Safer Shellfish: Biotoxin Monitoring

Seafood is a good source of protein, and shellfish have been shown to have many health benefits. Farmed UK shellfish are one of the most sustainable forms of food for us to eat, with very low impacts and increasingly recognised benefits to the wider environment.

It is normal for biotoxin-producing algae to be present in our coastal waters. They are usually at very low concentrations and pose no concern for most people that eat moderate amounts of shellfish. However, when algae "bloom", the number of biotoxin-producing algae can also increase. The more algae the shellfish eat, the more biotoxin they can accumulate.

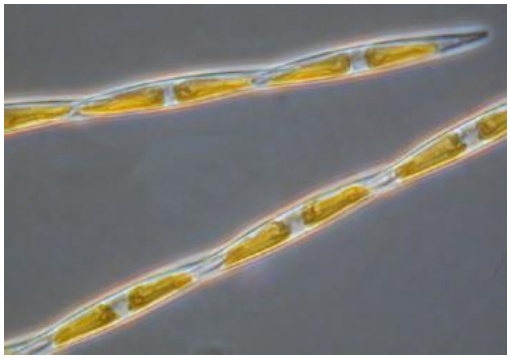
Because filter feeding bivalves are susceptible to picking up and accumulating naturally occurring biotoxins, controls are in place to mitigate against that potential contamination, helping to ensure safer seafood is delivered to the market.

Legal Requirements

It is a criminal offence to place any food on the market that is unsafe. Bivalves can only be commercially harvested from approved production areas and are regularly tested for the presence of three groups of biotoxins:

- Paralytic Shellfish Poisoning (PSP) Toxins: <800µg saxitoxin equivalents/kg
- Amnesic Shellfish Poisoning (ASP) Toxins: <20mg domoic acid/kg
- Lipophillic Shellfish Toxins (LTs):
    - Diarrhetic Shellfish Poisoning (DSP): <160µg okadaic acid equivalents/kg
    - Azaspiracid Shellfish Posioning (AZP): <160µg azaspiracid equivalents/kg
    - Yessotoxins: <3.75mg equivalents/kg

These strict regulatory limits must not be exceeded. If there is a risk of bivalves being contaminated, producers are required to take appropriate steps to ensure the shellfish they are placing on the market are safe. Effective end-product testing to ensure food safety is essential. When legal regulatory limits of biotoxins in shellfish are exceeded, the affected areas will be closed to harvesting.
The monitoring of the phytoplankton in the water is also undertaken in classified production areas. The trends in particular phytoplankton species are used to provide an early warning of potential contamination.

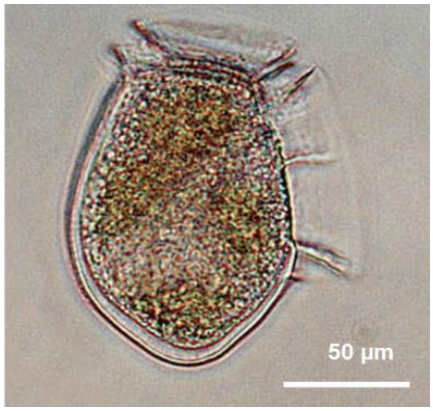


Pseudo-nitzschia spp. (© R. Jester)

Alexandrium sp. (© J. Rines)

Alert level phytoplankton concentrations are:

- PSP (saxitoxin): Equal to or greater than 40 cells/litre of *Alexandrium* spp.
- ASP (domoic acid): Equal to or greater than to 50,000 cells/litre of *Pseudo-nitzsch* spp. in Scotland and 150,000 cells/litre in England, Wales and Northern Ireland.
- DSP (okadaic acid): Equal to or greater than 100 cells/litre of *Dinophysis* spp. or 100 cells/litre of *Prorocentrum lima*



Dinophysis spp.
(© Marine Scotland)

Prorocentrum lima
(© M. Hoppenrath)

The legislation indicates that the sampling frequency for toxin analysis in the molluscs should be weekly during the periods at which harvesting is allowed. This frequency may, however, vary if a risk assessment on toxins or phytoplankton occurrence suggests a very low risk of toxic episodes. Conversely, it is to be increased where such an assessment suggests that weekly sampling would not be sufficient.

In England and Wales, biotoxin monitoring is undertaken on a monthly basis. However, if trigger thresholds are exceeded in either the bivalve or water sampling, the monitoring frequency will be increased to weekly. These trigger levels are:

- PSP: ≥400 µg saxitoxin equivalents/kg shellfish and/or 40 cells/litre of *Alexandrium* spp.
- ASP: ≥10 mg/ kg shellfish flesh and/or 150,000 cells/litre *Pseudo-nitzsch* spp.
- DSP: ≥80 µg okadaic acid equivalents/kg shellfish and/or 100 cells/litre of *Dinophysis* spp. and *Phalachroma spp.* or 100 cells/litre of *Prorocentrum lima*

In Northern Ireland, phytoplankton water sampling is undertaken on a monthly basis, with an increased frequency of bivalve sampling, potentially to weekly if required. This increased bivalve sampling is varied by season, production location and biotoxin test using a risk based approach and is agreed in advance on a 6 monthly basis.

For production areas in Scotland, biotoxin monitoring is undertaken on:

- A weekly basis for all sites between March and September;
- Fortnightly in October; and
- Monthly sampling from November to February in a limited number of selected areas, to reflect the low abundance of phytoplankton in the water column during the winter months.

End Product Testing

Producing safe food is the responsibility of Food Business Operators (i.e. the growers, harvesters and processors). Because biotoxins are heat stable, the only way to minimise the risk of consumers becoming ill through consumption of contaminated shellfish is to ensure that a product likely to contain unsafe levels of toxins is not placed on the market.

End product testing (ETP) by producers is used to demonstrate compliance with the legal obligations, add value to the product and may provide additional control over when bivalves are harvested and sold. Aspects to consider:

- Time of year. From April to October, toxicity levels are likely to be higher. Increased EPT should take place in the summer months or whenever there are indications that toxicity is likely to be high.
- Phytoplankton results. The official control monitoring results should be used as an indicator as to whether increased EPT should take place. Harvesters should also consider carrying out their own phytoplankton analysis to assess trends and risks. The official control monitoring for neighbouring sites can identify potential risks.

Always remember - If there is a risk of shellfish becoming contaminated, you must take appropriate steps to ensure that any placed on the market are safe. **Effective end-product testing to ensure food safety is absolutely essential.**

The Food Standards Agency provide further information on EPT. Seafish Guidance on EPT is also available online.