Critical review of the current evidence for the potential use of indicator shellfish species to classify UK shellfish production areas

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Background

Shellfish waters can become contaminated by sewage effluent discharges and surface water run-off from agricultural land, which may contaminate shellfish with pathogenic organisms known to cause human illness.
EU food law requires a range of official controls for live bivalve molluscs to ensure that shellfish placed on the market are safe to eat. Statutory hygiene classification and monitoring of shellfish production areas, based on Escherichia coli as an indicator of faecal contamination levels, determines the extent of post-harvest processing required. Shellfish from more heavily contaminated sites are required to be relayed or depurated (cleansed in clean seawater) to reduce contamination to acceptable levels, or thoroughly cooked, before consumption.

In the UK, commercially harvested species within a production area are currently monitored and each species bed is individually classified. This is a costly and resource intensive exercise. The FSA is committed to reviewing this system to ensure it remains fit for purpose, utilises available resources effectively and provides adequate protection for public health.

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Research Approach

The objective of this desk-based study is to critically review and evaluate the currently available UK and international literature and other evidence, both published and unpublished, on the potential to use indicator shellfish species for faecal contamination classification purposes. An evaluation of the strength and robustness of the identified evidence is presented and knowledge gaps that might be addressed through future research work, to support indicator species use, are identified.

This study is intended to support a review and possible simplification of the official classification of shellfish production areas across the UK. For any of the shellfish species harvested to be considered a suitable indicator, and in order to protect public health, that species must be shown to consistently accumulate E.coli to an equal or greater extent than any other. Previous FSA workshops, involving relevant scientific experts from across the UK, have considered evidence available in support of potential options for changes to the current classification system. These

have identified a certain amount of information (based on routine monitoring data from England and Wales) that showed mussels accumulate E.coli to a greater extent than some bivalve species, but not necessarily all. This critical review considers the amount and strength of wider evidence to support the suitability of mussels as a reliable indicator of uptake of E.coli in other commercially harvested bivalve molluscs and assesses the implications of adopting other indicator species options, together with any associated public health impacts. Options with regard to sampling effort for classification monitoring and impacts on classification status awarded to production areas are also presented.

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Results

The general conclusion, based on the limited number of directly applicable studies identified, is that an indicator species approach to shellfish classification could potentially be used in many situations typically encountered in the UK. However, due to the diverse nature of UK shellfish beds, use of indicator species should be assessed on a site-specific basis taking account of possible differences due to spatial and seasonal effects, as well as any potential impact on marginal classifications. At present, the use of indicator species following a pollution event cannot be recommended due to a lack of data.

The following recommendations are made on the assumption that species are co-located both geographically and with respect to depth in the water column:

- Mussels may be used to represent pacific, native or flat oysters, clams and hard clams.
- The data would support the use of cockles to represent mussels, or any of the above species that could be represented by mussels, where the monitoring of cockles is practical. The situations where cockles may be used as an indicator may, however, be limited due to practical issues associated with this species.
- Where native or flat and pacific oysters are produced in the same area then either species may be used to represent both. Native or flat oysters (and therefore by analogy pacific oysters) may also be used to represent hard clams.
- An indicator approach cannot be recommended at this stage for representation of cockles, surf clams, sand gapers, razor clams or king scallops.
- Mussels offer a number of practical advantages as an indicator shellfish species. They are relatively cheap to obtain, are generally more resilient than other bivalve species to environmental stressors and may be readily deployed in a variety of ways to facilitate sampling e.g. mesh bags on fixed installations, suspended from buoys in the water column, or on the seabed.

Although not the main focus of the study, norovirus versus E.coli accumulation and clearance characteristics in bivalves was investigated using data available from the FSA's previously funded survey of norovirus in UK oyster fisheries. Statistical analysis of the data suggested that neither mussels nor pacific oysters were ideal for representing norovirus risk on the basis of E.coli content all year-round. Further investigation of these differences between species may therefore be worthwhile, for wider public health considerations.

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Published Papers

- Younger, A.D., Reese, R.A (2013). Escherichia coli levels compared between bivalve mollusc species across harvesting sites in England and Wales. Journal of Shellfish Research 32(2):527-532. 2013

Research report

England, Northern Ireland and Wales

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