Antibiotic Usage in Nepalese Poultry in Relation to AMR

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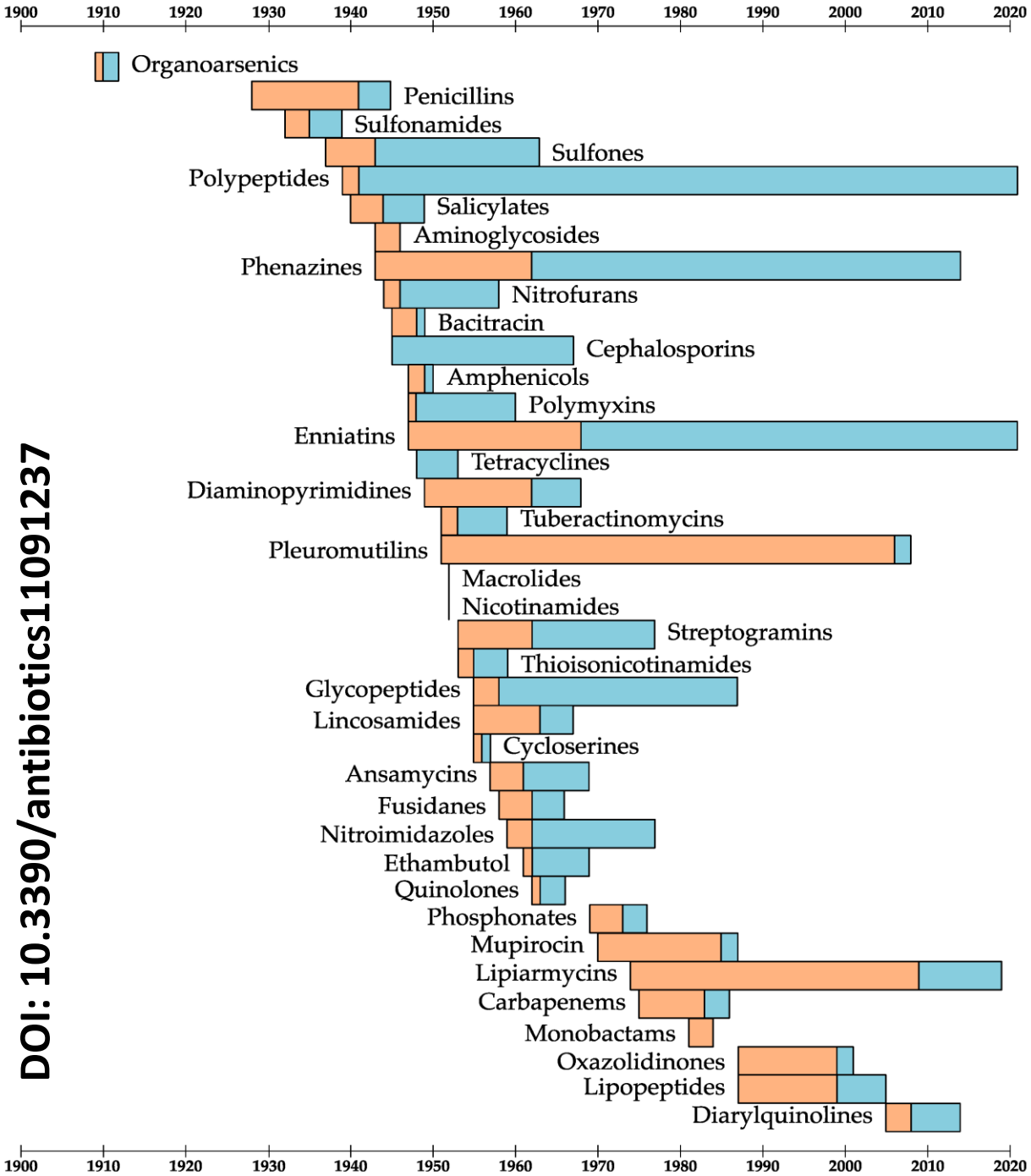
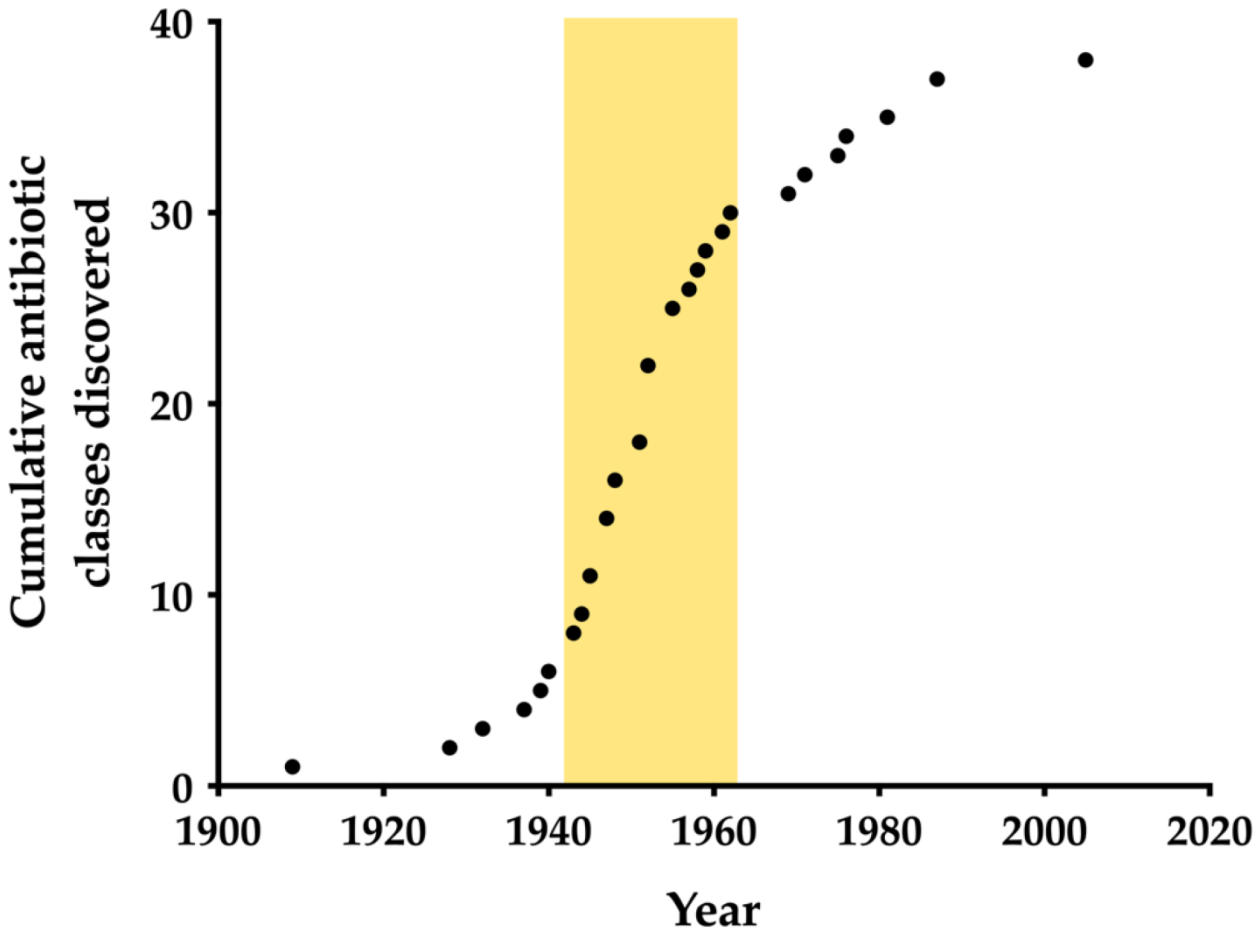


DOI: 10.3390/antibiotics11091237

Discovery, clinical use, & first report of clinical resistance

Golden Age of Discovery



Veterinary Antibiotics: Nepal Produce

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SN	Antibiotics	Molecules
1	Penicillins	Amoxicillin
2	Cephalosporins	Cephalexin monohydrate
3	Fluoro/Quinolone	Ciprofloxacin, Enrofloxacin, Norfloxacin, Levofloxcin,
4	Aminoglycosides	Neomycin Sulphate
5	Tetracyclines	Tetracycline, Doxycycline, OTC, CTC
6	Macrolides	Tylosin Tartarate
7	Sulpha-TMP	Sulphamethoxazole, Sulphadiazine, Sulphadimidine, Sulphaquinoxaline, Trimethoprim
8	*Others*	*Amprolium, Furaltadone, Diaveridine*

8 registered pharmaceuticals = 20 different molecules = 8 classes

Veterinary Antibiotics: Imported

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SN	Molecule Class	Molecules
1	Penicillins	Amoxicillin, Ampicillin, Cloxacillin, Benzyl penicillin
2	Cephalosporin	Ceftizoxime, Ceftriaxone
3	Fluoro/Quinolones	Ciprofloxacin, Enrofloxacin, Norfloxacin, Flumequin
4	Aminoglycosides	Gentamicin, Streptomycin, Amikacin, Neomycin
5	Tetracyclines	Doxycycline, OTC, CTC
6	Macrolides	Tylosin Tartarate, Tilmicosin, Tiamulin
7	Sulfa-TMP	Sulphamethoxazole, Sulphadiazine, Trimethoprim
8	Others	Colistin Sulphate, Lincomycin

Consumption & Resistance

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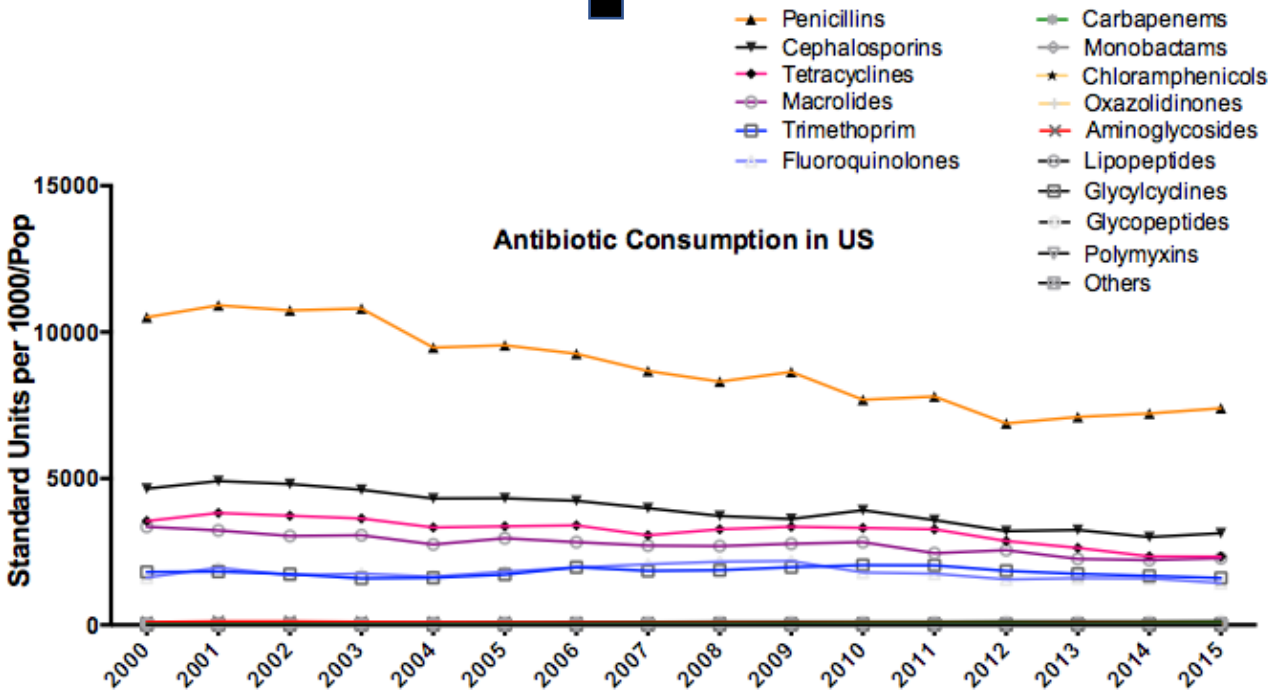
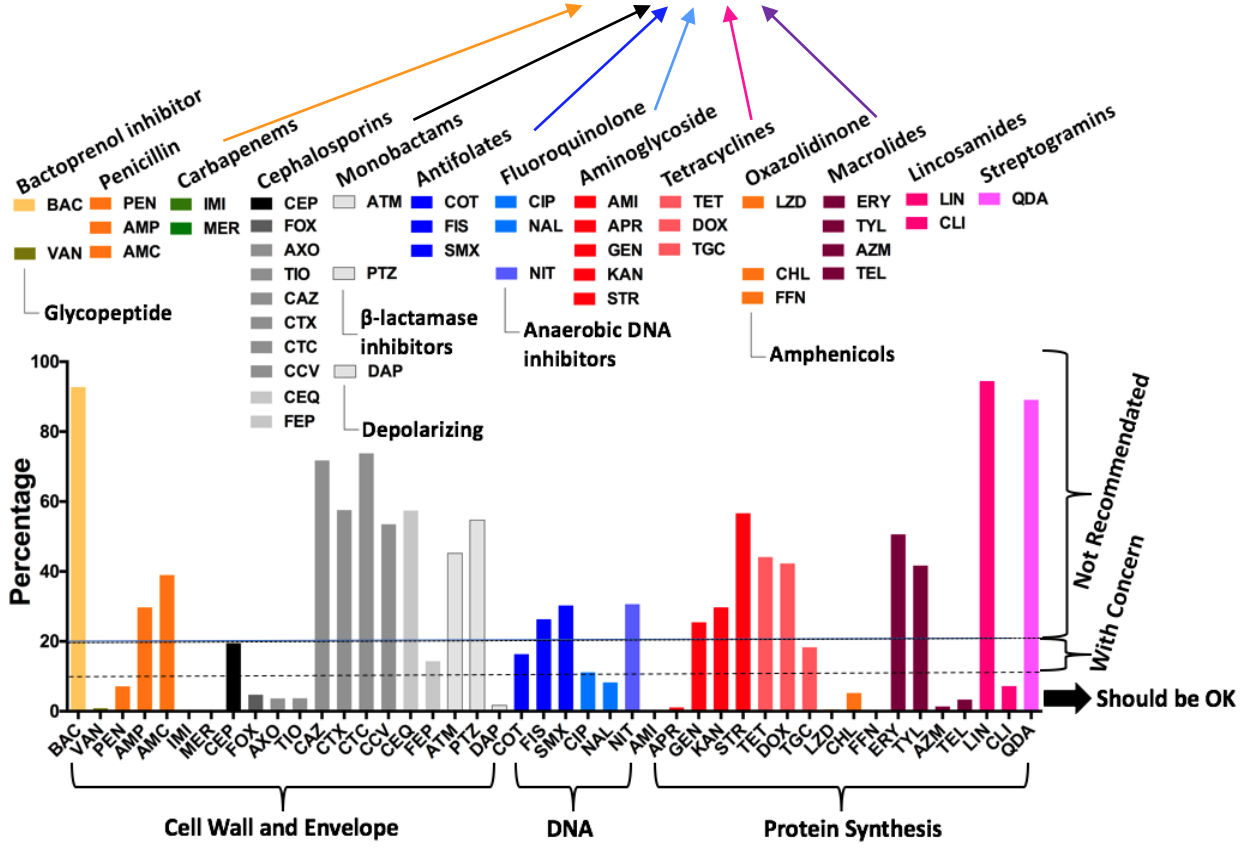
Top Consumption

High Resistance





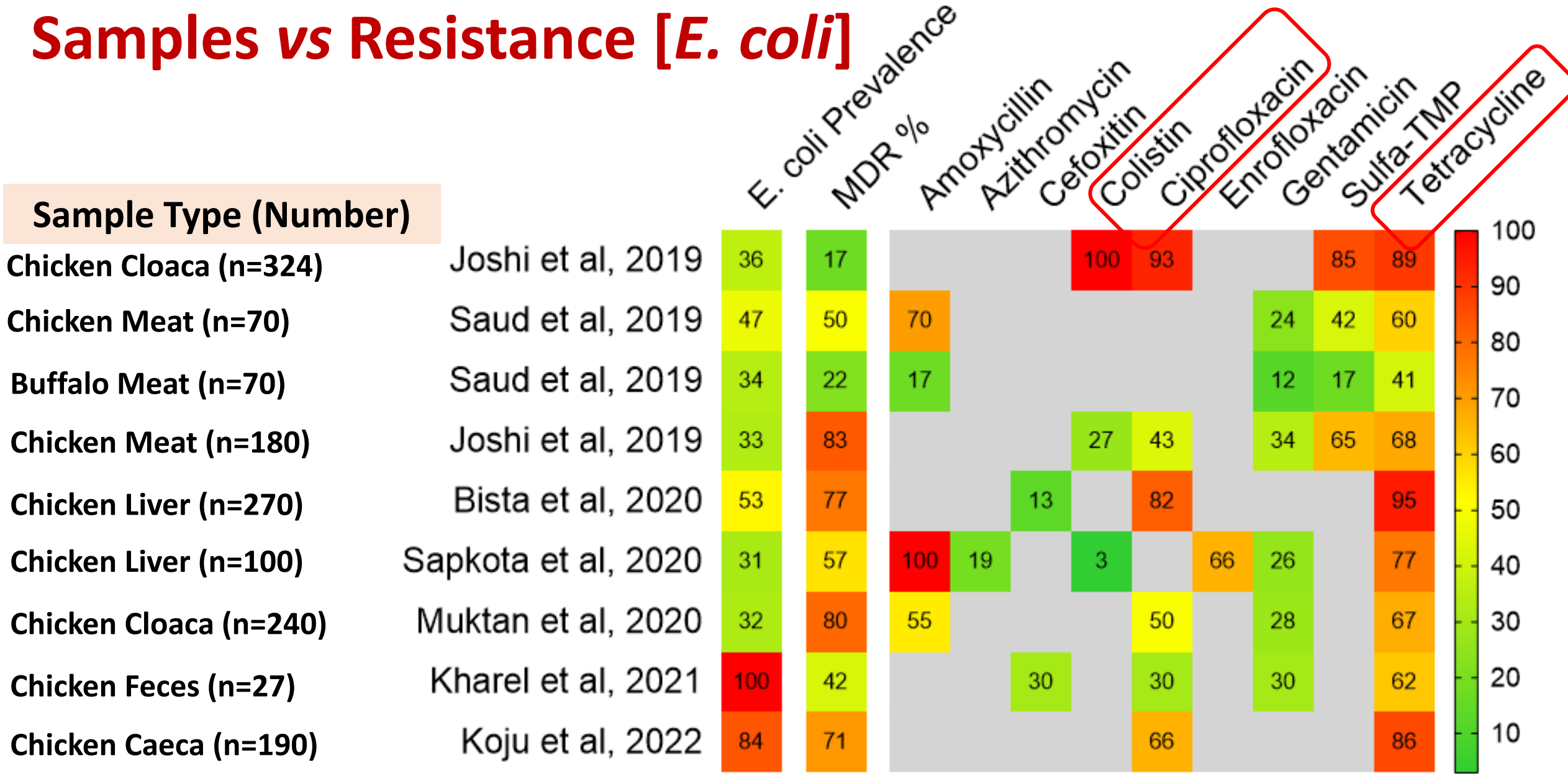
DOI: 10.1093/cid/ciq257

Research Evidences- Veterinary Usage- Nepal

- **Tylosin (47%)**, **colistin (47%)**, and dual therapies with **neomycin & doxycycline (33%)** used in poultry (DOI: 10.3390/tropicalmed6020047)
- Combination of **neomycin & doxycycline**, was used by **71%** of poultry farmers (DOI: 10.1186/s41256-021-00187-2)
- Class most frequently, self-reported was **polypeptides (35%)**, driven by the high use of **colistin (31%)** (DOI: 10.1186/s41256-021-00187-2)
- The second most used antimicrobial class was **fluoroquinolones (30%)**, which includes **ciprofloxacin, enrofloxacin, & levofloxacin** (DOI: 10.1186/s41256-021-00187-2)

Research Evidences…….

Samples *vs* Resistance [*E. coli*]



Monitoring of Antibiotic Resistance in Pathogens Isolated from Food Animals (MARPFA)

Funded By

Nepal Agricultural Research Council

Project No: 542, 2020-2025

In Nepal,

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- The Ministry of Health did an AMR surveillance program from 1998-2003 and the **Nepal Public Health Laboratory** and the **Epidemiology and Disease Control Division** took over these efforts in 2004.
- The **National Public Health Laboratory** has, with WHO's technical support, been conducting laboratory-based anti-microbial resistance (AMR) surveillance since 2005.
- The **Global Antibiotic Resistance Partnership-Nepal** working under the **Nepal Public Health Foundation**, meanwhile, has carried out important research on AMR in both human and animals
- **No veterinary AMR surveillance network exists** (Fleming Funds has initiated the supported)

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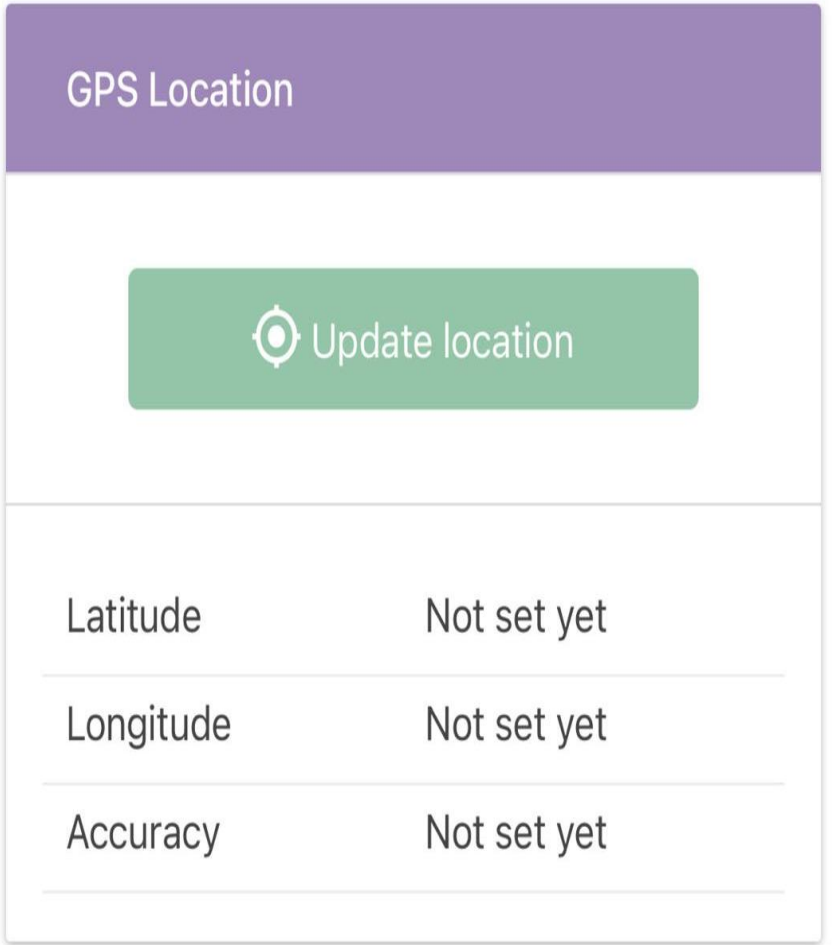
Premise

There is unregulated use of antibiotics in layers poultry farming. This contributes to the increasing resistance of pathogens like Salmonella & *E. coli*.

Collection of Metadata

- Metadata is collected electronically- **EpiCollect5**
- Each layer poultry farm is geo-located with GPS coordinates
- Primary focus: molecules & volumes of different antibiotics used
- Disease occurrence, treatment duration & prognosis
- Pathogen of interest: Salmonella

Sample Metadata

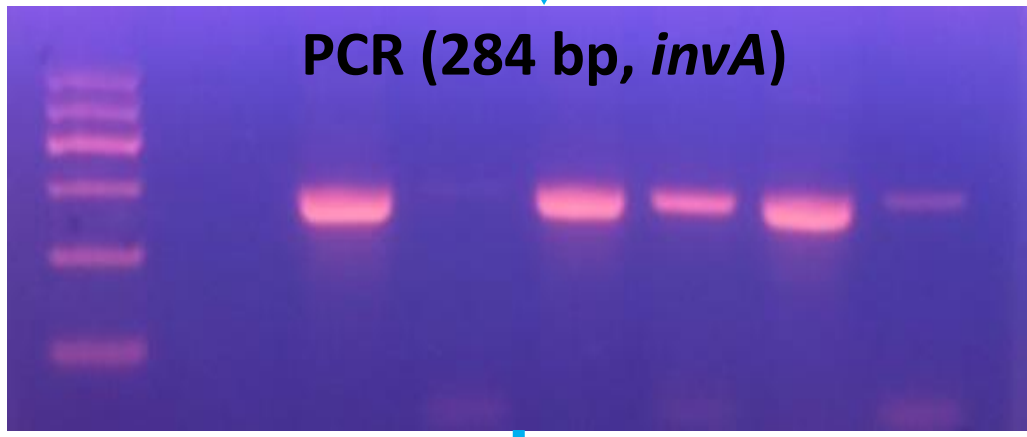


Study Sites

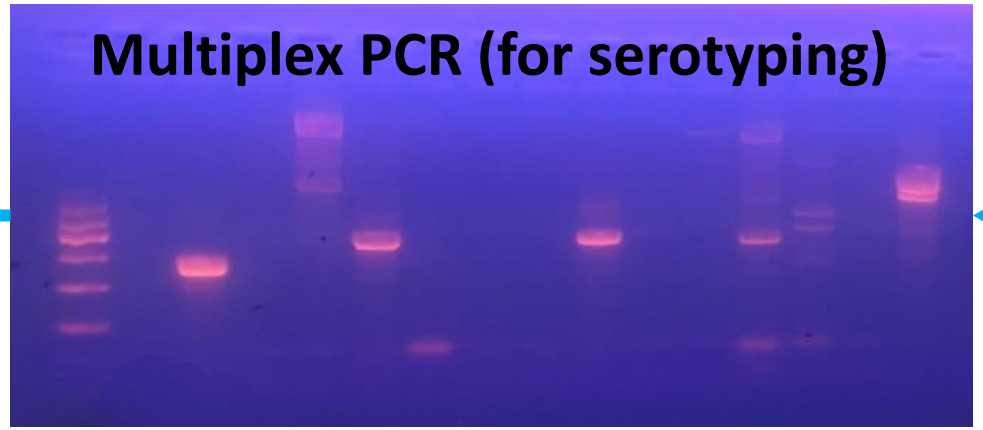

FAR-
WESTERN
PROVINCE
WESTERN
DEVELOPMENT
REGION
12
93
16
34
Bahraich
UTTAR
PRADESH
LUCKNOW
Faizabad
Gorakhpur
KANPUR
Birgunj
Muzaffarpur
EASTERN
DEVELOPMENT
REGION
Biratnagar
Siliguri
SAMZHUBZÊ

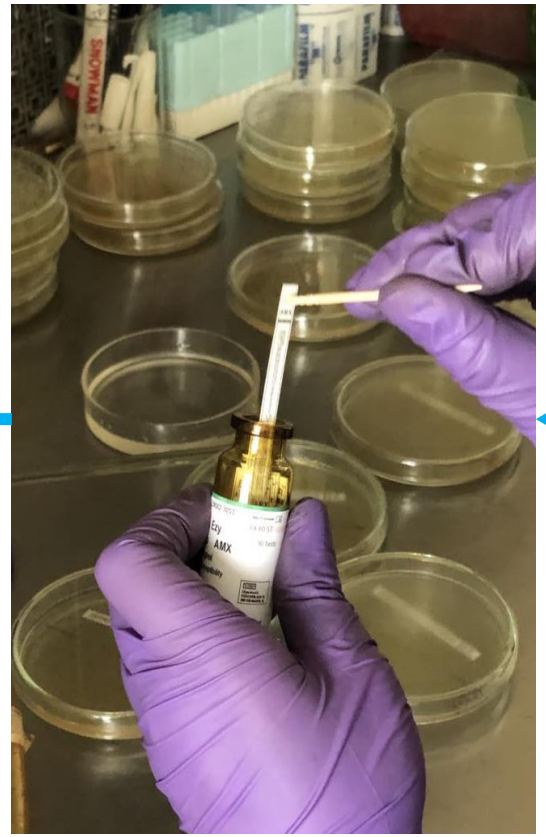
Workflow

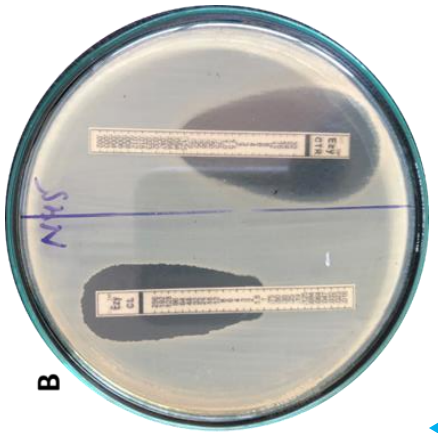
PCR (284 bp, *invA*)

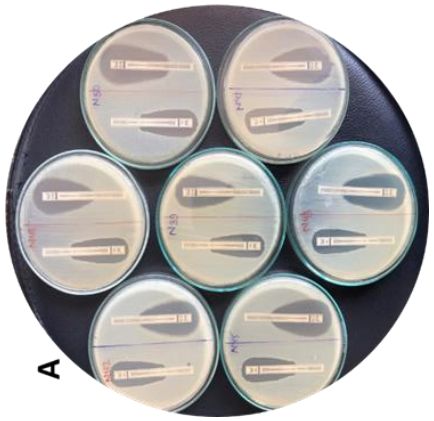


Multiplex PCR (for serotyping)



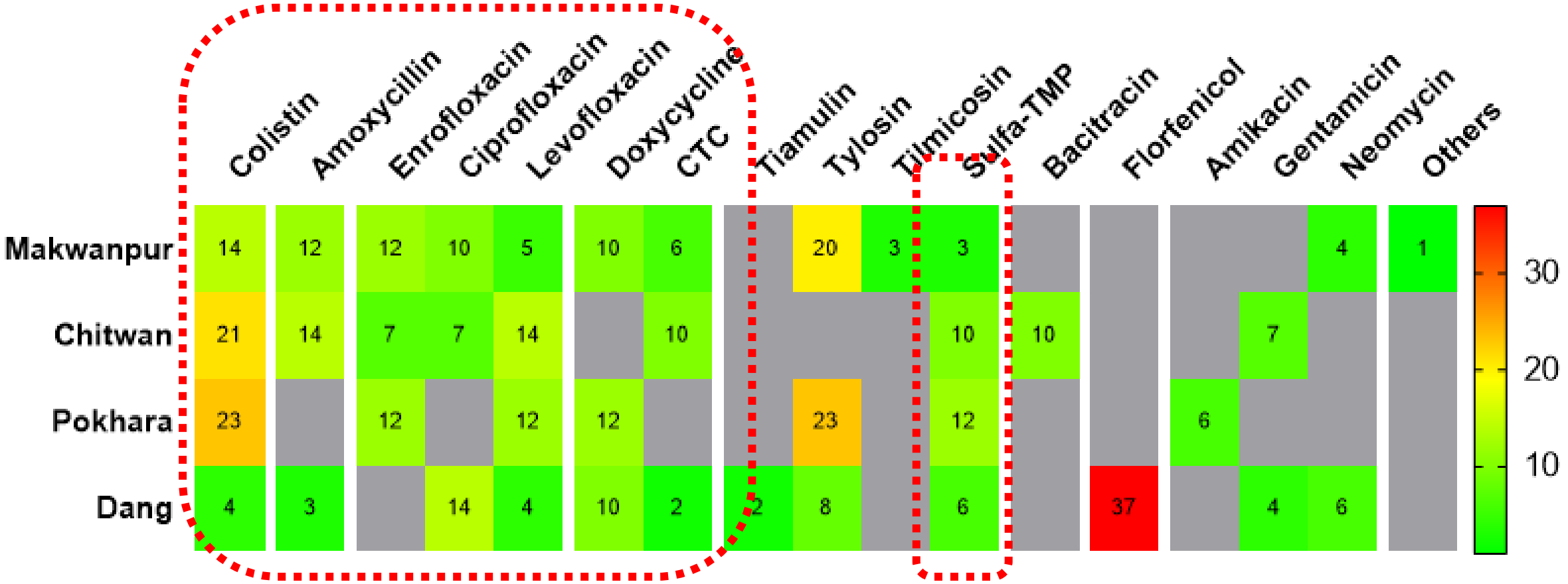


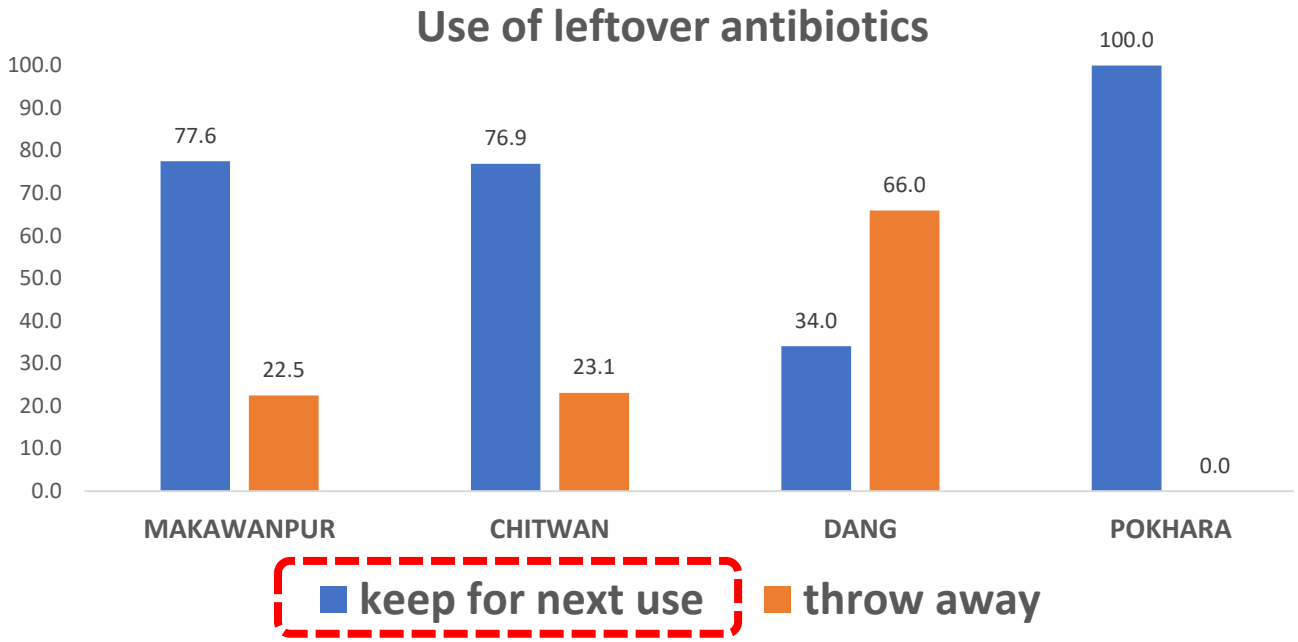


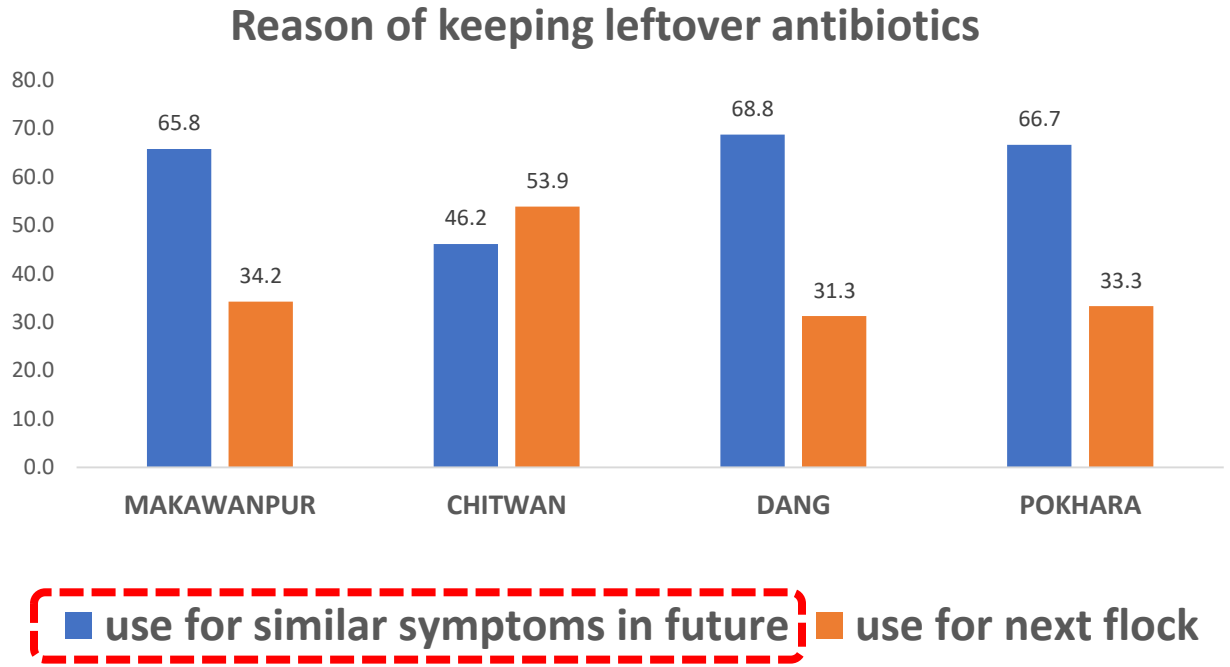


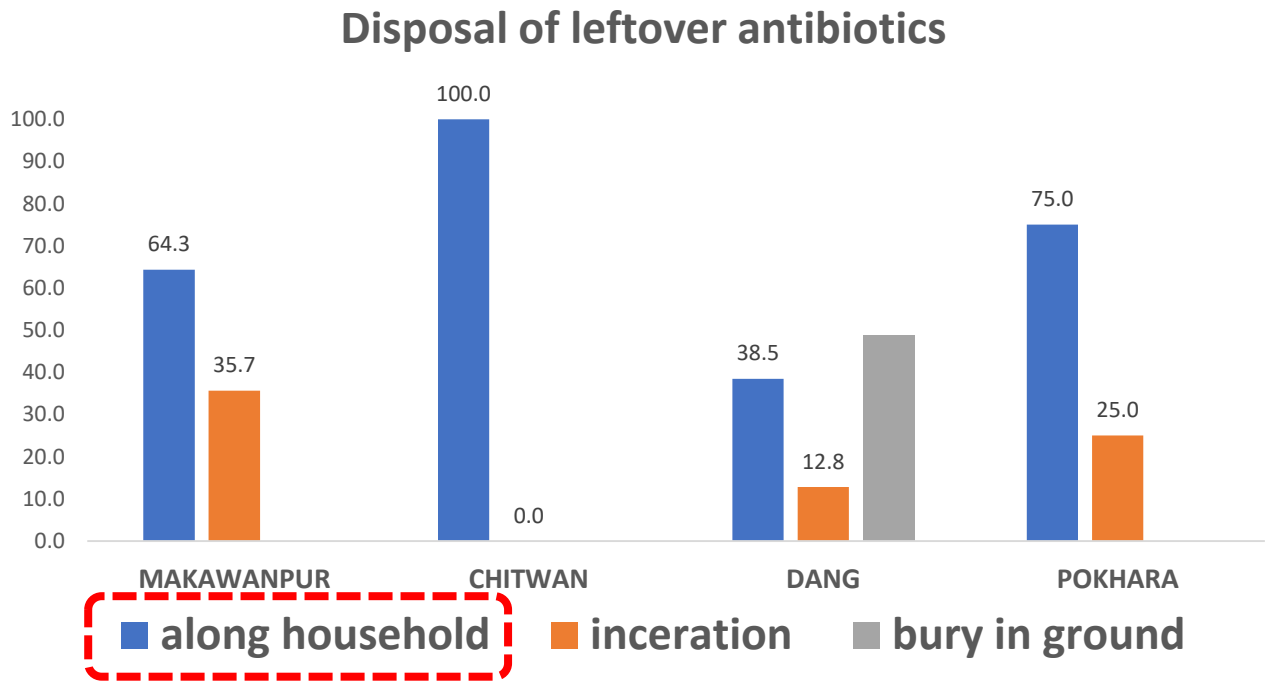
Usage Frequency of Antibiotic Molecules

During metadata collection, **Dustbin Method** was deployed to collect the empty container/packets/pouches of the antibiotics used in the farm









These factors are highly likely to contribute to increasing antibiotic resistance in the bacteria isolated from these farms.

Farm Practices

Conclusion (*Preliminary*)

- All commonly used molecules [except **Amikacin**] showed a high level of resistance.
- MIC of these agents is more than 6X the epidemiological cut-off value.
- Increased used is related to increased MIC & increased resistance in Salmonella.
- Farm/husbandry practices are major contributing factors leading to this phenomenon.

Acknowledgements

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THANK YOU