Gill Diseases in Salmon and Turbot in Spain

Juan L. Barja

Departamento de Microbiología y Parasitología
Fac. de Biología/CIBUS e Instituto de Acuicultura
Universidad de Santiago de Compostela
Coastline and River system of Galicia (NW, Spain)

North/NorthWest Atlantic Spain is the southern limit for the wild salmon populations in Europe
### Salmon Culture in Galicia (NW SPAIN)

<table>
<thead>
<tr>
<th>#</th>
<th>Year</th>
<th>Location</th>
<th>Specie</th>
<th>Company</th>
<th>Culture</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1976/1977</td>
<td>Ria de Arosa (A Pobra do Caramiñal)</td>
<td><em>S. salar</em></td>
<td></td>
<td>Net pens</td>
</tr>
<tr>
<td>2</td>
<td>1983/1985</td>
<td>Ría Ortigueira</td>
<td><em>O. kisuch</em></td>
<td><em>S. salar</em></td>
<td>Xanquei</td>
</tr>
<tr>
<td>3</td>
<td>1990/2000</td>
<td>Ferrol</td>
<td><em>S. salar</em></td>
<td>Norafish</td>
<td>Inland tanks</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Camariñas</td>
<td><em>S. salar</em></td>
<td>SAGAL</td>
<td>Inland tanks</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>Ría de Muros “A Creba”</td>
<td><em>S. salar</em></td>
<td>S. Roo</td>
<td>Net pens</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>Ría de Sada</td>
<td><em>S. salar</em></td>
<td>Isidro de la Cal</td>
<td>Net pens</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td>Estaca de Bares</td>
<td><em>S. salar</em></td>
<td>Isidro de la Cal</td>
<td>Net pens</td>
</tr>
<tr>
<td>8</td>
<td>2008/2010</td>
<td>Ría de Arousa, Riveira</td>
<td><em>S. salar</em></td>
<td>Northwest Food</td>
<td>Net pens</td>
</tr>
<tr>
<td>9</td>
<td>2011/2015</td>
<td>Ría de Muros, “San Francisco”</td>
<td><em>S. salar</em></td>
<td>Northwest Food</td>
<td>Net pens</td>
</tr>
</tbody>
</table>

**Fig. 2:** Historic summary of the salmon culture in Spain. Origin of *S. salar* smolts: Scotland or Ireland.
Locations of Salmon culture

Fig. 3: Sequential picture. No all sites occupied at the same time. A number of the rivers marked, still harbours will salmon
The main constraint to the culture of salmon: The fight for the space occupied by the mussel culture
Problems/Incidence

- Vibriosis
- Vibriosis/Tenacibaculosis
- Forunculosis/Tenacibaculosis
- Photobacteriosi (Formerly Pasteurellosis)
- AGD (Amoebic Gill Disease)
- Pancreas disease (PD)
- IPNV

- Early maturation in *O. kisuch*
- Pump clogging with algae (Inland culture)
- Oil spill (Aegean Sea tanker)

Vibriosis and Forunculosis occurred until the 80's before the starting of vaccination programs. PD and Pasteurellosis occurred only once. IPNV present occasionally with no mortalities associated. The stress derived from AGD treatments seems to be the origin to the Tenacibaculosis.
Example of Oceanographic stations established to monitor pollution and red tides. Red star = Salmon site.
Oceanographic parameters (M1)

High temperature and salinity--Plancton abundance (Chaetoceros, Skeletonema.....)--Gill discomfort--Mucus overproduction, give rise to AGD

Source: INTECMAR (Galicia Spain, 2009)
Inland Turbot farm
Atlantic Salmon in Northwest, Spain

In some cases, mixed infections of *T. maritimum* and *Aeromonas salmonicida*
Evolution of skin lesion diseased Atlantic salmon by *T. maritimum* in NW, Spain (2014-2015)

Example of process to Tenacibaculosis after freshwater treatment for AGD
Hydrogen peroxide ($\text{H}_2\text{O}_2$):

- Experiments in turbot demonstrated that 240 ppm/30 min of $\text{H}_2\text{O}_2$ is necessary to kill $T. \text{maritimum}$ when it is colonizing the skin mucus of flat fishes.

- However this high concentration increase dangerously the level of stress of fish.
**Prophylactic treatments**
*(AGD, *Philasterides*, *Tenacibaculum*)

* Freshwater baths:
  Preliminary experiments indicated that a decrease of salinity until 5ppt during at least 24h can be an useful strategy to reduce their prevalence in farmed flat fish.

* Formaldehyde: Treatment in turbot.
  Baths: 250 ppm during 1 hour
Go raibh maith agat.
Slán