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Legislative and regulatory aspects of molluscan health management

C.J. Rodgers [a,*], R.B. Carnegie [b], M.C. Chávez-Sánchez [c], C.C. Martínez-Chávez [d], M.D. Furones Nozal [a], P.M. Hine [e]

[a] IRTA-SCR, C/Poble Nou s/n, Sant Carles de la Ràpita, 43540 Tarragona, Spain
[b] Virginia Institute of Marine Science, College of William & Mary, P.O. Box 1346, Gloucester Point, VA, USA
[c] Centro de Investigación en Alimentación y Desarrollo (CIAD), Unidad Mazatlán, Av. Sábalo Cerritos s/n, Mazatlán, 82100 Sinaloa, Mexico
[d] Laboratorio de Acuicultura y Nutrición, Instituto de Investigaciones Agropecuarias y Forestales, UMSNH, Av. San Juanito Itzícuaro s/n, Morelia, 58330 Michoacán, Mexico
[e] 73 rue de la Fée au Bois, 17450 Fouras, France

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ABSTRACT

The world population is growing quickly and there is a need to make sustainable protein available through an integrated approach that includes marine aquaculture. Seafood is already a highly traded commodity but the production from capture fisheries is rarely sustainable, which makes mollusc culture more important. However, an important constraint to its continued expansion is the potential for trade movements to disseminate pathogens that can cause disease problems and loss of production. Therefore, this review considers legislative and regulatory aspects of molluscan health management that have historically attempted to control the spread of mollusc pathogens. It is argued that the legislation has been slow to react to emerging diseases and the appearance of exotic pathogens in new areas. In addition, illegal trade movements are taken into account and possible future developments related to improvements in areas such as data collection and diagnostic techniques, as well as epidemiology, traceability and risk analysis, are outlined.

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1. Introduction

As the world population continues to increase, there is an ever-growing need to provide relatively cheap and sustainable protein to feed the estimated more than 8 billion people by 2025 (United Nations, 2013), and all food production will have to more than double to cope with the increase (FAO, 2015). This provision requires an integrated approach from all sectors in order to increase productivity, since agriculture alone cannot be expected to meet the growing demand. Fisheries and aquaculture play significant roles in helping to eliminate hunger, provide essential protein, and create employment, particularly in rural areas (FAO, 2014).

Seafood production has increased dramatically in recent decades and internationally it now constitutes the most highly traded food commodity (Asche and Smith, 2010). However, trade from capture fisheries production has stabilized or declined, and the overall increase has been due to growth in aquaculture production and increased exports from developing countries (Asche and Smith, 2010). For example, whereas production from marine capture fisheries actually decreased by 1.2% from 2007 to 2012, the production of marine aquaculture increased by 23.5% (FAO, 2014). The worldwide production of molluscs from aquaculture in 2012 was approximately 15 million tonnes (mt), although there was large regional variation between the 11 countries that supplied 92.7% of the production (from China with 12.3 mt to Norway with 0.002 mt; FAO, 2014). This production was comprised of 102 different mollusc species that represented approximately 60% of all mariculture production, which additionally included finfish, crustaceans and other minor species (FAO, 2014).

In the period 1995–2005, worldwide bivalve production from aquaculture increased from 7.1 mt to 11.9 mt, which represented a mean annual increase of 6.8%, although wild harvest of bivalves decreased proportionally from 21.5% to 12.7% during the same 10-year period compared to a corresponding increase from 78.5% to 87.3% for aquacultured bivalves (Pawiro, 2010).

One of the major constraints to the expansion of marine aquaculture is the appearance and dissemination of pathogens with the potential to cause serious disease problems that can result in significant mortalities and notable loss of production. Nevertheless, the continued growth of bivalve mollusc culture will play an essential part in the provision of a nutritious food for

* Corresponding author at: Orden de Malta, 10, Sant Carles de la Ràpita, 43540 Tarragona, Spain.
E-mail address: crodgers@telefonica.net (C.J. Rodgers).

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human consumption that will complement other sources of sustainable protein. As a food, molluscan shellfish are low in fat and their protein content varies between 9.3 and 17.9 g according to the species considered (Dong, 2009; FHF, 2009).

All food supply chains require regulation in order to control the final product. In this context, legislation provides the necessary authority for governments to create and enact any laws considered necessary for regulatory purposes that establish boundaries or constraints generally designed to improve safety. In addition, legislation has to be flexible enough to be able to identify and deal with changing circumstances, since the impact of transmissible animal diseases can be high for animal populations. In the context of mollusc aquaculture, the importance of legislation and its associated regulations is related to the protection of native stocks, control of movements and guaranteed food safety, as well as the attempted reduction of disease prevalence and intensity that can be related to increased production and improved animal welfare.

The likely future growth projection for the aquaculture industry is very positive and is linked to increased consumer demand that will require a continued supply of molluscs sourced from guaranteed disease-free stocks.

This paper places the emphasis on examining how different approaches are taken by legislators responsible for aquatic animal health, using examples from existing trading blocs, and how management options are integrated into the current regulations. In addition, legislation related to the continued incidence of disease, as well as possible future developments for mitigation and data collection, are considered with respect to improving the response to emerging bivalve mollusc diseases and exotic pathogens in new areas.

2. Aquaculture vs terrestrial animal movements

The intentional international movement of marine aquatic organisms for aquaculture raises many more problems and challenges than international movement of terrestrial animals:

(a) Movements of terrestrial animals are usually deliberate and controls can easily be imposed at national borders. Transmission factors (aerosol transmission, direct contact, vectors) are reasonably easy to control and microorganisms outside the host must avoid desiccation. Bivalve animal movements may be deliberate but are often accidental. There are no national borders in the sea, and water transports and supports parasites and pathogens without the risk of desiccation.
(b) Terrestrial animals are transported in relatively small numbers, can be easily manipulated and health checks can be carried out on each animal. Bivalve spat and juveniles are moved by the thousands or millions, although prospective broodstock are transferred in smaller numbers, manipulation is difficult and health checks rely on sub-sampling of batches.
(c) Under quarantine and on farms, terrestrial animals can be treated individually with medical remedies. There is no prospect of being able to treat marine bivalves with such remedies, and the rapid dilution of chemicals in water makes it impractical.
(d) Terrestrial animals are on-grown in controlled environments, but marine bivalves are cultured in uncontrolled environments surrounded by wild bivalves that may be reservoirs of infection for known pathogens and unknown potential pathogens.

3. Legislative framework (hard law)

The different scenarios can be divided into trading patterns, species/taxonomic groups and specific regulations, but the concept of trading blocs can help illustrate the existence of any potential legislative variations.

Trading blocs tend to be of a similar economic status as well as being regional, frequently speak similar languages, have similar political systems and experience the same climates. However, there is movement toward alignment of policies and legislations under trading agreements, even when the nations involved are socioeconomically dissimilar (e.g. the Americas, including US/Canada, Central America and South America). Nevertheless, they can be grouped firstly at the world level by considering the trade obligations applicable to individual countries, and then at the international level according to whether blocs can be classified as net importers or net exporters, using the trade flows by continent indicated in the FAO State of World Fisheries and Aquaculture (FAO, 2014).

The general objectives for example legislation and standards are summarized in Table 1.

3.1. World level

3.1.1. World Trade Organization (WTO) and the SPS agreement

The WTO has a role in promoting smooth trade between countries by negotiating binding agreements with respective governments in order to liberalize commerce. It is a very broad multilateral organization (de Búrca and Scott, 2000), which has specific agreements that define permitted measures for free trade. As such, the WTO upholds international standards rather than procedures that favor national commodities. In terms of animal health, the Agreement on the Application of Sanitary and Phytosanitary Measures (SPS) (WTO, 2015) refers to the standards of the World Organisation for Animal Health (OIE) with regard to the conditions for international trade in aquatic animals. Consequently, any national or international legislative and regulatory measures dealing with the risks due to trade movements should aim for a degree of compliance with these standards. However, any such standards must not create unwarranted barriers to international trade (e.g. by favoring domestic products through protectionist policies), although trading countries can use science-based methods in order to protect their aquatic animal health, and the WTO may support maintaining trade barriers in certain cases in order, for example, to prevent the spread of disease.

3.2. International level (net importers)

3.2.1. European Union

The European Union (EU) is a good example of an international integration organization which produces rules that it interprets "autonomously" (Lamy, 2006), and is considered a geographically limited regional entity with a tighter supranational legal framework compared to the looser international nature of the WTO and its agreements (de Búrca and Scott, 2000). In the case of the EU, equivalent sanitary requirements apply to live aquacultured animal movements for both intra-EU trade and imports from third countries in order to protect aquatic animal health. A country wanting to export any commodity to the EU must be on a list of authorized countries that have approved processing establishments. In addition, all imports of aquatic animals (or their products) require a health certificate and, even then, shipments are subjected to health checks at border inspection posts (BIP) on arrival. Outbreaks of significant diseases in third countries may lead to

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