Quarantine of aquatic animals in Australia

K.A. DOYLE, P.T. BEERS and D.W. WILSON *

Summary: Australia is free from many significant diseases of aquatic animals. Quarantine policies for aquatic animals and aquatic animal products are designed to meet the international trade obligations of Australia, while preventing the entry of pests and diseases. These policies are supported by measures to prevent the introduction of aquatic species which would have deleterious effects on the environment.

The Australian approach to quarantine – utilising objective risk analysis, where possible – is more difficult to apply to aquatic species than to terrestrial animals, as it is hard to identify and quantify risks when much of the relevant disease and epidemiological information is unavailable.

Other than ornamental fish, for which stringent quarantine restrictions apply, involving isolation in quarantine premises, there have been no commercial importations of live aquatic species into Australia over the past decade. The onerous requirements for detailed analysis of disease risks and environmental implications have tended to deter potential importers.

For many years, specific controls – based on risk analysis – have also been placed on the importation of products such as oysters in the shell, salmonid products, and feeds and meals of aquatic animal origin.

A major review of quarantine requirements has been commissioned.

KEYWORDS: Aquatic animals – Australia – Diseases – Quarantine – Risk analysis.

INTRODUCTION

Since the settlement of Europeans in Australia in the 18th century, there has been recognition within the Australian community of the importance of excluding diseases of animals, plants and humans. Australia continues to rely on agricultural, fishery and resource industries and the unique flora, fauna and ecology of the country have meant that its health status has been kept under close scrutiny. Access to export markets is vital, due to the relatively small population (18 million) and the magnitude of agricultural production from, for example, 25 million cattle and 165 million sheep. The remoteness and extensive nature of many industries, together with the presence of large numbers of many species of feral animals and potential insect vectors, make the eradication and control of disease difficult and expensive, thus creating a demand within the community for quarantine measures which provide the necessary level of protection (1).

* Australian Quarantine and Inspection Service, GPO Box 858, Canberra, ACT 2601, Australia.
The international spread of serious pathogens of aquatic animals has been well
documented (12), and has created economic loss through mortality, reduced growth
rates and loss of desirable product features (23). Against this background Australia has
introduced quarantine measures based on current scientific knowledge to protect its
fishery and aquaculture industries. The implications of international movement of
aquatic animals and their products, together with the potential accompanying spread
of fish diseases, were recognised by the Office International des Epizooties (OIE)
through the inclusion of fish diseases in the OIE International Animal Health Code
and, more recently, the International Aquatic Animal Health Code (21).

The maintenance, in Australian waters, of populations of wild and farmed aquatic
animals which are free from the major diseases provides an economic advantage (or,
at least, economic viability) to fishers and producers in their exploitation of domestic
and export markets. This freedom from the major diseases is also a significant factor
in recreational fishing (one of the largest participatory sports in Australia), in the
viability of trade in ornamental and farmed species and their genetic material, and in
the maintenance of the sensitive ecosystem in the country (22).

The mission of the Australian Quarantine and Inspection Service (AQIS) is to
deliver quarantine and inspection services which ensure maximum practical protection
against the entry and spread of unwanted pests and diseases of animals and plants,
while facilitating the import and export of animals and plants and their products. AQIS
also has responsibility for ensuring that imported feedstuffs are free from agents of
concern to human health. AQIS recognises the international obligations of Australia
under the World Trade Organisation Agreement on the Application of Sanitary and
Phytosanitary Measures (SPS Agreement) (25).

AQIS employs quarantine measures at each point of entry (air or seaport) and
post-arrival quarantine, especially for living animals, based on a risk analysis approach
(25). AQIS commissioned the Bureau of Resource Sciences (BRS) to conduct a
comprehensive review of Australian quarantine requirements for aquatic animals, their
products and associated materials, to ensure that practices and policies are consistent
with international standards (12). Reasons for such a review are described by Lehane
(16).

**HISTORICAL BACKGROUND**

Aquatic animals have been introduced into Australia in a sporadic manner for more
than 100 years, for commercial, recreation or social purposes (e.g. fauna from the
homelands of European settlers). Examples include the brown trout (Salmo trutta)
introduced into Tasmania in 1864 and the Pacific oyster (Crassostrea gigas) in the
1940s (22).

Humphrey (12) describes some other introductions made over the same period,
including brown trout, rainbow trout (Oncorhynchus mykiss), Atlantic salmon (Salmo
salar) and chinook salmon (Oncorhynchus tshawytscha). Humphrey refers to four
marine fish species which appear to have been accidentally introduced in the ballast
water of ships, namely Acanthogobias flavimanus and Tridentiger trigonocephalus,
from Japan; the Japanese sea bass (Lateolabrax japonicus), and sea bream
(Sparidentax hasta) from the Arabian sea. Freshwater species which have been
intentionally and successfully imported include tench (Tinca tinca), redfin perch
(Perca fluviatilis), mosquito fish (Gambusia affinis) and carp (Cyprinus carpio). These species were imported for social and recreational purposes. Twenty ornamental species, including goldfish (Carassius auratus), have become established in Australian waters (18). Forty-seven species of marine invertebrates were apparently introduced through ballast water of ships, hull fouling or other means (12). Apparently no pathogens have been associated with these imports, but their pest potential is significant. The Japanese starfish (Asterias amurensis) has proved a problem for fisheries in Tasmania. Other introduced invertebrates include the European shore crab (Carcinus maenas), Japanese shrimp (Palaemon macrodactylus), Pacific oyster (22) and Asian mussel (Masculista senhousia) (12).

A serious concern has been the interception of exotic snail species in shipments of imported fish. These are capable of introducing animal and human diseases, as well as having pest potential.

HEALTH STATUS OF AUSTRALIAN AQUATIC ANIMALS

Aquatic animals are potential hosts for a wide range of pathogens which may cause diseases of minor or major social, economic or environmental significance. Some cause disease only under specific circumstances, e.g. overcrowding or when the animals are under some other form of environmental stress. Several pathogens appear to be unique to Australia while, importantly, many diseases of international significance are exotic to Australia (6, 13, 14, 15, 20).

Recurrent epidemic fish deaths in Queensland in 1892 (12) provide an early instance of investigation, research and community concern with fish disease. Major changes were made to methods of husbandry for the Sydney rock oyster (Saccostrea commercialis), at the end of the 19th century, to offset the effects of polychaete worms and maintain the viability of the industry (24).

Research efforts for much of the 20th century identified the metazoan, protozoan, parasitic and microbiological fauna of the Australian aquatic species. As with terrestrial species, many of these organisms appear non-pathogenic under Australian conditions but have pathogenic exotic counterparts, further confusing the interpretation of their presence. Organisms in this category include lymphocystis virus, monodon baculovirus, infectious pancreatic necrosis virus (IPNV), Yersinia ruckeri, Aeromonas salmonicida, Vibrio anguillarum and Aphanomyces spp. (6, 15, 20).

Some disease agents identified in aquatic animals in Australia are listed in Table I. The position of Australia in relation to diseases of aquatic animals listed by the Office International des Epizooties (OIE) and requiring notification is shown in Table II.

INTERNATIONAL COORDINATION

The OIE – the world organisation for animal health – develops Codes or guidelines for minimising the risk of disease transmission as a result of international movement of animals and their products. The OIE also provides a disease-reporting mechanism for its 143 Member Countries, making essential information available for use in quarantine policy formulation and decision-making (21).
### TABLE I

**Some infectious disease agents affecting Australian aquatic animals**

<table>
<thead>
<tr>
<th>Disease agent</th>
<th>Species affected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Epizootic haematopoietic necrosis virus</td>
<td>Redfin perch (<em>Perca fluviatilis</em>) and rainbow trout (<em>Oncorhynchus mykiss</em>)</td>
</tr>
<tr>
<td>Picorna-like virus</td>
<td>Larval barramundi (<em>Lates calcarifer</em>)</td>
</tr>
<tr>
<td>Lymphocystis virus</td>
<td>Farmed barramundi</td>
</tr>
<tr>
<td>Monodon-like baculovirus</td>
<td>Juvenile penaeid prawns</td>
</tr>
<tr>
<td>Infectious hypodermal and haematopoietic necrosis-like virus</td>
<td>Juvenile penaeid prawns</td>
</tr>
<tr>
<td>Atypical <em>Aeromonas salmonicida</em></td>
<td>Goldfish (<em>Carassius auratus</em>), carp (<em>Cyprinus carpio</em>) and roach (<em>Rutilus rutilus</em>)</td>
</tr>
<tr>
<td><em>Carnobacterium fiscicolor</em></td>
<td>Salmonids</td>
</tr>
<tr>
<td><em>Enterococcus seriolicida</em></td>
<td>Rainbow trout</td>
</tr>
<tr>
<td><em>Flexibacter</em> spp.</td>
<td>Various species</td>
</tr>
<tr>
<td><em>Mycobacterium</em> spp.</td>
<td>Ornamental fish</td>
</tr>
<tr>
<td><em>Enterococcus seriolicida</em></td>
<td>Rainbow trout</td>
</tr>
<tr>
<td><em>Yersinia ruckeri</em></td>
<td>Juvenile Atlantic salmon (<em>Salmo salar</em>) and rainbow trout</td>
</tr>
<tr>
<td><em>Vibrio</em> spp.</td>
<td>Marine crustaceans and molluscs</td>
</tr>
<tr>
<td><em>Saprolegnia</em> spp.</td>
<td>Finfish</td>
</tr>
<tr>
<td><em>Ichthyophonus</em> spp.</td>
<td>Mullet (<em>Mugilidae</em>)</td>
</tr>
<tr>
<td><em>Aphanomyces</em> spp.</td>
<td>Freshwater estuarine fish</td>
</tr>
<tr>
<td><em>Ichthyobodo necator</em></td>
<td>Various finfish</td>
</tr>
<tr>
<td><em>Paramoeba</em> spp.</td>
<td>Atlantic salmon and rainbow trout</td>
</tr>
<tr>
<td><em>Bonamia</em> spp.</td>
<td>Flat oysters (<em>Ostreidae</em>)</td>
</tr>
</tbody>
</table>

The OIE maintains two lists of diseases of aquatic animals. The list of diseases notifiable to the OIE contains eleven diseases of highest significance to international trade; of these, five are reported in Australia, namely epizootic haematopoietic necrosis, bonamiosis, marteiliosis, mikrocytosis and perkinsosis. A second list covers less important diseases which have limited geographic distribution or are not well defined. Four of the diseases on this list are present in Australia; however, although the causative agents of two of these diseases – namely infectious hypodermal and haematopoietic necrosis (IHHN)-like virus and monodon-type baculoviruses – are present in penaeid prawns, the relationship of these viruses with pathogenic exotic strains has not been characterised (12).

Workshops have been held in a number of regions of the world, under development assistance or United Nations agency funding (23). The need for quarantine procedures for aquatic animals has been recognised. Typically, this recognition has been supported by calls for international standards (to which the OIE has responded), together with the creation or commissioning of diagnostic and reference laboratories, inspection and certification systems for live fish and fish products, and quarantine systems for...
<table>
<thead>
<tr>
<th>Diseases</th>
<th>Status in Australia</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Notifiable diseases</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Fish diseases</strong></td>
<td></td>
</tr>
<tr>
<td>Epizootic haematopoietic necrosis</td>
<td>Present</td>
</tr>
<tr>
<td>Infectious haematopoietic necrosis</td>
<td>Exotic</td>
</tr>
<tr>
<td><em>Oncorhynchus masu</em> virus disease</td>
<td>Exotic</td>
</tr>
<tr>
<td>Spring viraemia of carp</td>
<td>Exotic</td>
</tr>
<tr>
<td>Viral haemorrhagic septicaemia</td>
<td>Exotic</td>
</tr>
<tr>
<td><strong>Diseases in crustaceans</strong></td>
<td></td>
</tr>
<tr>
<td>None at present</td>
<td></td>
</tr>
<tr>
<td><strong>Diseases in molluscs</strong></td>
<td></td>
</tr>
<tr>
<td>Bonamiosis</td>
<td>Present</td>
</tr>
<tr>
<td>Haplosporidiosis</td>
<td>Exotic</td>
</tr>
<tr>
<td>Marteiliosis</td>
<td>Present</td>
</tr>
<tr>
<td>Mikrocytosis</td>
<td>Present</td>
</tr>
<tr>
<td>Perkinsiosis</td>
<td>Present</td>
</tr>
<tr>
<td>Iridovirosis</td>
<td>Exotic</td>
</tr>
<tr>
<td><strong>Other significant diseases</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Fish diseases</strong></td>
<td></td>
</tr>
<tr>
<td>Bacterial kidney disease</td>
<td>Exotic</td>
</tr>
<tr>
<td>Channel catfish virus disease</td>
<td>Exotic</td>
</tr>
<tr>
<td>Viral encephalopathy and retinopathy</td>
<td>Present</td>
</tr>
<tr>
<td>Enteric septicaemia of catfish</td>
<td>Exotic</td>
</tr>
<tr>
<td>Epizootic ulcerative syndrome</td>
<td>Present</td>
</tr>
<tr>
<td>Infectious pancreatic necrosis</td>
<td>Exotic</td>
</tr>
<tr>
<td>Infectious salmon anaemia</td>
<td>Exotic</td>
</tr>
<tr>
<td>Piscirickettsiosis</td>
<td>Exotic</td>
</tr>
<tr>
<td><strong>Diseases in crustaceans</strong></td>
<td></td>
</tr>
<tr>
<td>Baculoviral midgut gland necrosis</td>
<td>Exotic</td>
</tr>
<tr>
<td><em>Baculovirus penaei</em> infection</td>
<td>Exotic</td>
</tr>
<tr>
<td>Crayfish plague</td>
<td>Exotic</td>
</tr>
<tr>
<td>Infectious hypodermal and haematopoietic necrosis</td>
<td>?</td>
</tr>
<tr>
<td>Monodon baculovirus infection</td>
<td>?</td>
</tr>
<tr>
<td>Yellowhead monodon virus infection</td>
<td>Exotic</td>
</tr>
<tr>
<td><strong>Diseases in molluscs</strong></td>
<td></td>
</tr>
<tr>
<td>None at present</td>
<td></td>
</tr>
</tbody>
</table>

- not present

? present but in a strain of low pathogenicity
international movement of live fish (including quarantine facilities and safe disposal of water). Disease has been a major factor in the viability of fish farming systems and aquaculture generally, and this has led to the emergence of systems of accreditation for farms and of qualified government fish pathologists for certification purposes. This type of control system has been implemented in Canada, the United States of America, the United Kingdom and Papua New Guinea. The European Commission, in particular, has developed detailed rules to reduce the disease risks from trade in aquaculture animals and their products within the European Union (EU) and imports from non-EU countries (9).

Many other countries have quarantine controls over live aquatic animals, and in some countries these extend to fish-derived biologicals, fish feeds and edible fishery products.

**THE AUSTRALIAN SITUATION**

Australia is a major exporter of fishery products, including tuna, prawns, shellfish, abalone and rock lobsters. Despite the volume of such exports, fisheries products such as shellfish, lobsters and salmonid products to the value of approximately AUS$500 million are imported annually, according to figures published by the Australian Bureau of Statistics.

In addition to these edible products, approximately 10 million ornamental fish are imported annually from approved sources and through a system of quarantine facilities. The aquaculture industry has a need for fish feeds and fish meals, and live foods such as brine shrimp are imported under a system of quarantine treatments. Speciality items, such as hormones to induce spawning for the collection of genetic material, are imported under special conditions of quarantine risk assessment and treatment (11).

**Legislation**

Importation of aquatic animals and their products into Australia is regulated through the Quarantine Act 1908, and the Wildlife Protection (Regulation of Exports and Imports) Act 1982.

Under the Australian federal system, the Commonwealth (National) Government is responsible for quarantine. Since federation in 1901, however, the States have performed field activities on behalf of the Commonwealth. This role has been complementary with the role of the States in terrestrial animal disease control. The States also have responsibility for some fisheries. The Chief Veterinary Officers of the States are also Chief Quarantine Officers (Animals). In these dual roles, they have access to State laboratory and field resources for quarantine operations.

Chief Quarantine Officers (Animals) of each State also act with federal officers as a committee to advise on quarantine policy and operations. These arrangements are currently being changed, with the Commonwealth soon due to take over field quarantine in several States.

Legislation emerged from a series of events which established the need for quarantine measures similar to those applied to terrestrial animals. In 1933, the appearance of *Ichthyophthirius multifiliis* drew attention to the need for quarantine for
imported live fish. In 1963, the Animal Quarantine Service became concerned over the relative lack of quarantine control on imports of live fish, and recognised the spread of fish diseases around the world. The need was recognised for additional precautions — such as registration of importers, inspection on arrival and quarantine, a list of species which should be allowed entry (established largely on environmental and safety grounds) — and these were established over the following few years (12).

By 1968, further controls were considered necessary. The need for health certification was recognised, and it was also decided that fish imported for breeding (including sporting fish) should be allowed entry only to government facilities. Formal control was initiated over which species — especially of ornamental fish — could be imported. As these controls were not prompted by specific disease concerns, they were effected through Customs legislation.

At about the same time, it was also decided that the world-wide spread of diseases of salmonids justified specific quarantine measures covering imports of live salmonids, their semen and ova, and salmonid products. Importation of products was to be allowed only if treated to inactivate potential pathogens. In practice, this meant heating or hot smoking. These measures were designed to protect the health status of local salmon and trout, which had been introduced more than a century earlier for sport and recreation. These restrictions were embodied in legislation in 1975, at a time when there was no commercial farming of these species in Australia (1, 12).

A major review of quarantine policies and practice was conducted by the Senate Standing Committee on Natural Resources in 1978 and 1979. This Committee recommended, inter alia, that the system for ornamental fish be augmented by post-arrival quarantine for fourteen days. Legislation was introduced to give effect to this recommendation. Ornamental fish must originate from approved premises, must be certified, must be mature enough for ready identification, and are inspected on arrival in Australia. The fish are transferred to quarantine premises, where the original water is exchanged and chemically treated before disposal. The fourteen-day quarantine period enables observation and detection of clinical disease, testing (if required), identification of non-approved species (if missed on initial inspection) and detection of exotic inclusions such as snails and water weeds (if not excluded by water change).

The 1983 and 1984 amendments to legislation also provided for importation of aquatic animals for scientific research and for display. The thrust of the legislation is to give the Director of Animal and Plant Quarantine authority to allow entry of certain items, provided that they are treated, tested or processed by other means so as not to introduce disease. This is usually accomplished by the development of ‘protocols’ which provide detailed support to the legislation.

Species approved for importation

Determination of which species can be imported is performed by the Australian Nature Conservation Agency (ANCA) under the Wildlife Protection (Regulation of Exports and Imports) Act 1982. ANCA is responsible for ensuring that Australia complies with the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES) and that native fauna and flora are protected.

The ANCA list of approved species of fish also helps to protect the Australian environment against the introduction of pest species, in case animals are released into
the wild. The list also seeks to exclude animals which might be dangerous to human health, e.g. due to spines or toxins. State legislation prohibits the release of imported fish. The role played by administrative law is discussed below.

Risk analysis and disease control

The Australian Government released a policy statement in December 1988, entitled ‘Australian quarantine: looking to the future’ (2).

This statement included requirements for public consultation (confirming and extending practice current at that time), formal risk assessment, and measures to ensure public understanding that ‘no risk’ policies were not practicable. The statement also requires quarantine discussions to be based on science (2).

Administrative law embodying ‘freedom of information’ and ‘due process’ principles also makes demands on the quarantine decision-making process. The nature of these legislative measures can mean that decision-making on controversial issues is protracted and public, but they do ensure input by all parties and the availability of as much information as possible. The Administrative Decisions (Judicial Review) Act gives the public access to knowledge of the grounds on which decisions are taken (3).

Risk assessment is as objective as possible, and methods are based on the ‘Import risk analysis’ chapter of the OIE International Aquatic Animal Health Code (21).

The principal steps for consideration are as follows:
- the country factor (i.e. presence, absence, prevalence of or regional freedom from the diseases of concern in the country of origin)
- the commodity factor (i.e. capacity for the animal, genetic material, product or biological to carry disease)
- risk reduction methods able to be employed (i.e. treatments, tests, processing of products to reduce the risk of specific shipments carrying specific pathogens)
- risk of domestic exposure (i.e. likelihood that the commodity will be exposed to a susceptible population and introduce disease)
- the number of import units being imported.

Assessment of the risk of each disease for each commodity from each country involves a ‘step risk analysis’. Each point of potential contamination is identified and, at each of these points, the probability of infection or contamination is assessed (5, 7, 17). This leads to an estimation of the overall cumulative probability of the commodity introducing the disease. Where there is a precedent, or where adequate data on risk reduction or agent inactivation steps are available, this can be calculated quickly (usually subjectively) (25).

Quantitative methods of risk assessment are being researched and are increasingly coming into use. This may involve the use of a computer spreadsheet model. For each step, estimates are made of the maximum, minimum and most likely values and the distribution, and Monte Carlo simulations are used to develop a cumulative probability distribution. This distribution aids decision-making and, when combined with a sensitivity analysis (enabling the identification of the most critical steps), gives the decision-maker a more defensible basis on which to determine the level of risk than a single deterministic probability figure (5, 7).
Quantitative risk analysis can assist risk communication, and can be particularly important in this regard where imports of products are involved (3, 25).

Quarantine practice for ornamental fish

Procedures employed for the quarantine of imported freshwater ornamental aquarium fish are described above. Details of procedures are as follows:

a) approval of farms in the country of origin  
b) certification provided by the country of origin  
c) shipments labelled as to species; mature specimens only  
d) shipments inspected on arrival at the airport:
   i) for species  
   ii) for inclusions, such as snails and water weeds, in the water  
e) shipments transported to quarantine premises  
f) inspection on arrival for disease, species and ‘inclusions’ (including snails and water weeds)  
g) water exchanged, disinfected and disposed of  
h) fish held under observation for fourteen days  
i) final inspection before release for: disease, species and ‘inclusions’.

Marine species are examined on arrival for evidence of disease and foreign matter, and for species identification. Demand is so great that a total ban would induce smuggling and increase disease risks, and this is therefore a significant consideration.

Other live aquatic animals

Specific Ministerial approval is required for the importation of other live aquatic animals, including crustaceans, molluscs, echinoderms and other invertebrates. These animals are allowed only for special purposes, and specific quarantine arrangements have been designed, including disinfection of waste water. Importations of such animals are normally approved for research or display, and they are kept in permanent quarantine. Specific permission is also required from ANCA.

During the 1970s and 1980s, consideration was given to imports of genetic material for aquaculture, but plans for two projects were abandoned following assessment of the health risks involved.

The Nile perch (*Lates niloticus*) was to be imported to replenish stocks in tropical waters as numbers of barramundi (*Lates calcarifer*) declined. A special quarantine facility was built to handle the project, and to allow for observation, testing and waste water control. The project was abandoned, however, due to environmental concerns.

The other project involved importation of improved genetic material of Atlantic salmon from Norway, for the intended establishment of salmon farming. It was decided that risks of disease were too great, and the project was commenced using the small number of animals introduced decades earlier and held at a government research facility.
Products of marine animals

Products from marine animals are allowed entry, provided that they are free from contamination and are not capable of propagation, and significant amounts of such products are imported. Oysters are an exception, however. Oysters on the full shell are prohibited, while oysters on the half shell are permitted only from New Zealand. Specific requirements apply to shellfish. Special conditions have been applied to salmonid products for more than twenty years, as these are believed to present a particular risk (see below) (4). An Imported Foods Inspection Program was implemented in 1993 to ensure that such products meet Australian food laws.

Manufactured fish feed

Manufactured fish feed products are imported only by permit, and after individual risk assessment which is designed to ensure that processing will inactivate the pathogens of concern. Fish foods and meals are subjected to inspection for freedom from insect infestation and assurance that specified treatments have been undertaken. A specific procedure applies, and involves the following steps:

- list of ingredients
- processing details (including temperatures achieved, times employed and chemicals involved)
- certification
- certification of country of origin.

Brine shrimp eggs are given separate approval, subject to chemical sterilisation and drying by heat.

Fishing equipment

Fishing equipment can be imported, provided that it is inspected and is found to be free from contamination. Cleaning and sterilisation may be required; the nature of the treatment is dependent on the circumstances and material from which the equipment is made.

Biologicals

Biologicals used for in vivo purposes in fish undergo individual evaluation due to their potential to introduce disease. Vaccines are becoming increasingly available for aquaculture. Methods of manufacture are carefully assessed. Biologicals designed for in vitro use present a much lower risk: they may carry pathogens but, if handled in suitably secure laboratories and appropriately disposed of, they can be used with a high level of safety. AQIS has laboratories approved for this type of activity, which are controlled by quality assurance programmes embodying approved use and disposal programmes (7, 8).

Products derived from species of the family Salmonidae

Specific quarantine provisions apply to products from salmonids, due to the rapid spread of diseases of salmonids throughout the world. The impact of disease entry on Australian salmonids has been increased by the development of salmon and trout
farming since the mid-1980s, in addition to salmon and trout released in the late 19th century for recreational fishing. Australian conditions appear to be at the limits of the environmental range of these animals, and disease could be expected to have a serious effect on them.

Disease would also have an effect on the viability of farming enterprises. It has been estimated that the introduction of furunculosis and IHN into Australia would result in losses of sales of the order of AUS$8.5 million to AUS$9.4 million per year. Should survival rates for salmon and trout slip below 75% and 70% respectively, it is expected that farming operations would not be viable (19).

Imported salmon and trout must undergo heat treatment to render these products safe in the event that they pass into waterways at any stage. Current requirements stipulate one of the following combinations:

- 35°C for 7 h
- 40°C for 5½ h
- 50°C for 3 h
- 60°C for 1 h
- 70°C for 15 min
- 120°C for 12 min.

In practice, the treatment stipulated by the current requirements can be undertaken by commercial producers overseas, and products are then imported under permit. Applications have been received for importation of frozen products, particularly ocean-caught, headed and filleted Pacific salmon. Risk assessments on such importations are being conducted at present, and documents have been published for public consultation.

AQIS is willing to consider variations to the current requirements which could take into account the effects of the auxiliary processing, such as ‘flash-baking’, ‘parboiling’, ‘gamma irradiation’, ‘brining’ or ‘freezing’, where the effectiveness of this process in inactivating organisms can be demonstrated.

INTERNATIONAL OBLIGATIONS

The completion of the Uruguay Round of Multilateral Negotiations — and with it the establishment of the World Trade Organisation (WTO) replacing the General Agreement on Tariffs and Trade (GATT) — created new obligations for quarantine. The new SPS Agreement embodies principles designed to ensure that quarantine measures are not used to limit trade unfairly. Rather, they are designed to facilitate trade while minimising the spread of diseases of humans, animals and plants (10).

The principles of the SPS Agreement are as follows:

- harmonisation (basing national quarantine measures on international standards)
- quarantine measures based on science (especially where international standards are not used), and under which all countries are treated consistently in respect of any given disease
- national treatment (treating imports in the same way as domestic production in respect of a given disease)
- transparency (open and consultative decision-making on quarantine)
- regionalisation (accepting commodities from disease-free zones within infected countries where possible)
- equivalence (accepting alternative means of achieving quarantine objectives)
- risk assessment (restrictions based on actual risk, assessed as objectively as possible).

Harmonisation under the SPS Agreement utilises the following bodies:
- Codex Alimentarius Commission (for food standards and hygiene)
- International Plant Protection Convention (for plant quarantine measures)

CONCLUSION

Australian quarantine policies and practices for aquatic animals are designed to address the requirements of this unique and remote country. They are also designed to meet international obligations, and are based (as closely as is practical) on international standards.

Quarantine decision-making is transparent, consultative, and based on risk analysis.

Quarantine controls are complemented by measures for protection of the environment and the unique aquatic flora of Australian waters. The exclusion of exotic species of aquatic animals – unless considered to be compatible with the environment – is an essential element of this policy. The sole objective of quarantine measures is the exclusion of unwanted disease. The mission of AQIS is to facilitate trade while addressing the risk of disease. Methods of treatment which inactivate disease organisms enable the importation of products which would be excluded under ‘zero risk’ policies.

While introduction of foreign species was undertaken in the past for sporting and recreation purposes, this has virtually ceased due to disease and environmental concerns. Very strict quarantine limitations are imposed to ensure the exclusion of pest species and disease.

Emerging information on diseases of aquatic animals, on their means of transmission, and on diagnostic technology is making quarantine for aquatic animals and their products more scientific.

* *


Résumé : L'Australie est indemne de nombre de maladies importantes affectant les animaux aquatiques. Les procédures de quarantaine applicables aux animaux aquatiques et à leurs produits ont été élaborées pour satisfaire aux exigences du commerce international et empêcher l'introduction de parasites et
de maladies. Ces procédures s’accompagnent, en outre, de mesures visant à faire obstacle à l’introduction d’espèces aquatiques qui pourraient nuire à l’environnement.

L’approche australienne de la quarantaine – fondée autant que possible sur une analyse objective des risques – est plus difficile à appliquer aux espèces aquatiques qu’aux animaux terrestres ; il est, en effet, difficile d’identifier et de quantifier les risques lorsque l’information sur l’épidémiologie et les maladies en cause est pratiquement inexistant.

Au cours des dix dernières années, et hormis le cas des poissons d’ornement auxquels s’appliquent des mesures de quarantaine strictes (y compris l’isolement dans des aquariums prévus à cet effet), il n’y a pas eu d’importation commerciale d’espèces aquatiques vivantes en Australie. Le coût des procédures obligatoires d’analyse des risques de maladie ainsi que des risques pour l’environnement a eu un effet dissuasif sur les importateurs potentiels.

Depuis de nombreuses années, des contrôles spécifiques – fondés sur l’analyse des risques – ont également été mis en place lors d’importation de produits tels que les huîtres en écaille, les produits de la salmoniculture et les produits à base d’animaux aquatiques destinés à l’alimentation humaine et animale.

Les autorités ont entrepris une importante révision des procédures officielles de quarantaine.


* * *


Resumen: Australia está libre de muchas de las principales enfermedades que afectan a los animales acuáticos. Las políticas de cuarentena para animales acuáticos y productos derivados han sido concebidas a la vez para adaptarse a las obligaciones de Australia en materia de comercio internacional y para impedir la penetración de parásitos y enfermedades. Dichas políticas se apoyan en un conjunto de medidas que impiden la introducción de especies acuáticas susceptibles de tener efectos deletéreos sobre el medio ambiente.

El enfoque australiano de la cuarentena –con utilización de la técnica de análisis objetivo de riesgos, siempre que ello sea posible– resulta de más difícil aplicación a las especies acuáticas que a las terrestres, pues la identificación y cuantificación de los riesgos entrañan mayor problema cuando se carece de buena parte de los conocimientos necesarios sobre las causas y la epidemiología de las enfermedades.

Excepción hecha de los peces ornamentales, para los que rigen normas de cuarentena muy estrictas (incluyendo el aislamiento en acuarios de cuarentena), ninguna especie acuática viva ha sido introducida en Australia con fines comerciales durante la década pasada. Las onerosas exigencias de la ley (análisis pormenorizado sobre el riesgo de enfermedad y las posibles implicaciones medioambientales) han disuadido hasta la fecha a los potenciales importadores.
Durante muchos años se han impuesto asimismo controles específicos —basados en el análisis de riesgos— sobre la importación de artículos tales como ostras vivas, salmónidos y productos alimenticios derivados de animales acuáticos y destinados al consumo animal y humano.

En la actualidad se está llevando a cabo una importante revisión de la normativa vigente en materia de cuarentena.

PALABRAS CLAVE: Análisis de riesgos — Animales acuáticos — Australia — Cuarentena — Enfermedades.

*  *

REFERENCES


