



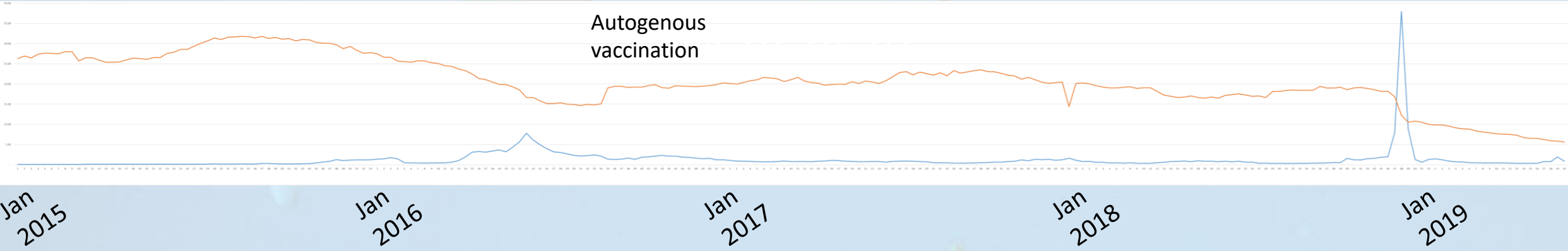
Training of National Focal Points for Aquatic Animal Health (Cycle IV)

2 - 4 October 2023 Kigali, Rwanda



Cefas: Aquatic animal health work in Ghana and Zambia

- WOAHA Collaborating Centre for Emerging Aquatic Animal Diseases (CCEAAD)
- Animal Health Strengthening Systems (AHSS)
- Ocean Country Partnership Programme (OCPP)
- FAO Antimicrobial Resistance Reference Laboratory (UK FAO AMR)



Received: 19 April 2017 | Revised: 31 May 2017 | Accepted: 6 June 2017
DOI: 10.1111/jfd.12681

SHORT COMMUNICATION

WILEY *Journal of Fish Diseases*

Streptococcus agalactiae Multilocus sequence type 261 is associated with mortalities in the emerging Ghanaian tilapia industry

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Received: 1 May 2020 | Revised: 29 July 2020 | Accepted: 3 September 2020
DOI: 10.1111/tbed.13825

ORIGINAL ARTICLE

WILEY

First detection of infectious spleen and kidney necrosis virus (ISKNV) associated with massive mortalities in farmed tilapia in Africa

José Gustavo Ramírez-Paredes¹ | Richard K. Paley^{2,3} | William Hunt¹ |
Stephen W. Feist^{2,3} | David M. Stone^{2,3} | Terence R. Field¹ | David J. Haydon¹ |
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Emanuel K. Pecku⁶ | Joseph A. Awuni⁶ | Timothy S. Wallis¹ | David W. Verner-Jeffreys^{2,3}

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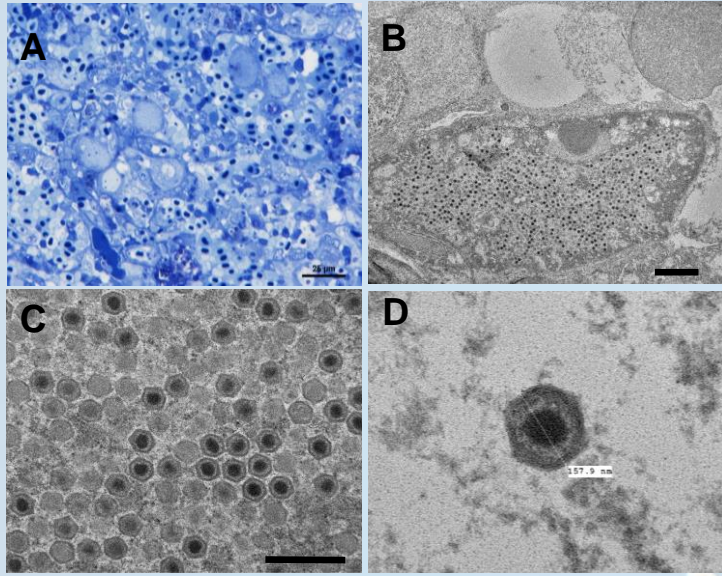
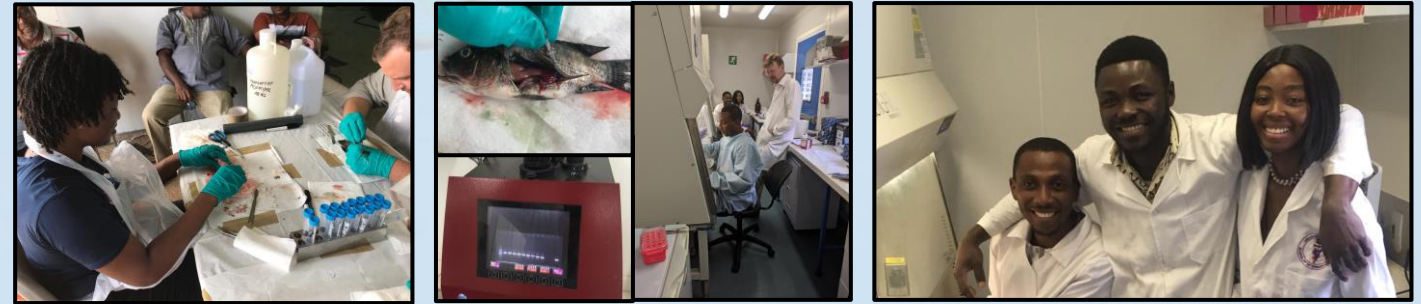
DOI: 10.1111/tbed.13825

ORIGINAL ARTICLE

Transboundary and Emerging Diseases | WILEY

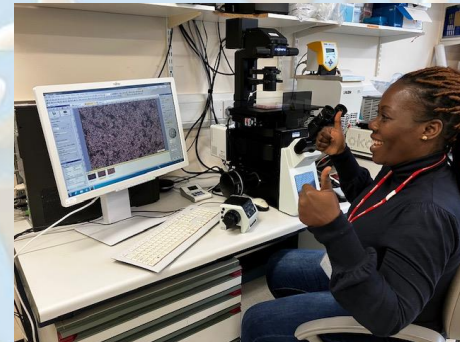
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Training and support in country - sampling and diagnostic techniques

Supporting PhDs - Epidemiology of ISKNV in lake Volta
- Novel detection methods



Animal health system strengthening (AHSS) - overview

- To work with competent authorities, through a **One Health, all-hazards** approach, to
 - improve livelihoods
 - enhance global health security
 - reduce preventable deaths
- Approach
 - Building alliances through the provision of tailored technical assistance
 - Support based on international standards (**WOAH PVS pathway**)
 - Facilitate mentoring, peer-to-peer skills and knowledge exchange between scientific, regulatory and veterinary experts



UKaid
from the British people

Project team



This project is administered by the UK's Department for Environment, Food and Rural Affairs (Defra) and its executive agencies:

The **Animal and Plant Health Agency** (APHA) delivers world leading technical assistance on responding to diseases outbreaks, building strong veterinary infrastructures and biosecurity

The **Centre for Environment, Fisheries and Aquaculture Science** (Cefas) is the UK's leading aquatic science organisation, working in the UK and overseas to safeguard human and animal health and support marine economies.

The **Veterinary Medicines Directorate** (VMD) is a leading regulator of veterinary medicines, experienced in providing technical support to improve regulatory capacity with expertise in AMR and residues surveillance.

Ghana – AHSS - aquatic

- Training in aquatic animal health management for fishery officers
- Development of diagnostic capacity
- Support development of emergency response
- Review current aquatic animal health and regulations
- Support development of national biosecurity

AHSS – fisheries officer training



The officers are now able to promote fish disease prevention and management strategies as part of the extension services for fish farmers and promote the sustainable development of aquaculture.

GENERAL, GENERAL NEWS, NEWS

DEFRA-UK trains veterinary and fishery officers on fish health and biosecurity

June 26, 2023 No Comments



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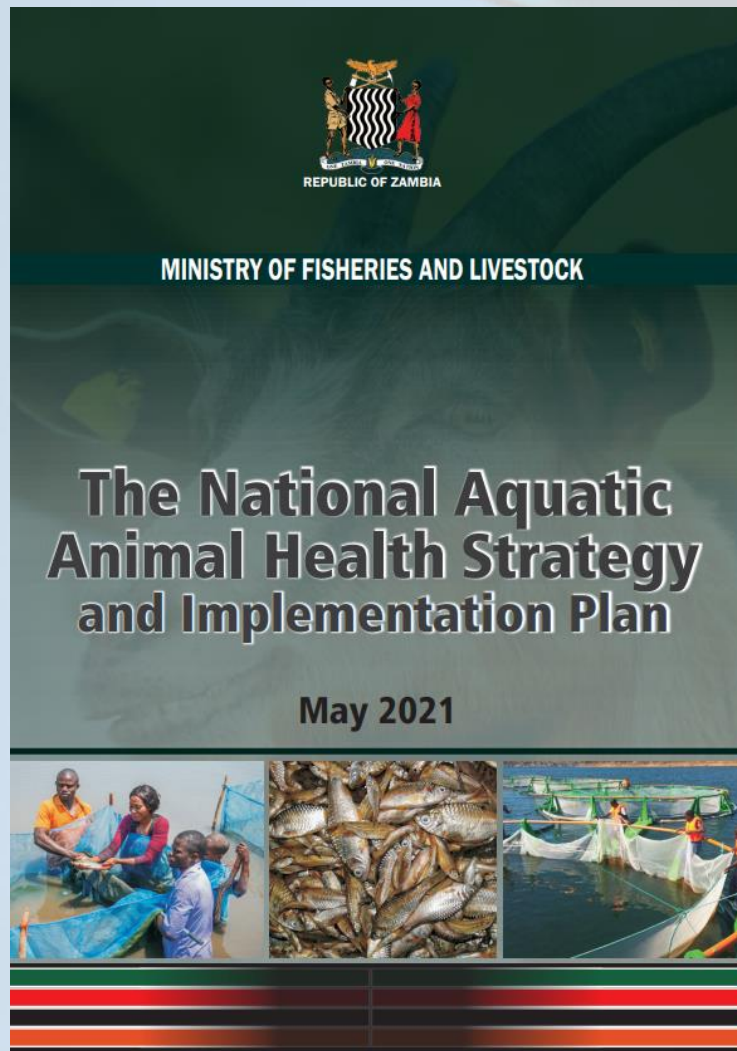
By Hannah Dadzie

A group of carefully selected officers of the Fisheries Commission of Ghana have been trained on fish health and biosecurity by Fish Health Inspectors from the Centre for Environment, Fisheries and Aquaculture Science (Cefas), an agency of the UK Department for Environment, Food and Rural Affairs (DEFRA).

The course was sponsored by the Animal Health System Strengthening Project (AHSS), a UK overseas development assistance project managed by Defra.

Aquaculture production Zambia

- 15 million hectares of water in the form of inland rivers, lakes and swamps, natural resource for fish production
- Wild capture fisheries provide the majority of fish production in Zambia (80 K compared to 20 K mt from aquaculture in 2014, leaving a deficit met by imports of 60 k mt).
- Aquaculture in Zambia is expanding and rapidly commercializing
- Production mainly tilapia species (eg *O. niloticus*) in earth ponds with a small larger scale commercial sector
- Main other farmed species is catfish (*Clarius gariepinus*)



Strategic Objectives

- Enhance Aquatic Animal Health Management
- Enhance AAH Research and Development
- Enhance collaboration with stakeholders
- Improve the AAH institutional capacity
- Operationalise AAH laboratories and support services

Support to implementation of the national aquatic health strategy, Zambia

- Development of capacity to allow Zambia to meet WOAHA standards
- Review legislation and regulations, e.g. disease listing
- Assess routes of pathogen introduction and mitigation
- Strengthening national biosecurity and borders
- Review early detection system
- Establishment of pathogen free zones

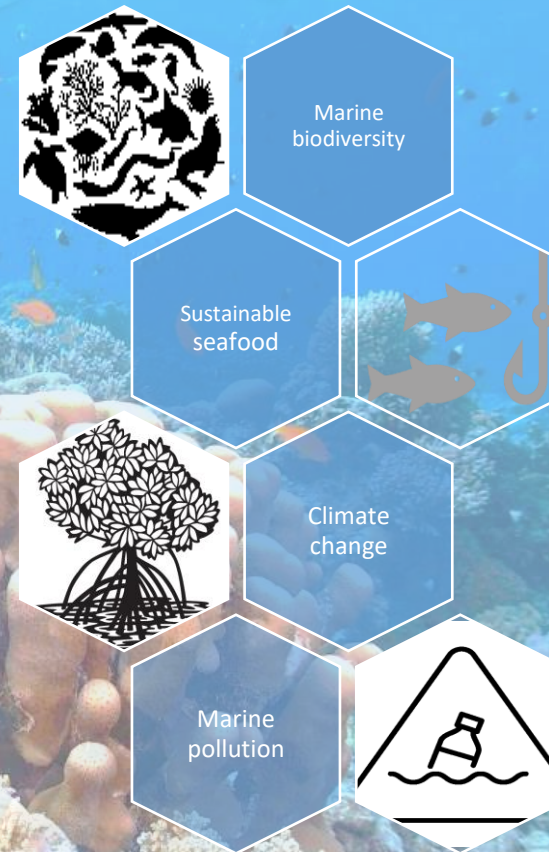
Animal health system strengthening - planned engagement in Zambia

- Training field staff in aquatic animal health (AAH) management
- Development of an AAH module for veterinary paraprofessional curriculum
- Development of diagnostic capacity at Central Veterinary Research Institute, Balmoral, Lusaka
 - PCRs for tilapia lake virus, *Aphanomyces invadans*
 - Histopathology
- Surveillance to demonstrate freedom from TiLV
- Support implementation of National Aquatic Animal Health Strategy

Blue Planet Fund: Ocean Country Partnership Programme

- strengthen marine science expertise
- develop science-based policy and management tools
- create educational resources for coastal communities

Overview of Collaborative Activities under the Sustainable Seafood Theme.



HM Government



Cefas



Marine
Management
Organisation



UKaid
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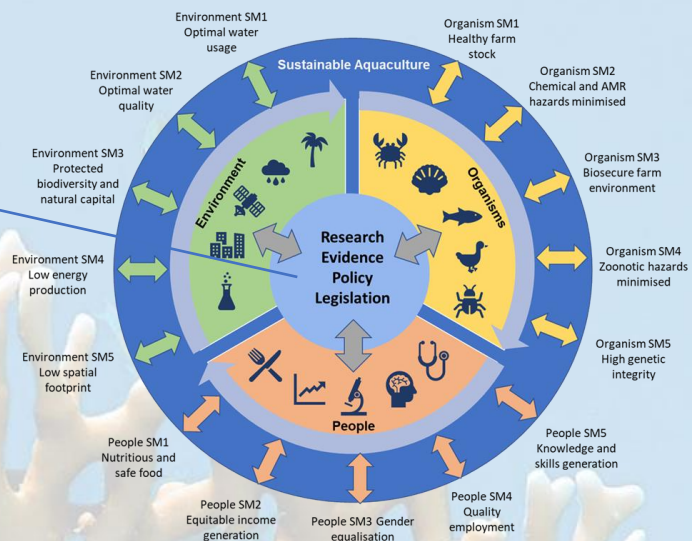
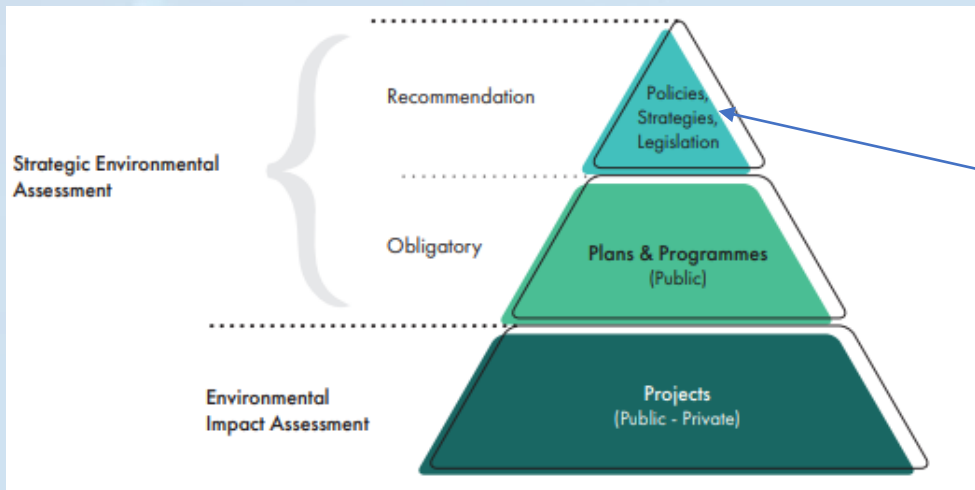
The Fleming Fund



Strategic Environmental Assessment for Sustainable Aquaculture Development in Coastal Environments using a One Health Approach

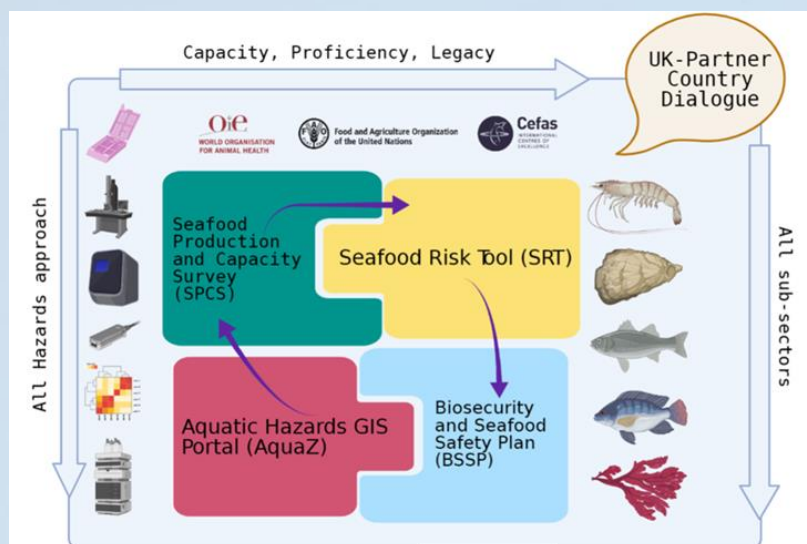
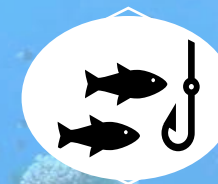


Undertake field sampling and GIS based activities to map chemical, physical and biological water quality parameters and hazards to produce spatial datasets to designate “aquaculture development zones” in areas that can meet suitable environmental criteria for One Health aquaculture.



BPF: Ocean Country Partnership Programme

Sustainable Consumption & Production: Seafood Risk Tool



Aim: One Health Aquaculture aims to build capacity within countries to detect and mitigate risks to production, trade, and consumption of seafood. Sustainable development is central.

Mechanism of engagement in Ghana may include:

- Completion of Seafood Production and Capacity **Questionnaire** to understand possible OHA support required in-country. Objectives and Capacity (e.g. EU trade, ref lab to diagnose aquatic animal disease).
- **Application of SRT** (chemical and bacterial hazard at farm, harvest, trade, consumption stages) to assess risk.
- Mitigation options (species, alternative farms etc), reassessment of risk and generation of **BSSP**. Access to data via **AquaZ** data portal.
- Other options: animal health and seafood safety projects relating to discrete sectors, including linkage to OIE and FAO Centres at Cefas.

BPF: Ocean Country Partnership Programme

a. Development of a comprehensive site suitability study for marine aquaculture (shellfish and finfish) in 8 sites across 4 coastal regions of Ghana. (Stakeholders: Fisheries Commission, Ministry of Sanitation and Water Resources, CSIR Ghana, Molendotech)

Deliverables;

- 1) SWOT analysis; Initial understanding of stakeholder interests in relation to aquaculture and specific species of interest; Potential of interest species and associated optimal growth conditions. Investigation of available datasets and data sources for the areas (aquaculture development zones).
- 2) Generation of chemical and physical water quality in-situ data of the 8 sites.
- 3) Provision of e-training in GIS and remote sensing.

b. Validation of rapid novel technology utilising gram negative endotoxins as a biomarker to quantify water quality of aquaculture sites. (GCRF Innovate UK- Africa AgriFood grant project alignment)

c. Conducting a baseline survey of associated biological and chemical risks at wild and farmed shellfisheries sites; Assessing risks to sustainable consumption and production. (Stakeholders: Fisheries Commission, Veterinary Services Directorate)

Deliverables;

- 1) Screening for specific WOAHA listed and/or non listed pathogens of concern;
- 2) Provision of training in sample handling and diagnostics. Training to be conducted in Ghana and/or Cefas UK.
- 3) Screening for food borne pathogens and scope wider food safety risk i.e., seafood risk profiling exercise.
- 4) Deployment of passive samplers for contaminants e.g. trace metal testing etc.

AHSS
alignment

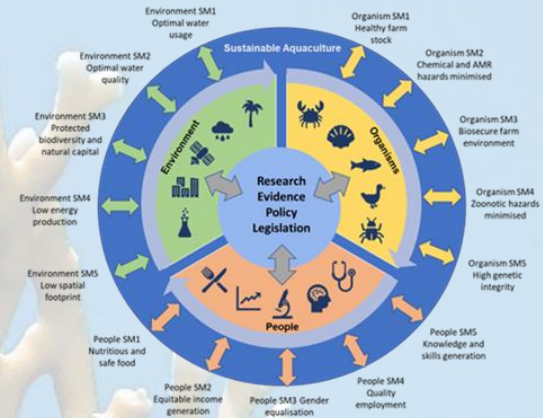
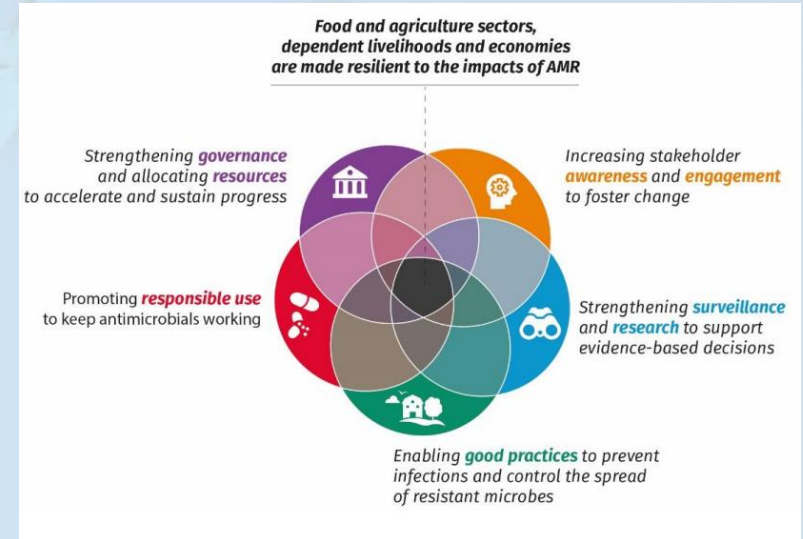
d. Conducting targeted and broad biodiversity surveys of marine and brackish water sites intended for commercial aquaculture production. (Stakeholder: Fisheries Commission)

Deliverables;

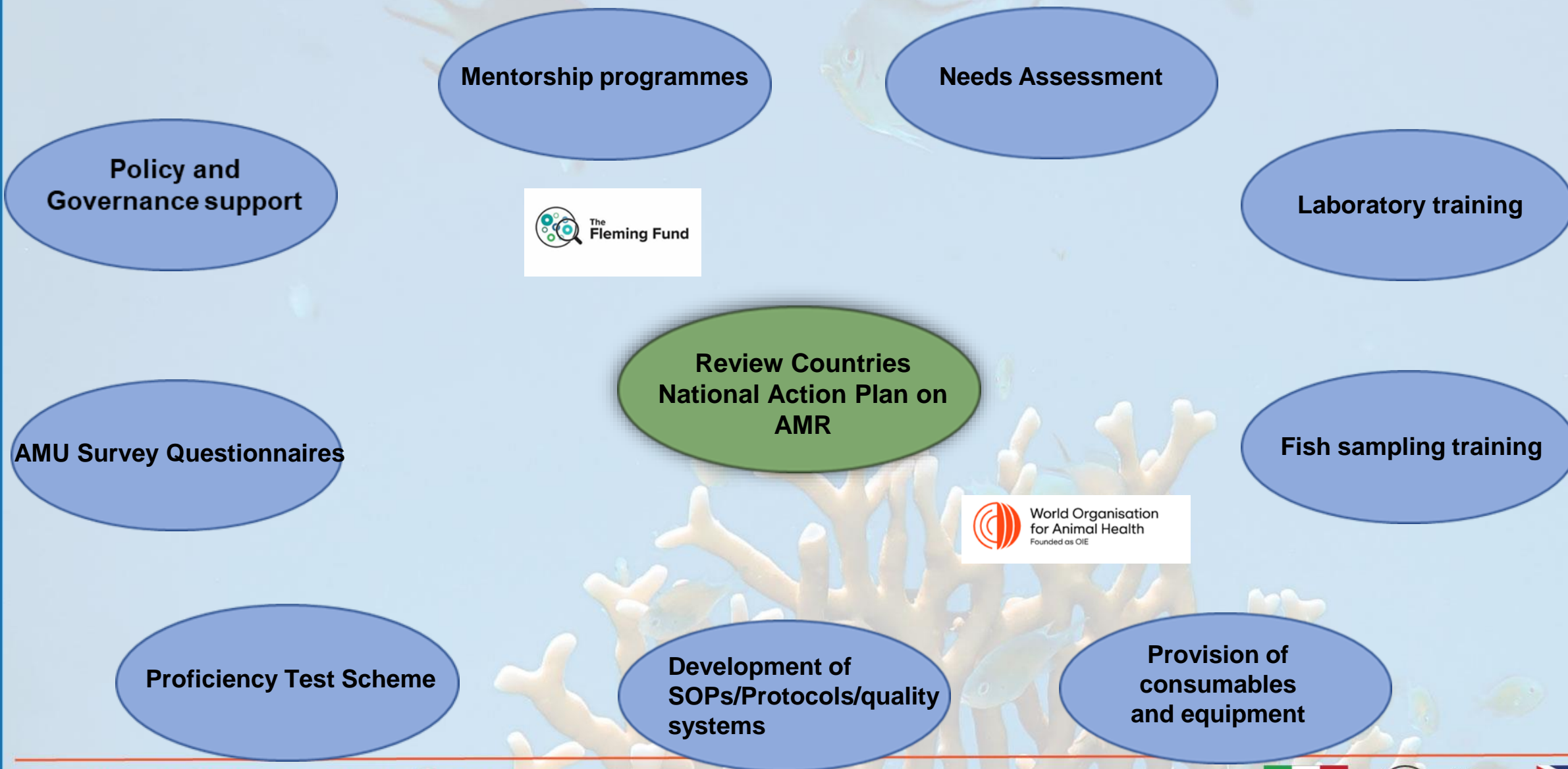
- 1) Collection and preservation of environmental DNA samples to produce sample sets suitable for future targeted and non-targeted biodiversity surveys (including host and/or parasite diversity screens) etc.
- 2) Utilisation of eDNA metabarcoding, conventional and quantitative PCR approaches to assess distribution/prevalence of targeted fish commodities in marine and brackish water environments.

e. Postgraduate studentships under the Association for Commonwealth University OCPP scholarship to support research in activity a, c, d. (Stakeholders: University of Ghana and University of Cape Coast)

f. One Health Aquaculture Workshop in Accra (26th - 28th February 2024) (Stakeholders: Fisheries Commission, MoFAD, Ghana Chamber of Aquaculture)



*Stentiford, G.D. et al (2020). *Sustainable aquaculture through the One Health lens*. Nature Food 1, 468–474





Antibiotics Use data in Aquaculture

ANTIBIOTIC USE AMONG FRESHWATER FISH FARMERS IN SELECTED FARMS IN GHANA.

Thank you for agreeing to take part in our survey. The aim of the survey is to understand the knowledge, attitudes, and practice of antibiotic use amongst fresh water fish farmers in Ghana.

The information you provide will help us to provide better training for farmers on best practices of antibiotic use to reduce the potential for antibiotic resistance.

All responses will be treated anonymously so please answer honestly and if you do not wish to answer a question please say so. You can stop at any time.

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Next

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Clear form

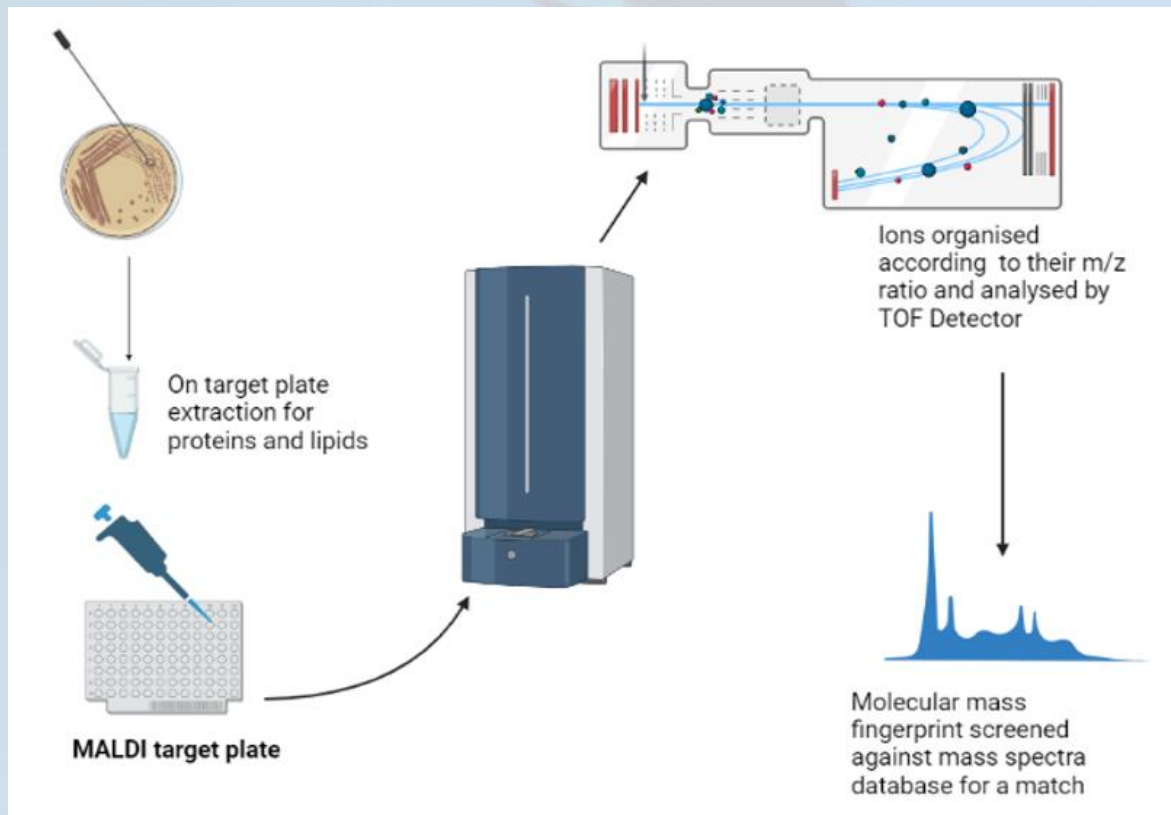
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Google Forms

- A combined total of **98 questionnaires** completed.
- **87%** of respondents **have used antibiotics** in aquaculture (Nigeria/Ghana). **49%** of respondents that used antibiotics did so as a **prophylactic measure**.
- Only **16% (Ghana)** and **24% (Nigeria)** of farmers surveyed reported **consulting a veterinarian** (or para-veterinarian) when sourcing and administering antibiotics.
- Antibiotics used were typically supplied by agricultural stores and human health pharmacies, rather than via prescription.





- Bacteria isolated from tilapia, catfish and water samples;
- ✓ 40 *Aeromonads* (*veronii/jandaei/hydrophila/caviae*)
- ✓ 58 *Enterobacteriaceae* (*E.coli, Citrobacter freundii, Klebsiella pneumoniae, Plesiomonas shigelloides*)
- ✓ 24 *Pseudomonads* (*aeruginosa, putida group*)
- ✓ 14 *Edwardsiella tarda*
- ✓ 2 *Lactococcus garvieae*
- ✓ 20 *Staphylococcus spp.* (*sciuri, ureilyticus*)

Sample preparation hands-on time:

- 1 isolate ~20 seconds
- 95 isolates < 20 min

Time-to-Result including sample preparation:

- 95 isolates + 1 QC sample: ~30 min

Rapid bacterial identification using;

- Selective and Generic culture media
- Primary identification tests. (Cat, OX, Mot, Gram, OF etc.)
- MALDI-TOF

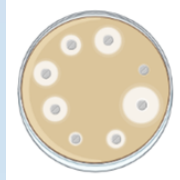
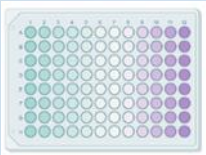
Phenotypic & Genotypic Methodology

Phenotypic-Functional antimicrobial susceptibility testing

Question: How do organisms respond to antibiotics?

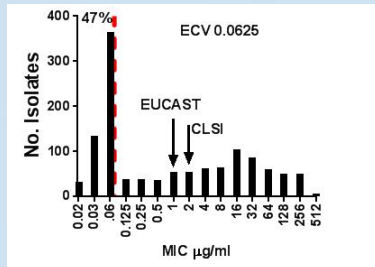
Broth Microdilution
MICs

Disc Diffusion
Zoi



CLSI & EUCAST Interpretive criteria

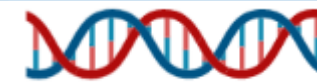
Epidemiological cut-off values



Genotypic- Identification –Molecular Characterisation

Question: Is there a resistance gene, mutation or mechanism present?

DNA



Conventional or
Multiplex

Whole Genome Sequencing



AMR Gene Databases & Bioinformatics

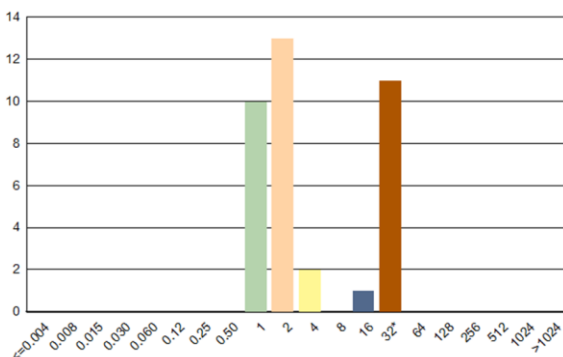
Phenotypic AST Method & Results for *Aeromonas spp.*

The following antibiotic panels and guidelines were utilised;

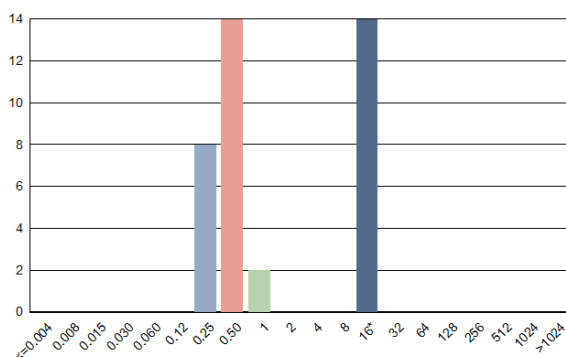
- EUVSEC3 panel following (CLSI guidelines M45 Table 3); Incubated at 35°C.
- AQGNECV panel following (CLSI VET04 Table 2B); Incubated at 28°C.

- **32% of isolates MICs $\geq 16\mu\text{g/mL}$ for Colistin.**
- **39% Non-wild type MICs ($\geq 0.06\mu\text{g/mL}$) for Enrofloxacin.**
- **53% of isolates Non-wild type for Oxolinic Acid ($\geq 0.06\mu\text{g/mL}$) and 32% have MICs $\geq 2\mu\text{g/mL}$.**
- **82% of isolates Non-wild type for Oxytetracycline ($0.5\mu\text{g/mL}$) and 37% have MICs $>16\mu\text{g/mL}$.**
- ***Aeromonas spp.* were generally susceptible to Phenicol's i.e., Florfenicol 89.5% and Chloramphenicol 94.6%.**

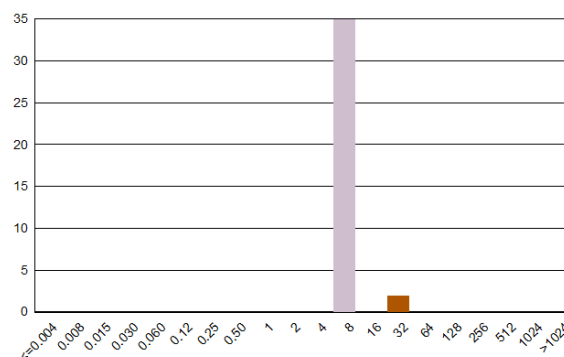
Colistin 35°C



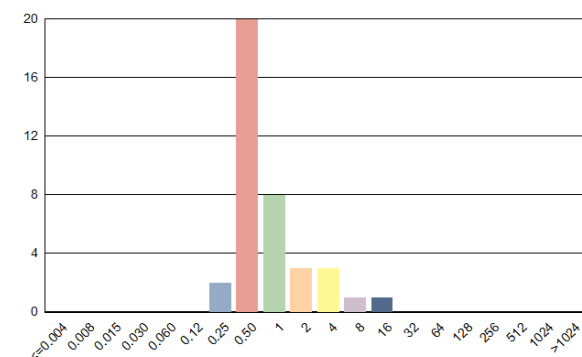
Oxytetracycline 28°C



Chloramphenicol 35°C



Florfenicol 28°C



- The Fleming Fund is enabling a network of highly motivated ambassadors for One Health and AMR in West Africa to address data gaps at country and regional level by building their knowledge and technical skills.
- Through the programme, baseline data on AMU and AMR in aquaculture is being generated using structured questionnaires and phenotypic/genotypic approaches to studying AMR.

