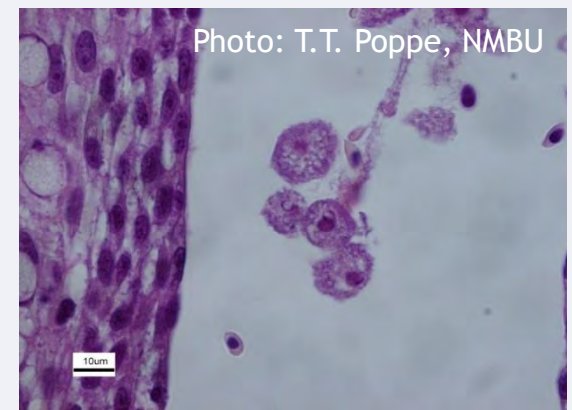
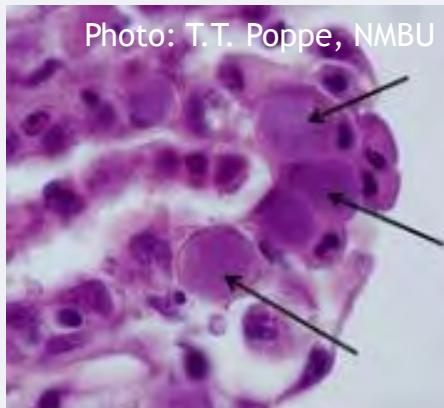
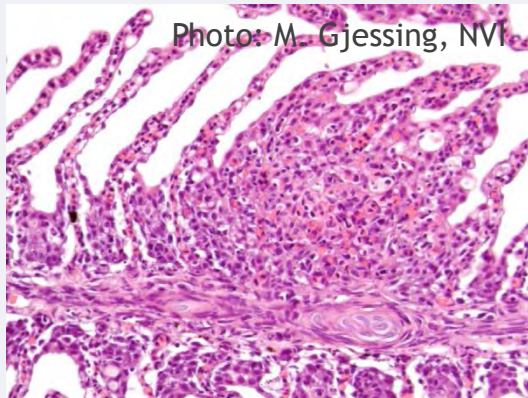


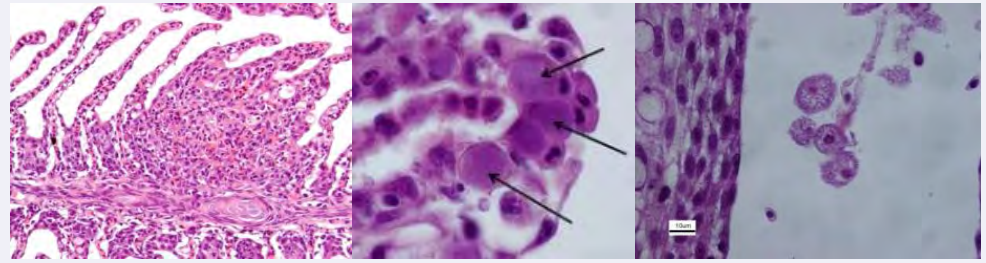
3rd Gill Health Initiative meeting
April 16th-17th 2015
Galway Mayo Institute of Technology

Gill disease issues in Norway



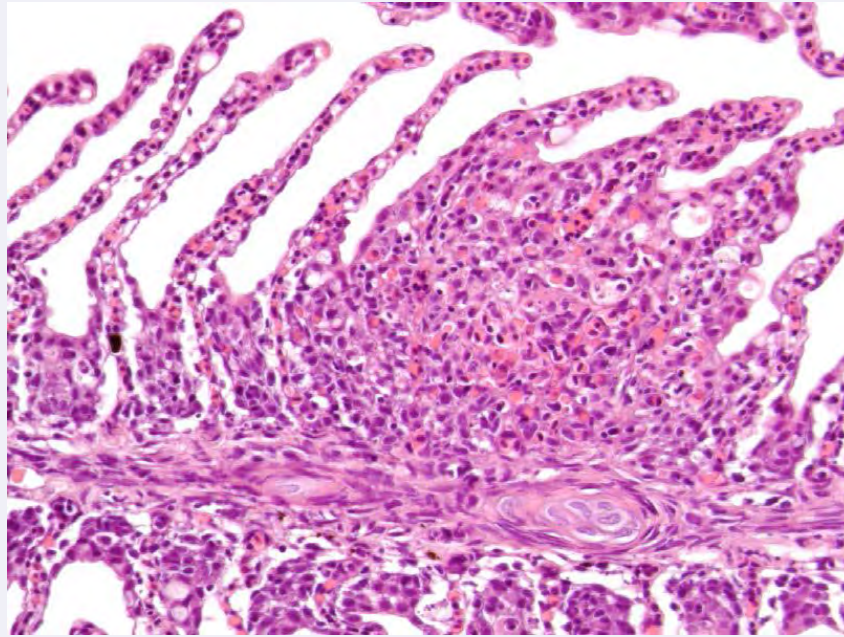
Anne-Gerd Gjevre and Tor Atle Mo
Veterinærinstituttet
Norwegian Veterinary Institute

Outline



- Gill disease in seafarmed salmon in Norway 2006-2014
 - Chronic gill disease (PGI)
 - AGD
- Aetiology and manifestation
- What do we know about risk factors?
- AGD management in Norway
- Summing up

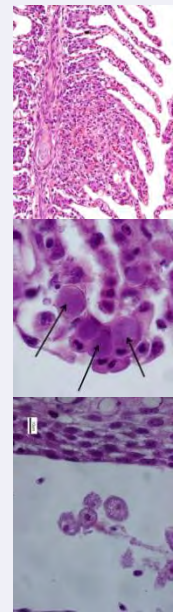
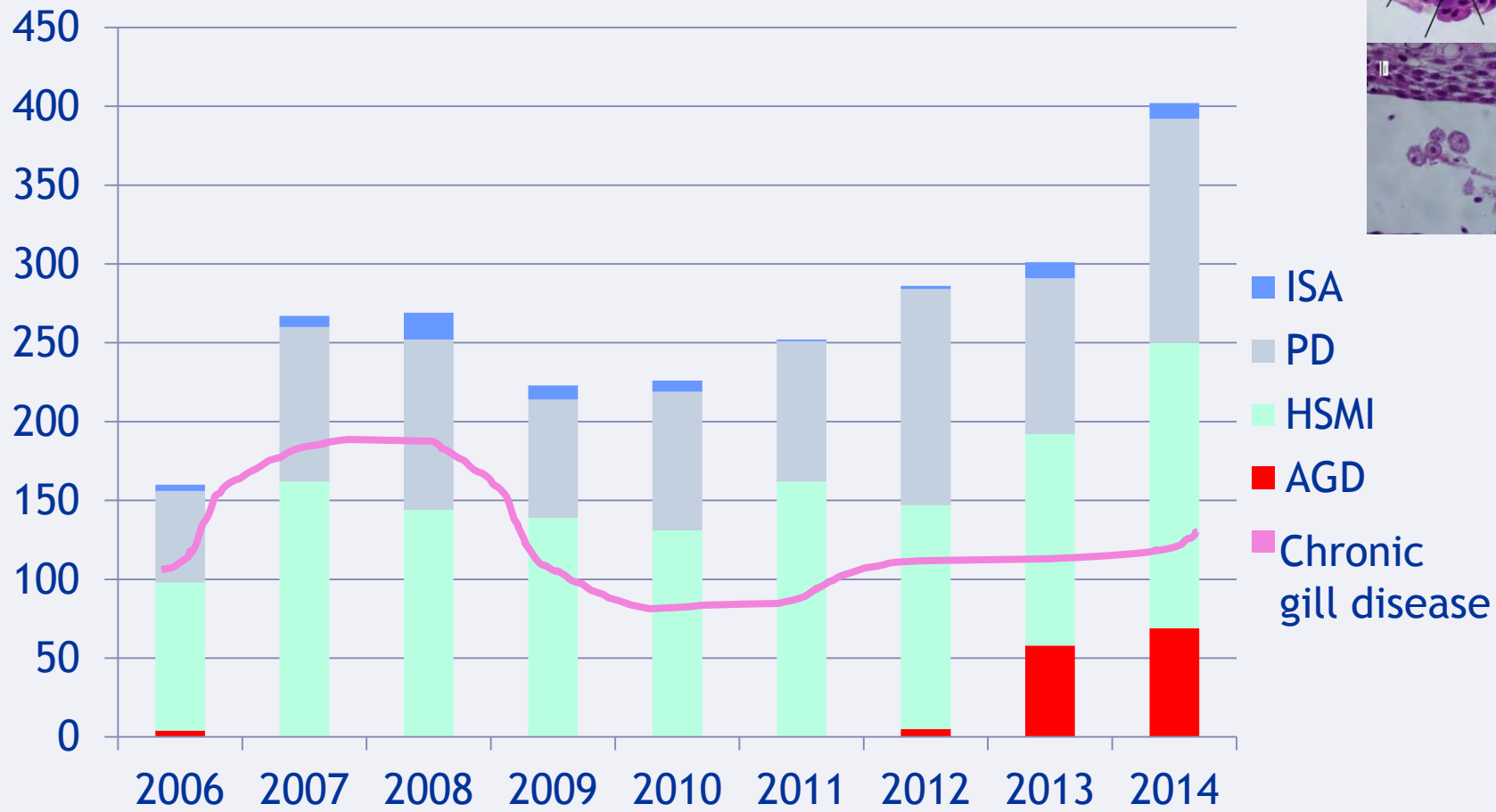
«PGI» = Proliferative gill inflammation



Chronic gill disease



Diseases frequently diagnosed at NVI from 2006 to 2014 (number of affected farms)



2010

Terje M. Steinum

Microbial studies related to proliferative gill diseases in Atlantic salmon



Norwegian School of Veterinary Science

2013

Agnar Kvellestad

Gill inflammation in Norwegian seawater-farmed Atlantic salmon – a study of aetiology and manifestation



Norwegian School of Veterinary Science



«Chronic gill disease» - aetiology and manifestation

- Geographical and annual variation
- Few reports indicate algae and jellyfish as primary causes
- Mixed infections often occur
 - Epiteliocystis is common
 - *D. lepeophtherii* is common
 - *Ichthyobodo sp.*, trichodines and *Tenacibaculum* seem to be of secondary importance
 - Piscine pox-virus plays most probably a role
 - Virus genome fully sequenced by NVI in 2014
 - Method for PCR-analysis established
- Unknown biotic or non-biotic factors?

Investigation of 26 sites with gill disease in 2012-2013 - mixed infections

Results of PCR analysis				Number of sites (%) with this combination
<i>Ca. P. salmonis</i>	<i>Ca. B. cysticola</i>	<i>D. lepeophtherii</i>	<i>P. perurans</i>	
1	1	1	0	11 (42,3)
1	1	1	1	5 (19,2)
0	1	1	0	3 (11,5)
0	1	1	1	2 (7,6)
1	1	0	1	1 (3,8)
1	1	0	0	1 (3,8)
0	0	1	0	1 (3,8)
0	1	0	0	1 (3,8)
0	0	0	0	1 (3,8)

 Four of the sites had AGD



Possible risk factors for chronic gill disease in seawater

- High numbers of smolts transferred to a site
- Infrequent cleaning of netpen walls
- Poor water dynamics (water-flow through netpens)
- Frequent delousing



Detection of *P. perurans* and AGD outbreaks in Norway



- Outbreaks 2006 (Steinum et al. 2008)
- Outbreaks autumn 2012 and winter 2013
- Surveillance spring-summer 2013
- Outbreaks autumn 2013 and winter 2014
- Outbreaks autumn 2014

AGD detected further north in 2014 compared to 2013. *P. perurans* detected sporadically further north than AGD outbreaks.



AGD - different manifestation between sites

Mortality reported from 10-90 %

This might be due to:

- Different temperature and salinity
- Different fish size
- Different time of sea transfer
- Some salmon-families might be more resistant
- Virulence differences between strains of amoeba
- Co-infection with other gill pathogens
- Other different biotic or nonbiotic factors



Risk factors for AGD

Most important

- High salinity
- «High» water temperature

What about

- Density of farms?
- Density of fish at farm level?
- Wild fish migration?
- Boat transports?
- Biofouling on netpens and equipment?

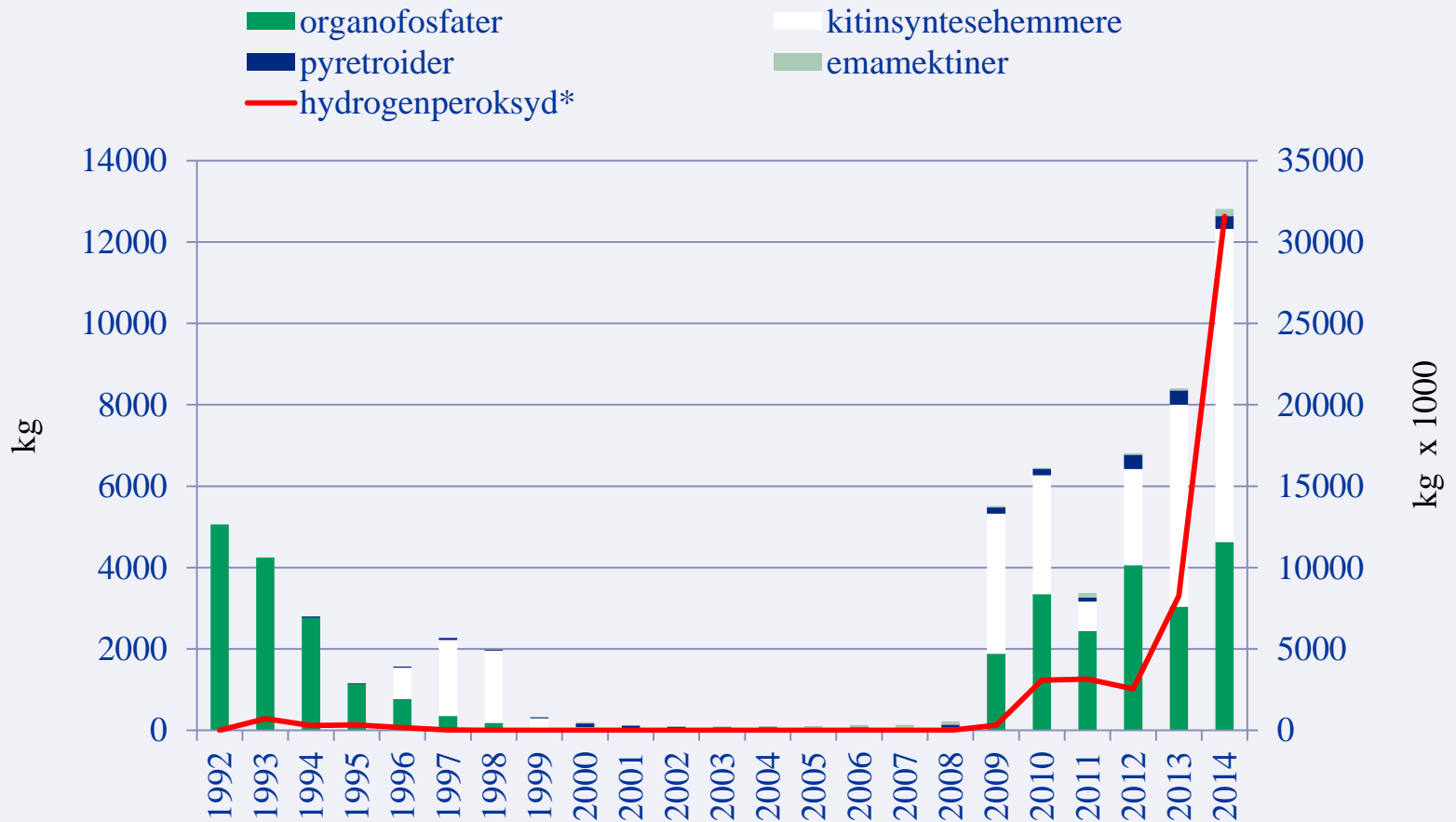


AGD-management in Norway

- Continuous surveillance of gill health (scoring)
- Preparedness at increasing temperatures (>7-10 °C)
- Examining gill smears on increasing scores
- Training of personnel in gill scoring and evaluation of smears
- Early treatment
- Focus on sufficient equipment and treatment capacity
- Cooperation and sharing of knowledge

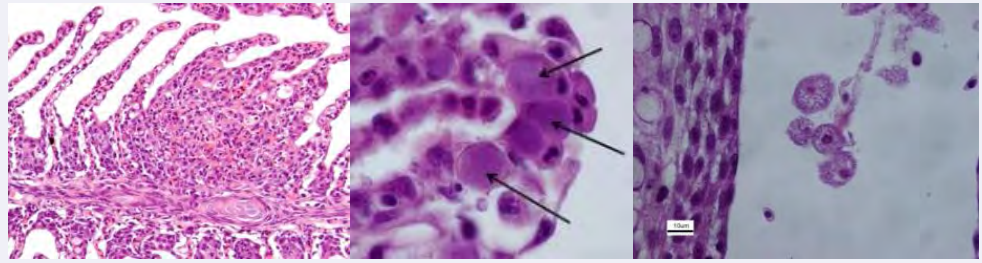


Use of H₂O₂ in Norway has «exploded»



Source: NORMVET

Summing up



- «Chronic gill disease» has been a problem in seawater farmed salmon in Norway for many years
- Mixed infections are common
- AGD is an «emerging» disease in Norway
- Manifestation of gill diseases differ between sites
- Some possible risk factors are identified
- Mixed infections might cause increased mortality in AGD outbreaks
- H₂O₂ treatment of AGD is common in Norway, freshwater is increasingly used
- There is a need for new strategies in AGD treatment