Method performance verification for the analysis of minor clam species for paralytic shellfish poisoning toxins

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Background

The mouse bioassay (MBA) is the official reference method for determination of PSP toxins (PSTs) in bivalve shellfish. However, in recent years the AOAC HPLC method 2005.06 has become an approved alternative Official Method by the European Commission and has already been validated and implemented into the UK official control monitoring programme for mussels, cockles, razors and hard clams.

Research Approach

The AOAC HPLC method 2005.06, which involves the acetic acid extraction of shellfish prior to clean up, derivatisation and HPLC analyses, was subjected to a method performance verification exercise at Cefas for four further clam species of UK commercial significance: (surf, manila, carpet shell and otter clams). Checks followed guidance from the AOAC including an assessment of method selectivity, sensitivity, recovery, precision and uncertainty of measurement. Performance checks were conducted on the major PSP toxins commercially available as standards and more commonly found in UK samples.

Results

Initial investigations in surf clams highlighted issues with the conversion of some PSP toxins to their decarbamoyl counterparts. Following a period of investigation, the decision was taken to limit the method verification exercises to only the decarbamoyl toxins in this species. For the other three clam species no such issues were encountered and the full spectrum of PSP toxins were studied.

Verification results showed that the analysis of PSTs in all four species was selective enough to detect and quantify the presence of each toxin peak. The sensitivity of the method was satisfactory, with method limits of detection and quantitation similar to those described in other species. Toxin recoveries determined at two concentration levels were within specified limits and were similar to those described previously for other bivalve species. The precision and repeatability of method for each clam species was also shown to be acceptable, with values below specified limits. Method performance results obtained throughout the study were used to calculate levels of Measurement Uncertainty (MU) for the analysis of PSTs in each of the four clam species, with results being similar to those reported previously for other bivalve species.

Overall, the results presented have shown the applicability of the method for the qualitative and quantitative determination of the PSP toxins in each of the four clam species. Results fall within specified performance limits and the overall size of the measurement uncertainty is similar to the values determined for other species previously validated. Consequently, the recommendation is to implement the method into the UK official control monitoring programme for the analysis of PSP toxins in the four clam species.

Research report

England, Northern Ireland and Wales

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