

**WHOLE GENOME SEQUENCING HIGHLIGHTS AMR DIVERSITY IN *E. COLI***

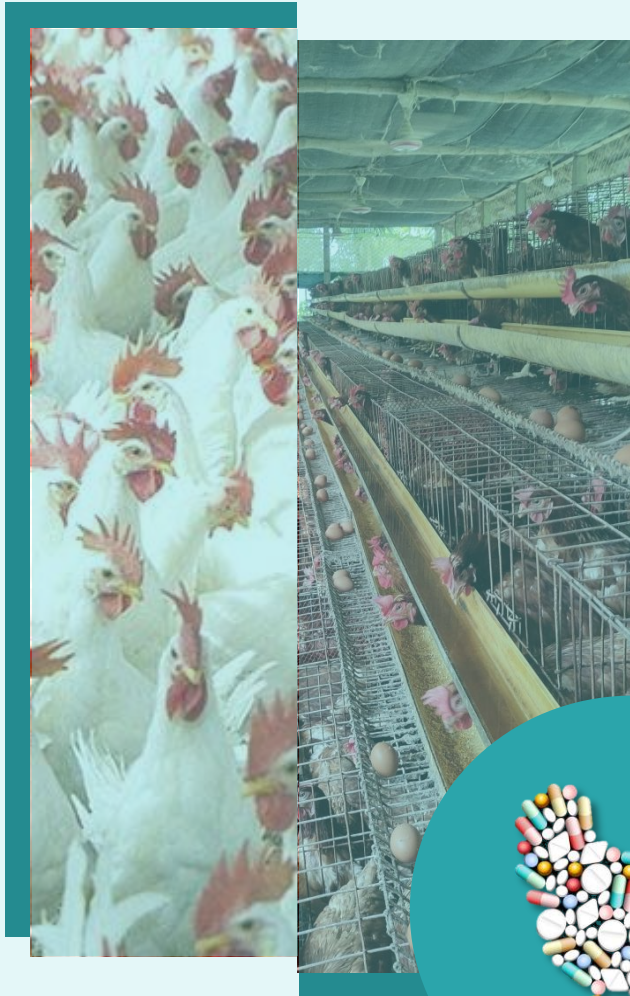
- 152 isolates submitted to whole genome sequenced and presence of AMR genes assessed
- Broth microdilution to determine Minimum Inhibitory Concentration for 14 antimicrobials also performed
- Resistance to ampicillin, tetracycline, sulphonamide, quinolones, and trimethoprim was common
- Very good correlation between reduced susceptibility and presence of AMR genes
- A large diversity of *E. coli* Sequence Type and AMR genes was present
- Importantly no isolates were resistant to the last resort carbapenem antibiotics

**Relevance**

- High levels of resistance to colistin and quinolones likely reflects the high AMU recorded
- Isolates harbouring ESBL/AmpC and *mcr* genes may present a potential risk for public health through the food chain
- Baseline information on the diversity of AMR *E. coli* in poultry in Bangladesh established
- Will help inform design of surveillance programmes and communication activities relating to responsible antimicrobial stewardship, for example, by helping to define prevalence of resistances and provide a reference for public health colleagues examining the risk present to people

**RECOMMENDATIONS**

- ✓ Prepare guidelines on antimicrobial usage tailored to each poultry production system
- ✓ Introduce a monitoring and surveillance system for antimicrobial use (AMU) and antimicrobial resistance (AMR)
- ✓ Strengthen awareness of AMU/AMR and farm bio-security among feed and drug traders, farmers, non-veterinary staff, and veterinarians alertness
- ✓ Introduce certification and graduation schemes and increase consumers' awareness of the benefits of certified meat



**Antimicrobial use, resistance and residues:**

**What's driving antimicrobial utilisation & resistance?  
How can a One Health approach help?**

Organized By



## INTRODUCTION

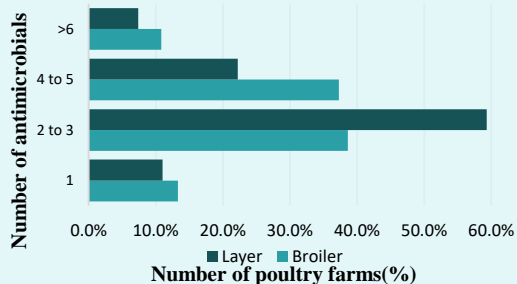
The Global Action Plan on Antimicrobial Resistance (AMR) was adopted in 2015 by all countries in the World Health Assembly, the Food and Agriculture Organization of the United Nations (FAO) Governing Conference and the World Assembly of World Organisation for Animal Health (OIE) Delegates. Member countries agreed to have a **National Action Plan on AMR** that is consistent with the Global Action Plan and to implement relevant policies and plans to prevent, control and monitor AMR. In line with this, Bangladesh prepared the ‘**Antimicrobial resistance containment in Bangladesh 2017-2022**’ and the ‘**Roadmap of National Action Plan of ARC in Bangladesh.**’

We are in the final year of the **National Action Plan** which provides an excellent opportunity to review progress to date, especially in relation to the poultry industry. The poultry industry, which has doubled over the last 20 years, now represents 37% of total meat production. This growth has had a considerable impact on the AMR situation. Taking an interdisciplinary and inter-sectoral ‘**One Health**’ approach, our One Health Poultry Hub and BALZAC (Behavioural adaptations in live poultry trading and farming systems and zoonoses control in Bangladesh), Bangladesh, team have conducted studies on AMR in humans and poultry.

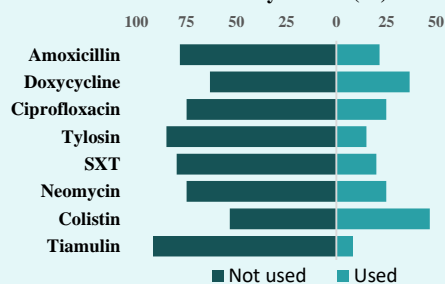
### ANTIMICROBIAL USAGE IN BROILER & LAYER FARMS (IMAM ET AL 2021; FAISAL & DAS 2021-22)

A total of 24 different antimicrobials were used in participating farms in Chattogram district, either alone or in combination, mostly administered via drinking water (97.1%). Only 15.3% of farmers used antimicrobials exclusively for therapeutic purposes, while 84.7% of farmers used them prophylactically, administering them either for prophylactic purposes only (22.6%) or in combination with therapeutic purposes (62.1%). The purpose of using antimicrobials did not differ between layer and broiler farms ( $p = 0.328$ ).

#### Number of antimicrobials used in poultry farms(%)



#### Antimicrobials used in poultry farms in absence of any disease (%)



The most commonly applied (alone or in combination) antimicrobials were colistin, ciprofloxacin, tylosin, neomycin, amoxicillin, trimethoprim, sulfonamides, doxycycline, and tiamulin, representing 71.5% of the total usage of antimicrobials. A worrying trend of selling eggs (in layer farms, 83.3%) and birds (in broiler farms, 36.1%) in flocks still being administered antimicrobials was observed ( $p < 0.001$ ). Colistin and ciprofloxacin are reserve antimicrobials for human use.

Symptomatic antimicrobial treatment was quite high (70% farms) in this study. Antimicrobials were most frequently used for respiratory signs (alone or in combination with other signs) (71.8%), followed by enteric signs (32.0%), and to address increased mortality (alone or in combination with other signs) (16.5%). While 16.5% of farmers administered antimicrobials to prevent and/or treat swollen head, ascites (i.e., fluid in the abdomen), in-appetence (i.e., loss or lack of appetite), and eye problems, 20.4% of layer farmers used antimicrobials to control decreasing egg production and egg quality control.

Colistin and ciprofloxacin were the most frequently used antimicrobials on farms reporting respiratory signs, enteric signs and increased mortality, as well as single miscellaneous signs, such as swollen head, ascites, inappetence, and/or eye problem. However, doxycycline (45.5%) and tiamulin (45.5%) were preferred to address a reduction in egg production. In the absence of clinical signs, colistin (47.1%), doxycycline (32.4%), and amoxicillin (29.4%) were the most frequent antimicrobials administered.

## ANTIMICROBIAL RESISTANCE

*E. coli* isolates were frequently resistant to quinolones, macrolides, polymyxins, aminoglycosides, beta lactams, sulphonamides, and tetracycline antimicrobials even when they were not reported to be used on these commercial farms in the current production cycle. Ninety-six per cent of the isolates had multiple drug resistance (resistance to equal or more than three antimicrobial classes). *E. Coli* isolated from commercial broiler and layer farms were resistant to average 10.4 and 9.6 antimicrobials, respectively (among tested 14).

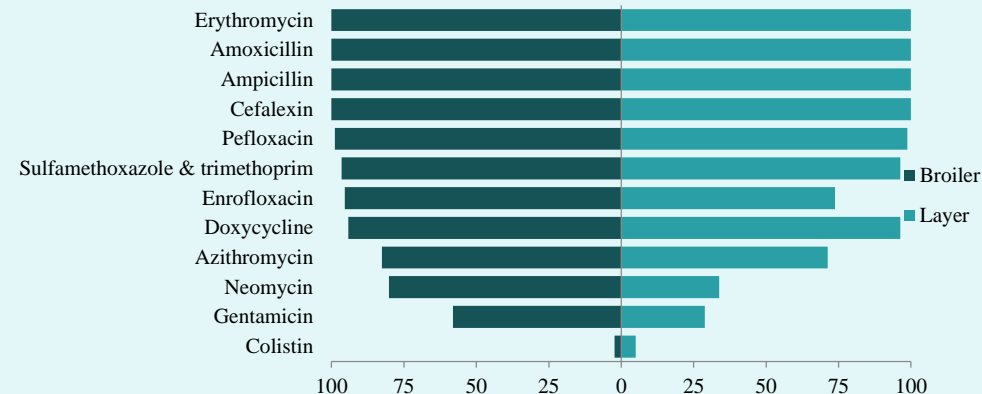


Fig : Antibiogram pattern of *E. coli* isolates obtained from 137 commercial broiler and layer farm (166 isolates)

## ANTIMICROBIAL RESIDUES IN POULTRY AND FISH (FERDOUS ET AL 2019)

A cross sectional study was conducted in June and October 2015 in six wet markets in and outside of Chattogram Metropolitan Area. In total, 182 chicken samples (91 in June and 91 in October) and 153 fish samples (74 in September and 79 in October) were collected. The overall prevalence of antimicrobial residue was 87.9% (N=182) and 56.9% (N = 153) among the tested raw chicken and raw/washed fish samples, respectively. Amoxicillin residue (87.4% in raw chicken and 48.4% in raw/washed fish) was more prevalent than other antimicrobials by TLC. So, only amoxicillin concentration was analysed using UHPLC.

### Treatment effect on amoxicillin

