Growth potential of blue mussels (M. edulis) exposed to different salinities evaluated by a Dynamic Energy Budget model

For blue mussels, Mytilus edulis, one major constrain in the Baltic Sea is the low salinities that reduce the efficiency of mussel production. However, the effects of living in low and variable salinity regimes are rarely considered in models describing mussel growth. The aim of the present study was to incorporate the effects of low salinity into an eco-physiological model of blue mussels and to identify areas suitable for mussel production. A Dynamic Energy Budget (DEB) model was modified with respect to i) the morphological parameters (DW/WW-ratio, shape factor), ii) change in ingestion rate and iii) metabolic costs due to osmoregulation in different salinity environments. The modified DEB model was validated with experimental data from different locations in the Western Baltic Sea (including the Limfjorden) with salinities varying from 8.5 to 29.9 psu. The identified areas suitable for mussel production in the Baltic Sea are located in the Little Belt area, the Great Belt, the southern Kattegat and the Limfjorden according to the prevailing salinity regimes. The new model can be used for supporting site selection of new mussel nutrient extraction cultures in the Baltic Sea that suffers from high eutrophication symptoms or as part of integrated multi-trophic aquaculture production. The model can also be used to predict the effects of salinity changes on mussel populations e.g. in climate change studies.

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