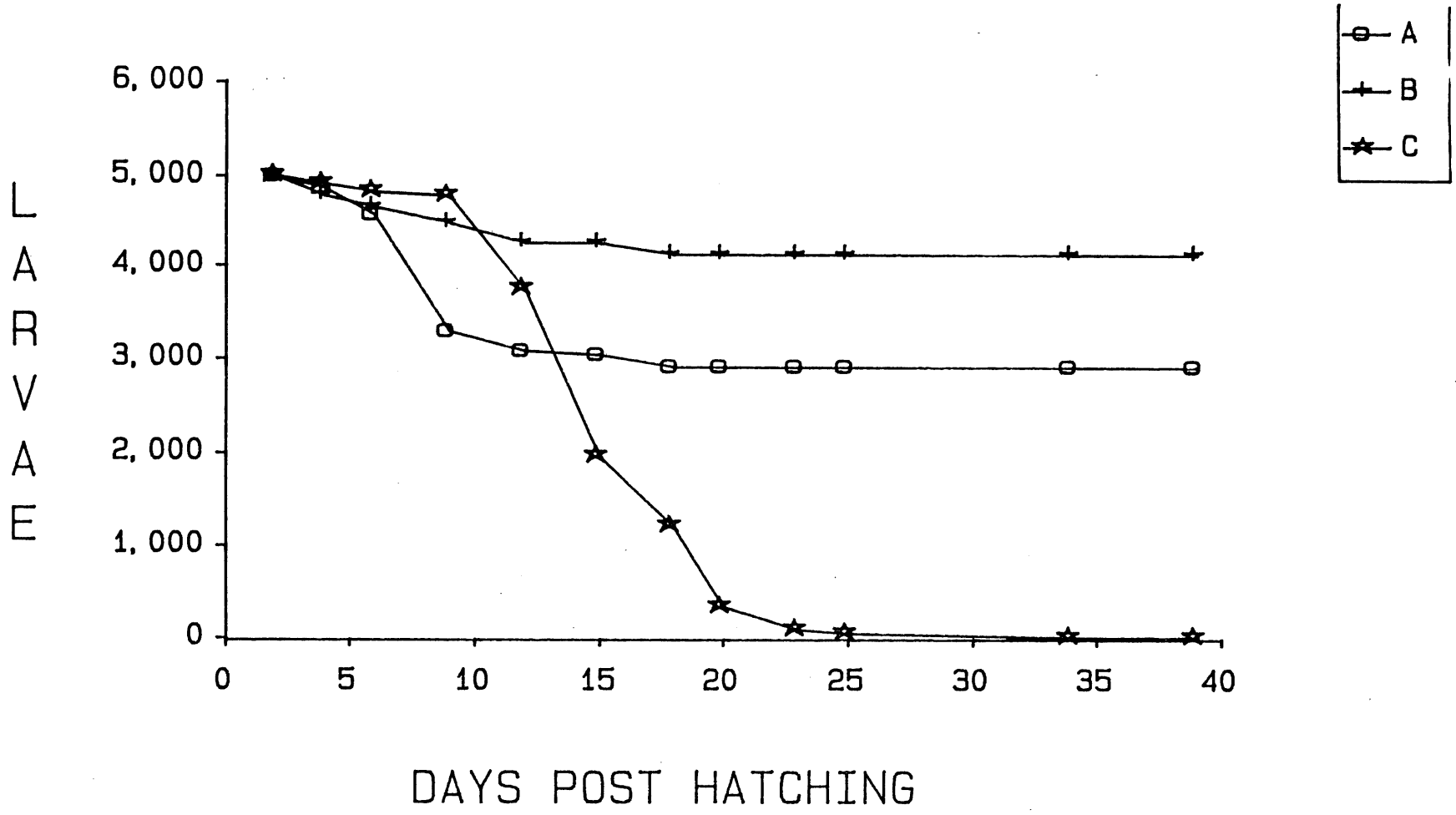

Fig. 2: Survival in silos. A: Stagnant with saltplug till day 10 and later flow, B: Continuous flow, C: Stagnant with saltplug throughout experiment.

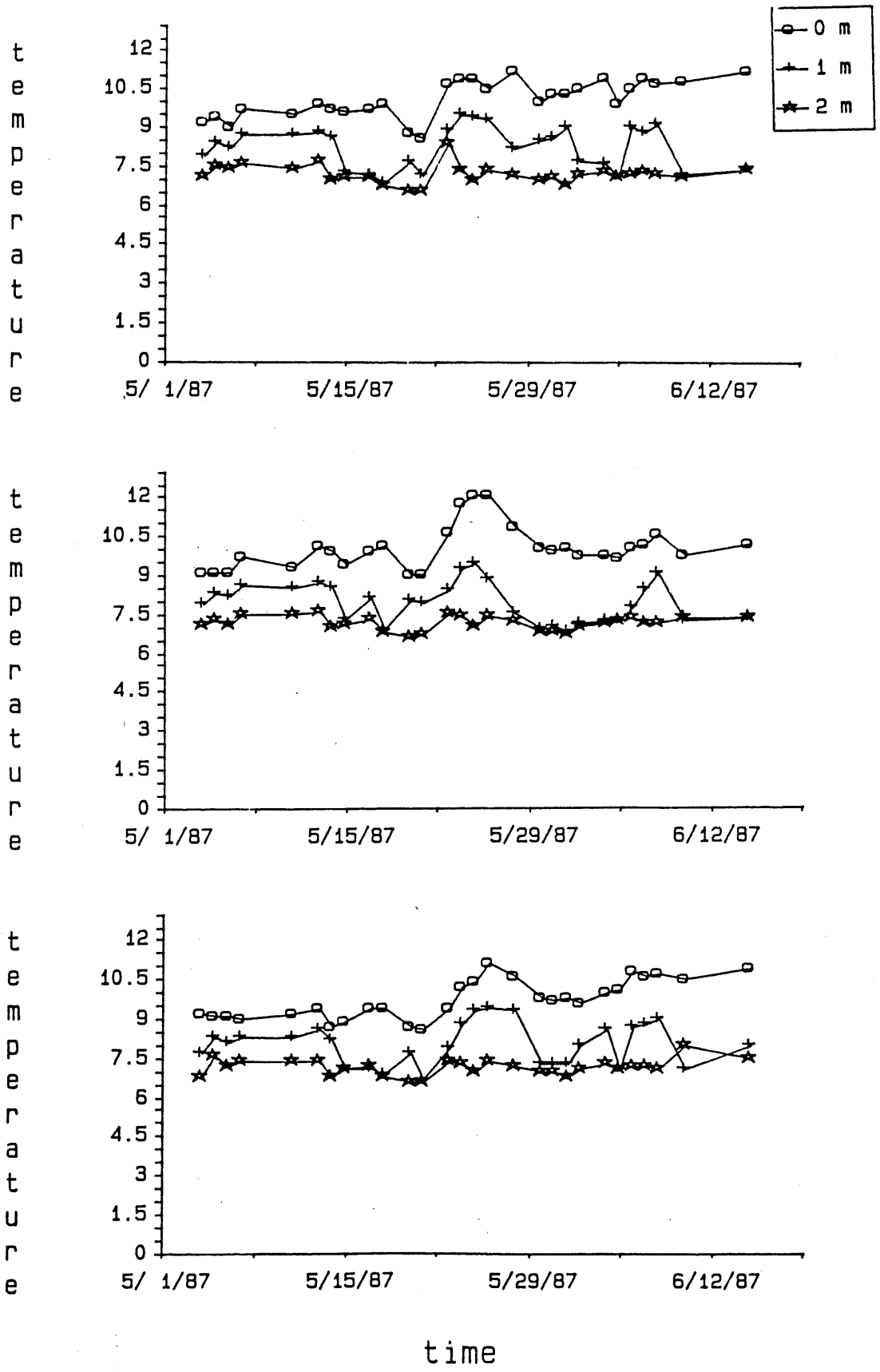

Fig. 3: Temperature in silos 1-3, stagnant with saltplug till day 10 posthatching, later slow upwelling.

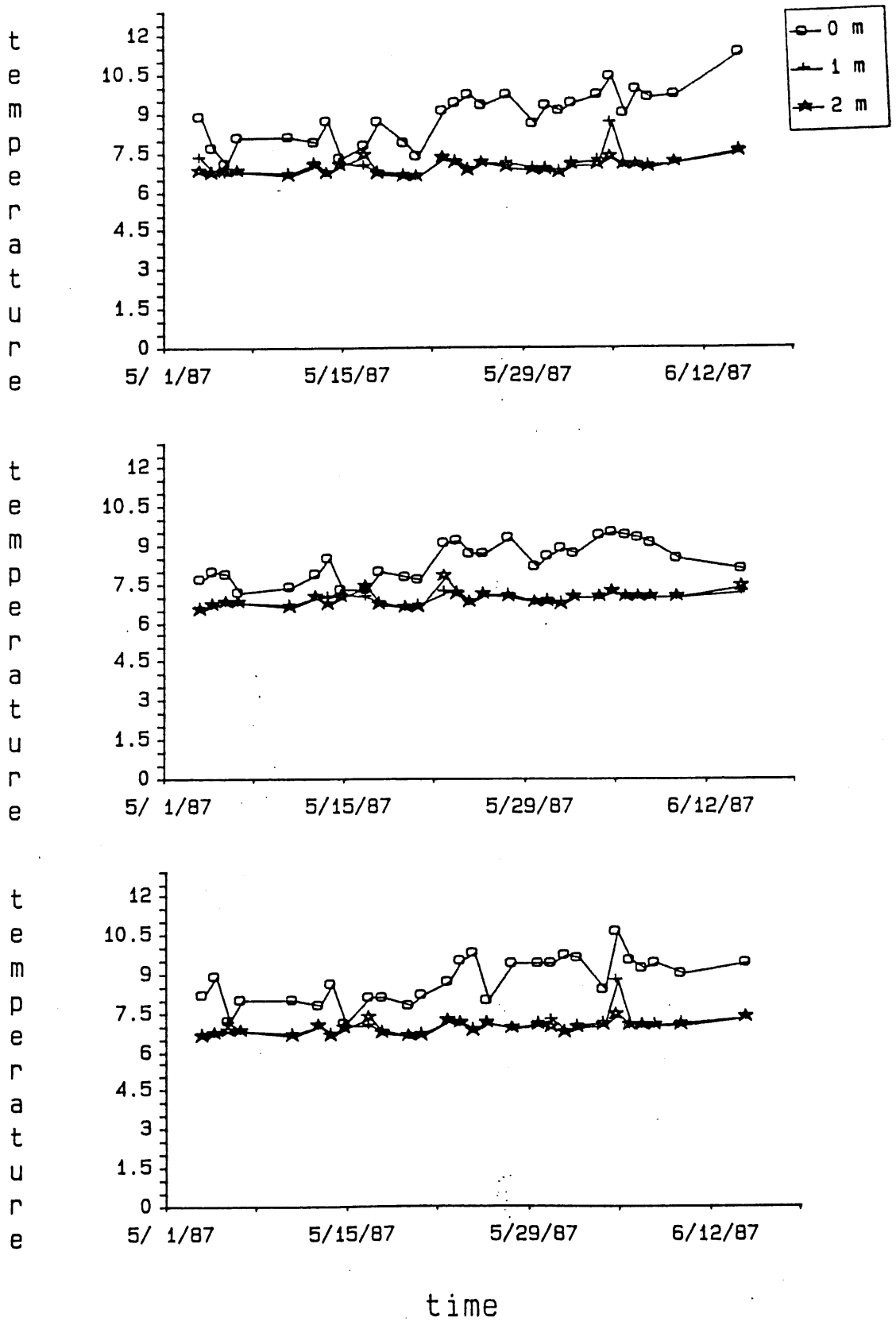

Fig. 4: Temperature in silos 4-6, continuous upwelling.