Yersiniosis in Farmed Atlantic cod (Gadus morhua) in a Marine Nursery in Atlantic Canada.

N. Y. O’Brien¹, D. Groman²*, J. Giles² and D. S. Whelan¹

1 Newfoundland and Labrador Department of Fisheries and Aquaculture, Aquatic Animal Health Division, St. John’s, NFLD A1B4J6 Canada.

3 Aquatic Diagnostic Services, Atlantic Veterinary College, University of Prince Edward Island, Charlottetown, PEI C1A4P3 Canada.
Clinical History

- Fish transferred to nursery in November 2009
- Increased mortality noted in early December
- Clinical signs included fish spiraling (likely due to granulomatous otitis)
- Diagnostic testing confirmed *Yersinia ruckeri*, in fish and incoming water samples
- Fish treated with in-feed antibiotic
- Non-responsive to therapy, and culled
- Nursery located in salmon rearing area

Diagnostics Testing

- Samples submitted for virus isolation, RT-PCR for Betanodavirus, bacteriology & histology
- Six submission recorded between Dec - 2009 and Feb – 2010
- All submission negative for Betanodavirus, final four positive for *Yersinia ruckeri* Type-I
- Early histology confirmed low-grade septicemia, later samples show systemic granulomatous bacterial vasculitis
### Bacterial Identification of *Yersinia ruckeri*

isolates from Atlantic Cod

<table>
<thead>
<tr>
<th>Sampling date</th>
<th>Gram CO</th>
<th>37 C</th>
<th>TSI</th>
<th>ADH</th>
<th>LDC</th>
<th>ODC</th>
<th>SIM 22 C</th>
<th>Sugar Rx</th>
<th>ARA/RH/XYL</th>
<th>Agglutination</th>
<th>API 20 E Biocode (37 C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dec. 16/09</td>
<td>Neg bacilli</td>
<td>- +</td>
<td>K/ A</td>
<td>- +</td>
<td>-/-/+</td>
<td>-/-/+</td>
<td>+ YR Type-I</td>
<td>- YR Type-II</td>
<td>4104100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jan. 5/10</td>
<td>Neg bacilli</td>
<td>- +</td>
<td>K/ A</td>
<td>- +</td>
<td>-/-/+</td>
<td>-/-/+</td>
<td>+ YR Type-I</td>
<td>- YR Type-II</td>
<td>4104100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feb. 15/10</td>
<td>Neg bacilli</td>
<td>- +</td>
<td>K/ A</td>
<td>- +</td>
<td>-/-/+</td>
<td>-/-/+</td>
<td>+ YR Type-I</td>
<td>- YR Type-II</td>
<td>4104100</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The isolate was found to be sensitive by the Kirby Bauer Method to the following aquaculture antibiotics:

- Enrofloxacin
- Aquaflor
- Trimeth/sulfa
- Oxytetracycline

Isolates were further confirmed using MALDI-TOF Mass Spectrometry against *Yersinia ruckeri* controls.
Histopathology Summary

- Initially septicemia with mononuclear phagocytosis localizing in Choroid Rete of eye and gas bladder
- Progressing systemic mononuclear and bacterial vasculitis, otitis and pericarditis
- Terminal lesions with granulomatous bacterial inflammation of nearly all organ systems
- NB: The cell mediated response from the Cod immune system encases bacterial colonies reducing efficacy of antibiotic therapy
**Icelandic Outbreaks**

- In 2005 and 2006 outbreak occurred in marine Atlantic Cod farm in Stadur Iceland
- Reported by Bjarnheidur Gudmundsdottir in 2006 at the ISAAH meeting
- *Yersinia ruckeri* Type-I confirmed as agent, clinical signs targeting eye, all organs affected
- Epidemiology confirmed this isolate identical to that targeting several marine species and Arctic char in facility nearby
Take Home Messages

- Avoid rearing Atlantic cod in association with Salmonid fish farming facilities
- Cod immune response may produce prolonged debilitating granulomatous infection
- Antibiotic therapy may be ineffective due to this immune response
- Yersinia ruckeri Type-I can be significant pathogen of many marine fin-fish: Cod, Eel, Halibut, Turbot as well as all salmonids