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## **Antimicrobial-resistant *Escherichia coli* in the rainbow trout farm environment in brittany, NW France**

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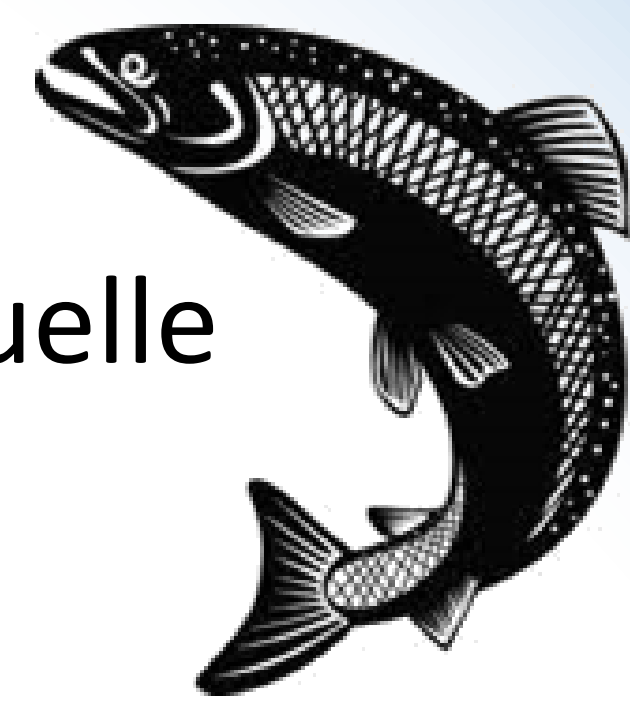
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## Introduction

Antimicrobial resistance (AMR) is a threat for human and animal health, and for the production of safe food including aquaculture products.

A **One Health approach** is needed to solve this global challenge, but studies that explore the link between AMR from animals, humans and the environment are very scarce.

The objectives of this study were:

- to assess the presence of **antibiotic-resistant *Escherichia coli* in the rainbow trout farm environment**,
- and to explore the **similarity** with AMR patterns from *E. coli* from **farmers**.



## Results

- 67 *E. coli* isolates were obtained
- 42% from farm A and 58% from farm B
- 36 isolates were obtained from water, 28 from fish farmers and 3 from fish.
- On farm A**, *E. coli* was found in water, fish and fish farmers.
- On farm B**, only water and fish farmers were positive
- E. coli* was not found in any biofilm sample
- Table 1 summarizes the results of AMR against each antibiotic tested.

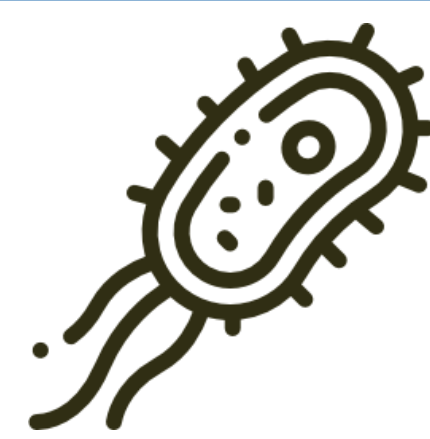


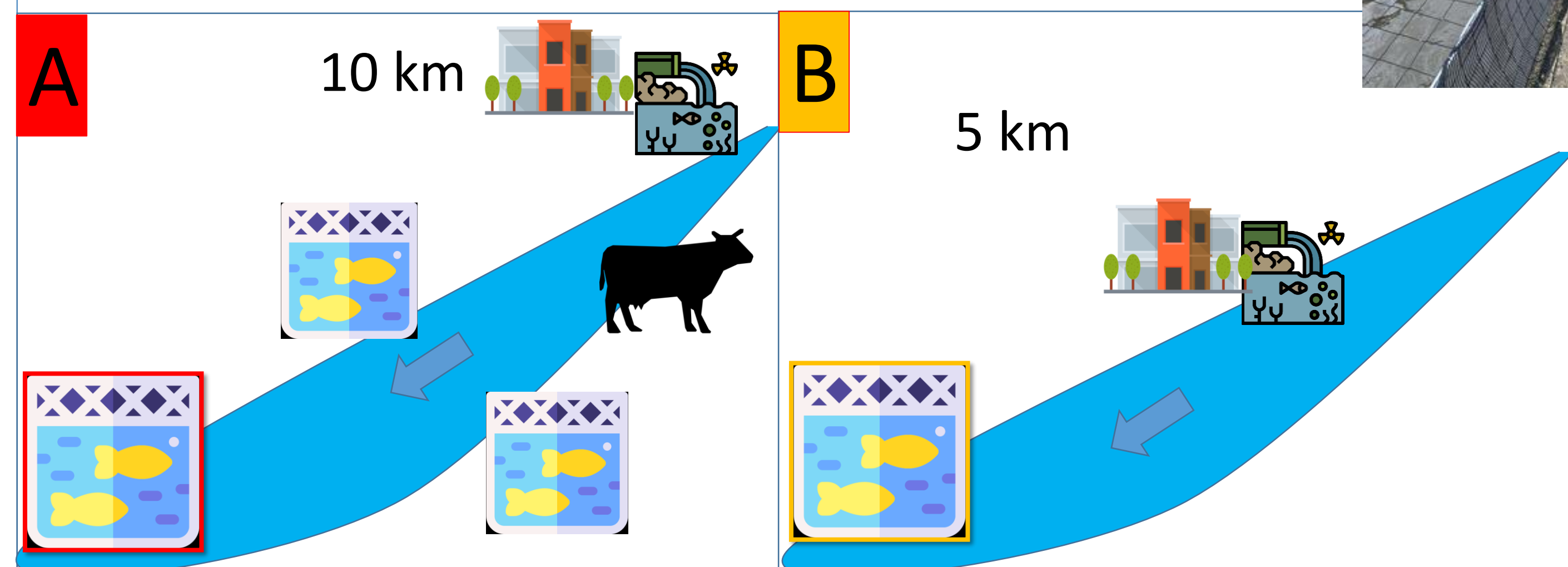
Table 1. Cut-off values used for each antibiotic tested, percentage of resistant isolates and samples of origin

Antibiotic	Cut-off value	% of resistant isolates	Sample type
Enrofloxacin	0.125 mg/l	17.9% (12/67)	water and farmers
Oxytetracycline*	8 mg/l	29.9% (20/67)	water, farmers and fish (sole resistance found in fish gastrointestinal tract)
Thrimethoprim-sulfadimethoxine*	1 mg/l – 19 mg/l	20.9% (14/67)	water and farmers
Flumequine*	16 mg/l	6% (4/67)	water and farmers, only farm B
Colistin	1 mg/l	25.4% (17/67)	water (mostly) and farmers
Florfenicol*	32 mg/l	0% (0/67)	-
Oxolinic acid*	1 mg/l	10.4% (7/67)	water, farmers and fish

\*antibiotic authorized for its use in aquaculture in France, only under veterinary prescription

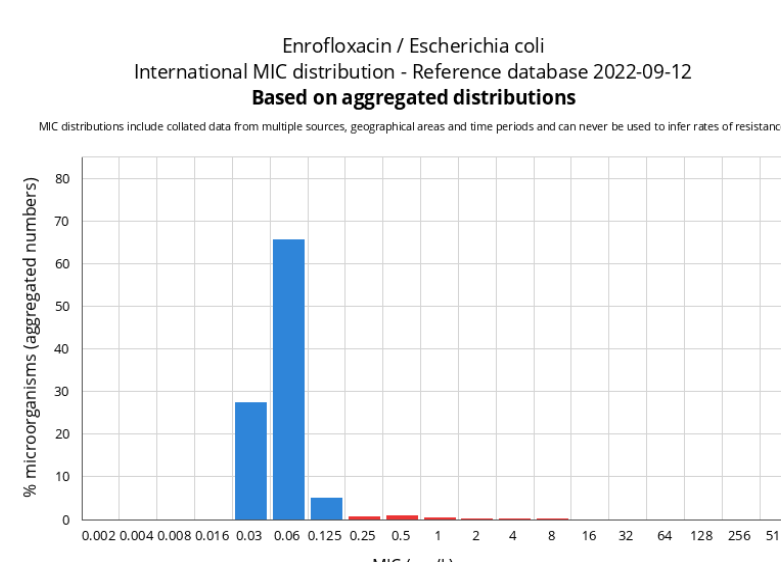
## Materials and Methods

- 2 rainbow trout farms in Brittany, NW France
- Both were continuous flow systems
- Different risk scenarios for AMR-*E. coli* sources:



- From February to August 2020
- Monthly** testing of *E. coli* in **water, biofilm and fish**
- One-time test in feces from **farmers** and their employees
- In total: **480 farm samples**, plus eight human feces.

- AMR was tested by the **broth microdilution method** against seven Antibiotics (Table 1).
- Epidemiological cut-off values** were used to classify an isolate as susceptible or resistant, preferentially those values determined by the EUCAST.



- 25/67 isolates did not show phenotypic resistance to any of the antibiotics tested (11 from farm A, and 14 from farm B).
- All 3 *E. coli* isolates from **fish (diseased fish, farm A) were resistant**.
- All 6 isolates showing **multi-drug resistance** were found in water and farmers from **site B**.

## Discussion

- E. coli* occurrence is very similar in **both sites**
- Fish are unlikely carriers and biofilm does not act as a reservoir of *E. coli* in this farm environment
- Similar AMR** phenotypes are found in **water and farmers**
- Some AMR phenotypes (e.g. colistin) are attributable to **upstream pollution** originating from livestock or humans, or both

