# A HANDHELD qPCR DEVICE FOR USE IN THE FIELD

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We have invented a Handheld Quantitative PCR (HHD qPCR) device that can operate on battery for up to six hours. The HHD qPCR device was tested using World Health Organization and IANZ accredited assays for *E.coli* STEC type strain NZRM3634, Influenza, Adenovirus, Enterovirus, Norovirus genogroup I & II, and Astrovirus. In side-by-side tests with larger laboratory based instruments and clinical samples the HHD qPCR was comparable to, and in one case better than, in-laboratory technology. Tests included measures for sensitivity, precision, and inter-assay variability.

The HHD qPCR detects both SYBR green and FAM reporter dyes. We have used DNA and RNA as reaction templates. Probe-based and intercalating dye assays have also been shown to perform successfully on the HHD qPCR device. The user interacts with the device via a tethered connection to a laptop computer. In addition, the HHD qPCR is wireless enabled to permit interaction with the operator via smart phone or tablet devices. Current reaction vessel volumes are equivalent to those found in a 96 well plate.

Diagnosis of infectious disease in the field or at the initial point-of-care brings the advantage of rapid infection containment, accurate diagnosis and immediate selection of the appropriate treatment. We see significant cost savings and benefits for the animal health sector with the technology quickly migrating to use in human health. For example, the HHD qPCR device could monitor for disease outbreaks as part of a national surveillance program. With the correct assay panel, our technology can determine the disease-causing species or reveal antibiotic resistance, all in real time either “cow-side” or in the remote clinic.

In addition to benefits in health diagnostics we also see potential for forensic applications. Building on our work in identifying individuals from bite marks by analysing the metagenome of Streptococcus deposited at the site of the injury (Kennedy et al, 2012) we determine whether our HHD qPCR is able to generate sequencable template from DNA samples collected from study participants.

Reference:
Kennedy DM, Stanton JA, Garcia JA, Mason C, Rand CJ, Kieser JA, Tompkins GR (2012). Microbial analysis of bite marks by sequence comparison of streptococcal DNA. *PLoS One* 7(12): e51757