

Potential Emerging Disease Outbreak in Swedish Rainbow Trout Farm

Anders Hellström
 Dept of Animal Health and Antimicrobial Strategies/Division of Fish
 Senior Veterinary Officer

NATIONAL VETERINARY INSTITUTE
 phone. +4618674000 mobil. +46705332331
 e-mail. anders.hellstrom@sva.se
 post. S - 751 89 Uppsala/ Sweden

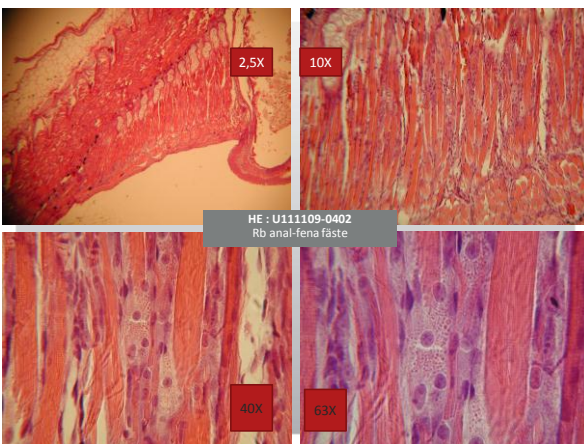


First signs in 2011, smolt farm on fry from imported fertilized, triploid eggs with US origin. Increased mortality. Samples was sent to the NRL



Rainbow trout :
 Length: 2.4-2.5 cm

Age approximately
 1 month post hatching



Farmed and wild populations were sampled

Transmission tests were conducted

Movement restrictions were put in place

Imported triploid fish were stamped out in beginning of 2012. Swedish rainbow trout -12 were stamped out in 2012 as well

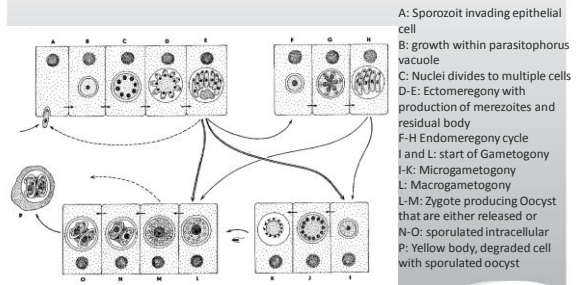
The most of the site has been disinfected



Movement restrictions from Stadsforsen hydropower plant to the coast line.
 Samples have been collected at a fish farm down stream.
 Further investigation will be conducted in wild populations in the same water catchment area, as well as in other water systems.



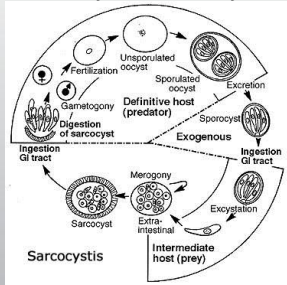
Apicomplexa, livscykel



A: Sporozoit invading epithelial cell
 B: growth within parasitophorus vacuole
 C: Nuclei divides to multiple cells
 D-E: Ectomeregony with production of merezoites and residual body
 F-H Endomeregony cycle
 I and L: start of Gametogony
 I-K: Microgametogony
 L: Macrogametogony
 L-M: Zygote producing Oocyst that are either released or
 N-O: sporulated intracellular
 P: Yellow body, degraded cell with sporulated oocyst



Generell livscykel Sarcocystis



Apicomplexa

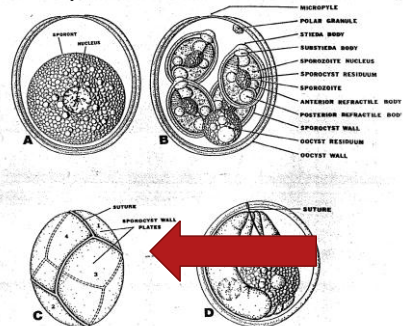
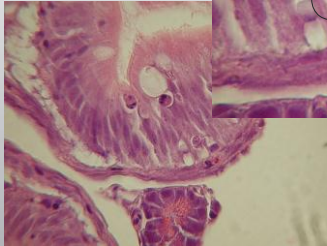


FIGURE 3. Diagrammatic representation of oocysts and sporocysts of several coccidian genera. (A) Unsporulated oocyst of *Eimeria* sp. (B) Sporulated oocyst of *Eimeria* sp. containing four sporocysts, each with two sporozoites. (C) Sporocyst of *Sarcocystis* sp. showing arrangement of wall plates and sutures. The sporocyst wall encloses four sporozoites (endospores from Reference 30). (D) Oocyst of *Cryptosporidium parvum* showing the suture that, when dissolved, opens up to release sporozoites.



Sporocyst from
Rb 10

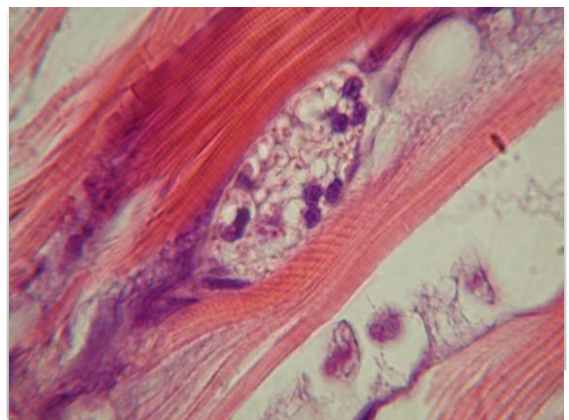
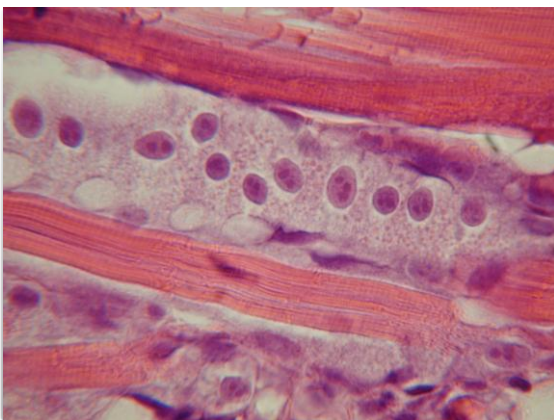


SVA

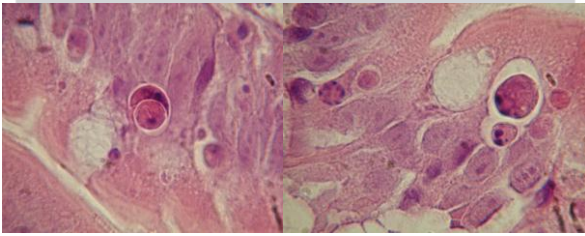
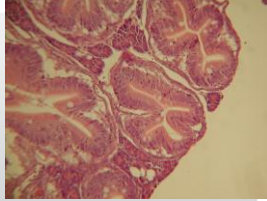
Life cycle for sarcocystidae in herbivores

- 1 a: Ingestion of oocyst/sporocyst
- 1b: excystation of sporozoites in intestine
- 1c: migration to arterial vessels where sporozoites develop into meronts
- 1d: merozoites liberated from meronts initiates 2:nd generation meronts in capillaries throughout the whole body
- 2a: merozoites escaping from the sec. generation meronts enter mononucleated blood cells
- 2b: merozoites undergoes endodyogeny (asexual reproduction) in the cytoplasm of the blood cells
- 2c: merozoites enter heart, skeletal muscle and neural tissue
- 3a: merozoites develop into immature noninfective sarcocyst containing merozoites
- 3b: merozoites produces bradyzoites that are infective for the predator animal
- 3c: Sarcocyst takes several months to develop. In some species these cysts remain microscopic

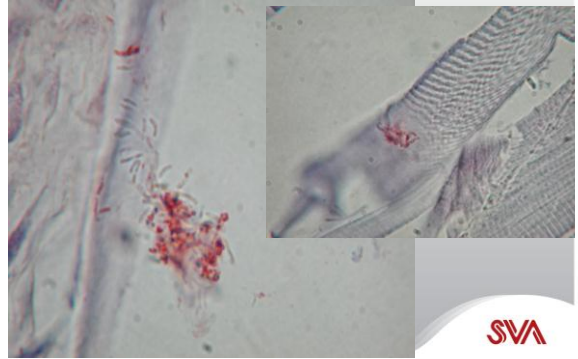
SVA



Histology gut,
Rb, hatched 2012



Immunohistology Rb muscle



SVA

Performed Diagnostics

- Several virology tests have been performed on cell cultures with negative results
- Cultivation on different agar substrates have shown several bacterial and fungal secondary infections as e.g. *Flavobacterium psychrophilum* and *Saprolegnia* spp.
- Histological investigations show infiltration of small intracellular organisms of protozoan type in several organs. Histology indicates that several of these cells are apicomplexan cells of a coccidian type. Also severe changes in muscle tissue including necrotic areas.
- Cytology; protozoan cells have been seen in blood and kidney smears. Investigation shows that the cells are free as well as intracellular in blood cells.
- PCR negative for Microsporidiosis and specifically for *Nucleospora*
- Parallel investigations have been conducted by NRL in Denmark on fixed fish sampled from the farm. These investigations, histology and PCR supports several of the Swedish observations
- Further investigations are ongoing mainly with PCR technique

SVA

Conclusions

The typical symptoms have never before been recorded in Swedish fish.

The parasite has, so far, only been detected in one fish farm.

Origin of the infection either introduced with the imported eggs or it was present in the area before detected.

SVA

Thank you for listening!

