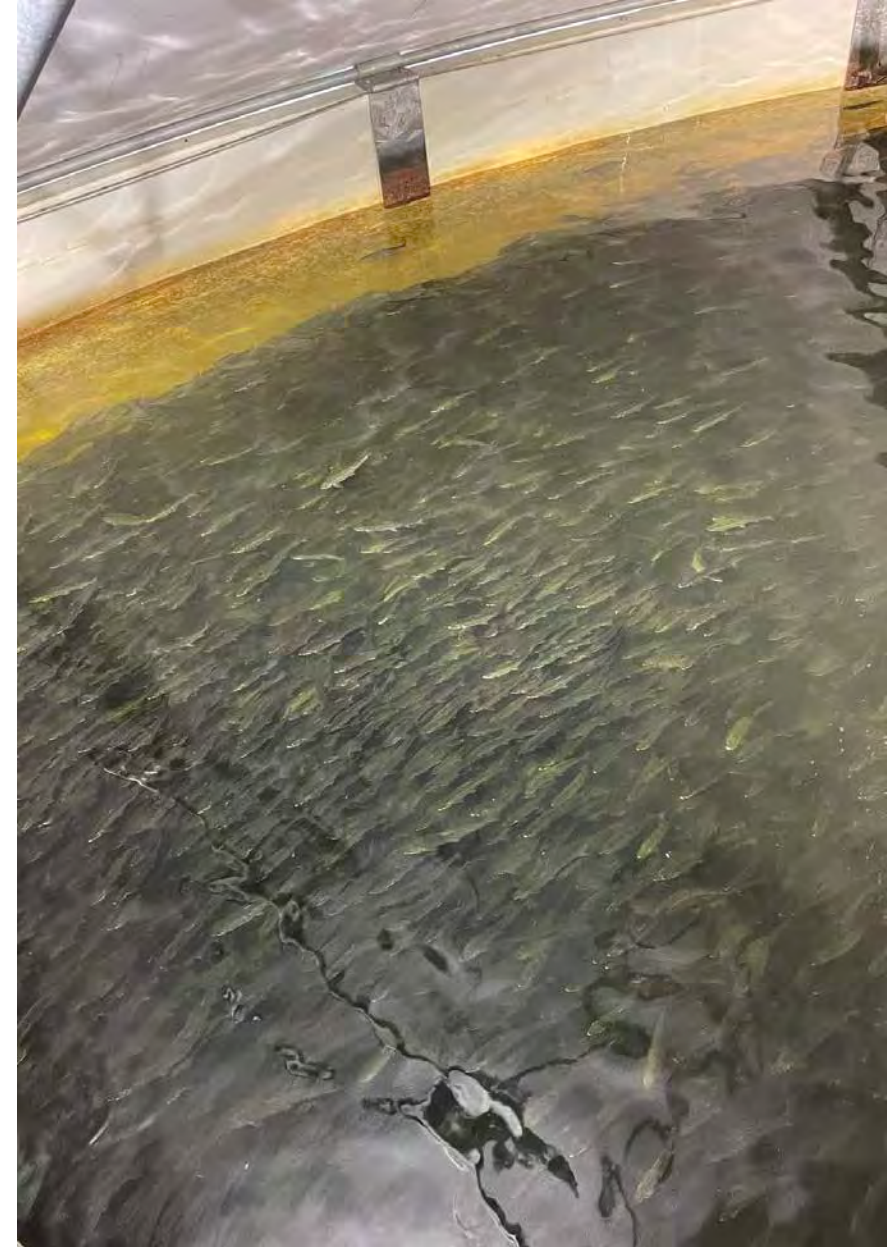

PRV-1 prevalence in Norwegian hatcheries

Preliminary results from PRVariant (FHF 910082)

Marit Stormoen, DVM, MSc, PhD

TriNation, 2026, Belfast



Norwegian Centres of Expertise
NCE Aquaculture

Finansiert av:



PRVariant – the project

The project will **map variants** of PRV-1 in Norway, their **correlation with HSMI** in the field, and **determine the virulence** of the variants in standardized infection trials. The results will form the basis for **measures against** highly virulent variants and severe HSMI.

Work package 1: Map PRV-1 variants and their association with HSMI in the field

Work package 2: Characterize virulence and identify virulence markers

Work package 3: Measures against highly virulent variants and severe HSMI

PRVariant – the project

The project will **map variants** of PRV-1 in Norway, their **correlation with HSMI** in the field, and **determine the virulence** of the variants in standardized infection trials. The results will form the basis for **measures against** highly virulent variants and severe HSMI.

Work package 1: Map PRV-1 variants and their association with HSMI in the field

Work package 2: Characterize virulence and identify virulence markers

Work package 3: Measures against highly virulent variants and severe HSMI

PRVariant – WP1

Work package 1: Map PRV-1 variants and their association with HSMI in the field

The following research questions form the basis for the work package:

- Which variants of PRV-1 are found in Norwegian sea farms, and what is their prevalence?
- What is the PRV prevalence in hatcheries, and which variants are found there?
- What is the geographical distribution of the different variants?
- Which variants are associated with HSMI in the field?

PRVariant – WP1

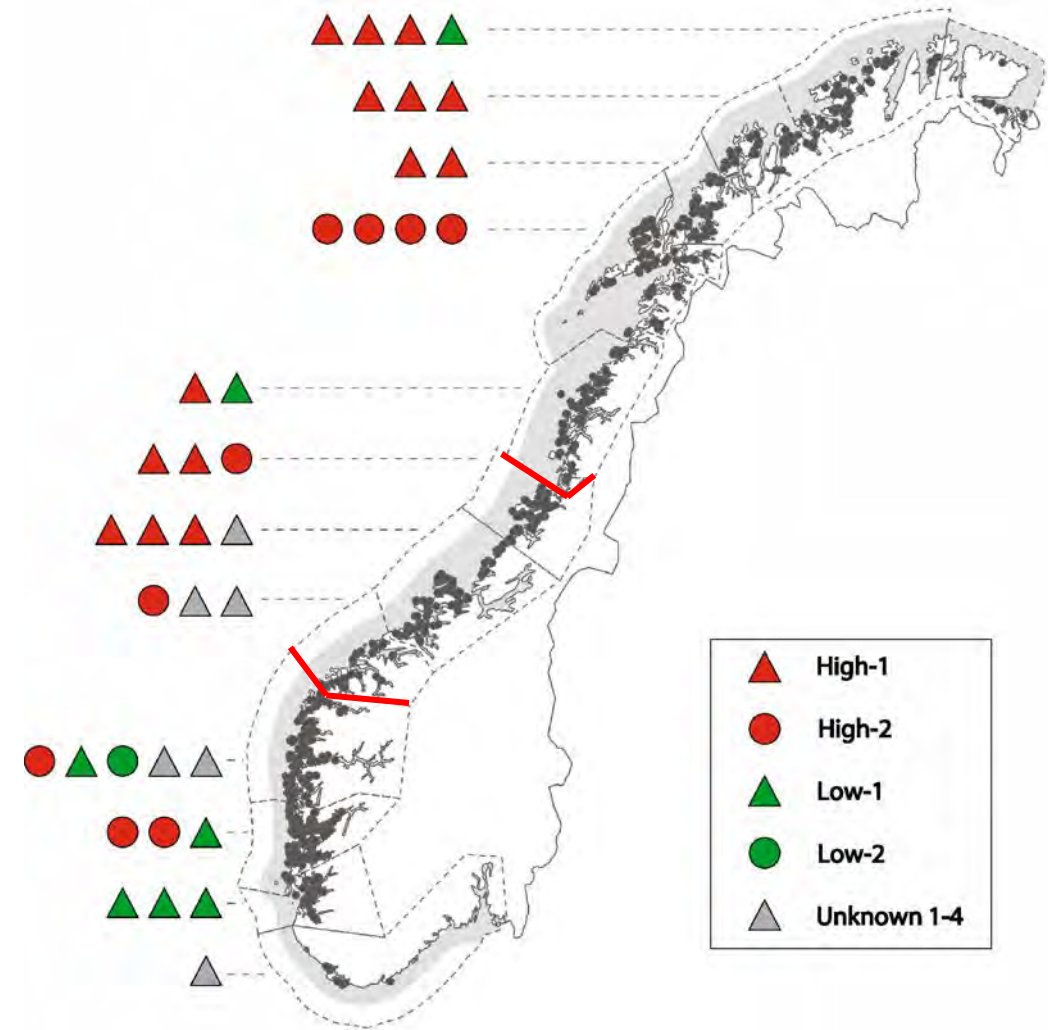
Work package 1: Map PRV-1 variants and their association with HSMI in the field

The following research questions form the basis for the work package:

- Which variants of PRV-1 are found in Norwegian sea farms, and what is their prevalence?
- **What is the PRV prevalence in hatcheries, and which variants are found there?**
- What is the geographical distribution of the different variants?
- Which variants are associated with HSMI in the field?

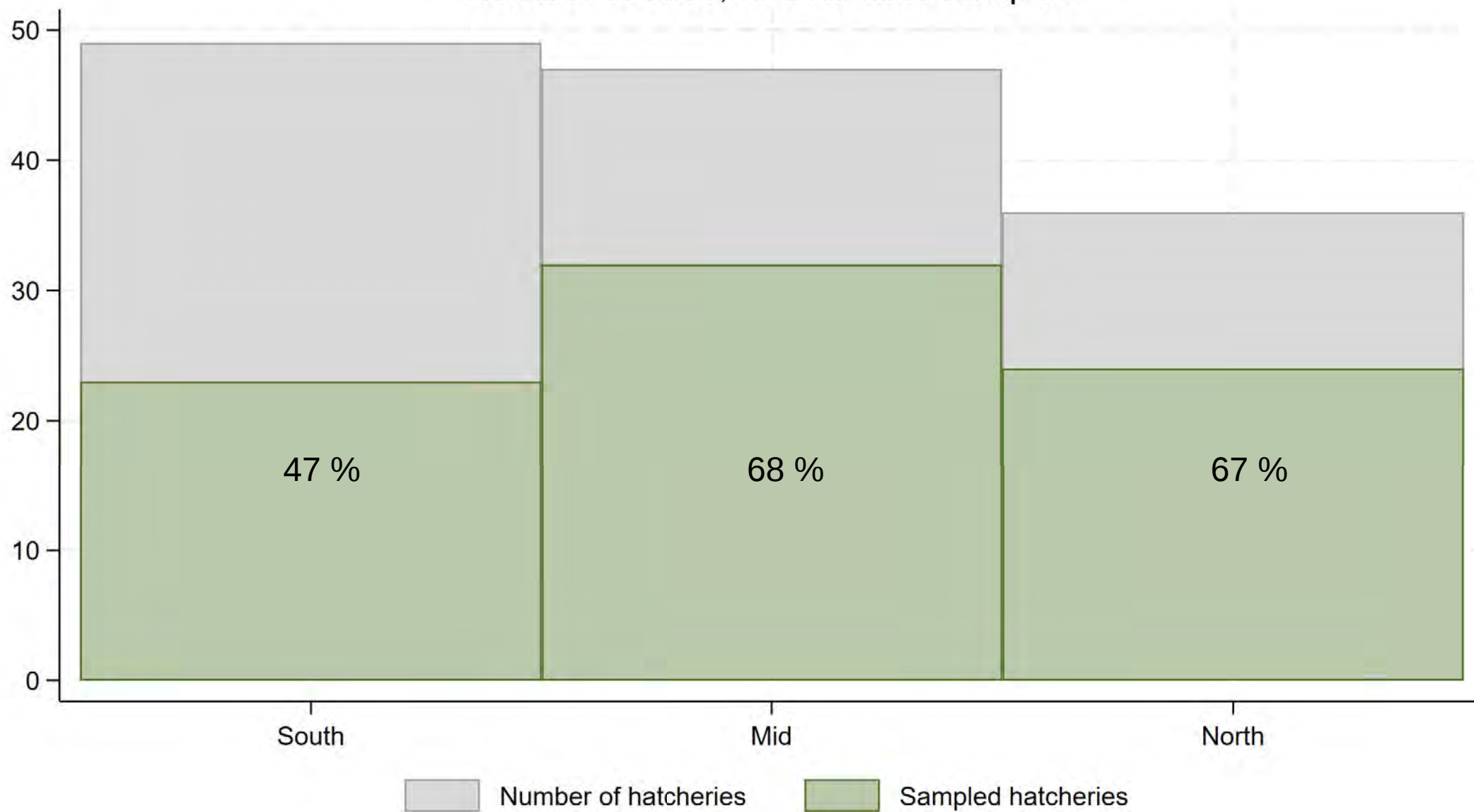
PRVariant – material

- Source material from PatoGens biobank
- Random sampling of sites from the biobank based on total number of hatcheries
 - 132 hatcheries in total
- Stratified by three geographical regions
 - Sampled total of 79 hatcheries
- Screened by qPCR
 - Most recent sample event of vaccinated fish with heart or kidney from selected site
 - Aimed at screening 10 fish per hatchery
- Sample with lowest Ct-value sequenced for virulence



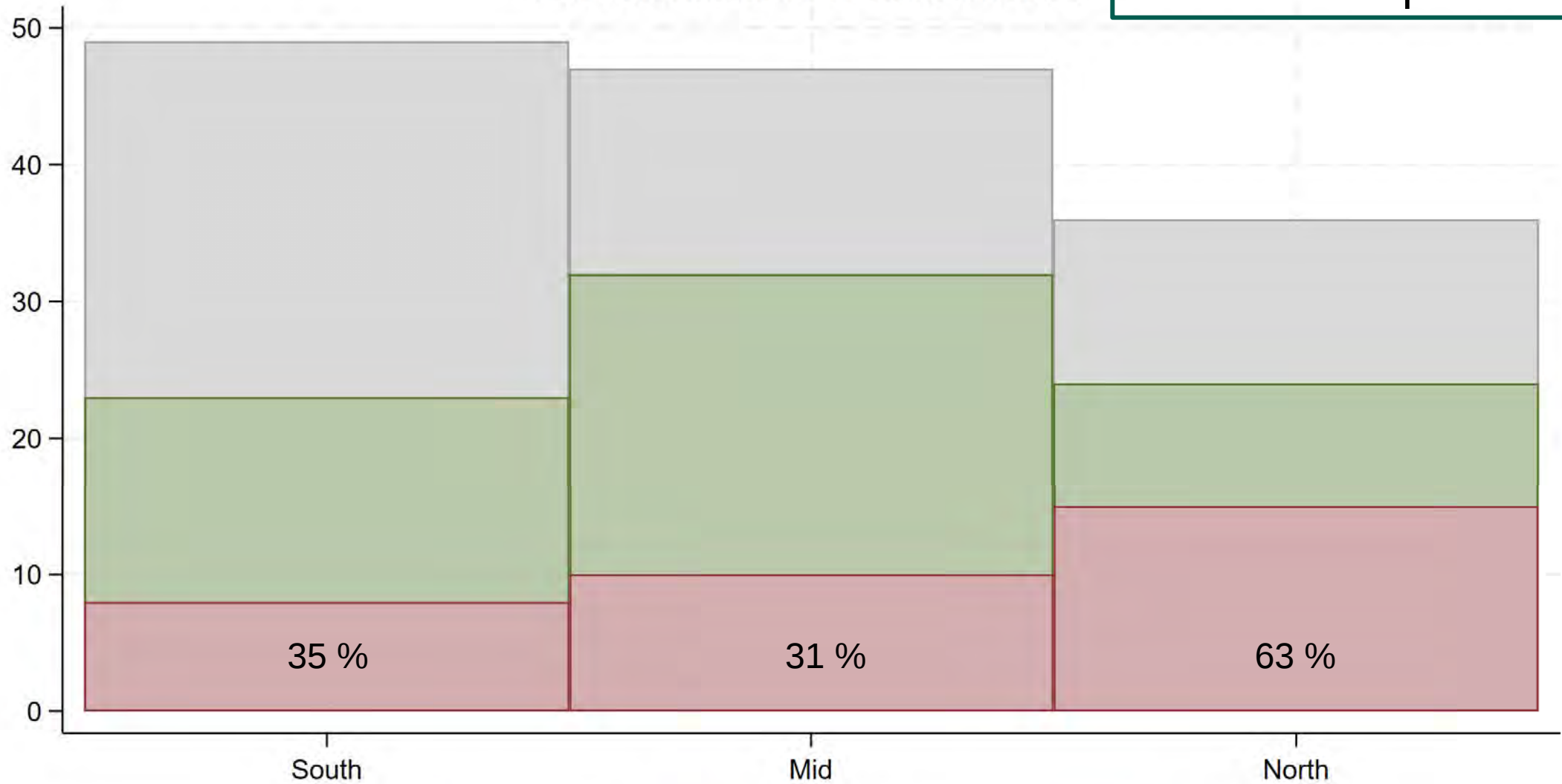
Vatne, N.A., Stormoen, M., Lund, M. *et al.* Genetic grouping and geographic distribution of Piscine orthoreovirus-1 (PRV-1) in farmed Atlantic salmon in Norway. *Vet Res* **52**, 131 (2021). <https://doi.org/10.1186/s13567-021-01000-1>

Number of sites, and number sampled



Prevalence of PRV in hatcheries

42 % overall prevalence



Number of hatcheries Sampled hatcheries Positive hatcheries

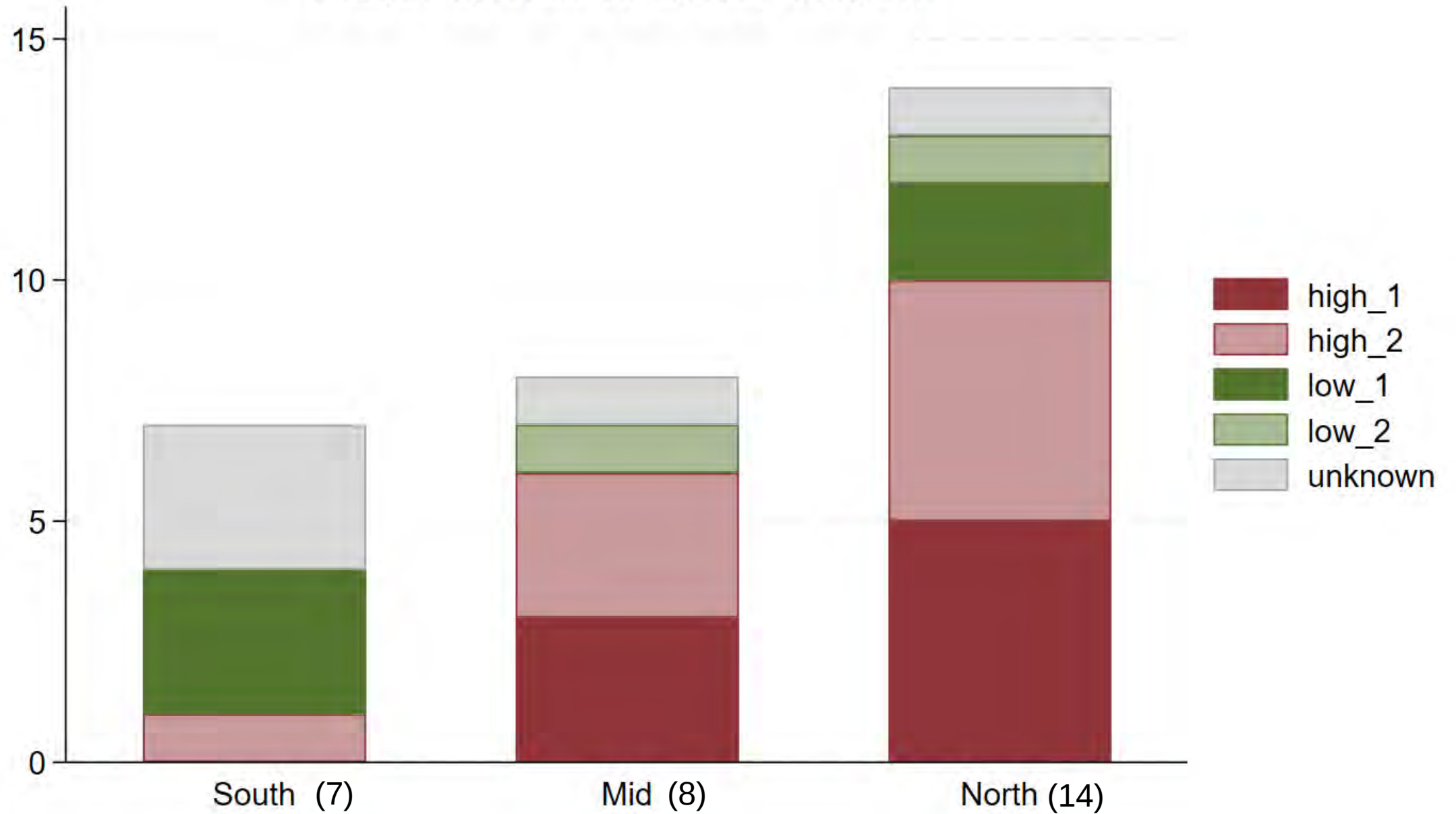
Virulence grouping

- Virulence definition based on infection trial from Wessel et al. 2020
- New trial is being planned now to elucidate the unknowns

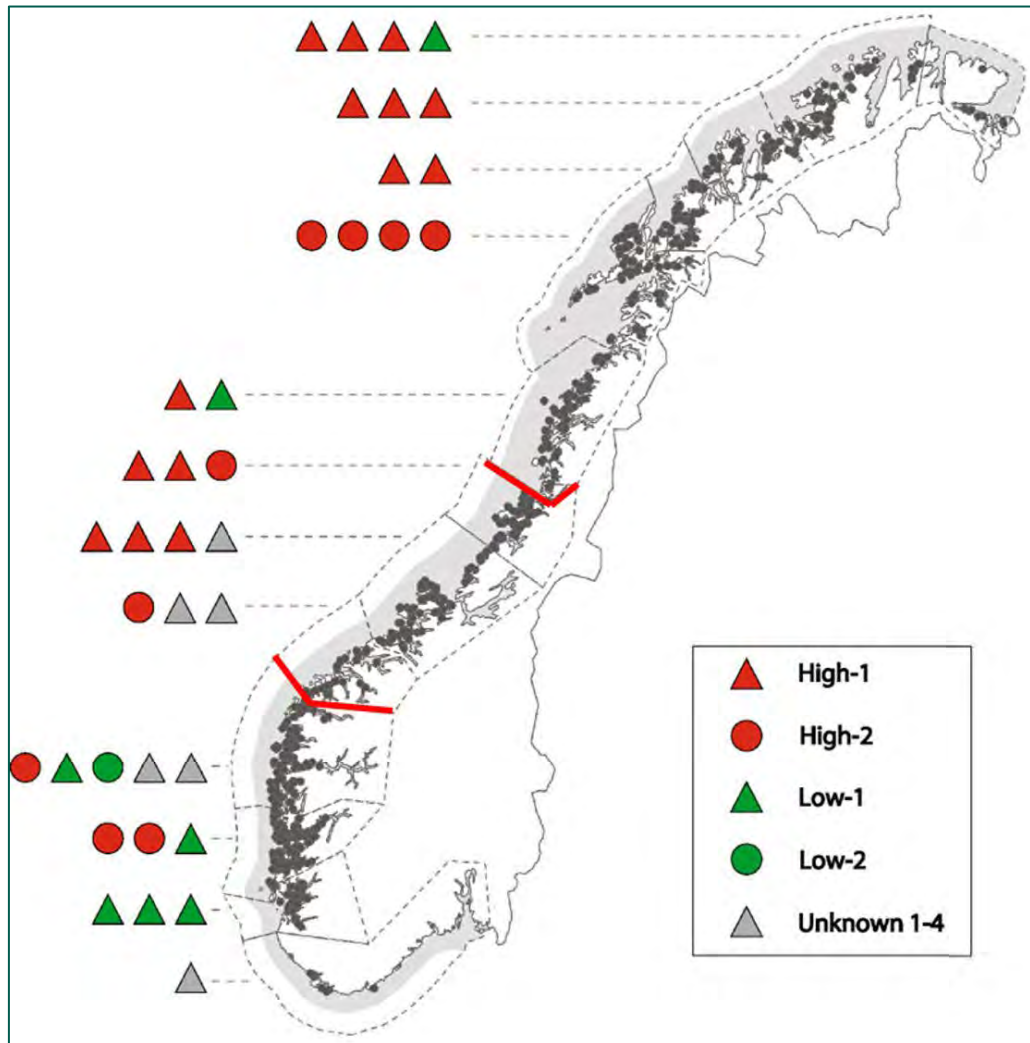
Genogruppe	S1 $\sigma 3$	M2 $\mu 1$	L1 $\lambda 3$	L2 $\lambda 2$	S4 $\sigma 1$
 High-1	B	B	A	A	D252N
 High-2	B	B	A	A	V107A
 Low-1	B	B	B	B	
 Low-2	A	A	A	A	
 Unknown-1	B	B	B	A	
 Unknown-2	B	B	A	A	
 Unknown-3	B	B	B	A	D252N
 Unknown-4	A	A	A	A	D252N
 Unknown-5	B	B	A	B	D252N

Wessel Ø, Hansen EF, Dahle MK, Alarcon M, Vatne NA, Nyman IB, Soleim KB, Dhamotharan K, Timmerhaus G, Markussen T, et al. Piscine Orthoreovirus-1 Isolates Differ in Their Ability to Induce Heart and Skeletal Muscle Inflammation in Atlantic Salmon (*Salmo salar*). *Pathogens*. 2020; 9(12):1050. <https://doi.org/10.3390/pathogens9121050>

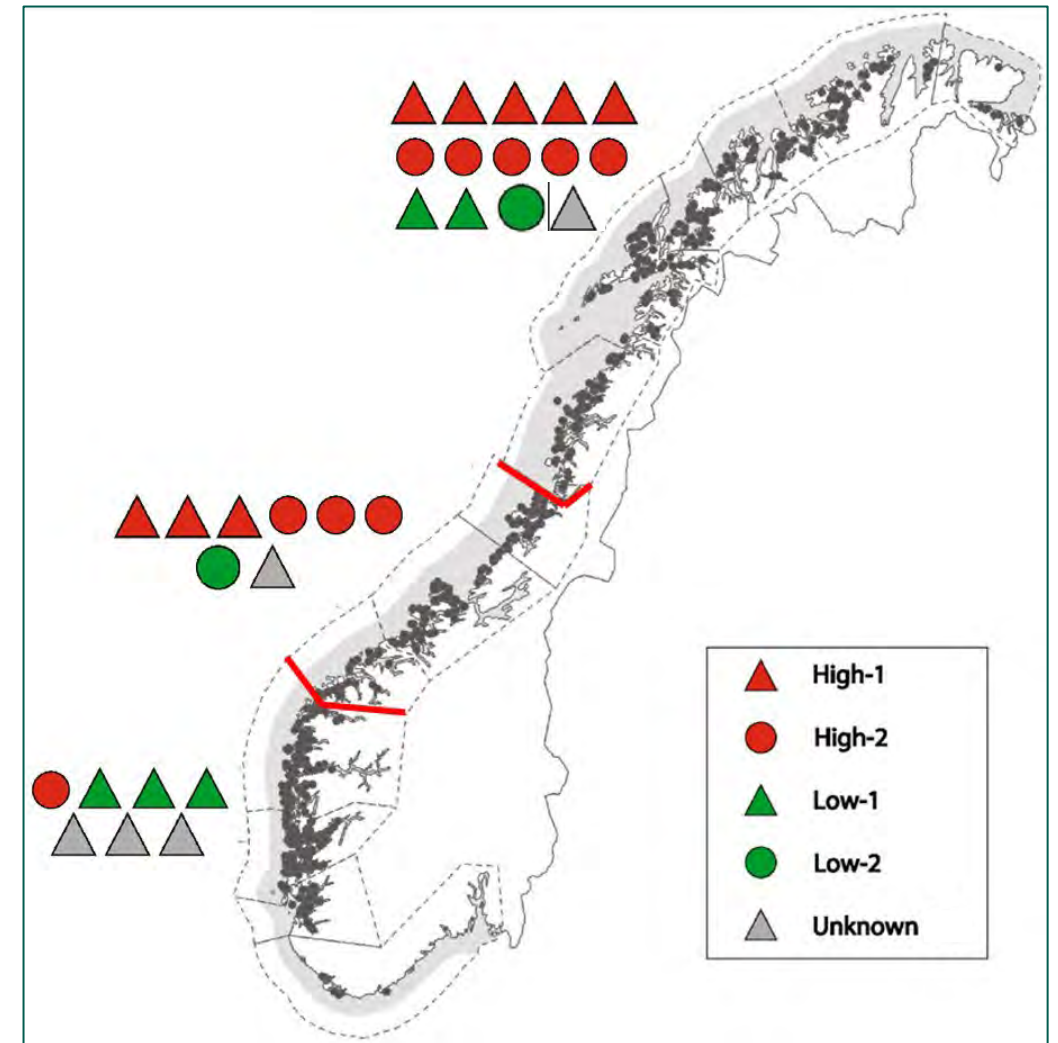
Distribution of virulence variants



Genogroups, sea, 2021-study



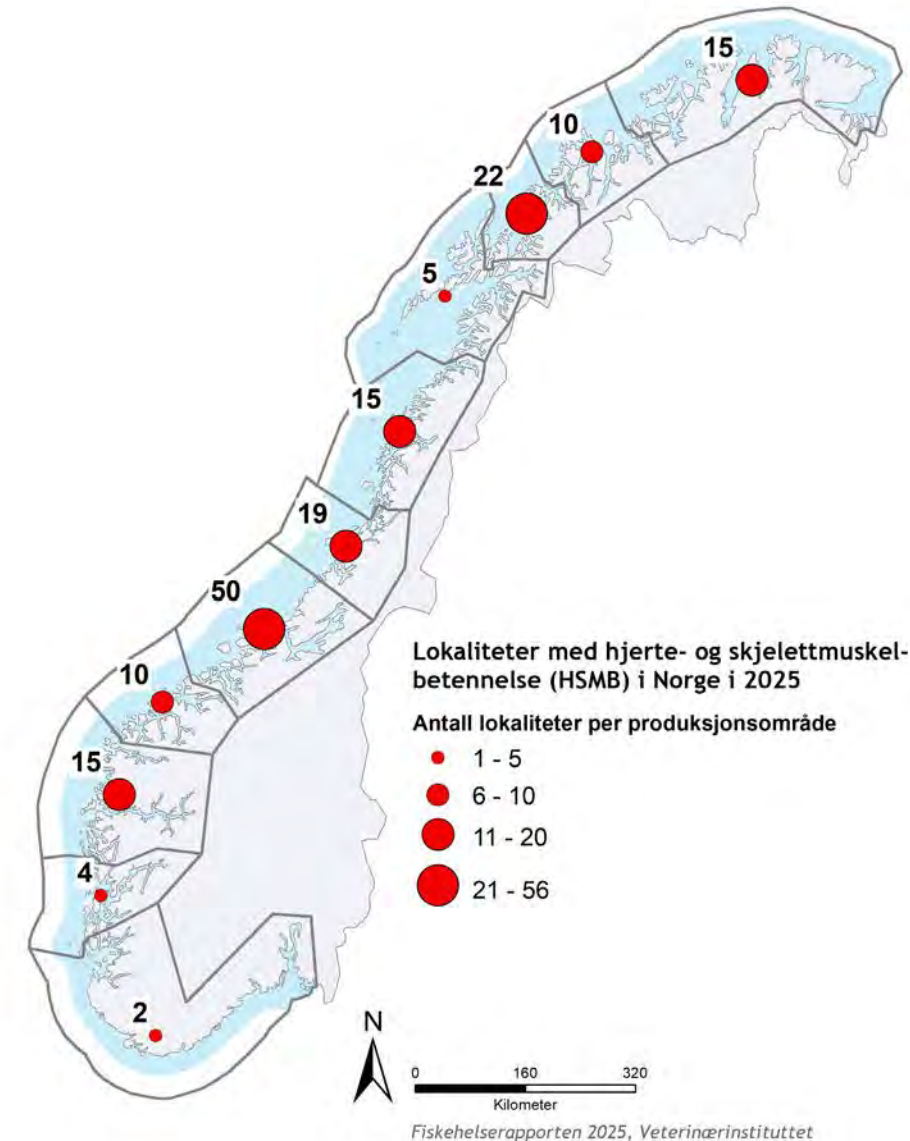
Genogroups, hatcheries, PRVariant



Vatne, N.A., Stormoen, M., Lund, M. *et al.* Genetic grouping and geographic distribution of Piscine orthoreovirus-1 (PRV-1) in farmed Atlantic salmon in Norway. *Vet Res* **52**, 131 (2021). <https://doi.org/10.1186/s13567-021-01000-1>

Summing up

- High prevalence of PRV in Norwegian hatcheries
 - 42% (ranging 31 - 63%)
 - Only samples sent to one diagnostic lab
 - Samples probably sent due to some clinical situation, may skew the results towards higher prevalence compared to a cross-sectional study in the field
- Distribution of positive sites coincides with results found in previous studies and results from the fish health report
- Distribution of virulence groups also coincides with geographical areas reporting highest impact of HSMB at sea



PRVariant – the next steps

PRVariant started late November 2025 and ends late October 2027 – more will come!

- Prevalence study from sea sites with virulence grouping
 - Association with HSMI-diagnosis
- Experimental trial to understand the virulence of the unknown variants
 - Which segments determines the virulence?
- Does the biosecurity routines differ between hatcheries with and without PRV-1?
- Washing and disinfection routines to eliminate PRV-1
- Is it a connectivity between sea sites and hatcheries in the same fjord system?
- Can we establish common preventive and biosecurity actions for PRV-1 infections, and HSMI, at both land and sea?

Financed by:



Big thanks to:



**Øystein
Wessel,
NMBU
Project lead**



**Simen
Westegaard
Larsen,
NMBU**



**Stine
Braaen,
NMBU**



**Joakim
Brunet,
PatoGen**



**Fredrikke
Nyberg
Formo,
PatoGen**



**Linda
Ramsevik
Teigene,
PatoGen**