GROWTH PERFORMANCE AND DETOXIFICATION OF MUSSELS CULTURED IN A FJORD ENHANCED BY FORCED UPWELLING OF NUTRIENT RICH WATER.

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Introduction

The growth of suspension feeding bivalves is dependent on transport and concentration of food (food availability). Bivalves show a remarkable capacity to exploit low food concentrations (Strohmeier et al. 2009) and they can be farmed in oligo- or mesotrophic waters (Sara and Pusceddu 2008). However, special care must be taken in oligotrophic waters as this environment support a low area specific production carrying capacity (Aure et al. 2007b) and bivalve farms are susceptible to seston depletion (Strohmeier et al. 2005). Bivalve farming at low food concentration thereby requires comparably more space than cultivation at higher food concentration. It has previously been shown that primary production and phytoplankton biomass can be approximately tripled in fjords by forced upwelling of nutrient rich deep water (Aure et al. 2007a). In the ongoing GATE project we assess how phytoplankton composition and quantity enhanced by forced upwelling affects growth performance and detoxification in the mussels, and how this environment can improve carrying capacity and reduce the space needed for farming bivalves.

Objectives

The objective of the study is to assess how phytoplankton composition and quantity enhanced by forced upwelling of nutrient rich deep water in a fjord affects growth performance and detoxification in cultured mussels. Sub goals are: 1. monitor the fjord environment and succession of phytoplankton including toxic algae, 2. contrast feeding and growth performance in mussels affected and unaffected by the enhanced phytoplankton assemblage forced by upwelling of nutrient rich deep water, 3. estimate elimination rate of algae toxins in mussels introduced to enhanced phytoplankton concentration forced by upwelling of nutrient rich deep water.

Material and methods

The study is conducted in the Lysefjord in south-western Norway. The upwelling of nutrient rich deepwater is conducted by dispersion of submerging brackish water (2

$m^3 s^{-1}$) at 30 m depth (Figure 1). The environmental condition is monitored along a gradient in the fjord, and the mussel feeding behavior is studied within and outside the upwelling area.

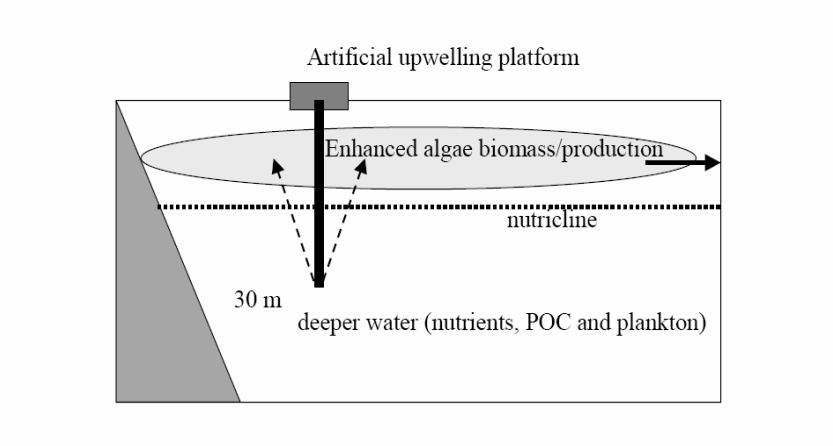

Figure 1. Relative position of the forced upwelling system in the water column in the Lysefjord (from Aure et al. 2007)

Results and discussion

Results on mussel feeding and growth performance according to the contrasting environment of natural and of enhanced phytoplankton production will be presented. This will be discussed in relation to carrying capacity issues using forced upwelling of nutrient rich deep water.

Literature

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