Terms of Reference for Request for Proposals

First Fleming Fund Country Grant to Zambia

1 Overview of this grant

This is a Request for Proposals (RFP) for a Country Grant to support surveillance of antimicrobial-resistant bacteria in Zambia. It has been created in response to a Request for Support from the Government of Zambia (GRZ). The grant will be funded by the UK Department of Health and Social Care, under its Fleming Fund Grants Programme, which is managed by Mott MacDonald, the Management Agent.

This Fleming Fund Country Grant for Zambia will focus on developing the foundations for Antimicrobial Resistance (AMR) and Antimicrobial Use (AMU) surveillance in the human and animal health sectors. It will facilitate a One Health approach to surveillance, bringing together multi-sectoral stakeholders to share surveillance data and gain a better understanding of AMR and AMU. In the human health sector, the grant will support development of a national AMR/AMU Surveillance Strategy and facilitate sentinel surveillance sites to implement the strategy. Clinicians at surveillance sites will be supported to improve their understanding of AMR and use of antibiotics.

In the animal health sector, the grant will support the development of an AMR surveillance strategy and implementation of surveillance systems for AMR/AMU, capacitate the Central Veterinary Laboratory to operate as the national animal health reference laboratory, and develop the roles of veterinary laboratories.

The Grantee will be responsible to Mott MacDonald for all aspects of the grant, including the management of any partners, their performance, technical delivery and financial accountability. The Grantee will be expected to sign the Grant Agreement with Mott MacDonald and will be expected to enter into sub-granting arrangements with partners on the same back-to-back terms.

The Grantee (or Lead Grantee if a consortium) will work in close coordination with the Antimicrobial Resistance Coordinating Committee (AMRCC) and other national stakeholders. The Grantee will also be required to harmonise efforts on this Country Grant with other types of grants under the Fleming Fund Grants Programme, namely Regional Grants and the Fleming Fellowship Scheme.

This Country Grant will be in two phases. The first phase will be for £1.5-2 million (including all capital and recurrent costs, overheads, and management costs) over 18 months, to establish the initial surveillance system, and should address the objectives and outputs detailed in this RfP. **Applicants should submit the workplan and budget for this initial 18 months.**

During the first 9 months of the grant, the successful Grantee should develop and submit a costed operational workplan for a further 12 months (Output 1.1). This will be for an additional £2.5-3 million, to sustain the established system and to expand to include further Human Health and Animal Health Laboratories, and will be subject to satisfactory performance and approval of the workplan, as indicated below.

	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	To October 2021	
Phase 1, Output 1.1										
Phase 1, other outputs										
Phase 2 (subject to satisfactory performance and approval of Output 1.1)										

2 Overview of the Fleming Fund

2.1 Introduction

The UK Government has established the Fleming Fund to respond to the global threat of drug-resistant infections due to bacterial Antimicrobial Resistance (AMR). The Fleming Fund will be a critical tool in achieving the resolution of the 68th World Health Assembly, 2015 (WHA A68/20), and in realising the 'Political Declaration of the High-Level Meeting of the United Nations General Assembly (UNGA) on Antimicrobial Resistance, 2016'. These recognise that urgent cross-sectoral rationalisation of antimicrobial use, and prevention and control of infections in humans, animals, food, agriculture, and aquaculture sectors, are key to tackling AMR and call for: innovative research and development; affordable and accessible antimicrobial medicines and vaccines; improved surveillance and monitoring; increased governance on antimicrobial use; and increased international cooperation to control and prevent AMR.

The Fleming Fund aims to address critical gaps in surveillance of antimicrobial-resistant bacteria in low- and middle-income countries (LMICs) in Asia and Sub-Saharan Africa. Countries in these areas are set to bear the highest burden of drug resistant infections. A Global Action Plan on Antimicrobial Resistance (GAP-AMR) has been developed by the World Health Organization (WHO), which acts as the blueprint for a multi-stakeholder global response to averting a global health crisis caused by AMR.[1]The Fleming Fund comprises a number of workstreams (see www.flemingfund.org for more information). One workstream provides support to the Tripartite Alliance – the Food and Agriculture Organization (FAO), the World Organisation for Animal Health (OIE) and the World Health Organization (WHO) – as part of the OH approach. Through funding to the Tripartite Alliance, the Fleming Fund has contributed to the development of National Action Plans (NAPs) in Sub-Saharan Africa, South and South East Asia, and to the building of the evidence base and guidance for AMR surveillance. This work will be critical for the overall success of the Fleming Fund Grant Programme and underpins the delivery of the portfolio of Country and Regional Grants and the Fleming Fellowship Scheme, as these will target capacity gaps identified in NAPs. The Fleming Fund also funds initiatives in academic institutions to develop guidance on the development of AMR surveillance systems.

The Fleming Fund Grants Programme is the largest stream of financial support available through the wider Fleming Fund. The DHSC has appointed Mott MacDonald as the Fleming Fund Management Agent for the Fleming Fund Grants Programme. Mott MacDonald is a global company with expertise in multi-sectoral international development and fund management. On behalf of the UK Government, Mott MacDonald is responsible for funding allocation and oversight of all investments made across the whole portfolio of grants in different activities and in different countries.

The aim of the Fleming Fund Grants Programme is to improve the ability of recipient countries to diagnose drug-resistant infections, with an emphasis on bacterial infections, and to improve data and surveillance to inform policy and practice at national and international levels. The overall goal is to avert the human and economic burden of AMR.

The geographic focus of the Fleming Fund Grants Programme is 20-24 LMICs from Sub-Saharan Africa, and South and South East Asia, including Sri Lanka. It can provide financial support up to 2021 to participating countries via three funding channels:

- Country Grants
- Fleming Fellowship Scheme Grants
- Regional Grants

The Fleming Fund will be independently evaluated by Itad, a specialist evaluation firm appointed by the DHSC for this purpose.

[1] http://www.who.int/antimicrobial-resistance/global-action-plan/en/

2.2 Problem statement to be addressed by the Fleming Fund

The main issues to be addressed by Fleming Fund Country Grants are outlined below:

- There are too few trained microbiologists to undertake the volume of testing required for representative surveillance on AMR.
- There are few health facilities that routinely undertake bacterial culture; still fewer facilities that meet the requirements for accreditation, or which do routine antimicrobial susceptibility testing.
- There is no culture of surveillance for AMR in healthcare delivery and there are barriers to developing it.
- There is little perceived use of surveillance data on any level, including low demand for the data from policy makers.
- There is a lack of knowledge on the use and consumption of antimicrobial agents across One Health sectors.
- There is a lack of antimicrobial stewardship.
- Logistical challenges are significant – transporting samples in a safe and secure manner under challenging transport conditions; ensuring a quality assured and sustained supply chain for reagents and consumables; and ensuring appropriate servicing of equipment are a few examples.
- Surveillance systems (national, regional and global) that do exist are often vertical in nature, are not linked, and are not integrated.
- There are weak One Health structures and there is poor inter-sectoral collaboration.
- There is a heterogeneous picture across countries and regions in terms of starting points, political will, capability, and donor interest and engagement.
- There are poorly defined and applied quality assurance standards in laboratory testing.
- There is lack of understanding on transmission patterns and drivers such as inappropriate use of antimicrobial drugs across all sectors.

2.3 Fleming Fund investment areas and outputs

To address the problems above, the Fleming Fund Grants Programme invests in:

- Laboratory infrastructure enhancement.
- Human resource strengthening and workforce reforms.
- Surveillance systems strengthening.
- Building foundations for AMR surveillance data use.
- Promoting rational use of antimicrobial medicines.

Investment in these areas is expected to achieve the following outputs:

- Improved laboratory skills and conditions for bacterial identification and Antimicrobial Susceptibility Testing (AST); and, therefore, improved data quality.
- A Strengthened One Health workforce with a range of relevant skills for AMR surveillance.
- Stronger AMR surveillance systems and processes at country and regional levels.
- Higher demand for AMR data at regional, country, subnational and facility levels.

- Better knowledge of country level patterns of prescribing practice and use of antimicrobials (particularly for bacterial infection) across sectors.

Fleming Fund outputs are expected to contribute to the following country outputs:

- Increase in quality and quantity of AMR and AMU data collected.
- AMR and AMU data shared in country to support evidence-based policy and practice
- AMR and AMU data shared internationally to improve and inform the global response.

The RFPs for Country Grants have been designed to ensure that investments and activities contribute directly to outputs. Grantees are expected to adhere to and demonstrate this alignment and contribution to outputs in their applications.

2.4 Core principles within the Fleming Fund Grants Programme

The Fleming Fund is built on four core principles. Grantees are expected to demonstrate how they will align with these principles while implementing the grant.

1) **Country Ownership:** The Fleming Fund Grants Programme will be implemented in line with national plans and aspirations, as laid out in the National Action Plan. Unless there are good reasons not to do so, Fleming Fund grants will chiefly invest in public sector laboratories and surveillance systems, thereby supporting national public health systems.

2) **One Health:** The Fleming Fund recognises that the problem of AMR is a great danger to human health and cannot be controlled without a One Health approach. A specific set of One Health investment parameters has also been developed and is summarised below. This approach is aligned with key documents and guidelines from OIE[2] and FAO[3] as well as the Global Action Plan.

    a. ***Collaborative multi-sectoral governance of AMR***: Leadership and resourcing of AMR surveillance and mitigation measures in all sectors that contribute to the emergence of AMR.

    b. ***Integrated AMR and antimicrobial use and consumption surveillance in all sectors*****:** Surveillance in humans, livestock, aquaculture, crops, food and the environment to produce information that is interpreted by multi-sectoral teams to help understand factors associated with AMR emergence within and between sectors.

    c. ***AMR mitigation policies and programmes prioritised across multiple sectors*****:** Evidence-based policies and programmes for AMR mitigation measures that are prioritised across the relevant sectors, based on information generated through AMR and AMU/C surveillance in all sectors.

3) **Alignment of Approach:** The Fleming Fund Grants Programme will seek to invest in areas which complement and build on work done to date, rather than create new systems. Grant applicants will need to demonstrate that they understand other actors' work in the field of improved laboratory capacity (both within and outside the sphere of AMR surveillance), improved disease surveillance, and the One Health approach. The Fleming Fund Grants Programme will assess grants for duplication of efforts and/or the development of parallel systems. To the extent possible, prospective Grantees will need to demonstrate how their proposals add value to existing and planned investments and systems.

4) **Sustainability:** The Fleming Fund Grants Programme will focus assistance on national systems with a view to long-term sustainability. Investment size and scope should, as far as possible, be aligned with national government spending so that systems created with Fleming Fund grants are sustainable within the public health system. We also recognise that the public good of conducting AMR

[2] OIE Standards, Guideline and Resolution on Antimicrobial resistance and the use of antimicrobial agents;

[3] The FAO Action Plan on Antimicrobial Resistance, 2016-2020.

surveillance means medium- to long-term support, and it is expected that countries that demonstrate good performance will have access to additional funds to provide ongoing support.

2.5 Fleming Fellowship Scheme

The Fleming Fellowship Scheme is part of the broader Fleming Fund Grants Programme and is also managed by Mott MacDonald. Rather than duplicate basic training, the Fellowships will focus on building advanced skills and leadership to promote the application of best practice in identified 'Beneficiary Institutions'. Beneficiary Institutions are organisations that add strategic value and complementarity to achieve the Fleming Fund's aims in the country and are likely to derive sustainable benefit from the Fellowship activities, such as AMR reference laboratories, national epidemiology units, hospitals and / or national drug administration agencies.

2.6 Fleming Fund activities in Zambia to date

The Fleming Fund has funded the multilaterals (FAO and WHO) to support the development of the Multisectoral National Action Plan.

To develop the Country Grant for Zambia under the Fleming Fund Grants Programme, Mott MacDonald carried out two visits to the country to undertake discussions with the Government of Zambia and other stakeholders. During these visits, Mott MacDonald met senior government officials, external development partners, and technical experts, and undertook visits to proposed surveillance sites and laboratories for both human and animal health sectors. A Request for Support was obtained from government which included identification of the initial surveillance sites

The visits and discussions identified the gaps and needs for strengthening AMR and AMU surveillance in humans and animals which will be supported by the Fleming Fund Country Grant for Zambia.

3 The current AMR situation in Zambia

3.1 Policy and strategy environment/National Action Plan for AMR

The Multisectoral National Action Plan was launched on 14 November 2017. Development of the NAP was led by the Ministry of Health, with committee members drawn from human health, agriculture, livestock, environmental protection, academia, regulatory bodies, civil society, planning and finance. The NAP has adopted the five strategic objectives from the WHO Global Action Plan and runs from 2017-2027.

The main objective of the NAP is to provide a coherent framework for combating AMR using a One Health approach.

For surveillance, the plan details the intention to develop a national co-ordination structure linking the sector-specific systems into a National Surveillance System, which also incorporates a traceability strategy for AMR in relation to food safety. The strategy involves development of laboratory capacity (human resources, consumables, equipment and infrastructure) to form an AMR laboratory network, linked to the Global Antimicrobial Surveillance system (GLASS). The NAP includes estimates for the costs of individual activities to 2027, and a monitoring and evaluation plan.

The National Multi-Sectoral Steering Committee (NMSC) is the highest policy and governance body responsible for all AMR activities. It is chaired by the Permanent Secretary (Health services) for the Ministry of Health, and co-chaired by the Permanent Secretary in the Ministry of Fisheries and Livestock. The secretariat is led by the Director of the Zambia National Public Health Institute (ZNPHI). The NMSC has representatives from the following: Ministry of Finance, Ministry of Agriculture, Ministry of Water Development, Sanitation and Environmental Protection, FAO, OIE, WHO, CDC, and can co-opt representation from any additional agency as required.
Co-ordination and implementation of the NAP is overseen by the Antimicrobial Resistance Co-ordinating Committee (AMRCC), supported by a secretariat. The AMRCC is tasked with leading implementation of the NAP, and developing the mechanisms and SOPs for data and information sharing. The AMRCC is co-chaired

by the Director of the ZNPHI and the Director of Veterinary Services, and oversees five Technical Working Groups (TWGs) with responsibility for 1) Education and Awareness; 2) Knowledge, Surveillance and Research; 3) Infection Prevention and Control; 4) Antimicrobial Use and 5) Investment and Development

3.2 One Health

There are several initiatives that encourage collaboration, particularly between human and animal health sectors to prevent and control zoonoses. However, formalisation of these relationships at all levels of governance is limited. It is hoped that the emergency operations centre at the Zambia National Public Health Institute (ZNPHI) will, when fully operational, lead this process at the national level.

In the Zambian NAP, Strategic Objective 2 aims to strengthen the knowledge and evidence base on AMR through surveillance and research. Under this objective there is a specific plan to develop a national, integrated AMR surveillance system (clinical and laboratory) for human, animal, plant, food, and environmental sampling, as well as building capacity (human, material, and infrastructure) in the network of laboratories to conduct AMR activities. A draft National Integrated AMR Surveillance Strategy (NIAMRSS) is being developed with support from the FAO Fleming Fund regional project but has not yet been finalised.

There is good representation across government sectors on the AMRCC, including the heads of Technical Working Groups (TWGs), Focal Points from the Ministry of Agriculture, the Ministry of Fisheries and Livestock, the Ministry of Water Development, Sanitation and Environmental Protection, and the Department of Wildlife Services. There is additional representation civil society, including the Churches Association of Zambia (CHAZ).

3.3 AMR Surveillance - human health

Currently, there are national programme specific AMR activities in Zambia for tuberculosis, malaria and HIV. In addition, the Lusaka University Teaching Hospitals (UTH) Laboratory performs susceptibility testing for epidemic-prone bacterial pathogens such as *Salmonella typhi*, *Neisseria meningitidis*, *Vibrio cholerae*, and methicillin resistant *Staphylococcus aureus* (MRSA) as part of related surveillance programmes. University Teaching Hospital Lusaka (UTH) is also a WHO Paediatric Bacterial Meningitis surveillance site and has detected penicillin-resistant *Streptococcus pneumoniae*.

Zambia has enrolled in the Global AMR Surveillance System (GLASS) and has participated in the introductory training. Since enrolment in 2016, Zambia has, through the GLASS focal point, submitted data collected at UTH Lusaka.

ZNPHI was recently established with the main function of providing a defined coordination mechanism to address the challenges currently faced in establishing a successful public health surveillance system. ZNPHI's main mandate to safeguard Zambia's Public Health Security by supporting districts in improving the health of the people through surveillance, prevention of infection, responding to public health emergencies including outbreaks, performing surveys and research, and capacity building.

AMR surveillance in the country is co-ordinated through the ZNPHI via the Laboratory Systems and Network cluster. It aims to i) coordinate all AMR surveillance activities, ii) supervise all surveillance sites, iii) support implementation of laboratory quality management systems based on ISO 15189, ISO 17025 and ISO 9001, iv) provide responsible use of drugs mentorships and training on AMR testing and surveillance in all technical areas of the AMR surveillance, and v) provide sentinel surveillance sites with reagents and commodity stocks required for surveillance activities. It is envisaged that ZNPHI manages and is the custodian of all AMR surveillance data and is responsible for sharing this data. ZNPHI is responsible for all public health laboratory functions in the country and is currently is currently taking steps to build a dedicated a national public health laboratory In the interim, the bacteriology laboratory at UTH Lusaka, a level IV hospital, has been chosen to serve as the reference laboratory for AMR surveillance until ZNPHI's laboratories are functional. UTH's roles include working with ZNPHI to provide technical support, confirmatory testing for sentinel sites for unusual organisms or resistance patters, providing an EQA service to sentinel sites, and maintaining a repository of isolates on behalf of ZNPHI. It is also a sentinel surveillance site.

ZNPHI is mentoring, training and providing technical support to three district laboratories (Ndola Teaching Hospital Laboratory, Livingstone Central Hospital Laboratory and Chilonga Mission Hospital Laboratory). Three additional sites (Lewanika Central Hospital, Chipata Central Hospital, and Mansa General Hospital) have been identified to be added to the network in the next phase of development.

Currently, UTH, Ndola and Livingstone laboratories are entering all samples into the DISA*LAB Laboratory Information Management System (disalab.com). This facilitates electronic reporting of results to the wards, however, DISA*LAB is not designed for managing and analysing AMR data for the purpose of reporting to GLASS. UTH Lusaka is the only site that has been using the WHONET software for collection, analysis, and sharing of AMR data. Lack of time and inadequate staffing levels has prevented entry of results onto both systems and attempts to get the two systems to communicate have so far failed. Ndola, Livingstone and Chilonga laboratories have WHONET software installed in their laboratories but it is not consistently used. With support from WHO AFRO, ZNPHI has planned for WHONET training, scheduled for May, 2019, for UTH, Ndola, Livingstone and Chilonga laboratory staff.

AMR surveillance data from all sentinel surveillance sites will be reported to ZNPHI to be merged, analysed, cleared and submitted to GLASS. AMR and AMU data from sectors will be collected and analysed in sector specific data bases and then merged at national level for sharing with policy makers for informed decision making. The AMR and AMU surveillance technical working group will be responsible for compilation of this data, which will then be submitted to the AMR Coordinating Committee for further scrutiny and submission to the NMSC.

3.4 AMR Surveillance – animal health

Animal health surveillance is currently focussed on major infectious diseases such as contagious bovine pleuropneumonia (CBPP), foot-and-mouth disease (FMD), African swine fever (ASF), and Newcastle disease, among others. There is no national surveillance system for AMR in animals or their products. Some studies have been conducted by research institutes which have included poultry, cattle and fish.

AST is performed for diagnostic samples submitted to the public and private laboratories. Submission of samples for culture is infrequent and the AMR data available from this source is limited, and is not reported at the national level.

However, an integrated AMR surveillance system involving humans, animals, environment and food of animal origin is being piloted through the Advisory Group on Integrated Surveillance of Antimicrobial Resistance (AGISAR), funded by WHO. This project is coordinated at University of Zambia (UNZA) School of Veterinary Medicine laboratories.

The Zambia Department of Veterinary Services has participated in the OIE training for collection of AMU data to be submitted into the global data base of antimicrobial use. The country submitted data for AMU to the OIE for 2015, 2016 and 2017.

In terms of readiness for surveillance, ten laboratories in the animal health sector have been assessed using the FAO Assessment Tool for Laboratory and Antimicrobial Resistance Surveillance (ATLASS), including the Central Veterinary Research Institute Laboratory (CVRI) which is the designated national reference laboratory for AMR. Five sites will be included in the initial surveillance system: these are CVRI, UNZA Public Health and Microbiology laboratory, VetLab, the Choma regional laboratory and the Zambia Bureau of Standards (ZABS) laboratory. In the active surveillance, only the laboratories which were assessed by the Fleming Fund Assessors will be included (CVRI, UNZA and Choma Regional Laboratory). To date, three laboratory staff members have received specific training for AST: two from CVRI and one from the University of Zambia.

The Directorate of Veterinary Services has engaged the major veterinary wholesalers to submit data on AMU. A database has been developed to capture data on the imports / exports of veterinary medicinal products. This has been used to provide information to the OIE on the nation's AMU. Laboratory data is capture in the

SILAB laboratory information management system, but currently this system does not have a designated component for reporting AMR surveillance data.

3.5 Laboratory capacity – human health

The National Situational Analysis (2018) concluded that there was a general lack of laboratory capacity and a paucity of information on AMR in Zambia, with most published data coming from UTH. The 2018 JEE report concluded that the ability to perform antimicrobial susceptibility testing is not widespread, reagent shortages can limit the availability of testing and there is a lack of appropriately trained staff to perform susceptibility testing at the subnational level.

The Fleming Fund Team has assessed three of the six proposed human health surveillance laboratories, at UTH Lusaka, Ndola University Teaching Hospital and Livingstone Central Hospital, and the Grantee will be expected to assess the remaining laboratories. UTH will act as both a surveillance site and as an interim reference laboratory pending development of the ZNPHI laboratory. It is led by an experienced microbiologist and the general level of staffing is adequate. The laboratory has an automated blood culture platform and VITEK II instrument. However, expansion of its role to include reference functions will be challenging as it is primarily a hospital clinical laboratory. Staff time allocations (including increasing the number of staff) will need to be formally agreed for it to succeed in its reference function.

The laboratories at Ndola and Livingstone are both currently performing bacteriology including blood cultures and AST, although both will require some refurbishment. Overall staffing levels are adequate but there are no microbiology specialists in place. ZNPHI is mentoring these sites with two-week long visits spread over the quarter, however, frequent staff rotation around the other sections of the laboratory means that training is not adequately built upon.

All laboratories visited are on the WHO-AFRO SLIPTA scheme. Biosafety and Biosecurity was adequate at all sites but will require strengthening in terms of equipment, materials and staff training.

3.6 Laboratory capacity – animal health

The Fleming Fund team visited 3 animal health laboratories: the Southern Province Regional Laboratory, the Central Veterinary Research Institute (CVRI) and the UNZA Public Health and Microbiology laboratory.

The UNZA and CVRI laboratories have some capacity to conduct bacterial culture, identification and susceptibility testing. The UNZA laboratory is currently more active in diagnostics, teaching and research compared to the CVRI laboratory. However, CVRI is in a much better position to coordinate the network of laboratories from the animal health sector, and already has connections to several regional and provincial laboratories, including those in Southern, Western, Eastern, Copperbelt, Northwestern and Northern Provinces. In addition, these laboratories are all supported by the existing structure of veterinary professionals and extension workers within the department of veterinary services, which will be vital for surveillance sample collection.

The CVRI is also linked with the National Livestock, Epidemiology and Information Center (NALEIC) and the Public Health Unit (PHU), both of which reside within the department of veterinary services and play an important role for AMR data collation and analysis and is part of the National Public Health Laboratory Network.

The Southern Province Regional Laboratory has a newly constructed building in Choma that is not yet in use. Construction is completed but installation of equipment is pending. It will also require additional human resources, and support with equipment, reagents, and materials to enable it to conduct AMR surveillance.

The Ministry of Fisheries and Livestock had the World Bank Livestock Development and Animal Health Project (LDAHP) from 2013 to 2018. The LDAHP supported several infrastructure investments designed to improve animal health services in Zambia. These include the construction of a new building to house the Zambian Institute for Animal Health (ZIAH) in Mazabuka; the construction of new regional laboratories in Mongu and Choma, and the restoration of the laboratory in Chipata.

All laboratories present challenges in terms of availability of equipment and reagents, lack of quality assurance schemes, lack of referral systems, lack of networks for external quality assurance for microbiological tests, inadequate of laboratory data management systems, inadequate biosafety and biosecurity measures, inadequate laboratory personnel with the required skills for AMR surveillance and lack of transport system for specimens, and these issues will need to be addressed to develop a sustainable, reliable surveillance system.

3.7 Antimicrobial Use – human health

Data from the Zambian NAP suggest that 78% of clinicians have observed treatment failures during their practice. Prescribing behaviour is mainly based on national clinical guidelines, consultation from colleagues, and laboratory results, and in tertiary hospitals, it is estimated that over 50% of the drugs prescribed are antimicrobials. However, there are no national level activities to systematically assess use or consumption of antimicrobials.

With support from ReAct Africa and the Ecumenical Pharmaceutical Network, Zambia is in the process of establishing the antimicrobial stewardship program in selected hospitals to spearhead antibiotic stewardship activities (consisting of Clinical, Laboratory, Infection Prevention Control and Pharmacy staff). A draft antimicrobial stewardship policy, draft framework and Terms of Reference (ToRs) have been developed, pending input from major stakeholders and finalisation. Piloting is scheduled to commence in the 2nd quarter of 2019 targeting 5 facilities. This is expected to improve engagement from clinicians and improve use of antimicrobials.

4 Scope of this Country Grant

4.1 Grant Objectives and Outputs

Objectives and outputs for this Country Grant are summarised in Table 1, with more detail provided in Section 7. Applicants should propose and cost relevant activities and indicators for each objective (see Section 9). All inputs must be permitted under the list of Eligible Funding Items, as outlined in Annex 1.

Table 1. Summary of Grant Objectives and Outputs

Objective/Output
Objective 1: Develop a costed operational workplan for sustained and expanded AMR and AMU surveillance in Zambia
• Output 1.1: A costed operational workplan for Phase 2, to sustain and expand AMR and AMU surveillance
Objective 2: Strengthened One Health governance structures to oversee and monitor AMR and AMU surveillance at the national level
• Output 2.1: Improved co-ordination between the AMRCC Secretariat, Technical Working Groups, and National Multisectoral Steering Committee to ensure a OH approach to surveillance
• Output 2. 2 The AMRCC integrates the knowledge generated through multi-sectoral AMR and AMU surveillance into decisions that guide the overall AMR programme in Zambia
• Output 2.3 The AMRCC shares AMR knowledge generated through multi-sectoral AMR and AMU surveillance both nationally and internationally.
Objective 3: Improved microbiology laboratory capacity and capability for quality assured AMR and AMU surveillance in the human health sector
• Output 3.1 The multi-sectoral AMR, Surveillance and Research Technical Working Group shares AMR and AMU data with the AMRCC

• Output 3.2: The multi-sectoral AMR, Surveillance and Research Technical Working Group is strengthened to provide technical support to the AMR surveillance system in human health
• Output 3.3: Enhanced capacity and capability of ZNPHI as the National Coordinating Centre for all surveillance sites in Zambia.
• Output 3.4: Increased capacity and capability of UTH Lusaka to function as a reference laboratory for AMR surveillance
• Output 3.5: Well-functioning sentinel laboratories that are included in an AMR laboratory network
• Output 3.6: Adequate levels of quality assurance and control in all laboratories
• Output 3.7: An improved specimen transportation system for AMR surveillance
• Output 3.8: AMC and AMU Integrated surveillance strategy established
• Output 3.9: Improved engagement of clinical staff at the surveillance sites with clinical microbiology services
• Output 3.10: Biosafety and security ensured at the reference laboratory and at sentinel surveillance laboratories
Objective 4: Increased microbiology laboratory capacity and capability for quality assured AMR and AMU surveillance in the animal health sector
• Output 4.1: The multi-sectoral AMR, Surveillance and Research Technical Working Group is strengthened to provide technical support to the AMR surveillance system in Animal Health
• Output 4.2: Central Veterinary Research Institute (CVRI) strengthened as an AMR reference laboratory.
• Output 4.3: Increased capacity of CVRI, zonal laboratory in Choma and UNZA to produce reliable quality bacterial culture, identification and Antibiotic Susceptibility Testing (AST) results
• Output 4.4: Biosafety and biosecurity measures are being applied within the surveillance laboratories for safe transport of samples and isolates between the laboratories
• Output 4.5: Active surveillance commenced: Good quality samples from broilers, layer and indigenous chickens are regularly sent to CVRI, Choma and UNZA laboratories
• Output 4.7: A national database of AMR/AMU and is established in the Department of Veterinary services.
• Output 4.7: Directorate of Veterinary Services (DVS) shares quarterly and annual reports of AMR surveillance results with the animal health Surveillance and Research TWG, the zonal laboratories, CVRI and UNZA laboratories, and other stakeholders
• Output 4.8: DVS shares antimicrobial consumption (AMC) and antimicrobial use (AMU) data with the Knowledge, Surveillance and Research TWG, the AMU TWG and other stakeholders

4.2 Duration and phasing of the grant

Phase 1 of the Country Grant to Zambia will be for 18 months. During the first 9 months, the Grantee should develop and submit a costed workplan for Phase 2, which will run consecutively for an additional 12 months to sustain and extend the surveillance system.

4.3 Funding envelope

Grant applications for Phase 1 should be in the region of £1.5-2 million, including all capital and recurrent costs, overheads and management costs.

Mott MacDonald is responsible for ensuring Value for Money (VfM) on behalf of the UK Department of Health throughout the Grant programme and will carefully consider how the proposal addresses efficiency, effectiveness, economy and equity in delivering the Request for Proposal (RFP) outputs in relation to the proposed costs. The Guidance Notes for the Grant Application Form provides more information on different dimensions to be considered as part of a VfM approach.

4.4 Procurement

During the site visits in November 2018, the Management Agent compiled an indicative procurement list of laboratory equipment, reagents and consumables. The grantee is expected to conduct further assessments, as indicated in Output 2.4, and develop a procurement plan for the reference laboratories and surveillance sites during the inception phase. The assessments will utilise the tools provided by the management agent and will include assessment of infrastructure to determine what renovations are required. For human health laboratory sites, applicants should include a placeholder budget of £200,000 per site in the application. For animal health laboratory sites, the applicants should include a placeholder budget of £100,000 per site. These figures can be revised following the laboratory assessments.

During the inception phase, the grantee will work in consultation with the Management Agent, the Management Agent's procurement supplier (International Procurement Agency, IPA) and the UK Department of Health and Social Care, to determine the most suitable method of procurement for laboratory equipment, and to develop reliable stock management and supply systems for consumable and reagents.

The lead grantee will also be expected to

1. assist with the import and delivery of equipment and consumables to recipient sites;
2. work closely with the procurement partner (IPA or an alternative organisation) to ensure the appropriate delivery sequence of items;
3. maintain an asset register of all items defined as assets by the programme;
4. regularly monitor the items that have been procured by Fleming Fund Grants Programme to ensure:
    (i) items are being used for intended purpose;
    (ii) items are being maintained appropriately; and
    (iii) any misuse or misappropriation of assets is reported to the Management Agent.

5 Key partnerships, alignment and coordination

The Country Grant must be delivered in alignment with the National Action Plan for Combating Antimicrobial Resistance in Zambia.

The grant must also align with other AMR related initiatives including those undertaken by bilateral and multilateral agencies such as US Centre for Disease Control, FAO and WHO.

Despite the existence of the Laboratory Technical Working Group in MOH, coordination and communication between the donors is limited and there is a risk of duplication and inefficiency. It is therefore important that the grantee makes every effort to coordinate, align and interact with other development partners. The Grantee will need to work with the AMRCC Secretariat (ZNPHI and DVS) to build strong collaborations and coordination with local academic and research institutions at different levels for technical and other support. Applicants should describe how they will co-ordinate the programme with the relevant stakeholders.

6 Complementing other grants from the Fleming Fund Grants Programme

The first Country Grant is expected to work, where necessary, with other grants under the Fleming Fund Grants Programme at the regional level. For details see www.flemingfund.org.

The Fleming Fund Regional Grant programme, also managed by Mott MacDonald, will focus on strengthening networking and data sharing on AMR at the regional level. The grantee is expected to liaise, through Mott MacDonald, with this programme where relevant, to maximise the sharing of AMR data and learning at the regional and global levels.

7 Detailed Objectives and Outputs

Objective 1: Develop a costed operational workplan for sustained and expanded AMR and AMU surveillance in Zambia

Output 1.1: A costed operational workplan for Phase 2, to sustain and expand AMR and AMU surveillance

We expect that this output will have been achieved by the end of the first nine months (quarter 3). This should draw on the experience of the Grantee in the early stages of Phase 1, and should aim to build on and expand the surveillance network to include additional Human Health and Animal Health laboratories. Extension of the AMR surveillance system to other sectors could also be considered at this stage.

Objective 2: Strengthened One Health governance structure to oversee and monitor AMR and AMU surveillance at the national level

Output 2.1: Improved co-ordination between the AMRCC Secretariat, Technical Working Groups, and National Multisectoral Steering Committee to ensure a OH approach to surveillance

Background information

While the AMRCC is a One Health entity comprising focal points from different sectors, there is no operational platform for co-ordination and analysis of data between the different sectors. The TWG for Antimicrobial Use, and the TWG for Knowledge, Surveillance and Research have responsibility for AMU surveillance and AMR surveillance respectively, but are currently operational in the human health sector only.

Role of the Grantee

Co-ordination spearheaded by AMRCC should be strengthened to ensure a functioning One Health entity at the operational level. To support this, the TWGS for Antimicrobial Use and Knowledge, Surveillance and Research should be expanded to provide technical oversight for data collection across the Animal Health and other sectors.

Expected outcomes

By the end of the grant, we expect that the following will have been achieved

- Increased co-operation between the AMRCC and sectors to form, or to act as, a One Health AMR platform, with overall responsibility for analyzing and synthesizing data from different sectors in a OH approach
- The roles of the TWGs for AMU and Knowledge, Surveillance and Research are expanded to support data collection across OH sectors

Output 2.2: The AMRCC integrates the knowledge generated through multi-sectoral AMR and AMU surveillance into decisions that guide the overall AMR programme in Zambia

Background information

The AMRCC is already a well-functioning national multi-sectoral AMR coordinating committee that has worked together to produce the NAP and is now leading the implementation of the NAP. The committee has members from the multiple sectors, including human health, animal health, environment and others as indicated in the NAP.

Role of the Grantee

Support and strengthening of the AMRCC should include the following:

- Facilitation of quarterly meetings involving all relevant sectors
- Support in understanding the outputs from AMR and AMU surveillance activities
- Development of responses to AMR and AMU surveillance data
- Support in achieving the key indicators of the surveillance system

Expected outcomes

By the end of the grant we expect that the following outcomes will have been achieved:

1. The NMSC, AMRCC and Technical Working Groups are operating effectively and sustainably, with active participation by representatives from all relevant sectors
2. The AMRCC facilitates implementation of the AMR and AMU surveillance programmes in human and animal sectors
3. The AMRCC makes evidence-based decisions on future surveillance priorities and policies to reduce the burden of AMR
4. Progress towards key indicators of the surveillance systems is achieved

Output 2.3 AMRCC shares AMR knowledge generated through multi-sectoral AMR and AMU surveillance both nationally and internationally.

Background information

The secretariat of the AMRCC is, as per the NAP, responsible for data and information sharing, including nationally and internationally via GLASS.

Role of the Grantee

The Grantee should support the AMRCC to share knowledge and data, including

- Regular intersectoral sharing of surveillance data
- Support for a national multisectoral AMR conference
- Ensuring alignment with, and reporting to, international bodies including the GLASS programme

Expected outcomes

By the end of the grant we expect that the following outcomes will have been achieved:

1. AMR and AMU information shared nationally and internationally
2. Regular reporting of AMR data via GLASS
3. An improved cross-sectoral understanding of AMR and AMU in Zambia

Objective 3: Improved microbiology laboratory capacity and capability for quality assured AMR and AMU surveillance in the human health sector

Output 3.1 The multi-sectoral AMR Knowledge, Surveillance and Research Technical Working Group shares AMR and AMU data with the AMRCC

Background information

The multi-sectoral AMR Knowledge, Surveillance and Research Technical Work Group has just been constituted and therefore its functions are currently being performed by the AMRCC. The AMRCC has contributed to development of the NAP and the draft national integrated AMR surveillance strategy. As AMR and AMU surveillance systems begin to generate data, the Surveillance and Research Technical Work Group will assume responsibility for monitoring of surveillance systems, reporting progress on implementation, and analyzing and reporting the data and knowledge generated through surveillance. The TWG is charged with the following strategic interventions:

- Establish a national coordination structure for surveillance of AMR
- Establish a food safety surveillance system including AMR
- Strengthen legal provisions to address AMR and related factors
- Designate a national reference laboratory for AMR surveillance
- Establish an AMR surveillance laboratory network

Role of the Grantee

The grantee should support the AMR Knowledge, Surveillance and Research TWG to ensure that it has the resources and capability to fulfil the above functions, including integration of data from both research and surveillance across One Health sectors.

This will include:

- Developing formal Terms of Reference for the TWG
- Facilitating quarterly meetings
- Technical support for data analysis
- Building capacity so that the TWG can present evidence-based recommendations to the ARMCC
- Support for an up-to-date national repository for AMR and AMU data

Expected outcomes

By the end of the grant we expect the following outcomes:

1. The multi-sectoral Knowledge, Surveillance and Research TWG is operating effectively and sustainably, with a TOR that outlines clear roles agreed for individuals and the group as a whole
2. Active collaborative participation by both the human and animal health sectors
3. Increased capacity within the TWG to understand and interpret AMR and AMU data
4. Regular reporting of multi-sectoral surveillance data, together with recommendations for future research priorities, programming and policies
5. Maintenance of up-to-date National repositories for AMR and AMU data

Output 3.2: The multi-sectoral AMR Surveillance and Research Technical Working Group is strengthened to provide technical support to the AMR surveillance system in human health

Background information

As above, the AMR Knowledge, Surveillance and Research Technical Working Group is evolving its role to assume increasing responsibility for AMR surveillance systems.

Role of the Grantee

The Grantee should support the TWG to expand its role to enable it to perform the following functions:

- Provide technical input to the design of AMR and AMU surveillance in humans
- Support the implementation of the AMR and AMU surveillance programmes
- Interpret and report AMR and AMU surveillance results
- Identify additional surveillance priorities in for AMR in human health
- Maintain a data repository for human health
- Collaborate with other sectors to understand the surveillance data in the OH context
- Identify opportunities for collaborating with the animal health sector in training, equipment procurement and maintenance, purchase of reagents, etc.

Expected outcomes

By the end of the grant we expect that the following will have been achieved:

- A National AMR Surveillance Strategy is agreed and implemented
- A National AMU Surveillance Strategy is agreed and implemented
- Results from the AMR and AMU surveillance in humans and other sources of information on AMR in humans have been presented to the AMRCC.

Output 3.3: Enhanced capacity and capability of ZNPHI as the National Coordinating Centre for all surveillance sites in Zambia.

Background information

ZNPHI supervises and provides technical support to sentinel surveillance sites to build capacity for AMR testing in the laboratory through regular mentorship and training, and, on completion of ongoing building work), the national public health laboratory will be the national public health reference laboratory for Zambia.

Role of the Grantee

The Grantee will need to ensure that ZNPHI is able to fulfil its role as the national coordinating centre for all AMR surveillance activities in the country. The Grantee will need to liaise with ZNPHI to ensure alignment with their activities.

Areas which may require support include

- Development of reliable supply chains and stock management systems for reagents and consumables
- Training in laboratory methods, data management and epidemiology, leadership and management for key personnel within these specialties
- Development of / support for quality management systems
- Building capacity in data management and analysis using the WHONET software
- Working to integrate WHONET and the Disa*Lab LIMS to ensure effective reporting to GLASS
- Development of IT systems that allow back-up of data and input of data from subordinate laboratories

- Support for ZNPHI to develop their role as the national coordinating centre (e.g. developing SOPs and bench aids suitable for sentinel laboratories to use, EQA support to sentinel sites)

Expected outcomes

By the end of the grant we expect that the following will have been achieved:

- ZNPHI is supporting all operational surveillance sites with training, and mentorship in bacterial identification, AST, and data entry and analysis.
- ToRs for developed for ZNPHI and UTH and an agreed handover plan
- Appropriate software (e.g. WHONET) is installed and in use at ZNPHI, the reference laboratory and the surveillance sites
- Linkage of DISA*Lab to WHONET to allow timely, efficient reporting
- Development of a stock management system, and strengthened supply chains, to ensure reliable supplies of reagents and consumables for surveillance activities
- ZNPHI has technical capacity to effectively coordinate activities in the surveillance network

Output 3.4: Increased capacity and capability of UTH Lusaka to function as a reference laboratory for AMR surveillance

Background information

UTH Lusaka has been identified as the national reference laboratory pending formal establishment of the ZNPHI laboratories. A summary of its current capacity is outlined in Section 3.5 above.

Role of the Grantee

The Grantee is expected to support UTH Lusaka to improve in its role as the interim reference laboratory. ZNPH should also be strengthened for its role as a supporting centre to UTH Lusaka.

Areas for support include:

- **Basic refurbishments.** Certain rooms and spaces need basic refurbishment to improve sample processing. This will be informed by the FF laboratory needs-assessment and should be agreed with the management agent
- **Inventoried biorepository with associated SOPs and policies for use**
- **Human resources:**
  - Training for good quality bacterial identification and AST, and for advanced confirmation / characterisation of phenotype
  - Support for technical staff in sentinel sites
  - Training in epidemiology / data management
- **Supply of Reagents and Consumables.** The laboratory should be support to establish reliable supply chains
- **Equipment.** UTH Lusaka currently has a Biomerieux Vitek 2 with limited capacity. In order to perform confirmation and advanced phenotypic susceptibility testing, UTH Lusaka will require additional equipment and the Grantee will need to work with the Management Agent's procurement agent, IPA, to ensure timely delivery and training on key instruments
- **Strategy for dealing with biosafety level 3 pathogens**. As the national reference laboratory it is important that UTH Lusaka is prepared for handling dangerous pathogens. The laboratory should be assisted to develop plans for dealing with these. The resultant plans may be beyond the scope of the current grant to fund.

Expected outcomes

By the end of the grant we expect that the following will have been achieved:

- SOPs for culture, identification and AST of all the bacteria included in the AMR surveillance programme have been update and are being used in all the microbiology laboratories in the surveillance programme
- An inventoried national biorepository of bacterial isolates from all laboratories is securely maintained at the UTH/ZNPHI
- A collection of all the necessary ATCC strains is maintained at UTH/ZNPHI
- The reference laboratory is participating in an international EQAS, and runs EQAS with the sentinel sites
- UTH/ZNPHI has the capability to conduct phenotypic testing to confirm ESBL-, acquired AmpC, and carbapenemase-producing organisms.
- UTH Lusaka delivers quality support services in bacteriology to its subordinate laboratories
- All specialist laboratory equipment at the UTH Lusaka bacteriology laboratory is receiving appropriate regular maintenance
- Automated identification and susceptibility testing equipment is installed, staff are trained, and a maintenance plan is in place
- Appropriate quality management systems and Biosafety and Biosecurity systems are in place

Output 3.5: Well-functioning sentinel laboratories that are included in an AMR laboratory network

Background information

All the surveillance sites in Phase 1 possess functioning microbiology laboratories, however they will need support to provide high quality surveillance data. Some laboratories are missing equipment that will be needed for the surveillance, for example automated blood culture machines and freezers for storage of isolates. Existing machines require maintenance and regular quality control. Stock out of all sorts of reagents and consumables is common, and in general the cheapest options are procured, rather than those that meet standards for in vitro diagnostic use. Data and IT facilities and support in sentinel sites need to be supported in order to minimise the burden on laboratory staff for data entry. Frequent rotation of laboratory staff at sentinel laboratories is a major concern hampering build-up of technical knowledge and transfer of knowledge to inexperienced colleagues.

Role of the Grantee

The Grantee will need to assess the equipment requirements of the laboratories taking into account using their own and other recent assessments. Working with ministries and other donors to avoid duplication, the Grantee should ensure the laboratories have the necessary equipment and service contracts. The Grantee should ensure consistent supply of quality reagents and consumables. The Grantee must assess the IT and data management system at sentinel labs and ensure improvements. The Grantee will need to assess the issues concerning frequent rotations of technical staff and ensure more consistency and propose solutions.

Expected outcomes

By the end of the grant we expect that the following will have been achieved:

- All supported laboratories have been assessed using the Fleming Fund site and laboratory needs assessment tool
- All renovations identified by the assessment and as agreed with the hospital and the management agent have been completed
- All equipment identified by the assessments and agreed with the management agent has been purchased and installed, and staff are trained in use

- All relevant equipment has a maintenance plan in place. Where necessary the cost of this is supported by the grantee
- Each surveillance laboratory has adequate stocks of reagents and consumables and a system for monitoring and reporting stock levels
- A mentoring based skills program training program on laboratory methods needed for surveillance is being delivered to each site
- Each laboratory has a functioning IT platforming allowing efficient entry of surveillance data
- All surveillance sites are contributing surveillance data suitable for inclusion in the WHO Glass database

Output 3.6: Adequate levels of quality assurance and control in all laboratories

Background information

All laboratories should be working to the same high quality standard. Staff should be adequately trained, and appropriate quality control organisms need to be available on site and used to monitor the quality of work. The national EQA scheme must also be strengthened for the anticipated expansion of the surveillance system.

Role of the Grantee

The grantee should ensure technical advice and training is provided to UTH Lusaka, the ZNPHI, UTH Lusaka and the surveillance sites for quality assurance and control, and ensure that control organisms are available in all sites.

Expected outcomes

By the end of the grant we expect that the following will have been achieved:

- Quality management systems and Biosafety and Biosecurity systems are in place in all the targeted laboratories
- Reference strains for IQC are available and being used. The resulting IQC data is being collected and monitored regularly at a national level
- A strengthened national EQA scheme is supported, with all surveillance sites participating.
- Surveillance site laboratories are working towards accreditation

Output 3.7: An improved specimen transportation system

Background information

A transportation system, in which samples can be shipped between laboratories in a secure and reliable manner without significant delays, is a critical part of a properly functioning AMR surveillance system.

Role of the Grantee

The grantee should provide support to identify strategies to improve transportation of samples throughout Zambia. Once a strategy has been selected this should be developed into a well-functioning system, and incorporated into laboratory funding mechanisms.

Expected outcomes

- A sustainable, well-working transportation system to ship samples throughout Zambia
- A plan for sample traceability in place and implemented.
- Training in sample shipments delivered to all surveillance sites

Output 3.8: AMC and AMU surveillance strategy is established

Background information

As described in section 3.7, AMU surveillance systems are essential prerequisites for targeted interventions to curb the unnecessary use of antibiotics. Point-prevalence surveys within one or more health-care facilities to monitor AMU are regarded a relatively inexpensive and easy option, however, there are other options that can be used to monitor AMU as well as AMC.

Both AMC and AMU data need to be collected to get a clear understanding of the current situation in Zambia and the effect of interventions.

Role of the Grantee

The grantee should support the development and implementation of a national strategy and plan for AMC and AMU surveillance. At sentinel sites, the grantee can provide support for data collection, for example training and computer equipment, and at the national level aggregation and analysis of data.

Expected outcomes

By the end of the grant we expect that the following will have been achieved:

- A national protocol for AMU and AMC surveillance has been developed.
- AMC surveillance has been conducted at national level
- AMU surveillance (e.g. a point prevalence survey) has been conducted at all surveillance sites.
- A report analysing the results of the AMU and AMC surveillance has been produced.

Output 3.9: Improved engagement of clinical staff at the surveillance sites with clinical microbiology services

Background information

In some sites, the number of sample submitted to the microbiology laboratory is very small, meaning that data is likely to be under-representative. Engagement with clinical staff is necessary to ensure appropriate sampling of patients, and laboratories must report results in a timely manner in order to inform patient care.

Role of the Grantee

The grantee should improve laboratory-clinician interaction at surveillance sites to ensure blood cultures are performed where indicated using good sampling techniques, and that relevant metadata is recorded. Clinical staff should also be responding to culture results appropriately.

Expected outcomes

By the end of the grant we expect that the following will have been achieved:

- Increased number of samples sent to the laboratory, with acceptable contamination rates and relevant clinical data recorded on the request form
- Results are communicated to clinicians in a timely manner
- Clinicians and pharmacists at the surveillance sites demonstrate an improved understanding of how to incorporate bacteriology results into their practice

Output 3.10: Biosafety and security ensured at the reference laboratory and at surveillance laboratories

Background information

Biosafety and Biosecurity is covered under the 2007 Biosafety act. It is one of the main pillars of a well-functioning laboratory. Currently, biosafety and biosecurity issues are present in laboratories visited and these need to be addressed.

Role of the Grantee

The grantee will need to provide equipment, training and technical assistance to establish functional Biosafety and Biosecurity programmes in each of the laboratories supported

Expected outcomes

We expect the following to be in place at each supported site:

- Monitoring systems for biosafety and biosecurity are established and in operation.
- There is a plan for maintaining biosafety and biosecurity beyond the life of the grant.

Objective 4: Increased microbiology laboratory capacity and capability for quality assured AMR and AMU surveillance in the animal health sector

Background information

In line with the global Fleming fund program based on the availability of an established protocol collaboratively developed by partners. the first round of AMR surveillance in animals will be an active surveillance programme targeting resistance to specified antimicrobials in selected zoonotic enteric bacteria in healthy broilers and layer hens, as a foundation for developing services which can be expanded subsequently.

CVRI, the zonal laboratory in Choma and the microbiology laboratory at UNZA will conduct AST on samples collected under this active AMR surveillance programme, with CVRI as the designated national AMR reference laboratory. These laboratories will additionally contribute passive surveillance data from AST conducted on samples from clinically ill animals to the AMR database. Some support will be provided through the Grant to strengthen the bacteriology laboratories at CVRI, Choma and UNZA to ensure reliable AST data is submitted under the surveillance programme.

In the initial stages, surveillance in animal health should focus on the following priorities

i) Resistant bacteria which frequently cause disease in humans (based on the GLASS priority pathogens for surveillance)

ii) Resistant bacteria which frequently cause disease in the species under surveillance, which may result in widespread use of antimicrobials or where resistance will have significant economic consequences

iii) Indictor bacteria: bacterial species where resistance may indicate high levels of antimicrobial use, or where there is a possibility that resistance genes could be passed to more virulent species

Output 4.1: The multi-sectoral AMR Knowledge, Surveillance and Research Technical Working Group is strengthened to provide technical support to the AMR surveillance system in Animal Health

Background information

The AMRCC has to date, focused on the human health aspects of the AMR surveillance. The operationalised AMR Surveillance and Research Technical Working Group will assume increasing responsibility for AMR surveillance systems, and should expand its role to include the AH sector and other OH sectors as necessary. The TWG should include relevant technical experts from different disciplines and stakeholders in AMR and AMU surveillance in the animal health sector, such as: the AMR focal point for animal health, microbiologists, epidemiologists, veterinary public health specialists, livestock production specialists, fisheries officers and veterinary product experts, and will be responsible for

- Technical input to the design of AMR and AMU surveillance in animals
- Discussion and interpretation of animal AMR and AMU surveillance results
- Contributing to knowledge about AMR and the links between AMU and AMR in animals and people in Zambia
- Identifying priorities for further surveillance and/or investigations in animals
- Identifying opportunities for collaborating with the human health sector in training, equipment procurement and maintenance, purchase of reagents, etc.

Role of the Grantee

The Grantee should support the TWG to develop its role in AH surveillance, including incorporation into the ToRs of the TWG and provision of technical assistance. If expansion of the TWG in this way is not feasible, the Grantee will need to work with the AMRCC to develop an equivalent entity.

Expected outcomes

By the end of the grant we expect that the following outcomes will have been achieved:

- The TWG incorporates AH into its ToRs, or an equivalent entity is established
- The TWG is contributing to knowledge on AMR and AMU in Zambia

Output 4.3: Central Veterinary Research Institute (CVRI) strengthened as an AMR reference laboratory.

Background information

The Central Veterinary Laboratory (CVRI) in Balmoral is designated as the national AMR reference laboratory for animals. The CVRI will provide leadership and support for the zonal laboratory (in Choma) that is participating in the surveillance network plus linkages through data sharing with the microbiology laboratory in UNZA.

A particular challenge faced in Zambia is the large distance between CVRI which is located in Lusaka and the zonal laboratory. For the AMR surveillance programme to be successful the zonal laboratory will need regular supervision and contact with CVRI, to ensure it is engaged and contributing to the programme through collection of samples, diagnostic testing and sharing AST results. This is likely to require regular visits (minimum of quarterly visits) from CVRI to the zonal laboratory in Choma.

Role of the Grantee

The Grant should provide support for the CVRI to undertake the following responsibilities in its role as AMR reference laboratory:

- Supervision and diagnostic expertise to support the zonal laboratory
- Maintain quality diagnostic systems in zonal laboratory contributing to surveillance, including:
    - Coordinate production of bench guides/flow charts
    - Develop SOPs to include all the bacteria in the surveillance programme
    - Training/mentoring on quality control (QC) and internal quality assurance system (IQAS)
    - External quality assessment (EQAS) in zonal veterinary laboratory and the microbiology laboratory at UNZA.
- Maintain an inventoried national biorepository of isolates produced by all laboratories in the surveillance network
- Maintain an ATCC or NCTC strain collection
- Collate & verify AMR surveillance diagnostic data from the contributing laboratories
- Participate in an international EQAS
- Develop the capability to undertake the following more advanced diagnostic methods:
    - ESBL, acquired AmpC (pAmpC), and carbapenemase-producing organism confirmation
    - Minimum Inhibitory Concentration (MIC) tests on a subset of isolates

Expected outcomes

By the end of the grant we expect that the following outcomes will have been achieved:

- SOPs for culture, identification and AST of all the bacteria included in the AMR surveillance programme have been updated and are being used in all the microbiology laboratories in the surveillance programme
- CVRI has delivered training to the microbiology technicians from the participating laboratories in culture, identification and AST
- An inventoried national biorepository of bacterial isolates from all laboratories is securely maintained at CVRI
- A collection of all the necessary ATCC strains is maintained at CVRI
- CVRI runs an EQAS with the zonal laboratory participating in the AMR surveillance programme and with the microbiology laboratory at UNZA
- CVRI is participating in an international EQAS
- CVRI has the capability to conduct phenotypic testing to confirm ESBL-, acquired AmpC and/or carbapenemase-producing organisms.
- CVRI has the capability to serotype the major *Salmonella* species found in animals.
- CVRI has conducted MIC testing on a representative sample of isolates

Output 4.3: Increased capacity of CVRI, zonal laboratory in Choma and UNZA to produce reliable quality bacterial culture, identification and Antimicrobial Susceptibility Testing (AST) results

Background information

There is good capability at CVRI to culture and identify a range of bacteria, with the exception of *Campylobacter*. The capacity of CVRI, zonal laboratory and UNZA needs strengthening to conduct AST according to internationally recognised protocols. In addition, quality control measures need to be improved and standardised to ensure accuracy of AST.

Bacteriology staff in the zonal laboratory currently do not have the capability to culture the priority bacteria identified for the surveillance programme. Hence, the training of bacteriology technicians is required in the zonal laboratory to conduct reliable AST.

CVRI and UNZA bacteriology laboratories require reasonably low-input renovations. Some equipment is needed to support bacteriology in the identified laboratories. All equipment in the laboratories needs to be calibrated and serviced prior to initiating the AMR surveillance testing. Good quality media and antibiotic disks need to be provided.

There is good capability to conduct AST in the bacteriology laboratory at UNZA. There is only a small throughput of samples from clinically ill animals, with the majority of work contributing to research projects. The laboratory lacks some equipment and has limited supplies of reagents for culture, identification and AST. The laboratory has no developed laboratory management system for storing the AST results, with all data stored in isolated excel files and paper forms. The management of data using WHONET software was introduced but is not yet fully used.

Laboratory technicians at CVRI, the zonal laboratory and UNZA require training in protocols and quality control measures to produce reliable culture and AST results for *E coli*, *Salmonella, Enterococci* and *Campylobacter* (CVRI only). The zonal laboratory and UNZA laboratory must participate in an EQA (inter-laboratory comparison) programme run by CVRI.

Role of the Grantee

The Grantee should provide support to the laboratories to produce reliable results by procuring quality reagents and consumables, including media and antibiotic discs, and developing sustainable supply chains for ongoing work.

The Grantee will also procure and install the equipment that the laboratories requires for quality microbiology testing, and organise servicing and calibration of equipment.

Where necessary, the Grantee can support CVRI to provide further training and mentoring to ensure laboratories use best laboratory standards for identification and antibiotic susceptibility testing including use of SOPs, monitoring of equipment and internal quality control checks on assays.

The Grantee will need to ensure the activities supported through the Country Grant align and compliment with the Zambian component of the AMR FAO regional project (GCP/GLO/710/UK) activities.

Expected outcomes

By the end of the grant we expect that the following will have been achieved:

- Availability of necessary equipment that have been calibrated and serviced plus a suitable working environment to conduct reliable diagnostic testing for AMR
- Bacteriology laboratory staff produce reliable culture, identification and AST results for the agreed bacteria as assessed by a relevant external quality assessment programme and by records of appropriate internal quality control
- All laboratories maintain accurate records of AMR diagnostic results and regularly send the results to National Livestock and Epidemiology Information Centre working in collaboration with the Public Health Unit (NALEIC/PHU)
- Quality management systems are in place

Output 4.4: Biosafety and biosecurity measures are being applied within the surveillance laboratories, including for safe transport of samples and isolates between the laboratories

Background information

Biosecurity issues to be considered include:

- Secure laboratory access
- PPE availability
- Biosafety cabinets functioning and used appropriately in each laboratory
- Equipment is available for triple packaging & transport of isolates and staffs are applying this to the safe transport of isolates from the zonal laboratories to CVRI.

Roe of the Grantee

The Grantee should review Biosafety and Biosecurity in the three laboratories in the AMR surveillance programme at the beginning of the Grant period to identify the issues that need to be addressed. Furthermore, the Grantee needs to integrate support provided through this initiative with support provided by other donors to avoid duplication.

Integration with other donor programmes

CVRI and the zonal laboratory may have had some training in Biosafety and Biosecurity. The Grantee will need to ensure that support provided under the Grant aligns with, and does not duplicate, support provided by other donors.

Expected outcomes

By the end of the grant we expect that the following will have been achieved:

- The laboratories are equipped with appropriate safety equipment and staff are wearing personal protective equipment while conducting testing
- Biosafety cabinets are operational maintained and being used by staff appropriately
- A functioning Biosafety and Biosecurity system is in place

Output 4.5: Good quality samples from broilers and layer hens are regularly sent to CVRI, Choma and UNZA laboratories

Background information

Initial Animal Health surveillance will focus on broiler and layer hens as a potential major focus of antimicrobial use and the emergence / propagation of resistant strains of bacteria. A surveillance strategy should be developed, with reference to the guidance which will be provided by the management agent, to ensure representative sampling. Field laboratory staff and/or students will be responsible for regularly collecting samples from healthy poultry in Lusaka and the Choma region and delivering these to CVRI, Choma or UNZA laboratories. A sampling protocol needs to be designed at the beginning of the grant period to collect an agreed number of poultry samples in each area. An SOP for collecting samples should also be prepared at the beginning of the grant period, if not already available, and sample collectors trained. Ethical practices and data protection of poultry owners should be considered during the development of SOPs.

Good quality reagents and consumables need to be purchased for sample collection and transport.

Role of the Grantee

The Grantee will need to support procurement of sufficient consumables and transport media for samples. The Grantee will also need to support development of an SOP, if one is not available, and support training of field staff to collect and transport samples. Costs of sample collection and transportation need to be covered under the Grant.

Expected outcomes

By the end of the grant we expect that the following will have been achieved:

- Field laboratory staff and/or students have sent the required number of samples to the laboratories for diagnostic testing
- Samples are labelled appropriately, transported in a safe manner, and are accompanied by epidemiological and demographic information
- Appropriate isolates are forwarded from zonal laboratories to CVRI for confirmation and archiving

Output 4.6: A national database of verified AMR/AMU data is maintained at the Department of Veterinary services

Background information

WHONET is not yet installed in any veterinary laboratories apart from UNZA in Zambia. The database needs to be customised for Zambia, installed in each of the surveillance laboratories and staff trained to enter the AST results that are correctly matched to demographic data for each sample. A computer, printer and UPS will need to be purchased for CVRI, UNZA and the Choma laboratory to specifically maintain the WHONET or any other databases for AMR data.

Each laboratory should be responsible for maintaining an accurate database of the samples that they test for AMR and should send a monthly dataset to NALEIC/PHU for updating the national AMR database.

An SOP needs to be developed to guide use of WHONET and the arrangements for sharing the data in WHONET from the network laboratories to NALECI/PHU.

AST results obtained from clinical animal samples should also be entered into the database as well as those collected for AMR surveillance in healthy birds, so that AMR associated with animal illness is also analysed. A system for transferring data from laboratories to CVRI and NALEIC/PHU needs to be agreed. Training provided for data management person at CVRI (collating and verifying data from laboratories) before it is transmitted to national database at NALEIC/PHU.

The government laboratory network in Zambia, which does not include UNZA, has a nationally networked web-based Laboratory Information System known as SILAB. If it is feasible to integrate WHONET with SILAB the Grant could support an IT expert to link the two databases.

Role of the Grantee

The Grantee should provide support for customisation of WHONET or SiLab for the veterinary laboratories in Zambia, installing the software in CVRI, the Provincial laboratory, UNZA and NALEIC/PHU, and providing training in data entry and data analysis. This input for veterinary laboratories could be integrated with similar input for the human surveillance sites.

Expected outcomes

By the end of the grant we expect that the following will have been achieved:

- Results for all samples tested under the surveillance programme are entered into WHONET or similar software, with laboratory results accurately matched to demographic and epidemiological details for each sample
- Data is regularly backed up
- Data is regularly sent from Choma laboratories, UNZA, CVRI to NALEIC/PHU for collation into a national database

Output 4.7: The DVS shares quarterly and annual reports of AMR surveillance results with the relevant TWG, the zonal laboratories, CVRI and UNZA laboratories, and other stakeholders

Background information

An epidemiologist or Public Health specialist at NALEIC/PHU (under the DVS) should be responsible for epidemiological analysis of the data collected through AMR surveillance. The AMR results should be interpreted in the context of data collected on AMU in the surveillance populations.

Role of the Grantee

The Grantee should support quarterly meetings with all contributors of AMR/AMU surveillance data at NALEIC/PHU to share and discuss results and issues related to data supply, quality, etc, and should support an epidemiologist or Public health specialist at NALEIC/PHU to conduct analysis of AST data from surveillance of healthy poultry populations as well as that from AST conducted on clinical cases. The Grantee should also provide support for training in AMR data analysis and interpretation, and for quarterly meetings with CVRI, Provincial laboratories and UNZA (data contributors) to share and discuss results and issues related to data supply and quality.

Expected outcomes

By the end of the grant we expect that the following will have been achieved:

- DVS is producing results from analyses of the AMR surveillance data and sharing with the relevant TWGs, CVRI, UNZA, zonal laboratories and other stakeholders as necessary

Output 4.8: DVS shares antimicrobial consumption (AMC) and antimicrobial use (AMU) data with the Surveillance and Research TWG, and / or the AMU TWG

Background information

The Zambia Medicines Regulatory Authority grants marketing authorisations for human and veterinary medicines. Both ZAMRA and DVS issue permits for importation of veterinary antimicrobial agents. Zambia does not have internal manufacturers of veterinary medicinal products and therefore all veterinary medicinal products are imported.

DVS has reported AMU data for Zambia to the OIE's first three rounds of data collection. It was indicated that there is a need for support to improve data collection and analysis for AMU.

Role of the Grantee

The Grantee should provide technical expertise to support the above needs described for AMC and AMU.

Expected outcomes

By the end of the grant we expect that the following will have been achieved:

- DVS collects AMU/AMC data
- NALEIC is producing results from analyses of the AMC and AMU surveillance data is analysed and shared with the Knowledge, Surveillance and Research TWG and other stakeholders as necessary.

Lead Grantee Roles and Responsibilities

The main role of the grantee will be to plan and execute outputs and deliver the objectives listed above. The Grant is designed primarily as an AMR laboratory capacity building and systems strengthening intervention, and applicants should refer to the resource handbook included in the full application pack. The grantee is responsible for providing, either through in-house resources alone, or through a partnership or consortium, the expert technical assistance and high-quality support needed to strengthen the selected reference and surveillance sites' capability and capacity to generate and share AMR surveillance data on both a national and international basis.

8 Measuring success

Country Grants will eventually be expected to generate results that can be tracked using a standard set of indicators that will monitor progress and achievements within and across Country Grants. A copy of the full list of indicators matrix will be shared in the Application Pack.

However, for the first Country Grant, it is important to note that:

- Applicants are not expected to select from and use these indicators for this first Country Grant. While it is possible that some of the formal indicators may trigger towards later stages of the grant award, the likelihood of this will be reviewed and discussed by Mott MacDonald with the successful applicant.
- For the purposes of this grant, process level indicators will be used to track progress against the work plan. The grantee is expected to utilise the indicators proposed above or to propose alternative SMART indicators in line with the outputs summarised above. These will then be negotiated and agreed with Mott MacDonald as the Management Agent.
- No Country Grant will be expected to use all the Fleming Fund indicators. Instead a relevant sub-set of indicators will be proposed by the grantee for joint agreement with Mott MacDonald.
- The Fleming Fund will be independently evaluated by ITAD, a specialist evaluation firm, who have been appointed by the UK Department of Health and Social Care for this purpose. In addition to measuring grant performance against the objectives and outputs stated above, the grant will also be monitored on the implementation of, and adherence to, the Fleming Fund grant principles described above. All grants are subject to review and evaluation by the evaluators, and full co-operation with the evaluators by all grantees is expected.

9 Application requirements

9.1 Grant Eligibility Criteria

Potential grant applicants must satisfy the following eligibility criteria before applications will be assessed in detail. Applicants:

- Must demonstrate that they are competent organisations responding to this call for proposals;
- Must have an appropriate track-record in supporting laboratory capacity development, surveillance, capacity building, and One Health.
- Must have experience of programme implementation in Zambia.
- Must demonstrate that they are registered to work in Zambia, including the provision of essential documents such as articles and memorandum of incorporation.
- Must be prepared to accept the Grant Agreement terms.

- Must be able to provide the same information and assurances for all sub-grantees, where the application is from a consortium.
- Should be able to provide all information required for due diligence checks, including clear evidence of financial standing and systems of financial management and control.
- Should be able to provide evidence of suitability in the form of references from clients and donors for previous work undertaken within the last three years.
- Can be a single organisation or consortia, though the latter must clearly identify a Lead Grantee with the appropriate governance and coordination mechanisms to manage sub-grantees.
- Can be:
    - National institutes – such as a university or research institutes;
    - Non-governmental organisations (NGOs);
    - UN Agencies;
    - Private companies;
    - Government-owned enterprises or institutions provided they can establish that they are (i) legally and financially autonomous, (ii) operate under commercial law, and (iii) are not dependent agencies of national governments

9.2 How to apply

Prospective lead grantees must register their interest to apply by emailing flemingfundESA@mottmac.com to receive an invitation to **the Applicant Information Session,** and an **example of the Application Pack.**

The Applicant Information Session will be organised **in Lusaka, Zambia on Tuesday, 07 March 2019**. The details of the venue will be shared with applicants registering their interest.

Ahead of the AIS, an example Application Pack will be shared will include the application form, budget and milestones template and Guidance Notes. Following the AIS, the **official Application Pack** will be sent out to prospective Grantees who have registered their interest to apply for the grant.

To apply, please complete the application form provided, in line with the Guidance Notes, by the deadline indicated in Section 9.5.

Note the key requirements set out at the beginning of the Country Grant Application Form:

- When submitting the application document, press “Reply All” from the **official Application Pack automated email** that you received with the application documents attached. Do not send it to us from a new email, and do not modify the Subject-line. Only “Reply All” emails will register the documents in our system.
- Keep file sizes as low as possible - there is a 9MB size limit to each individual email that can be received by the grant submission software. You can submit documents by sending multiple emails attaching submission documents to each one. Please follow the instruction (above) using “Reply All” to the original email.
- The submission deadline is: **17:00 Zambian Time (GMT+2) Friday, 04 April 2019**
- Applicants should observe the word limit. Additional words outside the limit will be disregarded.

- All documents included as part of the proposal must be submitted by separate e-mail in Word, Excel, and PDF format (body font: Calibri 11pt). Do not send through as zipped files.
- You should include a covering letter, signed by the person authorised to represent your organisation for the submission of this proposal.
- This application is conditional upon your acceptance of the grant agreement (format will be shared in the application pack).

Proposals that do not satisfy these criteria may not be accepted.

9.3 Evaluation criteria

The Application Pack will include the application form, indicating the scoring and weighting for each section of the application. The Application Pack will also contain Guidance Notes explaining what we are looking for in terms of a good quality response for each question, including approach to Value for Money (VfM).

We would be assessing the application on the following key areas:

- Technical capacity to address the different aspects of AMR covered by this Country Grant.
- Ability and preparedness to bring stakeholders together in an effective and productive working arrangement, promoting a One Health approach.

9.4 Restrictions/limitations

Any conflict of interest, or potential conflict of interest, should be declared to Mott MacDonald when applicants are registering their interest to apply for the grant. If a conflict of interest, or potential conflict of interest, arises after that point the prospective grantee must clearly declare this in their proposal.

9.5 Key dates

Publication of RFP: Friday, 15 February 2019

Deadline for registering interest to attend the Applicant Information Session: 17:00 GRZ Time (GMT+2), Friday, 22 February 2019

Applicant Information Session: Thursday, 07 March 2019

Deadline for registering to apply for Grant: 17:00 GRZ Time (GMT+2), Friday, 08 March 2019

Application deadline: 17:00 GRZ Time (GMT+2) Friday, 04 April 2019

Anticipated start date of grant: Friday, 16 June May 2019

9.6 Contact details and support information

Any questions on the Request for Proposals should be sent to flemingfundESA@mottmac.com The Management Agent will endeavour to respond to queries within 72 hours.

10 Annex 1: Eligible funding items

Laboratory Infrastructure Enhancement

- Infrastructure: renovation, redecoration, electricity and water supply, environmental controls, waste and waste disposal.
- Equipment: appropriate equipment for the level of capability; biosafety and biosecurity equipment; automated culture and identification platforms; IT equipment.
- Reagents, durables & consumables: appropriate media, reagents, culture plates, etc; glassware; sample collection consumables.
- Transport and logistics: vehicles or contacted services for transport of goods, and people; safe and secure transport of specimens and samples; logistical support for surveys.

Human Resource Strengthening and Workforce Reforms

- Training: clinical, veterinary, agricultural and One Health surveillance protocols; biosafety and biosecurity; microbiology, laboratory science and laboratory management; epidemiology and surveillance; genomics; IT training.
- Long-term support: ongoing and refresher training according to the competency and capabilities framework; Fleming Fellowship Scheme.

Surveillance System Strengthening

- Governance: support for AMR Coordination Committees & working groups; operational planning; cross-sectorial meetings and strategy reviews; evaluation(s).
- Quality assurance and control: site visits and audits, laboratory twinning / mentoring.
- Data: transfer and storage; safety and security; analysis software and training.
- Recurrent costs: utilities, maintenance of equipment, upkeep of laboratory space, small maintenance, personnel costs.

Building Foundations for Surveillance Data Use

- Support to build demand for AMR data: general awareness among prescribers, dispensers and agricultural consumers (i.e. farm workers, agribusiness); publication charges; workforce training.
- Evidence based strategy, policy and practice change: data / information sharing conferences, meetings and initiatives; conference attendance; IT platforms for data sharing and awareness / transparency.

Rational use of Antimicrobial Medicines

- AMU/C surveillance: development of strategies for AMU/C surveillance; use of AMU data for appropriate prescribing / informing stewardship programmes.

Annex 2 Tentative Fleming Fellowships in Zambia

Sector	Fellowship	Institution	Understanding AMR	Surveillance Expertise	Laboratory expertise	Data collection, analysis and use	One Health
Human	AMR Surveillance	ZNPHI	Keep up to date with information on AMR and AMU in Zambia Understand the likely AMR mechanisms in Zambia	Contribute to designing future targeted AMR surveillance plans		Collate and analyse existing AMR data Analyse AMR surveillance data Understand data biases Interpret AMR results in relation to AMU data	Discuss AMR and AMU results from humans and animals Present overall understanding of AMR in Zambia
Human	Laboratory	ZNPHI	Keep up to date with information on AMR and AMU in Zambia Understand the likely AMR mechanisms in Zambia		Improve quality of culture, identification and AST in surveillance site laboratories		Discuss AMR and AMU results from humans and animals Present AMU results from humans and relate to AMR data (with Surveillance Fellows)
Human	AMU Surveillance	ZMRA	Keep up to date with information on AMR and AMU in Zambia Understand the likely AMR mechanisms in Zambia			Conduct survey of prescribing practices. Analyse and interpret AMU surveillance results Work with clinicians to use data to improve prescribing practices	Discuss AMR and AMU results from human and animals Present AMU results from humans and relate to AMR data (with Laboratory Fellow)
Animal	Laboratory	CVRI	Keep up to date with information on AMR and AMU in Zambia Understand the likely AMR mechanisms in Zambia		Improve quality of culture, identification and AST in regional laboratories		Discuss AMR and AMU results from human and animals Present AMR results from animals (with Surveillance Fellows)

Animal	AMR Surveillance	DVS	Keep up to date with information on AMR and AMU in Zambia Understand the likely AMR mechanisms in Zambia	Contribute to designing future targeted AMR surveillance plans		Collate and analyse existing AMR data (clinical cases) Analyse AMR surveillance data Understand data biases Interpret AMR results in the context of AMU data	Discuss AMR and AMU results from human and animals Present AMR results from animals (with Laboratory Fellow)
Animal	AMU	DVS	Keep up to date with information on AMU in animal health in Zambia			Collect data, including from imports, and analyse in the context of AMR	