EUS in Asia and Africa: stimulus for regional initiatives!!!

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Trans-boundary movement of live aquatic animals (international trade) always carries a risk of transferring aquatic animal pathogens. Responsible introductions, compliance to regional and international standards and codes and informed decision making based on scientific risk analysis are some of the tools available to minimise the risks of pathogen introductions associated with the international trade in live aquatic animals.

Since 1970, an epizootic condition of wild and farmed fishes, characterised by ulceration, invasive fungal infections and high mortality has been reported from different parts of the world. These epizootics caused heavy losses when they first occurred and spread rapidly often across long distances. In Japan, the epizootic ulcerative condition was found for the first time in cultured ayu, *Plecoglossus altivelis* in 1971 and the disease was named as mycotic granulomatosis (MG). In Australia, the cutaneous ulcerative condition called red spot disease (RSD) affected estuarine fish, grey mullet in 1972 and later progressed to affect freshwater and other estuarine fish in coastal waters. In 1979, Malaysia became the first country in Peninsular south east Asia to report a serious ulcerative condition. This same disease first appeared in 1981 in the southern part of Thailand and later spread to central part in 1982 and became most significant epizootic in Thailand. Between 1981 and 1988, the disease spread to most of the countries in south east and south Asia. In Asia the disease was named epizootic ulcerative syndrome (EUS). The country to be affected most recently in Asia by EUS was Pakistan where EUS was confirmed in snakeheads from the Punjab province in 1996 and in *mrigal Cirrhinus mrigala* from Sindh province in January 1998. In the United States, similar ulcerative lesions, designated as ulcerative mycosis (UM) have occurred in estuarine fishes along the east coast since 1978. The disease has been given various colloquial names but is most commonly known as mycotic granulomatosis (MG) in Japan, red spot disease (RSD) in Australia, epizootic ulcerative syndrome (EUS) in south east Asia and ulcerative mycosis (UM) in USA. It is now generally accepted that EUS is the same disease as MG, RSD and UM. EUS is caused by an infection of a primary fungal pathogen, *Aphanomyces invadans (= A.piscicida)*.

Since late 2006, fish with clinical signs similar to that of EUS were found in several locations of Zambezi river system, in Africa. Following a request from the Government of Botswana to FAO, a joint mission involving scientists from FAO, AAHRI (Aquatic Animal Health Research Institute of Thailand) and NACA was undertaken during May 2007 to provide emergency technical assistance to assess the present situation and advise on future preventative and control measures. The team made field visits in Kasane, Botswana and specimens and tissue samples were collected from fish in Chobe-Zambezi river system. The preliminary histopathological investigations of the tissue samples from infected fish collected in Chobe River, Kasane, Botswana confirmed that the disease in question is EUS, caused by an infection of a primary fungal pathogen. Histopathology of muscle tissues from dashtail barb (*Barbus poechii*)

showed clear mycotic granulomas penetrating from the skin (epidermis and dermis) to the muscle layer, typical of fish infected with EUS. Confirmation of mycotic granulomas in histological sections of affected tissues and organs, using special stains such as Grocott's silver stain for fungal hyphae, is one of three OIE recommended EUS confirmatory methods. The confirmation by internationally accepted diagnostic procedures of EUS in the Chobe-Zambezi river system is the first confirmed case of this serious fish disease in the African region which has grave implications for the fisheries of the Chobe-Zambezi river system and the livelihoods of many people dependant on these fisheries. The risks to other fisheries through wider spread beyond the Chobe-Zambezi river system are also significant.

EUS in Asia was largely responsible for stimulating national, regional and international efforts aimed at developing and implementing national and regional aquatic animal health strategies. In 1998, the Food and Agriculture Organization of the United Nations (FAO) launched a Technical Cooperation Programme (TCP) Project "Assistance for the Responsible Movement of Live Aquatic Animals". This project addressed issues concerning trans-boundary pathogen transfer, with the view to build capacity in the Asia region on responsible movement of live aquatic animals. It was implemented by NACA with the participation of 21 countries in Asia. Under the project, 21 governments in the Asian Region adopted the guiding principles in the FAO/NACA *"Asia Regional Technical Guidelines on Health Management and the Responsible Movement of Live Aquatic Animals"* (or the "Technical Guidelines") and their associated implementation plan, "the Beijing Consensus and Implementation Strategy".

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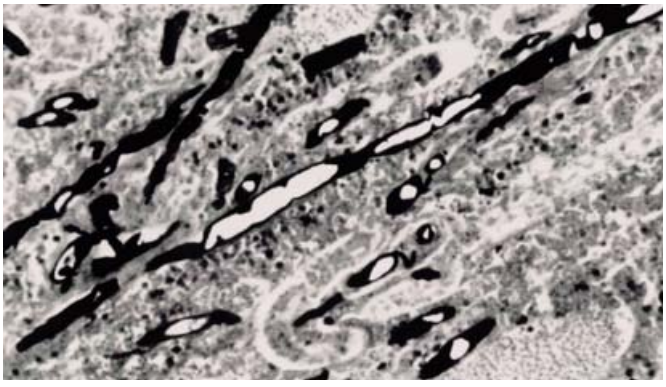

The application of vinyl coated steel wire mesh to the rigid frame of Micropods eliminates the threat of crop damage or loss posed by predators whether it is at or below the surface.

One must also consider the distribution of risk when working with smaller pens. The opportunity for total crop loss is diversified when multiple pens are used. The total risk posed by disease, damage to equipment and subsequent escape opportunities are all reduced when an entire crop is distributed in multiple pens.

Of course the requirements for any new equipment must not exceed the reasonable capacities of current farmers if such a transition is to occur. First the pens must be of a reasonable size that makes management by an individual or small crew easy. Existing boats should be sufficient to service them and if necessary tow them from one location to another. Routine operations also must require minimal equipment so that a barrier for entry is not created.

In the case of Micropods which have diameters of 10m or less, raising and lowering of the pen from the surface can be accomplished with a hand operated winch and all feeding, harvesting and repairs can be conducted near the surface by rotating the pen. This permits users to work almost exclusively from the surface. Diving requirements on pens of this size are mostly restricted to mooring inspection and maintenance and a simple hookah apparatus should be sufficient for most applications. The OCAT pen design also facilitates work from the surface.

Micropods are easily cleaned by rotating portions of the pen at the surface for drying. If appropriate, cleaning with a portable pressure washer can greatly accelerate the speed and ease at which fouling can be removed. According to the Soybean Industry's engineering manual the application of antifouling paint to the OCAT pen proved valuable in minimising the cleaning required.

Assembly of Micropods is relatively simple, can be accomplished in less than a day by a small crew and once completed can be rolled from a beach into the water, eliminating the need for docks or other major infrastructure elements that may be difficult or expensive to come by in some regions.

Local residents roll a Micropod off the beach.

Most submersible pens can be moored with a simple single point mooring system. In this configuration the pens swing freely in a watch circle with the prevailing current. These are the simplest systems to deploy as well as the most economical. Additionally, the larger site footprint created by a single point mooring further reduces the potential for concentrated waste deposition.

The benefits to moving production away from protected waterways to exposed ocean sites are clear and the time has arrived where such a move is not only feasible but it is reasonable. Adaptation and acceptance by established entities will take time and the initial steps may require the assistance and collaboration of government or NGO organisations to realise this. This new platform may also provide a means for artisanal fishermen to convert to aquaculture, especially because they are adapt at working at sea. Just as commercial scale aquaculture begins to accept the advantages and necessities of placing production in exposed open ocean sites, small scale artisanal farmers will likely draw the same conclusions. Until this transition begins the best interests of both the fish farmer and the environment cannot be realised.

Reference

Cremer, M.C., Lan, H.P., Chappell, J. (2008). Engineering Manual: Soybean Industry OCAT Offshore Ocean Fish Culture Cage.

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The project created a strong Regional Aquatic Animal Health Programme in Asia. Within Asia, the Technical Guidelines provide the basic Biosecurity framework and guidance for national and regional efforts in reducing the risks of diseases due to trans-boundary movement of live aquatic animals. Since 2000, supporting the implementation of the key elements of the technical guidelines has remained the focus of NACA's regional aquatic animal health programme. EUS in Africa has succeeded in focusing the attention of policy makers and researchers on issues of risks associated with movement of live aquatic animals and the need for effective national and regional aquatic animal health management strategies. Recognising the serious consequences of EUS, several southern African countries have now come together and taken preliminary steps to address the issue of aquatic animal disease management. In response to requests of FAO member governments for technical assistance, a regional Technical Cooperation Project *Emergency assistance to combat EUS in the Chobe-Zambezi River* has recently been approved by FAO for implementation. This regional project in operation since October 2007 is being participated by seven southern African countries (Angola, Botswana, Malawi, Mozambique, Namibia, Zambia and Zimbabwe). Several activities including capacity building, surveillance and disease reporting are being held as part of this project with the long term objective of developing and implementing an effective aquatic animal health management programme for southern Africa. NACA's regional aquatic animal health program executed in close partnership with FAO of the United Nations and the Office International des Epizooties (World Organisation for Animal Health), could serve as useful model for development and implementation of a possible future regional aquatic animal health programme in Southern Africa.