World Organisation for Animal Health

Regional Workshop on Antimicrobial Resistance (AMR) in Aquaculture - English-speaking Africa

13 - 15 August 2025
Harare, Zimbabwe

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World Organisation for Animal Health

Research Priorities for AMR in Aquaculture

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CLAR

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01 Introduction: The Growing Threat of AMR

Antimicrobial resistance (AMR) poses significant challenges for aquaculture sustainability and food security.

This presentation outlines key research priorities to tackle AMR in aquaculture and provides guidance on accessing funding by country and region to support these efforts.

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Surveillance and Monitoring Systems

Effective surveillance systems are essential to detect and monitor AMR patterns in aquaculture environments.

This includes

- **standardized sampling,**
- **molecular diagnostics,**
- **data sharing**

to track resistance trends and inform management decisions.

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Key Pathogens and Resistance Mechanisms

To helps prioritize interventions. must be

- Identifying critical pathogens.
- and understanding specific resistance mechanisms

Research should focus on

- pathogenic bacteria and their resistance genes.
- environmental factors influencing AMR development and spread.

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Risk Mitigation and Alternative Strategies

- Implement closed systems like recirculating aquaculture systems and IPRS to:-
    - limit AMR gene release and
    - reduce antibiotic usage.

- Explore alternatives such as
    - ✓ Apply Biosécurity stratgy
    - ✓ selective breeding for disease resistance,
    - ✓ vaccines,
    - ✓ probiotics,
    - ✓ antimicrobial peptides,
    - ✓ and phage therapy

to mitigate AMR risks effectively.

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Global Action Plan on AMR

WHO's Response to AMR

In 2015, the World Health Organization (WHO) established a Global Action Plan (GAP) on Antimicrobial Resistance (AMR) to combat this growing threat to public health.

National Action Plans (NAPs)

Following the GAP, most WHO members developed National Action Plans (NAPs) based on a "One Health" approach, recognizing the interconnectedness of human, animal, and environmental health.

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Aquaculture's Role in AMR

Overlooked Sector

- Despite its significance in food production,
- aquaculture has often been overlooked in AMR governance,
- leading to potential risks.

The Need for Urgent Action

- ❑ Given the global production of aquaculture commodities and its role in livelihoods,
- ❑ preventing AMR in this sector requires urgent action and focused attention.

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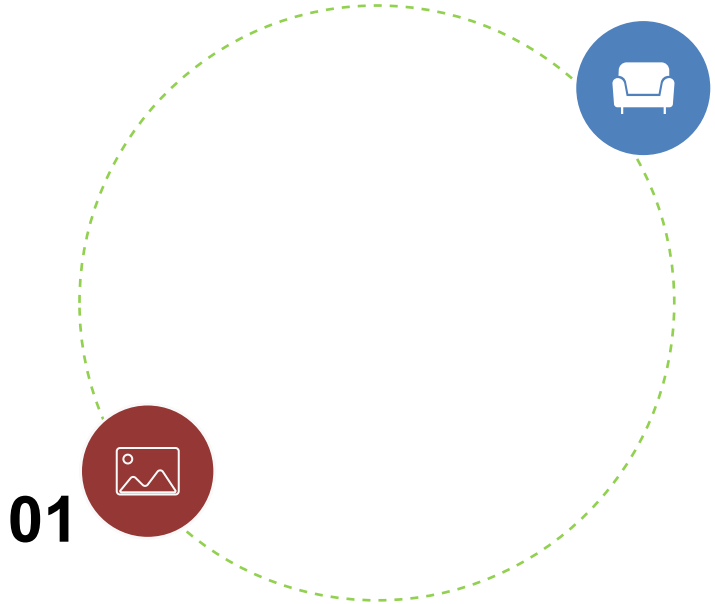
02 Understanding the Scope of AMR in Aquaculture

Systematic Review of Literature

Literature Analysis Timeframe

A systematic review of scientific literature was conducted to characterize AMR in aquaculture over the past 25 years.



02 Geographical Distribution of Studies

Most AMR-aquaculture related studies have taken place in China, followed by the United States and India, indicating a concentration of research efforts.

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Antimicrobials and Bacteria of Concern

01

Common Antibiotic Classes

Beta-lactamases, tetracyclines, sulfonamides, macrolides, and fluoroquinolones are the most represented classes of antibiotics in aquaculture.

02

Predominant AMR Bacteria

Vibrio spp. and Aeromonas spp. are the most investigated antimicrobial-resistant bacteria in the aquaculture environment.

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03 Analyzing National Action Plans for Aquaculture

NAP Inclusion of Aquaculture

Percentage of Countries Ignoring Aquaculture

A significant 37% of countries did not mention an aquaculture component within their AMR NAP.

Highlighting a critical gap in governance.

Regional Implementation Rates

The South-East Asia Region (SEARO) had the highest implementation rate of AMR-aquaculture programs.

Emphasizing the importance of aquaculture in the region.

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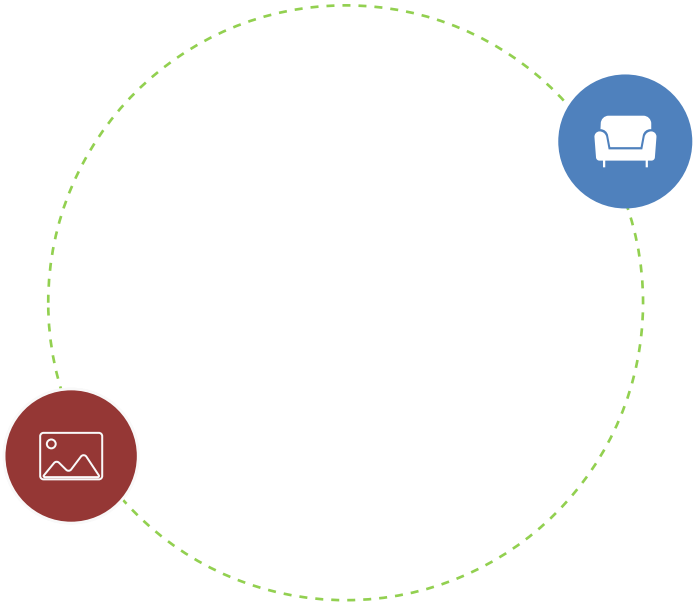
Factors Influencing NAP Implementation

Economic Considerations

Countries where aquaculture plays a vital role in livelihoods are more likely to incorporate it into their AMR NAPs.

01



02

International Support

FAO, WOAH support, through initiatives like the Blue Growth Initiative (BGI), has been crucial to the development of some countries' AMR NAPs.

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04 Identifying Gaps in AMR-Aquaculture Governance

Limited Data Transparency

Threat to Industry Sustainability

The limited data transparency regarding antimicrobial usage in aquaculture could threaten the sustainability of the industry and its associated economic impacts.

Lack of Implementation

Little to no implementation in controlling the spread of AMR has occurred in global aquaculture, despite its inclusion within the "One Health" framework.

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Inconsistent "One Health" Approach

Missing Sector Guidelines

- ❑ Many countries have developed extensive Animal Health sections within their NAP,
- ❑ but specific guidelines for the aquaculture sector are often lacking.

Need for Sector Inclusivity

- ❑ Countries should consider the inclusion of all relevant sectors in the development.
- ❑ or updating of their NAPs to ensure a comprehensive "One Health" approach.

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05 Addressing the Challenges and Progress Made

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Encouraging Country Commitments

01

NAP Development and Implementation

Countries must be developing and/or fully implementing AMR NAPs.

02

Research and Monitoring

- ✓ Further engagement in the research, monitoring.
- ✓ surveillance of antimicrobial usage
- ✓ AMR within the aquaculture sector is essential.

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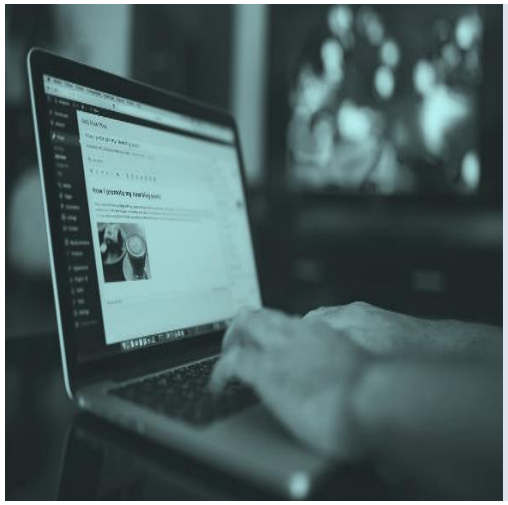
Collaborative Efforts



National and International Collaboration

Collaboration at national and international levels is necessary for a concerted "One Health" approach.

Knowledge Sharing Initiatives

Adopting a common language for sharing knowledge and expertise is essential for broader outreach and faster technological advancement in addressing AMR.

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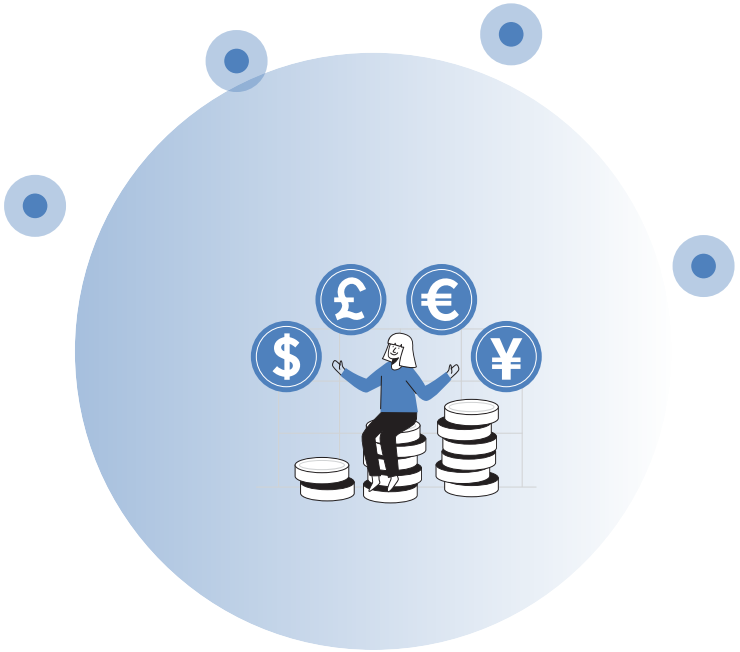
06 Future Directions and Recommendations

Enhancing Surveillance and Monitoring

Standardized Methodologies

Implementing standardized methodologies for assessing AMR in aquaculture is crucial for accurate data collection and analysis.



Data Integration to Improve Insight

Integrating the findings from various studies with advanced analytical tools can provide robust insights for improving public health.

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Promoting Responsible Antimicrobial Use

Education and Training

Providing education and training to aquaculture farmers on responsible antimicrobial use is essential for reducing AMR selection pressure.

Alternative Therapies

Promoting the use of alternative therapies, such as probiotics and bacteriophages, can help reduce the reliance on antibiotics in aquaculture.

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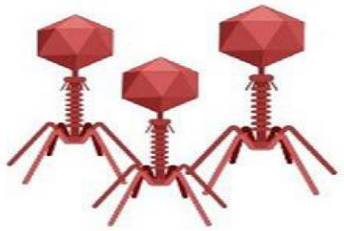
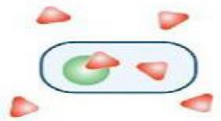
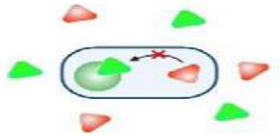


Bacteriophages



Quorum sensing

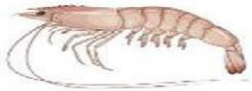


Quorum sensing
competitive inhibition

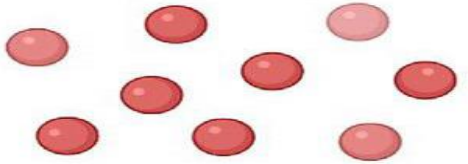
Quorum quenching

Quorum quenching

Vaccines

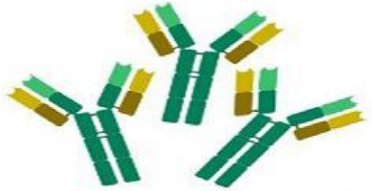


Alternatives to
antibiotics in
aquaculture production

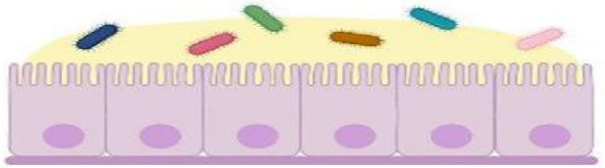


Bacteriocins

Medicinal plants



Chicken egg yolk



Probiotics/Prebiotics/
Synbiotics/Parabiotics/Postbiotics

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Global Commitment

Strengthen Knowledge

Strengthening knowledge through

monitoring

surveillance systems

research

for consistent regulation of antimicrobials.

Consistent Regulation of Antimicrobials

Improve awareness and understanding among

- ✓ **Member countries,**
- ✓ **Veterinarians,**
- ✓ **Farmers,**
- ✓ **Stakeholders**
- ✓ **Citizens**

to provide a global benchmark for consistent regulation of antimicrobials.

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And in the end

- ✓ Develop research proposals based on local priorities like
  - **surveillance initiation,**
  - **hotspot mapping,**
  - **alternative interventions aligned with One Health**
  - **national action plans.**
- ✓ Seek funding from international, regional, and national sources and build partnerships via organizations such as WOAH for technical guidance and alignment with global standards.
- ✓ Addressing AMR in aquaculture requires targeted research, robust surveillance, and innovative alternatives combined with strategic funding access.
- ✓ Collaboration across sectors and regions, guided by One Health principles, is critical to mitigate risks and ensure sustainable aquaculture development.

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Thank you for listening.

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