

General advice

■ Draw up a business plan and consult independent financial advisors.

■ Identify your market(s) at the outset.

■ How likely are you to receive planning permission from the competent authority (eg Local Council, Crown Estate)? Consult local aquaculture development plans, where they exist, and speak to the staff involved in granting licences.

■ Is the local infrastructure (roads, piers etc.) adequate to support your proposal, or will you have to construct them?

■ Can a Crown Estate lease be secured? Consult them.

■ Does the site have a conservation designation or conservation value/interest? What about the surrounding area? Could it affect access to the area? Consult the appropriate conservation organisations, statutory (ie English Nature, Countryside Council for Wales, Scottish Natural Heritage, Environment and Heritage Service (Northern Ireland)) and voluntary, for the area.

■ Is there likely to be any hazard to navigation or transport? Consult the Maritime & Coastguard Agency and the Department of Transport.

■ Are local inhabitants or other user groups of the marine environment likely to object? Can objections be overcome through dialogue, management agreements or design modifications? Consult them early on.

■ Does the proposition require grant aid or other assistance and how likely is it to be awarded? Consult the agencies administering grant and other business assistance in the area from the start.

■ Generally, avoid areas close to boatyards, marinas, industrial developments or large urban areas.

This minimises the risks from pollutants or other anthropogenic inputs. Potential inputs from the water catchment area (eg from farming, forestry, horticulture, chemical industry etc.) should be investigated.

■ Evaluate the potential risk (disease, nutrient input, therapeutic use, predator displacement, controls on stock movement/sales following disease events on other sites etc.) from any other marine-based aquaculture activity in the vicinity.

■ How secure is the site? What is the risk from interference or other unwanted human activity? Can the site be secured if required?

■ Try and establish whether the area has a shellfish cultivation or harvesting waters classification from the local Environmental Health office or equivalent

■ Try and establish whether the site has a history of algal biotoxin (PSP, DSP, ASP etc.) incidents or harmful algal blooms ('red tides'), although past track record is not always a predictor of future performance.

■ What potential predators, competitors or fouling organisms are likely to be encountered?

■ There are strict regulations controlling the movement of molluscan shellfish around the UK. This is to prevent the spread of oyster diseases that may affect native oyster stocks. Seed and part-grown stock may require checking by the competent authority before shipment. Check with The Centre for Environment, Fisheries and Aquaculture Science (CEFAS), Scottish Executive Environment (SEERAD) and Rural Affairs Department or Department of Agriculture and Rural Development (Northern Ireland) [DARD (NI)] for the latest position.

■ Once the business is operational, the site must be registered. Consult CEFAS, SEERAD or DARD (NI) as appropriate.

Further advice

■ For further advice on any aspect of seabed mussel cultivation please contact the aquaculture advisor for your area.

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Alternatively, please visit our website at www.seafish.org/sea for more information. The website also contains details of the CD-ROM based resources produced by Seafish. There is a specific Hyperbook, which combines in-depth information regarding the culture of this species together with an economic modelling tool for business planning purposes. In addition, there is a more general Guide to commercial bivalve molluscs with information on aspects of cultivation, harvesting, the fishery, depuration and distribution for all species.



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SEABED CULTIVATION OF MUSSELS

This leaflet is intended to offer a summary of the methods used in the seabed cultivation of the common or blue mussel in the UK. More detailed information about specific aspects of the business may be found in Seafish publications, technical publications from other agencies and books. Prospective cultivators are advised to consult these in addition to this sheet. Preliminary business planning assistance can be found in the associated Seafish economic model and 'Hyperbook' publications.



Seabed cultivated mussels



Site selection

■ Before beginning any commercial activity, it is prudent to conduct small-scale trials for at least 12 months on the intended site. This will give an indication of its overall suitability.

■ In the UK, mussels start to grow in the spring when seawater temperatures reach 8 - 9°C. Growth rate reaches a maximum in July or August when water temperature peaks (usually 16 - 18°C) and then falls off again as the temperature drops back below 8 - 9°C in November or December.

■ Salinity should generally be above 20 ‰.

■ Many of the sheltered bays and estuaries around the UK are suitable for mussel cultivation. Mussels will live on a variety of substrates such as rock, shingle, dead shells and compacted mud or sand, ie anywhere that can provide good anchorage.

■ Tidal flow of 1 – 2 knots (50 – 100 cm sec⁻¹) is optimal as this will ensure a good supply of food, although less (around 0.5 knots) is acceptable.

Cultivation techniques

■ Mussels can be cultivated on a small scale (50 - 250 tonnes per year) using small boats and/or tractors and trailers to move seed and mature mussels. Production levels of up to several thousands of tonnes per annum can be achieved using special, purpose-built dredgers.

a) Obtaining seed:

■ Seed mussels (15 - 30 mm shell length) are moved from higher parts of intertidal beds and from offshore sub-littoral beds where they do not grow well for relaying in other areas of greater productivity.

■ A 1:1 ratio (ie tonnes of harvested mussels per tonne of seed mussels relayed) is typical of many of our estuaries for seed mussels of this size.

■ By using seed of 10 mm, a 4:1 return can be achieved in good production sites and with appropriate management methods. However, it should be pointed out that mortalities of seed are usually high (> 90%) as a result of starfish/crab predation or from siltation and suffocation.

■ At smaller production levels (up to 50 tonnes per year), seed can be raked by hand from the beds for relaying. It is possible for two people to move up to 1 tonne of seed per tide. By using a small boat, this can be increased to 3 tonnes of seed per tide.

Mussels being gathered from seabed plots



Mussels in the hold of a dredger



■ Dredgers (of 24 m and above) can fish 50 tonnes of seed per hour and carry 150 tonnes per trip.

■ Seed are relayed over the seabed at a density of 50 - 100 tonnes ha⁻¹ by washing them from the deck of the boat whilst it is moving.

b) On-growing techniques:

■ Once seed have been relayed, there is limited management needed although a visual check of stock on site is recommended and some maintenance may be required, particularly for the removal of predators.

■ Where seed are relayed at higher densities, and provided there has been little loss of the stock then they will need relaying again before reaching maturity.

Harvest

■ Mussels take from 18 – 36 months to reach harvest size of 45 mm. The time is dependent on the location and productivity of the cultivation site and the initial size of seed relayed.

■ The normal harvesting season is from late August/September through to April. Mussels are harvested at ~20g live weight with the meat representing from 20% to 30% of the total weight depending on the productivity of the bed and the time of year. Meat quality is at its lowest after spawning.

■ Total yield can be very variable, depending on local conditions, and ranges from < 20 tonnes ha⁻¹ up to 200 t ha⁻¹.

■ At low levels of mechanisation a two-person team using a small boat could harvest ~3 tonnes (gross) of mussels, of which ~50% may be made up of shell/mud and undersize mussels. Mussels can be bagged on the boat, moved to the intertidal area, collected by tractor and trailer and transported to shore premises for washing, grading, purification and packing for the market.

■ Dredgers (of 24 m) can carry up to 150 tonnes per trip and are usually equipped with an on-board washing system. These systems can harvest and clean up to 50 tonnes of marketable mussels per hour. Once ashore, the mussels can be graded, purified and packed.

■ Depuration or purification of shellfish involves holding them in sterilized seawater (using ozone or ultra-violet light treatment) for 48 hours until bacteria have been removed. See the Seafish depuration leaflets for further advice.



A modern mussel dredger



Traditional hand-raking to gather mussels from the seabed



Mussel depuration system

Markets

■ Although there are markets for mussels in the UK, much of the bulk production is exported to the continent particularly France and the Netherlands.



Mussels bagged ready for sale



A delicious mussel dish

Equipment

■ In addition to the equipment previously mentioned, at production levels > 500 tonnes per year mechanisation will be needed to move mussels once ashore. This equipment will probably include a crane or lifting apparatus for transfer from the boat, forklift truck for bulk handling, and vehicles for road transport.

■ Additional equipment required may include storage and dispatch facilities, a depuration facility, weighing and grading machine, packing system, stock handling system.

■ A mussel farmer will also need an assortment of smaller pieces of equipment and safety clothing in addition to the more specialised items. Examples of the equipment required include First Aid kit, lifejackets/buoyancy aids, especially when working from small boats, signal flares for boat work, pressure washer, gloves, knives, communication equipment (mobile phone or VHF radio).