

Biosecurity System in Malaysian Fisheries: Gearing up for Safe and Quality Seafood

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The fisheries sector of Malaysia plays a significant role in its economic development and is also a source of employment, foreign exchange and protein supply for the country's populace. Statistics in 2012 have shown that Malaysia is one of the top fish-consuming countries in the world with an average consumption of 52.0 kg/person/year. In the same year, the fisheries sector had shown a significant increase in its contribution to the nation's economy of about Malaysian Ringgit (RM) 11,440 million. The food fish sector which comprises marine capture fisheries, inland capture fisheries and aquaculture produced 1,780,168 metric tons of fish and fishery products valued at about RM 10,597 million while the non-food fish commodities, namely seaweeds, ornamental fishes and aquatic plants accounted for about RM 843 million. As a whole, the fisheries sector contributed 1.1% or RM 7.822 billion to the nation's Gross Domestic Products in 2012 (Annual Fisheries Statistics, 2012). There is still room for expansion of the countries' fisheries sector however, such endeavor although bringing in increased diversity, fisheries production and trade volume, could also be key contributors to the spread of recognized and emerging fish diseases from region to region. Moreover, the changing aquaculture practices such as the use of various aquaculture chemicals that supposedly control the spread of diseases could lead to increased concerns on safety of food fish. Thus, it has become very significantly important to develop biosecurity measures in fisheries practices to secure not only fish health but also food safety benefiting the consumers.

Basically, the fisheries industry in Malaysia encompasses three (3) main sub-sectors, namely: marine capture fisheries, inland capture fisheries and aquaculture. The fisheries sector in Malaysia is governed by the Department of Fisheries (DOF) under the Ministry of Agriculture and Agro-based Industry (MOA) via the empowerment of Fisheries Act 1985. The DOF which has jurisdictions over all matters pertaining to live fish is also recognized as the national Competent Authority (CA) responsible for all matters involving live fish. As a member of the World Trade Organization (WTO) since 1995, Malaysia had also ratified the Sanitary and Phytosanitary (SPS) Agreement that was designed to protect human, animal and plant life or health in its member countries. Since then, Malaysia has been actively involved with international standard-setting organizations such as the CODEX Alimentarius Commission (CAC), World Organization for Animal Health (OIE), and the

International Plant Protection Convention (IPPC) which developed standards for various biosecurity sectors in accordance with their respective mandates. As part of the SPS implementation in the country's fisheries sector, DOF established its Fisheries Biosecurity Division (FBD) for the control and management of fish health and food safety, particularly for fish and fishery products. FBD is mandated to ensure that the spread of fish diseases is contained and that fish and fishery products are free from contaminants for safe consumption. In achieving these objectives, FBD conducts several activities, *i.e.* official control, official analysis and official guarantee at the primary production of the supply chain, such as in aquaculture farms, fishing vessels, feed mills, and fish meal manufacturing plants.

Official Control

Biosecurity is a strategic and integrated approach that encompasses policy and regulatory frameworks (including instruments and activities) for analyzing and managing relevant risks to human, animal and plant life and health, and associated risks to the environment (FAO, 2007). In this respect, one of the key functions of FBD is policy coordination and standards development in relation to fisheries biosecurity. This includes developing, coordinating and harmonizing fisheries biosecurity policies for the country taking into account national food safety and fish health policies as well as relevant policies from other agencies to achieve enhanced biosecurity control within the fisheries sector. FBD is also responsible for the development of regulations necessary to strengthen biosecurity control within the country, including regulations for compliance with biosecurity measures for international and domestic trade of live fish. In order to complement the policy and regulations in relation to biosecurity, FBD develops biosecurity standards, protocols and guidelines which contain minimum requirements or specifications of certain products or processes, used as reference in the development of regulations and operating procedures. Thus, FBD had developed the Biosecurity Measures Plan as guide for fish farmers, in particular for ornamental fish producers and exporters, in line with Good Aquaculture Practices (GAqP) to promote sustainable production. Other standards that have been developed include fishery product specification and process standards such as MS 1998: 2007 Good Aquaculture Practice - General Guidelines, and MS 2467: 2012 Seaweed Cultivation-Code

of Practice. Meanwhile, adoption of international standards relevant to the interest of the national government is being promoted and enforced. Considering that WTO allows its member countries to act on trade in order to protect human, animal or plant life or health, provided they do not discriminate or use this as disguised protectionism, FBD notifies concerned countries on live fish import requirements of Malaysia that had been prepared in accordance with the SPS Agreement. This is meant to strengthen the country's import control measures that safeguard aquatic animal health in the country. Thus, countries intending to export live fish to Malaysia shall comply with these requirements as per notification.

Import Control

Transboundary movement of fish is well known as possible carrier of diseases and therefore, the country's fish health biosecurity is concerned with import controls to prevent the introduction of new diseases into Malaysia. Under Article 5 of the SPS Agreement, it is stipulated that member countries shall ensure that their sanitary and phytosanitary measures are based on assessments, taking into account available scientific evidence and relevant economic factors in order to minimize negative impacts to trade. In this regard, FBD conducts Import Risk Analysis (IRA) for the importation of new/alien aquatic animal species or species that are not endemic to Malaysia, to identify the possible hazards in terms of pathogen and ecological risks that are associated with concerned species. Moreover, FBD also underlines the specific biosecurity conditions to manage risks.

In view of some devastating diseases, *e.g.* early mortality syndrome (EMS) that caused massive losses to the shrimp industry in the Asian region, DOF Malaysia introduced a new policy to protect the Malaysian shrimp industry, and as a protocol, risk assessment is required for the importation of shrimp broodstock into the country. FBD carries out risk assessment by conducting document verification, inspection at source (exporting country) and compliance audit at local shrimp hatcheries to verify that these comply with biosecurity requirements and that broodstocks are healthy and free from any of the OIE-listed diseases.



Fish Health Management

While competent authorities are proactive in preventing the introduction of pathogens into Malaysia, risk management programs to control such pathogens have already been established in the country. As with aquatic animal health, it is important to establish "disease-free" geographical compartments throughout the country for continuous trading of fish and fishery products. Furthermore, in order to improve fish health status in the country, FBD had established a fish health management program that comprises surveillance activities encompassing food fish and ornamental fish species, based on standards promoted by OIE and FAO, national legislations, and importing countries' requirements.

This health management program aims to maintain Malaysia as a disease-free country, eradicate existing diseases or control diseases within certain geographical area to prevent the spread of aquatic diseases through the conduct of various activities. The fish health surveillance activity includes sampling and inspection carried out at least twice a year at the exporters' and importers' premises, and aquaculture farms, particularly farms with species that have been suspected to be associated with OIE-listed diseases. Sampling is conducted for food fish as well as ornamental fish farms where samples are collected for disease screening analysis in official laboratories of the country. Meanwhile, inspection is performed at registered ornamental fish farms as well as importers' and exporters' premises by conducting document checks, *e.g.* fish movement record, mortality record, disinfection record, waste disposal record, and water quality record. On-site observations of biosecurity facilities, *e.g.* footbath, vehicle dipping, quarantine area, water treatment facilities, incinerator, water inlets and outlets are also conducted to look into all possible factors that may pose risk to the health of fish and aquatic species. The main target populations for such surveillance program are the koi and goldfish, mainly for Koi Herpes Virus (KHV) and Spring Viraemia of Carp Virus (SVC).

Food Safety Management

In food chains, hazards could be introduced anywhere from production to consumption, so that any breakdown in security at any point can result in adverse health consequences to individual or multiple biosecurity sectors. For instance, aquaculture chemicals that are used widely to control the spread of aquatic diseases may accumulate as residues in fish and eventually cause negative impact to human health. As global awareness towards food safety increases, food safety standards especially in terms of trade requirements had become more stringent. In Malaysia, food safety is governed by the Ministry of Health as empowered by Food Act 1983 and Food Regulations 1985. However, control of fisheries activities at primary production is still under the jurisdiction of DOF. In this regard, FBD has established



various public health management programs to minimize food safety hazards at aquaculture farms, fishing vessels, and feed manufacturing plants.

Established to provide assurance to importing countries on the safety and quality of Malaysian aquaculture products, the Aquaculture Residue Monitoring Plan (ARMP) was developed based on Regulation (EC) No 178/2002, Regulation (EC) No 852/2004 and Council Directive 96/23/EC. ARMP serves as an important part of the country's overall strategy of minimizing harmful residues and contaminants in aquaculture products, and verifying the implementation of Good Aquaculture Practices (GAQP). Based on annual monitoring scheme of ARMP, aquacultured shrimps and fishes are monitored for the presence of prohibited substances, *i.e.* veterinary drugs, pesticides, heavy metals, dyes, and other contaminants that are potentially harmful to human.

Hygiene on Board (HOB) was also established to ensure hygiene onboard vessels and that safe seafood is brought by these vessels to the market. The objectives of HOB are to reduce contamination in fish and fishery products onboard fishing vessels so that importing countries, especially the European Union, could be assured of the safety and quality of marine caught fish from Malaysia. In addition, HOB is designed to guarantee that marine caught fish that are supplied to processing plants, the products of which are intended for export to the EU complies with the EU food safety law and standards.

HOB is also one of the means of assuring that the implementation of good on-board handling and sanitary practices is enforced. Monitoring involves on-board sampling to check the presence of contaminants, *i.e.* heavy metals, histamine, parasites, polycyclic aromatic hydrocarbon (PAH), dioxin, polychlorinated biphenyl (PCB), as well as organoleptic examinations and inspection for poisonous fishes.

The SPS Marine Program is another scheme that has been implemented by DOF since 1999 in response to the SPS Agreement by the World Trade Organization (WTO), as a measure to improve food safety and quality. The purpose of this program is to ensure that marine fish captured from Malaysia is safe for consumption and consumers' confidence of the safety of marine products enhanced. Sampling is conducted on an annual basis to monitor contaminants such as histamine, heavy metals, microbiological elements, poisonous planktons while organoleptic examinations are also carried out onboard to assess the freshness of fish.

While the SPS Marine Program focuses on marine captured products, the SPS Aquaculture Program aims to ensure that aquaculture products are safe for consumption protecting humans from risks arising from aquaculture additives, contaminants, toxins or disease-causing organisms in aquaculture food products. This program is also part of the country's monitoring and control program to verify that aquaculture products comply with Malaysian food laws. Samples are collected randomly from aquaculture farms' premises and analyzed for undesired substances, *i.e.* veterinary drugs, heavy metals, microbiological elements, and chemical contaminants. The occurrence of harmful algal bloom (HAB) that could lead to red tide incidents and marine pollutions resulting in shellfish poisoning, has prompted FBD to implement the National Shellfish Monitoring Program (NSMP). This program is an annual sampling scheme for monitoring the presence of toxins and contaminants in shellfish. The substances that are monitored include microbiological elements, heavy metals, biotoxins, PCB, and harmful planktons. Results from the NSMP are used to identify and map areas of the country that are considered clean for potential shellfish aquaculture.

Aquaculture feed and its ingredients could also be potential sources of contamination and residue accumulation in aquaculture products. Thus, a monitoring program for aquaculture feeds and fish meal has been introduced to control these hazards from entering into the food chain. The program also provides assurance to importing countries on the safety and quality of feeds and fish meal manufactured in Malaysia. Undesired substances such as heavy metals, microbiological elements, chemical contaminants, growth promoters, veterinary drug residues, mycotoxins, and terrestrial animal proteins are monitored to prevent contamination of the feeds and fish meal. In accordance with the country's MS 1998: 2007 Good Aquaculture Practices - General



Guidelines, feeds used for aquaculture should be free from antibiotics and from banned substances, and are produced utilizing halal ingredients.

Audit and Inspection

In the context of Malaysian fisheries biosecurity, audit and inspection activities are conducted to verify that the implementation of biosecurity systems in aquaculture farms and fishing vessels is in accordance with the regulations and standards specified by national competent authorities. In this regard, FBD introduced certification schemes on voluntary basis for aquaculture farms and fishing vessels to encourage the adoption of responsible practices during aquaculture and fishing operations. The Malaysian Good Aquaculture Practice Certification Scheme (MyGAP) has been developed based on the MS 1998: 2007 Good Aquaculture Practices - General Guidelines although it is confined to aquaculture farms and hatcheries that grow food fish and ornamental fish species.

The country's Fish Quality Certificate (FQC) is not only a certification scheme designed for establishments that intend to export fish and fishery products, but is also applicable to aquaculture farms and premises, hatcheries, fishing vessels, and feed manufacturing plants. FBD conducts auditing procedures and awards FQC and MyGAP certificates to establishments that comply with the biosecurity measures as stipulated in relevant standards. During the audit process, emphasis is given to critical points where hazards could be possibly introduced into the control system, and if non-conformance is found, appropriate corrective actions are taken to mitigate the risks.

Considering that transboundary movements of fish and fishery products could lead to the introduction of known, new and emerging pathogens and subsequently disease establishment in natural aquatic environments and aquatic biodiversity of the receiving and neighboring regions, countries or territories, the FBD conducts Inspection Prior to Export (IPTE) to provide safety assurance to the countries

that import live fish from Malaysia. IPTE is carried out by FBD at the exporter quarantine facilities where live fish consignments are observed for clinical signs and quarantine records are inspected before such consignments are released for export. Malaysia makes sure that assurance is always provided to importing countries by taking appropriate actions to secure the aquatic animal health status of the country's fish and fishery products. The Malaysian Quarantine and Inspection Services Agency (MAQIS) was established at entry/exit points/borders to safeguard the health of plants and animals including aquatic animals, and ensure that aquatic animals imported into Malaysia are free from diseases.

Official Analysis

Official analysis is part of the biosecurity program implemented in Malaysia to support the official control program, specifically to control food safety of fish and fishery products as well as ensure the health of aquatic animals along the supply chain. In this regard, DOF has established several official laboratories nationwide to carry out analysis of samples collected during the process of implementing the official monitoring programs such as ARMP, HOB, SPS Marine and Aquaculture, and aquatic animal health surveillance, among others. While performing routine analysis, these laboratories also cater to requirements for analysis in emergency cases, *e.g.* emergence of new diseases, disease outbreaks or mass mortalities in aquaculture farms.

These official laboratories carry out analysis for parameters not only in public health but also in aquatic animal health. The analyses for public health include those for bacteria, veterinary drug residues, histamine, heavy metals, pesticides, plankton identification, biotoxins, water quality and porcine DNA identification. As for aquatic animal health, the laboratories undertake analysis for bacteria, viruses, parasites, fungi, water quality as well as histopathology as means of disease identification. Analysis for disease identification is mainly focused on OIE-listed diseases.

Considering the importance of enhancing the competence of the country's official laboratories and obtaining international recognition, DOF took one step further to obtain ISO/IEC 17025:2005 accreditation. As a result, some of the official laboratories have already been accredited for ISO/IEC 17025:2005 while other laboratories are still working towards obtaining such accreditations. Meanwhile, DOF also maintains close connection with other international organizations and participates in international fora to share information on latest laboratory technologies, equipment and methodologies, besides participating in proficiency testing given by accredited proficiency testing (PT) providers and ring tests among established laboratories.



Official Guarantee

Under the context of biosecurity, official guarantee refers to documents issued by the country's competent authorities to certify that its products do not contain hazards and comply with relevant standards. Thus, health certificate is an official guarantee provided by DOF to assure importing countries that live fish exported from Malaysia does not carry any pathogen and free from diseases. A Health Certificate is issued based on the results of IPTE inspections and laboratory analysis which form part of official control and official analysis activities. FBD issues the Health Certificate for live and fish meal consignments intended for the export market, while a Health Certificate for fishery products is issued by the Ministry of Health, as the authority responsible for the safety of food. The health certificates contain health declaration requirements taking into account the varying requirements of importing countries. As a whole, it is the responsibility of FBD to ensure that all the requirements are fulfilled before the consignments are released for export.

Challenges in Biosecurity Faced by the Southeast Asian Countries

The fisheries sector, mainly aquaculture had recently suffered significant losses due to diseases. Much of the impact falls on small-scale fish farmers, constituting the majority of fish producers in the Southeast Asian region, with devastating effects on their incomes and livelihoods as well as on international trade. Due to free trade connections, aquatic animal pathogens tend to spread rapidly throughout the region and internationally, multiplying the losses and impacts on fishers and fish farmers.

Nonetheless, improved health of plants and animals as well as the well-being of human populations are the ultimate outcomes of a well-functioning biosecurity system, and this has been the aim of every country in the region. Many developed countries for instance the European countries, have well established biosecurity systems in place. However, most countries in Southeast Asia still encounter significant challenges in the practical implementation of health management strategies, specifically in the areas of diagnosis, surveillance, risk analysis, emergency preparedness, and in their respective quarantine and certification programs.

Developed countries, for example in the European Union, have set higher standards on import requirements for fish and fishery products compared with those in the Southeast Asian countries. In this regard, there is a need for the countries in the region, to improve their respective biosecurity systems to ensure that fish and fishery products destined for export markets meet the relevant importing countries' requirements. Moreover, capacity building is needed to ensure that the

countries would have a pool of trained biosecurity experts who are ready to check for control systems adopted by the countries, in line with importing countries' requirements.

Way Forward

Effective biosecurity, particularly aquatic animal health management is a shared responsibility that requires coordinated approach from all countries. Therefore, the Southeast Asian countries should work closely and form proactive cooperation with international and regional organizations such as the Network of Aquaculture Centres in Asia-Pacific (NACA), Southeast Asian Fisheries Development Center (SEAFDEC), OIE, CODEX, FAO, and other relevant bodies to address issues on biosecurity. Nevertheless, to ensure the efficient implementation of biosecurity measures, establishing an integrated approach to promote to fisheries operators and government agencies, the importance and significance of eliminating and combating aquatic animal diseases, is necessary. Surely enough, significant improvements in biosecurity systems and outputs could be achieved if more coherent national and international approaches are developed, promoted, and adopted by relevant stakeholders.

The benefits that could be gained from these endeavors would include improved regulatory and policy frameworks for human health, particularly food safety; improved animal and plant health; greater efficiencies in the use of human and financial resources; better understanding of potential risks; and appropriate measures are in place and well-managed for improved protection and sustainable use of the environment. Finally, a more holistic approach to biosecurity would lead to the achievements of these benefits in manners that avoid inconsistencies, fill the gaps, and ultimately prevent the creation of unnecessary barriers to trade (FAO, 2007).

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