Zambia’s Integrated Antimicrobial Resistance Surveillance Framework

Presentation at
Pan-African Workshop on Effective Implementation of the National Action Plans on Antimicrobial Resistance (AMR)
Taj Pamodzi
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Presentation Outline

• Background

• Approach to development of Zambia’s integrated antimicrobial resistance surveillance framework

• Zambia’s integrated antimicrobial resistance surveillance framework
  - Surveillance of antibiotic resistance in meat from cattle
  - Surveillance of antibiotic residues in meat from cattle
  - Surveillance of antibiotic resistance in broiler and layer poultry
  - Surveillance of antibiotic residues in broiler and layer poultry

Conclusion
Background - Zambia

- **Land size**: 754,600 sq. Kilometers
- **Population**: 17 million people
- **Administratively**: 10 provinces, 116 districts
Animal Populations 2017/2018

- **Cattle**: 3,714,667
- **Goats and sheep**: 3,753,958
- **Pigs**: 1,082,765
- **Broiler/Layer chickens**: approx. 50,000,000
- **Local chickens**: 15,313,780
- **Dogs**: 968,372
- **Rabbits**: 550,790
Approach to development of Zambia’s integrated antimicrobial resistance surveillance framework

**Identification of thematic areas**

• Surveillance of antibiotic resistance in human-health sector

• Surveillance of antibiotic resistance and antibiotic residues in food-animal sector
  • Surveillance of *antibiotic resistance* in cattle for meat
  • Surveillance of *antibiotic residues* in cattle for meat
  • Surveillance of antibiotic resistance in broiler and layer poultry
  • Surveillance of antibiotic residues in broiler and layer poultry

• Surveillance of antibiotic resistance and antibiotic residues in environment
Approach to development of Zambia’s integrated antimicrobial resistance surveillance framework

A phased approach for surveillance - the timeframe considered is as follows:

- **Phase 1** (0-3 years; short term)
- **Phase 2** (4-5 years; medium term)
- **Phase 3** (>5 years; long term)

**General key elements** of the surveillance coverage (starting with **key food-animal** producing and **high consuming provinces** in phase 1 extending to all provinces in phase 3)
Approach to development of Zambia’s integrated antimicrobial resistance and residue surveillance framework

Key elements

Antimicrobial resistance and residues framework

Animal species
- Cattle, Poultry
- Other species in future versions

Sampling strategy*
- Sites, sample sizes, frequency of sampling, sample type

Microorganisms*
- Bacteria, Parasites, Fungi

Antimicrobials/Residues*
- Antibiotics

Resistance testing*
- Phenotypes, progressively to molecular

Laboratory network
- Starting with reference laboratory
- Building up based on capacities

Human resource development
- Training requirements for effective surveillance
Zambia’s integrated antimicrobial resistance surveillance framework

Surveillance of antibiotic *resistance* in meat from cattle

<table>
<thead>
<tr>
<th></th>
<th>Phase 1 (0-3 years)</th>
<th>Phase 2 (4-5 years)</th>
<th>Phase 3 (&gt;5 years)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sampling strategy</strong></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Sample type</td>
<td>Carcass swab</td>
<td>Carcass swab</td>
<td>Carcass swab</td>
</tr>
<tr>
<td>sites</td>
<td>Abattoirs/farms*, processing plants,</td>
<td>Abattoirs, meat processing plants, butcheries</td>
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</tr>
</tbody>
</table>
**Zambia’s integrated antimicrobial resistance surveillance framework**

Surveillance of antibiotic resistance in meat from cattle

<table>
<thead>
<tr>
<th>Microorganism</th>
<th>Phase 1 (0-3 years)</th>
<th>Phase 2 (4-5 years)</th>
<th>Phase 3 (&gt;5 years)</th>
</tr>
</thead>
</table>
| Bacteria for AST | ● Salmonella spp.  
● *Escherichia coli* (commensal and pathogenic)  
● *Enterococcus faecalis* | ● Salmonella spp.  
● *Escherichia coli* (commensal and pathogenic)  
● *Enterococcus faecalis*  
● *Campylobacter spp.*  
● *Staphylococcus aureus* | ● Salmonella spp.  
● *Escherichia coli* (commensal and pathogenic)  
● *Enterococcus faecalis*  
● *Campylobacter spp.*  
● *Staphylococcus aureus* |

<table>
<thead>
<tr>
<th>Antimicrobials</th>
<th>Salmonella spp. and <em>Escherichia coli</em>: Ampicillin, Cefatxime, Ciprofloxacin, Colistin, Gentamicin, Tetracycline, Trimethoprim-sulfamethoxazole</th>
</tr>
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<tr>
<td></td>
<td><em>Enterococcus faecalis</em>: Ampicillin, Enrofloxacin, Erythromycin, Gentamicin, Tetracycline, Tylosin, Vancomycin</td>
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<tr>
<td></td>
<td><em>Campylobacter spp.</em>: Ampicillin, Ciprofloxacin, Erythromycin, Tetracycline</td>
</tr>
<tr>
<td></td>
<td><em>Staphylococcus aureus</em>: Amoxicillin, Cefoxitin, Erythromycin, Gentamicin, Lincomycin, Oxacillin, Tetracycline</td>
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Zambia’s integrated antimicrobial resistance surveillance framework

Surveillance of residues in meat from cattle

<table>
<thead>
<tr>
<th>Residues</th>
<th>Phase 1 (0-3 years)</th>
<th>Phase 2 (4-5 years)</th>
<th>Phase 3 (&gt;5 years)</th>
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<tbody>
<tr>
<td>Sample type</td>
<td>meat</td>
<td>Meat/Milk*</td>
<td>Meat/Milk*</td>
</tr>
<tr>
<td>sites</td>
<td>Abattoirs, meat processing plants</td>
<td>Abattoirs, meat processing plants, butcheries, retail shops, local markets/establishments*</td>
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</tr>
<tr>
<td>Antibiotics for residue monitoring*</td>
<td>Ampicillin, Azithromycin, Ceftiofur, Ciprofloxacin, Cloxacillin, Colistin, Enrofloxacin, Erythromycin, Gentamicin, Neomycin, Penicillin, Streptomycin, Sulfonamides (commonly used), Tetracycline, Tylosin, Zinc Bacitracin</td>
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Zambia’s integrated antimicrobial resistance surveillance framework

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<tr>
<td>Residues</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Frequency of sampling</td>
<td>Annual</td>
<td>Bi-annual</td>
<td>Quarterly</td>
</tr>
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</table>

Surveillance of residues in meat from cattle
Zambia’s integrated antimicrobial resistance surveillance framework

Propotion of antibiotics classes imported for use in animals in Zambia 2015-2018

- Tetracyclines
- Sulfonamides (including trimethoprim)
- Penicillins
- Fluoroquinolones
- Aminoglycosides
- Pleuromutilins
- Macrolides
- Other quinolones
- Cephalosporins (all generations)
- 1-2 gen. cephalosporins
- Polypeptides

% of quantity of antibiotic imported
Conclusion

This Framework is linked to the country’s antimicrobial resistance national action plan and our integrated AMR surveillance strategy.

It was developed with inputs from key stakeholders industry such as feed producers, Agro-vet shops, Academia, Medicines and Regulatory Authority, and international experts.
The Baobab Tree

“Wisdom is like baobab tree. No one individual can embrace it.”

African Proverb

Thank You for your attention!