Marine Viral Haemorrhagic Septicaemia Virus (VHSV): Characterisation and Significance for Aquaculture

Introduction

Traditionally, viral haemorrhagic septicaemia (VHS) was considered to be a disease of rainbow trout which has caused extensive losses to freshwater culture operations across continental Europe.

An outbreak of VHS in farmed turbot in Scotland in 1994 prompted Fisheries Research Services (FRS) to initiate a VHS virus (VHSV) surveillance programme across the European marine environment. This resulted in the recovery of over 150 viruses from a wide range of wild marine fish species in the North Sea, Baltic Sea and eastern Atlantic (Fig. 1).

The widespread distribution of this virus in UK waters does not fit easily with the rationale governing current legislation, based on the maintenance of approved coastal zones that are free of VHSV.

Characterisation

Marine VHSV isolates differ from those associated with disease outbreaks in rainbow trout farms since experimental evidence suggests that they do not present a significant risk of disease in this species (Skall, 2004).

There is also no evidence that marine VHS is likely to cause disease in marine farmed species other than turbot. The current requirement to depopulate farms where the presence of marine VHSV is confirmed is perceived to be hindering investment in mariculture, while offering little additional protection to the rainbow trout industry. FRS continues to work towards an improved understanding of marine VHSV in order to provide the scientific evidence necessary to support appropriate legislative change.

Marine VHSV isolates have been grouped by genetic relatedness (Snow et al., 2004). The groupings correlate to broad geographic areas but are not host species specific.

Figure 1: The map shows the number of VHSV isolates made from each region (Atlantic, North Sea, Skagerrak, Kattegat and Baltic Sea). Three main groupings of genetically similar isolates were identified, and are based in two geographic regions ( ). (King et al., 2001; Mortensen et al., 1999)
Species tested for susceptibility to VHSV by bath challenge

<table>
<thead>
<tr>
<th>Genogroup of marine VHSV</th>
<th>Cod¹</th>
<th>Halibut¹</th>
<th>Turbot²</th>
<th>Atlantic salmon³</th>
<th>Rainbow trout⁴</th>
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</thead>
<tbody>
<tr>
<td>1. Marine isolates from Baltic Sea.</td>
<td>Not susceptible</td>
<td>Not susceptible</td>
<td>Susceptible</td>
<td>Not susceptible</td>
<td>Not susceptible</td>
</tr>
<tr>
<td>2. Additional virus group from the Baltic Sea.</td>
<td>Not susceptible</td>
<td>Not susceptible</td>
<td>Not susceptible</td>
<td>Not susceptible</td>
<td>Not susceptible</td>
</tr>
<tr>
<td>3. Marine isolates from east Atlantic, North Sea, Kattegat and Skagerrak.</td>
<td>Not susceptible</td>
<td>Not susceptible</td>
<td>Susceptible</td>
<td>Not susceptible</td>
<td>Not susceptible</td>
</tr>
</tbody>
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### Results of genetic analysis by FRS show:

- The outbreak of VHS in 1994 in turbot on the Island of Gigha was caused by a virus which is similar to many VHSV isolations from several species of wild marine fish from the north east Atlantic and North Sea. The virus in this outbreak could have originated from wild fish.

- VHSV isolates from rainbow trout are similar to VHSV from marine species in the Baltic Sea. This suggests that VHSV in rainbow trout emerged from fish in the Baltic Sea. One mechanism for this emergence could have been the previously widespread practice of feeding unpasteurised marine fish to rainbow trout.

### Significance for aquaculture

FRS has investigated the disease risk of representative isolates from each of the three genotypes in important mariculture species, including cod, halibut and turbot.

#### Research conducted by FRS has demonstrated that:

- Marine VHSV isolates are of low risk to rainbow trout and Atlantic salmon.

- Marine VHSV isolates appear to be of low risk to marine aquaculture species other than turbot.

### Current and future research

Research is on-going to develop tests which will distinguish between different subgroups of VHSV. This could allow changes to existing legislation regulating the control of marine and freshwater isolates of VHSV.

### References


