Antimicrobial resistance of *Enterobacteriaceae* in poultry in Lebanon

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INTRODUCTION

The overuse of antibiotics in veterinary medicine leads to antibiotic resistance in animals. Resistant bacteria from animals can be transmitted to humans in contact or through the food chain representing a major public health concern. Moreover, animal manures containing resistant bacteria contribute to the contamination of the environment and the spread of antimicrobial resistance genes.

In Lebanon, inappropriate use of antibiotics in food-producing animals, especially in poultry production for prophylactic reasons and as growth promoters contribute to the burden of antimicrobial resistance.

➡ The aim of the present study was to decipher the spread of resistant Enterobacteriaceae in poultry farms in almost the entire Lebanese territory.

MATERIALS AND METHODS

1. A total of 280 rectal swabs samples were collected from 56 poultry farms in Lebanon (5 samples per farm).
2. A survey has been completed by the veterinarian in each farm about the antibiotic usage.
3. Selection of resistant Enterobacteriaceae strains was carried out on MacConkey and Hektoen media supplemented with cephalosporins or carbapenems: Cefotaxime (2 mg/L) or Cefepime (4 mg/L) or Ertapenem (1 mg/L) .
4. All the isolates were identified using Biomérieux API® 20E strips.
5. Antibiotic susceptibility was determined by disk diffusion test according to 2018/2019 EUCAST guidelines.
6. Extended spectrum β-lactamase (ESBL) production was confirmed by double-disk synergy test.
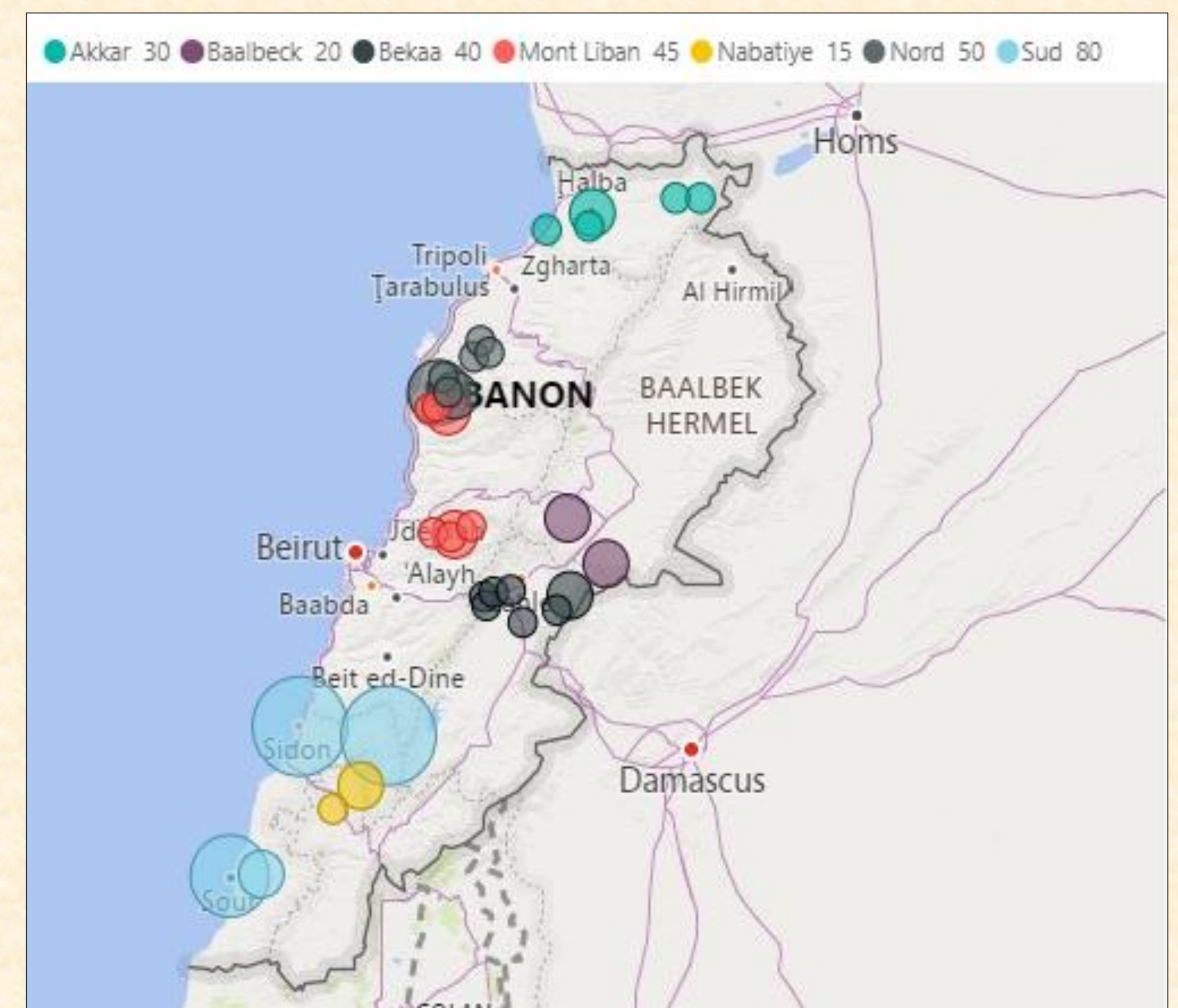

Figure 1: Geographical distribution of sampling in Lebanon.
Circles size represents the number of samples per district (see above the map sample number per constituency).
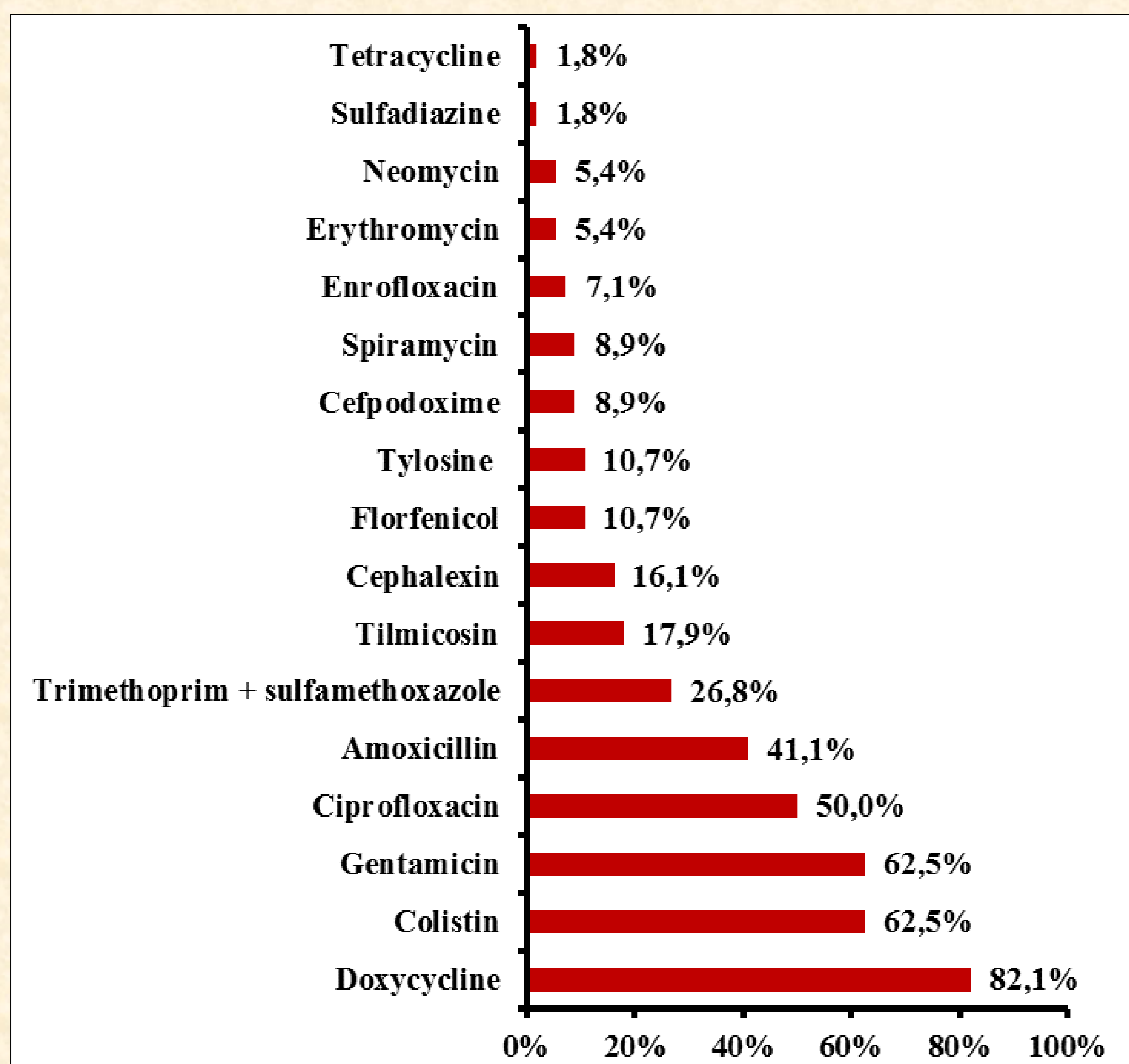
RESULTS

Figure 2: Proportion of broilers receiving antimicrobial treatments (per antibiotics). Depending on the farms, combinations of 2 to 8 different antibiotics have been administered for therapeutic or preventive purposes. N: Number of samples.
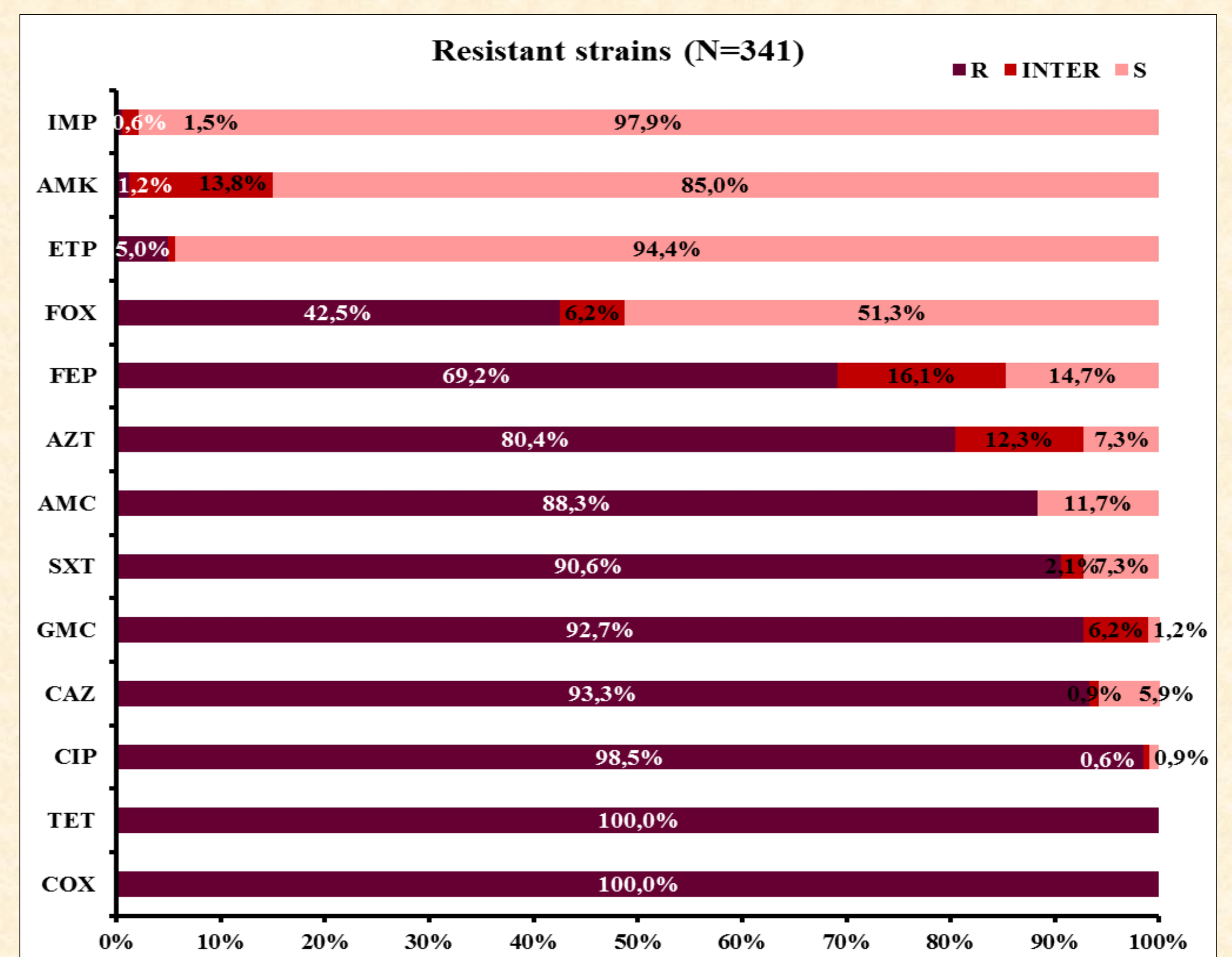

Figure 3: Proportion of resistant, intermediate and susceptible bacteria for the tested antibiotics.
N: Number of samples, **R:** Resistant, **INTER:** Intermediate, **S:** Sensible, **IMP:** Imipenem, **AMK:** Amikacin, **ETP:** Ertapenem, **FOX:** Cefoxitin, **FEP:** Cefepim, **AZT:** Aztreonam **AMC:** Amoxicillin + Clavulanic Acid, **SXT:** Trimethoprim + Sulfamethoxazole, **GMC:** Gentamicin, **CAZ:** Ceftazidime, **CIP:** Ciprofloxacin, **TET:** Tetracycline, **COX:** Cefotaxime
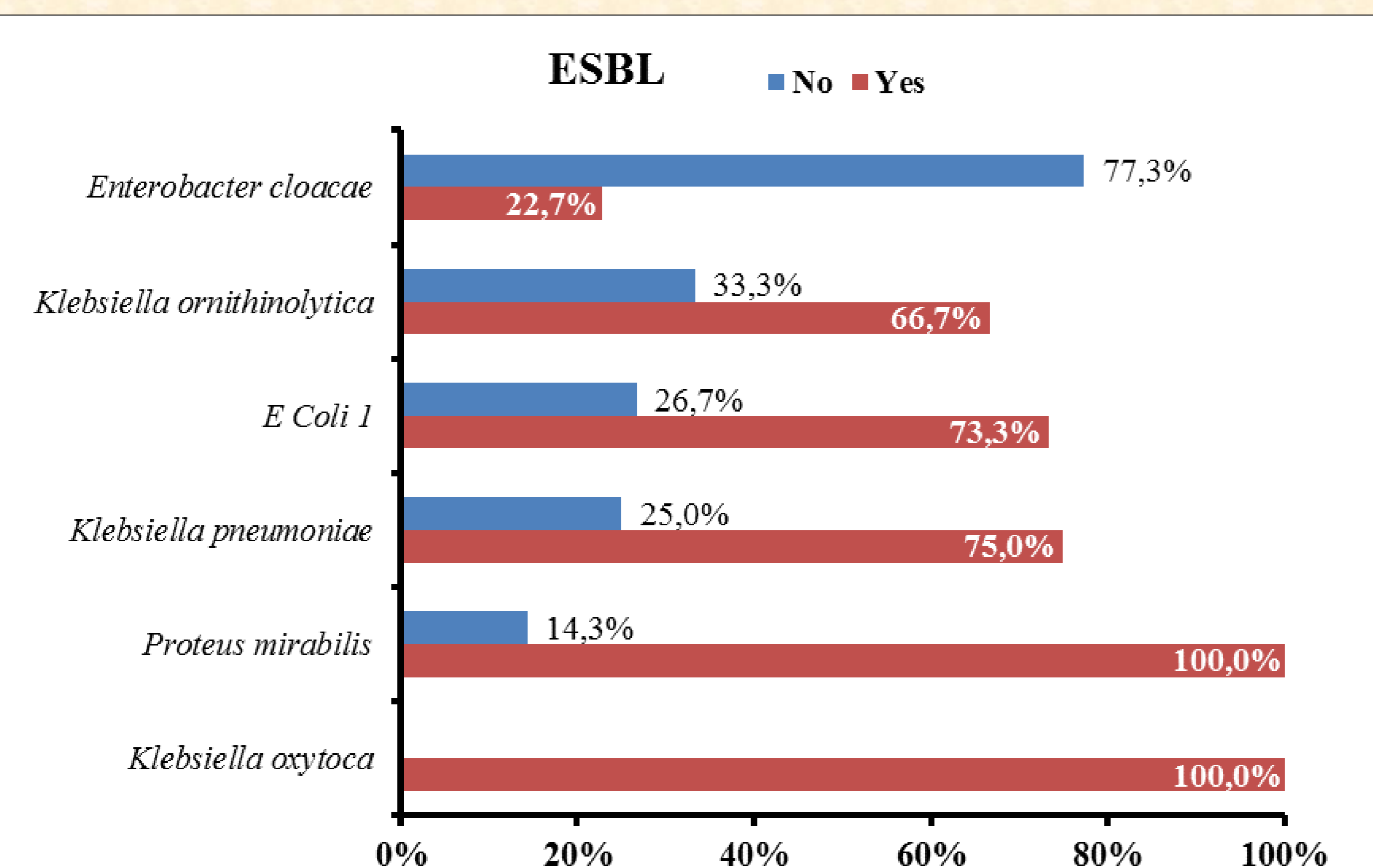

Figure 4: ESBL (Extended-spectrum β-lactamases) rates for each species.

DISCUSSION & CONCLUSION

✓ This study illustrates first of all the alarming rates of administered antibiotics in Lebanese poultry farms and also the high proportion of resistant bacteria .

✓ Among these resistant strains, the most recovered species was E. coli (83,6%).

✓ More than 70% of the isolates are ESBL producers. It is noteworthy that around 2% of the isolates are suspected to produce carbapenemases.

✓ A set of representative isolates (n=264) will be further characterized by ongoing whole genome sequencing (resistance gene content, phylogeny…).

✓ This emphasizes the urgent need to develop antimicrobial stewardship initiatives in Lebanon to prevent the transmission of these resistant bacteria to humans.