Paramoeba perurans

in farmed salmon (*Salmo salar*) in the Faroe Islands

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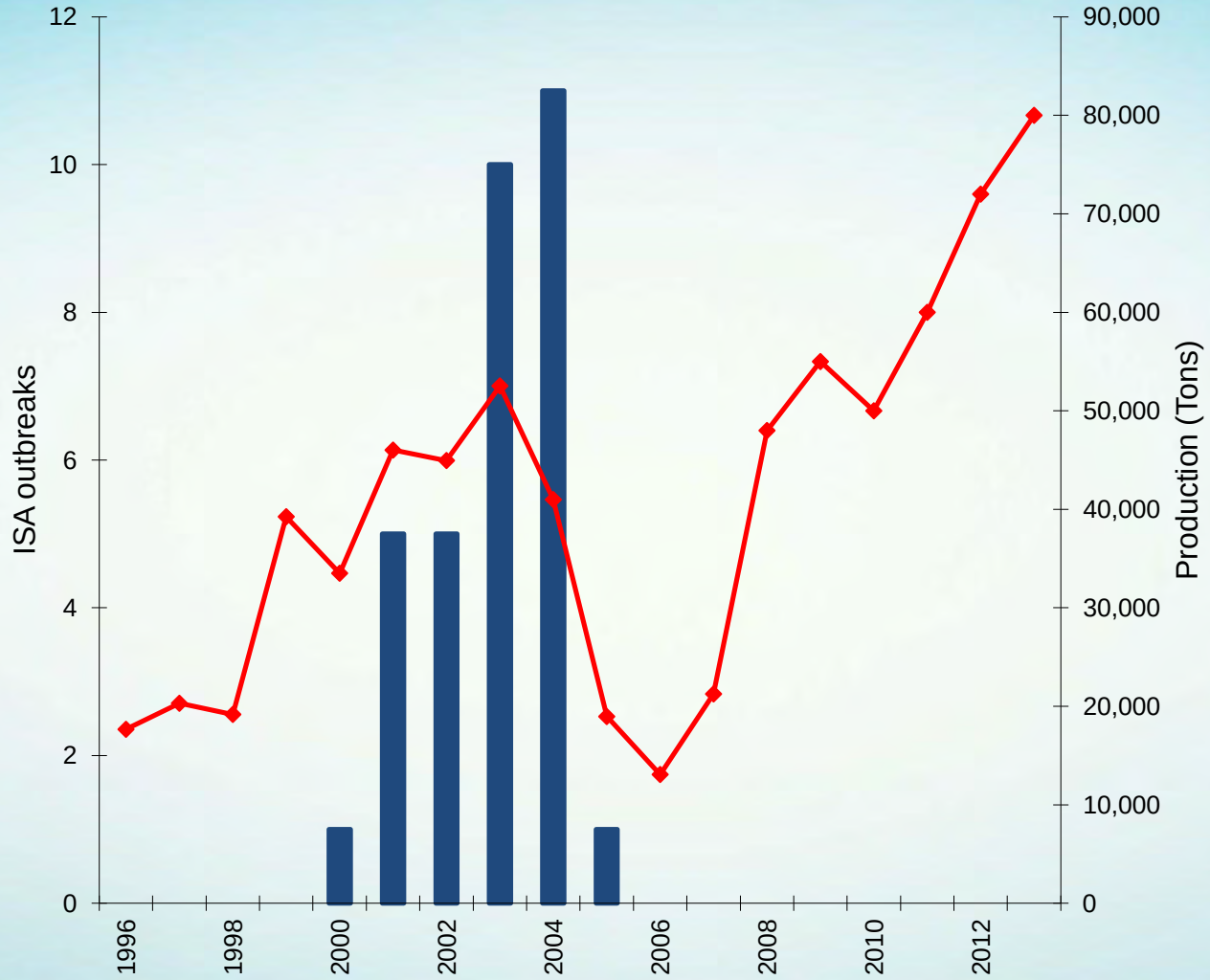
Outline

- The Faroese industry
- *Paramoeba perurans* in the Faroes
- Monitoring preformed
- Surveillance strategy
- Description of an“AGD outbreaks”

Faroe Fish Farming

- 26 salmon sites
- 4 companies
- Low mortalities
- Good water quality
  - Temperature 6-11°C
  - Salinity 35 ‰

Production of Atlantic salmon in the Faroes 1996 - 2014



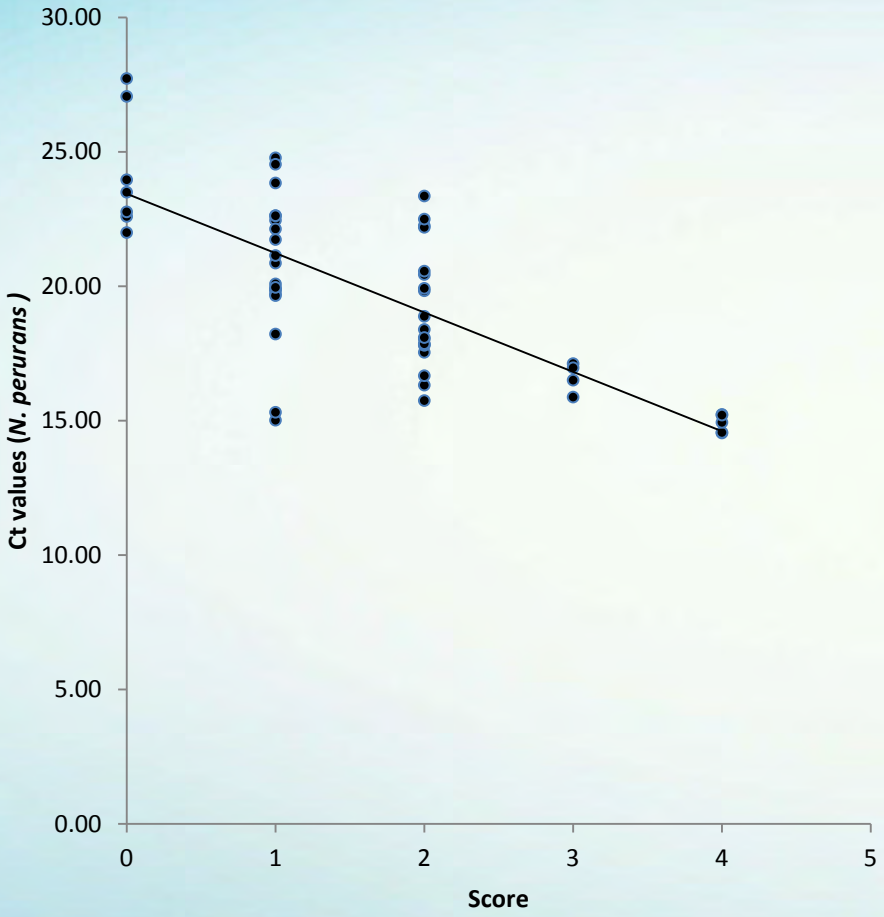
AGD history


ARCTIC OCEAN
Greenland
Svalbard (Nor.)
ARCTIC OCEAN
United States of America
Canada
2006
Norway
Iceland
2006
United Kingdom
1995
Ireland
1995
1995
1985
United States of America
ATLANTIC OCEAN
Sweden
Finland
Russia
Estonia
Latvia
Belarus
Denmark
Neth.
Ger.
Pol.
Ukraine
Kazakhstan
Mongolia
France
Italy
Rom.
Georgia
Spain
Bulgaria
Azer.
Uzb.
Turkm.
Kyrgyzstan
Tajikistan
Turkey
Greece
Tunisia
Syria
Lebanon
Iraq
Iran
Afg.
Pakistan
China
N. Korea
S. Korea
Japan
Morocco
Israel
Jordan
Kuwait
Nepal
Bhutan
Western Sahara
Algeria
Libya
Egypt
Saudi Arabia
U.A.E.
Oman
India
Laos
Taiwan
Mauritania
Mali
Niger
Chad
Eritrea
Yemen
Djibouti
Bangl.
Burma
Thailand
Vietnam
Philippines
Senegal
Guinea-Bissau
Sierra Leone
Liberia
Cote d' Ivoire
Ghana
Togo
Nigeria
Cam.
C.A.R.
Sudan
Ethiopia
Somalia
Cambodia
Sri Lanka
Malaysia
Gabon
Dem. Rep. of Congo
Uganda
Kenya
Tanzania
Rep. of the Congo
Indonesia
Papua New Guinea
Solomon Islands
Angola
Zambia
Malawi
Namibia
Zimbabwe
Mozambique
Madagascar
Botswana
Swaziland
Lesotho
Australia
Fiji
2007
Chile
2001
South Africa
1980's
New Zealand
Mexico
Guatemala
Honduras
Nicaragua
Costa Rica
Panama
Colombia
Ecuador
Ven.
Guyana
French Guiana
Suriname
Brazil
Peru
Bolivia
Paraguay
Argentina
Uruguay
PACIFIC OCEAN
PACIFIC OCEAN
INDIAN OCEAN

Strategy

- Faroese Atlantic salmon farming sites, tested positive for *P. perurans* in 2013
- Limited knowledge on the amoeba and the disease
- Crucial to fill in some essential knowledge gaps
- Field trip overseas
- Compare Different analytical methods

Association between gross scores and C_t values

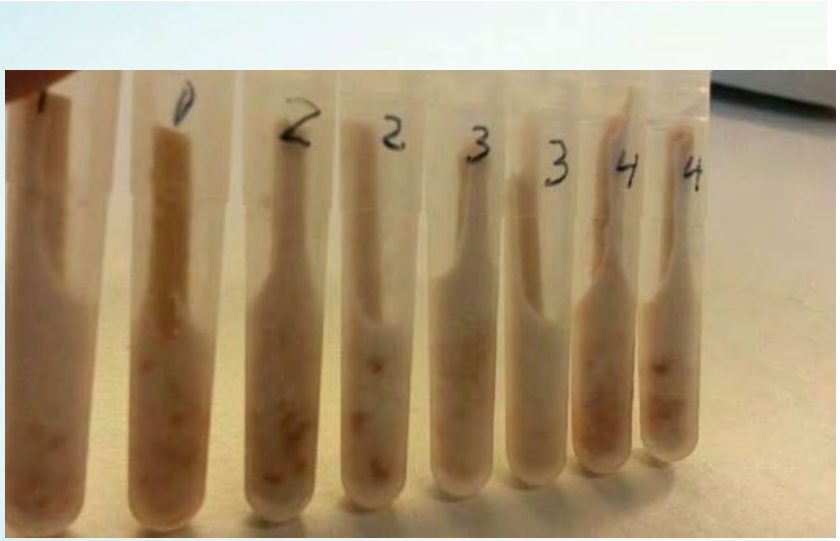


- Clinical signs and real-time RT-PCR
- Association between gill scores and detection of *P. perurans* by C_t values
- The p value associated with C_t values is <0.001

Comparing methods of analysis

Gross scores	PCR(C_t average)	Fresh smears	Histopathology
0	24.23	None	None
1	20.76	Low	Low
2	19.17	Low	Low
3	16.62	Low	Mild
4	14.90	Moderate to high	Moderate

Sampling method

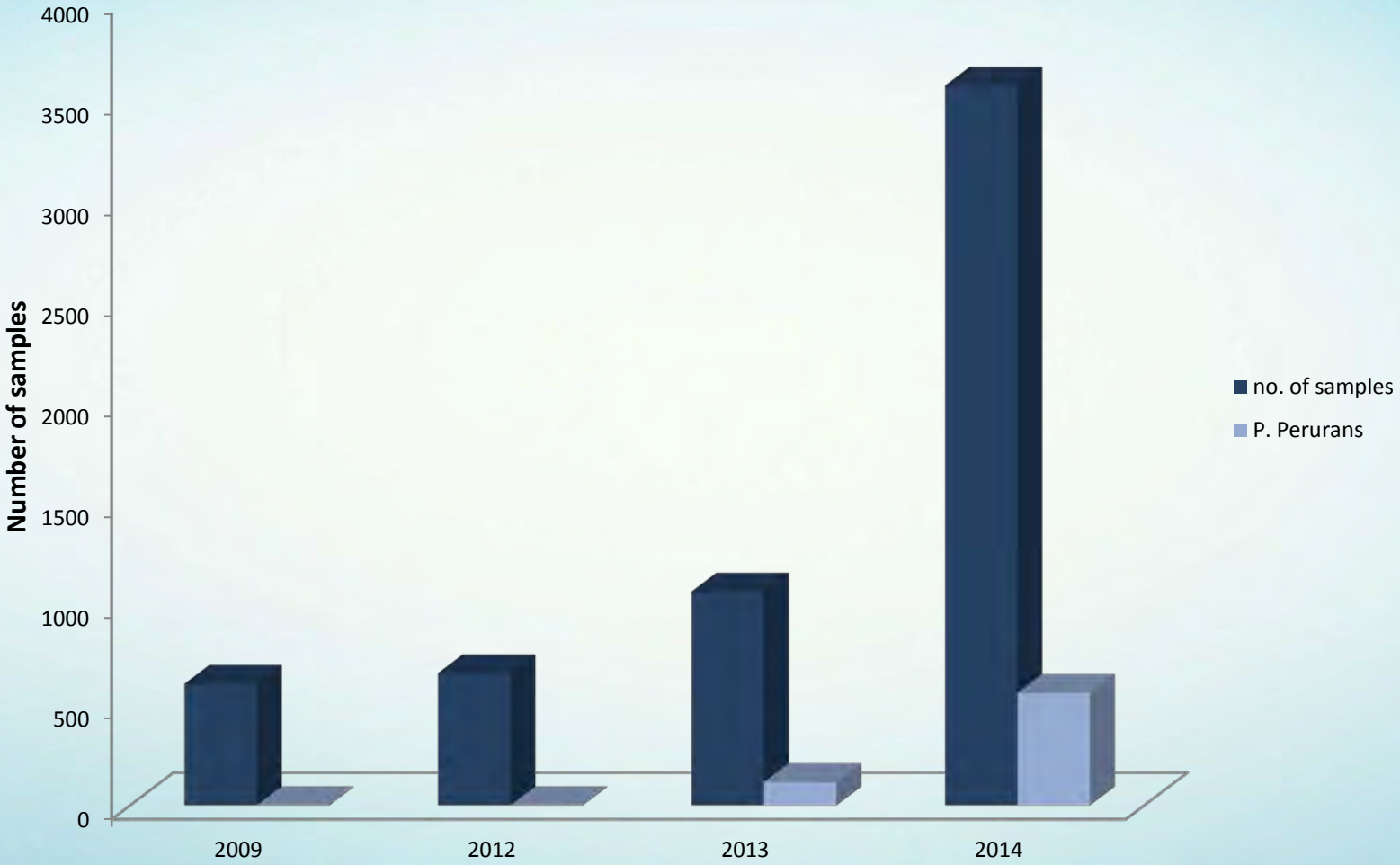


Present AGD surveillance

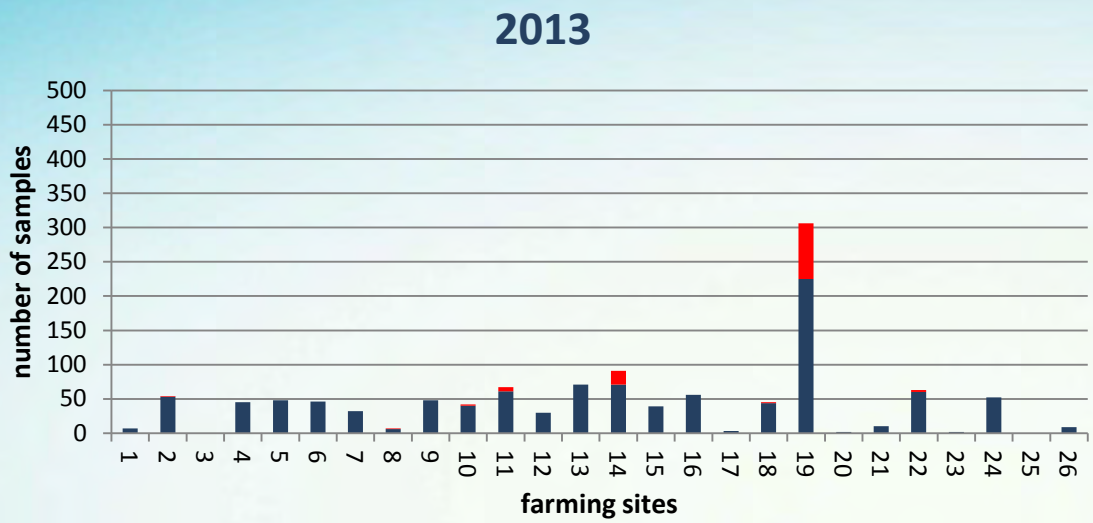
- Routine check by the Authority.
  - PCR samples as an early warning strategy
  - at least 25 fish a minimum of four times a year

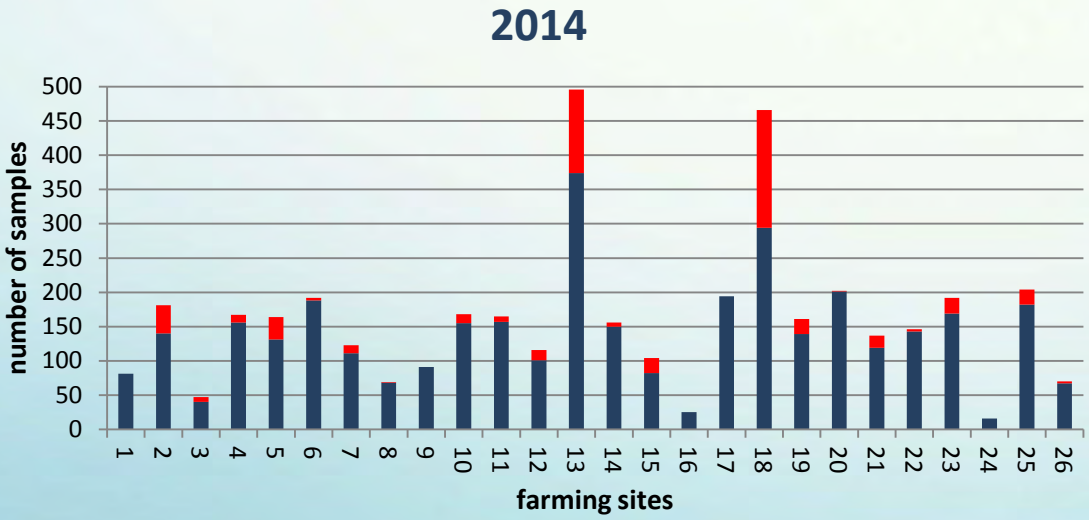
- Requirements to the industry
  - AGD scoring simultaneously as louse counts every second week, reported to the authority
  - Any confirmation of AGD reported to the authority

Prevalence of *P. perurans*



Spread of *p. perurans*





- 26 Farming sites
- 2013 33% of all farming sites tested positive
- 2014 80 % of all farming sites tested positive
- *Endemic*

AGD case

- Lethargy and elevated body position
- AGD scores up to 4
- Confirmation with histopathology
- No increased mortality
- Mean accumulated mortality for the Faroes is higher than in this case
- No treatment

Conclusions

- *P. perurans* did not seem to be part of the Faroese environment prior to 2013
- In 2013 *P. perurans* was detected with real time RT-PCR sporadically around the country
- In 2014 *P. perurans* was detected around the whole country, and AGD was confirmed with histopathology
- Not detected increased mortality

Discussion

- Several PCR positive detections so far in 2015 with Ct-values between 14-36
- Why do we detect the amoeba with Ct values below 20 without any clinical signs or increased mortality?
  - Other infections agents e.g. Desmozoon, Branciomonas cysticola, Pisciclamydia salmonis, Parvicapsula, Clavoclamydia?
  - Algae blooms
  - Low seawater temperature?
  - Other factors?
- Can we expect the same development as in Scotland, Ireland and Norway ?

Thank you