THE ROLE OF ANIMAL HEALTH IN AMR SURVEILLANCE

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Introduction

- Antimicrobial resistance (AMR) is emerging as a global health security threat
- Antimicrobials have played a critical role in saving lives in livestock as well as humans
- Used for therapeutics, prophylactics and metaphylactics
- Used in agriculture mainly in animal production for both therapeutic and non-therapeutic purposes
- Resistance is mainly a consequence of selective pressure created by use
Why is AMR a Global Health Concern?

- Growing awareness and commitment
- Increasingly serious global public health threat
  - Untreatable infections, prolonged hospital care
  - Approximately 700,000 people die of AMR-related infections yearly (O’Neill, 2016)
  - By 2050, approximately 10 million people/year will die of AMR-related complications (O’Neill, 2014)
  - Desperation over "dry pipeline"
- Economic burden (costing the world up to $100 trillion by 2050)
  - Global economy > $6 trillion annually – nearly 4% of GDP (Adeyi, 2017)
  - Increase in extreme poverty (World Bank, 2016) – negative impact on food security

“Bacteria do not recognize borders and so is AMR”
What is AMR?

- Inability of micro-organisms to be inactivated or killed by antimicrobials
- Occurs when micro-organisms become unresponsive to medications they were responding to initially
- A natural biological unstoppable phenomenon but accelerated by over use and misuse
- When the micro-organisms become resistant to most antimicrobials they are often referred to as “superbugs”
Main Drivers Contributing to AMR

After Surgery

Dry-Cow Therapy

Some Examples of Prophylactic and Metaphylactic Uses of Antibiotics in Animals

Before Transportation

Potential Outbreaks

Stressful Conditions
Antibiotic use in animal health
Integrated ecosystem of the transfer and spread of antimicrobial resistance
# AMR National Policy & Action Plan

## Table 1. Five Strategic Issues and Objectives for Countermeasures on AMR

<table>
<thead>
<tr>
<th>Strategic Issue</th>
<th>Strategic Objective</th>
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<tbody>
<tr>
<td>1. Public Awareness and Education</td>
<td>Improve public awareness and understanding, and promote education and training of professionals</td>
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<tr>
<td>2. Surveillance and Monitoring</td>
<td>Continuously monitor antimicrobial resistance and use of antimicrobials, and appropriately understand the trends and spread of antimicrobial resistance</td>
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<td>3. Infection Prevention and Control</td>
<td>Prevent the spread of antimicrobial-resistant organisms by implementing appropriate infection prevention and control measures</td>
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<td>4. Appropriate Use of Antimicrobials</td>
<td>Promote appropriate use of antimicrobials in the fields of healthcare, livestock production, agriculture and aquaculture</td>
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<td>5. Research and Development</td>
<td>Promote research on antimicrobial resistance and foster research and development to secure the means to prevent, diagnose and treat the antimicrobial-resistant infections</td>
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Surveillance Introduction

- The AMR Policy and NAP calls for implementation of an integrated SS for AMR, in bacteria isolated from humans, food animals, food and environment

- National Government in collaboration with CG to develop and implement a National integrated AMR SS

- Agric. sector plan outlines how an integrated SS will be operationalized in Agriculture and food sector

- Considers priorities for the public health sector to ensure integration of data
### Awareness & Education

<table>
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<tr>
<th>Activity</th>
<th>Status</th>
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<tr>
<td>Increased public awareness and understanding of AMR</td>
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<tr>
<td>- Communication strategy on Prevention and Containment of AMR</td>
<td>Developed and launched in 2019</td>
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<tr>
<td>- Developed new and revised existing IEC materials on AMR and distributed them</td>
<td>Developed and tested KAP on AMR</td>
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## Surveillance & Monitoring

<table>
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<tr>
<th>ACTIVITY</th>
<th>COMPLETED</th>
<th>ONGOING</th>
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| Establish AMR national reference centres with Sector strategies | • NPHL for HH  
• CVL for AH | Data collection and analysis  
Submitted Data to GLASS |
| Create a National public health laboratory network | • Human health network – 12 sites  
• Animal Health network – 6 sites  
• Equipped Reference labs | Recruitment of more surveillance sites |

### AMR SURVEILLANCE SITES

![Graph showing AMR surveillance sites projection from 2017 to 2022]
AMR Surveillance Pilot

- Pilot site – Kiambu County in four regions viz; Gituamba, Githobokoni, Mang’u and Chania

- Period – 16th July – 17th September 2019

- Sites visited –
  - 34 farms;
  - one slaughter house and
  - one hatchery

- Pooled samples collected – Environmental swabs; Cloacal swabs; Oropharyngeal swabs; Faecal swabs, Meat swabs and Eggs content
Relationship of Institutions involved in AMR Surveillance
Appendix E: Distribution of county laboratories in the AMR surveillance network

Counties of Kenya

- Reference lab (NMRL)
- Other county laboratories
- AMR Surveillance Laboratories

Map showing the distribution of laboratories across Kenya, with specific indicators for reference labs, other county laboratories, and AMR surveillance laboratories.
Developed an integrated information management system for AMR in Human Health & Animal Health
All data is analysed in LIMs and transmitted to a Central Data Warehouse
Training of Staff on Diagnostics
Renovation of Microbiology Laboratories in 5 Sites
Assessments of the Central & Regional Veterinary Laboratories and the University of Nairobi carried out
Sources of samples

- Fish farms, Livestock farms, Associated Environment
- Live animal markets, Poultry, large & small animals, fish & associated environments
- Processing plants & sale outlets, Abattoirs, retail & wholesale shops, fish processing plants & associated environments
- Lakes, Rivers, Dams and Oceans

Who to collect samples/data
- CVL, RVILs, VEES, fisheries staff, County public and private AHSP
- CVL, NB: Limited access (use passwords to access electronic forms and key in results)
- University, research & other labs, NB: Limited access (use passwords to access electronic forms and key in results)
- Kenya Fisheries Service, To contract accredited labs for fisheries e.g. SGS, KEBS, Chemiphar Uganda LTD, NB: Limited access (use passwords to access electronic forms and key in results)
- National Public Health Laboratory, NB: A capacity need- linking LIMS, epicollect & VEES database

Data capture tools
- Sample collection & submission forms in electronic form (epicollect, ODK) and/or manual form
- Resources: Data collection forms, Mobile phones, Internet, Software(s)
- Computer, Personnel training

Schematic representation of the AMR data flow
4. APPROPRIATE USE OF ANTIMICROBIALS (CONT.)

**Activities**

**Completed**
- Antimicrobial Use Protocol in Animal Health

**Ongoing**
- Gathering data on use of antimicrobials in the poultry value chain in 15 counties
- Training of field staff on AMC/AMU Tools

**Antibiotic combinations**

- [Doxycycline, Tylosin] 38%
- [Sulfadimethoxazole, Trimethoprim] 22%
- [Colistin, Erythromycin, Oxytetracycline, Streptomycin] 7%
- [Trimethoprim, Sulfadimethoxazole] 4%
- [Fosfomycin, Tylosin] 3%
- [Erythromycin, Oxytetracycline, Streptomycin, Colistin] 3%
- [Erythromycin, Sulfadiazine, Trimethoprim] 3%
- [Tetracycline, Tylosin] 2%

**Single Antibiotic Preparations**

- Oxytetracycline 33%
- Sulfachlorpyridazine 14%
- Tylosin 10%
- Doxycycline 8%
- Enrofloxacin 6%
- Sulfadimidine (sulfamethazine, sulfadimerazine) 5%
- Amoxicillin 4%
- Sulfadiazine 3%
- Other 33%

Activities Completed Ongoing

- Monitoring of Antimicrobial Consumption and Use
  - Antimicrobial Use Protocol in Animal Health
  - Gathering data on use of antimicrobials in the poultry value chain in 15 counties
  - Training of field staff on AMC/AMU Tools

**Monitoring of Antimicrobial Consumption and Use**

- Antimicrobial Use Protocol in Animal Health
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Microbiological Contamination And AMR: Meat Value Chains IN KENYA

E. coli, coliforms and other enterics

- Contamination rates higher in chicken at retail markets compared to the commercial abattoir for E. coli, Salmonella spp. and Campylobacter spp. in comparison to beef
Challenges & Lessons Learnt

Challenges

➢ Economic case for investment in AMR under developed
➢ Inadequate awareness by leadership on the impact of AMR
➢ Inadequate resources to support NAP implementation
➢ Suboptimal stakeholder engagement and coordination.

Lessons Learnt

➢ It is all about data & packaging it
➢ Political support is KEY
➢ Defining the AMR burden in the country is critical
➢ Multi Sectoral approaches work best
➢ Develop realistic work and sustainability plans to guide the process and focus support from development partners
➢ Resources are crucial: workforce and the funds
Lab guiding principles

Quality control
- Optimal storage of antibiotic disks, reagents and isolate
- Proper use and storage of ATCC strains
- Proficiency testing

Biosafety and biosafety
- Staff awareness of risks
- Provision and use of PPE
- Containment of microorganisms
- Lab rules

Data management
- Real time data entry via LIMS
- Backups - manual using a lab book
- Barcoding to mitigate transcription error risk
Thank you