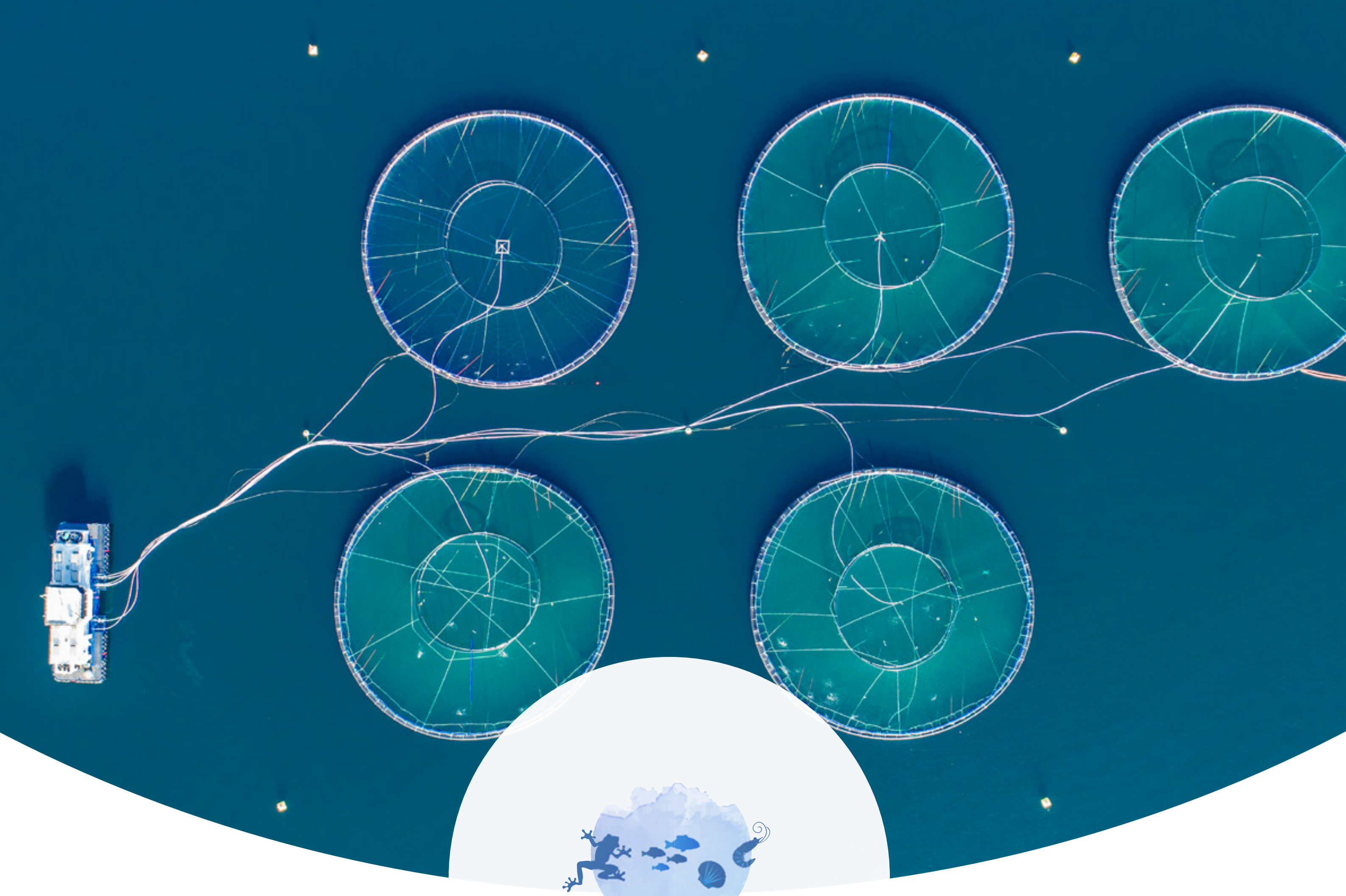


OIE GLOBAL CONFERENCE ON AQUATIC ANIMAL HEALTH

COLLABORATION, SUSTAINABILITY: OUR FUTURE

SANTIAGO, CHILE,
2-4 APRIL 2019

WORLD ORGANISATION FOR ANIMAL HEALTH
Protecting animals, preserving our future

DONORS

This event is organised with financial support of the People's Republic of China, the European Union, Japan, and Norad.
The OIE would also like to thank the government of Chile for its significant financial and logistical support in organising this Conference.

SPONSORS

This conference is also organised with the financial support of Aquachile and the University of Chile.

WORLD ORGANISATION FOR ANIMAL HEALTH
Protecting animals, preserving our future

OIE GLOBAL CONFERENCE ON AQUATIC ANIMAL HEALTH

COLLABORATION, SUSTAINABILITY: OUR FUTURE

SANTIAGO, CHILE,
2-4 APRIL 2019

OIE GLOBAL CONFERENCE ON AQUATIC ANIMAL HEALTH

COLLABORATION, SUSTAINABILITY: OUR FUTURE

CONTENTS

Page

OIE GLOBAL CONFERENCE ON AQUATIC ANIMAL HEALTH
COLLABORATION, SUSTAINABILITY:
OUR FUTURE

OBJECTIVES

The Conference will highlight the critical contribution of aquatic animal health programmes to improving aquaculture productivity and sustainability, and consequently the availability of high-quality protein to feed the world. The conference will raise awareness of the need for good governance of Veterinary Services and Aquatic Animal Health Services, including both governmental and private sectors, promoting collaboration between veterinarians, aquatic animal health professionals, and other partners in assuring safe and sustainable aquaculture production.

The Conference programme will focus on four key themes:

1. Managing transboundary and emerging diseases

Diseases emerge regularly in aquaculture and many have catastrophic impacts on aquaculture, fisheries or the environment. Managing emerging diseases presents particular challenges due to a lack of understanding about their epidemiology and potential impacts; a lack of diagnostic tests and treatment tools; and the need to make management decisions despite these limitations in knowledge. In recent decades the global performance in managing these diseases has been poor, with numerous outbreaks spreading internationally.

This session will address the threat of aquatic animal diseases; drivers of emerging diseases; routes of spread and impacts of disease; and improved approaches to emerging disease response.

2. Biosecurity in aquaculture

OIE Member Countries have requested that guidance on biosecurity be provided in the *Aquatic Code* to support disease control but also to underpin other OIE Standards. Implementation of biosecurity standards is most effectively achieved through public private partnerships, reflecting the shared responsibility for management of transboundary diseases.

This session will improve understanding of risk-based approaches to biosecurity that can be applied at different scales and to different systems; present OIE guidance on biosecurity; and present examples of the application of biosecurity to support trade.

3. Advances in disease management

New technologies are developing rapidly, and many are likely to provide advances in the management of aquatic animal health.

This session will explore new approaches and tools for the prevention and control of aquatic animal diseases including strategies to reduce the use of antimicrobial agents, tools for surveillance, diagnostics and communication; and how new technologies are being used and may be used in the future.

4. OIE international standards

This session will provide an overview of recent updates of the OIE *Aquatic Code* and *Aquatic Manual* and future directions, as well as highlight the importance of implementing these provisions to prevent the spread of transboundary aquatic animal diseases.

GENERAL INFORMATION

VENUE

Crowne Plaza Santiago
Hotelera Alameda SPA, Av. Libertador Bdo. O'Higgins 136,
Santiago | 6513491 | Chile
https://www.ihg.com/crowneplaza/hotels/fr/fr/santiago/sclco/hoteldetail

LANGUAGE

Presentations will be delivered in one of the official OIE languages (English, French or Spanish with simultaneous interpretation).

FOLLOW THE CONFERENCE

- Via social media **#OIEAquatic2019**
- Via the dedicated website **www.oie.int/aquatic-conference2019**
- Speaker biographies are available on the Conference website at **www.oie.int/aquatic-conference2019**.
- Presentations will be uploaded after the Conference.

PROGRAMME

OIE GLOBAL CONFERENCE ON AQUATIC ANIMAL HEALTH
COLLABORATION, SUSTAINABILITY:
OUR FUTURE

MONDAY 1 APRIL 2019	
17:00–19:00	**REGISTRATION**

DAY 1: TUESDAY 2 APRIL 2019 – OPENING SESSION		
08:30–09:30	**REGISTRATION** (CONTD)	
09:30–10:15	Representative of the Government of Chile **Mark Schipp,** President, OIE World Assembly of Delegates **Monique Eloit,** Director General, OIE	
10:15–10:45	**TEA/COFFEE BREAK**	
KEYNOTE ADDRESSES AND PANEL DISCUSSION		
Chair: **Ingo Ernst, President,** OIE Aquatic Animal Health Standards Commission		
10:45–11:45	The global seafood revolution	**George Chamberlain**, USA
	Seafood and human welfare	**Randall Brummet**, USA
11:45–12:40	**PANEL DISCUSSION: PAINTING THE FUTURE FOR AQUACULTURE**	
	Alicia Gallardo Lagno, Sernapesca, Chile **Qing Li,** Ministry of Agriculture and Rural Affairs, People's Republic of China **Kristina Landsverk,** Food Safety Authority, Norway **Arturo Clement,** SalmonChile, Chile **Arni Mathiesen,** Department of Fisheries and Aquaculture, FAO	
12:40–13:00	Introductions	**Gillian Mylrea**, OIE
13:00–14:00	**LUNCH**	

SESSION 1 *MANAGING TRANSBOUNDARY AND EMERGING DISEASES*		
Chair: **Ingo Ernst**		
14:00–14:20	A new approach to managing emerging aquatic animal diseases	**Edmund Peeler,** Vice-President, OIE Aquatic Animal Health Standards Commission
14:20–14:40	The history of aquatic animal disease emergence and spread	**Tomoyoshi Yoshinaga**, Japan
14:40–15:00	Lessons learned from the emergence of AHPND, EHP, and white faeces disease	**Loc Tran,** Vietnam

15:00–15:20	Global cooperation to manage Tilapia lake virus – an emerging disease	**Henrique Cesar Pereira Figueiredo,** Brazil
15:20–15:50	**TEA/COFFEE BREAK**	
15:50–16:10	Infection with ostreid herpesvirus 1 microvariants – a review of its emergence, impact and control	**Marine Fuhrmann,** France
16:10–16:30	Protecting biodiversity from an emerging disease of amphibians – *Batrachochytrium salamandrivorans*	**Jonathan Kolby,** USA
16:30–16:50	A known threat in a new environment —the emergency response to infection with white spot syndrome virus– in Australia	**Kerrod Beattie,** Australia
16:50–17:10	How can public and private sectors share responsibility for managing aquatic animal diseases?	**Katie Scutt,** Australia
17:10–18:00	**PANEL DISCUSSION**	**All presenters**

DAY 2: WEDNESDAY 3 APRIL 2019		
SESSION 2 *BIOSECURITY IN AQUACULTURE*		
Chair: **Alicia Gallardo Lagno,** Vice-President, OIE Aquatic Animal Health Standards Commission		
09:00–09:20	Aquaculture biosecurity seen from the ground	**Victoria Alday-Sanz,** Spain
09:20–09:40	Biosecurity in livestock production: are there lessons to be learned for aquaculture?	**Nigel Gibbens,** United Kingdom
09:40–10:00	Applying biosecurity in aquaculture at a national level	**Marcela Lara,** Chile
10:00–10:20	The importance of biosecurity for market access	**Eduardo Rodriguez,** Iceland
10:20–10:40	Biosecurity in shrimp production	**U Win Latt,** Myanmar
10:40–11:10	**TEA/COFFEE BREAK**	
11:10–11:30	Biosecurity in tilapia production	**Vishnumurthy Mohan Chadag**, Worldfish
11:30–12:10	**PANEL DISCUSSION**	**All presenters**

SESSION 3 *ADVANCES IN DISEASE MANAGEMENT*		
Chair: **Kristina Landsverk,** Food Safety Authority, Norway		
12:10–12:30	Understanding and managing aquatic animal health during the aquaculture revolution to 2050	**Grant Stentiford,** United Kingdom
12:30–12:50	Accelerated breeding for resistance – white spot syndrome virus resistant black tiger prawns	**Jiun–Yan Huang,** Chinese Taipei
12:50–13:10	An integrated approach to the use of veterinary medicines in aquatic animal health management	**Ben North,** Pharmaq
13:10–14:10	**LUNCH**	
14:10–14:30	The prudent use of antimicrobial agents in aquatic animals	**Kristina Landsverk**
14:30–14:50	OIE Strategy on Antimicrobial Resistance and the Prudent Use of Antimicrobials	**Matthew Stone** OIE

14:50–15:10	Aquaculture and the Progressive Management Pathway for Improving Aquatic Biosecurity – a new initiative	**Arni Mathiesen**
15:10–15:45	**PANEL DISCUSSION**	**All presenters**
15:45–16:15	**TEA/COFFEE BREAK**	

SESSION 4 *OIE INTERNATIONAL STANDARDS*		
Chair: **Kevin Christison,** OIE Aquatic Animal Health Standards Commission		
16:15–16:35	The importance of OIE Aquatic Standards to meet future challenges of aquaculture	**Ingo Ernst**
16:35–16:55	Why disease reporting is fundamental to aquatic animal health?	**Edmund Peeler**
16:55–17:15	Update on the OIE World Animal Health Database (OIE WAHIS)	**Matthew Stone**
17:15–17:35	Update on the OIE PVS Tool: Aquatic	**Stian Johnsen,** OIE
17:35–18:00	**PANEL DISCUSSION**	**All presenters**

DAY 3: THURSDAY 4 APRIL 2019		
SESSION 5 *AQUATIC ANIMAL HEALTH - OUR FUTURE*		
Chair: **Edmund Peeler**		
09:00–09:20	2030 – A future vision for management of Aquatic Animal Health	**Ingo Ernst**
09:20–10:10	Aquatic Animal Health: Collaboration, sustainability: our future **PANEL DISCUSSION (AS PER DAY 1)**	
10:10–10:30	What the OIE can contribute to the future of aquaculture	**Mark Schipp**
10:30–11:00	**TEA/COFFEE BREAK**	
11:00–12:00	**RECOMMENDATIONS OF THE CONFERENCE**	
12:00–12:20	**WRAP-UP SESSION**	**Gillian Mylrea**
12:00–12:30	**CLOSING CEREMONY**	

ABSTRACTS

OIE GLOBAL CONFERENCE ON AQUATIC ANIMAL HEALTH
COLLABORATION, SUSTAINABILITY: OUR FUTURE

KEY NOTE PRESENTATIONS

SESSION 1

MANAGING TRANSBOUNDARY AND EMERGING DISEASES

SESSION 2

BIOSECURITY IN AQUACULTURE

SESSION 3

ADVANCES IN DISEASE MANAGEMENT

SESSION 4

OIE INTERNATIONAL STANDARDS

K1.1

THE GLOBAL SEAFOOD REVOLUTION

George Chamberlain
Global Aquaculture Alliance, 85 New Hampshire Avenue, Suite 200, Portsmouth, NH, 03801 United States of America
E-mail: George.Chamberlain@aquaculturealliance.org

The evolution of aquaculture is analogous to that of terrestrial animal husbandry where traditional culture of wild animals at low density in a natural setting has progressed to intensive culture of domesticated animals in a controlled setting. The difference is that domestication of terrestrial animals began thousands of years ago, but many forms of aquaculture began in recent decades as fisheries production began to plateau. Despite its late start, aquaculture production has surged forward.

In 2014, it achieved the remarkable milestone of surpassing fisheries production. The sector continues to grow and intensify through advances in the fundamental disciplines of health management, genetic selection, nutrition, and engineering, which have enabled more consistent yields and reduced costs. Simple outdoor ponds and complex indoor recirculating systems are beginning to converge in large-scale, covered, intensive systems with water reuse. Open ocean systems are also becoming a reality.

The former concerns about a "fishmeal trap", due to insufficient supplies of fishmeal and oil have been relieved by advances in various alternatives such as microbial and insect meals, oils from algae and GM crops, and synthetic attractants. The closer proximity and increasing intensity of aquaculture farms and hatcheries has led to more disease pressure from viruses, bacteria, and parasites. Better disease management technologies and antibiotic stewardship are needed to minimise antimicrobial resistance. Promising advances in diagnostics, improved water treatment including ultramembrane filtration, certified SPF broodstock, genomic selection for disease resistance, probiotics, immunostimulants, and RNA interference are needed to position the sector for the next stage of growth.

Market-driven certification systems have been developed to ensure that production systems meet international guidelines for environmental, social, and food safety compliance. Looking forward, the outlook for aquaculture to become an increasingly important source of wholesome food is optimistic, provided the sector remains focused on sound science and responsible practices.

K1.2

SEAFOOD AND HUMAN WELFARE

Randall Brummett
World Bank, 1818 H St NW, Washington DC
E-mail: rbrummett@worldbank.org

Driven by increasing population and prosperity in aquatic animal-eating nations, and health concerns in industrialised countries, aquatic animal demand is likely to double by mid-century. With many capture fisheries in decline or under threat from climate change, income among fishers is dropping and jobs are being lost all along the seafood value chain, with women fish traders and processing plant workers being particularly vulnerable.

The gap between supply and demand creates an important opportunity for the major aquaculture producing countries, most of which are low to middle income, to grow the sector and create new jobs and economic prosperity. Net present value (NPV) of the aquaculture sector has been estimated at $100 billion, but even if finance were available, land and fresh water to double the aquaculture sector as it currently exists, is limiting.

To grow aquaculture without creating environmental problems, we need new technology. As a young industry, there remains much to be gained in terms of technical and ecological efficiency. It has been calculated that 21% of losses, equal to some $10 billion dollars, are incurred annually due to disease in the aquaculture sector and represent the major firm-level risk. Most major disease events occur in developing countries where over 90% of aquaculture takes place, reducing revenues, eliminating jobs, threatening food security and development gains. The sector needs finance to develop and/or purchase the technology needed to grow the sector and make it more efficient while reducing risk from disease, but the risk of losing one crop in five makes investors reluctant to put the new money needed to fuel innovation and sustainable intensification. New technology is needed to facilitate the modernisation of the seafood supply. To buy that technology we need bankers, and to convince those bankers to lend money to aquaculture, we need to better manage risk, particularly of disease.

S1.1

A NEW APPROACH TO MANAGING EMERGING AQUATIC ANIMAL DISEASES

Edmund Peeler [1] **& Ingo Ernst** [2]
(1) Centre Environment, Fisheries and Aquaculture Science, Barrack Rd., Weymouth, DT4 8UB, United Kingdom
E-mail: ed.peeler@cefas.co.uk
(2) Aquatic Pest and Health Policy Animal Division, Australian Government, Department of Agriculture and Water Resources, GPO Box 858 Canberra ACT 2601, Australia
E-mail: Ingo.Ernst@agriculture.gov.au

Since 1970 aquaculture has grown at almost 10% per annum by expanding into new areas, farming new species (often non-native species) which, combined with large-scale movements of animals, has driven disease emergence, and consequently damage to both production and biodiversity. Improved management of emerging aquatic animal diseases (EAADs) can be achieved by taking action to reduce the likelihood of emergence and responding more effectively.

An understanding of these drivers for disease emergence is needed to develop mitigation measures. Exposure to wild populations and non-native species (and their pathogens) combined with host-switching underpins disease emergence but can be reduced by infrastructure and management that reduce escapes and exclude wild animals (e.g. barrier nets, cage integrity and siting). Secondly, a high standard of health management ensures immunocompetence and resistance to putative new pathogens and strains, and thus reduces the rate of emergence.

Early detection, reporting and action are all needed to prevent spread of EAADs. Field and laboratory infrastructure are needed for detection, legislation and well-developed decision-making processes to ensure decisive action. Under-reporting by farmers is a major constraint to detection. Information and communications technology (e.g. smartphone applications, cloud computing) to collect and manage data, coupled with a farmer-centric approach to surveillance, demonstrably improves reporting. Other technological advances (earth observation and environmental monitoring) provide data on risk factors for emergence and spread. These technological developments can be fully exploited if the near real-time data generated is continuously analysed to create information for rapid decision-making about control options, e.g. eradication, containment, doing nothing. Inaction may be the best option but should not be selected by default. Improving reporting of EAADs to the OIE, critical to reducing transboundary spread, can be incentivised if the global response includes support to low income countries so they can apply well-established OIE standards and new approaches to manage EAADs.

S1.2

THE HISTORY OF AQUATIC ANIMAL DISEASE EMERGENCE AND SPREAD

Tomoyoshi Yoshinaga
Graduate School of Agricultural and Life Sciences, The University of Tokyo,
Yayoi 1-1-1, Bunkyo-ku, Tokyo 113-8657, Japan
E-mail: atyoshi@mail.ecc.u-tokyo.ac.jp

Lessons from past cases of emerging diseases are valuable for our future actions for biosecurity of aquatic animals. This presentation gives a brief history of aquatic disease emergence and spread and present a summary of recent past including patterns of emergence and consequences.

From a biosecurity perspective, aquatic animals and their diseases have some characteristics different from those of terrestrial animals and diseases. The diversity of aquatic animal species causes host switching and live animals are transported easily beyond boundaries and continents as aquaculture seeds and human foods, which lead to frequent appearance of emerging diseases. Pathogens are easily transmitted through water and transmission cycles are easily established between aquaculture and wild populations. Once the cycles are established, enclosures and elimination of pathogens are impossible, imposing long-lasting damage on aquaculture and wild fisheries. When novel or emerging diseases appear, we have little available information necessary for risk assessments and biosecurity measures based on the assessments. On the other hand, biosecurity measures, such as suspension of shipment and call for attention to the public, often pose economic damages to the industry. Therefore, countries and local governmental authorities hesitate to quickly implement necessary actions against emerging diseases.

Implementation of national contingency plans describing provisional biosecurity measures on pertinent information, as well as quick and international sharing of disease information through the OIE World Animal Health Information System (WAHIS), can be a solution to frequent appearance of emerging diseases in aquatic animals.

S1.3

LESSONS LEARNED FROM THE EMERGENCE OF AHPND, EHP, AND WHITE FAECES DISEASE

Loc Tran [1, 2*], Vy Van Nguyen [1], Phuc Hoang [1] & Trang Nguyen [1]
(1) ShrimpVet Laboratory, Ho Chi Minh City, Vietnam
(2) Department of Aquaculture Pathology, College of Fisheries, Nong Lam University, Vietnam
E-mail: thuuloc@email.arizona.edu

Early Mortality Syndrome (EMS) or Acute Hepatopancreatic Necrosis Disease (AHPND) have been characterised and determined since 2013. Since then, there has been made several attempts in Vietnam to reduce the impact of AHPND in shrimp production. These include: better hatchery, nursery, and grow out protocols. With regards to hatchery protocols, several improved practices have been applied including: PCR screening for all material (brood stock, live feed, Nauplii, and post larvae before harvest), better sanitation, better bio-remediation with focus on the reduction of vibriosis. The same sanitation, probiotics, and bio-remediation approaches have been applied in nursery and grow out practices. Several trials using "functional diets" with feed additives added in feed ingredients before extrusion showed positive result in both disease prevention and growth performance. An overall antibiotic-free farming protocol is achievable.

In practice, Vietnam has moved a long way since the outbreak of AHPND in 2010 from a very natural based farming system with low levels of biosecurity and antibiotic-based farming protocols towards more controlled farming methods. Several new practices have been applied including: screening for diseases throughout the farming cycle, better pond preparation with good probiotic blooms before stocking, plastic-lined pond farming protocol, nursery phase at the farm level, routine/daily application of bioremediation, daily shrimp pond waste removal, probiotics top-coating in feed, and functional feed. With better adaptation to new farming protocols, it appears that the shrimp farming becomes more predictable, explaining the fast increase of Vietnamese shrimp production in recent years.

S1.4

GLOBAL COOPERATION TO MANAGE TILAPIA LAKE VIRUS – AN EMERGING AQUATIC ANIMAL DISEASE

Henrique C.P. Figueiredo
Veterinary School, Federal University of Minas Gerais, Avenida Antônio Carlos, 6627, CEP 31.270-901, Belo Horizonte, Brazil
E-mail: figueiredoh@yahoo.com

Nile tilapia *(Oreochromis niloticus)* and its hybrids comprise the second major farmed fish in the world and the second-ranked product in global aquaculture trade.

In 2014, a new emerging disease in Nile tilapia, named Tilapia Lake Virus (TiLV) disease, was characterised, and described in Israel and Ecuador. The pathogenic agent is a segmented RNA virus, close to the *Orthomyxoviridae* family. According to official reports and scientific literature, TiLV has now been recorded in 14 countries, from Asia, the Americas, and Africa. Its outbreak can result in mortalities ranging from 9.2 to 90%, with fingerlings and juveniles being more susceptible than the adult fish. Several Diagnostic methods have already been described, although without a complete validation.

The disease has been assessed several times against the criteria for listing aquatic animal diseases in Chapter 1.2. of the *Aquatic Code* but have not been found to meet criterion 3 because of insufficient information concerning analytical and diagnostic specificity and sensitivity of the diagnostic method. An *ad hoc* Group has been convened to advance work on the method

The fast spread of the virus through different countries suggests that the trade of fingerlings was the major source of infection and that basic adopted measures of biosecurity, health certification and quarantine were unable to avoid the pathogen introduction. Some other countries, that still are free of TiLV, have adopted measures to avoid the introduction of this virus; however, several gaps exist in our knowledge of risk factors for TiLV transmission, risk assessment for the main tilapia commodities (fresh and frozen fillets, live fingerlings), as well as the development of target surveillance plans, contingency plans and quarantine procedures. Cooperation among OIE Member Countries, sharing experiences of TiLV control, and adoption of evidence-based measures by sanitary authorities, will be the key factors for the future control of the disease.

S1.5

INFECTION WITH OSTREID HERPESVIRUS 1 MICROVARIANTS – A REVIEW OF ITS EMERGENCE, IMPACT AND CONTROL

Marine Fuhrmann [1], Aurélie Castinel [2], Deborah Cheslett [3], Dolors Furones Nozal [4] & Richard Whittington [1]
(1) The University of Sydney, School of Veterinary Science, Faculty of Science, Camden, Australia
(2) Ministry for Primary Industries, 118 Vickerman Street, Port Nelson, Nelson, New Zealand
(3) Marine Institute, Rinville, Oranmore, Ireland
(4) Institute of Agrifood Research and Technology, Sant Carles de la Ràpita, Spain
E-mail: marine.fuhrmann@sydney.edu.au

Mollusc farming is the third most productive aquaculture activity in the world, and the Pacific oyster *(Crassostrea gigas)* is one of the most widely cultivated species. The biggest risk for aquaculture is diseases which can have an enduring impact on the volume and stability of production and therefore on local livelihoods.

For the last ten years, the Pacific oyster industry has been challenged by the Pacific Oyster Mortality Syndrome due to infection of *C. gigas* by *Ostreid herpesvirus* 1 microvariants, a disease not listed by the OIE. The emergence of the disease occurred in Europe in 2008, then in New Zealand and Australia in 2010. It is likely that stock movements is one of the causes for the quick spread of OsHV-1 across European borders and at national scale in New Zealand. In response to the disease emergence and to limit the spread of OsHV-1, most of the affected countries regulated the movement of oysters through containment measures and developed surveillance programs for early detection of OsHV-1. Even if these measures have limited the spread of OsHV-1 in specific areas in the UK and Australia, they have not prevented global-scale spread. Unintentionally, biosecurity policies and responses to outbreaks affected both hatcheries and farmers in areas free of disease, mainly due to restrictions on animal movements.

The spread of disease is often viewed as a management failure. However, there is still uncertainty about OsHV-1 transmission mechanisms and not all pathways may have been identified. The specific role of recreational and commercial vessels in virus transmission via biofouling and ballast water, oceanic dispersal in currents and transfer of virus in uncooked seafood still require further investigation.

There may be opportunities for better coordination of industry and government responses to epizootic disease emergence in aquaculture, and there is a need for increased adoption of technical advances once they have been adequately verified.

S1.6

PROTECTING BIODIVERSITY FROM AN EMERGING DISEASE OF AMPHIBIANS – *BATRACHOCHYTRIUM SALAMANDRIVORANS*

Jonathan Kolby
United States Fish and Wildlife Service, 317 North Howard Street, Apt. #404, Alexandria, Virginia, 22304
United States of America
E-mail: j_kolby@hotmail.com

Amphibians around the world are experiencing population decline and extinction, largely due to the spread of an emerging infectious disease. This disease, chytridiomycosis, is caused by the pathogenic chytrid fungi *Batrachochytrium dendrobatidis* (Bd) and *Batrachochytrium salamandrivorans* (Bsal). Together, these pathogens are uniquely devastating because they demonstrate exceptionally low host species specificity within the Class Amphibia, and now many of the world's 7,000+ amphibian species are in jeopardy. These pathogens are highly transmissible and spread through skin-to-skin contact between animals and by exposure to contaminated water or substrates.

The international trade in live amphibians remains the single greatest source of contemporary dispersal between countries. Annually, millions of live amphibians are shipped internationally for use as exotic pets, for human consumption as frog legs, and as research subjects. Studies have shown that many of these animals carry chytrid fungus and other pathogens.

Recently, several nations where Bsal has not yet been detected banned the importation of salamanders to prevent its introduction and hopefully evade an amphibian biodiversity catastrophe. Despite these actions, greater international cooperation and collaboration are still needed to effectively control the continued spread of these pathogens and prevent the emergence of novel hypervirulent disease strains. Following identification of these pathogens, efforts to control their spread progressed much slower than actions often taken to protect the health of livestock and agriculture. Why might this be and what lessons can we learn from the past 20 years of amphibian chytrid fungus research? In this presentation, learn more about the global emergence of these pathogens, what actions might help stem the global amphibian extinction crisis, and why controlling this emerging disease may help protect global biodiversity in the future.

S1.7

A KNOWN THREAT IN A NEW ENVIRONMENT –THE EMERGENCY RESPONSE TO INFECTION WITH WHITE SPOT SYNDROME VIRUS IN AUSTRALIA

Kerrod Beattie
Biosecurity Queensland, Department of Agriculture and Fisheries, 41 George Street, Brisbane QLD 4000, Australia
E-mail: Kerrod.Beattie@daf.qld.gov.au

White spot syndrome virus is the causative agent for the disease and has been problematic in prawn culture since an epidemic in Taiwan 1992 and subsequent large-scale mortalities in the People's Republic of China in 1993.

On 22 November 2016, Biosecurity Queensland, Australia, was notified of some unusual minor mortalities at a prawn farm located on the Logan River in South East Queensland. By 29 November 2016, this farm had experienced over 90% mortalities as the disease rapidly progressed.

On 1 December 2016, Biosecurity Queensland received confirmation from the Australian Animal Health Laboratory that the disease agent was White Spot Syndrome Virus. This was Day 1 in which the Aquatic Consultative Committee for Emergency Animal Diseases was convened to provide advice for a Response Plan and Emergency Powers of Inspectors under the Queensland *Biosecurity Act 2014*.

These events led to Australia's largest ever response to an aquatic disease, with Queensland as the combat State. Despite stringent biosecurity and eradication measures on the index farm, surveillance sampling in the surrounding Logan River resulted in positive detections of white spot syndrome virus in wild prawns. By mid-February 2017, the disease had spread to all seven farms on the Logan River.

Containment of the disease through extensive destruction and decontamination activities continued until Day 156 on 6 May 2017. The Queensland Government through legislation has imposed a regulated area, restricting movements of certain carrier species, imposed fishing restrictions and continues to undertake extensive surveillance and monitoring to determine the potential for the spread of this disease.

S1.8

HOW CAN PUBLIC AND PRIVATE SECTORS SHARE RESPONSIBILITY FOR MANAGING AQUATIC ANIMAL DISEASES?

Katie Scutt
Department of Agriculture and Water Resources, Australia
E-mail: katie.scutt@agriculture.gov.au

Aquatic animal disease outbreaks affect both the public (represented by governments) and private sectors (represented by aquaculture and fisheries industries), but all too often, the responsibilities and costs of responding to an outbreak may not be shared. Without a mechanism for public and private sectors to work together, the outcomes of an emergency response may not be ideal or be of common benefit to all potentially affected parties.

In Australia, a mechanism for public and private sectors to share responsibilities and costs of responding to aquatic animal disease outbreaks is being developed, through an industry–government emergency aquatic animal disease response agreement. This agreement provides a way for both public and private sectors to share the responsibilities and costs of responding to a disease outbreak and to coordinate disease prevention activities to reduce shared risk. The key elements of the agreement include provisions to incentivise faster notification of disease outbreaks, facilitate faster response, share decision making and costs (including compensation for affected businesses), clarify responsibilities of all parties and importantly, strengthen risk mitigation activities.

This presentation will describe how the agreement has been developed among 18 industry and government sectors, how key elements of the agreement will improve aquatic animal health outcomes, and principles that could be applied to improving aquatic animal health outcomes by other OIE Member Countries.

S2.1

AQUACULTURE BIOSECURITY SEEN FROM THE GROUND

Victoria Alday-Sanz
NAQUA, P.O. Box 20, Al-Lith 21961, Saudi Arabia
E-mail: alday@naqua.com.sa

Diseases have proven to be one of the major threats to the sustainability of the aquaculture industry. They have caused severe economic impact at all levels, starting with small farmers, corporate companies up to national economies. Diseases have a wide range of expression and may range from severe and acute mortality to low chronic mortality or slow growth.

There are various definitions of biosecurity that could be synthesised as all the actions needed to prevent and manage diseases reducing their economic impact. Biosecurity uses different tools to implement its strategies working at three different levels: international, national and farm level.

International standards and agreements are needed to prevent the transboundary movement of pathogens and protection of regional health status. These relate to the control of importation of live aquatic animals, fresh and frozen aquaculture products for reprocessing and the handling of ballast water, in accordance with the *OIE Aquatic Code*. The risks, possible strategies and monumental difficulties to implement them are discussed in this presentation.

Suitable national legislation is required, again to prevent the transboundary movement of pathogens, early detection of pathogens through surveillance programmes, reference diagnostic laboratories, suitable use of veterinary drugs and geographic zonation and compartmentalisation

Eventually, farm level biosecurity needs to consider different strategies depending on the culture system used and endemic pathogens. The suitable genetic characteristics of the broodstock and their health status are crucial for the success of the culture. Exclusion versus pathogen management approaches will depend on the economic impact of diseases, the stage of culture and the type of pathogen. It is important to try to balance the economic risk of the disease and the investment in biosecurity.

S2.2

BIOSECURITY IN LIVESTOCK PRODUCTION: ARE THERE LESSONS TO BE LEARNED FOR AQUACULTURE?

Nigel Gibbens
Itinerant Vets Ltd, Nightingale House, 46-48 East Street, Epsom, Surrey, KT17 1HQ. United Kingdom
E-mail: itinerant.vets@gmail.com

Biosecurity measures are applied at international, national and local levels. This responsibility falls on all actors, from the individual livestock keeper to the national Government.

At farm level, disease threats must be identified, and biosecurity measures should address them. Farm level biosecurity measures also protect against entry of exotic diseases, should import controls fail. Introduction of animals is the biggest threat for most diseases but bringing in new stock is integral to many management systems. Animals must therefore be carefully sourced. Other risks include mechanical transmission of pathogens on people, vehicles, foodstuffs and other materials, and mechanical or biological transmission from wild animals such as rodents or wild birds. Good management can minimise these risks, controlling and reducing the number of interactions, and controlling wild animals or preventing direct or indirect contact with them.

A lot can be achieved by action at farm level but there are important limitations that can only be addressed if farmers work cooperatively. For example, disease free animals can only be sourced if they are available and their status can be assured, and farm biosecurity can break down if the disease challenge from neighbouring farms is very high. Concerted action can be delivered through integrated businesses or by associations of farmers.

Governments set import policies to protect national animal health status and ensure that import health standards are met. The private sector may set biosecurity requirements that go beyond those that Governments may apply under WTO rules. This may be done by individual farms or farmer associations.

Where diseases have a high impact at national level, compulsory Government-led action is required. Such biosecurity actions may be stringent and widespread, such as preventing any movements of susceptible animals, requiring vaccination, treatment or housing, or culling of affected or high-risk herds or flocks.

S2.3

APPLYING BIOSECURITY IN AQUACULTURE AT A NATIONAL LEVEL

Marcela Lara & Alicia Gallardo
National Fisheries and Aquaculture Service, Valparaíso, Chile
E-mail: MLARA@sernapesca.cl

In 2007, Chile faced an aquatic animal health crisis following outbreaks of infection with infectious Anemia virus (ISAV) in its Atlantic Salmon aquaculture. The crisis had a big economic impact, decimating 75% of the total salmon production. According to the World Bank the disease costed Chile 3,500 million dollars, 15,000 jobs and 25 points reduction of the GDP of the Los Lagos region.

The main causes to the crisis were structural problems concerning the localization and operations of the industry, insufficient national regulations, high stocking densities at the farms and insufficient control of trade with salmon.

The National Fisheries and Aquaculture Service (Sernapesca) put in place short-term biosecurity measures to mitigate the sanitary and economic impact. Once all the initial aspects were tackled to face this crisis, Sernapesca, together with the industry, set out a roadmap with the objective of having a sustainable production over time.

A national biosecurity management program was implemented covering the whole salmon value chain production, including; pre- and post-border risk analysis, strict biosecurity standards, epidemiological surveillance, early detection systems for aquatic animal diseases, more stringent disease control, increased diagnostic capability (reference and private laboratories) and good practices for the use of pharmaceutical products. As a result, Chile presently has high health standards in salmon farming and has recovered the production status as the comprehensive health management across the salmon production chain ensures the zoo sanitary requirements for trade to more than 100 export markets.

As lessons learned, it is important to point out that the crisis forced us to strengthen the legislation, Veterinary Services, public-private links as well as research entities and training centers.

S2.4

THE IMPORTANCE OF BIOSECURITY FOR MARKET ACCESS

Eduardo Rodríguez H.
Stofnfiskur, Sturlugata 7, 101 Reykjavik, Iceland
E-mail: eduardo@stofnfiskur.is

Diseases have had a huge impact on salmon farming in different parts of the world, e.g. in Chile where infection with ISAV decimated 75% of the production. Stofnfiskur has taken the consequences of this and implemented a series of biosecurity measures to ensure safer trade Atlantic salmon. Our land-based farms are supplied with unpolluted sea- and freshwater from boreholes. This water is naturally filtered through porous lava, providing the best disease-free habitat for fish. Farming in such optimal conditions allow us to produce and deliver healthy and fast-growing Atlantic salmon ova every week of the year. In order to maintain this status, we have developed and implemented a very effective biosecurity management focused on preventing and protecting our fish from infectious disease agents. We place emphasis on minimising the chance of infection with strict preventative measures selected after an extensive risk assessment which is constantly reviewed. In 2015 Stofnfiskur's biosecurity system was improved by implementing biosecure compartments according to the OIE (World Organisation for Animal Health) standards. Stofnfiskur's Salmon Farms are certified as an isolated biohazard containment unit by the Icelandic Food and Veterinary Authority (MAST), the governmental body for fish disease control. This status was also approved by the Chilean Fisheries and Aquaculture Authorities, Sernapesca, positioning Stofnfiskur as the only foreign company allowed to export salmon eggs to Chile, one of the biggest salmon producers on the planet.

S2.5

BIOSECURITY APPLICATION IN SHRIMP HATCHERY: BENEFICIAL OR A COST FACTOR

U Win Latt [1]
(1) Aqua Global Environs Co., Ltd.
002/B2, Minye Kyawswa, Tamwe Lay Ward, Tamwe Tsp., Yangon, Myanmar.
E-mail: u.winlatt@aqua-ge.com

In shrimp production, the concept of biosecurity has not been widely known or implemented until recent years. The benefits of implementing biosecurity includes market access and increased productivity, directly through improved survival, growth rates and feed conversion and indirectly through the reduction in treatments and associated production costs. However, the implementation of biosecurity of often not successful because of lack of knowledge and training or because famers are reluctant because of the significant costs involved.

This presentation will address common issues and threats in shrimp hatchery operations where biosecurity obviously plays a vital role. Systematic hatchery operation includes various tools to prevent, detect and control aquatic animal diseases in line with the OIE standards. Qualitative analysis on costs of some unit operations within a shrimp hatchery, with and without employing biosecurity programme, will be presented. The analysis shows overwhelming economic and social benefits of effective biosecurity programmes to downstream grow-out sectors. The consequences of a simple luminescence bacteria infection in post larvae is given as example to highlight the importance of biosecurity.

In addition, the presentation will describe possible and affordable options for introducing and implementing biosecurity in medium scale hatcheries.

S2.6

BIOSECURITY IN TILAPIA PRODUCTION

Vishnumurthy Mohan Chadag & Delamare-Deboutteville Jerome
WorldFish, Jalan Batu Maung, 11960 Bayan Lepas, Penang, Malaysia
E-mail: V.Chadag@cgiar.org

Tilapia are the second most farmed species by volume after carp. Native to Africa, tilapia in view of their overall resilience, are now farmed in over 90 countries. Systematic selective breeding and genetic improvement programs began with the work of WorldFish and partners in 1988 and has led to the development of several improved strains. Until recently, no major disease outbreaks were reported among farmed tilapia. With farming intensification, tilapias are becoming more susceptible to disease outbreak that if not controlled, can cause serious production losses. Some of these pathogenic agents include *Streptococcus agalactiae, Aeromonas hydrophila*, Tilapia iridovirus and Tilapia Lake Virus (TiLV). With the recent emergence of TiLV, there is a growing global interest in tilapia health and biosecurity.

To safeguard tilapia production against disease burden, strong biosecurity strategy and governance should emanate from national competent authorities (CAs). National risk analysis, surveillance, disease reporting, and responsible intra and international movements of tilapia will ensure good biosecurity implementation at farm, region and country levels. At present, there are no tilapia pathogenic agents listed by the OIE and there has been little control on the movement and production of the tilapias at national and international levels. Until recently, national CAs in many countries have considered biosecurity from a non-native species invasiveness angle. Farming systems for tilapia across Asia, Africa and Latin America are diverse, and bulk of the production owned and operated by small-scale farmers, making the implementation of farm level biosecurity difficult. Dissemination of genetically improved strains should comply with international standards, the OIE standards in particular (e.g. health certification, quarantine requirements) with respect to transboundary movement of live aquatic animals to ensure the trade is biosecure. Future research should focus on vaccination of specific pathogen free (SPF) animals along with long-term breeding programs for disease resistance.

S3.1

UNDERSTANDING AND MANAGING AQUATIC ANIMAL HEALTH DURING THE AQUACULTURE REVOLUTION TO 2050

G.D. Stentiford [1,2*], S.W. Feist [1], N. Taylor [1,2], E.J. Peeler [1,2], C.R. Tyler [2] & D. Bass [1,2]
(1) International Centre of Excellence for Aquatic Animal Health, Cefas Weymouth Laboratory, Weymouth, Dorset DT4 8UB, United Kingdom
(2) Centre for Sustainable Aquaculture Futures, University of Exeter, Stocker Rd, Exeter EX4 4PY, United Kingdom
E-mail: grant.stentiford@cefas.co.uk; Twitter @grantstent

Achieving enhanced sustainable production (ESP) from aquaculture to 2050 will require an enabling environment of policies, institutions and governance, grounded in strong evidence. ESP from global aquaculture is technically, socially and politically complex.

A hyper-diverse livestock range (>500 species), farmed in varied environments, set in widely divergent social and legislative infra-structures, with different end goals (direct nutritional security through to internationally traded product) requires careful focus on tangible nodes by which intervention strategies will have greatest impact. Keeping stock alive and, in a high health and welfare status, lies at the centre of aquaculture ESP. Despite this, disease is considered *the* major constricting factor for ESP from aquaculture to 2050.

Recalcitrant and novel emerging diseases associated with defined pathogenic agents will likely continue to affect yield in discrete sub-sectors. In addition, multi-agent or syndromic conditions, which capitalise on genetic, nutritional or environmental sub-optima inherent within intensive production systems are becoming more common place. These multi-agent diseases (potentially partly due to genetic bottlenecks in the host) will challenge the traditional legislative mechanisms by which transboundary diseases (of single pathogenic agents) are controlled. Further, where multiple agents are implicated in disease (the ‘pathobiome’), the specific target against which farm-, catchment- and national-surveillance programmes are designed may become harder to identify.

Emerging technologies (e.g. portable high throughput sequencers) applied over broad spatial and temporal scales will help to identify the ‘susceptibility window’ within which outbreaks occur (a potentially useful tool where publicly-funded national infrastructure is not well developed). Deployment of on-farm technologies for specific pathogen diagnostics, diagnostic approaches suitable for pathobiome profiling and, collection of farm-level production data via smartphone applications has significant potential for mitigating the most important yield-limiting production diseases and, will improve the insurability of the sector. By combining industry-led on-farm analyses with Competent Authority-driven national disease control programmes, we envisage significantly enhanced potential to control in-country outbreaks and, transboundary aquatic animal diseases to 2050.

S3.2

ACCELERATED BREEDING OF RESISTANCE – INFECTION WITH WHITE SPOT SYNDROME VIRUS RESISTANT TO BLACK TIGER PRAWNS

Jiun-Yan Huang, Jiun-Yan Ding & Chu-Fang Lo
International Center for the Scientific Development of Shrimp Aquaculture, National Cheng Kung University, Tainan, Taiwan
E-mail: jyhuang@mail.ncku.edu.tw

White spot disease (WSD) is one of the most economically damaging shrimp diseases worldwide. Over the past two decades, even as our understanding of its pathogenic mechanisms has advanced, it has proven extremely difficult to contain, and it continues to cause enormous losses to the shrimp aquaculture industry.

In this presentation, we explore what the traditional approaches to selection and the disadvantages to these. We also present a relatively new approach to fight this disease: the selection and breeding of WSSV-resistant lines of *Penaeus monodon*, and discuss what the possible benefits to industry and what the next steps to industry adoption are.

Following this approach, we selected wild founders with diverse genetic backgrounds and tested which of their progeny could survive WSSV challenged. A single family with promising characterises was subsequently chosen to breed a WSSV-resistant *P. monodon* line. To accelerate this WSD-resistance breeding programme, we used non-exclusive collaboration agreements that gave simultaneous access to different populations of shrimp; this had a multiplicative effect that produced stronger resistance.

To ensure better process management and we also established an indoor culture facility with a high level of biosecurity and a closed circulation water system with semi-automatic monitoring/control devices. Currently, our work involves the use gene stacking approach with marker selection to breed *P. monodon* with additional desirable traits to enhance the commercial profitability of these shrimp.

S3.3

AN INTEGRATED APPROACH OF VETERINARY MEDICINES IN AQUATIC ANIMAL HEALTH MANAGEMENT

Ben North
PHARMAQ AS, P.O. Box 267, Skøyen, Harbitzalleen 2 A, 0213 Oslo, Norway
E-mail: ben.north@zoetis.com

Aquaculture is widely regarded as a reliable and sustainable way of producing high quality protein to feed the World's burgeoning population. Whilst fish farming has been conducted for several thousands of years, industrialisation started primarily in the 1980s. Unfortunately, as with terrestrial animals, the risk of disease increases with intensification and the global fish farming industry is no different in this respect.

The root-cause of disease outbreaks within the fish farming industry is often multifactorial, but it is generally recognised that biological stress caused by poor environmental or farming practices contributes negatively to the health status of an animal population. In order to strengthen the disease resistance of an individual animal and of the animal population, implementation of safe and efficacious vaccines has been shown to be an effective health management tool. However, vaccines only work optimally when the immune system of the vaccinated animal is fully functional and in order to ensure that the vaccinated animal acquires maximum protection, regulators, farmers and the pharmaceutical industry must work closely together in order to push the balance in favour of the fish and not in favour of the pathogen.

This presentation will provide examples of how vaccination can be used as a powerful health management tool that can improve productivity and reduce the use of antibiotics in industrialised aquaculture. A summary of some of the challenges that must be overcome and key success factors for the development and supply of efficacious vaccines will be presented from the viewpoint of a global pharmaceutical company, along with a summary of the current thinking with regard to aquaculture therapeutics.

S3.4

THE PRUDENT USE OF ANTIMICROBIAL AGENTS IN AQUATIC ANIMALS

Kristina Landsverk
Norwegian Food Safety Authority, P.O. Box 383, 2381 Brumunddal, Norway
E-mail: Kristina.Landsverk@mattilsynet.no

Norwegian marine farming of salmonids began to develop during the 1970s. During the first decade, outbreaks of bacterial diseases increased, together with antibacterial treatments, reaching a peak maximum in 1987. During the 1980s and 1990s, vaccines against the most important specific bacterial infections were taken into use, resulting in a significant reduction in antibacterial treatments. Polyvalent vaccines for injection administration were developed, making it practical to immunise the fish against all relevant diseases with one dose injected.

Since the mid-1990s, the use of antibacterial agents in Norwegian aquaculture has been kept on a very low level, and during the last years, it has been even lower than 20 years ago, taking the increased production volumes of fish into account.

All veterinary medicinal products for use in animals, including farmed fish, are available by prescription only, and it is mandatory to report all prescriptions to the veterinary prescription register of the Norwegian Food Safety Authority. The register includes information on fish species treated, production stage and volume of fish, as well as volume and antibacterial agent used, and the reason for treatment, i.e. the diagnosis. The register data makes it possible to survey the use of antibacterials and which diseases that triggers treatment. The register data confirms that the specific bacterial diseases included in the polyvalent vaccines are largely under control.

When bacterial infections are identified as the cause of disease in diagnostic material from both farmed and wild fish at the Norwegian Veterinary Institute, the bacterial isolates are tested for antibiotic sensitivity. In a few cases, reduced sensitivity is found for some antibiotics, still the results from the monitoring show that there is a favourable situation with very low rates of antibiotic resistance in current fish pathogenic bacteria in Norwegian fish farming.

S3.5

THE OIE GLOBAL STRATEGY ON ANTIMICROBIAL RESISTANCE AND PRUDENT USE OF ANTIMICROBIALS

Matthew Stone
World Organisation for Animal Health (OIE), 12 rue de Prony, Paris 75017, France
E-mail: m.stone@oie.int

Anti-microbial resistance (AMR) is a global One Health challenge across human, animal health (both terrestrial and aquatic), plant health, and food safety. The FAO, OIE and WHO created the Global Action Plan in 2015. In November 2016 the OIE Strategy on Antimicrobial Resistance and Prudent Use of Antimicrobials was published and has guided our work programme since.

The four strategic objectives of the OIE AMR Strategy are advocacy through better awareness and understanding of AMR and the animal sectors role in addressing it; surveillance and monitoring to strengthen the knowledge base for action; supporting National Action Plans through good governance and regulatory capacity; and development and implementation of international standards on AMR.

The challenges for the aquatic sector are in some ways similar to terrestrial production systems, but there are also particularities. Many OIE members and their aquatic animal sectors are challenged by the regulatory capacities required to ensure prudent and responsible use in accordance with Chapter 6.2. of the *OIE Aquatic Code*, which ascribes specific responsibilities for all actors in the value chain. Further, there is the added challenge of developing national surveillance and monitoring mechanisms for AMR and antimicrobial usage (AMU) in the aquatic sector. Such monitoring mechanisms for AMU involve first identifying and then actively coordinating the actors involved in prescriptions, sales and use decision in aquaculture, before monitoring consumption at the national level can be developed. This process can also support the understanding of the needs of the aquaculture sector. More specifically, the limited or complete absence of product registrations with indications for diseases in aquaculture in some countries, and the absence of clear and consistent clinical treatment guidelines from an authoritative source, constrains choices for aquatic animal health professionals and farmers. National actions can often involve supporting access to quality-assured antimicrobials and the development of targeted clinical guidelines adapted to the local context

With the generous support of the Norad (the Norwegian Agency for Development Cooperation), the OIE will explore the challenges the aquatic animal sector is facing in meeting obligations under the OIE AMR Strategy, in particular challenges faced and the support required to improve monitoring and reporting of AMU.

S4.1

THE IMPORTANCE OF OIE AQUATIC STANDARDS TO MEET FUTURE CHALLENGES OF AQUACULTURE

Ingo Ernst
President, OIE Aquatic Animal Health Standards Commission
Animal Health Policy Branch, Australian Government Department of Agriculture and Water Resources, Canberra ACT 2601, Australia
E-mail: Ingo.Ernst@agriculture.gov.au

The Aquatic Animal Health Standards Commission (Aquatics Animals Commission) is one of four OIE Specialist Commissions that support the OIE and its Member Countries to improve animal health and welfare globally. The Aquatics Animals Commission is responsible for (among other things) ensuring that the OIE *Aquatic Animal Health Code* (the *Aquatic Code*) and the *OIE Manual of Diagnostic Tests for Aquatic Animals* (the *Aquatic Manual*) reflect current science and include effective standards for safe international trade in aquatic animals (amphibians, crustaceans, molluscs and fish) and their products. These standards are developed to serve the common interests of OIE Member Countries in improving aquatic animal health and welfare worldwide.

The Aquatic Animals Commission comprises six elected members who work with internationally renowned specialists—including the OIE Reference Centre experts—to draft new texts for the *Aquatic Code* and *Aquatic Manual* and to revise existing texts. The views of OIE Delegates and International Organisations who have a cooperative agreement with the OIE, are routinely sought through the circulation of draft texts and, at each annual General Session, the Delegates of Member Countries discuss and formally adopt the draft texts as OIE standards. These texts are then incorporated into the next annual editions of the *Aquatic Code* and *Aquatic Manual*. The consultative process to develop standards is fundamental to ensuring that they represent the best available science and provide practical approaches to aquatic animal health management.

Aquaculture is characterised by rapid change that is unprecedented in the history of animal production and which presents unique challenges for managing aquatic animal health. To meet these challenges, the OIE's aquatic animal health standards must evolve together with the global aquaculture industry and the rapidly developing science of aquatic animal health. This presentation will highlight some significant activities that the Aquatic Animals Commission is pursuing to meet current and future challenges of global aquatic animal health management.

S4.2

WHY DISEASE REPORTING IS FUNDAMENTAL TO AQUATIC ANIMAL HEALTH

Edmund Peeler
Centre Environment, Fisheries and Aquaculture Science, Barrack Rd., Weymouth, DT4 8UB, United Kingdom
E-mail: ed.peeler@cefas.co.uk

Disease reporting by farmers, veterinarians and others is fundamental to passive surveillance, which, through comprehensive coverage all farmed stock, is essential for the detection of introduced and new diseases. However, under-reporting is a major constraint. The Competent Authority (CA) has a responsibility to ensure that reporting obligations are understood, and to process data for decision making by both Government and producers. Farmers can be incentivised to report if they understand its importance and reporting results in benefits, which only result if reporting is used for decision-making. For introduced diseases, disease reporting must lead to an effective response, notably control measures. For endemic diseases, reporting allows the CA to make decisions about resource allocation to disease control activities. For a country to raise its aquatic animal health status by establishing freedom from specified diseases, there is an obligation under OIE aquatic animal health standards for those diseases to be listed.

Problems with disease reporting do not just exist at the level of the farm. OIE Member Countries are obliged to report, via the World Animal Health Information System (WAHIS), the occurrence of epidemiologically important events, e.g. the first occurrence of an OIE-listed disease or a new disease. However, there is a high level of under-reporting. The primary benefit to international reporting is that it allows action to prevent disease spread. In addition, prompt reporting establishes a country's reputation as a trustworthy trade partner, and supports a case for technical assistance. Six-monthly disease reports submitted by Member Countries, accessible via WAHIS, are used in many ways to improve aquatic animal health, e.g. in import risk analysis to assess disease risks associated with trade and about where to source stock. WAHIS data can be used to investigate long term disease trends, predict disease outbreaks (e.g. through modelling and spatial analysis) and to identify priorities for future research.

S4.3

UPDATE ON THE OIE WORLD ANIMAL HEALTH INFORMATION SYSTEM (OIE WAHIS)

Matthew Stone
World Organisation for Animal Health (OIE), 12 rue de Prony, Paris 75017, France
E-mail: m.stone@oie.int

The World Animal Health Information System (WAHIS) was developed by the OIE in 2005 as a global tool to support its Membership in the control of transboundary animal diseases, including zoonoses, by giving access to animal health data. Considering changes in societal demands, and the rapid pace of technological and digital evolution, OIE Members requested that the Organisation develop an analytically versatile and up-to-date system (OIE-WAHIS). The OIE is now undertaking a ten-year process to modernise the existing WAHIS through a project composed of four stages:

1. Foundation. Rebuilding modernised Core modules and migration of data currently hosted by WAHIS (2019).
2. Evolutive. Developing the interoperability and integration with external systems and data sources (2020).
3. Advanced. Integrating the data received before 2005, held in a WAHIS predecessor system *Handistatus* (2021).
4. Optimisation. Integration of new modules and future innovations (2021–2027 and beyond).

The first three stages will include the progressive development of the OIE-WAHIS platform which will be fully operational by 2021. OIE-WAHIS will be a fully redesigned platform which will incorporate a transdisciplinary and holistic approach to data collection, analysis and dissemination, addressing animal diseases and zoonotic diseases.

Moreover, as OIE-WAHIS moves forward, it will offer a series of improvements, namely:

a) progressive incorporation of climate and environmental data sources;

b) quicker, more intuitive and user-friendly system with new features, such as extended data mining, customisable data queries and enhanced mapping and data visualisation capabilities;

c) access to interactive maps through personalised dashboards for OIE Delegates aiming to present national data such as outbreak location, affected species, analytics indicators and risk perimeters (zoning and compartmentalisation).

The dynamic, interactive and ergonomic national dashboards will integrate analytical capabilities and the possibility to extract and upload data in a wide range of formats (e.g. PDF, Excel, CSV and images). Building bridges between OIE-WAHIS and national/regional databases will contribute to OIE Members' efforts to participate in regional information platform initiatives already underway.

S4.4

UPDATE ON THE OIE PVS TOOL: AQUATIC

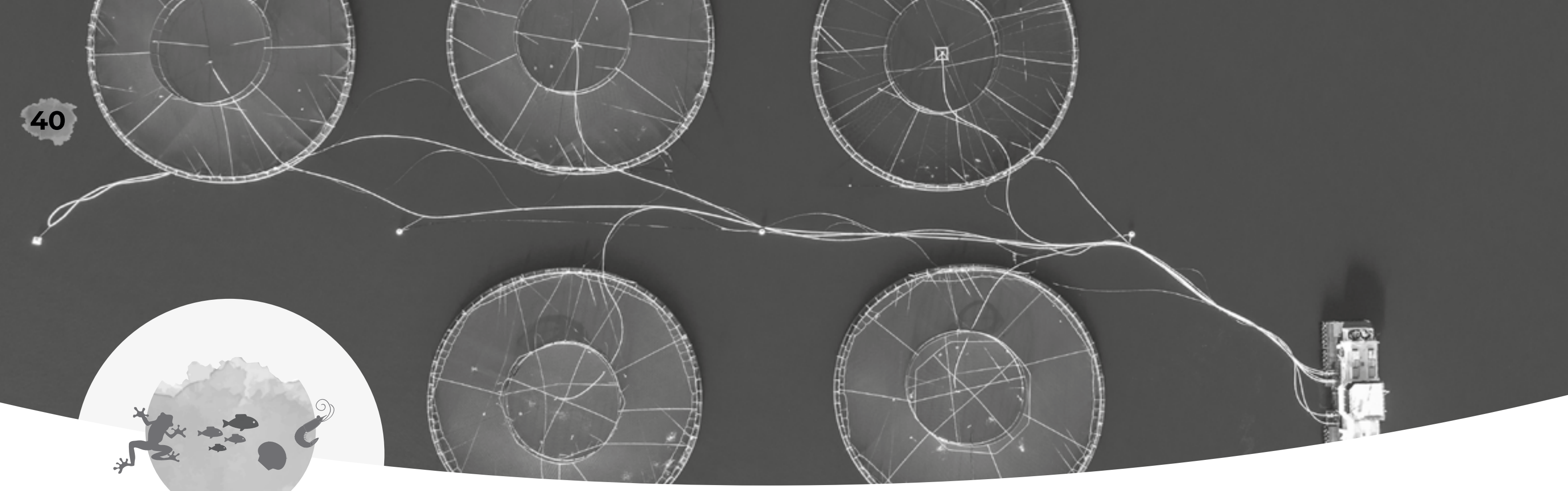
Stian Johnsen
World Organisation for Animal Health (OIE), 12 rue de Prony Paris 75017, France
E-mail: s.johnsen@oie.int

The OIE PVS Pathway is a continuous process aimed at sustainably improving the compliance of a country's Veterinary Services or Aquatic Animal Health Services with relevant OIE international standards.

In 2013, the *PVS Tool: Aquatic* was developed for the evaluation of an Aquatic Animal Health Service's against the international standards published in the *Aquatic Code* and *Aquatic Manual*.

To date, 140 OIE Members have participated in the PVS Pathway for the terrestrial animal sector and there is strong evidence of positive impacts in many countries, with respect to improved staffing levels, infrastructure, governance arrangements, and technical capacities. The story for the aquatic animal sector is somewhat different. To date only 13 countries have completed a PVS Evaluation mission; one a pilot PVS Gap Analysis mission; and one PVS Evaluation Follow Up mission. Considering the vast diversity of aquaculture with over 500 species cultured globally and more than one third of the world's production being traded internationally, it is likely that the participation of more countries in the PVS Pathway for the aquatic animal sector would result in improvements in the implementation of OIE international standards and the prevention, detection and control of aquatic animal diseases at national, regional and international level.

This presentation will discuss the benefits of undertaking PVS Pathway missions and explore possible reasons for differences in the uptake of the PVS Pathway between terrestrial and aquatic animal sectors.



ORGANISATION OF THE CONFERENCE

STEERING COMMITTEE

- Dr Monique Eloit (Director General, World Organisation for Animal Health, OIE)
- Dr Matthew Stone (Deputy Director General, OIE)
- Dr Alain Dehove (Director of Finance, OIE)
- Dr Oscar Eduardo Videla Pérez (Delegate of Chile to the OIE, Servicio Agrícola y Ganadero (SAG)
- Dr Alicia Gallardo Lagno (National Director, Servicio Nacional de Pesca y Acuicultura, SERNAPESCA)
- Dr Gillian Mylrea (Head of the Standards Department, OIE)
- Dr Stian Johnsen (Chargé de mission, OIE)
- Dr Mara Gonzalez-Ortiz (Head of the Events Coordination Unit, OIE)

SCIENTIFIC COMMITTEE

- Dr Ingo Ernst (President, OIE Aquatic Animal Health Standards Commission)
- Dr Edmund Peeler (Vice-President, OIE Aquatic Animal Health Standards Commission)
- Dr Alicia Gallardo Lagno (Vice-President, OIE Aquatic Animal Health Standards Commission)
- Dr Kevin William Christison (Member, OIE Aquatic Animal Health Standards Commission)
- Dr Atle Lillehaug (Member, OIE Aquatic Animal Health Standards Commission)
- Prof. Hong Liu (Member, OIE Aquatic Animal Health Standards Commission)
- Dr Gillian Mylrea (Head of the Standards Department, OIE)
- Dr Stian Johnsen (Chargé de mission, OIE)

ORGANISING COMMITTEE

- Dr Mara Gonzalez-Ortiz (Head of the Events Coordination Unit, OIE)
- Dr Luis Barcos (Regional Representative for the Americas, OIE)
- Dr Carla Fernanda Anguita Böhmwald (Médico Veterinario, SERNAPESCA)
- Dr Marcela Alejandra Lara Fica (Jefa de Gabinete, SERNAPESCA)
- Ms Nelly Dubarry (Events coordinator, OIE)
- Ms Esperia Bonilla (Events coordinator, SERNAPESCA)