Epizootic Ulcerative Syndrome

Scientific Opinion adopted 15/9/11

Ana Afonso - Animal Health and Welfare (AHAW)
• Background
  – EUS
  – Legislation
• EUS epidemiology: pathogen, hosts, transmission, distribution, prevalence
• Ornamental fish trade
• Risk of entry
• Risk of spread
• Possible Impact
• EUS is an epizootic disease in wild and farmed freshwater and estuarine fish.

• The disease has never been reported in Europe.

• The fish species susceptible to EUS include many ornamental fish.
Definitions

• Ornamental aquatic animal (OF)

• Closed ornamental facilities (COF): pet shops, garden centres, garden ponds, commercial aquaria or wholesalers keeping ornamental aquatic animals

• Open ornamental facility (OOF)
Derogations to ornamentals in COF

• Requirements on authorization, record keeping, traceability, risk-based surveillance and good hygiene practices do not apply.

• EUS susceptible species:
  – May be imported from all third countries being members of the OIE.
  – Currently no EUS specific requirements apply.

HOWEVER

• Notification and minimum measures for control of diseases in aquatic animals do apply.
The Commission is aiming to re-assess the current regulatory regime as regards EUS.

It is therefore appropriate and necessary to assess the risks posed by EUS for the EU aquaculture industry.
• EUS is caused by the oomycete known as *Aphanomyces invadans*. 
The hosts

• Large number of fresh water and estuarine species.

• European species:
  – naturally susceptible: crucian carp (*Carassius carassius*) and grey mullet (*Mugil cephalus*)
  – susceptible by experimental challenge: rudd, (*Scardinius erythrophthalmus*) European catfish (*Silurus glanis*), common carp (*Cyprinus carpio*), and roach (*Rutilus rutilus*).
  – Introduced fish species known to be susceptible: goldfish (*Carassius auratus auratus*) bluegill (*Lepomis macrochirus*), channel catfish (*Ictalurus punctatus*), rainbow trout (*Oncorhynchus mykiss*), rosy barb (*Puntius schwanenfeldi*) and rosy bitterling (*Rhodeus ocellatus*).
Signs
Transmission

• Horizontal transmission (there is no published evidence demonstrating that zoosporangia form on the surface of infected fish and release zoospores)?

• Very small MID (demonstrated experimentally)?

• Predisposing factors: skin damage, low water temperature, water quality changes or other infections.

• Persistence between outbreaks
Distribution of EUS world wide

Map showing the current global distribution of epizootic ulcerative syndrome
(prepared by Jeff Jenness and José Aguilar-Mainjarez, FAO-FIMA; source: African Water Resource Database)

(FAO –2009)

11/1/12 – SCOFAH, EUS
Trade volumes of live fish

Top exporting countries to the EU (Eurostat 2009 data)

<table>
<thead>
<tr>
<th>Partner/product</th>
<th>030110 - live ornamental fish(a)</th>
<th>03019 - live fish (excl. Ornamental fish)¹ (a)</th>
<th>EUS Detection</th>
</tr>
</thead>
<tbody>
<tr>
<td>SINGAPORE</td>
<td>12666</td>
<td>?</td>
<td></td>
</tr>
<tr>
<td>MALAYSIA*</td>
<td>1350</td>
<td>?</td>
<td>YES</td>
</tr>
<tr>
<td>UNITED STATES</td>
<td>1822</td>
<td>2326</td>
<td>YES</td>
</tr>
<tr>
<td>SRI LANKA*</td>
<td>1915</td>
<td>?</td>
<td>YES</td>
</tr>
<tr>
<td>JAPAN</td>
<td>1924</td>
<td>?</td>
<td>YES</td>
</tr>
<tr>
<td>THAILAND</td>
<td>1979</td>
<td>?</td>
<td>YES</td>
</tr>
<tr>
<td>INDONESIA</td>
<td>4501</td>
<td>?</td>
<td>YES</td>
</tr>
<tr>
<td>KENYA*</td>
<td>458</td>
<td>?</td>
<td>YES</td>
</tr>
<tr>
<td>MALDIVES*</td>
<td>601</td>
<td>?</td>
<td></td>
</tr>
<tr>
<td>BRAZIL</td>
<td>620</td>
<td>?</td>
<td></td>
</tr>
<tr>
<td>ISRAEL</td>
<td>6789</td>
<td>66</td>
<td></td>
</tr>
<tr>
<td>CHINA (PEOPLE'S REPUBLIC OF)*</td>
<td>750</td>
<td>66</td>
<td></td>
</tr>
<tr>
<td>COLOMBIA</td>
<td>810</td>
<td>816</td>
<td>YES</td>
</tr>
<tr>
<td>HONG KONG</td>
<td>816</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PHILIPPINES</td>
<td>861</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Quantities in 100 kg
- The main exporters of ornamental fish to EU are countries considered not free of EUS.

11/1/12 – SCOFAH, EUS
Trade volumes of live fish

• Total imports of ornamental (2010): 210 058 725

• Total value of the industry in UK: 400 millions £

• 85% of EU imports arrive at UK and 47% through Heathrow BIP.
Table 1: Live aquatic animals imported through the Heathrow BIP in 2010.

<table>
<thead>
<tr>
<th></th>
<th>No. consignments</th>
<th>%</th>
<th>No. fish/eggs</th>
<th>%</th>
<th>No. boxes</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-ornamental fish*</td>
<td>40</td>
<td>0.8</td>
<td>20,430,700</td>
<td>42.1</td>
<td>87</td>
<td>0.1</td>
</tr>
<tr>
<td>Ornamental fish</td>
<td>4,864</td>
<td>94.0</td>
<td>27,941,784</td>
<td>57.6</td>
<td>110,371</td>
<td>92.4</td>
</tr>
<tr>
<td>Others**</td>
<td>271</td>
<td>5.2</td>
<td>136,674</td>
<td>0.3</td>
<td>8,936</td>
<td>7.5</td>
</tr>
<tr>
<td>Total</td>
<td>5,175</td>
<td></td>
<td>48,509,158</td>
<td></td>
<td>119,394</td>
<td></td>
</tr>
</tbody>
</table>

*Trout eggs and one consignment of halibut
**Molluscs, crustaceans, corals, etc.
Trade routes of Ornamental fish

TRADE LINKS

WILD CATCHERS

WILD CATCHERS CO-OP

CONSOLIDATOR/WHOLESALER

AIR/SHIPPING FREIGHT

SHIPPING CONSOLIDATOR

BIP

CONSOLIDATOR

SUB-WHOLESALE
SUB-CONSOLIDATOR

WHOLESALE

RETAILER

HOBBYIST

FISH FARMERS

11/1/12 – SCOFAH, EUS
Terms of Reference

• To assess the risk of introduction of EUS into EU aquaculture, by means of import of live fish from third countries:
  – into closed ornamental facilities, and
  – into aquaculture facilities other than closed ornamental facilities.
Risk of entry

Third Countries

Import (wild catch & farmed fish)

Non-Ornamental

Farmed non-ornamental fish for market

Ornamental fish

Ornamental fish in closed facilities

Farmed incl.

ToR 1

BIP

Regulated

Closed

Closed

Closed

NOT Closed

ToR 1

11/1/12 – SCOFAH, EUS
Risk reduction measures

• FVO inspections in three of the main ornamental fish exporters have reported insufficiencies regarding certification for export and biosecurity in ornamental fish production sites.

• Visual inspection of live fish consignments at the BIP is sub-optimal (large number of boxes, large numbers of fish per box, difficult observation conditions, mixed consignments, reduced time available for inspection).

• Programmes of health monitoring/surveillance of ornamental fish are not in place in more than 50% of EU MS.

• EUS surveillance is based on passive surveillance.
Conclusions – Risk of entry

- Limited traceability of the origin of live ornamental fish.
- Imported ornamental fish originate from countries with historic or recent reports of EUS.

- No certification of EUS free status for imports to COF - **PROBABILITY**
- The large majority of live fish (>99%) imported into Europe is classed as ornamental fish - **FREQUENCY**.
- There is a greater **RISK** of entry of *A. invadans* into closed ornamental facilities compared to facilities other than closed ornamental facilities.

- It is likely that EUS has repeatedly entered into EU via ornamental fish import from third countries.
• To assess the risk of EUS to spread and persist within the EU, in particular the risk of spread from closed ornamental facilities.
Risk of spread

Given introduction...

No ornamentals expected to go to non-ornamental farms

Closed

ToR 2

A. invadans

incl. Farm

NOT Closed

The Wild (Lakes, Rivers)

Farm

Farm

Farm

Farm

Farm

Farm

Farm

Farm

11/1/12 – SCOFHAH, EUS
How closed is closed?

• Closed ornamental facilities as defined by Council Directive 2006/88/EU do not avoid the release of A. invadans.

• Release occurs with the
  – movement/sale of live fish or
  – insufficient effluent treatment or
  – unintentional contact with natural waters.
Terms of Reference

- To assess the possible significance and impact on **EU aquaculture** taking account of the pathogenesis, epidemiology, the available diagnostic methods, the susceptible species range, and the relevant environmental conditions.
Given introduction & release ...

ToR 3

A. invadans

What can go wrong & what may happen?

The Wild (Lakes, Rivers)
Evidence of EUS impact on aquaculture, fisheries and trade

- There is **evidence of economic impact** on EUS-affected countries, both by decline in capture fisheries and mortality in aquaculture.

- **Impact on biodiversity** is probably high in affected water bodies but there is a lack of studies documenting this effect.

- More recent outbreaks (with exception of the large outbreak in the Zambezi River) have been reported as **low or no mortality**. However, a possible effect on productivity has not been investigated.
• In natural infections, the disease was reported at water temperatures as low as 10 to 15 °C and as high as 33 °C.

• The majority of fish species produced by EU aquaculture are not known to be highly susceptible to EUS.
• Risk of entry – import is expected
• Climatic conditions and susceptible species do not exclude establishment of A. *invadans* in Europe.

• **However:** So far no report exists?

• Moreover:
  – EUS outbreak may not be associated with high morbidity/mortality
    <-> low chance of clinical detection
  – EUS awareness and diagnostic capability in the EU is low (2008)
    <-> low chance of laboratory detection
1. Fish in European waters have never been exposed to A. invadans.

2. EUS does not establish but fades out after introduction due to unfavourable conditions.

3. EUS epidemics repeatedly establish and spread unnoticed in EU as certain circumstances prevent massive disease expression.

4. EUS is already endemic in EU and regularly misdiagnosed

No data from monitoring of aquaculture fish in Europe or wild stocks in rivers and other natural water bodies is available to allow for confirmation of either scenario or its likelihood.
However, if EUS is endemic (Scenario 4)

the impact may change in the future if conditions such as climate, water quality or availability of susceptible species, either in aquaculture or in natural water bodies, become favourable for initiating epidemics and disease expression.
Recommendations

• In order to provide evidence on the actual epidemiological situation of EUS within the EU, scientifically based surveys for aquaculture, live imports and the wild should be considered.

• In order to increase confidence in the EUS health status of imported ornamental fish it is recommended to gain knowledge of the surveillance systems in place that support health certification by the exporting countries.

• It is recommended to increase traceability of ornamental fish movements within the EU.

• Differential diagnosis of *A. invadans* infection should be undertaken for fish exhibiting clinical signs consistent with EUS. Histopathology provides a presumptive diagnosis, whereas further molecular analysis and/or culture are recommended as confirmatory diagnostic tools.

• New scientific evidence regarding a wider temperature range for disease expression and the variety of pathological lesions observed should be taken into account in the case definitions applicable to EUS.

• To minimize the risk of releasing *A. invadans* from COF it is recommended to ensure and monitor that adequate biosecurity measures are in place.
Thank you:

• WG: Hans-H. Thulke, Fulvio Salati, Mo Salman, James M. Sharp, Nicholas Stinton and Birgit Oidtmann
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• The AHAW panel and AHAW unit EFSA
• DG SANCO colleagues