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Evaluating the impact of flow discharge on Escherichia coli concentration in farmed mussels following rainfall events: a case study in Central Italy

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Many of the estuaries and coastal areas in Europe are used for bivalve molluscs cultivation and harvesting. These areas are influenced by many environmental, climatic and anthropogenic factors interacting in the boundaries of land, freshwater and seawater. The waters of the highly populated coastal areas receive large quantities of treated and sometimes untreated wastewater discharged from human and industrial sources. In addition, rainfall might increase the level of enteric pathogens from distant sources into coastal waters. The study of coastal pollution is further complicated by the dilution, survival, and resuspension of sediment-bound pathogens, which are all affected by continuous and often violent environmental fluctuations.
Bacteriological contamination studies of seawater offer only a snapshot of the effect of contamination events. On the other hand, bivalve molluscs accumulate and retain contaminants for various periods, and their analysis can provide evidence of past contamination events well after a contaminant has been diluted beyond the level of its detection in the overlying waters. Rivers are major routes of bacteriological contamination from surface or sub-surface runoff impacting on coastal areas. After the cessation of the stormflow, elevated bacterial concentrations can remain high in water for at least 3 days.
The official control programmes for bivalve molluscs in EU, according to the Regulation (EC) No 854/2004, provide the classification of mollusc production areas on the basis of bacteriological monitoring for the bacterium Escherichia coli (as faecal indicator organism - FIO) in the mollusc flesh and intravalvular liquid. The environmental influences on FIO contamination of coastal waters have been extensively studied, however, very few researches have correlated these factors with shellfish healthy and water quality.