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Cost-effective IMTA: a comparison of the production efficiencies of mussels and seaweed

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This paper compares the biofilter capacity and cost-effectiveness of blue mussels (*Mytilus edulis*) and seaweed for use in integrated multi-trophic aquaculture (IMTA) based on experiences in Ireland and Denmark. This comparison shows that weight for weight, mussels are a better biofilter than seaweed with regard to the amount of nitrogen assimilated. Furthermore, in optimised systems, areal requirement for mussels is similar to the cultivation of the same tonnage (1,000 t) of seaweed (approx. 8 ha). The cost-effectiveness of a mussel biofilter is €1.4-19.2 kg⁻¹ N removed based on modeled results compared to production cost of €209-672 kg⁻¹ N removed and €1,013 kg⁻¹ N removed for respectively *Laminaria digitata* and *Alaria esculenta* from extrapolated laboratory and field trials. However, a commercial seaweed (*Saccharina latissima*) producer claims that production costs are less than €10 kg⁻¹ N removed. This up-scaled and commercial figure makes the seaweed cost competitive to mussels for removal of nitrogen.

Disadvantages such as predators (e.g. eider ducks) and bio-fouling should also be taken into account before choice of biofilter is made. These drawbacks can reduce overall biofilter capacity and biomass value as a consequence of biomass spoilage or loss. However, disadvantages may be mitigated by seasonal choice of cultivation and harvest times.

Cultivation technologies and harvesting methods may be improved together with breeding to improve the cost-efficiency of the biofilter, especially in the “newer” European seaweed cultivation. Furthermore, upscaling of IMTA to commercial proportions, other than the Danish example, would allow more real data on production costs and revenues.