

## ANTIMICROBIAL RESISTANCE (AMR) IN AQUACULTURE FROM A ONE HEALTH APPROACH

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One Health proposes an integrated approach to work collaboratively to study the connection between the health of people, animals, and the environment (<https://www.cdc.gov/onehealth/index.html>), recognizing the interconnection in the spread of pathogens and their antimicrobial resistance (AMR). Diseases in aquaculture are mainly associated with intensive cultures, poor biosecurity, and impacted environments. Antimicrobials are being used widely for the treatment of diseases, as growth promoters and to eliminate or inhibit the proliferation of pathogenic bacteria to prevent outbreaks. Metaphylaxis (antimicrobial administration to a group of individuals to control of a disease) in aquaculture affects both pathogenic and symbiotic bacteria and it is being discussed in terms of the risk for spreading AMR, due to the emergence, persistence, and transmission of reservoirs of antimicrobial resistance genes (ARGs). AMR bacteria is produced by conditions of the farm and the susceptibility to infections of shrimp due to the stress and usually having low genetic variability. The high levels of human contact with water and animals, the nationally and international shrimp trade, the relative lack of infrastructure for waste treatment, including antimicrobials, which are released directly into the aquatic environment completing the Human-Animal-Environment cycle.

In this scenario, shrimp producers are suffering infections by *Vibrio parahaemolyticus* strains carrying a toxigenic plasmid that causes acute hepatopancreatic necrosis disease (AHPND) and generating losses estimated at more than a US\$ billion in Asia. While no concrete actions have been taken in shrimp farming worldwide from 1994 to the present, different bacteria (*Vibrios*, *Aeromonas*, *Pseudomonas*, *Escherichia*, *Klebsiela*, *Shigella*, others) are reported carrying different ARGs that allow them to be resistant to all generations of cephalosporins (CEF), glycopeptides (GLY), macrolides (MAC), quinolones (QUIN), polymyxins (POLY), aminoglycosides (AGLY), ansamycins (ANS), carbapenems (CARB), monobactams (MONO), penicillins (PEN), amphenicols (AMPH), lincosamides (LIN), sulphonamides (SUL), tetracyclines (TET), anti-staphylococcal penicillins (APEN), aminocyclitols (ACYC), cyclic polypeptides (CYPOL) and nitrofurantoin (NIT) (Fig. 1). The increase in AMR and the spread of ARGs in bacteria isolated from shrimp farming is of great concern, suggesting the need to implement systematic surveillance systems at the local, regional and national levels, following One Health approach that allow evaluating the true impact of the problem in order to apply prevention actions to support the industry and to lessen the impact on human health.

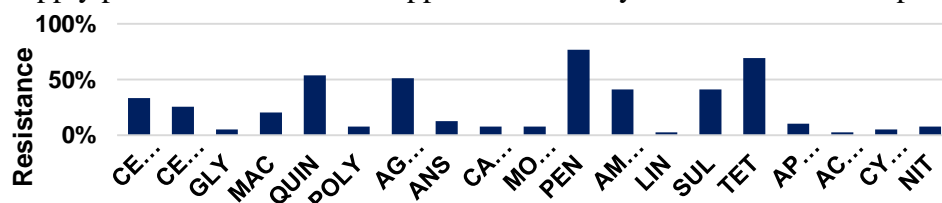


Fig. 1. Antimicrobial resistance in bacteria associated with farmed shrimp (adapted from Thornber et al. 2020, Rev Aquac, 12(2):966-986; doi: 10.1111/raq.12367)