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, therapeutant 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. In general, hatchery seed is certified disease-free, but 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 and Rural Affairs Department (SEERAD) 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.

CLAM CULTIVATION

Further advice

- For further advice on any aspect of clam cultivation please contact the aquaculture advisor for your area.

They are:

England and Wales

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Scotland and Northern Ireland
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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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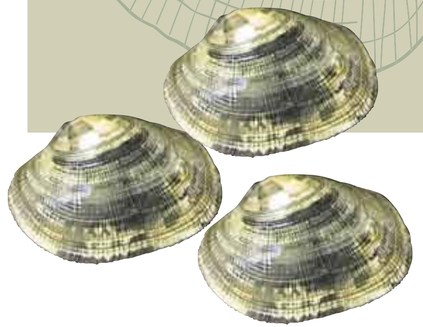
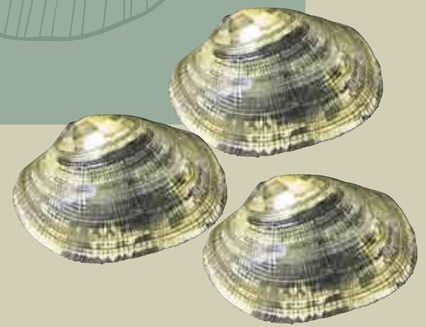


CLAM CULTIVATION

This leaflet is intended to offer a summary of the methods used to cultivate native, Manila and American hard shell clams 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.

Manila clams



CLAM CULTIVATION

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, clams start to grow in the spring when seawater temperatures reach 8 - 9ºC. Growth rate reaches a maximum in July or August when water temperature peaks (usually 14 - 18ºC) and then falls off again as the temperature drops back below 8 - 9ºC in November or December.

Salinity should generally be above 25 ‰.

Intertidal and sub-littoral locations are best. Clams will grow more slowly higher up the shore due to periods when they are exposed to air and cannot feed.

Clams live buried in the substrate. Their survival is better in sand or gravel substrates but it is possible to grow them in muddy areas too.

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

Manual methods can be used for small-scale cultivation. More mechanisation is needed for laying mesh and harvesting as scale of production is increased.

Spreading seed clams in a 'typical' clam farming location

Seed are available from commercial hatcheries at a range of sizes from 4 to 30 mm shell length. Larger seed (10 mm+) is more expensive but has higher survival rates.

Alternatively, small seed can be purchased and held in nursery trays on trestles on the foreshore until large enough to sow.

Manila clam seed can survive winter temperatures at/below 3ºC for short periods whereas native clams lose condition at around 6ºC.

Manila clams generally have higher survival rates than native clams with around 50% of seed reaching market size.

Clams are usually grown in plots under lengths of netting (25 x 2 m, with 5 x 5 mm mesh size) to protect them from predators, and in the case of non-native species, to also keep them in containment. Sowing densities should be around 400 to 800 m^{-2}.

Covering the clams below a mesh cover

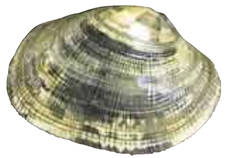
The edges of the netting should be buried in the substrate down to 10 cm and kept in place with rope stapled round the edges with metal hooks every 0.5 m pushed through the mesh into the substrate.

Since the clams will take around 3 years to grow to a harvest size, it will be necessary to change the netting at least once during this time, increasing the mesh size.

Clams can also be grown in oyster bags sunk into the sand in rectangular plots (0.8 x 0.5 m) and staked into place leaving about 2.5 cm protruding above the sand. Initial stocking density should be approximately 400 to 500 seed at 8mm shell length.

Clams can be grown in trays or bags on trestles although this is a less common method. The clams are exposed to environmental extremes and tend to have misshapen shells due to the coarse substrate that must be added to the trays or bags.

When deciding upon a culture method the relative costs of production should be considered carefully as bag and tray culture can be up to four times more expensive than sowing seed into meshed plots.



Specialised catamaran-based harvesting elevator dredge

Vertical depuration system

Harvest

In southern parts of the UK, Manila clams generally reach market size (around 40 mm shell length) in 2 - 3 years; native clams and American hard shell clams take 3 - 4 years. More northerly locations may take another year to market size.

The normal harvesting season is from late August/September through to April.

Clams harvested at around 20 g live weight usually have a meat yield representing from 20% to 30% of the total weight depending on the productivity of the bed and the time of year.

Harvesting of clams grown in the ground in inter-tidal locations can be carried out by hand raking or by mechanised methods including the use of potato or carrot harvesters towed by tractors.

Low-shore or sub-littoral plots can be harvested by hydraulic dredging using water jets to fluidise the sediment. Newer more environmentally friendly dredges are now available. These minimise the disturbance to the seabed and return undersize clams to the substrate.

After harvesting the clams will require washing, grading and bagging before being sent for depuration.

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

Markets

Manila clams being bagged for sale

Although there are markets for clams in the UK, much of the production is exported to the continent particularly France, Spain and Italy.

Equipment

At increased production levels mechanisation will be needed in order to lay mesh and to harvest the clams. Equipment that may be needed includes tractors and trailers, small boats, quad bikes.

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

A clam 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).