Longitudinal study of AGD on three Atlantic salmon farms in Norway

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Background and aims

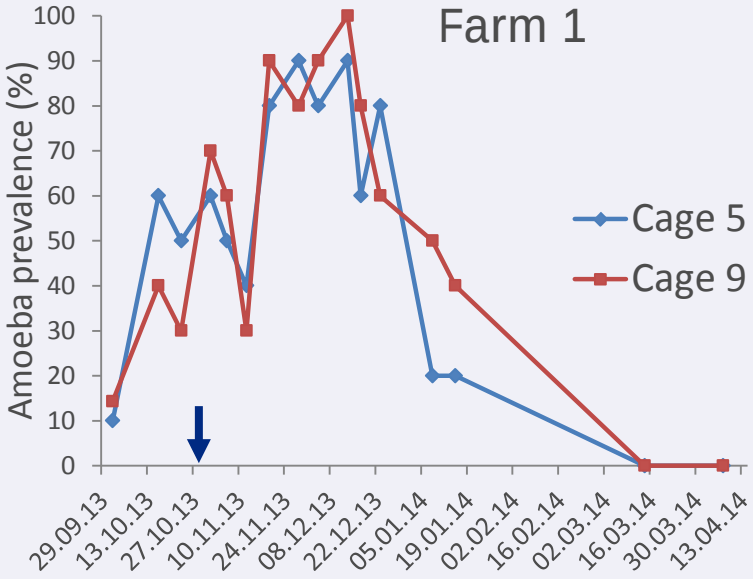
- Amoebic gill disease is an emerging disease in Norwegian aquaculture
- In 2012, a few AGD outbreaks were reported south west in Norway
- Norwegian farm owners were concerned about the northwards expansion of AGD, and feared numerous outbreaks in Norwegian fish farms in 2013
- Knowledge about AGD development under Norwegian environmental conditions was asked for

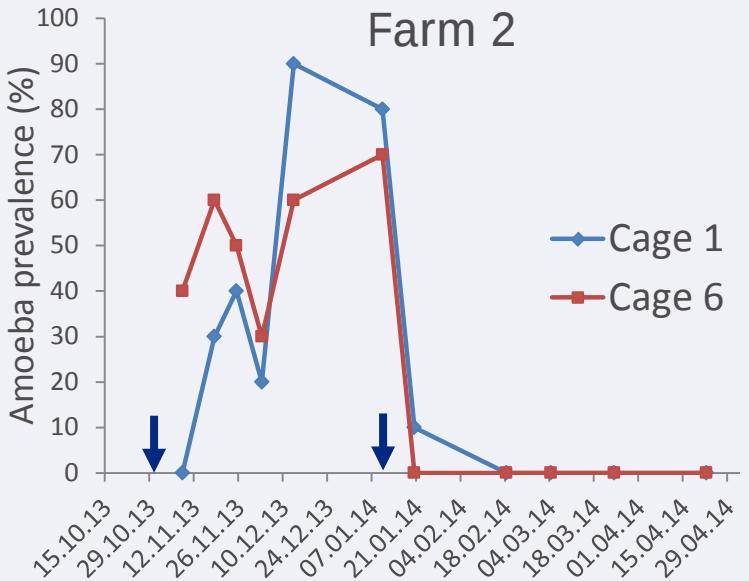
- Aims
  - Study *Paramoeba perurans* infections in Atlantic salmon farms in Norway
  - Study development of AGD under Norwegian environmental conditions

The study

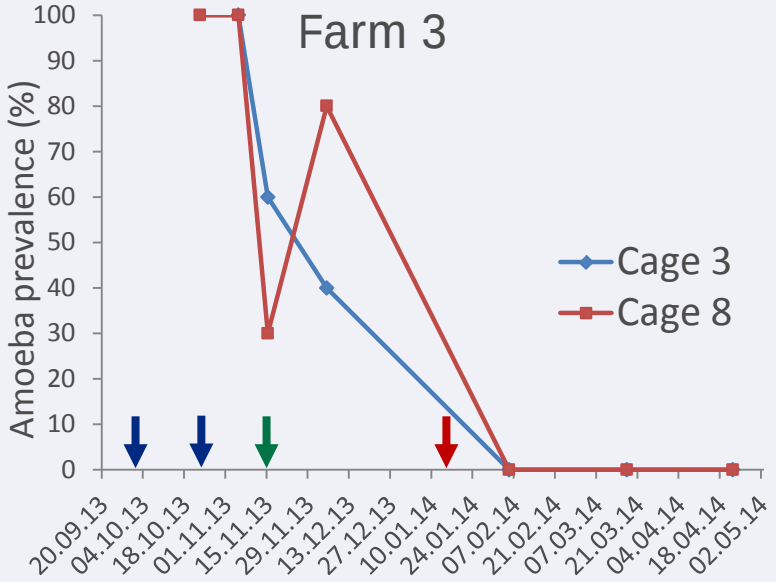
- Project period from late September 2013 - late April 2014
- Three farms located in south-west of Norway
- Sampling every second week, 10 fish from two cages at all three farms
  - Gill score, fish length and weight
  - Gill samples for real-time PCR and histology
  - Internal organ samples for histology
  - Fish mortality
- Water temperature and salinity were recorded

Results – Amoeba prevalence (Real-time PCR, Fringuelli *et al*., 2012)





- Blue arrow indicates H_2O_2-treatment against P.p.
- Green arrow indicates fresh water treatment against P.p.
- Red arrow indicates H_2O_2-treatment against sea lice



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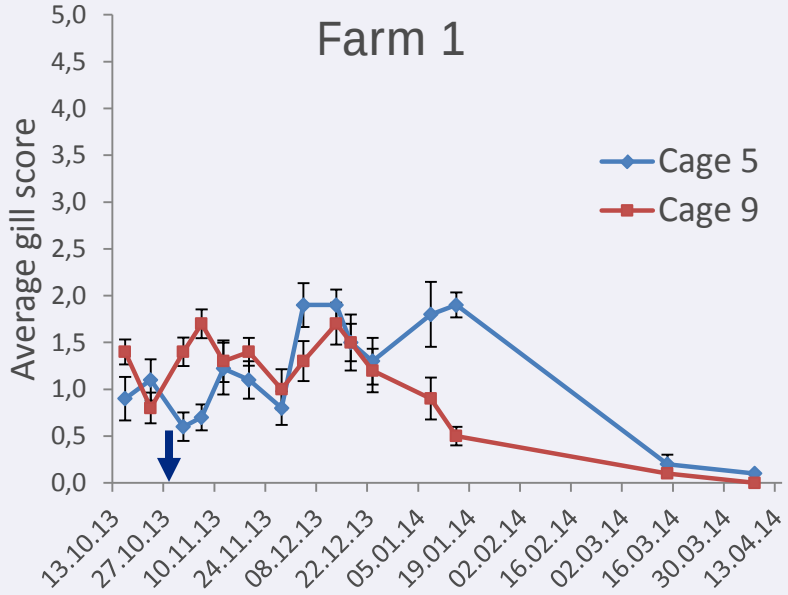
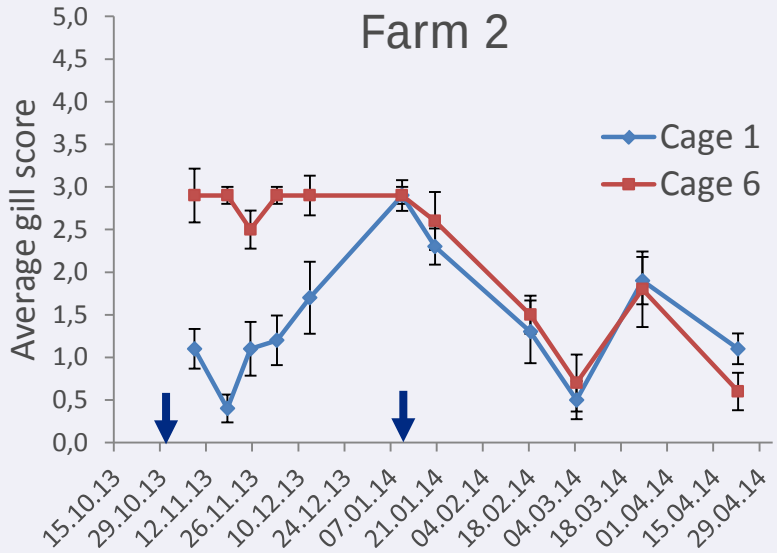
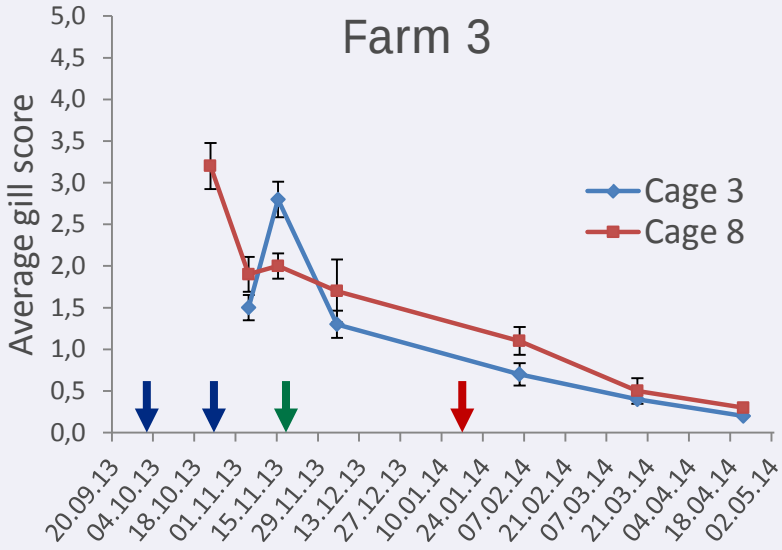
Results – gill score







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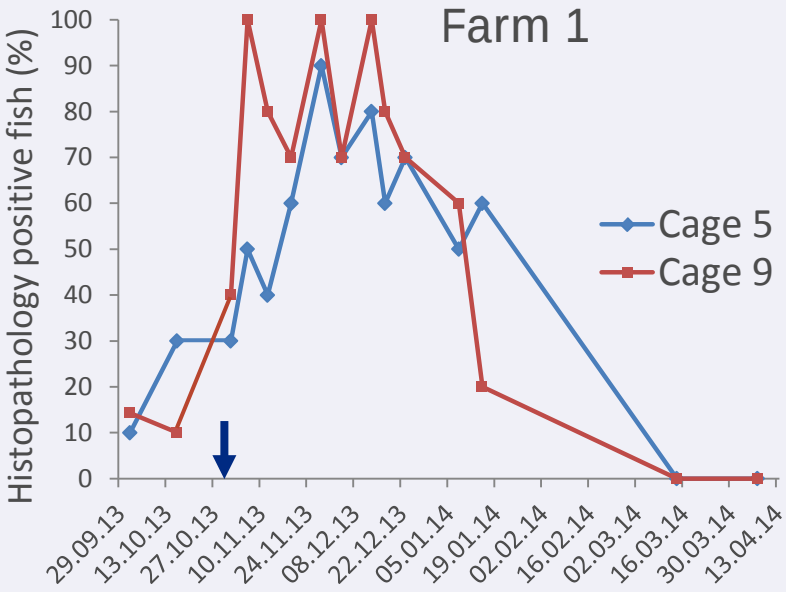
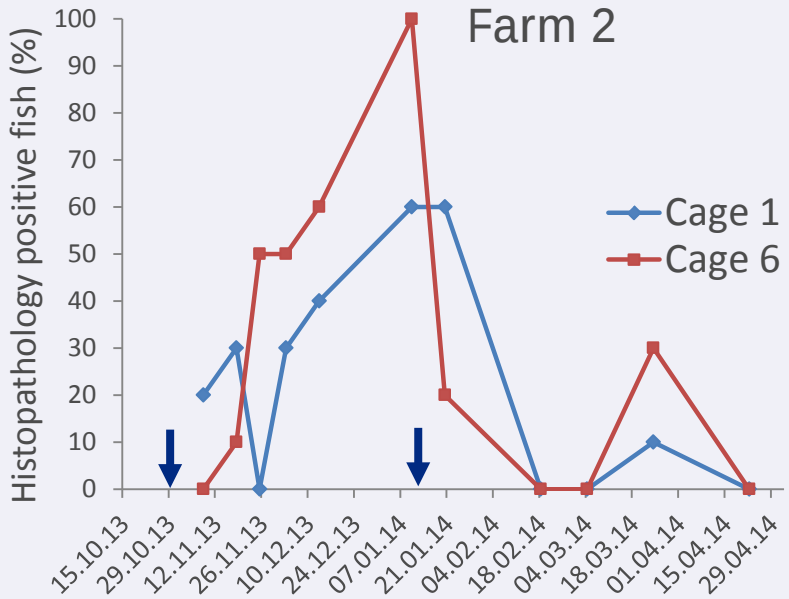
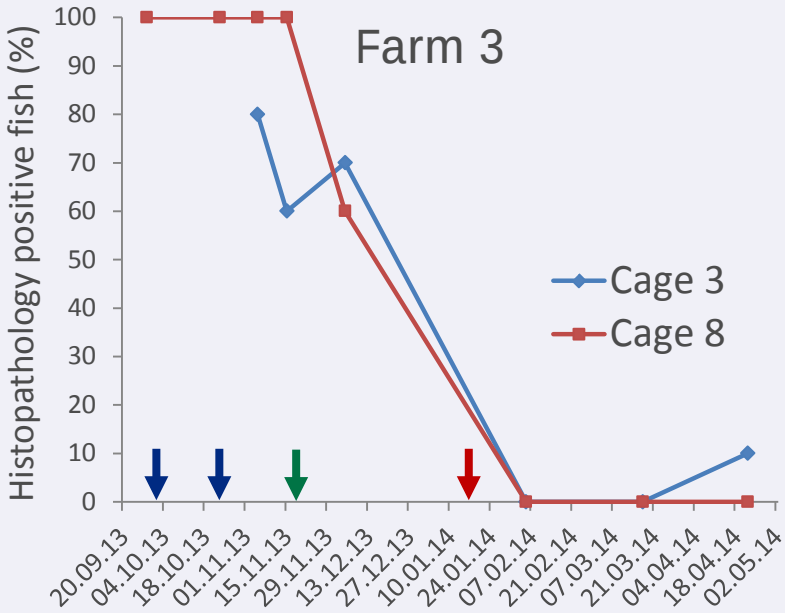
Results - gill histopathology







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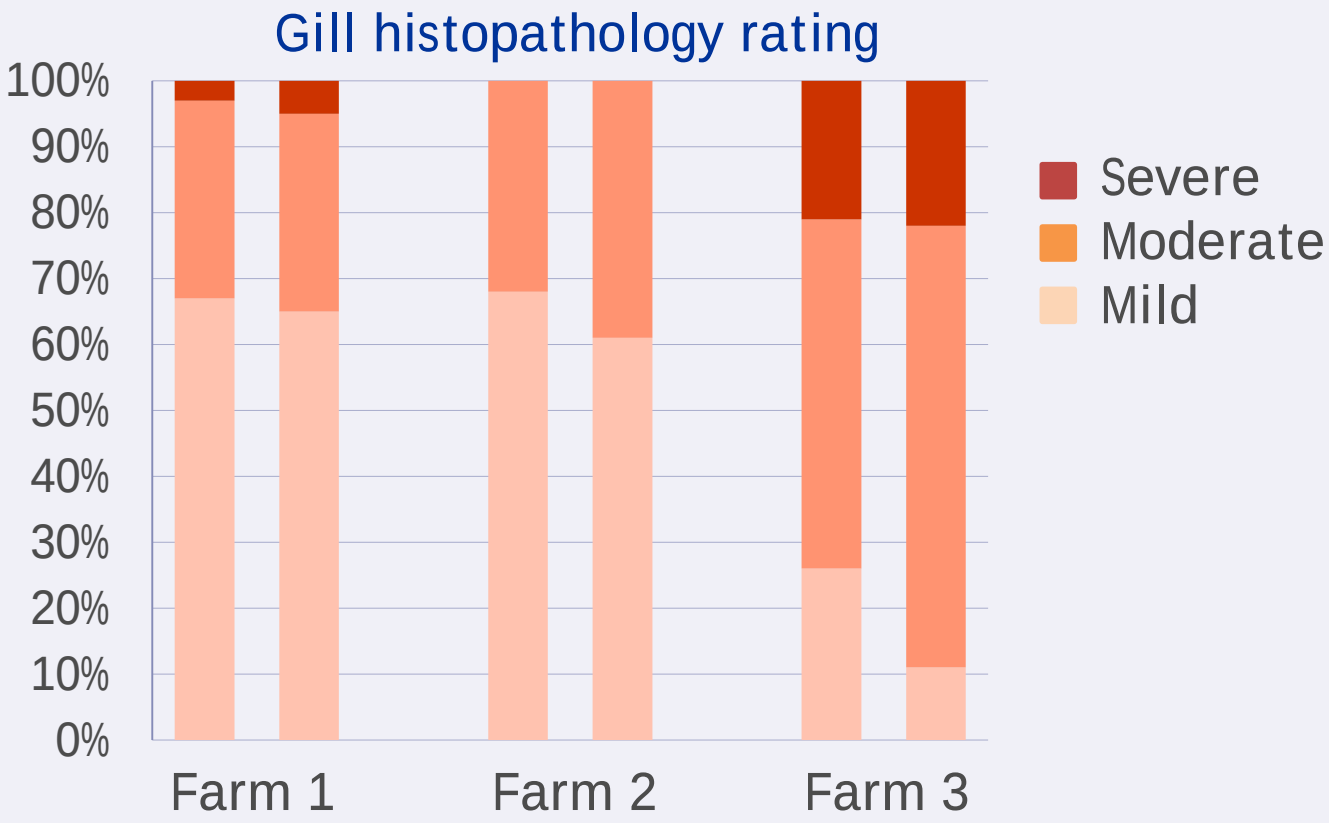
Results – gill histopathology

- How severe was the gill pathology?



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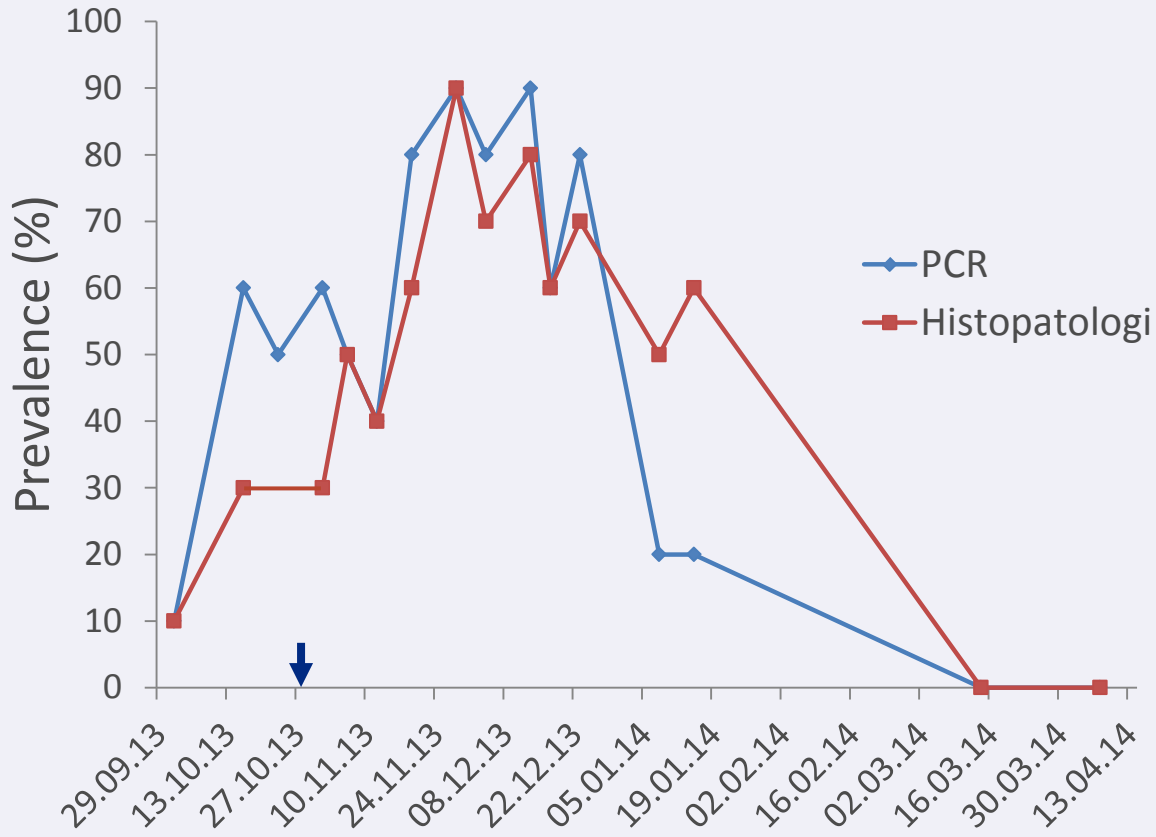
Amoeba prevalence vs gill histopathology

- The amoeba prevalence and AGD-histopathology developed almost synchronously
- A delay between PCR-positive and histopathology positive fish



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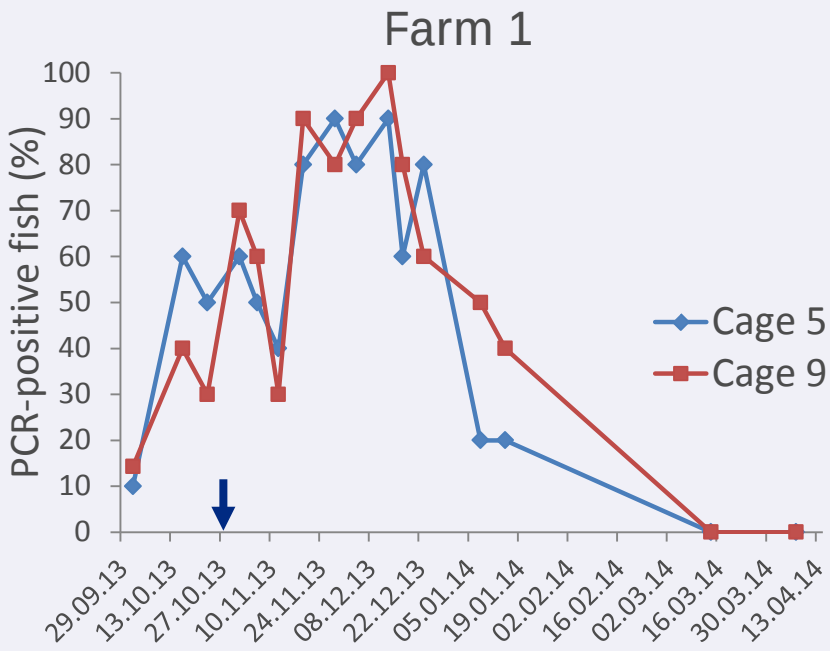
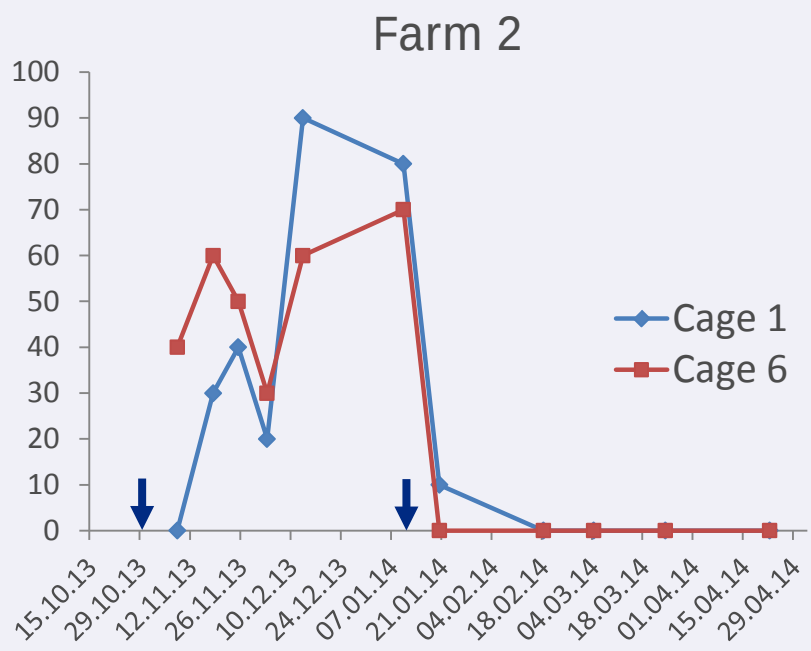
Between cage variations in amoeba prevalence

- Amoeba prevalence developed almost synchronously in the two cages at all three farms





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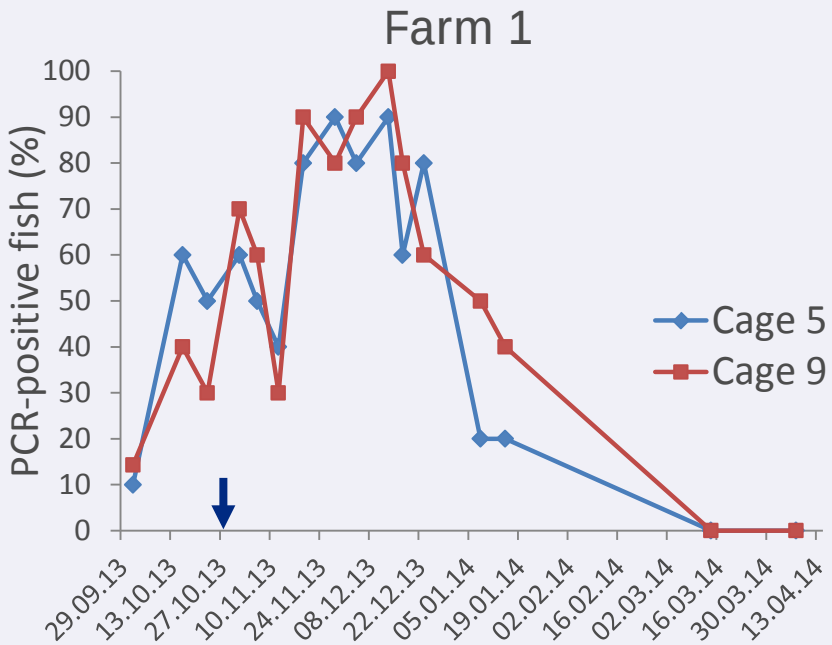
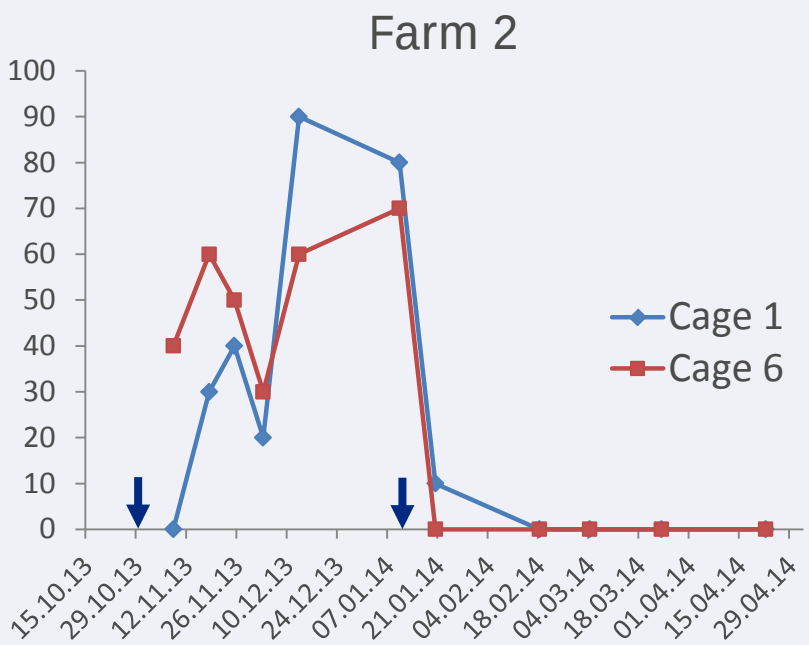
Treatment effects

- Different effect from H_2O_2-treatments in farms, Why?
  - Different implementation of treatments?
  - Different fish size and breeding lines?
  - Different sea temperatures at time of treatment?





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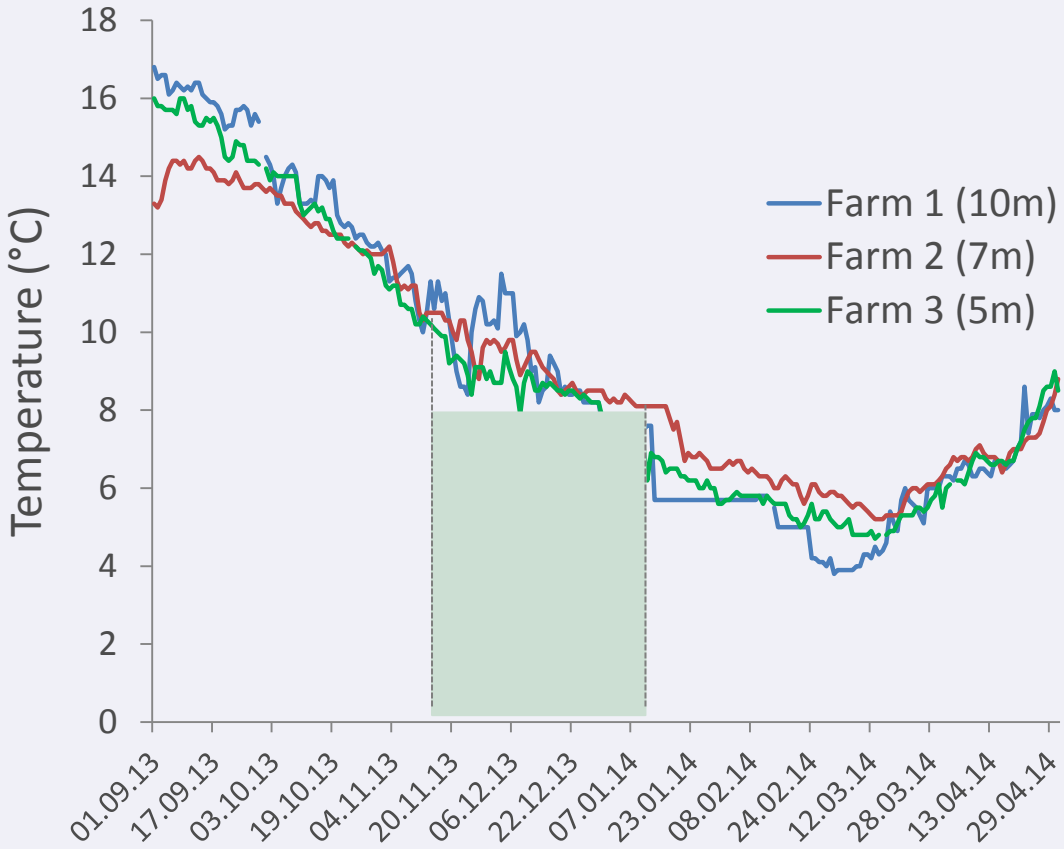
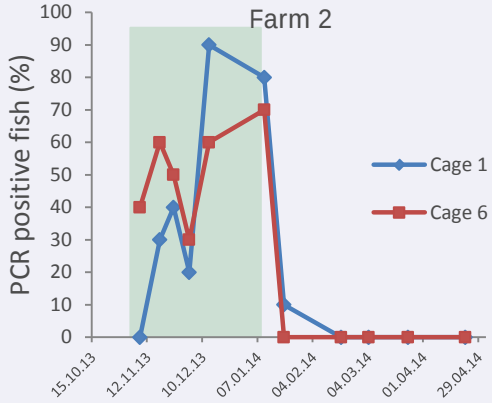
Temperature and salinity

- Same temperature development in all three farms
- Lowest temperature was recorded in mid March
- Average salinity was 28 ‰ in Farm 1 and 30,1 ‰ in Farm 3





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Conclusions

- AGD outbreaks lasted from September to January in all three farms
- The amoebae and AGD gradually disappeared in late winter
- Two farms had a predominance of fish with mild AGD pathology, while the pathology was more severe in one farm
- Amoeba prevalence and AGD histopathology developed almost synchronously
- *Paramoeba perurans* causes AGD in Norwegian fish farms at lower temperatures (6-8 °C) than observed in other countries