Sharing Malaysian Experience: Active Surveillance

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National CA

Director General
Department of Fisheries

Fisheries Biosecurity Division

Fisheries Research Institute

National Fish Health Research Division
(NaFisH)

Main Tasks
- **Surveillance programmes**
  (OIE listed Diseases)
- **Registration**
  (Farm/Importer/Exporter)
- **Import and Export Procedures**
- **Report Compilation**
  (Including OIE /NACA disease)

Main Tasks
- **R&D&C**
  (Epidemiology-high economic impart diseases)
- **R&D&C**
  (Control measures/Alternative medicine)
- **Disease Expert/ Reference Centre**
- **Diagnostic works**

National Fish Health Strategy for Malaysia

Objective:

- To **minimize the risk of fish diseases** impacting on the sustainable development of aquaculture, with some consideration for the **aspects of aquatic biodiversity, food security, food safety and the economy**

Duration:

- 5 years (2018 until 2022)

Committee:

- 23 members (2016) under FAO Project TCP/MAL/3501

Strategy:

- 15 Programme Elements
- 38 projects

15 Programme Elements

	Program	Number of Project
1	Policy, Legislation and Enforcement	5
2	Risk Analysis	4
3	Pathogen List	1
4	Border Inspection and Quarantine	3
5	Diagnostics	2
6	Farm-level biosecurity and health management	4
7	Chemicals, Veterinary Drugs, effective microbes and Antimicrobial Resistance (AMR) in Aquaculture	1
8	Surveillance, Monitoring and Reporting	5
9	Communication and Information System	1
10	Zoning and Compartmentalization	1
11	Emergency Preparedness and Contingency Planning	3
12	Research and Development	2
13	Institutional Structure (including Infrastructure)	1
14	Human Resources and Institutional Capacity Development	4
15	Regional and International Cooperation	1

Pathogen list

Surveillance, Monitoring and Reporting

Research and Development

DOF Malaysia - 27 Diseases of concern

Commodity	National-listed Diseases		Importing country requirements
	OiE-listed Diseases	**Economic Importance-listed Diseases**	
Shrimp	1. Taura syndrome 2. White spot disease 3. Yellowhead disease 4. Infectious hypodermal and haematopoietic necrosis 5. Infectious myonecrosis 6. Acute hepatopancreatic necrosis disease	*7.* *Enterocytozoon hepatopenaei* (EHP) 8. Decapod iridescent virus 1 (DiV1) ***new*** 9. Viral covert mortality disease (VCMD) ***new***	
Finfish	1. Koi herpesvirus disease 2. Spring viraemia of carp 3. Epizootic ulcerative syndrome 4. Red sea bream iridoviral disease	5. Tilapia Lake Virus 6. Viral nervous necrosis 7. Iridovirus 8. Skin monogenean 9. Streptococcus sp. 10. Enteric septicaemia of catfish 11. Nocardiosis 12. Flexibacter 13. Vibriosis 14. Isopod infestation	15. Megalocytivirus *16.* *A.salmonicida* 17. Enteric redmouth disease
Mollusc	1. Infection with *P.olseni*		

DoF Malaysia - 24 Aquatic Animal Surveillance

Active Surveillance

Shrimp

1. Taura syndrome
2. White spot disease
3. Yellowhead disease
4. Infectious hypodermal and haematopoietic necrosis
5. Infectious myonecrosis
6. Acute hepatopancreatic necrosis disease
7. *Enterocytozoon hepatopenaei* (EHP)
8. Decapod iridescent virus 1 (DIV1) ***new***

Fish

9. Koi herpesvirus disease
10. Spring viraemia of carp
11. Epizootic ulcerative syndrome
12. Red sea bream iridoviral disease
13. Tilapia Lake Virus
14. Viral nervous necrosis
15. Iridovirus
16. Skin monogenean

Passive Surveillance

Shrimp

1. Viral covert mortality disease (VCMD)

Fish

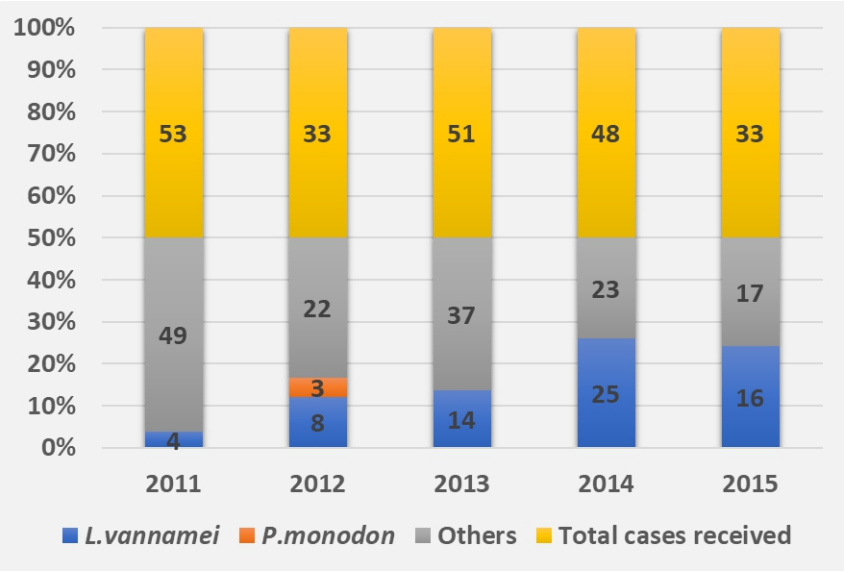
2. Streptococcus sp.
3. Enteric septicaemia of catfish
4. Nocardiosis
5. Flexibacter
6. Vibriosis
7. Isopod infestation

Active surveillance of microsporidian Enterocytozoon hepatopenaei (EHP) in farmed shrimp in Malaysia

1

Problem statement
(What/How)
-impact

- Report on slow growth performance in white shrimp *L.vannamei* *(information gathered during the EMS/AHPND surveillance programmes in 2011/12)*
- Shrimp with slow growth performance have various sizes resulting in reduced farm productivity *(information gathered during observation/interview & diagnosis cases reported to NaFisH during 2011-2015)*
- EHP was confirmed associated with shrimp with slow growth performance
- **Country status on EHP** was reported in NACA/FAO/OIE QAAD report in 2016
- **EHP was group under Non OiE-listed diseases**



Data from Passive surveillance

Active surveillance of microsporidian Enterocytozoon hepatopenaei (EHP) in farmed shrimp in Malaysia

1

Problem statement *(What/How) -impact*

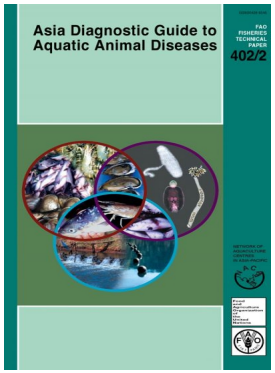
Problem statement *(Where/When/Why) -occurrence*

- Marine shrimp farming (*L.vannamei* & *P. monodon*)
- Whole stage/one cycle production
- Spreading disease/vector/carrier

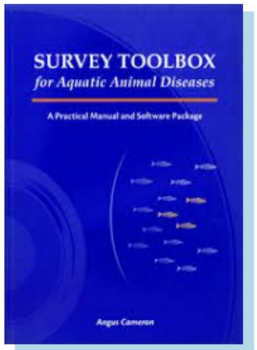
2

Objectives of Epidemiology

i.	**To determine EHP infection in one rearing cycle**	$H_{0(i)} : \mu_1 = \mu_2$ $H_{A(i)} : \mu_1 \neq \mu_2$
ii.	**To identify the potential macrofauna that may act as a carrier of EHP**	$H_{0(iii)} : \mu_1 = \mu_2$ $H_{A(iii)} : \mu_1 \neq \mu_2$
iii.	**To determine the effect of EHP on the Specific Growth Rate(SGR) of the infected shrimp**	$H_{0(ii)} : \mu_1 = \mu_2$ $H_{A(ii)} : \mu_1 \neq \mu_2$



FAO Fisheries Technical Paper No. 402, (2001)



Cameron, 2002

Manual Kit prosedur Kes Diagnosis (2019)

3

Research methodology

A.Research personnel/facilities & Financial		
i.	Researcher officers (specialized field)	2 (parasitology & pathology)
ii.	District Fisheries staff	1/state
iii.	Researcher assistant/MSc Std	1 MSc
iv.	Facilities	Necropsy lab., Parasite lab., Histology lab. & PCR lab.
v.	Financial	11th Malaysia Plan

B.Interaction with farmers		
i.	Farmers Commitment	3 farmers (Johor, Penang & Kedah)
ii.	Species of culture	*L.vannamei*
iii.	Study timeframe	1 year
iv.	Methods sampling	Random sampling/shrimp ponds periodically

C.Sample collection		
i.	Location of farm	Johor, Penang & Kedah
ii.	Species of culture	*L.vannamei*
iii.	Stage of culture/cycle	PL, DOC 14, 30, 50 & 70
iv.	Sample condition & size	Alive & 60 PL/site, 30 shrimps/site/stage

Active surveillance of microsporidian Enterocytozoon hepatopenaei (EHP) in farmed shrimp in Malaysia

3

Research methodology

D.Laboratory Test/Result		
i.	Gross observation	Clinical sign (Field Form)
ii.	Detection methods	Smear(Giemsa stain) Histology(H&E stain) PCR for EHP *(Jaroenlak et al., 2016)* PCR for identification of Macrofauna *(Barcoding)*
iii.	Keyin data	Field Form (raw), Pivot table

4

Data Analysis

E. Data Analysis		
i.	EHP on *P. vannamei* in one rearing cycle	Prevalence (Light & Heavy) *-PL, DOC14, 30, 50 & 70*
ii.	EHP on Macrofauna examined	Prevalence(Light & Heavy) *-Crab, Insert, wild fish, molluscs, polychaetes*
iii.	The effect of EHP on the Specific Growth Rate(SGR) of infected shrimp	SGR *- Non-infected and infected shrimp (*Anova one way)

Active surveillance of microsporidian Enterocytozoon hepatopenaei (EHP) in farmed shrimp in Malaysia

5 Results & Summary

i. Cultured shrimp, *L. vannamei* in an earthen pond for one rearing cylce from 3 states in Malaysia shown prevalence ranging from 88 to 100% confirmed by PCR method.

EHP Status of PL(Before stocking)	Early detection of EHP (< DOC 31)		Later detection of EHP (> DOC 31)	
	Light Infection	Heavy Infection	Light Infection	Heavy Infection
Unknown status	100	0	10	80
100% positive(Light infection)	80	20	30-50	40-60
100% positive (50% Light & 50% Heavy)	100	0	30-50	50-90

6 Knowledge Dissemination

i.	Report	Diagnostic reports for 3 states
ii.	Dialogue with targeted group	Feb 2020 - State Fisheries & farmers from 3 states - Phamplet on EHP
iii.	Technical paper/Publication	Dis Aquat Org 144: 1–7, 2021

Active surveillance of microsporidian Enterocytozoon hepatopenaei (EHP) in farmed shrimp in Malaysia

1 Problem statement

(What/How/Where/When/Why)
-impact & occurence

a) Marine shrimp farming (*L.vannamei* & *P. monodon*)
b) Whole stage/one cycle production
c) Spreading disease/vector/carrier

CH-1
Status of EHP is confirmed in Malaysia

CH-3
EHP's population in pond

CH-4
EHP is spreading & has potential vector in pond

2 Objectives of Epidemiology

a) To determine EHP infection in one rearing cycle of shrimp (*L.vannamei*)
b) To identify the potential macrofauna that may act as a carrier of EHP
c) To determine the effect of EHP on the Specific Growth Rate(SGR) of the cultured shrimp

CH-2
EHP surveillance in one rearing cycle

3 Research methodology

a) Research personnel/facilities/financial
b) Interaction with farmers
c) Sample collection
d) Laboratory Test/Result

CH-11
Human & Resources needed in EHP study

CH-5
Case definition of EHP

CH-7
EHP study design

CH-6
Diagnostic testing of EHP

CH-8
EHP Database

4 Data Analysis

a) EHP on *L. vannamei* in one rearing cycle: Prevalence-PL, DOC14, 30, 50 & 70
b) EHP on macrofauna examined: Prevalence-Crab, Insert, wild fish, molluscs, polychaetes
c) The effect of EHP on the SGR: non-infected and infected shrimp with Anova one way

CH-9
EHP's data Analysis

5 Result & Summary

a) Prevalence EHP on *L. vannamei* in one rearing cycle
b) Prevalence EHP on Macrofauna in rearing pond
c) The effect of EHP on the SGR of infected infected

CH-12
Management of EHP in one rearing cycle

6 Knowledge Dissemination

a) Report
b) Dialogue with targeted group(State Fisheries & farmers from 3 states)
c) Technical paper/Publication

CH-10
EHP's Quality assurance(?) & validation

Thank you

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