



Food and Agriculture
Organization of the
United Nations



THE WORLD BANK
IBRD • IDA

**Stakeholder Consultation on Progressive Management Pathway (PMP) to
Improve Aquaculture Biosecurity**

World Bank Headquarters, Washington, D.C. 10-12 April 2018

Biosecurity in Aquaculture: Philippines

Leobert de la Peña (SEAFDEC/AQD)

leobertd@seafdec.org.ph

Joselito Somga (DA-BFAR)

Dan Baliao (SEAFDEC/AQD)



Important references on shrimp biosecurity

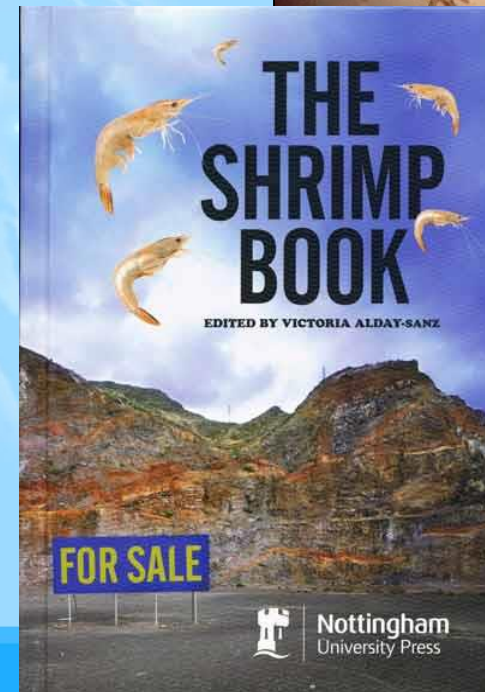
Lotz, J.M. 1997. Disease control and pathogen status in an SPF-based shrimp aquaculture industry, with particular reference to the United States. pp. 243–254. In T.W. Flegel and I.H. MacRae. (eds.) *Diseases in Asian Aquaculture III*. Asian Fish. Soc., Fish Health Sect., Manila, Philippines.

Fegan, D.F. & Clifford, H.C. III. 2001. Health management for viral diseases in shrimp farms. pp. 168–198 In C.L. Browdy and D.E. Jory. (eds.) *The New Wave: Proceedings of the Special Session on Sustainable Shrimp Farming*. The World Aquaculture Society. Baton Rouge, LA, USA..

FAO. 2003 Health management and biosecurity maintenance in white shrimp (*Penaeus vannamei*) hatcheries in Latin America

Danner, G.R., and Merrill, P., 2006. Disinfectants, disinfection and biosecurity in aquaculture. In. *Aquaculture Biosecurity, prevention, control and eradication of aquatic animal diseases*. Scarfe, A.D., Lee, C. and O'Bryen, P.J. Blackwell Publishing. USA. 182p.

The Shrimp Book. Editor, Victoria Alday Sanz. 2010. Nottingham University Press. United Kingdom.



Problem:

Economic losses in aquaculture

Cause:

Mortalities due to disease outbreaks

One of the solutions:

Strict implementation of
biosecurity program





What is biosecurity?

The sum total of the activities and measures taken by aquaculture production facility to protect the cultured stocks from the possible negative impacts resulting from the introduction and spread of serious aquatic animal diseases (modified from FAO, 2007).

Sets of practices that will reduce the probability of a pathogen introduction and its subsequent spread from one place to another (Lotz, 1997).

Biosecurity = "safe life" (Greek, bios = life + Latin, securitas = secure/safe)

Biosecurity = risk management

Biosecurity refers to the activities with the goal:

1. prevent
2. control
3. eradicate risks to life and health
4. reduce the economic impact of diseases



Program of SEAFDEC/AQD related to Biosecurity

- SEAFDEC/AQD has continued implementing a regional program entitled “*Promotion of sustainable aquaculture and resource enhancement in Southeast Asia*” under the ASEAN-SEAFDEC Fisheries Consultative Group Program.
- Under this program, project entitled “Reinforcement and optimization of fish health management and the effective dissemination.”
- ASEAN Regional Technical Consultation on Aquatic Emergency Preparedness and Response Systems for Effective Management of Transboundary Disease Outbreaks in Southeast Asia



Program of SEAFDEC/AQD related to Biosecurity

The following activities make up this project:

- Development and acceleration of rapid and effective fish and shrimp health management,
- Enhancement of vaccine efficacy for the prevention of viral nervous necrosis in high value marine fish,
- Application of adjuvants, carriers and RNAi technology to enhance the antiviral immune response of shrimp to WSSV,
- Establishment of protective measures against persistent and emerging parasitic diseases of tropical fish,
- Epidemiology of acute hepatopancreatic necrosis disease (AHPND) in *Penaeus monodon*, and
- Technology extension and demonstration.



Challenges

Shrimp

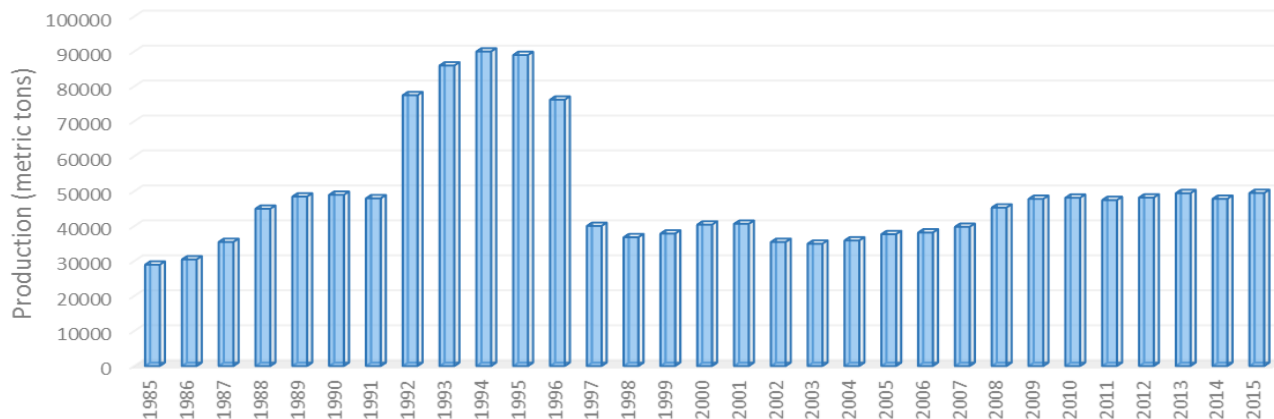
In the early 1990s, the Philippines was the third most important shrimp producing country after Thailand and Indonesia, with a production of over 90,000 t, primarily of black tiger shrimps (*Penaeus monodon*). However, bacterial disease caused the industry to collapse to half its production level and has not yet fully recovered. Current interest is spurred by *P. vannamei*, BFAR lifted the ban on its production in January 2007 after experimenting on a Specific Pathogen Free broodstock and drafting specific guidelines on its culture.

Biosecurity in open water for cage culture system (wild stocks potential/possible carrier of aquatic animal diseases/pathogens)

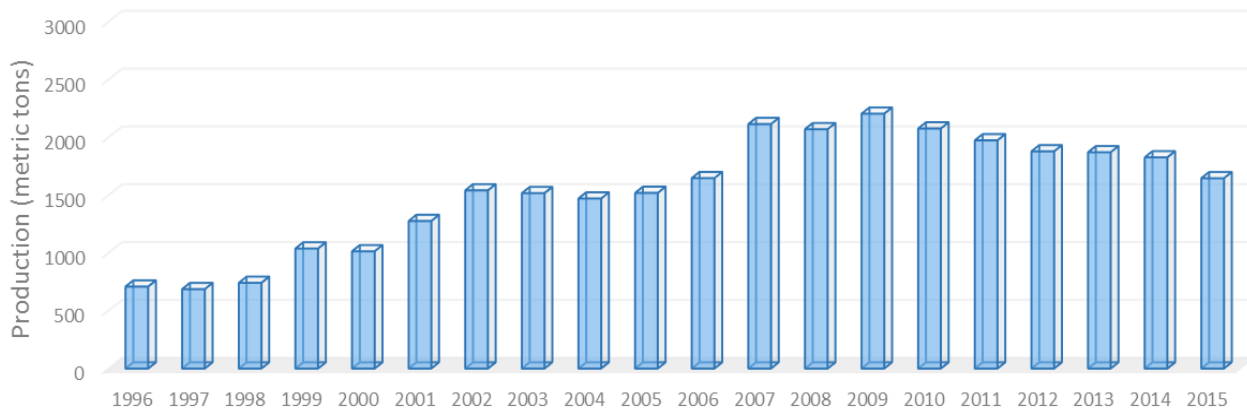
Challenges

Production of Cultured Shrimp in the Philippines

Volume of Production of *P. monodon* in the Philippines from 1985-2015



Volume of Production of *P. vannamei* in the Philippines from 1996-2015



Cultured shrimp is a major export commodity of the Philippines with **50,000 metric tons** production in 2015 valued at **around USD 300 million** with a total fry requirement estimated at **400 million per month**.

Challenges

WSSV Outbreak in *P. monodon*,
Quezon Province
(Y 2005)



Challenges

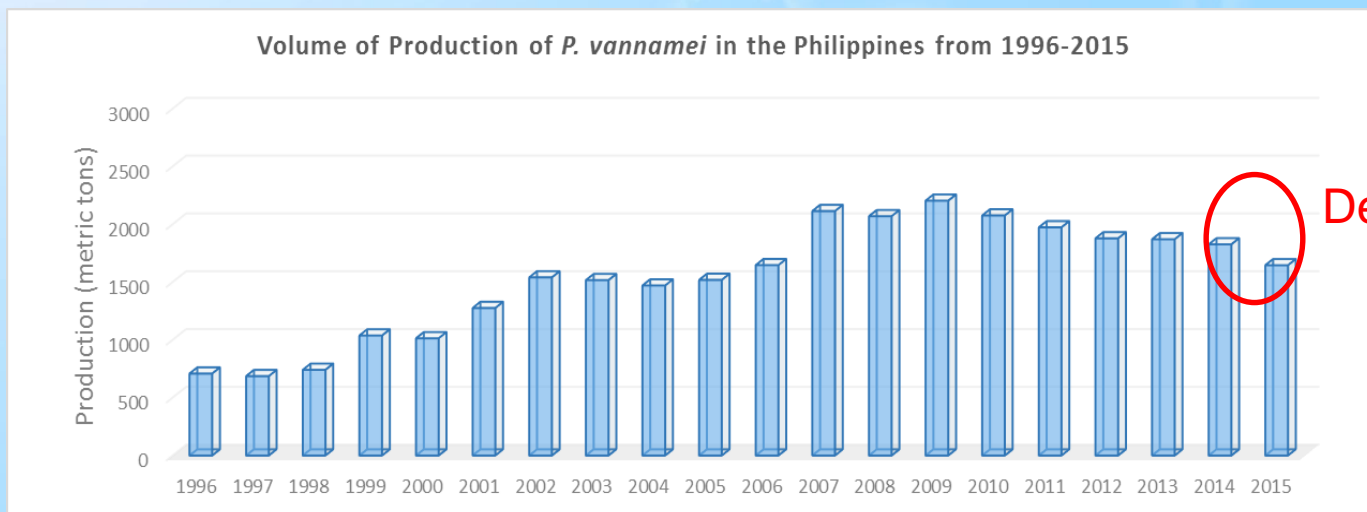
AHPND Asian Pandemic

In 2014, shrimp farms in the Philippines with disease outbreaks were confirmed to be positive for AHPND.



Challenges

Annual Production of Shrimp from 1996-2014 (Bureau of Agricultural Statistics – BAS)



Bureau of Agricultural Statistics, 2015



Solutions/interventions by the Philippine Government (DA-BFAR)

FISHERIES ADMINISTRATIVE)

ORDER NO. 214 : Series of 2001)

SUBJECT: Code of Practice for Aquaculture

SECTION 10. Fish health management. – The following practices shall be complied with to provide effective management of fish health focusing on disease prevention rather than disease treatment, eventually reducing the incidence of diseases and protecting the natural fisheries.

- a. Sustainable farming practices shall be promoted;
- b. Appropriate quarantine procedures, handling, transport and proper acclimatization of healthy fry and fingerlings prior to stocking shall be strictly observed;



- c. Good water quality shall be maintained by using appropriate stocking and feeding practices;
- d. For non-infectious diseases related to pond condition, specific corrective management measures shall be carried out;
- e. For mild infectious diseases with potential to spread within a farm, the pond shall be quarantined and remedial measures shall be applied;
- f. For serious infectious diseases that may spread widely, the pond shall be isolated and the remaining fish shall be harvested by net and the pond shall be disinfected without discharging the water;
- g. Treatment shall be done only when necessary;
- h. Dead, diseased fish shall be disposed of in a sanitary manner to prevent the spread of the disease;
- i. When disease occurs, transfer of fish, equipment and pondwater shall be avoided;
- j. Fishfarmers shall participate in the BFAR's national program on disease information, surveillance and reporting system; and
- k. On-site disease monitoring shall be conducted only by a competent Aquatic Animal Health Officer



Solutions/interventions by the Philippine Government (DA-BFAR)

Republic of the Philippines
DEPARTMENT OF AGRICULTURE
Office of the Secretary
Elliptical Road, Diliman, Quezon City

FISHERIES ADMINISTRATIVE)
ORDER NO. 225-1:
Series of 2007)

Subject: Guidelines for the Importation and Culture of the Pacific White Shrimp (*Penaeus vannamei*)

Pursuant to the provision of Fisheries Administrative Order No. 225, Series of 2007 entitled "**Allowing the importation of the broodstock of Pacific White Shrimp (*Penaeus vannamei*) and culture of the offspring thereof**" the following rules and regulations are hereby issued:

Section 1. Shrimp Broodstock Importation - the following measures shall be observed in the importation of *P. vannamei* broodstock.:

a. Pre-border Biosecurity Measures

1. Prior to the issuance of special import permit to accredited shrimp hatchery for importation of SPR/SPF *P. vannamei* broodstock, Proponent shall submit a **CERTIFICATE OF COMPLIANCE** duly signed by the National BFAR Director. The issuance of the Certificate shall be based on the results of the inspection of hatchery facilities that shall be authorized to breed *P. vannamei*. Inspection and accreditation shall be undertaken by National Fisheries Research and Development Institute (NFRDI) to be assisted by concerned BFAR Regional Offices.

<https://www.bfar.da.gov.ph/LAW?fi=382>



Solutions/interventions by the Philippine Government (DA-BFAR)

Republic of the Philippines
Department of Agriculture
Office of the Secretary
Elliptical Road, Diliman, Quezon City

FISHERIES ADMINISTRATIVE)

ORDER NO. 230-1 :

Series of 2009.)

SUBJECT: Guidelines for the Importation and Culture of the Broodstock and/or Postlarvae of Specific Pathogen Free / Specific Pathogen Resistant (SPF / SPR) Black Tiger Shrimp (*Penaeus monodon*) and Culture of Offspring thereof

Pursuant to the provisions of Fisheries Administrative Order No.230, Series of 2009 entitled "**Allowing the importation and culture of the broodstock and/or post- larvae of specific pathogen free / specific pathogen resistant black tiger shrimp (*Penaeus monodon*) and culture of the offspring thereof**" the following rules and regulations are hereby issued:

Section 1. Shrimp Broodstock and/or Post-larvae Importation- The following measures shall be observed in the importation of *P. monodon* broodstock and/or postlarvae:

a. Pre-border Biosecurity Measures

1.) Prior to the issuance of special import permit to accredited shrimp hatchery for importation of SPF/SPR *P.monodon* broodstock and/or post larvae, Proponent shall submit a **CERTIFICATE OF COMPLIANCE** duly signed by the National BFAR Director. The issuance of the Certificate shall be

<https://www.bfar.da.gov.ph/LAW?fi=390>



Solutions/interventions by the Philippine Government (DA-BFAR)

Republic of the Philippines
Department of Agriculture
Office of the Secretary
Elliptical Road, Diliman, Quezon City

FISHERIES ADMINISTRATIVE)

ORDER NO. 231

Series of 2009.)

SUBJECT: Amending Section 1 a-1, a-2, a-4, d-1, d-3 and e-1 of Fisheries Administrative Order No. 225-1 Series of 2007 as follows:

SECTION 1. Section 1 of FAO No. 225-1 s. 2007 is hereby amended to read as follows:

"Section 1. Shrimp Broodstock Importation – the following measures shall be observed in the importation of P. vannamei broodstock.

a. Pre-border Biosecurity Measures

1. Prior to the issuance of special import permit to accredited shrimp hatchery for importation of SPF/SPR P. vannamei broodstock, Proponent shall submit a CERTIFICATE OF COMPLIANCE duly signed by the National BFAR Director. The issuance of the Certificate shall be based on the results of the inspection of hatchery facilities that shall be authorized to breed P. vannamei. On site inspection within the country shall be undertaken by Regional P. vannamei Panel as stipulated from Section 2 of FAO 225-1 Series of 2007. The Regional Panel shall be entrusted to conduct the site inspection of applicant's shrimp hatchery facility in accordance to and in compliance to minimum bio-

<https://www.bfar.da.gov.ph/LAW?fi=391>



Biosecurity in Hatchery Operation

Stages of Hatchery Operation

Facility Entrance

Water Management

Maturation

Hatchery

Natural food

Facility Entrance

- control at entrance for personnel, vehicles and other disease vectors to prevent transfer of infections from other hatcheries and environment
- chlorine (50-100 ppm) treated foot bath and tire bath; commercial disinfectants



Water Management

- all the water used in production units must be treated (chlorine, ozone, UV, ultrafiltration) to kill pathogens
- bacterial analysis should be conducted 2X a week (**luminous bacterial count, *V. parahaemolyticus*, Total *Vibrio* count**)



Maturation

- quarantine of incoming broodstock (at least 20 days)
- disinfection of equipment, tanks and water and air lines (chlorine – 20 ppm)
- disinfection of broodstock (iodine-PVP-20 ppm, formalin- 50-100 ppm), eggs (iodine-PVP – 50-100 ppm, formalin – 100 ppm) , and nauplii
- fry should be submitted to PCR analysis 2-3X prior to harvest (before PL5, PL10, & PL15)



Hatchery

- regular dry-out periods
- cleaning and disinfection of buildings, tanks, filters, water and air lines and equipment
- separation of working materials for each room and each tank



Natural food

- restriction of entrance of personnel to algal laboratory and tank facilities
- disinfection of equipment, tanks, water and air
- disinfection and quality control of algae
- disinfection of *Artemia* cyst and nauplii





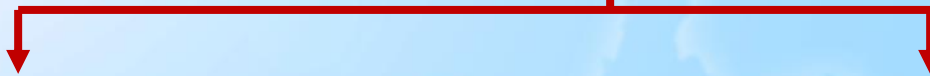
Screening of WSSV & AHPND in Hatchery using PCR

Check spent spawners



Rinse eggs with sterile seawater/disinfection

Check eggs or nauplii



Positive for WSSV

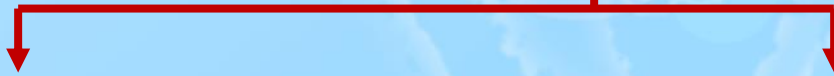
Negative for WSSV



Disinfect and discard

Larval rearing

Check PL per tank 2-3 times before market



Positive for WSSV

Negative for WSSV



Disinfect and discard

Market



Biosecurity in Grow-out Operation

Stages of Grow-out culture

Fry Selection

Pond Preparation

Water Source

Stocking of Fry

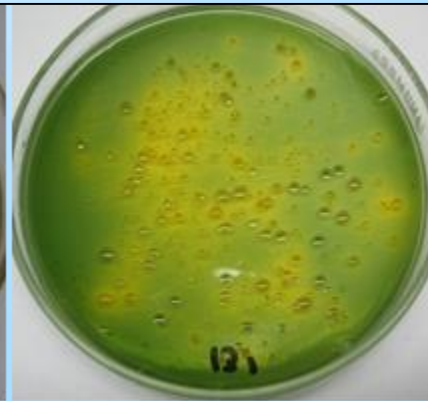
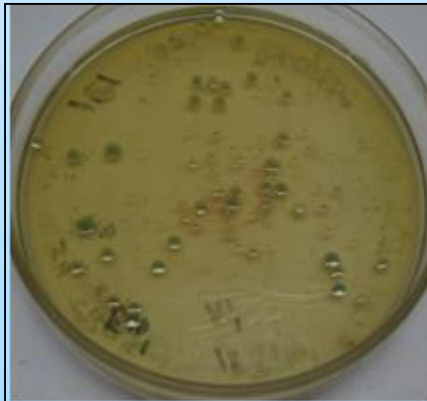
**Reservoir /
Treatment Pond**

Feeding Management

Greenwater Pond

Water Management

Fry Selection



PCR analysis for AHPND-every week, and WSSV every 2 weeks.
Bacterial analysis of water 2X a week

Water Source

- disinfection of pond water (chlorine at 20-30 ppm)
- Bacterial analysis
- water filtration using filter bags of 100-250 μm mesh size



Reservoir / Treatment Pond



- filter bags, flumes, dikes, paraphernalia and liner are disinfected with chlorine (20 – 30 ppm) or commercial disinfectants
- water pumped into the pond should be disinfected with chlorine (20-30 ppm)
- disinfected seawater is settled for 3 days with aeration before using as rearing water in grow-out ponds.



Greenwater Pond



- use disinfected water from treatment pond
- treat tilapia with formalin before stocking
- stock tilapia at 2-3 tons/ha to minimize the growth of pathogenic *Vibrio*
- monitor phytoplankton profile, bacterial tests (luminous bacterial count, *V. parahaemolyticus*, Total *Vibrio* count).

Pond Preparation

1. Mouldboard



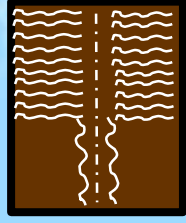
2. Mouldboard



3. Pulverizing / Harrowing



4. Mouldboard



8. Pulverizing / Harrowing



7. Disc Plow



6. Liming



5. Pulverizing / Harrowing



9. Levelling & Compacting



10. Fixing of Filter Screens / Tanks / Bunkers



11. Fixing of paddle wheel aerators



12. Liming



Pond Preparation

- installation of HDPE liner eliminates cross contamination of diseases due to seepage between pond dikes
- reduce pond preparation time and cost
- improves water conservation and control soil erosion
- Disinfect liner



Pond Preparation



Bird scare



Crab fence



Aerosol barrier



Hand washing area



Foot bath in between ponds

Stocking of Fry

- upon arrival, the fry bags are disinfected and rinsed with running water prior to stocking



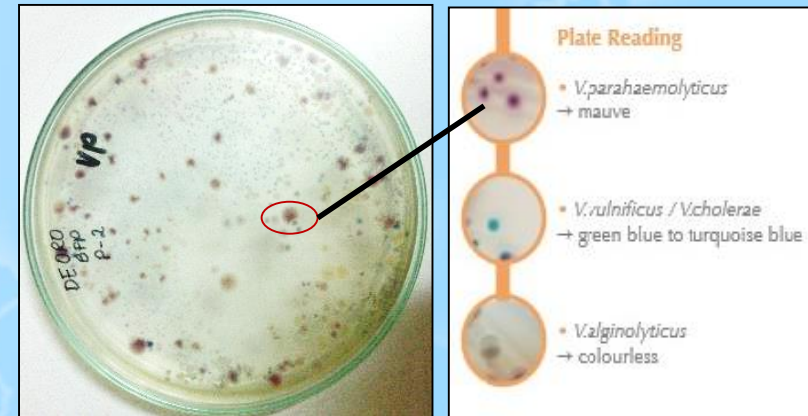
Feeding management



- from DOC 2, implement nutritional supplementation in the feeds
- supplement the feeds with probiotics, immunostimulant and vitamins for better digestion and gut wellness.

Water Management

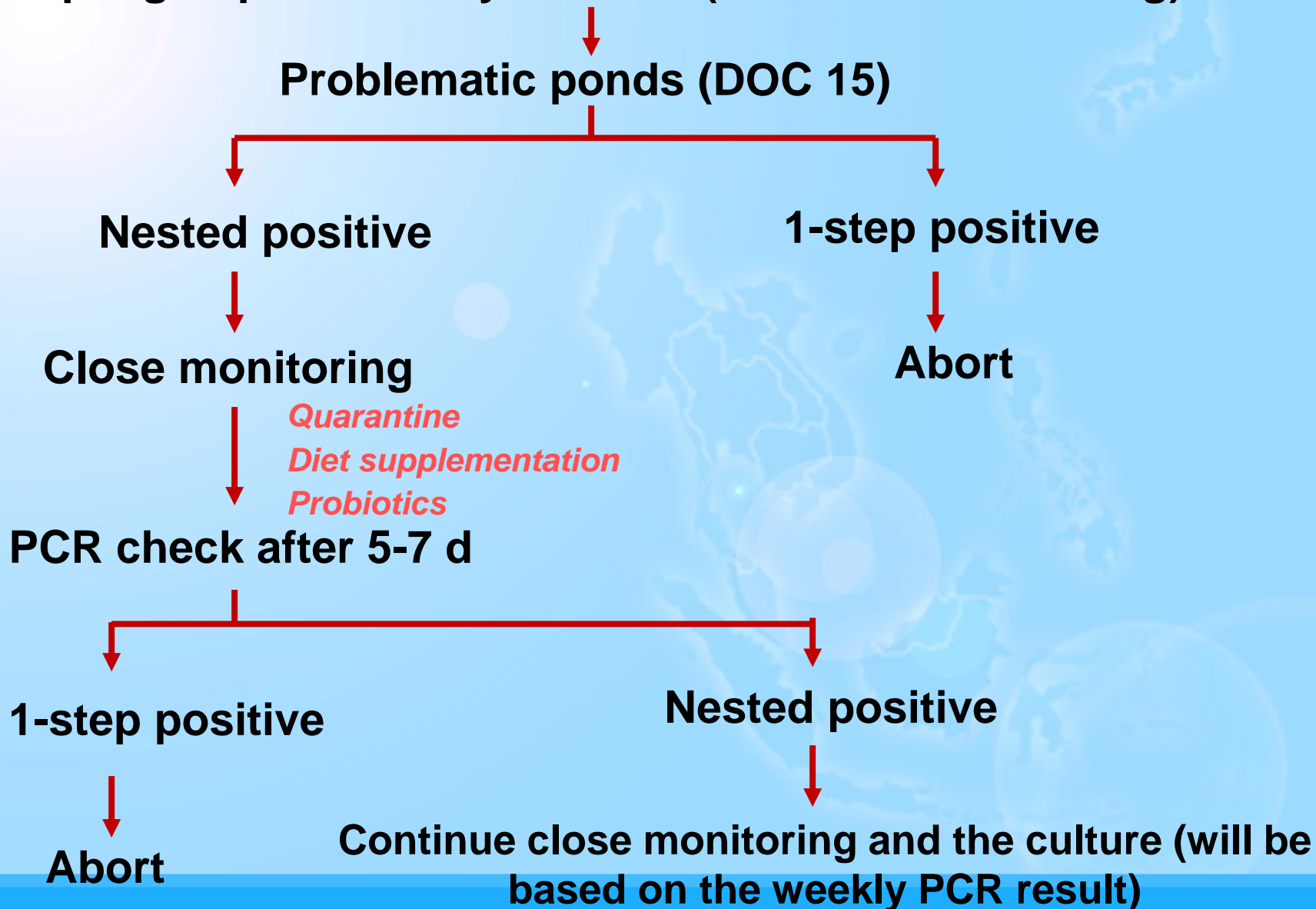
- Monitor physico-chemical parameters, phytoplankton count and bacterial load 2X a week (luminous bacterial count, *V. parahaemolyticus*, Total *Vibrio* count).
- Periodic application of organic disinfectant to lower bacterial load, trace elements (5-10 kg/ha) for stable algal bloom and probiotics.





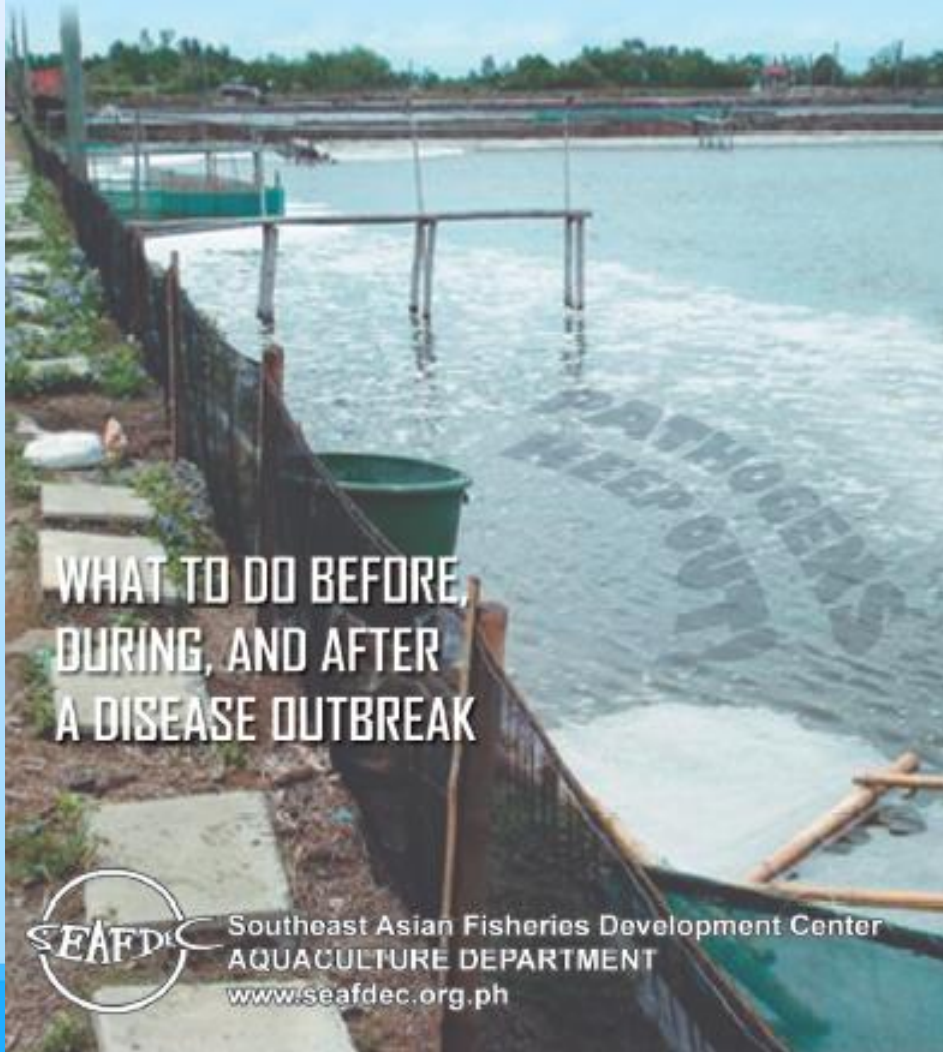
Screening of WSSV & AHPND in Grow-out Ponds using PCR

Sampling of ponds every 2 weeks (Proactive monitoring)



BIOSECURITY

for shrimp farms



WHAT TO DO BEFORE,
DURING, AND AFTER
A DISEASE OUTBREAK



Biosecurity measures in the grow-out phase

BEFORE DISEASE HITS YOUR FARM

1. Observe GMP or good management practices



Provide settling and treatment pond



Provide reservoir with fish (tilapia is popular)



Provide a filtration system



Use good quality fry (or WSSV-negative fry as certified by a disease diagnostic lab)

2. Install biosecurity measures



Tire bath at the farm entrance



Footbath and hand disinfection at the pond entrance



Nets and high-density polyethylene liners as crab fence



Bird scaring device



Individual paraphernalia (feeding trays and boat, secchi disc, refractometer, basins, sampling materials) for each pond

Biosecurity measures in the grow-out phase



Farm personnel should:

Not have visited other shrimp culture sites or facilities within the past 24 hours



Change into a work uniform and foot gear before entry into areas where shrimp are raised



Under some conditions, shower in addition to changing clothes, prior to entering the shrimp production facilities

3 Monitor the presence of viruses by sending tissue samples regularly to a disease diagnostic laboratory

DURING DISEASE OUTBREAK

- 1 Do not drain contaminated pond water
- 2 Report immediately the disease outbreak to either:

SEAFDEC Dumangas Brackishwater Station, Dumangas, Iloilo
Telefax no. (033) 527-3016

SEAFDEC Tigbauan Main Station, Tigbauan, Iloilo
Telefax no. (033) 511-9029 (Attn: TVCD)

- 3 When proven to be infected by WSSV or other shrimp viral diseases, eradicate hosts (shrimp stock and other crustaceans) mechanically and **hold rearing water** for at least a week. Sell the shrimp if big enough, but gather the remaining crustaceans and **burn**

Bear in mind though that any uncooked, infected shrimp or its washings are potential sources of the virus

Ideally, **crusticide** treatment should be applied to affected ponds before **disinfection** and release of water

- 4 SEAFDEC will report this disease outbreak to the Department of Agriculture Local Government Units (DA-LGU)
- 5 DA-LGU will inform other farms in the locality of the outbreak to prevent the spread of diseases

AFTER DISEASE OUTBREAK

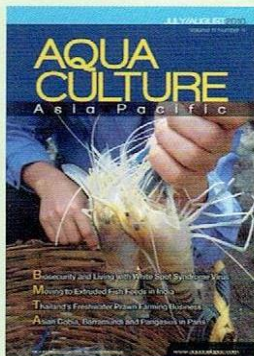
To avoid recurrence:

- 1 **Review your operations.** Did you do GMPs? Were the biosecurity measures in place? Was your monitoring adequate?
- 2 **Modify culture system** (use of greenwater, reservoir; closed/semi-closed system; crop rotation; screening and filtration)



Contents

Volume 6, Number 4 July/August 2010 MICA (P) 028/10/2009 ISBN 1793-0561



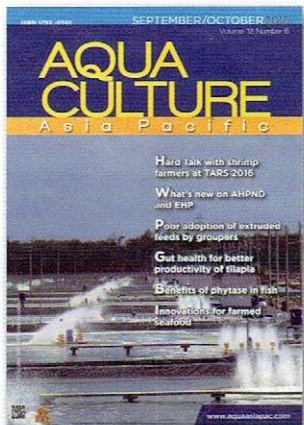
Health and Biosecurity

The proactive way to live with WSSV

There is still no zero exposure to WSSV even with a rigid biosecurity system at a farm in the Philippines say Roselyn Usero and Leobert D. de la Peña

Contents

Volume 12, Number 5 September/October 2016 MCI (P) 013/10/2016 ISBN 1793 -056



Ponds at iSharp Farm, Blue Archipelago, Malaysia. Picture by Blue Archipelago, p8

Shrimp Culture

Mitigating the high risks of WSSV and AHPND outbreaks

In the Philippines, training on sustainable aquaculture practices at the Shrimp School is nurturing a new generation of shrimp technicians. By Leobert D. de la Peña, Westly R. Rosario, Rodolfo V. Zamora, Jr., Mary Ann C. Solis and Cary P. Andigan



Industry comments...

Dan Fegan on risks and limiting the introduction of the virus

Article: The proactive way to live with WSSV by Roselyn Usero and Leobert de la Pena, Volume 6 (4) July/August 2010

Once the biosecurity program is established...

Need to have a regular review and audit by an expert



Recommendations

- Effective implementation of quarantine policies, regulations and quarantine measures (updating/review of regulations, needs human resources and technical competence)
- Adaptation of biosecurity measures/good aquaculture practices of small scale/farm operators (needs awareness raising through seminar/training extension works on biosecurity and GAqP)
- Rapid/early response to disease emergencies/outbreak (build strong partnership with stakeholders, contingency plan for disease emergency)
- Government compensation for disease control measures (destruction of stocks, disease containment or possible eradication)

Thank you!





www.seafdec.org.ph

