

WOAH Collaborating Centre for Reference Materials for

Molecular Diagnostic Techniques in Aquatic and Terrestrial Animal Diseases

NIFS (National Institute of Fisheries Science) & APQA (Animal and Plant Quarantine Agency)

1. Overview

- In 2024, we were designated as the first WOAHH Collaborating Centre in Korea.
- Our main goal is to strengthen laboratory expertise & enhance diagnostic capacity using reference materials.
- In PCR-based diagnostic methods, reference materials are routinely used to ensure diagnostic accuracy and performance.
- Without appropriate standards, different laboratories may obtain different results in PCR-based techniques.
- We aim to address inconsistencies in diagnostic test results and reduce diagnostic errors by using reference materials.

2. Expertise, services and facilities



Lecture



Experimental Education



On-site Consulting



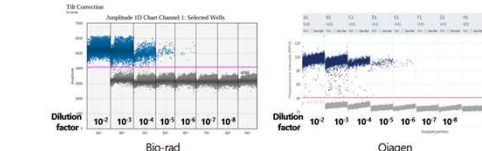
Comparison Tests

- Since 2024, we have provided various training programs, including lectures, practical laboratory training, and on-site consulting in Chile, Peru, Ecuador, Fiji and Korea.
- Through these activities, we identified key factors that reduce detection sensitivity when using our diagnostic reference materials.

3. Recent Innovations, research highlights, technical developments

Standardization of gene copy number on the plasmid DNA

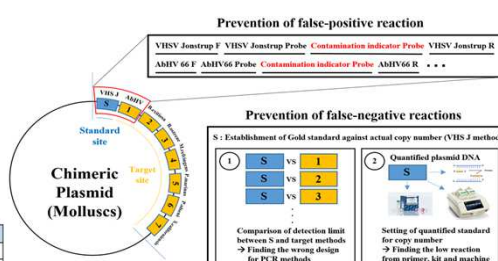
- Comparison of ddPCR platforms from two different manufacturers



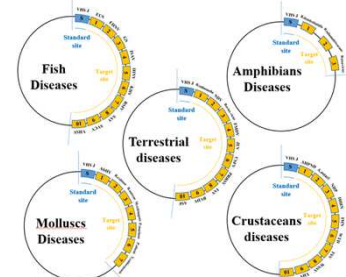
- Quantification of viral copy numbers using the Jonstrup method via ddPCR

Dilution factor	RNA 10 ⁻²	RNA 10 ⁻³	RNA 10 ⁻⁴	RNA 10 ⁻⁵	RNA 10 ⁻⁶	RNA 10 ⁻⁷	RNA 10 ⁻⁸	NC
Copies/ul	12137	1398	139	10.1	1.19	0	0	0
Qiagen	8094.1	749.4	71.34	6.613	0.765	0	0	0

Development of multi-functional positive plasmid DNA



Constructed plasmid DNAs targeting animal diseases



- (Validation of Standard materials)** The VHS Jonstrup method can detect a single copy of the viral gene, demonstrating its suitability as a standard.
- (Prevention of false-positive reactions caused by reference material contamination)** We added an additional probe sequence to detect contamination from reference materials in real-time PCR. In conventional PCR, contamination can also be checked through inserted sequences between target gene regions.
- (Results)** We developed multifunctional standard plasmid DNAs targeting various animal diseases.

Development of validation tool for experimental kits and machines using reference DNA materials during real-time PCR and conventional PCR



- (Prevention of false-negative reactions caused by poor-performing PCR materials)** The use of reference materials can help identify suitable reagents and equipment for PCR-based diagnostic methods.
- (Summary)** Reference materials help establish optimized laboratory conditions and improve diagnostic sensitivity and reliability. In addition, our reference material provide a practical tool for maximizing the use of existing laboratory equipment and reagents.

4. How can we support Members?

Submission of demand survey for reference materials

- (Delivery)** Reference materials and SOPs will be delivered **free of charge** to your government laboratory through a transfer company.

Demand Survey for reference materials in Aquatic and Terrestrial animal diseases



Aquatic animal diseases
Dr. Hyoung Jun Kim, NIFS



Terrestrial animal diseases
Dr. Kyoung Ki Lee, APQA

Consultation method

- (On-site Consultation)** We can provide on-site consultations, including lectures and practical testing using our reference materials.
 - Laboratory Standardization:** Establishing optimized laboratory conditions and improving diagnostic sensitivity & reliability through the implementation of validated reference materials.
 - Resource optimization:** Maximizing the utility of existing laboratory equipment & reagents without requiring expensive upgrades.
 - Diagnostic Quality Assurance:** Reducing misdiagnosis & enhancing technical proficiency in molecular diagnostic methods.

Current or planned collaboration and capacity building activities

- (KOICA Program)** Provide technical training to strengthen diagnostic capacity for animal diseases to Fijian government officers in Korea.
- (Online consultation)** Meeting with government officers in Chile, Peru, and Ecuador

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