

Review of the currently available field methods for detection of marine biotoxins in shellfish flesh

Area of research interest: [Chemical hazards in food and feed](#)

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Conducted by: Seafood Safety Assessment

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Background

Marine biotoxins produced by phytoplankton can accumulate in the tissues of filter-feeding bivalve shellfish. If these shellfish are consumed by humans, toxin related illness can occur.

Producing safe food is responsibility of food business operators; as such shellfish producers must ensure that food they place on the market is safe. In order to meet their legal obligations, they must be able to demonstrate that their shellfish do not contain harmful levels of biotoxins. Food Standards Scotland and our organisation monitor the levels of biotoxins in shellfish grown in harvesting areas across the UK, and close these areas when the levels could present a risk to consumers. However biotoxin levels can increase very quickly, so even when an area remains open, it is necessary to undertake end product testing of harvested shellfish to make sure it complies with safe limits. This is particularly important in the summer months, when toxic phytoplankton are most prevalent.

Currently there are a number of methods available to the industry for testing of marine biotoxins. These include analytical methods (e.g. high performance liquid chromatography) which, although capable of quantifying the levels can be complex, expensive and time consuming. Simpler, assay based approaches are commercially available which provide a less accurate measure of biotoxin levels, but have the advantage of being suitable for use in the field, are more affordable, and offer shellfish producers a more rapid means of assessing the potential risks associated with their products.

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Research Approach

The aim of this review was to critically review existing commercially available field testing methods that can be applied for end product testing and to evaluate their capabilities and limitations.

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Results

The study concluded that in general, the commercially available field methods have appropriate sensitivity and are capable of detecting ASP, DSP, and PSP toxins at concentrations well below the regulatory limits. The methods were also found to have acceptable specificity, and did not cross react with non-related toxins or other compounds that were present in shellfish samples.

The final report presents a number of recommendations to address technical issues and information gaps identified in the review. With regards to specific future research needs, the review recommended provision of additional resources to assist in advancing the commercialisation of assays for azaspiracids (one of the lipophilic toxins) and the development of biosensor methods for toxins in shellfish. The review also recommended that field methods should undergo formal validation process to ensure they are capable of detecting relevant toxins with appropriate sensitivity.

The outcomes of this research will also be used by Food Standards Scotland to update existing guidance for shellfish producers on the management of shellfish biotoxin risks.

Research report

England, Northern Ireland and Wales

PDF

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