BASELINE INFORMATION FOR INTEGRATED ANTIMICROBIAL RESISTANCE SURVEILLANCE IN ZAMBIA

Presentation at
Pan-African Workshop on Effective Implementation of the National Action Plans on Antimicrobial Resistance (AMR)
Taj Pamodzi
Lusaka, Zambia January 22-24, 2020

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National Project Coordinator, FAO AMR Project
Presentation Outline

• Approach adopted to collate baseline information for integrated AMR surveillance

• Baseline information: Human sector
• Baseline information: Animal sector
• Baseline information: Plant sector
• Baseline information: Environment sector
Approach adopted to collate baseline information for integrated AMR surveillance

Identification of key elements

• In human-health sector

• In animal health sector

• In environment sector
Approach adopted to collate baseline information for integrated AMR surveillance

Key elements in animal health sector

- Food-animal population
- Food production data in animal sector
- Infectious diseases
- Key antimicrobials used
- Historical AMR trends
- Laboratory infrastructure in this sector
## Baseline information: Animal sector

### Food-animal population

Number of Livestock by Type and Province as at January 2018 from the livestock and aquaculture census to be captured here.

<table>
<thead>
<tr>
<th>Province</th>
<th>Cattle</th>
<th>Goats</th>
<th>Sheep</th>
<th>Pigs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Central</td>
<td></td>
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<tr>
<td>Copperbelt</td>
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<tr>
<td>Eastern</td>
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<tr>
<td>Luapula</td>
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<tr>
<td>Lusaka</td>
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<tr>
<td>Muchinga</td>
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<tr>
<td>Northern</td>
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<tr>
<td>North Western</td>
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<tr>
<td>Southern</td>
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</tr>
<tr>
<td>Western</td>
<td></td>
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<tr>
<td>Zambia</td>
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</tr>
</tbody>
</table>

Note: HH = Household, Estab = Establishment (registered entity)
## Baseline information: Animal sector

### Food production in metric tones 2017 – 2018

<table>
<thead>
<tr>
<th>Food</th>
<th>2017</th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>BEEF</td>
<td>6,103,281.00</td>
<td>5,111,098.00</td>
</tr>
<tr>
<td>CHICKEN MEAT</td>
<td>5,111,098.00</td>
<td>555,270.20</td>
</tr>
<tr>
<td>MILK</td>
<td>1,686,400</td>
<td>118,799.00</td>
</tr>
<tr>
<td>FISH</td>
<td>1,686,400</td>
<td>118,799.00</td>
</tr>
</tbody>
</table>

### FOOD PRODUCTION

The diagram above illustrates the food production in metric tones for the years 2017 and 2018.
Baseline information: Animal sector

Key infectious diseases and causative organisms

Bacteria diseases

Cattle
• Colibacillosis (*Escherichia coli*)
• Mastitis (*Escherichia coli*, *Staphylococcus aureus*, other *Staphylococcus* spp., *Streptococcus agalactiae*, other *Streptococcus* spp.),
• Salmonellosis (*Salmonella typhimurium*, *Salmonella dublin*),
• Campylobacteriosis (*Campylobacter jejuni*),
• Anthrax (*Bacillus anthracis*),
• Blackleg (*Clostridium chauvoei*),
• Brucellosis (*Brucella abortus*),
• Tuberculosis (*Mycobacterium bovis*)
• Contagious bovine pleuropneumonia (*Mycoplasma mycoides*),
• Anaplasmosis (*Anaplasma centrale*, *Anaplasma marginale*),
Baseline information: Animal sector

Bacteria diseases

Chicken

• Colibacillosis (*Escherichia coli*)
• Respiratory infections (*Mycoplasma* spp., *E.coli*)
• Salmonellosis—fowl typhoid, bacillary white diarrhea (*Salmonella pullorum*, *Salmonella gallinarum*)
• GIT infections (*Clostridium* spp., *Escherichia coli*, *Salmonella* spp.)
• Infectious coryza (*Haemophilus paragallinarum*)
• Mycoplasmosis (*Mycoplasma gallisepticum*, *Mycoplasma synoviae*)
• Necrotic enteritis (*Clostridium perfringens*)
Baseline information: Animal sector

Bacteria diseases

Pig

• colibacillosis (*Escherichia coli*),
• Salmonellosis
• Brucellosis (*Brucella suis*),
• Enzootic pneumonia (*Pasteurella multocida, Mycoplasma* spp.), erysipelas (*Erysipelothrix rhusiopathiae*),
• Greasy pig disease (*Staphylococcus hyicus*), leptospirosis (*Leptospira* spp.),
• Mycoplasma infections (*Mycoplasma suis*),
• Necrotic enteritis (*Clostridium perfringens* type A, B or C),
• pasterollosis (*Pasteurella multocida*)
Baseline information: Animal sector

Bacteria diseases

Fish

• Diseases caused by *Aeromonas* spp.,
• *Lactococcus* spp.,
• *Staphylococcus* spp.,
• *Streptococcus* spp.
Baseline information: Animal sector

Viral diseases

Cattle

• Foot-and-mouth disease (Foot-and-mouth disease virus),
• Lumpy skin disease (Lumpy Skin Disease virus),
• Bovine viral diarrhoea (Bovine Viral Diarrhoea virus),
Baseline information: Animal sector

Viral diseases
Fungal diseases
Protozoal
Helminthic diseases
Baseline information: Animal sector

**Antibiotics used**

**Cattle**

- Aminoglycosides: Gentamicin, streptomycin
- Fluoroquinolones: Enrofloxacin
- Macrolides: Tulathromycin, tylosin
- Penicillins: Amoxicillin, benzopenicillin, penicillin
- Sulfonamides: Sulfathiazole, sulfamethazine, sulfamerazine, sulfadiazone, sulfadimidine sodium
- Tetracyclines: Doxycycline, oxytetracycline, tetracycline
Baseline information: Animal sector

Antibiotics used

Chicken

• Aminoglycosides: Gentamicin, neomycin, streptomycin
• Tetracyclines: Doxycycline, tetracycline
• Fluoroquinolones: Enrofloxacin, flumequine
• Macrolides: Tylosin
• Penicillins: Amoxicillin, ampicillin
• Sulfonamides: Sulfadiazine, trimethoprim/sulfamethoxazole
• Polymyxins: Colistin
• Cephalosporins: Ceftiofur
• Amphenicols: Chloramphenicol
• AGPs: Avilamycin, flavomycin, olaquindox, virginiamycin, zinc bacitracin
Baseline information: Animal sector

Antibiotics used

Pig

• Aminoglycosides: Gentamicin, streptomycin
• Tetracyclines: Tetracycline
• Fluoroquinolones: Enrofloxacin
• Macrolides: Tulathromycin, tylosin
• Penicillins: Amoxicillin, benzopenicillin
• Sulfonamides: Sulfadimidine, sulfathiazole
## Baseline information: Animal sector

### Historical AMR trends

<table>
<thead>
<tr>
<th>Microorganism</th>
<th>Animal</th>
<th>Antimicrobial</th>
<th>AMR reported (%)</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>E. coli</td>
<td>Cattle (Beef)</td>
<td>Ampicillin augmentin co-trimoxazole</td>
<td>88, 83, 91</td>
<td>Mshana et al., 2013</td>
</tr>
<tr>
<td></td>
<td>Dairy</td>
<td>Tetracycline, Ampicillin, Cefpodoxime Gentamicin, Trimethoprim/sulfamethoxazole</td>
<td>10.61, 6.0, 1.9, 0.8, 4.49</td>
<td>Mainda et al., 2015</td>
</tr>
</tbody>
</table>
## Historical AMR trends

<table>
<thead>
<tr>
<th>Microorganism</th>
<th>Animal</th>
<th>Antimicrobial</th>
<th>AMR Reported (%)</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>E. coli</td>
<td>Poultry</td>
<td>tetracycline</td>
<td>59.7</td>
<td>Chishimba et al., 2016</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ampicillin</td>
<td>100</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>cefotaxime/ceftazidime</td>
<td>100</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>chloramphenicol</td>
<td>57.1</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>ciprofloxacin</td>
<td>48.1</td>
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<tr>
<td></td>
<td></td>
<td>Gentamicin</td>
<td>37.7</td>
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<tr>
<td></td>
<td></td>
<td>Trimethoprim/sulfamethoxazole</td>
<td>41.6</td>
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</tr>
</tbody>
</table>
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<tr>
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<th>Animal</th>
<th>Antimicrobial</th>
<th>AMR reported (%)</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>E. coli</td>
<td>Swine</td>
<td>Ampicillin</td>
<td>10.8%</td>
<td>Ngoma et al., 1993</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Kanamycin</td>
<td>0.6</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>Streptomycin</td>
<td>11.5</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Sulfadimethoxine</td>
<td>9.6</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Tetracycline</td>
<td>18.5</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Colistin</td>
<td>0.6</td>
<td></td>
</tr>
</tbody>
</table>
# Historical AMR trends

<table>
<thead>
<tr>
<th>Microorganism</th>
<th>Animal</th>
<th>Antimicrobial</th>
<th>AMR reported (%)</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salmonella spp.</td>
<td>Poultry</td>
<td>Ampicillin</td>
<td>20%</td>
<td>Ziba et al., 2020 (unpublished)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ciprofloxacin</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Gentamicin</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Trimoprim/Sulfadimethoxine</td>
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<td></td>
<td></td>
<td>Tetracycline</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Colistin</td>
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</table>
Baseline information: Animal sector

Laboratory capacity

Develop the capacity for provincial and where possible district laboratories

- Kabwe provincial laboratory (Central), Kasama provincial laboratory (Northern)

Develop the capacity for regional laboratories

- Chipata RDL (Eastern), Isoka RDL (Muchinga), Choma RDL (Southern), Mongu RDL (Western), Ndola RDL (Copperbelt), Solwezi RDL (North Western)

LABS WITH CAPACITY FOR AST

- Central Veterinary Research Institute (CVRI)
- Food and Drugs laboratory (FDCL)
- UNZAVET microbiology laboratory
- UNZAVET public health laboratory
- VETLAB
Teeth that are together help each other in chewing food.

African Proverb

Thank you for your attention!