

# The influence of laying hen housing systems on antimicrobial resistance in indicator bacteria

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## INTRODUCTION

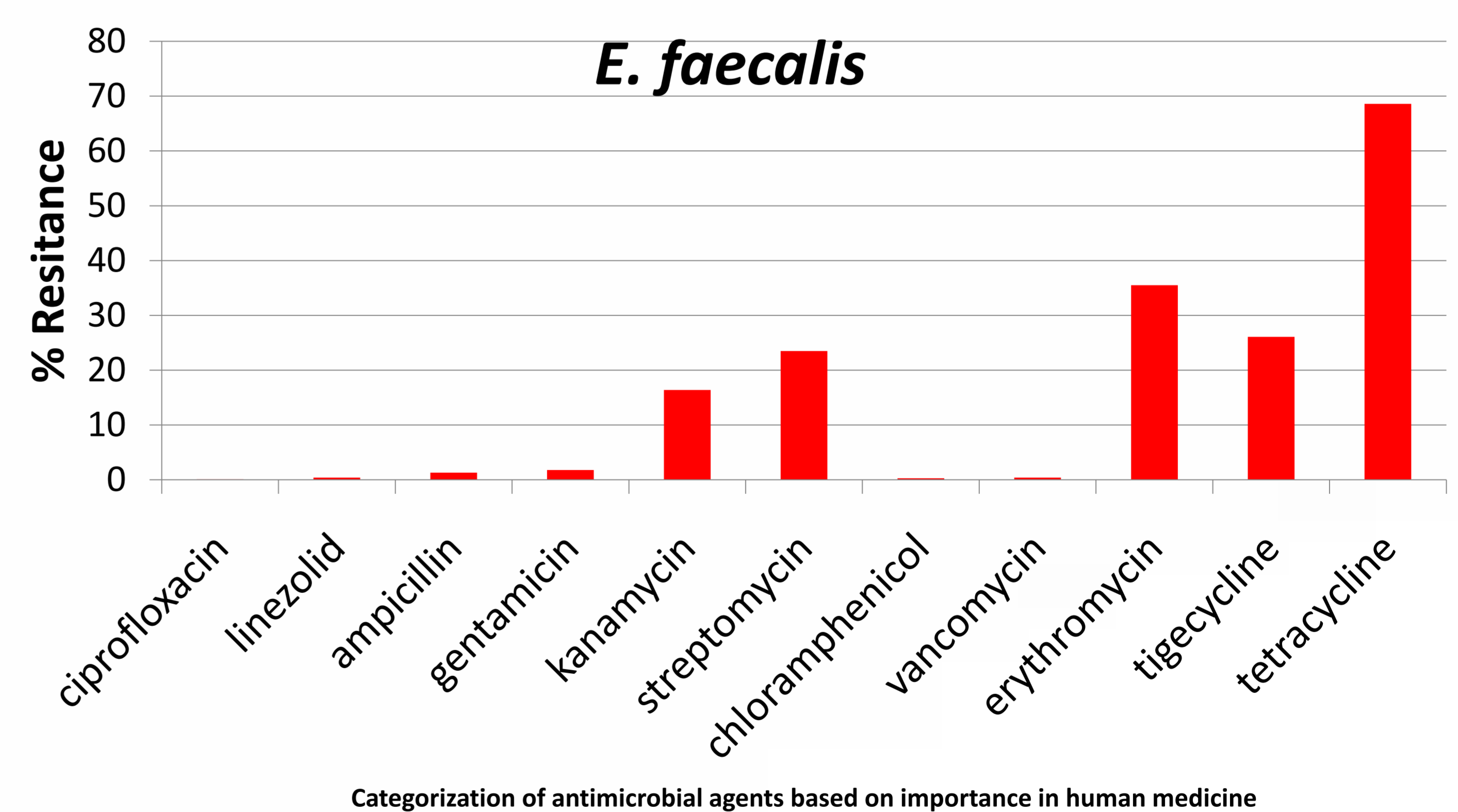
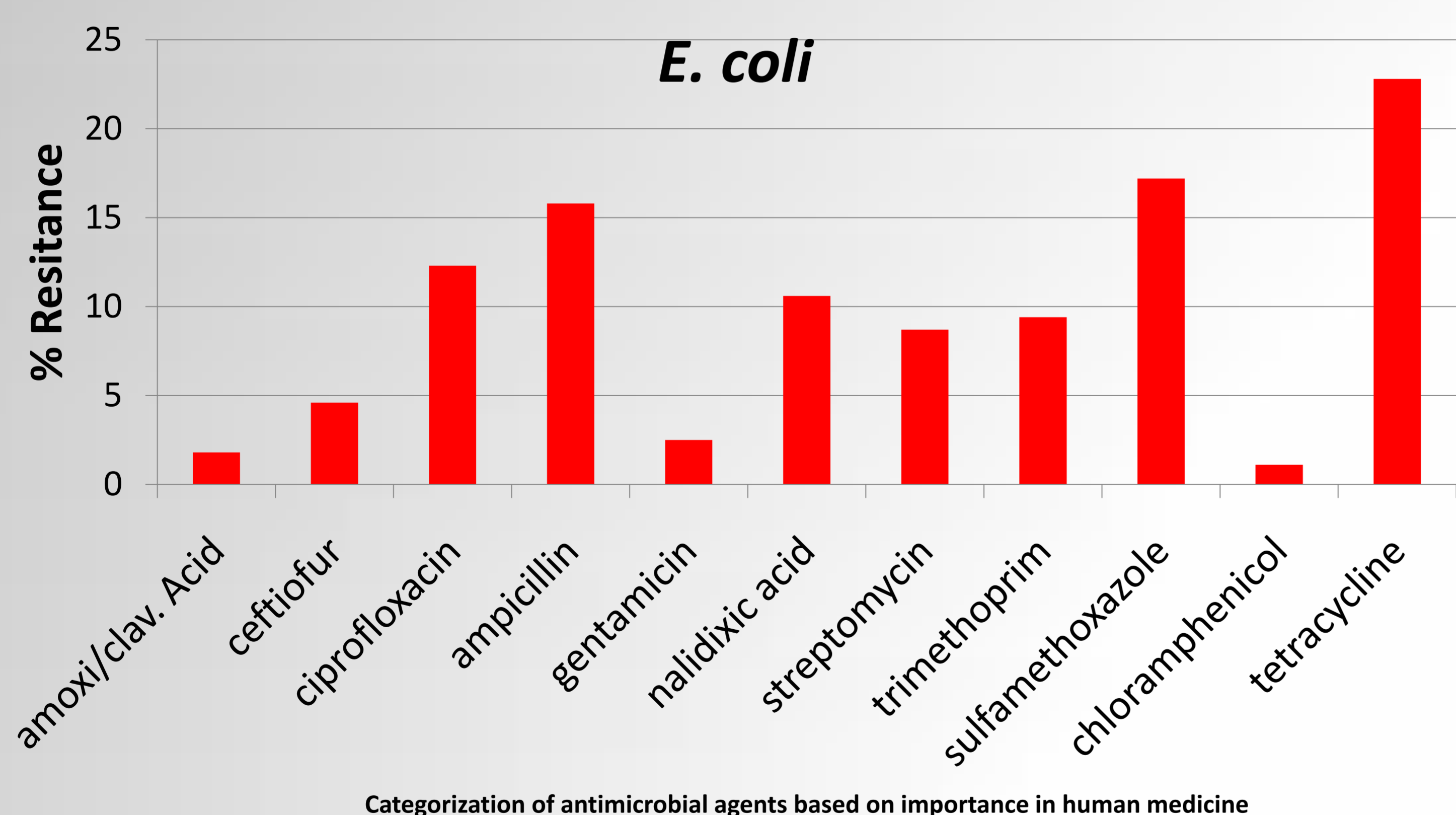
The emergence of antimicrobial resistance (AR) in production animals and the spread of AR from animals to humans has become an issue of concern with respect to public health. The data on AR in laying hens are very limited and taking into account the EU ban on conventional battery cages from 2012 onwards, screening of AR in laying hens is useful to assess the risk of AR transfer from hens or eggs to humans. The aim of this study is to determine whether the laying hen housing system has an influence on the observed levels of AR in laying hens.

## MATERIALS AND METHODS

- 282 randomly selected flocks sampled in Belgium, Germany, Italy and Switzerland with 20% battery cages farms and 80% non-cage housing systems
- In each flock 4 randomly selected hens were sampled by taking a cloaca swab. All flocks sampled the month prior to depopulation.
- For both indicator bacteria AR was tested by means of broth microdilution using custom made Sensititre® plates
- The EUCAST epidemiological break points were used
- For both indicator bacteria Multiple Drug Resistance (MDR) ( $\geq 2$  antimicrobials) was used as an outcome variable
- The influence of the housing system was tested using a Generalized Estimating Equations model

## RESULTS & DISCUSSION

- In total 1102 *Escherichia coli* and 803 *Enterococcus faecalis* isolates were analysed
- For *E. coli*, 55% of all isolates were susceptible to all 18 antimicrobials tested and 28.1% were multiresistant. The housing of laying hens in floor-raised systems turned out to be a risk factor for higher levels of MDR ( $P < 0.05$ ). The level of ceftiofur-resistance was significantly higher in Belgium compared to the other countries
- For *E. faecalis*, only 14.4% was pan-susceptible and 51.1% was multiresistant. Laying hens housed in free-range systems were more likely to have lower levels of MDR compared to hens housed in conventional battery cages



- The difference in effect of housing system on MDR in *E. coli* and *E. faecalis* might be the result of different biological characteristics?
- Differences between countries is probably related to regional differences in animal husbandry and antimicrobial usage?
- High ceftiofur-resistance might be due to off-label use in hatcheries? Mixed animal production on the farm? Role of the rearing period?

## CONCLUSION

**These results suggest that the levels of AR in indicator bacteria in laying hens are relatively low. No consistent conclusion on the influence of the housing system could be drawn.**

## ACKNOWLEDGEMENTS

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