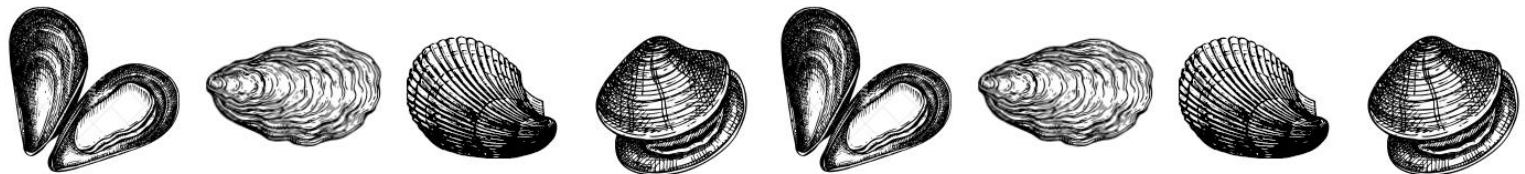


# COMITÉ NATIONAL DE LA CONCHYLICULTURE

Update on the French shellfish industry strategy for  
assessing the risk of infectious noroviruses in shellfish

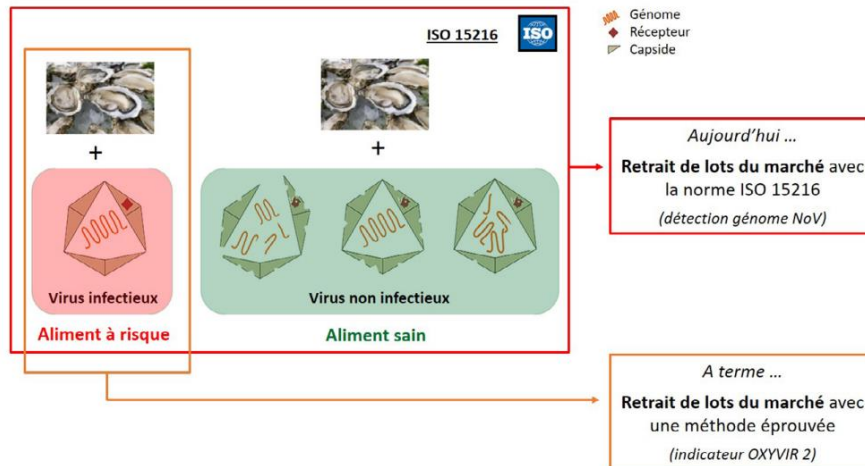
WG2 – Aquaculture Advisory Council

10h-14h30, 11/06/24



# OXYVIR programme (2017-2023, FEAMP)

Objective: To evaluate and validate the use of infectious group II F-specific RNA bacteriophages (FRNAPH-II) to estimate the presence of infectious noroviruses in oysters



As with *E. coli*, apply of the Mossel's concept (1983) to validate this indicator:

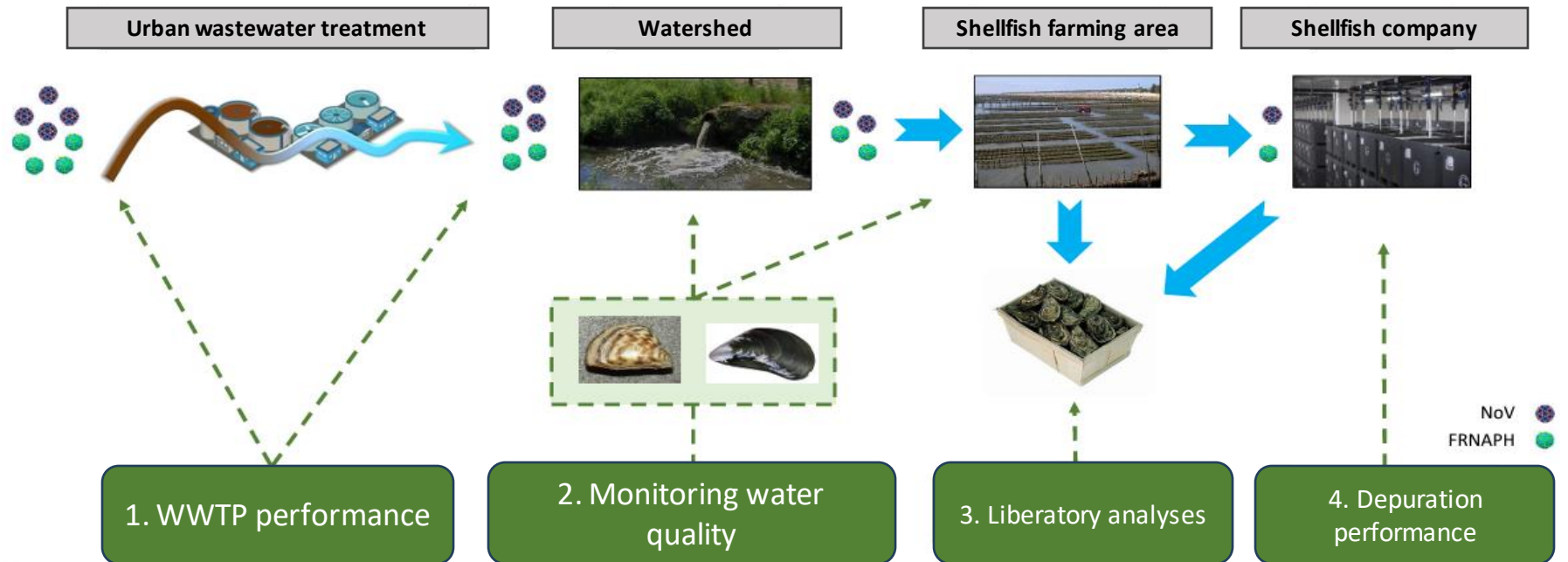
- « Must always be detected when the pathogen is present »
- « Can be detected in the absence of the pathogen »

# Conclusions of the OXYVIR programme

- **Enteric origin** and **similar structure** of FRNAPHs and noroviruses
  - FRNAPH-II genomes > norovirus genomes in **wastewater**
  - **Degradation of FRNPAH and norovirus genomes low and similar** in:
    - In the **environment**
    - During **oyster depuration**
    - Under **representative oyster farming conditions**

⇒ **Correlation demonstrated** between FRNAPH-II and norovirus genomes in oysters
  - **Partially demonstrated similar survival** of infectious FRNAPHs and infectious noroviruses in oysters:
    - Results from 15 meal scraps incriminated in norovirus epidemics
    - Infectious FRNAPH criterion used routinely by oyster farmers (no negative customer feedback)
    - Literature data: survival of infectious noroviruses in seawater between 14 and 20 days (human enteroid technique) (Desdouits et al., 2022)
- ⇒ **Willingness of the French shellfish industry to deploy the use of the OXYVIR indicator (group II F-specific RNA bacteriophages)**

# OXYVIR indicator, a monitoring tool to control the threat of infectious noroviruses in shellfish



**Work on WWTPs:** network separation and renovation, reduction of enteric virus load (UV)

**Real-time information** on malfunctions

**Enteric virus threshold** in treated wastewater (urban wastewater directive)

**Monitoring infectious noroviruses in shellfish during the risk period using the OXYVIR indicator:** like REMI microbiological monitoring

**If thresholds are exceeded (to be determined):** management measures (temporary downgrading of the sanitary quality of the zone and obligation for long-term purification)

**Product protection:** unsinkable basins

**Long purification with the OXYVIR indicator:** purification basins and water treatment

# Experimental monitoring of the OXYVIR indicator (1/2)

## When?

During the risk period for winter gastroenteritis : from November to April over two consecutive winters

## Where?

- In shellfish areas at risk from norovirus
- In several shellfish areas with little or no influence from viral pollution of faecal origin

## How?

- Shellfish samples taken once a week at identified
- Analyses of shellfish:
  - Génome of GI and GII noroviruses,
  - Génome of group II F-specific RNA bacteriophages,
  - Total infectious F-specific RNA bacteriophages (**OXYVIR indicator**),
  - *E. coli*.

# Experimental monitoring of the OXYVIR indicator (2/2)

## How? - continued

- If infectious F-specific RNA bacteriophages ( $> \text{LOQ} = 5 \text{ PFU/g}$  digestive glands) are detected in shellfish, **several batches are recovered and sent to professionals for purification:**
  - Monitoring of viral decontamination of batches of shellfish over 21 days
  - Sampling and analysis on D0, D7, D14 and D21:
    - Génome of GI and GII noroviruses,
    - Génome of group II F-specific RNA bacteriophages,
    - **Total infectious F-specific RNA bacteriophages (OXYVIR indicator),**
    - *E. coli*.
- Analysis stopped if total infectious F-specific RNA phage concentration  $< \text{LOQ}$

Results of experimental monitoring transmitted to professionals, in particular results of the OXYVIR indicator for implementation of management measures

# Expected objectives

## Why?

- **Acquisition of knowledge** via an in-situ study of shellfish farming areas representative of the national network
- **Assessment and validation of the threshold for infectious FRNAPH** in shellfish in the area to manage the risk of infectious noroviruses
- **Determination of management measures** to be adopted: identification of at-risk areas, duration of purification in closed tanks depending on initial contamination with infectious F-specific RNA phages, relaying of shellfish in a protected area, etc.

## Final objectives

- **Use of the infectious RNA F-specific bacteriophage indicator** with setting of a threshold in shellfish i) in the production area or ii) after purification in a closed circuit depending on the initial contamination with infectious RNA F-specific bacteriophages
- **Norovirus risk management tool** for shellfish professionals in the area and to define the duration of shellfish purification depending on the level of contamination.
- **Implementation of management measures** by the industry/Government

# Reflections on management measures linked to the management of the norovirus hazard in shellfish

As part of the experiment, application of voluntary management measures:

- In shellfish areas targeted by the experiment
- Ideally, in all areas where infectious bacteriophages are monitored

## How?

1. Determination of an infectious bacteriophage threshold to be defined and refined during the experiment: 10, 15 or 20 PFU/g of DG.
  2. If the threshold is exceeded:
    - **Relaying the shellfish** in an area free of infection and natural purification in the area with release analyses on the shellfish
    - Modification of farming practices => **harvesting in a norovirus-free zone**
    - **Prolonged purification** with release analyses on the shellfish (the duration of purification depends on the initial contamination)
    - **Etc.**
- ⇒ A national guide should be drawn up: objectives of the experiment, receipt of results and voluntary management measures to be applied, principle and application of purification, etc.



# Questions



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THANK YOU FOR YOUR ATTENTION!

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