NETWORK OF AQUACULTURE CENTRES IN ASIA-PACIFIC

Twelfth Meeting of the Asia Regional Advisory Group on Aquatic Animal Health

REPORT OF THE MEETING

Maruay Garden Hotel, Bangkok, Thailand
11-13 November 2013
Prepared by the NACA Secretariat

Preparation of this document:

This report was prepared by the 12th Asia Regional Advisory Group (AG) on Aquatic Animal Health (AGM-12) that met at Maruay Garden Hotel, Bangkok, Thailand on the 11th to 13th November 2013.

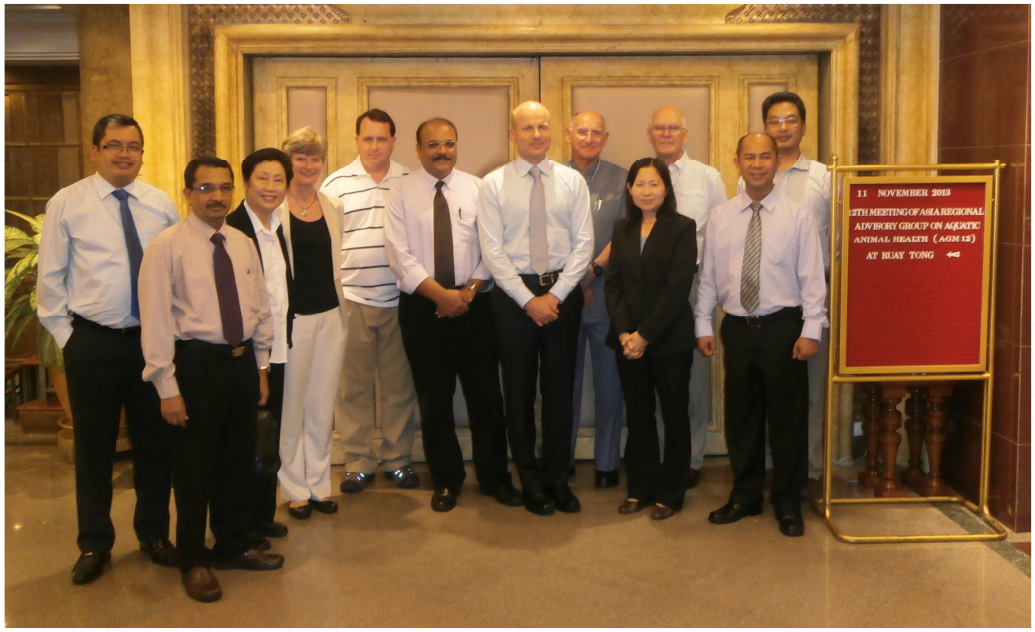
The Advisory Group was established by the Governing Council of the Network of Aquaculture Centres in Asia-Pacific (NACA) to provide advice to NACA members in the Asia-Pacific region on aquatic animal health management, through the following activities: (a) evaluate disease trends and emerging threats in the region; (b) identify developments with global aquatic animal disease issues and standards of importance to the region; (c) review and evaluate the Quarterly Aquatic Animal Disease reporting programme and assess the list of diseases of regional concern; (d) provide guidance and leadership on regional strategies to improving management of aquatic animal health including those under the framework of the Asia Regional Technical Guidelines; (e) monitor and evaluate progress on Technical Guidelines implementation; (f) facilitate coordination and communication of progress on regional aquatic animal health programmes; (g) advise in identification and designation of regional aquatic animal health resources, as Regional Resource Experts (RRE), Regional Resource Centres (RRC) and Regional Reference Laboratories (RRL); and (h) identify issues of relevance to the region that require depth review and propose appropriate actions needed. Members of the Advisory Group include invited aquatic animal disease experts, World Animal Health Organization (OIE), Food and Agricultural Organization of the United Nations (FAO) and collaborating regional organizations.

Reference: NACA 2013. Twelfth Meeting of the Asia Regional Advisory Group on Aquatic Animal Health: Report of the Meeting. Published by the Network of Aquaculture Centres in Asia-Pacific, Bangkok, Thailand.

ABBREVIATIONS AND ACRONYMS

AAH	Aquatic Animal Health
AAHSC	Aquatic Animal Health Standards Commission of the OIE
AAPQIS	Aquatic Animal Pathogen and Quarantine Information System (FAO)
ADG	Asia Diagnostic Guide
AG	Advisory Group
AGM	Advisory Group Meeting
AHPND/AHPNS	Acute Hepatopancreatic Necrosis Disease/Acute Hepatopancreatic Necrosis Syndrome
ANAAHC	ASEAN Network of Aquatic Animal Health Centres
ANQAP	Australian National Quality Assurance Program
APEC	Asia-Pacific Economic Cooperation
APIQTC	Animal and Plant Inspection and Quarantine Technology Center (China)
ASEM	Asian European Meeting
ASEAN	Association of South East Asian Nations
AVG	Abalone viral ganglioneuritis
AVM	Abalone viral mortality
BIMP-EAGA	Brunei, Indonesia, Malaysia, Philippines – East Asia Growth Area
BMP	Best management practices
BIOTEC	National Center for Genetic Engineering and Biotechnology (Thailand)
BOBLME	Bay of Bengal Large Marine Ecosystem
CA	Competent authority
CAAHRI	Coastal Aquatic Animal Health Research Institute (Thailand)
CSIRO	Commonwealth Scientific and Industrial Research Organisation
COFI	Committee on Fisheries (FAO)
DA	Australian Government Department of Agriculture
DoF	Department of Fisheries (Thailand)
EU	European Union
EUS	Epizootic ulcerative syndrome
FAO	Food and Agricultural Organization of the United Nations
GAP	Good aquaculture practices
GC	Governing Council of NACA
IAAHRI	Inland Aquatic Animal Health Research Institute (Thailand)
IHHN	Infectious hypodermal and haematopoietic necrosis
IMN	Infectious myonecrosis
IMNV	Infectious myonecrosis virus
KHV	Koi herpesvirus
LPT	Laboratory proficiency testing
LSNV	Laem Singh necrosis virus (in *P. monodon*)
MrNV	*Macrobrachium rosenbergii* nodavirus
MSGS	Monodon slow growth syndrome
NACA	Network of Aquaculture Centres in Asia-Pacific
NaCSA	National Center for Sustainable Aquaculture (India)
NC	National Coordinator
NHP	Necrotising hepatopancreatitis
OIE	World Organisation for Animal Health
OsHV	Ostreid herpesvirus
PCR	Polymerase chain reaction
QAAD	Quarterly Aquatic Animal Disease
RRC	Regional resource centre
RRE	Regional resource expert

RRL	Regional reference laboratory
RT-PCR	Reverse transcriptase PCR
SAARC	South Asian Association for Regional Cooperation
SEAFDEC	Southeast Asian Fisheries Development Center
SEAFDEC-AQD	Southeast Asian Fisheries Development Center Aquaculture Department
SPC	Secretariat of the Pacific Community
SPF	Specific pathogen free
SVC	Spring viraemia of carp
SVCV	Spring viraemia of carp virus
TAC	Technical Advisory Committee of NACA
TG	Technical Guidelines (Asia Regional Technical Guidelines on Health Management for the Responsible Movement of Live Aquatic Animals)
TOR	Terms of Reference
TS	Taura syndrome
TSV	Taura syndrome virus
VHS	Viral Haemorrhagic Saepticemia
WAHIS	World Animal Health Information System
WAHID	World Animal Health Information Database
WFC	WorldFish Center
WSD	White spot disease
WSSV	White spot syndrome virus
WTD	White tail disease
WTO	World Trade Organization
YHV	Yellowhead virus



The 12th Asia Regional Advisory Group on Aquatic Animal Health.

(From Left to Right)
Dr. Eduardo Leaño (NACA); Dr. CV Mohan (NACA); Dr. Supranee Chinabut (Thailand); Dr. Kjersti Gravningen (PHARMAQ-Vietnam); Mr. Simon Wilkinson (NACA); Dr. Ambekar Eknath (NACA); Dr. Ingo Ernst (Australian Department of Agriculture); Dr. Timothy Flegel (Centex Shrimp/Mahidol University, Thailand), Dr. Hnin Thidar Myint (OIE-RRAP, Tokyo, Japan); Dr. Roger Doyle (Canada; Observer); Dr. Edgar Amar (SEAFDEC AQD, Philippines); and Dr. Jie Huang (OIE-AAHSC, China).

Not in Photo: Dr. Weimin Miao (FAO-RAP, Bangkok, Thailand); Dr. Temdoung Somsiri (IAAHRI, Bangkok, Thailand)

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OPENING SESSION

A brief introduction was given by Dr. Eduardo Leaño, Coordinator of Aquatic Animal Health Programme of NACA, who also served as the Technical Secretary for the Advisory Group (AG). Dr. Ambekar Eknath, Director General of NACA, gave the welcome message and thanked the group once again for their continuous support to the flagship programme of NACA, the Asia Regional Aquatic Animal Health Programme. This meeting in particular was held back-to-back with the first Regional Expert Consultation on Genetic Erosion Risk Analysis for Shrimp Diseases in Asia, Dr. Eknath encouraged all members to be present and share their knowledge on the topic, as the AG platform is the most appropriate to bring this issue into focus. He also thanked the presence of Dr. Roger Doyle who was the key person for the consultation.

Dr. Ingo Ernst continued to serve as the Chairperson. With the resignation of the Vice-chairperson, Dr. Somkiat Kanchanakhan, a new Vice-chair was selected by the group – Dr. Jie Huang.

Dr. Ingo Ernst took over in presiding the AG meeting and the meeting agenda (Annex A) was adopted. The list of participants is presented in Annex B.

SESSION 1: PROGRESS SINCE AGM-11

1.1. PROGRESS REPORT FROM NACA'S REGIONAL AQUATIC ANIMAL HEALTH PROGRAMME

Dr. Eduardo Leaño presented the progress report of NACA's Regional Aquatic Animal Health Programme since the previous AGM 11. One of the important projects that has been implemented is the Regional Laboratory Proficiency Testing Programme being participated by 42 laboratories from 13 NACA-member countries. The first round of test results has been completed in September 2013. ANQAP prepared a report the first round of testing and distributed it to all participating laboratories prior to the start of the second round. Results for the second round of test were due on 31st October 2013. Overall, 134 laboratory results were submitted out of 145 tests that have been enrolled, representing 92% submission which was considered excellent.

On AHPND, NACA and AG have participated in several important activities in the region including several national meetings/consultations/workshops both in countries affected and not affected by the disease. A follow-up Disease Advisory was also released by NACA in March 2013, to address the many circulating false and baseless speculations on the effects and spread of AHPND in the region. E. Leaño, T. Flegel and J. Huang also participated in the FAO-TCP on EMS in Vietnam which was completed in August 2013. Presentations and report of the final workshop are available for free download at NACA and FAO websites.

The QAAD reporting system is still continuing to publish the printed copies of the reports. Since AGM 11, four reports have been published (3rd and 4th quarters of 2012 and 1st and 2nd quarters of 2013) with an average of 15 member countries reporting. The most recent activity that was undertaken was the joint OIE-NACA Workshop on Emergency Aquatic Animal Disease Response which was held in Bali, Indonesia on 6-8 November 2013. The workshop focussed on the status of TG implementation in the region as well as case studies on important crustacean, finfish and molluscan diseases.

Progress made on the implementation of Action Plan formulated during the AGM 11 was also presented. Although most of the activities undertaken under NACA's AAH Programme addressed some of the formulated action plans, limited progress has been made in some topics due the prioritisation of other activities such as those related to AHPND. Some of the projects for which limited progress has been made include: 1) Project funds for AAH programme in the region; 2) Dissemination of revised OIE standards and updates; 3) Development of information sheet for Scale-drop Syndrome; 4) Capacity building for molluscan disease diagnosis/surveillance; 5) Twinning programmes on AAH; 6) Implementation of OIE-NACA WAHIS Regional Core; and 7) Development of assessment tool for TG implementation in the region.

DISCUSSION

- On the Regional Laboratory Proficiency Testing Programme, some laboratories withdrew their participation to the programme, while a few of the remaining laboratory participants did not submit the results of the samples that they received for testing during the first round. The programme provides a valuable opportunity for participating laboratories to evaluate their diagnostic performance and make improvements where necessary. From a previous exercise working with commercial services providers, only 40-45% of laboratories could reliably identify the status if samples, and follow up training was provided to improve

skills.

- The present exercise was working with national laboratories responsible for the competent authority's testing. As the programme has four rounds, it will provide good opportunities for laboratories to identify their weaknesses and improve during the rounds of testing.
- On AHPNS, there were some confusions between the catch-all term "EMS" versus the more specific AHPNS, the difference was properly addressed in the disease card. There is still some difficulty in confirmatory diagnosis as there is no other current method available except histopathology. Detailed information can be obtained from NACA and FAO websites: http://www.enaca.org/modules/news/article.php?article_id=1993&title=final-technical-consultation-tcp-ems-ahpns; http://library.enaca.org/Health/DiseaseLibrary/disease-advisory-ems-ahpns.pdf; http://www.fao.org/docrep/018/i3422e/i3422e.pdf
- A roundtable discussion on AHPNS had been convened by the Global Aquaculture Alliance in Montpelier, France. Dr. Lightner had indicated that a diagnostic kit was in development.
- FAO is developing an inter-regional technical cooperation programme on management of AHPNS. While there has been a lot of interest in conducting epidemiological studies of AHPNS there has been little progress due to a lack of funding and inadequate design of the work that was conducted, which was done before a putative causative agent had been identified.
- On twinning programmes, there has been no response yet on AAHRI's proposal on EUS for Zambia. The AG was unsure on the status of the twinning program for EUS between Thailand and Zambia.
- On the QAAD List of Diseases, the AG agreed that the situation for Grouper iridovirus still requires further consideration. There are many different strains affecting other finfish species, which is not clear if they can be grouped under one "Iridovirus". E. Leaño will check with Dr. Siow Foong Chang as to current status.
- On Technical Guidelines, the status of TG implementation in the region is a possible topic that could be included in the next OIE Aquatic Focal Point meeting to be held in the region.
- On trade facilitation, a training exercise had been held for 45 participants from 22 Indian institutions on aquatic animal health surveillance programmes as part of a $6 million Indian Government project. The training used abstract models of disease and hosts to avoid sectoral or geographic biases, which proved to be very effective. NACA is represented on the scientific and technical committees for the programme. The contributions of Dr. Kenton (University of Liverpool) and Dr. Jiraporn (Thailand DOF) were greatly appreciated. The India Government has also approved a programme to establish aquatic animal quarantine facilities, which NACA will assist in implementing.
- The GC of NACA has endorsed the establishment of emergency project fund for AAH programme in the region. Capacity building activities were identified as a high priority for the overall AAH management. A proposal for a web-based histopathology training course (NACA-CEFAS) had been developed and is awaiting funding from donor agencies.
- A half-day Regional seminar for OIE delegates on activities of specialist commissions will be held in Cebu City during the OIE Regional Commission Conference in Asia, where specialist commission members will give presentations to the delegates. This may be a useful venue to share information on the AG's regional activities.

RECOMMENDATIONS

- AG recommended to revise the disease card for AHPNS in line with the current state of knowledge, and to continue gathering information regarding on-ground developments with AHPNS in the region.
- It is also very important to keep raising farmer awareness of the role of live animal movements in disease spread, and to gather good information about related losses.
- A follow-up workshop on AHPNS was recommended to bring countries together and share information on the status and state of knowledge of AHPNS, after the causative agent was identified. Planning for research priorities and collaboration, particularly once a specific and rapid diagnostic test has become available, was also recommended. The workshop should be planned towards the end of 2014 (close to the schedule of DAA9 in Vietnam).

SESSION 2: OIE STANDARDS AND GLOBAL ISSUES

2.1. OUTCOMES OF RECOMMENDATIONS FROM OIE GENERAL SESSION AND THE AQUATIC ANIMAL HEALTH STANDARDS COMMISSION

Dr. Jie Huang reported on outcomes from the May 2013, 81st General Session (GS) of the OIE with relevance to aquatic

animal health and the Sept 2013 meeting of the Aquatic Animal Health Standards Commission of the OIE.

The OIE decided to delay the publication of the next hard copy edition of the Aquatic Manual to 2014, the online version will remain as the most up-to-date version. The GS adopted the name change of the disease "Epizootic ulcerative syndrome" to "Infection with *Aphanomyces invadans* (Epizootic ulcerative syndrome)" and "Infectious salmon anaemia" to "Infection with HPR-deleted or HPR0 infectious salmon anaemia virus". The GS also adopted the listing of "Infection with salmonid alphavirus" as a new disease.

At their Sept 2013 meeting, the AAC touched upon several issues related to emerging diseases and how they are addressed in the Aquatic Code; these included the definition of emerging disease (Glossary), mechanisms for notification of an emerging disease (Chapter 1.1.) and the mechanism for listing emerging diseases (Chapter 1.2.). All of these sections recognised important emerging diseases and prevention of their spread while continuing safe trade. As proposed, Emerging Disease would be defined as *a disease which has a significant impact on animal or public health resulting from a change of pathogenic agent or its spread to a new geographic area or species; or, a newly recognised or suspected pathogenic agent*. On Chapter 1.1, some significant changes were proposed with regard to emerging diseases which include its definition (as described above) and the development of a new Article 1.1.3. which clearly separates the different notification obligations for an emerging disease, i.e. the obligation to notify an emerging disease, and the circumstances under which reporting should be terminated. Considering all these changes and the slow process for listing an emerging disease, Article 1.2.3 was proposed to be deleted.

For the case of AHPNS which was recommended to be listed, the AAC considered that the available information may be insufficient to assess AHPNS against the criteria in Article 1.2.2. In particular, uncertainty on pathogen identity and lack of availability of a specific diagnostic test means that criteria for listing are unlikely to be met. The AAC, therefore, does not consider it appropriate to list AHPNS. The Commission did agree that the disease satisfies the definition of an emerging disease. An OIE Technical Factsheet on AHPNS was drafted with input from experts and will be uploaded onto the OIE webpage.

Several amendments were made to the texts in the *Aquatic Code* and provided in the meeting report for comment by member countries, including the following:

- Revision of Chapter 6.1: Control of Hazards in Aquatic Animal Feeds;
- Table of Contents: placing of Chapter 6.1 to Section 4; change of the title for Section 6 "Veterinary Public Health" to "Recommendations for Antimicrobial Use in Aquatic Animals";
- Chapter 9.4 "Necrotising hepatopancreatitis": the name for the causative agent to change from NHP-B to *Candidatus hepatobacter penaei* in light of the outcome from ICTB;
- Chapter 10.5 "Infection with infectious salmon anaemia virus": deletion of Article 10.5.5 and the equivalent point in Article 10.5.7. New Article 10.5.15 on the "Importation of aquatic animal products from a country, zone or compartment declared free from infection with HPR-deleted ISAV" was also introduced
- Horizontal issues in disease specific chapters using recently revised Chapters 10.2 and 10.5 as the model for applying the changes to disease naming nomenclature;
- New Chapters on 1) Criteria for determining susceptibility of aquatic animals to specific pathogenic agents; and 2) Infection with Salmonid alphavirus;

The AAC reviewed all listed diseases and considered possible issues related to the pathogen differentiation approach and recognised that the Yellow head disease chapter in the Aquatic Code requires clarification with regards to scope, and alignment of the *Aquatic Manual* with the *Code*. The AAC will discuss this issue further at their February 2014 meeting. Amended texts in the *Aquatic Manual* for comments include: Chapter 2.3.5 Infection with infectious salmon anaemia virus; Chapter2.4.9 Infection with Ostereid herpesvirus 1 microvariant; 2.1.4 Infection with salmonid alphavirus.

Some Reference Labortories (RLs) are in the process of achieving an internationally recognised quality management system. However, the AAC was concerned that some RLs do not have a quality management system nor plans to implement one, despite this being a requirement stated in the TOR for an OIE RL. The AAC noted that a letter would be sent to these RLs indicating that failure to comply with Chapter 1.1.1 of the Aquatic Manual (Quality management in veterinary testing laboratories) could result in these RLs being proposed for delisting.

Due to personnel and organisational changes, some member countries have advised that they will not provide OIE RLs for certain diseases. These include: OIE RL for Spherical baculovirosis (*Penaeus monodon*-type baculovirus) at the National Taiwan University in Chinese Taipei; and OIE RL for Infection with *Batrachochytrium dendrobatidis* at the Australian Animal Health Laboratory in Australia. The AAC invites applications for designation as an OIE RL for *B.*

dendrobatidis. Replacement of experts for OIE RLs for Epizootic hematopoietic necrosis and Infection with Ranavirus was also reviewed and accepted. The 3rd Global Conference of the OIE RCs will be held in Seoul, Korea (Rep. of) from 14 to 16 Oct 2014 with the themes: Strengthening the OIE RC network, laboratory quality management systems; Strengthening links between RCs and VS; and Global databases of pathogen sequences.

For OIE twinning projects, there are three on-going in the region: USA/China for IHN; USA/Indonesia for crustacean diseases; and Japan/Indonesia for KHV. The AAC proposed to hold their next meetings respectively from 24th to 28th Feb 2014 and from 29th Sept to 3rd Oct 2014. Comments on the OIE report must reach OIE Headquarters prior to 24 January 2014 to be considered at the February 2014 meeting of the Commission. Other forthcoming meetings include OIE RLs Conference on 7-9 October 2014, and OIE Global Aquatic Animal Health Conference on January 2015.

DISCUSSION

- The new chapter on Determining Criteria for Susceptibility will have an impact on the scope of the standards (ie. species to which the standard apply) for the Aquatic Code. Once adopted, the criteria will be applied to every disease chapter in the Aquatic Manual which may result in changes to the species listed as susceptible. This is particularly important for pathogens with a wide host range. To apply standards to species outside of their known scope would require support from a risk assessment. This chapter, so far, has received few comments from countries in the Asia-Pacific region.
- The definition of emerging disease has been proposed to be changed, as well as the criteria for reporting emerging diseases. There will be a specific article on requirements to report emerging diseases. The mechanism for listing emerging diseases is proposed for removal, as it is considered too slow.
- The name change for OIE-listed diseases to "Infection with (pathogen)" will be adopted gradually by the commission. Presently, the disease name of all molluscan and amphibian diseases has already been changed.
- There is some concern that some OIE Reference laboratories do not have acceptable quality assurance systems in place. The AG noted that OIE is following up with these laboratories to determine their progress towards adopting QA systems.
- A proposal to use the term "stress" in place of "pain" in some aquatic animal welfare provisions was not accepted by the OIE GA in 2013. The AG noted that AAW is an important issue for the region, but member countries are not actively engaged in standard setting for this issue.

RECOMMENDATION

- AG recommended the region to engage more closely in the development of OIE standards. First step is to get countries to read and submit comments on draft OIE standards. It is at this step where there is a major opportunity to assist delegates and Aquatic focal points to understand the issues in the drafts and to coordinate their responses to the OIE.

2.2. UPDATES ON FAO INITIATIVES IN ASIA PACIFIC IN SUPPORT OF AQUATIC ANIMAL HEALTH

Dr. Weimin Miao, FAO aquaculture officer, thanked NACA for inviting FAO to participate in the 12th meeting of the Advisory Group for Aquatic Animal Health Management in Asia and the Pacific. He briefly introduced FAO's work supporting aquatic animal health management in Asia and the Pacific in 2013 to the AG members. He briefed the Advisory Group on the recently concluded FAO TCP project supporting Viet Nam in coping with the emergency of EMS/AHPNS disease in shrimp farming, covering both the major findings and shortcomings. He introduced FAO TCP/TCPF project that are been implemented in Indonesia and Sri Lanka addressing aquaculture biosecurity control and disease emergency response plan and related surveillance and monitoring system.

Dr. Miao also introduced the collaborated FAO-NACA work on developing aquaculture planning and management toolkit, which includes the tools for import risk analysis, aquaculture biosecurity control and animal health management at different levels. He also informed the advisory group that FAO is still working on developing and implementing two interregional TCP projects for the major purpose of helping the countries to prevent incursions of IMNV and EMS/AHPNS disease of shrimp respectively. Both of the projects will include a number of shrimp producing countries that are not yet affected by diseases in Asia, South America and Africa. He also informed the Advisory Group that FAO Regional Office for Asia and the Pacific called a donor consultation to introduce the SAARC regional projects developed jointly by ADB and FAO, including a SAARC regional project "Institutionalization of SAARC Mechanisms for the Control of Trans-boundary Aquatic Animal Diseases (TAADs) as the effort to mobilize funding support for the projects.

DISCUSSION

- AG considered the development of the toolkit as important activity in the region.
- Inter-Regional TCP: AG suggested that consideration should be given to inclusion of countries that are affected by the disease in the project.

RECOMMENDATION

- AG recommended that important TCP reports should be widely disseminated to member countries.

SESSION 3: REVIEW OF REGIONAL DISEASE STATUS

3.1. UPDATES ON TOP DISEASE THREATS INCLUDING EMS/AHPNS FOR SHRIMPS CULTURED IN ASIA

Prof. Timothy Flegel presented updates on top disease threats on cultured shrimps in the region. As with AGM 11 in 2012, cultivation of domesticated and genetically selected stocks of the American whiteleg shrimp *Penaeus (Litopenaeus) vannamei* remains the first choice in Asia and the formerly dominant giant tiger or black tiger shrimp *Penaeus (Penaeus) monodon* is distant second choice. For viral pathogens of both species in Asia, white spot syndrome virus (WSSV) and yellow head virus (YHV) are still the most lethal. For *P. vannamei* only, the next most important threat is infectious myonecrosis virus (IMNV) (fortunately still confined to Indonesia), while Taura syndrome virus (TSV) and infectious hypodermal and hematopoietic necrosis virus (IHHNV) are not serious threats to the tolerant shrimp stocks being cultivated. *P. vannamei* sometimes exhibits abdominal segment deformity disease (ASDD), probably caused by a retrovirus-like agent [Sakaew et al. 2013. Discovery and partial characterization of a non-LTR retrotransposon that may be associated with abdominal segment deformity disease (ASDD) in the whiteleg shrimp *Penaeus (Litopenaeus) vannamei*. BMC Veterinary Research. 9, 189].

For *P. monodon* only, the next most important viral pathogen is Laem Singh virus (LSNV) together with a cryptic integrase-containing element (ICE) that cause monodon slow growth syndrome (MSGS) (Panphut et al. 2011. A novel integrase-containing element may interact with Laem-Singh virus (LSNV) to cause slow growth in giant tiger shrimp. BMC Vet Res. 7, 18). Less important are hepatopancreatic parvovirus (HPV) and monodon baculovirus (MBV) but only when captured *P. monodon* are used for postlarval production without implementation of proper preventative measures.

The most important non-viral disease threat for both species since 2009 has been acute hepatopancreatic necrosis syndrome (AHPNS), sometimes unadvisedly called early mortality syndrome (EMS). The causative agent has recently been identified by researchers at the University of Arizona as a particular type of *Vibrio* most closely related to *V. parahaemolyticus* (Tran et al. 2013. Determination of the infectious nature of the agent of acute hepatopancreatic necrosis syndrome affecting penaeid shrimp. Dis Aquat Org. 105, 45-55), but different from isolates of that species that pose a human health threat. The name has been changed to acute hepatopancreatic necrosis disease (AHPND). AHPND began in China around 2009 and spread to Vietnam in 2010, Malaysia in 2011, Thailand in 2012 and Mexico in 2013. The main diagnostic characteristic is medial to distal, massive sloughing of shrimp hepatopancreatic (HP) tubule epithelial cells in the absence of any recognizable pathogen by light or electron microscopy. The *Vibrio* pathogen colonizes the shrimp stomach and produces a toxin(s) that causes HP cells to slough. It is positive for the *V. parahaemolyticus* species-specific marker gene lecithin-dependent hemolysin (*ldh*)(non-pathogenic for humans) but negative for the two human-pathogen markers thermostable direct hemolysin (*tdh)* and *tdh*-related hemolysin (*trh*).

Details for field and laboratory diagnosis of AHPND can be found at the website of the Network of Aquaculture Centers in Asia-Pacific (NACA; www.enaca.org). Using the laboratory challenge model developed in Arizona, we have proven at Centex Shrimp that several isolates of *Vibrio* obtained from AHPNS shrimp in Thailand cause the characteristic lesions of AHPND and share the genetic characteristics given above for the Arizona isolate. However, we have also found that they differ somewhat in virulence, indicating the possibility of genetic variation. It is also possible that genetic element(s) such as plasmids or bacteriophages may be involved in governing their virulence. We have also found isolates with the same genetic characteristics (i.e., presmumptive *V. parahaemolyticus*) that cause no mortality or cause very high mortality without AHPND histopathology. Thus, it is urgent to develop a specific, rapid diagnostic method such as PCR for detection of AHPND so that the reservoirs and points of entry into the shrimp production cycle can be identified and blocked.

Rumors indicate that announcement of a specific PCR method is imminent from the University of Arizona. At the same time, next generation sequencing work is underway at Centex Shrimp in cooperation with international partners with the aim of identifying candidate genes for specific molecular probes to detect isolates capable of causing AHPND. In the meantime, the only dependable method for their identification is the laboratory bioassay model developed in Arizona.

Since this bioassay method uses very high bacterial doses unlikely to occur in shrimp aquaculture (10^8 cfu per ml for initial bath exposure), it is likely that other factors may be required to cause AHPND outbreaks under normal cultivation conditions. Our metagenomic study has shown that relatively higher proportions of bacteria in the genera *Delftia, Rhodococcus* and *Leifsonia* are associated with shrimp in AHPND ponds than in normal ponds. Although subsequent work confirmed the presence of these bacteria in AHPND shrimp by PCR assays, no cultures were obtained from the PCR positive shrimp. However, bath exposures by the Arizona protocol have shown that some of these bacteria can also cause high shrimp mortality with different histopathology from AHPND but with the HP as the target. Thus, combined bath challenges are now underway with AHPND isolates to determine whether small, combined doses at environmentally feasible levels may also cause AHPHD at levels that doses of single isolates do not.

In addition, to AHPND, three other phenomena in the HP have become prominent together with AHPND since 2009. These include high prevalence of the microsporidian *Enterocytozoon hepatopenaei* in both broodstock and cultivated shrimp (Tangprasittipap et al. 2013. The microsporidian *Enterocytozoon hepatopenaei* is not the cause of white feces syndrome in whiteleg shrimp *Penaeus (Litopenaeus) vannamei*. BMC Veterinary Research. 9), of vermiform, aggregated transformed microvilli (ATM) (sometimes mistaken for gregarines) and of distorted hepatopancreatic tubules. It is possible that the latter two phenomena may result either from low levels of the toxin(s) that causes AHPND or from separate causes. However, the rapid regional spread of AHPND and the simultaneous increase in prevalence of infections by the distinctly different pathogen *E. hepatopenaei*, suggests that the current situation in Asia may have resulted from an industry-wide decrease in rigor of biosecurity measures in shrimp hatcheries and rearing ponds. This could have arisen due to the dramatic reduction in disease outbreaks in cultivated shrimp since the widespread adoption of specific pathogen free (SPF) *P. vannamei* in Asia since 2001. Even with production based on use of SPF stocks, any decline in biosecurity measures would leave the industry vulnerable to the emergence of any new pathogen.

Finally, the outbreaks of AHPND in Mexico since April 2013 are rumored to have arisen from illegal import of broodstock shrimp for larval production and stocking in shrimp cultivation ponds. If it is eventually shown that shrimp from the outbreak ponds also carry *E. hepatopenaei*, it would support the hypothesis for illegal import of stocks from Asia, because the parasite has never been previously reported from the Americas. A PCR method (Tangprasittipap et al. 2013 above) and a LAMP method (Suebsing et al. 2013. Loop-mediated isothermal amplification combined with colorimetric nanogold for detection of the microsporidian *Enterocytozoon hepatopenaei* in penaeid shrimp. J Appl Microbiol). All countries should add this organism to the list of required pathogens for exclusion from SPF stocks of both *P. monodon* and *P. vannamei*.

I my opinion, one of the most suspect practices for biosecurity breeches with cultivated shrimp in Asia is the relatively recent practice of using living polychaetes as feed for shrimp broodstock. These polychaetes often originate directly from natural sources in regions where AHPND and other disease outbreaks are occurring, and they are often transported between countries without any biosecurity oversight by national authorities. Given that they are detrivores, they have a high potential to be infected carriers or mechanical carriers of shrimp pathogens. Possible preventative measures against pathogen entry with such feed material would require some type of treatment that would result in their death and it would include (in declining order of desirability) gamma irradiation (sterilization), pasteurization or freezing. The last of these methods used to be the standard practice for polychaetes fed to shrimp broodstock, and it is still the practice in North and South America. However, the widespread habit of feeding live polychaetes has apparently arisen based on associated increases in nauplii production at the complete sacrifice of all biosecurity concerns. In my opinion, it would be better to accept decreased nauplius yields in order to insure the integrity of SPF broodstock. This is especially important for the risk of exposure to previously unknown pathogens. Another approach to solve the problem of disease transmission from living polychaetes has been to produce SPF animals in closed culture facilities.

For all the pathogens described above, the most effective control measures for reducing the risk of disease are the use of post larvae derived from domesticated SPF shrimp stocks (with a pathogen exclusion list that includes all major viruses and parasites including *E. hepatopenaei*), and cultivation of these larvae in biosecure settings under management practices aimed at optimum (not maximum) production.

DISCUSSION

- On AHPNS, *Vibrio parahaemolyticus* does appear to be a necessary cause for AHPNS. A microsporidian has been commonly observed in AHPNS ponds which does not appear to be fatal but substantially affects growth. The reservoir for the organism is not known but it is often found in postlarvae, suggesting a serious biosecurity problem.
- Hatcheries are still routinely feeding live polychaete worms to broodstock to increase nauplii production, even though this may present a significant biosecurity risk and a possible source of AHPNS. PCR and LAMP methods are available for rapid detection of this microsporidian, thus there is no reason for it not to be added to the list of excluded pathogens for the SPF stocks.
- Shrimp selective breeding programmes often fail to address disease resistance, as they focus primarily on growth.
- In investigating possible cases of early mortality in shrimp, only a proportion can be attributed to AHPNS, the rest were from a variety of causes. This emphasizes the need for AHPNS case definition to be applied to suspected cases, and further research should be done on other causes of mortality that can't be ascribed to a known cause.
- There are other options to reduce the risk associated of using polychaetes as feeds.
- Traceability of seed is practiced in some countries of the region but not others. However, even with traceability, the quality of seed is not known and difficult to regulate. It is an important responsibility of the farmers to assure that whoever is the supplier (big or small), they should be transparent with the biosecurity measures and origin of their broodstock.

RECOMMENDATIONS

- AG recommended to raise awareness of the risks of feeding live feeds to broodstock.
- AG recommended to update the AHPNS disease card to include: change of name to AHPND based on the Final Report of FAO on the TCP in Vietnam; causative agent that was identified by Dr. Lightner's group (Tran et al., 2013); a more complete and precise case definition; bioassay methods for confirmation; and a warning on biosecurity risks in feeding live polychaetes to shrimp broodstock.
- AG recommended that disease susceptibility/resistance to AHPNS and other diseases should be given more emphasis in the improvement and dissemination of genetic stocks
- AG suggested several forthcoming meetings where new research outcomes and progress on AHPNS can be presented and discussed: WAS Asia-Pacific, Vietnam (December 2013); WAS Adelaide meeting (June 2014); and, DAA9 (November 2014) when it is hoped that a rapid diagnostic test should be available by then.
- FAO TCP Report should be widely disseminated for better awareness about AHPNS. Currently, this can be accessed for free download at FAO and NACA websites.
- AG recommended that the microsporidian *Enterocytozoon hepatopenaei* be added to the disease list for SPF as methodologies for rapid detection are available. Hatchery operators should be transparent about their biosecurity measures and the source of their broodstock.
- AG recommended that hatchery operators should be required to provide biosecurity/health certificates on the origin of broodstock and health status of their SPF stocks. NACA to generate a generic form of certificate that can be used as a model/tool.

3.2. UPDATES ON FISH DISEASES IN ASIA

Dr. Kjersti Gravningen presented current disease concerns for finfishes in the region. In tilapia culture, several serotypes of *Streprococcus agalactieae* are causing problems. The serotyping of the strains is important and not widely done in the region. In pangasius catfish, *Edwardsiella ictaluri* and *Aeromonas hydrophila* are causing problems. *A. hydrophila*, in particular, is now more virulent than earlier described. Virulent strains are also reported form China and USA. Resistance against several antibiotics occur widely. The first vaccine is now licensed against *Edwardsiella ictaluri*.

For marine fish, the viruses including iridovirus and VNN are causing problem in several species. A vaccine is licensed against iridovirus in Japan, Korea, Indonesia and Singapore. VNN vaccine is licensed in Japan. Bacterial diseases affecting cultured marine finfishes include *S. iniea*, Vibrio spp., and *Tenacibaculum* sp.

DISCUSSION

- *Aeromonas hydrophila* has traditionally been considered as an environmental pathogen, however this may no longer be the case. New extremely virulent strains are being found and they are often resistant to one or more antibiotics. Despite this fact, there is still a need to use antibiotics in aquaculture.
- Vaccination is an important health management tool that can reduce the reliance on antibiotics. AG recognized that vaccine development is a continuous process due to the ongoing emergence of new pathogens and strains.
- It is important that vaccine development processes can include field trials so that efficacy of the vaccines can be assessed under commercial conditions. It is recommended that member countries should facilitate field testing of important vaccines that are being developed in the region.
- Double stranded RNA is found effective in insects and crustaceans; can be further explored for application in aquaculture. Current limitation is on commercial production and product approval as well as human health concerns.
- The OIE now has chapters / recommendations on managing the development of antimicrobial resistance. At present**,** they are probably not implemented widely, but when implemented it is possible that these maybe applied as trade standards by some countries.

RECOMMENDATIONS

- AG recommended better control/regulations on the use of antibiotics in general, recognizing the OIE list of antibiotics that should not be used in livestock;
- AG promotes vaccine research development and licensing, as well as its adoption for use in aquaculture;
- AG recommended that education on the proper use of chemicals and drugs in aquaculture should become a part of the regulatory measures of each country;
- AG recommended that more research should be undertaken on alternative treatment methods and national surveillance program for antibiotic resistance.

3.3. UPDATES ON MOLLUSCAN DISEASES

No report was presented on this item, but a brief discussion was made as summarized below.

DISCUSSION

- Ostreid herpesvirus has been detected in the in Hawkesbury River estuary in New South Wales, Australia. The virus caused mass mortality of Pacific oysters in the estuary and has resulted in the loss of all stock and stopped production in the estuary. This is the second oyster farming estuary in Australia to be affected (both in New South Wales). A range of measures, including movement controls, are in place to prevent spread of the disease to unaffected estuaries.
- An international workshop was held in Geelong, Australia in October 2013 to discuss collaboration in mollusc disease diagnostics between Australia, New Zealand and EU. The group considered prioritised 3 disease for collaboration (*Bonamia*, *Perkinsus* and ostreid herpes virus) and agreed on a number of possible collaborative projects. The group found that most OIE tests for these diseases are not sufficiently validated.
- Abalone parasitic disease in the Philippines is causing low mortality and the study is still for completion; reports from this study are submitted to OIE aquatic focal point for reporting to QAAD.

RECOMMENDATION

- AG recommended that proficiency testing program on histopathology for important molluscan diseases should be done in the region for better diagnosis and surveillance capacities;

SESSION 4: REPORTS ON AQUATIC ANIMAL HEALTH PROGRAMMES FROM PARTNER AGENCIES

4.1. AUSTRALIA'S NATIONAL AQUATIC ANIMAL HEALTH PROGRAMMES

Dr. Ingo Ernst presented a report on aquatic animal health programs in Australia and some regional activities.

AQUAPLAN

AQUAPLAN, Australia's National Strategic Plan for Aquatic Animal Health, outlines priorities for enhancing Australia's management of aquatic animal health. Australia has had two national strategic plans for aquatic animal health: AQUAPLAN 1998-2003 and AQUAPLAN 2005-2010. A review of AQUAPLAN 2005–2010 found that it made substantial progress in strengthening Australia's aquatic animal health management systems, and that it attracted available resources to agreed national priorities. The review also found that there is a strong ongoing need for a nationally coordinated approach to aquatic animal health in Australia.

In 2013, Australia's aquatic animal industries (aquaculture; commercial and recreational fisheries; and ornamental fish) and governments agreed to the development of Australia's third national strategic plan for aquatic animal health, AQUAPLAN 2014-2019. Priority issues for inclusion in AQUAPLAN 2014-2019 were discussed at a national workshop held in September 2013. A new plan was drafted based on the outcomes of the workshop and is undergoing further consideration by stakeholders. The new plan is intended to address common national priorities across industry sectors, target strategic issues that could have lasting benefit, and will be focussed on defined achievable tasks.

The draft plan includes five objectives, each supported by specific project activities. These include:

1. Improving regional and enterprise-level biosecurity
2. Strengthening emergency preparedness and response capability
3. Enhancing surveillance and diagnostic services
4. Improving availability of appropriate veterinary medicines
5. Improved education, training and awareness.

Pending endorsement by industries and governments, it is anticipated that AQUAPLAN 2014-2019 will commence in July 2014.

Aquatic Animal Health Training Scheme

Australia's Aquatic Animal Health Training Scheme was established in 2010 for 3 years. The scheme aimed to "improve the knowledge and skills in aquatic animal health management to support Australia's fishing and aquaculture industry, including the aquarium sector." Funding was offered on a competitive, merit-based approach, with one application round per calendar year. Eligibility was open to employees or other persons directly involved in the Australian fishing and aquaculture industries with a specific health component in their role.

A review of the scheme was completed in 2013. The scheme funded 18 projects including for group and individual training. The scheme supported training for over 140 people and provided about 800 person-days of training. The review found that the scheme's competitive, merit-based approach ensured that projects addressed user needs, and provided training in a variety of disciplines critical to the management of aquatic animal health in Australia. The scheme's flexibility allowed for specialist training of individuals and more generic training for groups. The eligibility of international activities ensured that Australian experts could access the best training opportunities from across the world. The scheme benefited aquatic animal health sector professionals from industry, government, research and educational organisations. Based on the positive review outcomes, a decision was made to continue the scheme.

Emergency aquatic animal disease response arrangements

AQUAPLAN 2005–2010 made significant progress toward the development of emergency aquatic animal disease response arrangements. Despite these efforts, there are currently no formal industry-government arrangements in place that are equivalent to the government and livestock industry cost-sharing deed for emergency terrestrial animal disease responses. Such arrangements are desirable to formalise how aquatic animal industries and governments would share the responsibilities and costs for managing emergency aquatic animal disease incidents. In 2013, governments and industries agreed to a detailed work plan to develop terms of an industry–government deed for aquatic animal industries. This agreed work plan will be implemented as an activity of AQUAPLAN 2014–2019.

National Laboratory Proficiency Testing Program

The Australian Laboratory Proficiency Testing Program for Aquatic Animal Diseases of National Significance ran from 2010-2012. The program was funded by the Australian Government and implemented by the Australian National Quality Assurance Program (ANQAP) and the Commonwealth Scientific and Industrial Research Organisation (CSIRO) Australian Animal Health Laboratory (AAHL). Aquatic animal diseases included in the proficiency testing program were selected through consultation with state and territory governments and participating laboratories. A review of the program was completed in 2013. It found that laboratories experienced a range of benefits from participation, and most participating laboratories expressed a desire to participate in a future program. Based on positive review outcomes the scheme has been continued for an additional 3 years (2013-2015).

Regional Laboratory Proficiency Testing Program

The Australian Government has funded a regional proficiency testing program for aquatic animal disease diagnostic laboratories in Asia Pacific. The program includes over 40 participating laboratories and offers test panels for 10 priority diseases that were agreed by participants in 2012. The first of 4 testing rounds was completed in May 2013. A further testing round is scheduled for late 2013, and two rounds are scheduled for 2014. The project is being implemented with the cooperation of NACA, ANQAP and CSIRO AAHL.

DISCUSSION

- The aquaculture industry commonly has crop loss insurance, however this does not cover government stock destruction orders. There are currently no mechanisms for owner reimbursement in Australia in the event of government ordered destruction for disease control purposes.
- For AHPNS, Australia's existing quarantine measures (e.g. no importation of live shrimps) mitigate the likelihood of entry of this disease into the country.
- For Australia's national laboratory proficiency testing program, participation is voluntary; however, to achieve accreditation, it is normally a requirement that laboratories participate in PT.

RECOMMENDATION

- AG thanked DA Australia for the excellent presentation on the AAH activities and recognized its support to several important AAH activities in the region (e.g. LPT, EMS emergency consultation, etc).
- AG recommended that mechanisms for continuation of the Regional LPT programme be considered. One option is for national laboratories to coordinate PT at the national level. This is possible but a good/accredited laboratory is required to do it, and running a proficiency testing program will require considerable financial and technical resources.

4.2. SEAFDEC AQD FISH HEALTH ACTIVITIES: PROGRESS AND UPDATES

Dr. Edgar Amar presented highlights of Fish Health Section (FHS) activities of SEAFDEC AQD. A major change in the implementation of AQD programs is the shift from commodity-based to theme-based approach. AAH falls under the program theme "Healthy and Wholesome Aquaculture" with the following objectives:

- Investigate the efficacy of probiotics and rationalize the need and application of diagnostics that will ensure biosecurity within culture systems and keep out exotic pathogens, especially transboundary pathogens;
- Promote the wider use of conventional diagnostic as well as new methods especially for newly reported, emerging diseases;
- Find effective alternative safe drugs/chemicals (including natural products) to manage aquaculture diseases in lieu of the harmful chemicals and drugs which have been discouraged or banned for use due to quality and safety issues;

Activities undertaken during the year 2013 include development of probiotics/application and mode of action of polyhydroxybutyrate in larval rearing of *Penaeus monodon*, bacterial diversity and algal community structure in biofilms of settlement plates for abalone *Haliotis asinina* larvae, quantitative and qualitative analyses of the bacterial microbiota of Tilapia (*Oreochromis niloticus*) cultured in earthen ponds, epidemiological study and elucidation of route of spread of shrimp viral diseases in Southeast Asian countries, antimicrobial screening and withdrawal period for antibiotics, and screening and development of immunostimulants and vaccines. In line with accelerating information dissemination and capacity building on AAH management in the region, training courses on Fish Health Management (online, on-site and hands-on) were conducted, specific training courses for the government and private sector were offered, and internship programs for undergraduate students and special science high school teachers were carried out upon request. FHS also offers diagnostic services and reports disease occurrences to OIE Aquatic Focal Points.

AQD received government funds to implement some emerging AAH issues of national interest such as surveillance of pathogens of tilapia and mudcrab, development of diagnostic tools through genomics, and establishment of the Philippine shrimp pathogen bio-bank and online biosurveillance information resource.

DISCUSSION

- Survey on shrimp bacteria still uses conventional identification methodology, but metagenomics will be considered in the future when the current shrimp project is expanded.
- The histopathology training offered by SEAFDEC AQD is include processing of samples and interpretation of results by network of experts.
- All samples received for diagnostics are from local farmers in the Philippines. However, diagnostic service is open to accepting samples from outside of the country.

RECOMMENDATIONS

- AG thanked SEAFDEC AQD Philippines for sharing the important AAH activities of its Fish Health Section.
- AG recommended that aside from the partner agencies on AAH, NACA should consider to invite one member country per AGM to present their AAH activities and programmes. NACA should either provide partial or full funding for attendance

4.3. ACTIVITIES OF IAAHRI ON AQUATIC ANIMAL HEALTH

Dr. Temdoung Somsiri presented the on-going aquatic animal health programmes of Thailand. The DoF through IAAHRI and CAAHRI continues to actively implement surveillance and monitoring programmes in the country including contingency plan and diagnostic services for aquatic animal disease control under the Animal Epidemic Act. Officers in each province are responsible for the implementation of these programmes. Procedures implemented for surveillance and monitoring of notifiable diseases (based on OIE-list) follow the OIE manual and importing countries' requirements. Currently, Thailand has declared freedom on 9 finfish and crustacean diseases: Epizootic haematopoietic necrosis; Infectious haematopoietic necrosis; Infectious salmon anaemia; Viral haemorrhagic septicaemia; Infection with *Gyrodactylus salaris*; Spring viraemia of carp; Epizootic ulcerative syndrome; Infectious myonecrosis; and Crayfish plague. Country freedom was also declared for all OIE-listed molluscan diseases. IAAHRI summarizes all data for both active and passive surveillance and submits disease report to DoF, OIE and NACA.

The Molecular Biology and Virology laboratories of IAAHRI/CAAHRI are participating in the on-going Laboratory Proficiency Testing Programme of Australian DA, ANQAP, CSIRO AAHL and NACA. The Institute has passed the first round of testing for WSSV, IHHNV, YHV, TSV, IMNV and KHV. The institute also received development sample for SCVC for 2013 and decided to add this disease for 2014 rounds of testing.

On the importation and exportation of live aquatic animals, approval of quarantine is now the responsibility of IAAHRI. Imported animals found to harbour infectious pathogens will be eradicated without providing any compensation to the importers. IAAHRI issues health certificates for live aquatic animals intended for export. From January to October 2013, a total of 6,499 health certificates were issued.

In response to the current shrimp disease problem on AHPNS, the DoF has implemented several action plans (mostly on biosecurity) for local shrimp farmers including: improved hatchery sanitation and surveillance programme; improved shrimp farm management programme; epidemiology and research programme; and, shrimp disease monitoring network. An increase in shrimp production was already observed in July-September and was attributed to increased stocking of PLs, which started in late March signifying farmers' confidence on DoF resolution for importation of high quality broodstock; and, improvement on farm management. These measures also led to the continuous decrease in AHPNS outbreaks in the country.

The first ANAAHC workshop was held in Bogor, Indonesia on 10-12 June 2013 to set-up an action plan for 2013-2015. The workshop was participated by representatives from Brunei Darrusalam, Indonesia, Malaysia, Philippines and Thailand. Action plans formulated are summarized in the table below.

Activities	Expected outcome	Year
ASEAN Workshop on Standard of Operation of Live Aquatic Animal Movement	To develop standard operating procedures for movement of particular diseases and susceptible species of live aquatic animals	2014
Training on quarantine system	Capacity building for some AMSs that quarantine system does not exist	2014-2015
Training on disease diagnosis	Capacity building for some AMSs	2014-2015
Harmonize a health certificate form among AMSs	Only for species identified by the above mentioned workshop	2014
Updating on EMSs situation, mitigation and control measures among AMSs through focal point of ANAAHC	Minimize loss from EMSs outbreak and sharing technical information	2015

DISCUSSION

Under new Thai legislation research proposals involving experimentation on live animals must be sent for review by the Animal Welfare Committee at Mahidol University. All animals are presently covered (including invertebrates). In the OIE guidelines on animal welfare, however, there are no existing standards for invertebrates.

- When sampling for AHPNS detection, it is necessary to take at least 10 shrimps, as if the disease is not in its acute stage it is difficult to be sure.
- Small-scale shrimp hatcheries typically maintain their own broodstock.
- Companies producing improved shrimp broodstock usually send a very limited selection of genetic material if someone tries to develop their own broodstock from these animals, it will very quickly run into inbreeding problems.

RECOMMENDATIONS

- AG thanked IAAHRI Thailand for sharing the important AAH activities of the institute.
- AG recommended that governments should become aware of the supply problem when setting their broodstock importation regulations. The best thing to do is to facilitate imports via a quarantine facility to overcome supply limitations and reduce the temptation to go through other pathways.

SESSION 5: DISEASE REPORTING

5.1. QAAD REPORTING – NACA AND OIE REGIONAL REPRESENTATION FOR ASIA AND THE PACIFIC, TOKYO

Dr. E. Leaño (on behalf of NACA and OIE-RRAP, Tokyo) presented the status of QAAD Reporting system in the region. A total of 60 reports have been published to date with an average of 15-16 member countries submitting the reports. One significant development is the resumption of reporting from Republic of Korea since the 3rd quarter of 2012 and Peoples Republic of China since the first quarter of 2013. One disease (Acute Hepatopancreatic Necrosis Syndrome (AHPNS)) was added to the list, while one disease exotic to the region (Infection with *Xenohaliotis californiensis*) was transferred under Diseases of Crustaceans. This makes a total of 29 diseases in the QAAD list: 10 Finfishes; 7 Molluscan; 10 Crustaceans; and 2 Amphibians.

From the report of Ms. Nanae Takagishi of OIE-RRAP, Tokyo, most of the reporting countries (n=9) are providing more than 20 disease information on the reports submitted. In 2012, finfish diseases that were present in 6 or more countries include Viral encephalopathy and retinopathy (10 countries), Grouper iridoviral disease, Infection with Koi herpesvirus and Red seabream iridoviral disease (7 countries), and Epizootic ulcerative syndrome (6 countries). For molluscan disease, Infection with *Perkinsus olseni* was reported from 7 countries. For diseases of crustaceans, the most widespread were White spot disease (15 countries), Infectious hypodermal and hematopoetic necrosis (10 countries), Yellowhead disease (7 countries) and White tail disease (6 countries).

New NCs were also appointed for some member countries as follows:

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DISCUSSION

- Reports (including from Vietnam) of infection with *Perkinsus olseni* have substantially increased over the past three years. Are people looking for it more often, or is it spreading?
- South Korea and China resumption of disease reporting is a good progress.

5.2. LISTING REVIEW: AKOYA OYSTER DISEASE AND MILKY HAEMOLYMPH DISEASE OF SPINY LOBSTERS

Dr. E. Leaño presented a review of two QAAD-listed diseases: Akoya oyster disease (AOD) of Japanese pearl oyster (*Pinctada fucata martensii*) and Milky haemolymph disease (MHD) of spiny lobsters. AOD was initially reported from Japan through QAAD in 2007 and officially listed under non-OIE-listed diseases in 2009 after satisfying the listing criteria. Up to this date, however, the main causative agent was not identified. MHD was listed in QAAD in 2009 with reports of the disease affecting spiny lobsters (*Panulirus* spp.) in Vietnam. The causative agent was identified as *Rickettsia*-like bacterium.

Since the listing of the two diseases in 2009, Japan reported the presence of AOD up to the 4th quarter of 2009, while Vietnam reported the presence of MHD up to the 1st quarter of 2010. Since then, both Japan and Vietnam has not been reporting the occurrence of these diseases.

DISCUSSION

- Akoya Oyster Disease now seems to be controllable via changes in management practices. The disease does not appear to be causing production losses, has not been reported for some time, and the causative agent remains unknown. The disease no longer meets the listing criteria.
- Milky haemolymph disease appears to be readily controllable by changes in management (e.g. lifting the cage 1 m above the sediment, as the pathogen is likely to come from the sediment). There is no indication that the disease is at risk of spreading, and has not been reported for a while. MHD is now considered to be a production disease.

RECOMMENDATIONS

- AG recommended to delist Akoya oyster disease and Milky haemolymph disease of spiny lobsters from the QAAD list.

5.3. REVISIONS TO THE QAAD LIST

Revisions to the QAAD list are carried out annually by the AG. Such revisions consider the changes made to the OIE list (presented by Dr. J. Huang) plus diseases of regional concern and other emerging diseases. The AG deliberated on this in detail and made the following recommendations. The list of diseases for QAAD reporting for 2014 is presented in Annex C.

RECOMMENDATIONS

- AG recommended to adopt the changes in the OIE list for finfish diseases for the revised QAAD list for 2014 as follows:
    - The name "Epizootic ulcerative syndrome" changed to "Infection with *Aphanomyces invadans* (Epizootic ulcerative syndrome)";
    - Infection with salmonid alphavirus;
    - Infection with HPR-deleted or HPR0 infectious salmon anaemia virus;
- AG also recommended to include Ostreid herpesvirus in the QAAD list for 2014, with a note that it is listed in OIE as an emerging disease. Depending on the decision to be made, in reference to deletion of the mechanism for Listing Emerging Diseases under the OIE Code, the disease can either be retained under OIE-listed diseases (if not delisted by the OIE) or transferred to non-OIE-listed diseases (if delisted by the OIE).
- AG recommended to delist Akoya oyster disease and Milky haemolymph disease of spiny lobsters as discussed in Section 5.2;
- AG recommended to change AHPNS to AHPND based on the recommendations made during the final FAO-TCP Workshop in Vietnam.

5.4. UPDATES ON OIE-NACA WAHIS REGIONAL CORE AND AAH MANAGEMENT ACTIVITIES OF OIE REGIONAL REPRESENTATION IN ASIA AND THE PACIFIC

Dr. Hnin Thidar Myint (OIE-Tokyo) presented updates on the development and implementation of OIE-NACA WAHIS Regional Core and important activities on aquatic animal health by OIE Regional Representation in Asia and the Pacific. The IT team from OIE HQs is working on the development/implementation of the OIE-NACA Regional Core Interface system which will have 2 specific features; administration of data of non OIE Listed diseases and the possibility to add text notes by the OIE national aquatic focal points (FPs)/NACA national coordinators (NCs). Current email-based QAAD reporting system will be continued until the Regional Core is functional.

The OIE published the 1st edition of the OIE PVS Tool: Aquatic in 2013, based on the 6th Edition of OIE PVS Tool. It is standalone PVS Tool for the evaluation of AAHS and available on the OIE website. Philippines and Vietnam already had the OIE PVS missions for Aquatic and other members are encouraged to submit the request for having the OIE PVS missions.

The OIE Regional Representation for Asia and the Pacific has involved in AAH activities in the region by conducting the Regional Short-term training on Veterinary Vaccine Assessment for Fish Vaccines, in collaboration with National Veterinary Assay Laboratory, in Japan in Oct 2013. Recent collaborative activity with NACA is the OIE Regional Workshop on Emerging Aquatic Disease Response which was conducted in Bali, Indonesia from 6 to 8 November 2013. OIE FPs and NACA NCs were invited to discuss about emergency response on molluscan, shrimp and fish diseases. The workshop recommended that prevention, which is the best treatment to fight against AADs, can be achieved by sharing disease information, conducting import risk analysis in line with OIE Standards and Guidelines with the support of OIE PVS Tool and application of BMPs and GAPs.

The members of OIE AAHSC will present updates on the activities of the OIE in AAH during the Regional Seminar for OIE Delegates in Cebu in Nov 2013. The plan for 2014 includes the Third OIE Global Conference on Aquatic Animal Health and Regional Seminar for OIE FPs on AA.

DISCUSSION

- On OIE-NACA WAHIS Regional Core, NACA has no problem with the database being run/located at OIE, for as long as the regional reporting mechanism is preserved. OIE does not see any technical difficulties, although who will have administrative access needs careful consideration as some of the information may be sensitive. Decision on the list of diseases in the regional QAAD remains with the NACA AG
- There is a need to consider how reporting of emerging diseases and alert system is handled. Information needs to be fast and readily accessible.
- On the possibility for NACA to expand their training scope to include the use of vaccine in the region, this is highly possible if funding can be sourced.

RECOMMENDATIONS

- AG congratulated OIE and NACA for the successful conduct of the Workshop on Emergency Aquatic Animal Disease Response held in Bali, Indonesia on 6-8 November 2013. Final report of the workshop is still being prepared by Drs. Hnin and Leano.
- AG recommended that training priorities should be properly identified in the region with regard to AAH. A survey questionnaires can be formulated in this regard which should be distributed to NACA member countries. Proper participants to the identified training needs should also be selected.
- AG recommended to promote implementation of OIE PVS Aquatic tool in other NACA member countries, which will basically cover most of the elements of the TG. OIE-Tokyo office can assist member countries in the preparation of application for PVS.

SESSION 6. IMPLEMENTATION OF FAO/NACA TG ON RESPONSIBLE MOVEMENT OF LIVE AQUATIC ANIMALS; OTHER MATTERS

6.1. DISCUSSION ON THE DEVELOPMENT OF TOOLS FOR ASSESSMENT OF TG IMPLEMENTATION IN THE REGION; IMPLEMENTATION OF TOOLS IN 2014; AND REPORTING BACK FOR 2014 AGM

(Adopted from AGM11 Report) Currently, the implementation of the Asia Regional Technical Guidelines on Health Management for the Responsible Movement of Live Aquatic Animals (TG) in most NACA member countries lacks proper assessment to identify gaps and issues, resulting in the less-efficient national strategies for AAH management. The TG was developed in collaboration with FAO, OIE, regional and international experts. These guiding principles were adopted as a regional strategy by 21 governments in the Asia-Pacific region in 2000, through NACA's Regional Aquatic Animal Health Programme. The TG identified six major elements which need to be in place and operating effectively in trading countries, if the risk of international disease spread within the region is to be reduced:

1. Disease surveillance and reporting
2. Import risk analysis
3. Zoning
4. Contingency planning
5. Health certification and quarantine measures
6. Disease diagnosis

While progress has been, made there are only few member governments with well-established preparedness and response measures in place especially for disease zoning, contingency planning and import risk analysis (see Table below).

Progress made by 21 member governments on the major components listed in the Asia Regional Technical Guidelines and on national strategies and policy frameworks.

Elements in the Technical Guidelines	Progress Made in Asia-Pacific (Number of Countries)		
	Good	Moderate	Low
Disease surveillance and reporting	8	8	5
Import risk analysis	4	4	13
Disease zoning	3	3	15
Contingency planning	3	7	11
Health certification and quarantine measures	10	5	6
Disease diagnosis	10	6	5
National strategies and policy frameworks	11	4	6

In lieu of this, the AG decided to develop an Assessment Tool will assist in the identification of some gaps/issues in the implementation of the TG among NACA member governments, based on the 6 elements listed above. Some of these gaps/issues are presented in Annex D.

RECOMMENDATIONS

- The AG recommended that development of assessment tools for TG implementation in the region should be pursued. This can be done electronically among member countries. CV Mohan and I Ernst to develop simple and suitable framework to assess the implementation of the guidelines.

6.2. DATE OF NEXT MEETING

The next AGM (AGM 13) will be held in Ho Chi Minh City, Vietnam, on 22-23 November 2014, back-to-back with the 9th Symposium on Diseases in Asian Aquaculture (DAA9; 24-28 November).

SESSION 7: PRESENTATION OF MEETING REPORT AND CLOSING

The list of AG Recommendations was revised and adopted, and the meeting closed. Summary of Action Plans based on the recommendations is presented in Annex D.

ANNEX A: MEETING AGENDA

12TH MEETING OF ASIA REGIONAL ADVISORY GROUP ON AQUATIC ANIMAL HEALTH (AGM 12)
11-13 NOVEMBER 2013
MARUAY GARDEN HOTEL, BANGKOK, THAILAND

Day 1 (11 November, Monday)

AGM12

09:00 – 12:00

Opening Session

- Welcome address: **Dr. Eduardo Leaño**, Coordinator, Aquatic Animal Health Programme, NACA
- Opening remarks: **Dr. Ambekar E. Eknath**, Director General, NACA
- Selection of AG Vice-Chairman (in lieu of resignation of Dr. Somkiat Kanchanakhan)

(AG Chairman, will take over)

Session 1. Progress Reports

- Progress since AGM 10 **(Dr. Eduardo Leaño**, NACA)

DISCUSSIONS AND RECOMMENDATIONS

Session 2. OIE Standards and Global Issues

- Outcomes of recommendations from OIE General Session and the Aquatic Animal Health Standards Commission (**Dr. Jie Huang**, AAHSC, OIE)
- Updates on FAO initiatives in Asia-Pacific in support of aquatic animal health (**Dr. Weimin Miao**, FAO)

DISCUSSIONS AND RECOMMENDATIONS

Working Lunch

13:30 – 17:00

Session 3. Review of Regional Disease Status

- AHPNS updates and other emerging threats on crustaceans (**Dr. Tim Flegel**, Mahidol University)
- Updates and emerging threats on finfishes (**Dr. Kjersti Gravningen**, PHARMAQ)
- Updates on other diseases (molluscs and amphibians) (**TBD**)

DISCUSSIONS AND RECOMMENDATIONS

Group Photo

19:00

Welcome Dinner (hosted by NACA)

Day 2 (12 November, Tuesday)

09:00 – 12:00

Session 4. Reports on Aquatic Animal Health Programmes from Partner Agencies

- DAFF Australia (**Dr. Ingo Ernst**, DAFF)

- Fish Health Section, SEAFDEC Aquaculture Department, Philippines (**Dr. Edgar Amar**, SEAFDEC AQD)
- Aquatic Animal Health Research Institute, Thailand (**Dr. Temduong Somsiri,** IAAHRI)

DISCUSSIONS AND RECOMMENDATIONS

Working Lunch

14:00 – 17:00

Session 5. Disease Reporting

- QAAD Reporting: 2012 List and status of reporting (**Dr. Eduardo Leaño**, NACA)
- New OIE Disease List and revisions to the QAAD List for 2013 (**Dr. Jie Huang**, AAHSC, OIE)
- Listing review: Akoya Oyster Disease and Milky Haemolymph Disease of Spiny Lobster (**Dr. Eduardo Leaño**, NACA)
- Updates on OIE-NACA WAHIS Regional Core and AAH activities of OIE-Regional Representation for Asia and the Pacific (**Dr. Hnin Thidar Myint**, OIE Tokyo)

DISCUSSIONS AND RECOMMENDATIONS

Session 6. Implementation of FAO/NACA TG on Responsible Movement of Live Aquatic Animals

- Follow-up on the Development of Tools for Assessment of TG Implementation in the Region; Implementation of tools in 2013; and Reporting back for 2013 AGM (background material and template to be developed by Secretariat) (**Dr. Ingo Ernst**, DAFF Australia; **Dr. CV Mohan**, NACA)

Day 3 (13 November, Wednesday)

09:00-12:00

Session 7. Closing

- Other important matters
  9th Symposium on Diseases in Asian Aquaculture: Introduction and Overview (**Dr. CV Mohan**, NACA)
- Presentation and Adoption of Report and Recommendations
- Date of next AGM

Working Lunch

Annex B: List of Participants

I. Advisory Group Members
World Organisation for Animal Health (OIE)
Dr. Jie Huang Virologist – Senior Researcher Head, Maricultural Disease Control and Molecular Pathology Laboratory Yellow Sea Fisheries Research Institute Chinese Academy of Fishery Sciences 106 Nanjing Road, Qingdao, SD 266071, PR China aqudis@public.qd.sd.cn; huangjie@ysfri.ac.cn
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Private Sector
Dr. Kjersti Gravningen

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IV. NACA Secretariat
Dr. Eduardo M. Leaño (Technical Secretary of AG) Coordinator, Aquatic Animal Health Programme eduardo@enaca.org
Dr. C.V. Mohan Manager, Research and Development mohan@enaca.org
Mr. Simon Wilkinson Coordinator, Information and Communication simon@enaca.org
Dr. Ambekar E. Eknath Director General ambekar.eknath@enaca.org
V. Observer
Dr. Roger Doyle

Annex C: List of Diseases in the Asia-Pacific

Quarterly Aquatic Animal Disease Report
(Beginning January 2014)

1. DISEASES PREVALENT IN THE REGION	
1.1 FINFISH DISEASES	
OIE-listed diseases	**Non OIE-listed diseases**
1. Epizootic haematopoietic necrosis	1.Grouper iridoviral disease
2. Infectious haematopoietic necrosis	2.Viral encephalopathy and retinopathy
3. Spring viraemia of carp	3.Enteric septicaemia of catfish
4. Viral haemorrhagic septicaemia	
5. Infection with *Aphanomyces invadans* (Epizootic ulcerative syndrome)	
6. Red seabream iridoviral disease	
7. Infection with koi herpesvirus	
1.2 MOLLUSC DISEASES	
OIE-listed diseases	**Non OIE-listed diseases**
1. Infection with *Bonamia exitiosa*	1. Infection with *Marteilioides chungmuensis*
2. Infection with *Perkinsus olseni*	2. Acute viral necrosis (in scallops)
3. Infection with abalone herpes-like virus	
4. Infection with *Xenohaliotis californiensis*	
5. Infection with ostereid herpesvirus *	
1.3 CRUSTACEAN DISEASES	
OIE-listed diseases	**Non OIE-listed diseases**
1. Taura syndrome	1. Monodon slow growth syndrome
2. White spot disease	2. Acute hepatopancreatic necrosis disease (AHPND)
3. Yellowhead disease	
4. Infectious hypodermal and haematopoietic necrosis	
5. Infectious myonecrosis	
6. White tail disease (MrNV)	
7. Necrotising hepatopancreatitis	
1.4 AMPHIBIAN DISEASES	
OIE-listed diseases	**Non OIE-listed diseases**
1. Infection with Ranavirus	
2. Infection with *Bachtracochytrium dendrobatidis*	
2. DISEASES PRESUMED EXOTIC TO THE REGION	
2.1 Finfish	
OIE-listed diseases	**Non OIE-listed diseases**
1. Infection with HPR-deleted or HPR0 salmon anaemia virus	1. Channel catfish virus disease
2. Infection with salmon pancreas disease virus	
2. Infection with *Gyrodactylus salaris*	
2.2 Molluscs	
OIE-listed diseases	**Non OIE-listed diseases**
1. Infection with *Bonamia ostreae*	
2. Infection with *Marteilia refringens*	
3. Infection with *Perkinsus marinus*	
2.3 Crustaceans	
OIE-listed diseases	**Non OIE-listed diseases**
1. Crayfish plague (*Aphanomyces astaci*)	

*** listed as Emerging Disease**

Annex D: AG Action Plan (for 2014)

(Based on the list of recommendations from all sessions)

Issue(s)	Actions needed
1) Acute hepatopancreatic necrosis syndrome (AHPNS)	• NACA to update and revise the Disease Card to include: name change to AHPND based on the Final Report of FAO on TCP in Vietnam; causative agent as identified by Dr. Lightner's group (Tran et al., 2013); bioassay method for confirmation; and a warning on biosecurity risks in feeding live polychaetes to shrimp broodstock. • NACA to continue gathering information regarding on-ground developments of the disease in the region, and keep farmers' awareness on role of live movements in disease spread. • NACA to organize a follow-up workshop on AHPND to bring countries together and share information on the status and state of knowledge about the disease including rapid diagnostic kits. The workshop should be done towards the end of the year (close to DAA9 schedule in HCMC, Vietnam); • AG and/or NACA to present AHPND status in various international gatherings: WAS Adelaide meeting (June 2014); DAA9 (November 2014). • NACA to widely disseminate available published information.
2) SPF biosecurity/health certificate	• NACA to generate a generic form of the certificate that can be used as a model/tool is assessing the origin of broodstock and health status of SPF stocks.
3) OIE Standards	• NACA to summarize proposed changes to alert members of its significance to the region. This will be an annual action following each AGM
4) QAAD List	• Delist Akoya oyster disease and Milky haemolymph disease of spiny lobsters; • Adopt changes in the OIE list for finfish diseases; • Include Ostereid herpesvirus in the list with a note that it is listed in OIR as emerging disease
5) Scale-drop Syndrome	• NACA and AG to work on concerned experts to develop information sheet of the disease including case definition, disease card, etc. This is to support the surveillance effort in the region. E Leano to make a follow-up with Dr. Siow Foong Chang (MSD Animal Health)

6) Aquatic animal health training	• NACA to formulate a survey questionnaires for distribution to member countries ro identify common training needs.
9) OIE-PVS Tool	• NACA , AG and OIE-Tokyo to promote implementation of and assist in the preparation of application for PVS.
10) Assessment tool for TG implementation in the region	• Drs. I. Ernst and CV Mohan to formulate a technical approach (questionnaires) for assessment of TG implementation in the region. Target respondents will be the NCs. • First draft of the questionnaires to be circulated to AG members for comments and suggestions. • Results of the assessment will be presented in the next AGM.
11) Annual AG Meeting	• NACA should consider to invite one member country per AGM to present their AAH activities and programme, with either partial or full funding.

ANNEX E: ASIA REGIONAL TECHNICAL GUIDELINES – STATUS OVERVIEW (ADOPTED FROM AGM 9 REPORT)

Element of technical guidelines	Progress / status	Gaps / opportunities
1. Disease reporting *An understanding of the basic aquatic animal health situation is a pre-requisite for prioritising activities, developing national policy and identifying pathogens of national importance.*	• Regional QAAD reporting system established – participation has increased • The QAAD list has incorporated emerging diseases that were later listed by the OIE • Many countries have established national lists for reporting purposes with appropriate supporting legislation	• Participation could improve further – some countries report irregularly • The proposed regional core utilising the OIE's WAHID will streamline reporting and may improve participation • The exact status of individual countries with regard to adoption of national lists and supporting legislation is not know
2. Disease diagnosis *Diagnosis requires various levels of data, starting with farm- or site-level observations and progressing in technical complexity to electron microscopy, immunological and nucleic acid assays and other biomolecular methods. This means all levels of expertise, including that of the farmer and extension officer working at the pond side, make essential contributions to rapid and accurate disease diagnosis.* *Effective diagnostic capability underpins a range of programs including early detection for emergency response and substantiating disease status through surveillance and reporting.*	• Diagnostic capabilities have improved in many countries • NACA disease cards have been developed and maintained for emerging diseases • The Asia regional diagnostic manual has been developed • An Asia regional diagnostic field guide has been developed • OIE reference laboratories • Regional reference laboratories – where no OIE reference laboratory exists • Regional Resource Experts are available to provide specialist advice • Ad hoc laboratory proficiency testing programs have been run	• OIE twinning programs are a means to assist laboratories to develop capabilities • The exact status of diagnostic capability in individual countries is not certain • There is limited or no access to ongoing laboratory proficiency testing programs • Some areas of specialist diagnostic expertise are lacking • Network approaches are a means draw on available diagnostic expertise
3. Health certification and Quarantine measures *The purpose of applying quarantine measures and health certification is to facilitate transboundary trade in aquatic animals and their products, while minimising the risk of spreading infectious diseases*	• Strong progress has been made, particularly for high risk importations (e.g. importation o broodstock and seed stock) • Training has been provided through regional initiatives (e.g. AADCP project) • Commercial implications for trade have driven improved certification practices	• The importance of supporting aquatic animal health attestations through sound aquatic animal health programs continues to be underestimated, with possible ramifications for trade • Some inappropriate or illegal activities continue and threaten to spread trans-boundary

	• Harmonisation with OIE model certificates has occurred	diseases
4. Disease zoning and compartmentalisation *Zoning (and compartmentalization) allows for part of a nation's territory to be identified as free of a particular disease, rather than having to demonstrate that the entire country is free. This is particularly helpful to facilitate trade in circumstances where eradication of a disease is not feasible.Zoning is also an effective tool to restrict the spread of important pathogens and aid in their eradication.*	• Is an emerging need to meet requirements of importing countries • To facilitate trade, some countries are working toward having compartments and zones recognised	• Where common health status can be identified restrictions on trade can be reduced • Training opportunities would be beneficial • Learn from the experience of terrestrial animal industries (e.g. poultry)
5. Disease surveillance and reporting *Necessary to produce meaningful reports on a country's disease status by providing evidence to substantiate claims of absence of a particular disease and thereby support import risk analysis, justify import health certification requirements, and enable export health certification*	• Regional Resource Experts are available to provide specialist advice • Training has been provided through a number of initiatives (e.g. AADCP project) • Many published resources are available, including those of the OIE (publications and the OIE centre for aquatic animal epidemiology) • Collation of surveillance information has improved through participation in international reporting	• Remains a reliance on passive surveillance. Active surveillance may be beneficial but cost is often a barrier. • Methodologies to undertake effective but low-cost active surveillance would be of assistance • Epidemiological expertise is often limited • There is a need to increase surveillance of wildlife to support health status
6. Contingency planning *Important to provide a rapid and planned response for containment of a disease outbreak—thereby limiting the impact, scale and costs of the outbreak*	• Important provides a rapid and planned response for containment of a disease outbreak Some countries have advanced contingency planning with appropriate supporting legislation • Some countries have tested contingency plans through simulation exercises • Resources are available (e.g. Australia's AQUAVETPLAN, FAO guidelines, OIE links to resources)	• The exact status of contingency planning in individual countries is not certain • Training in emergency management frameworks may be useful • Support for developing contingency plans might usefully be directed at particular disease threats e.g. IMN
7. Import risk analysis	• Numerous resources and case studies published	• There is a need to build awareness of the concepts

The movement of live aquatic animals involves a degree of disease risk to the importing country. Import risk analysis (IRA) is the process by which hazards associated with the movement of a particular commodity are identified and mitigative options are assessed. The results of these analyses are communicated to the authorities responsible for approving or rejecting the import.	• The approach has been applied, particularly for some circumstances e.g. import of live *P. vannamei* • However risk analysis is not always applied, or is not applied appropriately • Regional training has been provided (e.g. AADCP project) •	• Training can be abstract and disengaging - should aim at trainees learning on scenarios relevant to their circumstances • This is a high priority generic need that is suited to development of a central training program
8. National strategies *The implementation of these Technical Guidelines in an effective manner requires an appropriate national administrative and legal framework, as well as sufficient expertise, manpower and infrastructure.*	• Many countries have developed national strategies • Detailed assistance has been provided to some countries (e.g. AADCP project)	• The exact status of national strategies in individual countries is not certain • The OIE's PVS tool provides a means of assessing the progress of individual countries
9. Regional capacity building *Regional-level capacity building in support of the implementation of the Technical Guidelines*	• Regional level programs are a cost-effective means to support capacity building in the region • Organisational structures are in place to coordinate activities and communicate progress (e.g. NACA, AG) • Numerous projects have been implemented to support capacity building across a range of disciplines (e.g. those supported by/through FAO, OIE, SEAFDEC, AADCP etc.) • Many organisations have an ongoing interest in investing in aquatic animal health capacity building in the region	• While many projects have been implemented, they are sometimes ad hoc in nature and ongoing impact may not be measured • Better coordination might be achieved by better documentation of progress and remaining gaps • There may be strategic benefit in implementing major projects that address multiple capabilities