Sterling White Halibut AS

Larval Husbandry: Industry Applications and Challenges

Børre Erstad




- Biologically monitoring - crucial in a hatchery!
  - Live feed production
  - Larvae production
- Monitoring = control in production!
  - Finding biological errors in the production
  - Correction (Action!)
  - Protocol improvement

Livefeed production– *Artemia*- clean, stuffed and cold

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Bacterial decontamination of on-grown *Artemia*

Anthony Tolomei[a,*], Chris Burke[a], Bradley Crear[b,c], Jeremy Carson[d]

[a] *School of Aquaculture, Tasmanian Aquaculture and Fisheries Institute, University of Tasmania, Locked Bag 1-1370, Launceston, Tasmania 7250, Australia*
[b] *Marine Research Laboratories, Tasmanian Aquaculture and Fisheries Institute, University of Tasmania, GPO Box 192B, Hobart, Tasmania 7001, Australia*
[c] *Geraldton Fisherman's Co-operative, Ocean Street Geraldton, Western Australia 6530, Australia*
[d] *Fish Health Unit, Tasmanian Aquaculture and Fisheries Institute, University of Tasmania, P.O. Box 46, Kings Meadows, Launceston, Tasmania 7249, Australia*

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- Cleaning of newly enriched Artemia is essencial in relativ to microflora
- Dirty Artemia gives trouble in startfeeding!
- Cleaning on the outside and the inside
  - flushing
  - Chemicals
    - (Pyceze,formalin, INVE products etc)
  - Fresh water
  - Boosting of *Artemia*
- Cold storage!

- Microscopy of whole and crushed *Artemia*
  - *Bacteria growth- rodshaped bacteria?*
  - *agressive*

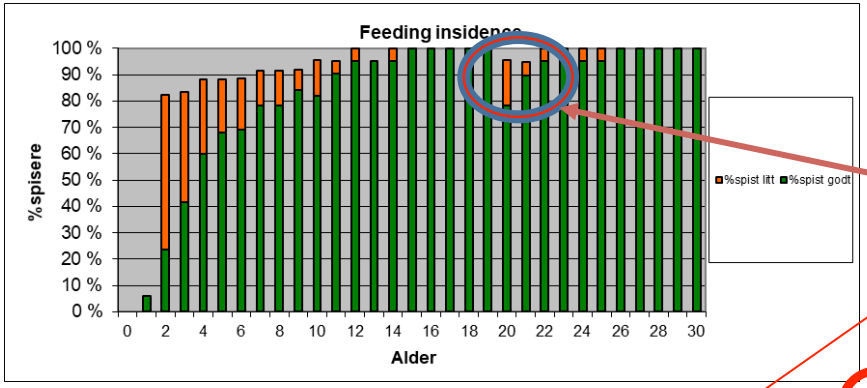
- Plating if necessery
- Feedback/ communication between starfeeding and livefeed departments

Larva biology/startfeeding

- Monitoring and controlling- on a every day basis is important to find the production errors you may have

- Sampling of larvae on a specific time after feeding
  - Feed uptake (prey count in gut)
  - Register the degree of digestion
  - Feeding incidence; Full/half full/empty gut?
  - Bacteriology (inside the gut? outside? Rod/round shaped?)
  - Organ development
  - Length development
  - Larva behavior-
  - Take pictures and save them for later comparison
  - «what does the fish tell you?»

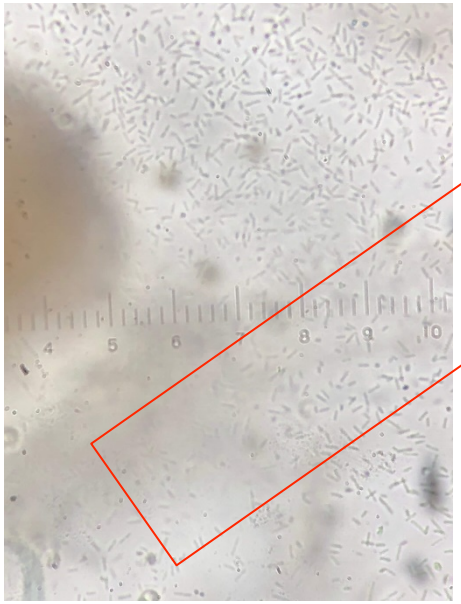
– Prey residual values in water column

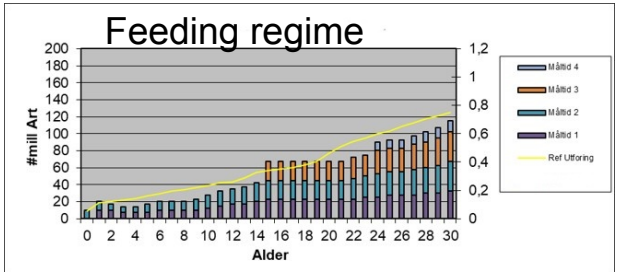


The feeding incident is dropping From 100% to 80%!

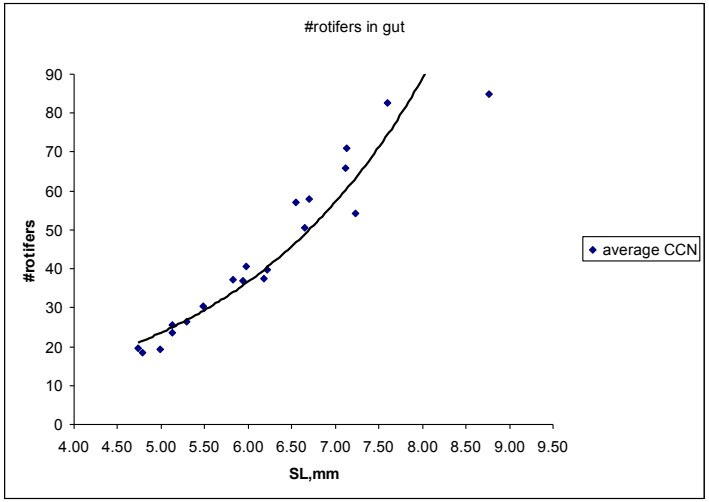
- Whats the prey residual level in tank?
- Prey content in gut. As normal?
- Bacterial load? Outside/inside of larvae?
- Larvae behavior? Down/high i water column?
- Level of clay in water

ACTION!!

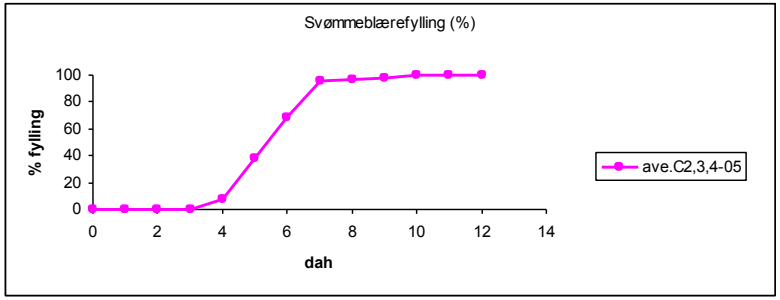




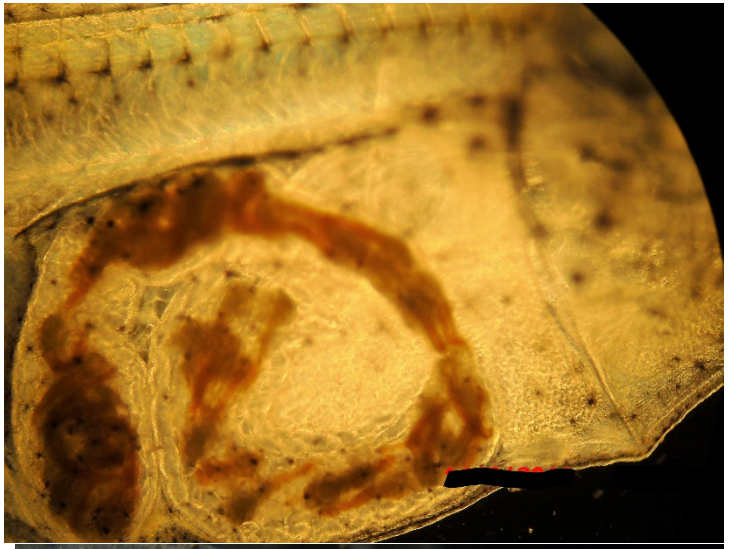
- Expected feedintake, cod
  - Predictibel
  - Deviation from curve is a good indication that someting is going wrong in the production!
- Same trend on *Artemia* intake on halibut



- Swimbladder filling on cod larvae

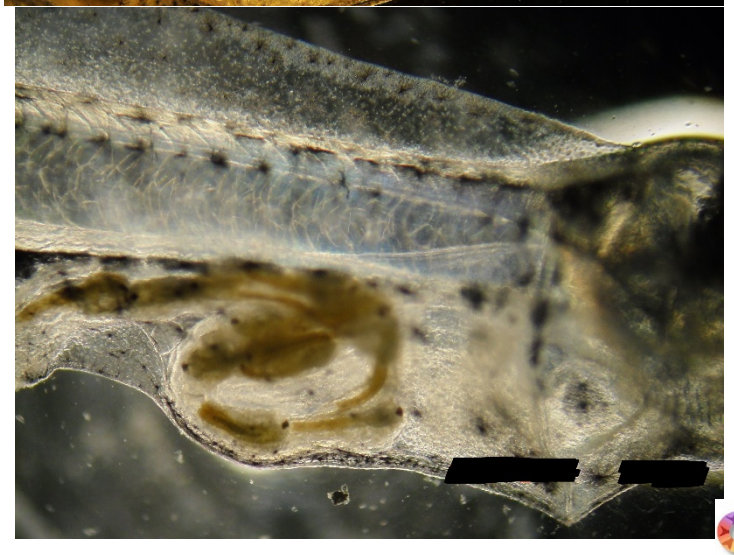


Healthy larva, good digestion,
Liver, gut, etc looks fine



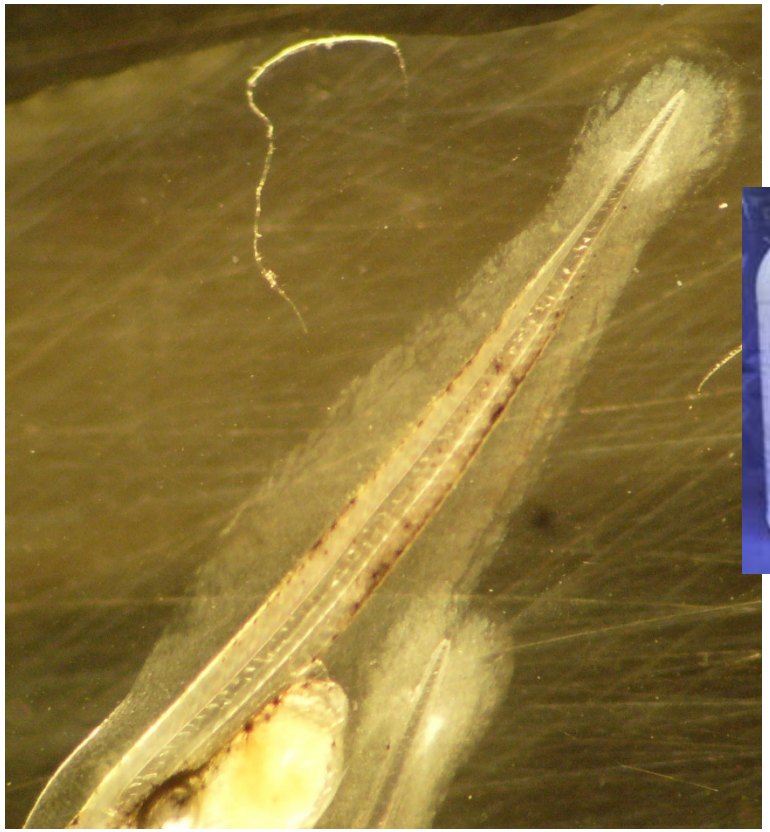
«skinny» dying larvae.

Feeding regime error!

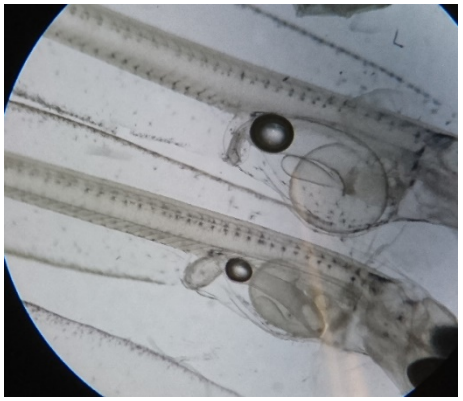


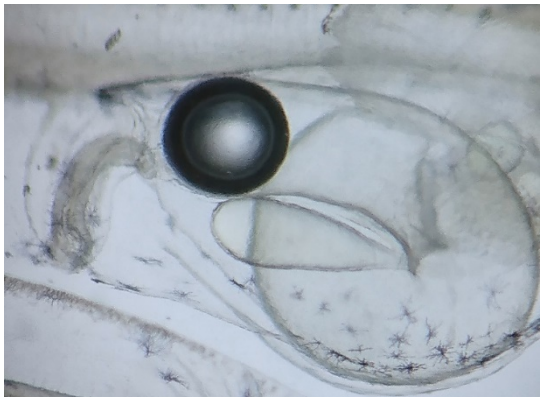
Bacterialayer on larva

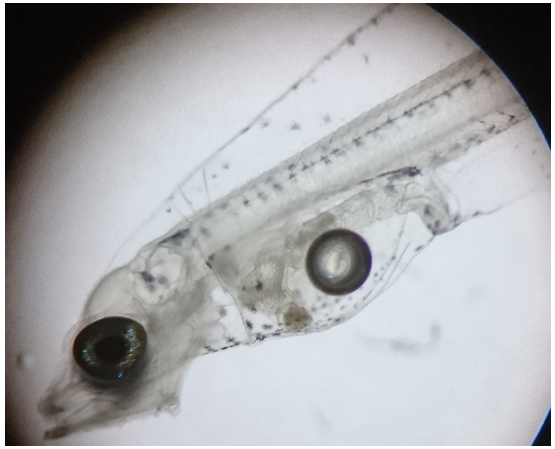
Nice and clean! ☺



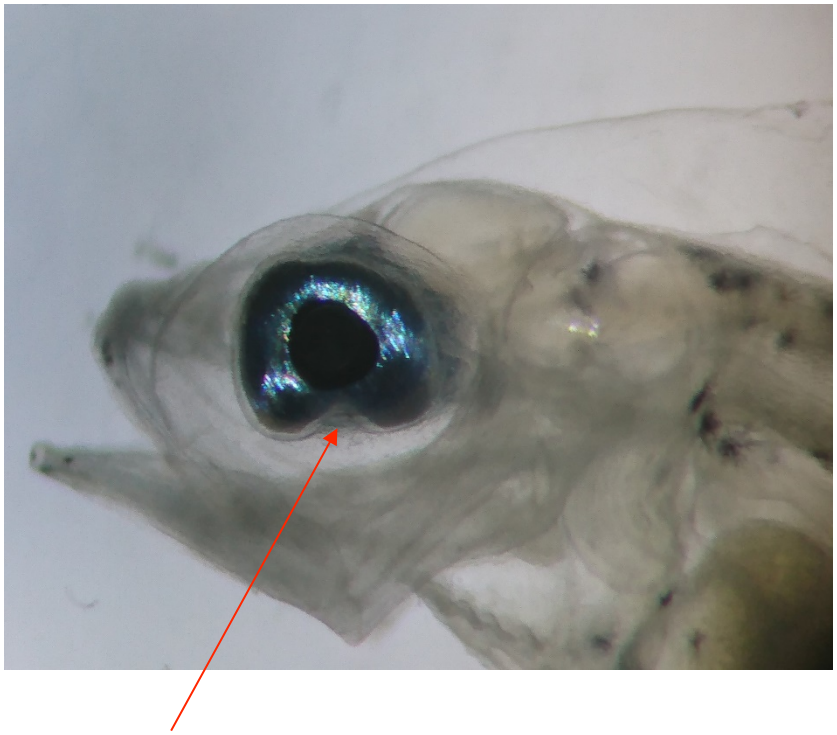
Air bubles in gut (yes, you can buble your larvae to death!)





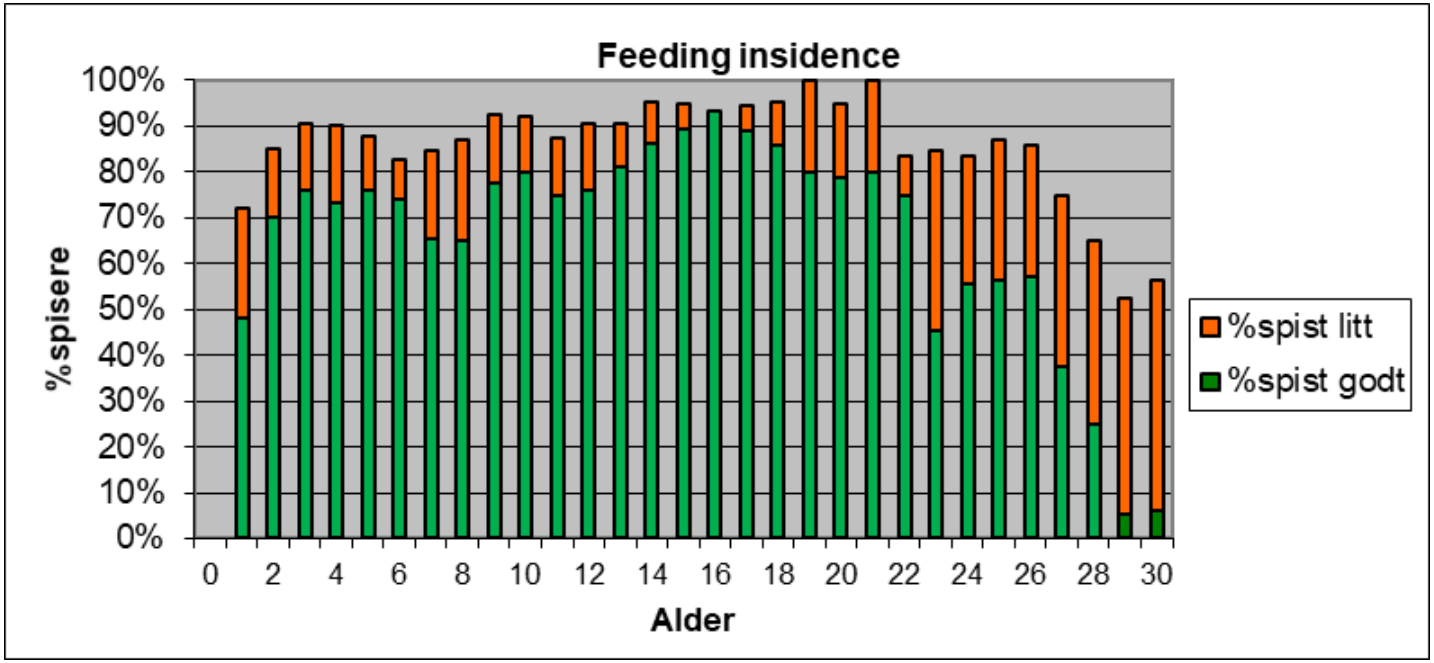


Eye health



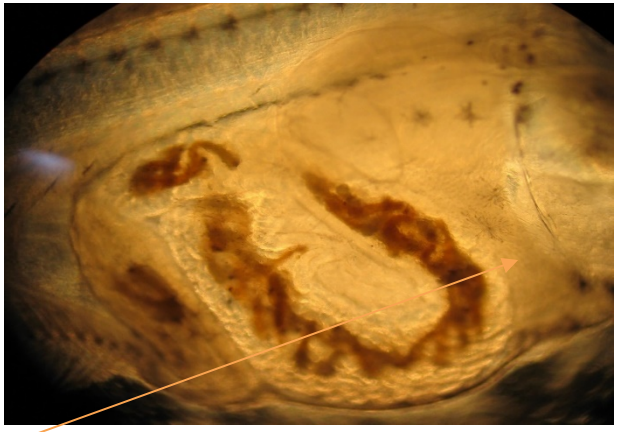
Ventral optic fissure have not grown properly together;
Which means that the larva will not have vision up towards the water surface

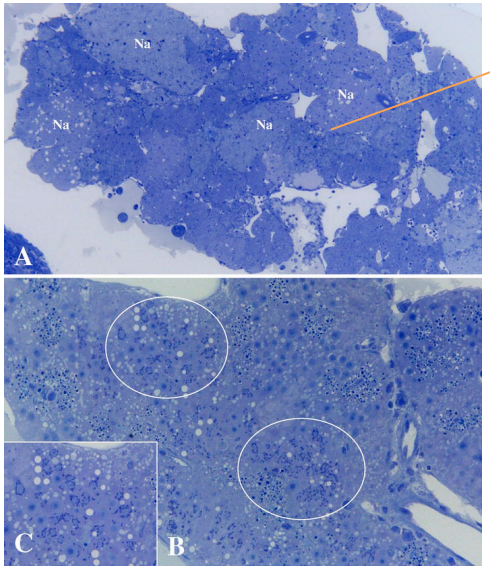
Impossible startfeeding!



You might have a virus problem!

Liver necrosis



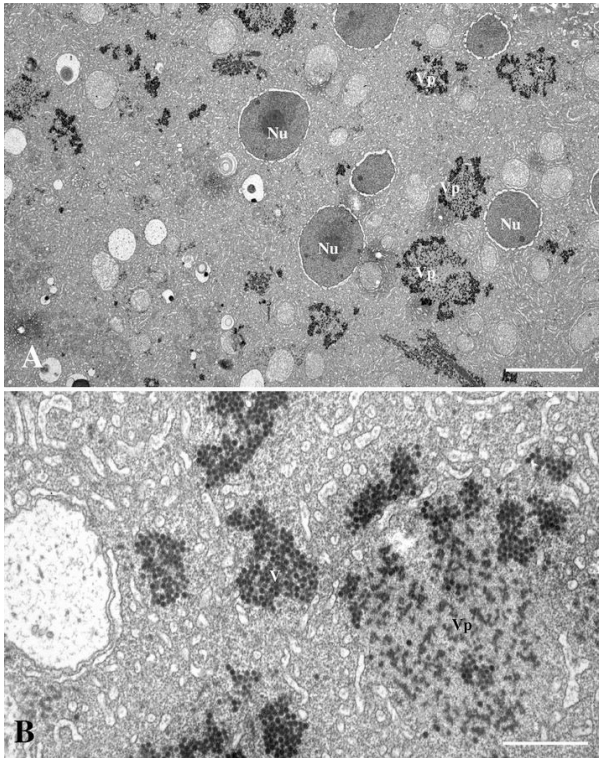


A. Multifocal necrosis (Na) in the liver of Atlantic halibut fry. **B**. Areas in pancreas tissue with formation of syncytia containing viroplasm (circles). **C**. Large subcellular inclusion, viroplasm (arrows), present in the pancreatic tissues

Blindheim et al., 2014

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4284399/

Atlantic Halibut Reo Virus (AHRV)



A. Viroplasm (Vp) within a syncytial area in the liver. Cell nucleus (Nu). Bar = 5.0 µm. **B.** The viroplasm (Vp)
consists of amorphic material with variable electron density and contains virions (V). Bar = 1.0 µm

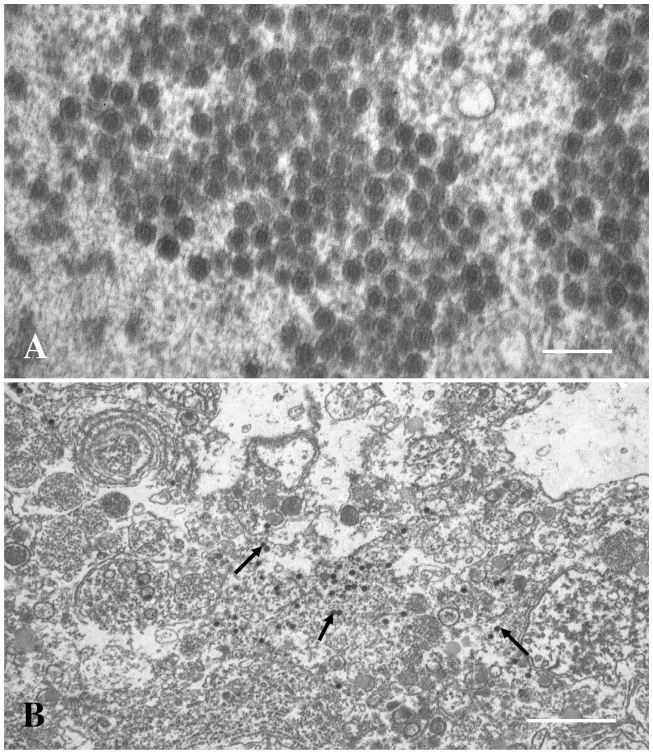


Fig. 4 A. Mature virions of approximately 70 nm in diameter. Some of the virions show a hexagonal shape (icosahedral particles).
Bar = 200 nm. B. Section from a necrotic part of the liver showing cell debris and virions (arrows). Bar = 1.0 lm

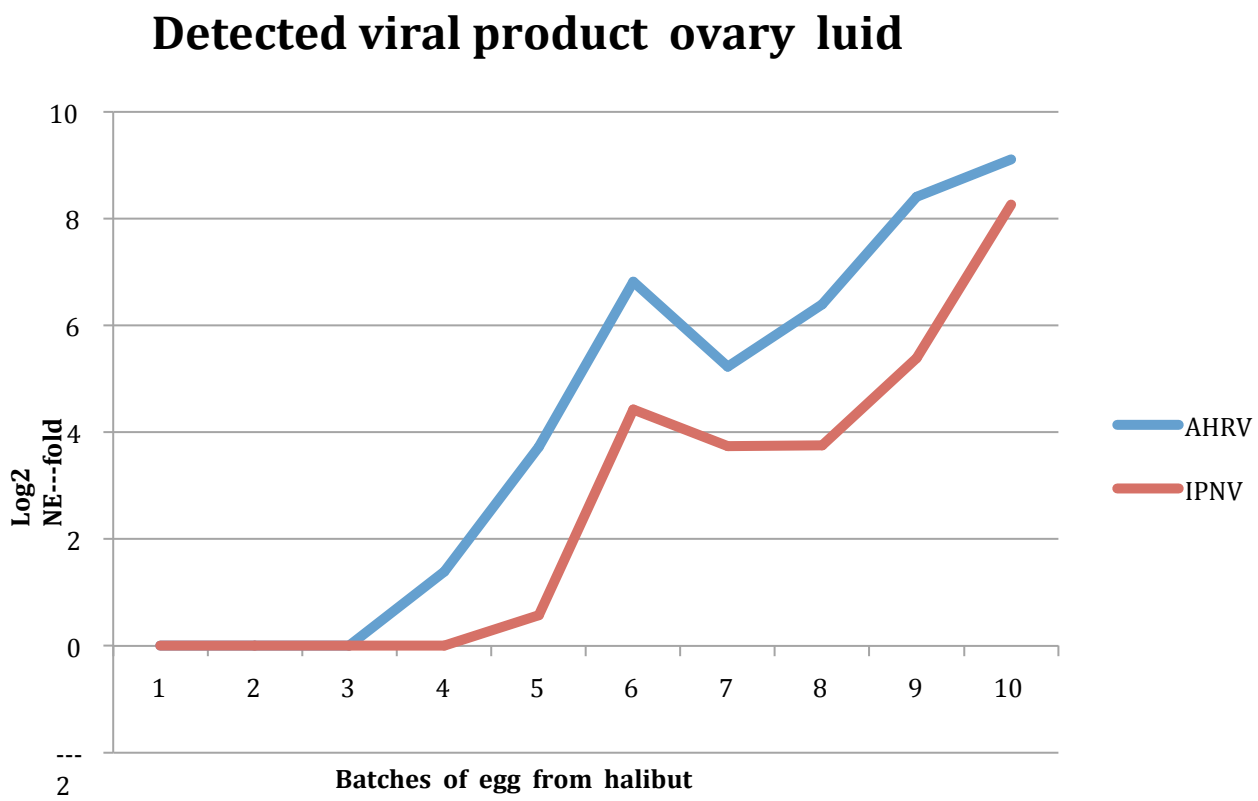
Blindheim et al., 2014

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4284399/

- Challenging with virus
- Marine fish species in aquaculture has at least 3 common virus types
  - IPNV
  - Reovirus
  - VNNV (NODA)

– Broodstock is the source

– Screening of eggs, larvae and broodstock is essential



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Hatchery Health

- Never mix different generation in startfeeding! (even though it tempting!)
- Biology flow must go in one direction
- Sluice between the different production areas
- Limitied acess to production facilities
- Different production facilities: different equipment and clothes
- Disassembly, washing, desinfection and dry out between all cycles

Summary:

- Monitor your animals! And you vil pick up anomalties in your production
- Love, passion and caring
- Screen your broodstock for potensial pathogens

Thank you for your attention!