

LABORATORY TWINNING PROGRAMME EXPERIENCE AND IMPACT

Regional Workshop for WOAH Focal Points for Aquatic Animals

Christina Retna Handayani

7 – 9 July 2026 | Tokyo, Japan

Focal point for aquatic animal
from Indonesia



World Organisation
for Animal Health



Australian Government
Department of Agriculture,
Fisheries and Forestry



国立大学法人

東京海洋大学

Tokyo University of Marine Science and Technology



OIE Twinning Project on KHV of Japan and Indonesia

2014 - 2017

**National Research Institute of Aquaculture, Fisheries
Research Agency, Japan
with
Main Center for Freshwater Aquaculture Sukabumi,
Indonesia**



BACKGROUND

- As one of its core responsibilities, MCFA Sukabumi is tasked with providing healthy koi broodstock (Minister Regulation no. 6/2006).
- To fulfill this mandate, MCFA Sukabumi must ensure that the production and distribution of koi broodstock are free from Koi Herpesvirus (KHV) infection.
- In order to meet the World Trade Organization (WTO) requirements for the international trade of koi fish, which require certification of freedom from Koi Herpesvirus (KHV), the establishment and development of a KHV Reference Laboratory in Indonesia is of critical importance. This will ensure the credibility of Indonesia's fish health certification system and support the international acceptance of Indonesian common carp and koi products in the global market.
- Objectives: to improve the capability of research and diagnostic techniques of the candidate laboratory on KHV disease



Application Process of Twinning Programme

- Decree of DGA no. 4899/2013: mandate to develop reference lab for KHV

- OIE approval and start the twinning project





Activities



1. 2015:

- Technical visit and capacity-building activities conducted by an expert from the Reference Laboratory (NRIA, Japan), Dr. Kei Yuasa, at the Fish Health Laboratory of MCFA Sukabumi.
- Training of MCFA Sukabumi laboratory personnel in Japan (phase 1).

2. 2016:

- Training of MCFA Sukabumi laboratory personnel in Japan (phase 2).
- Evaluation and capacity-building activities conducted by an expert from the Reference Laboratory (NRIA, Japan) at the Fish Health Laboratory of MCFA Sukabumi.
- National workshop on Introducing the KHV Twinning Program.

3. 2017:

- Training of MCFA Sukabumi laboratory personnel in Japan (phase 3).
- Evaluation and capacity-building activities conducted by the experts from the Reference Laboratory at the Fish Health Laboratory of MCFA Sukabumi.
- Conducted of an International Workshop on the KHV Twinning Program.





Funding

WOAH

Mostly funded by WOAH (founded as OIE)

CANDIDATE

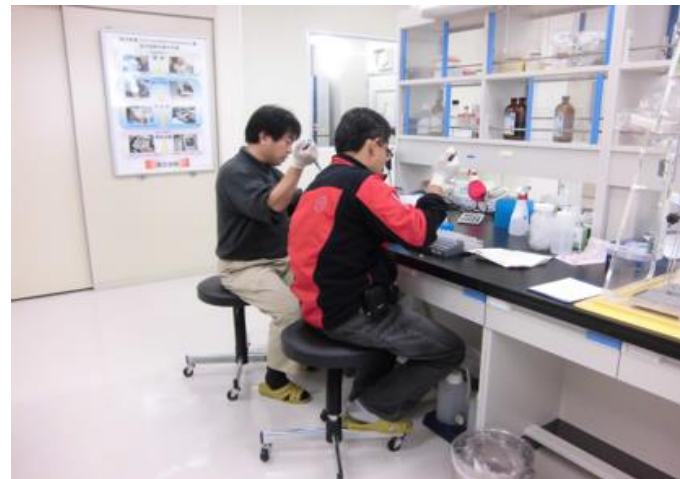
Main Center for Freshwater Aquaculture Sukabumi,
Directorate General of Aquaculture, MMAF
Indonesia

- ☐ Indonesia funded the reagents and materials for surveillance and workshops which conducted in Indonesia



SUCCESS of THE LABORATORY TWINNING PROJECT 2014-2017

- ❑ Strengthened laboratory equipment and human resources capacity for KHV diagnostics;
- ❑ Improvement of the KHV diagnostic system;
- ❑ MCFA Sukabumi has established a new laboratory facility for virus isolation and is equipped with a comprehensive system for histopathological examinations.





EVALUATION OF EQUIPMENT AND HUMAN RESOURCES FOR KHV DIAGNOSTIC



Year	Items	Equipment	Human resources	Training in Japan
2015	Conventional PCR	good	good	+
	Real time PCR	good	intermediate	+
	Histopathology	good	not evaluated	+
	ELISA	good	not evaluated	+
	Viral isolation	not prepared	not evaluated	+
	Experimental infection	good	not evaluated	
	Bacteriology	good	not evaluated	
2016	Conventional PCR	good	excellent	+
	Real time PCR	excellent	excellent	+
	Histopathology	excellent	good	
	ELISA	excellent	not evaluated	
	Viral isolation	excellent	good	+
	Experimental infection	excellent	good	+
	Bacteriology	not evaluated	not evaluated	
2017	Conventional PCR	excellent	excellent	+
	Real time PCR	excellent	excellent	+
	Histopathology	excellent	excellent	+
	ELISA	not evaluated	not evaluated	
	Viral isolation	excellent	excellent	+
	Experimental infection	excellent	excellent	+
	Bacteriology	excellent	excellent	+

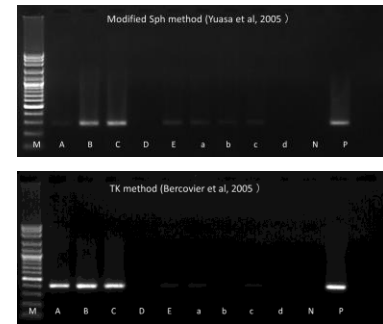


CHALLENGES

- ☐ No scientific publications were produced by the end of the project.
- ☐ Limited availability of human resources
- ☐ Limited of laboratory facilities

IMPACT of THE LABORATORY TWINNING PROJECT 2014-2017

- ☐ The laboratory has regularly participated in international KHV proficiency test conducted by CSIRO, Australia, achieving satisfactory results.
- ☐ Providing KHV isolates to support research conducted by other national institutions (NRIA and the Indonesian Quarantine Agency).
- ☐ Provided technical support, scientific recommendations, and expert consultation to international KHV researchers visiting Indonesia, including Matt Barwick (Australia), JC Avaare (IRD, France), and Joao Sendão (Phibro Animal Health, Bangkok, Thailand).





OIE Twinning Project on shrimp diseases of USA and Indonesia

2015 - 2018

**School of Animal and Comparative Biomedical
Sciences, The University of Arizona, USA
with
Brackishwater Aquaculture Development Center
Situbondo, Indonesia.**

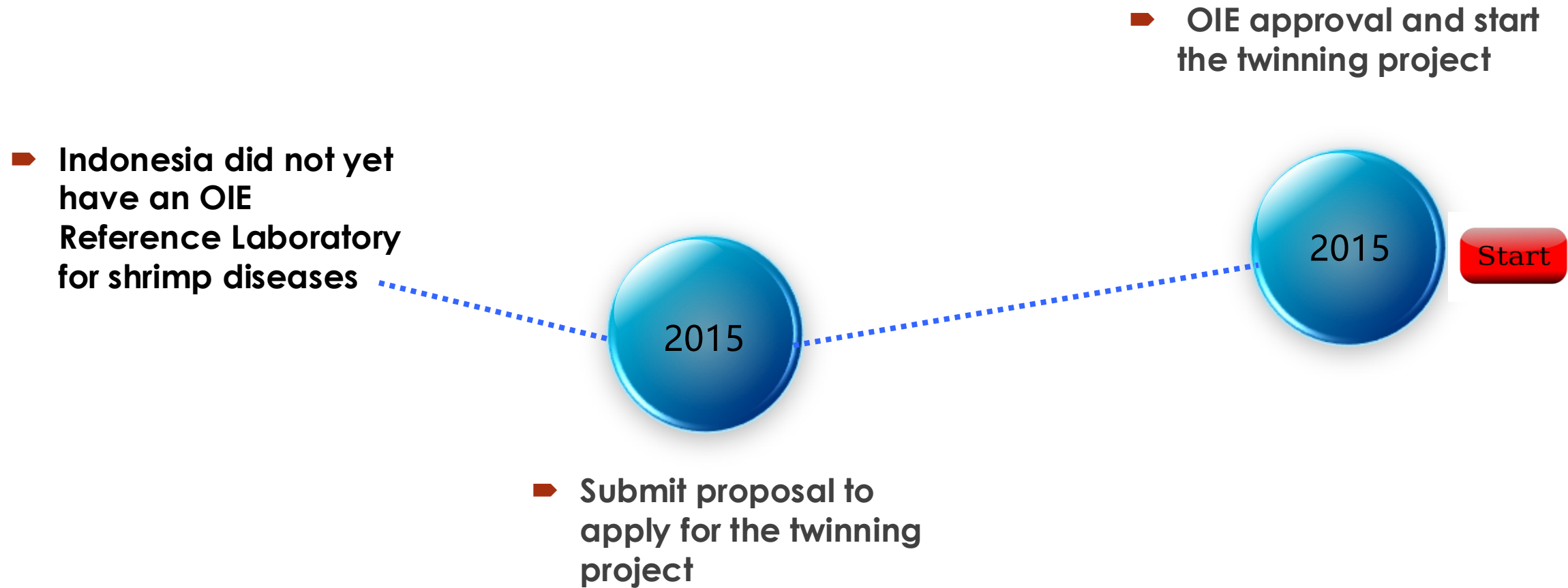


BACKGROUND

- The Fish Health and Environmental Laboratory of BADC Situbondo is responsible for providing diagnostic services for fish and shrimp diseases and conducting epidemiological studies of fish and shrimp diseases, as well as research on fish health and the aquatic environment.
- This twinning program objective: to strengthen the early detection and control of shrimp diseases by enhancing the diagnostic capacity of the candidate laboratory, improving surveillance capabilities, and developing expertise in shrimp diseases.



Application Process of Twinning Programme





Funding

WOAH

Mostly funded by WOAH (founded as OIE)

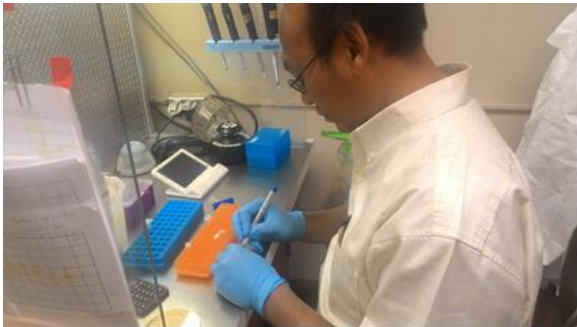
CANDIDATE

Center for Brackishwater Aquaculture
Development, Directorate General of Aquaculture,
MMAF Indonesia

- ☐ Indonesia funded the reagents and materials for surveillance and workshops which conducted in Indonesia



Activities



1. 2015:

- Training Activities at University of Arizona-Aquaculture Pathology Laboratory.
- Training activities at BADC-Situbondo, Indonesia (experts: Dr. Kathy Tang Nelson and Dr. Jee Hun).

2. 2016:

- Workshop on Shrimp Disease Diagnostic (experts: Dr. Kathy Tang Nelson and Dr. Fernando Luis Arangueren Caro).
- Workshop twinning program at University of Arizona.

3. 2017:

- Workshop on Shrimp Disease Diagnostic at BADC Situbondo (experts: Arun K. Dhar, PhD and Dr. Fernando Luis Arangueren Caro).

4. 2018:

- Shrimp Pathology Short Course at The University of Arizona.
- Dr. Hung Nam Mai from University of Arizona, visited BADC Situbondo, to have collaboration on the collection of samples from ponds infected with IMNV and white feces disease.





SUCCESS of THE LABORATORY TWINNING PROJECT 2014-2017

- ❑ Strengthened laboratory and human resource capacity for shrimp disease diagnostics significantly
- ❑ Publications:
 - ❑ “Detection of White Spot Syndrome Virus (WSSV) in Commercial Shrimp Feeds by PCR” (presented at “Asian Pacific Aquaculture 2016 conference“, Surabaya, Indonesia)
 - ❑ “Histological, In Situ and PCR Detection of *Enterocytozoon hepatopenaei* (EHP), a Microsporidian Parasites Infecting Penaeid Shrimp, In Indonesia” (presented at “Asian Pacific Aquaculture 2016 conference“ Surabaya, Indonesia)
 - ❑ “Dense Populations of the Microsporidian *Enterocytozoon hepatopenaei* (EHP) in Feces of *Penaeus vannamei* Exhibiting White Feces Syndrome and Pathways of Their Transmission to Healthy Shrimp” (Journal of Invertebrate Pathology 140 (2016) 1–7)

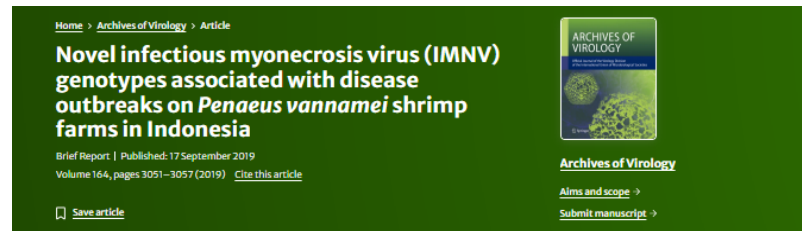




SUCCESS of THE LABORATORY TWINNING PROJECT 2014-2017

☐ Publications:

- ☐ Novel infectious myonecrosis virus (IMNV) genotypes associated with disease outbreaks on *Penaeus vannamei* shrimp farms in Indonesia (Archives of Virology (2019) 164: 3051 – 3057)
- ☐ Molecular and histopathological evidence supporting *Enterocytozoon hepatopenaei* association with white feces syndrome in farmed *Penaeus vannamei* in Venezuela and Indonesia (Diseases of Aquatic Organisms Vol. 141: 71–78, 2020)



Hung N. Mai, Bambang Hanggono, Luis Fernando Aranguren Caro, Ujang Komanuddin, Yuni L. Nur'aini & Arun K. Dhar

1090 Accesses 12 Citations [Explore all metrics](#)

Abstract

Infectious myonecrosis virus (IMNV) is one of the most pathogenic viruses that affect *Penaeus vannamei* shrimp. In 2018, IMNV was reported in grow-out ponds of *P. vannamei* in Situbondo, Indonesia. Diseased animals displayed clinical signs of infectious myonecrosis (IMN) characterized by white discoloration of skeletal muscle. Histopathology of affected shrimp revealed lesions that are pathognomonic of IMNV infection. The major capsid protein (MCP) gene was amplified and sequenced from representative samples showing IMN pathology. Multiple alignment of predicted amino acid sequences of the MCP gene with known IMNV genotypes in the GenBank database revealed three unique genotypes, SB-A, SB-B and SB-C, in Situbondo samples. The number of amino acid changes in SB-A, SB-B and SB-C compared to known IMNV genotypes ranged from 7–710, including the isolate SB-B, which contains deletion of 622 aa. A phylogenetic analysis using homologous sequences from Brazil and Indonesia showed that these three isolates represent new IMNV genotypes.

Access this article

[Log in via an institution](#)

Subscribe and save

- Springer+ from €37.37 /Month
 - Starting from 10 chapters or articles per month
 - Access and download chapters and articles from more than 300k books and 2,500 journals
 - Cancel anytime

[View plans](#)

Buy Now

[Buy article PDF 39,95 €](#)

Price includes VAT (Indonesia)
Instant access to the full article PDF.

Article Full-text available

Molecular and histopathological evidence supporting *Enterocytozoon hepatopenaei* association with white feces syndrome in farmed *Penaeus vannamei* in Venezuela and Indonesia

September 2020 | *Diseases of Aquatic Organisms* 141
DOI: [10.3354/dao03522](#)

LF Aranguren Caro · Hung Nam Mai · Orlando Pichardo · [Show all 6 authors](#) · Arun K. Dhar

Research Interest Score 28.7
Citations 35
Recommendations 0
Reads

[Learn about stats on ResearchGate](#)

Overview Stats Citations (35) References (20) [Download](#) [Share](#) [More](#)

Abstract

White feces syndrome (WFS) is an emerging and poorly described disease characterized by the presence of floating white fecal strings in shrimp (*Penaeus monodon* and *P. vannamei*) grow-out ponds. WFS has been associated with several pathogens, including *Enterocytozoon hepatopenaei*. This association is based on the fact that in areas where *E. hepatopenaei* has been reported, there was also a high WFS prevalence. *E. hepatopenaei* is an emerging pathogen that has affected cultured shrimp in Indonesia, Vietnam, China, Thailand, and India. In 2016, we reported the presence of *E. hepatopenaei* in farmed *P. vannamei* in Venezuela. In this study, we describe the first case of WFS in Venezuela associated with *E. hepatopenaei*. The white fecal strings and shrimp displaying white feces along the gastrointestinal tract observed in this study were similar to the gross signs found in WFS-impacted *P. vannamei* in SE Asian countries. Furthermore, we describe a strong association between WFS and *E. hepatopenaei* in the samples obtained from Venezuela and Indonesia. Quantification of *E. hepatopenaei* in WFS-affected ponds, ponds with a history of WFS, and ponds with no WFS showed that *E. hepatopenaei* loads were significantly higher in WFS-affected ponds. Furthermore, these findings constitute the first report of WFS being associated with *E. hepatopenaei* in farmed shrimp in Latin America. Additionally, we propose that the gross signs of WFS such as floating whitish fecal strings can be used as an indicator of the presence of *E. hepatopenaei* in countries where *E. hepatopenaei* is endemic.

ThermoFisher
SCIENTIFIC

Cancer Biomarker Research eBook

[Download eBook](#)

Discover how translational workflows, liquid biopsy assays, and advanced technologies help track cancer progression and therapy response

[Read now](#)

Highlights:

From discovery to analytical validation
Turn molecular data into clinically relevant insights

Liquid biopsy integration
Track disease and therapy response non-invasively

Cancer evolution & technologies



CHALLENGES

- ❑ Limited availability of human resources
- ❑ Limited of laboratory facilities

IMPACT of THE LABORATORY TWINNING PROJECT 2014-2017

- ❑ Strengthened laboratory and human resource capacity for shrimp disease diagnostics significantly.
- ❑ It provides benefits to the parent laboratory by increasing opportunities to work on significant shrimp diseases such as white feces disease and IMNV.





OIE Twinning Project on WSD and IHHN of China and Indonesia

2019 - 2022



**Yellow Sea Fisheries Research Institute, Chinese
Academy of Fishery Sciences (YSFRI), China
with
the Fish Quarantine and Inspection - Standard
Examination Laboratory (FQI-SEL), Indonesia**



BACKGROUND

As an archipelago, Indonesia has 17.502 islands; the total coastal length: 81.000 km; 70 % or 2/3 are ocean

01



02

The Production of the fishery products (2016) consist of capture fisheries 6,83 million tons and aquaculture 16,68 million tons, and its value reaches US\$ 4.17 billion

Utilization of potential fishery resources encourages increased trade activities of fisheries products

03

04

Increased fishery traffic activity brings the consequences of increased risk of entry and spread of dangerous fish diseases, for example WSSV (1994) and IHNV (2003)

Indonesia has strengthened the laboratory to test shrimp and fish diseases using PCR, Real Time PCR and DNA Sequencer.

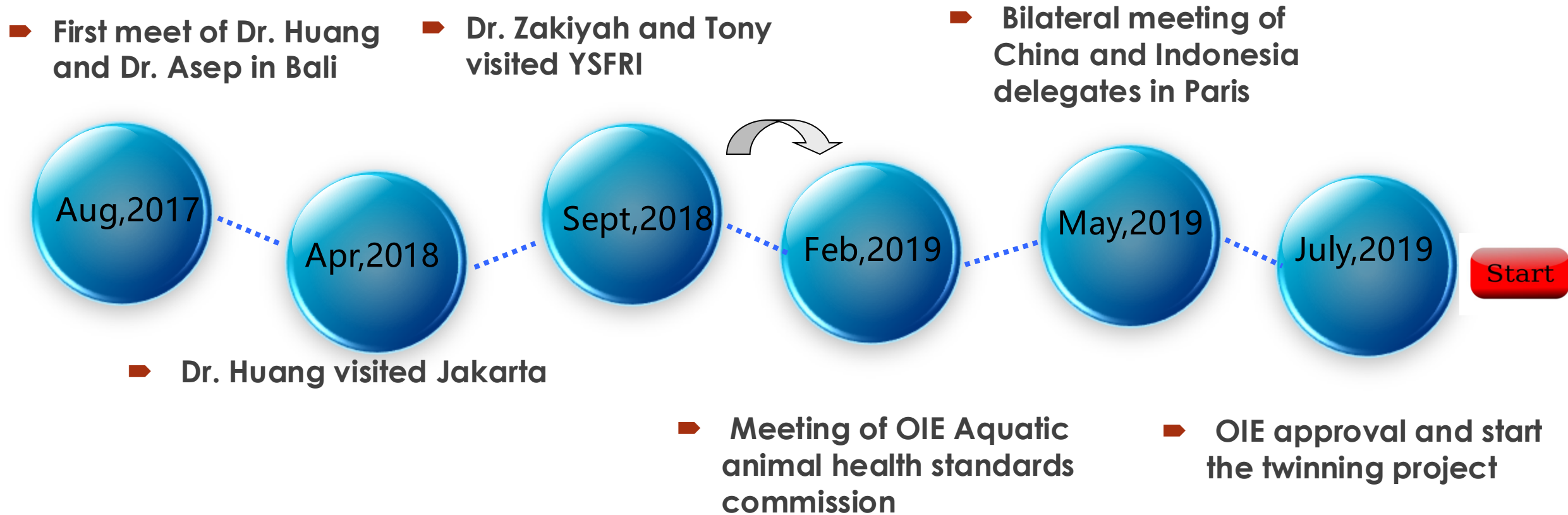
05

06

FQI STL's laboratory need to improve competence through twinning laboratory programs



Application Process of Twinning Programme





Funding

PARENT LABORATORY

Yellow Sea Fisheries Research Institute,
Chinese Academy of Fishery Sciences, People
Republic of China

- ❑ In the period of training visit 17-29 September 2019 in China, China covered two staff from Candidate Laboratory
- ❑ Parent laboratory prepares WSD and IHNN proficiency test materials where FQI-STL is one of the participants.

CANDIDATE

Fish Quarantine and Inspection-Standard Testing
Laboratory, Ministry of Marine Affairs and Fisheries,
Indonesia

- ❑ In the period of expert visit 26-30 August 2019, Indonesia covered one person from parent laboratory.
- ❑ Indonesia funded meetings, workshops, and training for 15 fish quarantine laboratories in 15 Indonesian provinces.
- ❑ Indonesia funded the implementation of WSSV and IHNNV proficiency testing, which involved 40 laboratories across Indonesia.

There is no funding contribution from
the OIE for this twinning program.



CERTIFICATE

TWINNING
LABORATORIES

On behalf of the OIE Member Countries, I certify the
successful completion of the OIE Laboratory Twinning project
between

YSFRI-CAFS
China

&

FQI - STL
Indonesia

on diagnosis and control
of WSD and IHHN

Paris, 27th January 2022

Dr. Monique Eloit
Director General of the OIE



SUCCESS of THE LABORATORY TWINNING PROJECT 2019-2023

- ❑ Improving laboratory personnel competency through training during the laboratory twinning program.
- ❑ FQI-STL has provided technical training in WSD and IHHNV diagnostics to 46 FQI laboratories throughout Indonesia.
- ❑ FQI-STL is developed Indonesian National Standards (SNI) for 10 aquatic animal disease detection methods.
- ❑ FQI-STL conducted national WSD and IHHN proficiency tests from 2018 to 2020, with more than 40 participating fish disease diagnostic laboratories in Indonesia.

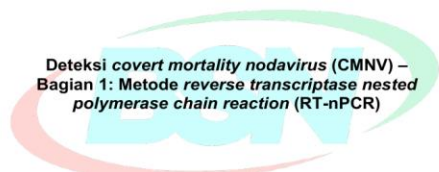


SNI 9060-1:2022

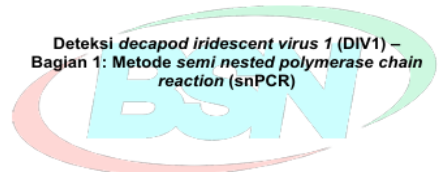


SNI 9062-1:2022

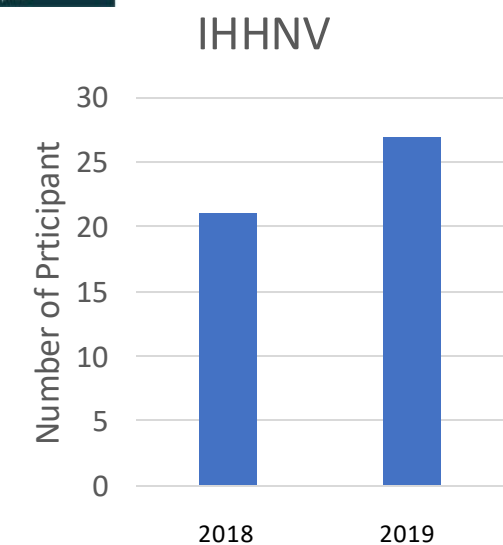
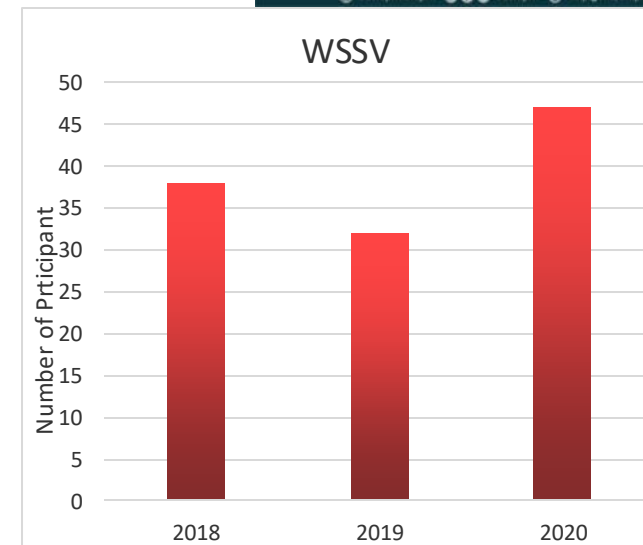
Halaman 1 dari 1 | Standar Nasional Indonesia | Standar Nasional Indonesia | Standar Nasional Indonesia



Deteksi covert mortality nodavirus (CMNV) –
Bagian 1: Metode reverse transcriptase nested
polymerase chain reaction (RT-nPCR)



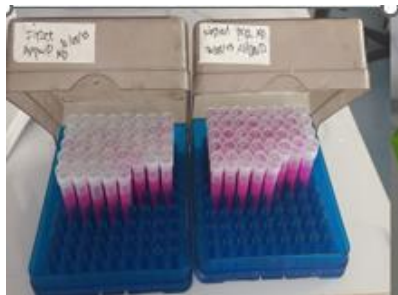
Deteksi decapod iridescent virus 1 (DIV1) –
Bagian 1: Metode semi nested polymerase chain
reaction (snPCR)





SUCCESS of THE LABORATORY TWINNING PROJECT 2019-2023

- ❑ FQI-STL Laboratory has received accreditation as a reference material producer according to ISO 17034:2016 for WSSV and *Aphanomyces invadans* parameters.
- ❑ FQI-STL has produced diagnostic kits for WSSV and IHHNV detection using multiplex PCR, which have been distributed to 22 FQI technical implementation unit laboratories.





CHALLENGES

HISTORY

- ❑ Before 2001: Fish quarantine was part of the agricultural quarantine system.
- ❑ 2001–2023: Fish quarantine was managed by BKIPM under the Ministry of Marine Affairs and Fisheries.
- ❑ Since 20 July 2023: Fish quarantine has been integrated into the Indonesian Quarantine Agency (Barantin) under Presidential Regulation No. 45 of 2023.
- ❑ Fish quarantine officially became part of the Indonesian Quarantine Agency (Badan Karantina Indonesia/Barantin) in 2024.

FISH QUARANTINE FACES SEVERAL SECTOR-GENERAL & SPECIFIC ISSUES

- ❑ Organizational Transition
- ❑ Regulatory Harmonization
- ❑ Human Resource Management
- ❑ Budget and Asset Transfer (Laboratory)
- ❑ Surveillance and control of aquatic animal diseases.
- ❑ Continuity of diagnostic laboratory services.
- ❑ Coordination with fisheries management authorities.
- ❑ Responding rapidly to emerging aquatic diseases.



Twinning Laboratory Program Impact on Laboratory Capacity And Aquatic Animal Health Systems In Indonesia

- ❑ The FQI-STL has been integrated with animal and plant quarantine to become the Indonesia Quarantine Standard Testing Laboratory.
- ❑ The accreditation scope for WSD has increased to 25 laboratories and IHHNV to 14 laboratories out of 38 accredited Indonesian quarantine laboratories across all provinces, helping to accelerate the diagnosis of WSSV and IHHNV in various provinces across Indonesia.
- ❑ The FQI-STL is accredited as a proficiency testing provider (ISO/IEC 17043:2023) and a reference material producer (ISO 17034:2016). This expanded accreditation scope has made it easier for aquatic animal diagnostic laboratories to obtain certified reference materials.
- ❑ The reduction in outbreaks of WSD and IHHNV in shrimp farming areas is related to the implementation of biosecurity and shrimp disease monitoring throughout the cultivation period.



Thank you

