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Detecting Highly Virulent Chinese-Type Porcine Reproductive and Respiratory Syndrome Virus (H-PRRSV) by a Field PCR Platform – POCKIT

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A highly sensitive field diagnostic platform is an essential tool for farmers. It allows quick decision making to avoid significant economic impact. POCKIT is a qualitative PCR detection system based on insulated isothermal PCR (iiPCR). The PCR reaction is driven by the Rayleigh-Bénard convection principle. A natural thermal convection phenomenon is induced inside a capillary tube with a single heating source applied at the bottom, which results in a temperature gradient between 60°C to 95°C inside the tube. The convection will repeatedly circulate the reagents through different temperature zones for the three steps of PCR –denaturing, annealing, and extension respectively.

A field test was conducted to detect the highly virulent Chinese-type PRRSV (H-PRRSV) by POCKIT. A set of specific primers and a FAM labeled TaqMan probe were designed to detect the H-PRRSV but not the normal strains including Asian origin, NA origin, and EU origin. The RNA was prepared by a 15-minute spin-column protocol. The result showed that the POCKIT system was capable of detecting the field samples efficiently. When confirmed and quantified by the real-time PCR, the titers of the field samples were in the range between 10^3 to 10^5 viral particles/μl of extracted samples. A normal PRRSV BSL vaccine strain was introduced as a specificity control and the result was negative accordingly.

The POCKIT system is specifically designed for field diagnosis though it can be used for reference labs for screening tests. It comes in as a portable hard-case carry-on suitcase with a mini-centrifuge and two micro pipettes. The total run time from sample to result is less than 1.5 hours. With its high sensitivity and specificity, easy-of-use and short-turn-around-time, POCKIT can provide farmers and field consultants a powerful tool for veterinary disease management.