



Short communication

The influence of the number of *Escherichia coli* results on the classification status and assessment of microbiological risk of shellfish production areasRobson V. de Souza^{a,*}, Andrew D. Younger^b, Mickael Teixeira Alves^b, Carlos J.A. Campos^{b,1}^a Empresa de Pesquisa Agropecuária e Extensão Rural de Santa Catarina (Epagri), Rodovia Admar Gonzaga, 1.188, Itacorubi, Florianópolis, SC, CEP 88034-901, Caixa Postal 502, Brazil^b Centre for Environment, Fisheries and Aquaculture Science (Cefas), Weymouth Laboratory, Barrack Road, the Nothe, DT4 8UB, UK

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ABSTRACT

Classification of shellfish production areas (SPAs) based on monitoring for faecal indicator organisms is undertaken in many shellfish producing countries to assess the risk of contamination with pathogens and determine the level of post-harvest treatment prior to sale for human consumption. This study assessed the effect of the number of *E. coli* monitoring results on the classification status of SPAs using the A, B and C classification criteria prescribed in the European Food Hygiene Regulations. The assessment was based on a database of *E. coli* concentrations monitored in shellfish from seven production areas (> 255 sample results/SPA) on the coast of Santa Catarina (Brazil). It was found that six SPAs would be classified as B and 1 as C if all the available results were considered. Ten series of 50 data samples were randomly extracted from each production area dataset (12–120 results/sample, in multiples of 12). Classifications given to each data sample resulted in two production areas that had been given B status based on the full database being classified more times as A than as B when data samples with 12 results were considered. There was a tendency for data samples compliant with class A to reduce with higher number of *E. coli* results/sample. The results indicate that areas with class B status can be misclassified as A during the initial classification when fewer results are available. Furthermore, areas with 'prohibited' status can be misclassified as C during the initial classification, when 12 results are considered in compliance assessments. Despite the preliminary nature of this study, the results underscore the need to consider long-term monitoring datasets in compliance assessments to ensure that the classification status of SPAs truly reflects environmental contamination levels.

1. Introduction

Filter-feeding bivalve molluscan shellfish accumulate microorganisms, including human pathogenic bacteria and viruses, when grown in sewage-polluted waters and can present a significant health risk when consumed raw or lightly cooked (Butt, Aldridge, & Sanders, 2004; Lees, 2000). The risk of human illness is a long standing and internationally recognised problem associated with the consumption of shellfish (Iwamoto, Ayers, Mahon, & Swerdlow, 2010). Sanitary measures aimed at controlling this risk include monitoring of faecal indicator organisms (FIOs) in shellfish and/or water, classification of production areas based on the results of this monitoring and, if required, post-harvest purification treatments (deuration, relaying, heat treatment) prior to sale

for human consumption (WHO & FAO, 2012). The classification of shellfish production areas (SPAs) is an essential element of the risk management process because it provides an indication of the microbiological risk at production stage so that common risk management procedures and processing requirements can be applied (FAO & WHO, 2018).

In the European Union (EU), SPAs are classified as A, B or C according to the levels of *Escherichia coli* in shellfish flesh. The *E. coli* standards for each class are summarised in Table 1. Harvesting is not permitted from production areas that exceed 46,000 *E. coli* MPN/100 g.

The EU Food Hygiene Regulations (FHR) specify that sampling plans must be representative of the levels of contamination in SPAs but do not specify the frequency and timing of sampling and the way *E. coli*

Abbreviations: FHR, Food Hygiene Regulations; EU GPG, European Union Good Practice Guide; FIOs, faecal indicator organisms; MPN, most probable number; SPA, shellfish production area

* Corresponding author.

E-mail addresses: robsonsouza@epagri.sc.gov.br (R.V. de Souza), andrew.younger@cefas.co.uk (A.D. Younger), mickael.teixeiraalves@cefas.co.uk (M.T. Alves), carlos.campos@cawthron.org.nz (C.J.A. Campos).

¹ Present address: Cawthron Institute, 98 Halifax Street East Nelson 7010, Private Bag 2, Nelson 7042, New Zealand.

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