

Eel disease problems in cultured and wild eels since 25 years



Olga L.M. Haenen, Ineke Roozenburg, Michal Voorbergen, Steven van Beurden and Marc Engelsma

Fish & Shellfish Diseases Laboratory CVI Lelystad, NL





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- Wild eel versus farmed eel
- Parasites
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INTRODUCTION

Ref. Cairns & Casselman, 2003




- **WELCOME** to the workshop
- Decline of freshwater eel stocks worldwide
- Factors: fisheries, birds, migration barriers, pollution
- Factor disease is under focused
- This workshop: get an overview of eel diseases worldwide
- Summary Report of the workshop due for in the EAFP Bulletin



WILD EELversus..... FARMED EEL




- Open water Indoor Recirculation (or ponds)
- Start with glass eels →..... Start with glass eels
- Seasonal temps At constant temp 25°C
- Wild feed Pelleted feed/fish eggs
- Low densities High densities
- Natural water quality Water quality critical



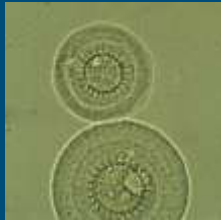

Diagnosis The Netherlands at our lab: PARASITES




- Main parasites are mentioned
- Most parasites are non lethal
- Wild eel mostly has some parasites without problems




Parasites: protozoans at skin and gills

Ichthyophthirius multifiliis



Giemsa stained



Parasites: protozoans at skin and gills



Ichtyobodo spp. at gills

Chilodonella spp.

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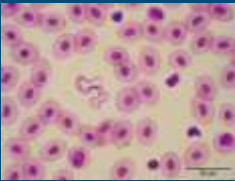
***Myxidium giardi* in wild eels, Lake IJsselmeer, NL, 2005**

- mortality
- in lateral line



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Blood parasites: *Trypanosoma* spp.




- High prevalence in silver eels in lower River Rhine (Haenen et al., 2010)
- Very high numbers in 80ies → wild eel mortality

Trypanosoma sp.

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Gill worms: Monogenic trematodes



Gyrodactylus spp.

(Pseudo)dactylogyrus spp. at gills

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***Anguillicoloides crassus* in the swimbladder: SE-Asia → NL since start 80ies, spread over the world**



↑ Non infected Infected

Van Banning et al., 1990

Acute: severe fibrosis



Since acute phase, now mild phase

← female & male


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BACTERIA: often secondary

- Many *Vibrio*-species (*V. vulnificus* is zoonotic)
- *Aeromonas sobria*, *A. hydrophila*, a.o.
- *Pseudomonas anguilliseptica* in glass eels
- *Edwardsiella tarda* (zoonotic) in yellow eel
- Myxobacteria (*Flavobacterium* a.o.)
- Mortality may be high, depending on other factors (water pollution, water temp, a.o.)

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Vibriosis: in brackish and marine waters



Vibrio species

V. vulnificus (zoonotic)

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***Aeromonas* infections**

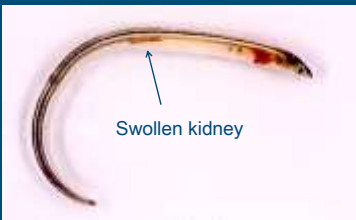


Aeromonas sobria infection in wild silver eel in NL

Aeromonas hydrophila infection in yellow eel in NL

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Red spot disease: *Pseudomonas anguilliseptica*
in glass eels from N-Portugal/SW France



Swollen kidney

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Edwardsiella tarda
(potentially zoonotic)



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Myxobacteria: *Flavobacterium* spp.:
skin infection



Myxobacteria in skin smear from fish

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EEL VIRUSES: the 3 most important in Europe
(disease dependent on stress)

- **EVE** = Eel Virus European (biRNA virus, IPNV, type Ab/VR299): not yet found in wild eels, but found at farms: mortality <50%
- **EVE**: Egusa (1970): pond cultured Japanese eels: branchionephritis, mortality 50%.
- **EVEX** = Eel Virus European X (rhabdovirus); now and then found in wild and farmed eel: mortality <20% in farmed eel
- **EVEX**: Sano et al. (1976, 1977); EVA: diseased European eelers from Cuba, EVEX: European eels imported from France
- **AngHV-1 = HVA** = Herpesvirus Anguillae; often found in wild and farmed eel: mortality <50%
- **HVA**: Békési, et al. (1986): herpes-like particles in skin lesions of European eel; Sano et al. 1990, diseased European and Japanese eels.

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EEL & ISAV?

- Experiments in 90ies, with elvers and young salmon at *VESO Vikan* Large Scale facilities, Namsos, Norway (with *VESO Vikan*, CEFAS, Marine Lab)
- Eels were not susceptible to ISAV
- Eels could not transmit ISAV to salmon
- Important finding, as eels are migrating long distances.. To be published



EVE: only at farms, not yet in wild eels: haemorrhages, oedema, anemia, mortality



Optimum temp. for EVE: 15-20°C



AngHV-1 = Herpes Virus Anguillae (HVA)

since 1998 in W-Europe (1st found in Netherlands)
44% of silver eels found positive in lower River Rhine



Optimum temp for AngHV-1: 26°C



Double: HVA & *Vibrio vulnificus* in farmed eel



Double: EVEX and *Pseudomonas anguilliseptica* in glass eels

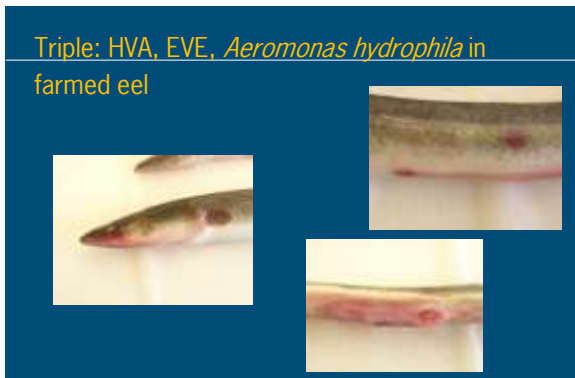


Swollen kidney



Double: HVA & EVEX in farmed eel





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Conclusions

- Pathogens like AngHV-1 and *A. crassus* have spread worldwide via transport of wild eel (glass eels a.o.)
- Many eel pathogens and diseases are known: often double or triple infections; mostly more severe in farmed eel → Farmed eel can be a risk for wild eel, when restocked in the wild
- Hypothesis: *A. crassus*, *Trypanosoma* and HVA could cause disease in migrating silver eel → Disease should be taken as a serious factor in the decline of the eel
- This workshop to highlight the situation, with a summary report to inform the world

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