The purpose and challenges of screening programs

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PD TriNation

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Purpose of screening

- Early detection
  - In population
  - In individual

- Overview
  - For control
  - Demonstrate freedom from disease

- Eradication of disease

- Research

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Examples of screening programs

- Cervical cancer
  - Since 2006, all women between 25 and 66 are screened every 3rd year.
  - Prevalence of cancer reduced by 35%, mortality by 50%

- Screening of newborn babies
  - Bloodtest within 48 hrs. Screened for 23 heritable diseases.
  - ~50 cases are discovered each year

- Screening for VHS/IHN….BVD….Trichines…

    Resistent bacteria…etc

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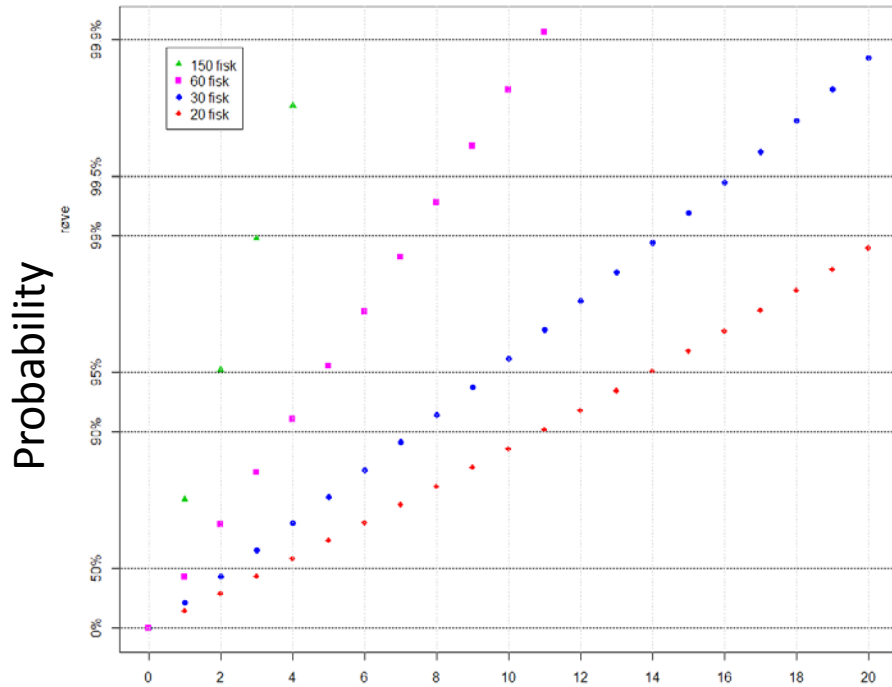
Factors to be considered:

- The population
  - Production system
  - Geography
- Sampling
  - Sample size
  - Target animals

PURPOSE….!

- Efficacy of tests
  - Sensitivity/specificity
  - Material
- Acceptable prevalence
- Consequences of a positive test

Sample sizes:

Probability

150 fisk
60 fisk
30 fisk
20 fisk

Prevalence

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- In large populations…
- What prevalence is expected/accepted?
- For example:
  - Sampling 20 fish:

  =>Detect at least 10% prevalence, with 90% prob.

Efficacy of test:

- Sensitivity
  - Ability to detect TRUE positive samples
  - (few false negatives)
- Diagnostic sensitivity:
  - Ability to detect TRUE positives in a population

- Specificity
  - Ability to detect TRUE negative samples
  - (Few false positives)

Generally, a screening test should be highly sensitive, and a confirmatory test highly specific
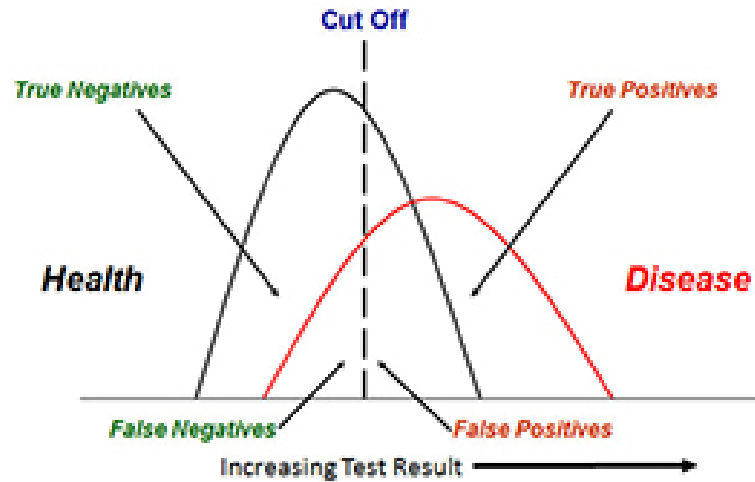
Sensitivity

- Example:

- 100.000 samples, prevalence 2%, se & sp both 99%:

- 1.980 of 2.000 positives will be positive

- And:

- 980 (1%) of 98.000 negatives will be positive

Figure 1

Sensitivity/Specificity

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Cut-off value…

- Normally a trade-off, set on base of what is the consequences of false positives vs false negatives.

- Should be based on purpose of test:
  - Screening: High sensitivity / low cut-off
  - Confirmatory: High specificity / high cut-off

The PD-screening

Purpose:

- To reduce the consequences of PD in a PD-zone, to hinder PD in establishing itself in a surveillance-zone and to limit the spread of the specific subtypes of SAV.

§4:

- From each seafarm, 20 fish shall be sampled every month. Heart (and kidney) examined by PCR.

- Before movement, 60 fish must be sampled

- Sampling should target those most likely to have SAV

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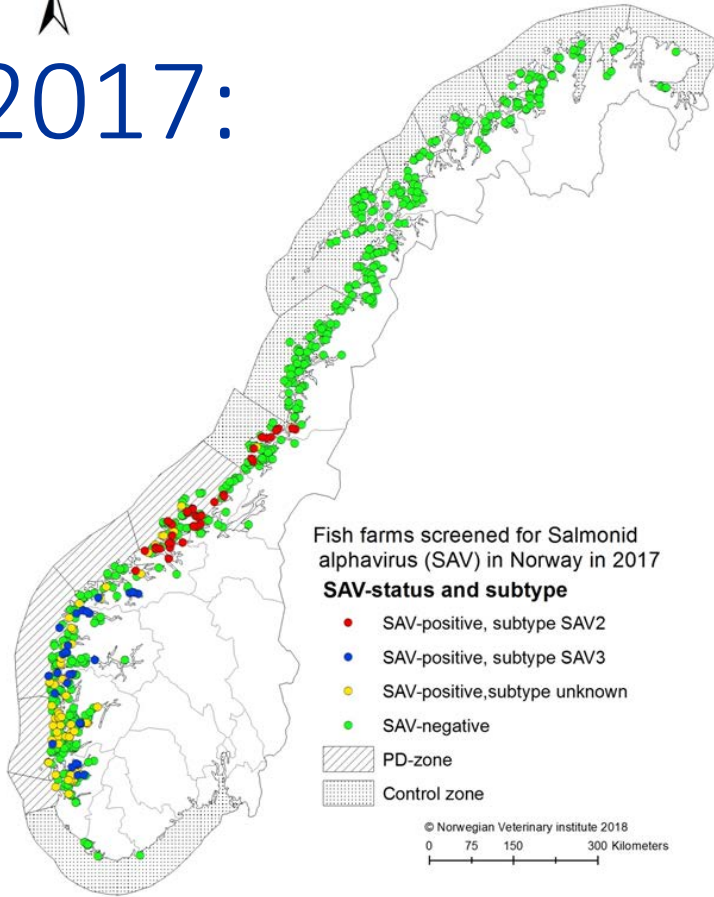Norwegian Veterinary Institute

The PD-screening

- Some rough estimates…
- 400 active farms (-those that have SAV allready)
- *20 fish*12 months => 96.000 samples / year
- Costs?
- Benefits?

2017:

Fish farms screened for Salmonid alphavirus (SAV) in Norway in 2017
SAV-status and subtype
- SAV-positive, subtype SAV2
- SAV-positive, subtype SAV3
- SAV-positive, subtype unknown
- SAV-negative

PD-zone

Control zone

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0   75   150   300 Kilometers

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Within PD-zone:

- 320 farms tested

- 130 SAV positive

Surveillance zone:
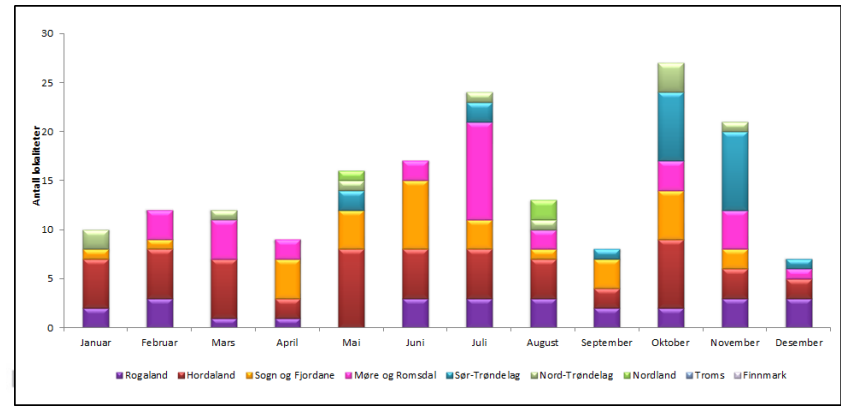
- 266 farms tested

- 12 SAV positive

PD-screening –what have we learned so far?

- Peak of SAV just after screening was initiated

- Many cases in epidemic area that would maybe not have been reported

- No surprises in occurence of subtypes

PD screening and the purpose:

«To reduce the consequences of PD in a PD-zone»

- Early slaughter? Reduced movements? Reduced waiting time at slaughter?

«To hinder PD in establishing itself in a surveillance-zone»

- Early detection! Early stamping out!

«To limit the spread of the specific subtypes of SAV»

- ……

Why not: «Eradicate PD in specific areas?»

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Suggestions for use of the PD-data

- Early contingency

- Risk map: predicting outbreaks

- Combined with vaccination and mortality data => proof of what works

- Control and eradication

- Research on transmission rates etc

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Thank you for the attention!

Why salmon should never be allowed to drive…