Economic impact of parasitic diseases in Rainbow Trout

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Working for the Danish fish farmers organization since year 2000

- Fish health plans
- Disease eradication
- Medicine availability
- Legislation
- Vaccination
- Fish welfare

FEAP Fish Health Commission
## Main species in Denmark

<table>
<thead>
<tr>
<th>Species</th>
<th>2017 Tonnes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trout</td>
<td>43000</td>
</tr>
<tr>
<td>Blue mussel</td>
<td>3000</td>
</tr>
<tr>
<td>Eel</td>
<td>500</td>
</tr>
<tr>
<td>Pike Perch</td>
<td>250</td>
</tr>
<tr>
<td>Salmon</td>
<td>800</td>
</tr>
<tr>
<td>Sturgeon</td>
<td>2</td>
</tr>
</tbody>
</table>
Parasites in European trout farming

Main problem

A lot of pathogenic parasites

No or only few medicines available

Economical impact is high but often difficult to estimate
Trout parasites

An Introduction to Parasitic Diseases of Freshwater Trout
K. Buchmann & J. Bresciani
Drawings by B. Beyerholm

www.parafishcontrol.eu

Lepeophtheirus salmonis
Trout parasites
Some very important

- PKD, Proliferative kidney disease
  - *Tetracapsula bryosalmonae*

- White spot disease
  - *Ichthyophthirius multifilis*

- Costiasis
  - *Ichthyobodo necator*

- Whirling disease
  - *Myxobolus cerebralis*

- Sea lice
  - *Lepeophtheirus salmonis*

- Gill Amoebae, freshwater

- Anisakidosis
  - *Anisakis spp*
Fighting external parasites in trout production today

Mainly biocides (few medicines)

Water treatment
- Formaldehyde
- Peracetic acid
- Hydrogen peroxide
- Chloromine T
- Copper sulphate
Often no wonder drug exist!!!

Medicine VMP Regulation
Biocide Regulation
Water Frame Directive

Growing focus of ERA

Environmental Risk Assessment
Economic impact

In general only very few information's

Often made by one parasite in one country

Example:

Current research on PKD in the Aquatic Vaccine Unit at Stirling

Proliferative kidney disease (PKD), caused by *Tetracapsuloides bryosalmonae* continues to be a major constraint on the rainbow trout industry in Western Europe and North America. The disease has been estimated to cost the UK trout industry approximately £2.5 million per year and is one of the main research topics in the Aquatic Vaccine Unit. Both short and long-term approaches are being taken to tackle this disease, including the testing of novel treatments, elucidation of the life cycle development of a vaccine to prevent PKD, and selective breeding of PKD-tolerant fish.

Infectivity trials demonstrated that a single *T. bryosalmonae* spore released from a bryozoan (intermediate host) can infect a rainbow trout resulting in it developing clinical PKD. While previous studies have indicated that rainbow trout in the UK are likely to be among hosts to the parasite, we have recently demonstrated that brown trout are true hosts, with the parasite being able to cycle between bryozoans and this fish species. Increased knowledge of the life cycle of *T. bryosalmonae* and the ability to keep the parasite in the laboratory is a significant step forward in allowing us to understand PKD. Current work at Stirling, funded by the BBSRC, Dr Morris, Prof. Adams, is focused on charting the development of *T. bryosalmonae* in both the bryozoan and salmonid hosts and how these factors affect spore production/release. In a related project jointly funded by DEFRA/Scottish Aquaculture (Dr. McGorrick, Dr. Morris, Prof. Adams) recombinant vaccine is being developed to protect fish against this important disease. Another approach is being taken in a third project funded by DEFRA and the British Trout Association to investigate the possibility of breeding PKD resistant fish (Gareth Battenfield/PhD student; Prof. Brendan McAndrew/Dr. Morris/Prof. Adams).

Rainbow trout are collateral casualties in the life cycle of *Tetracapsuloides bryosalmonae*

David J. Morris - Aquatic Vaccine Unit

America. The disease has been estimated to cost the UK trout industry approximately £2.5 million per year and is one of the main
Importance of the parasites

Depends on

➢ The water source
➢ The temperature
➢ Intermediate host
➢ Number of fish / fish farms
➢ Management (e.g. all in - all out)

➢ THE PRODUCTION SYSTEM
Importance can change
Example DK
Importance can change
Example DK

From FT to recirculation
• Change of water source
• Reuse of water
• Temperature
• Fish density

Result:
No/fewer PKD but problems with Ich (white spot), costia and fresh water gill amoebae
Changing the conditions for parasites
Economic impact
Where are the money lost/used?

➢ Mortality
➢ Higher feed conversion rate
➢ Less feeding
➢ Changing the farm specific production cycles
➢ Impact on immune system – other diseases
➢ Extra work on farms, surveillance
➢ Expenses to medicine / biocides
➢ Expenses to fish health people (e.g. vets)
➢ Lack of farm authorization
➢ Freezing of end product (anisakis)
Economic impact
Do we have exact figures?

No because the effect can vary from

➢ parasite to parasite
➢ farm to farm
➢ year to year
➢ country to country

Two situations
1. Clinically outbreaks with high mortality
2. A constant parasite pressure not leading to high mortality but extra money lost/spend
   • Reduced growth
   • Biocide/medicine use
   • etc
An important factor for economic impact

The lack of medicines for parasite treatment!

Except a few licensed VMP for sea lice there is none authorized to trout!!!

Main aquaculture species in EU countries
Average volume in tonnes live weight 2008-2014

+ 90,000 tons trout in Norway
In Denmark we produce 40,000 tonnes of trout

Our best guess is an annually loss of approximately 3 - 6 million € caused by parasites in farmed trout in DK (no sealice problem!!)

Europe (300,000 tonnes)

Best guess: at least 25 – 50 million € annually!!
Thank You

ParaFishControl

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