FAO Reference Centre - annual report

(Antimicrobial Resistance)

Title of FAO Reference Centre for Antimicrobial Resistance	**UK FAO Reference Centre for Antimicrobial Resistance**
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Reporting period	**October 2018- April 2020**

Introduction

Antimicrobial resistance (AMR) is a global problem that impacts all countries and their animal and human populations regardless of their socioeconomic state. Resistant microbes have no respect for borders and can spread resistance genes easily through the movement of bacteria carried by people, animals, food and water - with many resistance genes being able to transfer from one bacterial species to another. It is essential to manage AMR because it can result in the failure to successfully treat infections in both humans and animals, lead to increased mortality, prolonged illness, production and economic losses and threaten food security. Lord O'Neil's review estimated the global economic costs of AMR to be up to $100m by 2050. This means that containing and controlling AMR requires coordinated national and international action across all stakeholders, including governments, international organisations, private businesses, farmers, investors, civil society, academia, and philanthropy.

In 2017, the Food and Agriculture Office of the United Nations (FAO) sought interest from institutions for designation as Reference Centres for AMR to support FAO and its member countries in the implementation of the activities outlined in their (FAO) Action Plan on Antimicrobial Resistance 2016-2020. The Veterinary Medicines Directorate (VMD) initiated and coordinated a response to be recognised as a Reference Centre working closely with other Executive Agencies of the UK Department for Environment, Food and Rural Affairs (Defra): Animal and Plant Health Agency (APHA), Centre for Environment, Fisheries and Aquaculture Science (Cefas).. Officially launched in October 2018, the UK's Reference Centre became the world's first designated FAO reference Centre for AMR in April 2019.

Who we are

The Reference Centre is collaborative effort that spans three Executive Agencies of Defra. An overview of each agency is given below.

Animal and Plant Health Agency (APHA)

APHA works to safeguard animal and plant health for the benefit of people, the environment, and the economy. Its responsibilities include identifying and controlling endemic and exotic diseases and pests in animals, plants and bees; surveillance of new and emerging pests and diseases; scientific research in areas such as bacterial, viral, prion and parasitic diseases and vaccines, and food safety; and to act as an international reference laboratory for many farm animal diseases.

APHA is globally recognised for its AMR expertise, and has been a reference laboratory on AMR for the World Organisation for Animal Health (OIE) since 2003 and is the UK's national reference laboratory for AMR in veterinary bacteria. It has significant laboratory capability in its network of diagnostic laboratories and at its central facility at Weybridge, Surrey. APHA's capability includes development of phenotypic and genotypic diagnostic tests; molecular typing utilising dedicated sequencing units (e.g. whole genome sequencing); research with extensive collaborative networks and complex modelling techniques.

Centre for Environment, Fisheries and Aquaculture Science (Cefas)

Cefas is the UK government's marine and freshwater science agency, working for healthy and productive oceans, seas and rivers and safe and sustainable seafood. Innovative, world-class science is central to the mission, working to safeguard human and animal health, enable food security and support marine economies. Cefas is a global leader in aquatic animal health and is positioned to provide services in identifying AMR risks to aquatic animals and to help develop and assess the effectiveness of alternatives to use of antibiotics for control of diseases of farmed aquatic animals (particularly in finfish and shrimp).

For this Cefas can draw on its extensive expertise in disease investigation, diagnosis and control, including experience of AMR characterisation of aquatic pathogens. As well as state of the art equipment for measuring AMR, it also has access to a range of advanced pathology and molecular technologies, including high throughput sequencing for pathogen genomics. Cefas epidemiology and risk teams also have experience in designing and interpreting surveys to help quantify and reduce antibiotic usage on farms.

Veterinary Medicines Directorate (VMD)

The VMD supports Defra's objectives to protect public health and meet high standards of animal welfare. It is the UK's regulator of veterinary medicines. Defra's AMR and residues policy areas sit within the VMD.

VMD publishes an annual report on sales of antibiotics and surveillance of AMR (UK Veterinary Antimicrobial Resistance and Sales Surveillance) and is responsible for overseeing implementation of Defra's commitments in the UK's national action plan to tackle AMR (2019-2024). The VMD chairs Defra's cross-government AMR Coordination group which brings together expertise from across the UK government and devolved administrations to review and respond to emerging AMR threats.

The Vision, Mission and Objectives of the Reference Centre

Our Vision

…is to safeguard animal and human health from the threat of antimicrobial resistance.

Our Mission

…is to provide world leading scientific and policy expertise within the global community to tackle antimicrobial resistance in terrestrial and aquatic animals and their environments.

Our Objectives

- …to improve understanding and engagement between key sectors and organisations within countries to support the delivery of their national action plans on AMR.
- …to support the development of scientific capability and quality management in partner countries for the surveillance of antimicrobial resistance, use and residues.
- …to provide advice and support to national and international partners to help strengthen governance and policy related to antimicrobial resistance and usage.

Achieving our Objectives

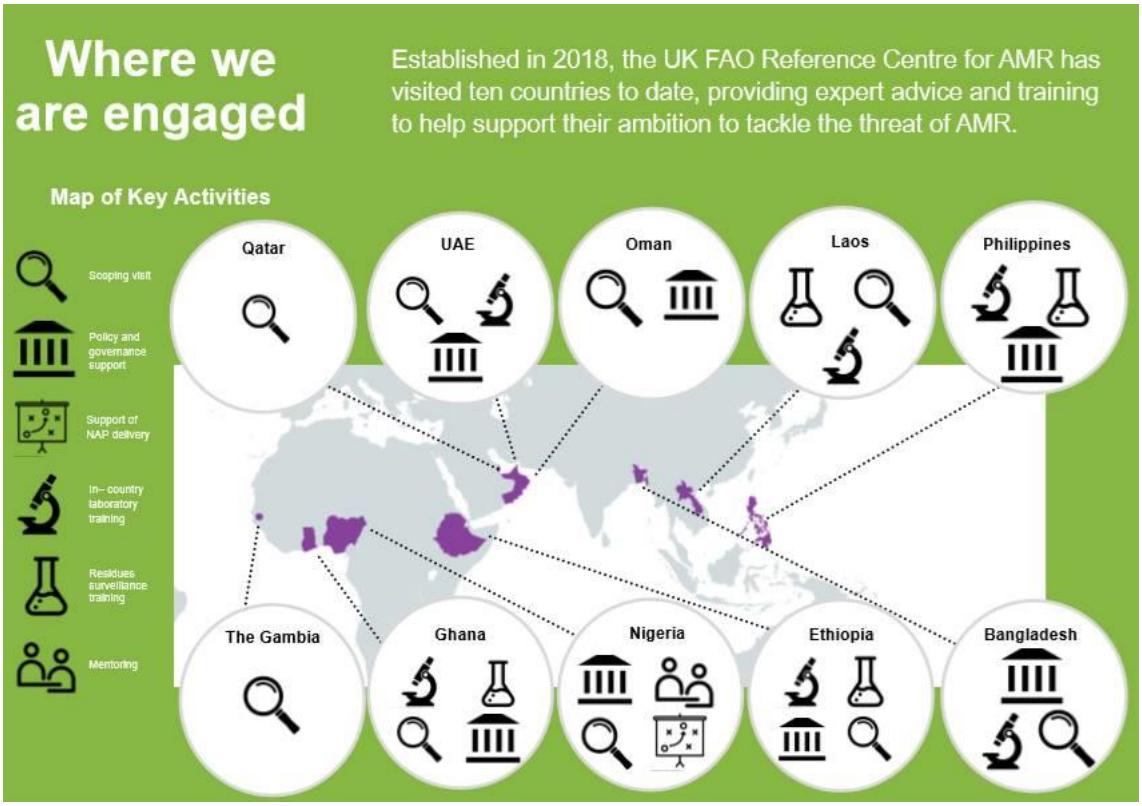
To achieve our objectives, we seek to complement FAO's programme in supporting member states implementation of national action plans on AMR. The Reference Centre identified an initial range of activities under these objectives and as the Centre evolves, it will look to modify and adapt these to reflect the most effective deployment of our resource and expertise.

Activity areas

1. Improve awareness on antimicrobial resistance and related threats.
2. Develop capacity for research, surveillance and monitoring of antimicrobial resistance and antimicrobial use in food and agriculture.
3. Strengthen governance related to antimicrobial use and antimicrobial resistance in food and agriculture.
4. Promote good practices in food and agriculture systems and the prudent use of antimicrobials.

Highlights of the Reference Centre's year include:

- Designation as an *FAO Reference Centre for AMR* in April 2019.
- Delivery of in-country scoping visits, technical and scientific training sessions, and policy and governance support to ten countries: Bangladesh, Ghana, Nigeria, Laos, Philippines, Ethiopia, The Gambia, Qatar, Oman, and United Arab Emirates.
- 'On stage presence' at national and international conferences and workshops.
- Delivery of a substantial coordinated programme of capacity development and support in Ghana and Bangladesh.
- Provision of support to Laos and Philippines in their antibiotic residues training programme.
- Development of Proficiency Testing schemes for Antimicrobial Susceptibility Testing for *Escherichia coli* and *Campylobacter* spp.
- Provision of policy support for the drafting and development of National Residues Surveillance Strategy in Nigeria, bringing together the National Agency for Food and Drug Administration and Control (NAFDAC) and the Federal Ministry of Agriculture and Rural Development (FMARD).



Activity Area 1: Improve awareness on Antimicrobial Resistance and related threats

The Reference Centre has organised, supported and presented at many workshops, conferences and events in the UK and globally.

Title	Date and location	Summary
Working directly with countries to improve awareness on AMR		
AMR in Aquaculture: A one health challenge.	Dhaka, **Bangladesh**, February 2019.	Working with Exeter University and WorldFish, this event brought together the FAO, WHO, academics, government officials, and industry stakeholder such as farmers and suppliers to discuss in a One Health context AMR in aquaculture through a series of Reference Centre led activities. AMR Reference Centre staff gave oral presentations, led breakout sessions, and networked widely to ensure successful delivery of this workshop. The meeting report can be obtained at this link.
Nigeria Fellowship Work-planning Workshop.	Abuja, **Nigeria** August 2019.	AMR Reference Centre staff attended as mentors and contributed to the successful kick-off of the Fleming Fellowship programme in Nigeria. This visit also enabled the Reference Centre to undertake an initial scoping visit in Nigeria to assess the national AMR landscape. Initial meetings were held with Nigerian government officials including the Nigerian Chief Veterinary Officer to discuss areas for joint work.
Gulf Workshop on Antimicrobial Resistance (AMR) in the Marine Environment: A One Health Perspective.	Muscat, **Oman** November 2019.	The purpose of this meeting was to foster collaboration and share expertise across Gulf Cooperation Council (GCC) countries over a two-day programme. The AMR Reference Centre was a co-convener of the workshop and its staff gave oral presentations, reported on joint project work undertaken with GCC partners and networked widely. Outputs included a re-invigorated sense of shared endeavour and a strong commitment to continued effort to tackle AMR in a holistic One Health manner.
Antimicrobial resistance workshop	Addis Ababa, **Ethiopia**, November 2019.	The Reference centre hosted a workshop on Antimicrobial resistance in Ethiopia with policy leaders and scientist to articulate some of the challenges in the Ethiopian AMR prevention, containment and implementation strategy.

Validating antibiotic residues testing methods at Veterinary Drug and Animal Feed Administration and Control Authority (VDFACA), Ethiopia.	Addis Ababa, **Ethiopia** December 2019.	The Reference Centre was in Ethiopia to train VDFACA-Lab scientists, specifically on practical aspects of developing, optimising, validating and routine quality control of chromatographic methods for antibiotic residues in animal tissues and develop local expertise on the quality management systems which will underpin external confidence in VDFACA-Lab analytical results for VMP specification testing.
A Regional Workshop on Food Security by the Ministry of Municipality and Environment (Qatar) in cooperation with The Department for Environment, Food and Rural Affairs (UK)	Doha, **Qatar** December 2019.	The AMR Reference Centre supported a scoping visit by APHA staff to obtain an initial insight into the veterinary AMR landscape in Qatar and future areas for joint work.
Establishing Microbial Sequencing and Bioinformatics Capacity in Challenging Environments.	Fajara, **The Gambia**, January 2020	Reference Centre staff were invited to present at this event at the MRC-Gambia facility and networked widely. This visit also enabled the Reference Centre to undertake an initial scoping visit in The Gambia to assess the national AMR landscape. Initial meetings were held with Gambian government officials and the FAO livestock specialist.
Promoting awareness of the UK FAO Reference Centre for AMR		
5th International Symposium on the Environmental Dimension of Antibiotic Resistance.	**Hong Kong**, June 2019.	The Reference Centre presented on work done to develop methodology for AMR surveillance in shellfish samples recovered as part of statutory monitoring in UK for *E. coli*. It also presented results of a baseline study for monitoring the marine environment in the Gulf States for AMR. Both programmes have direct relevance for developing policies for environmental AMR surveillance.
Aviva Antimicrobial Resistance and Emerging Risks Event.	London, **United Kingdom** July 2019.	The Reference Centre presented at this meeting and participated in panel discussions, promoting AMR awareness and the UK's national and international approach to a diverse audience from the corporate and medical worlds.

19th International Conference on Diseases of Fish and Shellfish.	Porto, **Portugal** September 2019.	Reference Centre staff chaired the session on AMR in aquaculture and facilitated a workshop on definition of epidemiological cut off values (ECOFF) for aquatic pathogens including the zoonotic pathogen *Vibrio*.
The Colston Research Society Symposium on Antimicrobial Resistance.	Bristol, **United Kingdom**, November 2019.	Poster on Reference Centre (future) activities at this international symposium held in the UK, which generated interest and discussion from a range of delegates.
Hosting visitors and delegations in the UK.	**United Kingdom**, Throughout the year.	The Reference Centre has hosted visitors and met delegates at its UK facilities from countries including Japan, Qatar, Uganda, Nigeria, and Ghana. Visitors from Ghana included two Fleming Fund Fellows and a veterinarian from the Veterinary Services Directorate whom we had been supporting through our training programme. The visits enabled networking, laboratory tours, and information exchange to facilitate future engagement and joint work. The Reference Centre also hosted Nigerian Government aquatic animal veterinarians to discuss introduction of AMR surveillance in the Nigerian aquaculture industry.

Activity Area 2: Develop Capacity for Surveillance of AMR, AMU, and Residues

The AMR Reference Centre has undertaken a coordinated programme of capacity development support in Ghana and Bangladesh. Staff visited both countries in scoping visits to consult widely with the national competent authorities, the national veterinary AMR reference laboratories, and other stakeholders including the FAO, Fleming Fund, and Mott MacDonald. Laboratory assessments and the identification of training requirements to support capacity development were also undertaken. An implementation plan tailored to each partner's needs was designed, ensuring that it complemented existing AMR surveillance programmes.

In subsequent country visits AMR Reference Centre staff worked alongside our partners to deliver training and coaching in their home country facilities. The specifics of the training were adapted according the laboratory's needs and resources available. Coaching was provided following EUCAST and CLSI guidelines for bacteria affecting terrestrial and aquatic animals respectively. Control strains were provided where required to ensure that accurate and reproducible surveillance results were collected, thereby supporting internal quality assessment procedures. The control strains were also used as part of the training to assess the technical competency of laboratory staff following the training. To further assist with technical understanding and quality management, EUCAST documents such as disk diffusion manuals, breakpoint tables and Quality Control guides were provided to the partner

laboratories. Throughout the training visits recommendations of methods to improve quality were shared, to further improve the capacity and resilience of partner laboratories.

The provision of tailored support enables a holistic One Health approach to be implemented that complements and integrates into existing national action plans for AMR. The delivery of coaching in home laboratories is a powerful approach as all participants are exposed to the 'ground truth experience' of working successfully to strict safety and quality requirements in the often resource limited settings.

Importantly, in both Ghana and Bangladesh the reference centre was able to provide laboratory reagents and thereby provide an opportunity for the authorities to expand and develop their veterinary AMR surveillance in a sustainable manner.

Ghana

Following on from initial meetings with Ghanaian stakeholders in November 2018, the AMR Reference Centre undertook a scoping visit to Ghana in March 2019 to define areas where assistance can be targeted to best effect, in consultation with key stakeholders including the Ghanaian Chief Veterinary Officer. During two subsequent visits in July and September 2019 the capacity development support programme was delivered. The Reference Centre provided laboratory-based training for the isolation, identification, and antimicrobial susceptibility testing of bacteria from aquaculture and poultry samples. The Reference Centre also supported Ghana by developing its residues surveillance programme through gap analysis of current capability and delivering training in analysis and interpretation of antibiotic sales data.

Ghana, July 2019: Antimicrobial Susceptibility Testing training course held at the Veterinary Services Directorate laboratory (Accra, Ghana).

Bangladesh

The AMR Reference Centre visited Bangladesh for a workshop (see above) in February 2019, and this afforded the opportunity to undertake an initial scoping exercise to assess the AMR landscape and capacity development support required in the agriculture sector. In coordination with Bangladesh partners, Mott MacDonald, and the FAO a tailored support programme was then designed.

Bangladesh, Feb 2019: Workshop on "Aquaculture and AMR – a One Health challenge".

The AMR Reference Centre undertook three further visits (October, November, and December 2019) to deliver capacity development support and training to staff from four and the six animal health and aquaculture laboratories selected for support through the Fleming Fund country grant. To expand the knowledge and expertise base further, training was also provided in this programme to staff from three additional government laboratories identified as important for AMR surveillance. Participation of staff from different laboratories in a single training course had the added benefit of fostering closer links and establishing personal contacts for those attending the course. This will help strengthen networks and facilitate the One Health approach to tackle AMR being undertaken in Bangladesh.

Bangladesh, October 2019: Antimicrobial Susceptibility Testing training course held at the Central Disease Investigation Laboratory (Dhaka, Bangladesh).

Laos

In response to a direct request from the FAO, the AMR Reference Centre has provided support for Antibiotic Residues Testing in Laos. This programme focused primarily on strengthening national level capacity for antimicrobial residue monitoring along the food chain. The Reference Centre visited in August 2019, to establish methodologies for antimicrobial residues detection specifically with basic field and laboratory protocols for residue monitoring including field sampling at retail and slaughter plants, sample preparation and extraction. At the end of this training, trainees were able to interpret screening results decisions for samples, setting acceptance criteria for enzyme-linked immunosorbent assay kits, and preparation of control samples.

Vientiane, 2019: Residues testing training at the National Animal Health Laboratory in Laos.

Gulf Countries

The Reference Centre has had considerable engagement with the countries from Gulf Cooperation Council (GCC) region. Due to demographic and environmental factors, the marine environment of the GCC may be particularly susceptible to the threat of AMR, however there is currently little information on the presence of AMR in the GCC marine environment to inform the need for, and design of appropriate targeted surveillance activities.

To start to fill this knowledge gap, and to build a network of researchers across the GCC addressing this issue, the UK-Gulf Marine Environment Partnership (UK-GMEP) programme has initiated a GCC wide rapid baseline survey of the presence of AMR in the marine environment. Building on this, a workshop in Oman was convened in 2019 that brought together the GCC and UK researchers from the baseline study (including Reference Centre Staff) and additional invited experts (including from the FAO) to review the findings of the survey and to identify priority actions required to develop the knowledge base and address AMR in marine and aquatic environments in the GCC. The workshop was focussed on AMR in the marine environment but also considered wider environmental aspects of AMR from a One Health perspective.

Recommendations from the workshop

• Call by delegates to develop 'One Health' led Antimicrobial Resistance (AMR) National Action Plans (NAPs) that integrate and coordinate work across human, veterinary and environmental stakeholders.

• Requirement to develop regional and national reference laboratories for AMR that include expertise and protocols for tackling veterinary and environmental issues.

• Established a technical workshop/working group to standardise methods and approaches adopted across GCC to tackle environmental AMR.

• Develop risk assessments to better understand sectors where environmental AMR poses the greatest threat to humans and livestock (including aquaculture).

• Call for better integration of research projects to tackle the evidence gaps and coordinate activities across multiple GCC member states.

Oman, 2019: Workshop delegates presenting ideas from the breakout group.

Proficiency Testing Schemes

The Centre is developing Proficiency Testing schemes for Antimicrobial Susceptibility Testing (AST) of key bacterial species related to public and animal health such as *Escherichia coli*, *Campylobacter jejuni* and *Campylobacter coli*. These schemes will provide external quality assurance to participating laboratories which can enable confirmation of competent performance and monitoring of performance trends and improvements in testing of these key bacterial species.

Setting Testing Standards

The Reference Centre supported the APHA-led project to validate an antimicrobial susceptibility testing protocol for the veterinary pathogens *Brachyspira hyodysenteriae* and *Brachyspira pilosicoli* (the latter of which is also zoonotic) which involved eight laboratories from seven countries. The work fills a significant gap by establishing an internationally validated standard method for susceptibility testing for these important veterinary bacterial pathogens and describes new controls strains. This work has been published in a peer reviewed scientific journal.

The Reference Centre has been leading an international consortium developing a standard antimicrobial susceptibility testing protocol for the aquaculture pathogens *Vibrio* spp., many of which are zoonotic. In 2019 the Bangladesh Livestock Research Institute (a Fleming Fund supported laboratory) were invited to join this collaboration as partners.

Fleming Fund Fellowship Programme

The AMR Reference Centre (through APHA) is a host institute for the two Nigerian animal health Fleming Fund fellows. Reference Centre staff attended the Nigeria Fellowship Work-planning Workshop (Abuja, Nigeria August 2019). The Fellows have now successfully completed their first visit to the central APHA laboratory at Weybridge UK in December 2019. They received training from many recognised experts at APHA, including for the establishment and management of Quality Assurance and health & safety systems. This learning will now be applied in their home laboratories, facilitated by the provision of documentation and reagents via this programme.

This programme is being undertaken in a One Health context and in close partnership with the fellows supported by the other host institutes at the WHO Collaborating Centre for Reference & Research on Antimicrobial Resistance and Healthcare Associated Infections (Public Health England, UK) and the Danish Technical University (Denmark).

Abuja, August 2019: Nigeria's Fleming Fund fellowship kick-off event

Activity Area 3: Strengthen governance related to antimicrobial use and Antimicrobial Resistance in food and agriculture.

Nigeria

The presence and effect of antibiotic residues in food of animal origin is very well researched and documented in Nigeria. The Reference Centre met Senior officials from the Federal Ministry of Agriculture and Rural Affairs (FMARD) during a scoping visit in August 2019 where a request to provide support in developing and strengthening Nigeria's national residues surveillance strategy was articulated. Following detailed planning and correspondence, a workshop to bring all stakeholders together was agreed.

The workshop was organised and hosted by the AMR Reference Centre from February 24th-Feb 28th, 2020 in Abuja, Nigeria. It was attended by over 60 delegates with Senior Government officials and regulators in attendance. The Reference Centre team provided expert advice on legislation, scope, analytes, sampling, analysis, non-compliance, costs, monitoring and evaluation which were considered in the deliberations of the different working groups. Priority food producing animals in the first phase of implementation will include poultry, goat, sheep, cattle, while the second phase will include pigs, bees, rabbits and snails. Bringing these diverse stakeholders together helped engender a strong sense of cooperation and communication that has resulted in the drafting of the strategy document by two Fleming Fund Professional Fellows. The draft strategy document has been endorsed by FMARD and NAFDAC.

Abuja, Feb 2020: Nigeria Residues Surveillance Strategy Workshop

Manilla, Sept 2019: Reference Centre Training visit, Philippines

Philippines

The Reference Centre in September, 2019 supported FAO Philippines (FAOPH) and the FAO Regional Office for Asia and the Pacific (FAORAP) in conducting capacity assessment including the Strength, Weakness, Opportunity and Threats (SWOT) analysis for three laboratories and develop recommendations from which progressive strengthening of capacity for veterinary drug residue monitoring can be built.

FAO Data Collection (ATLASS)

The Reference Centre was invited to participate in à workshop in May, 2020 to brainstorm the development of an AMR database at the FAO. The purpose was to define trends in AMR in terrestrial aquatic, horticulture and environment. As national surveillance systems evolve, there is the need for a robust platform to allow for antimicrobial resistance-related data sharing at local and global levels. To prioritise further action and the tracking of progress, the data collected from diverse food and agriculture sectors and the environment should be integrated and harmonized with other global efforts such as the OIE's annual data collection on the use of antimicrobial agents in animals, and the Global Antimicrobial Resistance Surveillance System (GLASS), hosted by WHO. A repository of antimicrobial resistance-related data and metadata from the food and agricultural sectors is needed.

FAO, Rome, May, 2019: Stakeholder Consultation on an FAO Database for Antimicrobial Resistance (AMR) in Food and Agriculture.

Activity Area 4: Promote good practices in food and agriculture systems and the prudent use of antimicrobials.

November 2019, Durban, South Africa: Reference Centre staff supported facilitation and planning of an OIE Sub-regional workshop on AMR in aquaculture for Southern African Development Community (SADC) countries.

Durban, 2019: Experts in aquaculture, aquatic animal health, epidemiology and antimicrobial resistance came together and examined the feasibility of using the OIE risk analysis methodology to address AMR in aquaculture settings.

Peer review publications written by staff associated with the UK FAO Reference Centre for AMR

Identification of a New Antimicrobial Resistance Gene Provides Fresh Insights Into Pleuromutilin Resistance in Brachyspira hyodysenteriae, Aetiological Agent of Swine Dysentery. **Card RM**, Stubberfield E, Rogers J, Nunez-Garcia J, Ellis RJ, AbuOun M, Strugnell B, Teale C, Williamson S, Anjum MF. Front Microbiol. 2018 Jun 19;9:1183. doi: 10.3389/fmicb.2018.01183. eCollection 2018.

Use of whole genome sequencing of commensal *Escherichia coli* in pigs for antimicrobial resistance surveillance, United Kingdom, 2018. Stubberfield E, AbuOun M, Sayers E, O'Connor HM, **Card RM**, Anjum MF. Euro Surveill. 2019 24(50). doi: 10.2807/1560-7917.ES.2019.24.50.1900136.

Validation of an antimicrobial susceptibility testing protocol for *Brachyspira hyodysenteriae* and *Brachyspira pilosicoli* in an international ring trial Stubberfield E, Pringle M, A Landén, Veldman K T, Geurts Y, Jouy E, Devendec L Le, Rubin J E, Kulathunga D G R S, Kristensen K A, Chanter J, Bollard A, Johnson P, Maycock J, Habighorst-Blome K, Rohde J, **Card RM**. Vet Microbiol 2020 244:108645. doi: 10.1016/j.vetmic.2020.108645.

Biogeography of the fish pathogen Aeromonas salmonicida inferred by vapA genotyping Gulla S, Bayliss S, Björnsdóttir B, Dalsgaard I, Haenen O, Jansson E, McCarthy U, Scholz F, Vercauteren M, **Verner-Jeffreys D**, Welch T, Wiklund T, Colquhoun D FEMS microbiology letters 366 (7), fnz074

Evaluating antimicrobial resistance in the global shrimp industry Thornber K, **Verner-Jeffreys D**, Hinchliffe, S, Rahman MM, David Bass, Tyler CR Reviews in Aquaculture DOI: 10.1111/raq.12367

First detection of Infectious Spleen and kidney Necrosis Virus (ISKNV) associated with massive mortalities in farmed tilapia in Africa Ramires G, Paley RK, Hunt W, Feist SW, Stone DM, Field T, Hayden D, Ziddah PA, Duodu S, Wallis T, **Verner-Jeffreys D** bioRxiv, 680538

Setting epidemiological cut-off values for bacteria isolated from aquatic animals: a toolbox for designing a 96-well plate for microdilution MIC assays S Baron, P Smith, **DW Verner-Jeffreys**, Bull. Eur. Ass. Fish Pathol 40 (2), 5

Communications

In addition to the awareness raising, engagement activities, and peer reviewed publications outlined in this report, the AMR Reference Centre has had an active communication strategy aimed at reaching a wider audience. Articles have been published on the official UK government's website (here) and on the Fleming Fund website (here). Significant events have been communicated via the APHA Science blog, including for the establishment of the Reference Centre (here) and during the One Health Awareness Month Campaign in January 2020 (here).

March 2020: SMArt launch at the UK House of Lords

The Reference Centre was also represented at the launch of a new charity to improve veterinary medicines regulation worldwide at the House of Lords. Safe Medicines for Animals through regulatory training (SMArt).

SMArt was launched on 11 March at a reception at the House of Lords attended by Ministers, senior government officials, and leaders in the pharmaceutical industry and representatives from major international charitable bodies: The Bill and Melinda Gates Foundation; Fleming Fund; GALVmed, and Wellcome Trust.

Impact of Covid-19 on the Reference Centre's activities

The restrictions imposed by many countries around the world as a result of the coronavirus pandemic has caused significant disruptions to the activities of the Reference Centre with partner countries including postponing planned training visits and delaying the hosting of visitors. All our partners are also involved in their national responses to the pandemic.

To help overcome these challenges the AMR Reference Centre is making increased use of remote support via on-line collaboration tools, development of e-learning packages, and through the establishment of joint projects to support research capacity development. We continue to look forward to recommencing country visits and hosting visitors when restriction ease.

Acknowledgements

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The Fleming Fund

Department for Environment Food & Rural Affairs