A tool to support sanitary survey in areas for live bivalve molluscs: preliminary results for the area Vasta N. 2

Francesca Barchiesi (1), Francesca Leoni (1), Donatella Ottaviani (1), Elena Rocchegiani (1), Erica Calandri (Bruno Barchiesi (2), Giovanni Guidoni (3), Federica Savini (3), Silvia Piva (3), Andrea Serraino (3), Federica Giacometti (3)

(1) Istituto Zooprofilattico Sperimentale dell'Umbria e delle Marche "Togo Rosati" (2) Azienda Sanitaria Unica Regionale A.S.U.R., Area Vasta N.2 (3) Università degli Studi di Bologna, Dipartimento di Scienze Mediche Veterinarie

Corresponding author: Francesca Giacometti (federica.giacometti3@unibo.it)

Before classifying a production or relaying area for live bivalve molluscs, the Competent Authority has to carry out a sanitary survey of the area, that includes an inventory of the sources of pollution of human or animal origin likely to be a source of contamination for the production area, an examination of the quantities of organic pollutants released during the year, according to rainfall readings, waste-water treatment, etc., the determination of the characteristics of the circulation of pollutants. Based on sanitary survey findings, a monitoring programme is established (1). *Escherichia coli* is a common indicator organism of faecal contamination in aquatic systems that in the European Union is used for the classification of the mollusc production areas as A, B or C. The presence of *E. coli* in water environment is associated with biotic and abiotic factors and its abundance is associated with heavy rainfall events that could cause an overload and possible leakage from sewage systems or facilitate the arrival of an increased amount of fecal material from land living animals to the sea.

This study presents data on: i) official controls performed in the area Vasta n.2 from 2015 until 2019 on 2.701 bivalve samples, that were examined for *E. coli* enumeration or *Salmonella* spp. detection; of these, 924 were samples of mussels of the species *Mytilus galloprovincialis* (n=473 examined for *E. coli*; n=451 examined for *Salmonella*) and 1777 were striped clams of *Venus gallina* (n=945 for *E. coli*; n=832 for *Salmonella*); ii) visualization of the different sources of contamination of the investigated area by QGIS; iii) assessment of the impact of rainfalls on *E. coli* concentrations in molluscs in the 48 and 72 hours before official sampling. In the 5 years of sampling, only 9 (1.9 %) and 44 (4.7%) non-compliant *E. coli* samples were observed in mussels and striped clams, respectively, and a significant difference in the *E. coli* level of contamination was found between mussels and clams (Kruskal-Wallis test, $p < 0.00001$). An overall occurrence of 1.1% was reported for *Salmonella* spp., detected in 5 and 6 samples of mussels and striped clams, respectively. The most commonly isolated serotypes were *S.* Derby (18%), *S.* Napoli (18%) and monophasic *S.* Typhimurium (9%). For the assessment of the impact of rainfall, five catchment areas (Cesano, Misa, Esino, Musone) and 19 bivalve mollusc harvesting areas were investigated and 1.418 rainfall observations collected by pluviometers. The investigated sources of contamination (rivers, production areas of molluscs, water discharges, flood risk areas, sewage treatment plant, and livestock populations) were presented in different maps by an open source GIS. A correlation was observed between the *E. coli* concentration in molluscs and rainfall (precipitation quantity expressed in mm) at both 24 and 96 hours before sampling, reflecting the impact of the sources of contamination located in the investigated area and its amplification after heavy rainfalls.

E. coli concentration in bivalve molluscs was found to be correlated with rainfall in the area at both 24 and 96 hours before sampling. The proposed tool could be useful to raise awareness of potential contamination of the bivalve mollusc production areas and used for a real risk-based monitoring available to Veterinary Competent Authority and National Health System.

[1] Regulation (EU) 2019/627.