REAL-TIME PCR DETECTION OF PATHOGENIC MICROORGANISMS IN ROOF-HARVESTED RAINWATER IN SOUTHEAST QUEENSLAND, AUSTRALIA

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Summary
The microbiological quality of roof-harvested rainwater was assessed by monitoring the concentrations of E. coli and enterococci in rainwater tanks in Brisbane, Australia. Samples were also tested for potential pathogens using real-time PCR-SYBR Green dye. The presence or absence of potential pathogens did not correlate with any of the indicator bacterial concentrations.

Objective
To assess the microbial quality of roof harvested rainwater in Brisbane, and to investigate the prevalence of pathogenic microorganisms, and their correlation with traditional faecal indicator bacteria.

Methodology
1. In all, 72 samples were collected from 52 rainwater tanks after a rain event.
2. The membrane filtration method was used to process the water samples for E. coli and enterococci enumeration.
3. PCR primers were selected from published research literature.
4. From each water sample, DNA was extracted using DNeasy blood and tissue kit (Qiagen). Each water sample was tested for the potential PCR inhibitors,
5. Real-time PCR assay was performed using Rotor-gene 6000 (Corbett, Australia).

Results
Concentrations of E. coli, C. jejuni, L. pneumophila, S. enterica, and E. coli for the 72 samples tested for potential pathogens did not correlate with any of the indicator bacterial concentrations.

Conclusions
1. The presence of one or more pathogenic microorganisms along with high levels of faecal indicators could represent a significant health risk to users.
2. The results obtained also indicated a poor correlation between faecal indicators and potential pathogens tested. Therefore, testing faecal indicators may not be adequate to assess the microbiological quality of rainwater and consequent health risk.
3. As a part of the on-going research, we are currently using real-time PCR to quantify C. jejuni, L. pneumophila, Salmonella spp., and Giardia spp. in rainwater samples. Our future research will focus on Quantitative Microbial Risk Assessment (QMRA) for roof harvested rainwater.