

# Relation between antimicrobial usage and resistance in *Escherichia coli* from German pigs



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## Aim

To relate antimicrobial usage patterns with antimicrobial resistance patterns in *Escherichia (E.) coli* from the pig production chain in Germany.

## Background

Antimicrobials in German pig production are usually administered per pen via the feeding or water system (treatment of sick alongside with healthy animals). A review on international literature showed that oral antimicrobials increase the risk of antimicrobial resistance in *E. coli* from swine. Resistance effects in *E. coli* from swine were highest for the use of aminoglycosides, quinolones and tetracycline.

## Materials & Methods

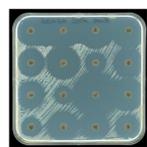
Information on use of antimicrobials in German pig production from VetCAb 2013:

- Records in year 2011
- Fattening pig



Information on resistance to antimicrobials in German pig production from the systematic national monitoring (ZoMo 2011)

- Sampling in year 2011
- *E. coli*
- Fattening pig, pork



Usage information for fattening pigs at farm level and resistance information for pigs' commensal *E. coli* were related per antimicrobial (group).

- > Same target population
- > Different study population
- > Representative samples
- > Same antimicrobial groups applied and tested
- > Slightly different antimicrobial agents applied and tested

Minimum inhibitory concentration (MIC): broth microdilution method (CLSI guidelines, M07-A8), plate format EUMVS (TREK Diagnostics Ltd., UK); epidemiological cut-off values (Commission Decision 2007/407/EC or by EUCAST)

## Results

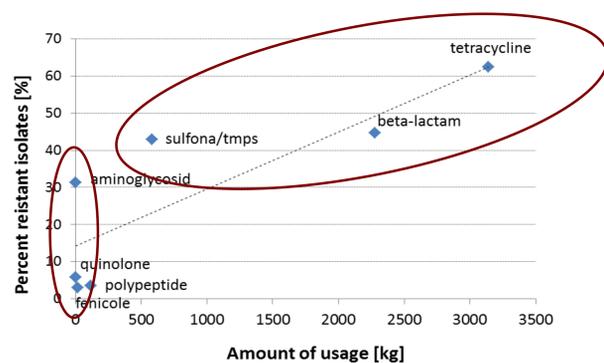


Figure 1: Resistance in *E. coli* against use of antimicrobial groups administered to German fattening pigs

- > Usage and resistance were highest for tetracycline, followed by beta-lactams and trimethoprim-sulfonamide combinations.
- > Some antimicrobial (groups) were of low usage but high resistance as e.g. quinolone and fenicole.
- => co-selection/ cross-resistance?

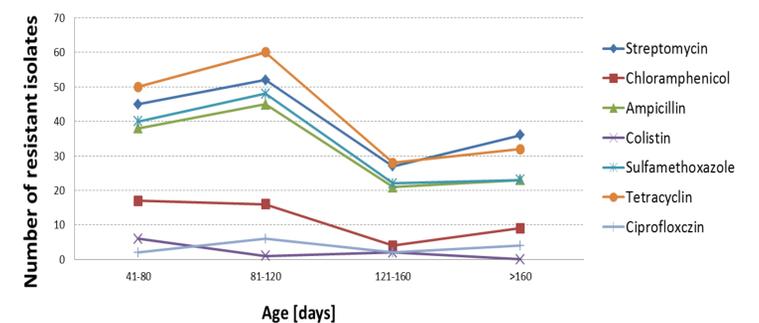


Figure 3: Development of resistance in *E. coli* across production stages (n = 299 isolates from fattening pigs, ZoMo 2011)

-> Treatment frequency and resistance occurrence decreased across production stages.

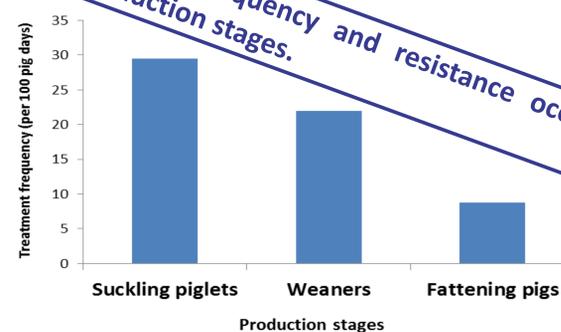


Figure 2: Treatment frequency across production stages (VetCAb 2013)

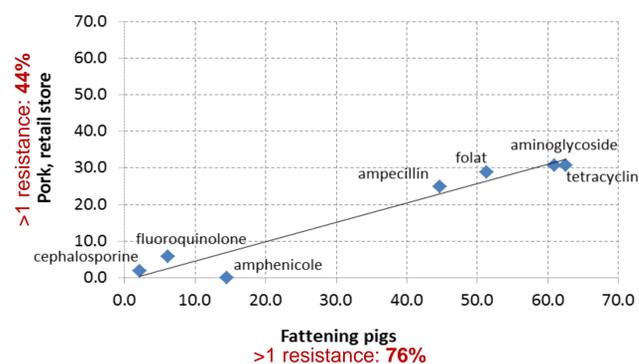


Figure 4: Resistance in *E. coli* from fattening pigs and pork (>1: resistant to >1 antimicrobial)

- > Resistance was still at considerable level for *E. coli* from slaughter pigs and in pork. 76% of the isolates from animals and 44% of the isolate from foodstuffs showed resistance against at least one antimicrobial.

## Conclusion

As future perspective, analysis of data (usage and resistance) from same animals/farms is required to investigate risk effects. Relations of (specific) antimicrobials as co-selection/ cross-resistance/ multi-resistance need to be further investigated.

### Acknowledgements

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### Contact

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