

EFFECT OF PROBIOTICS ON THE PREVALENCE OF ANTIMICROBIAL RESISTANCE IN THE BROILER CAECUM



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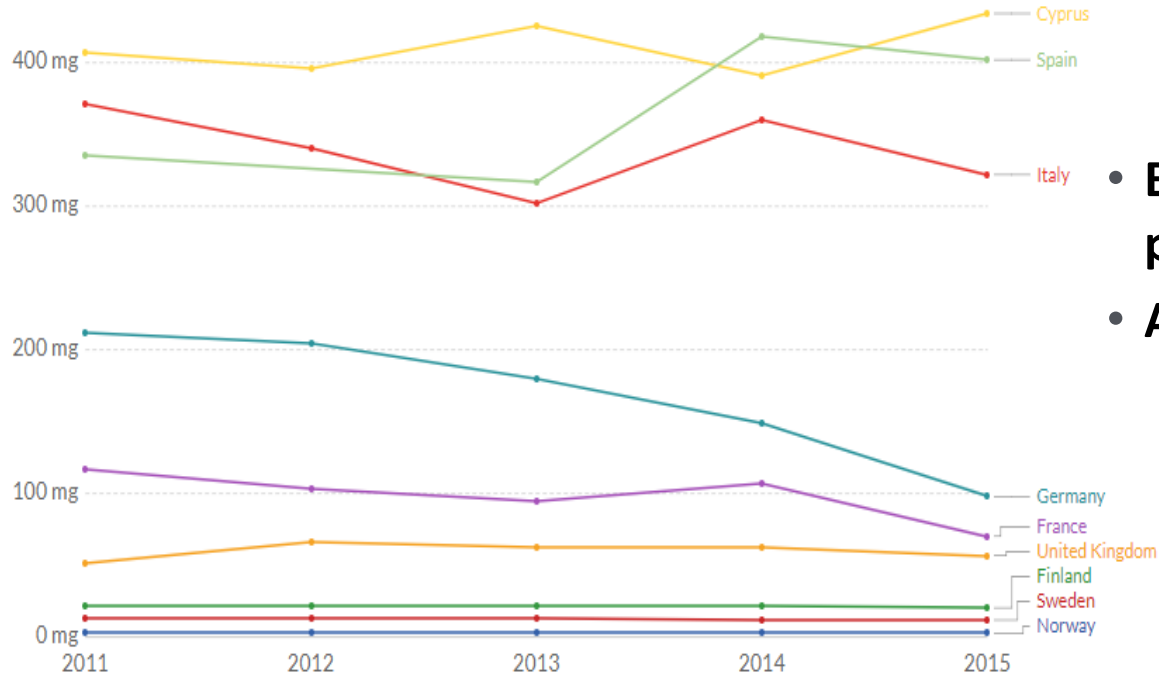
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INTRODUCTION

• Trend of Antibiotic Use in Livestock in Europe

mg/PCU (population-corrected unit)

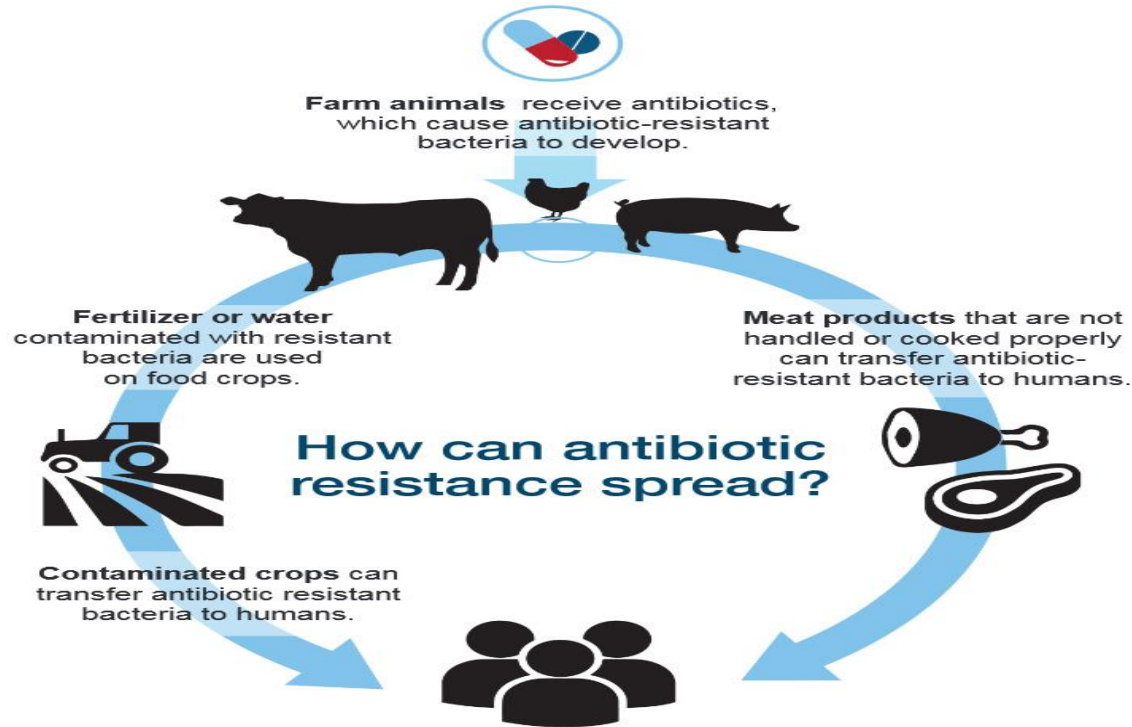


- Ban on antibiotics as growth promoters in 2006
- A general downward trend

Source: European medicines Agency, European Surveillance of Veterinary Antimicrobial consumption (2017)& Van Boeckel et al. (2015)

INTRODUCTION

- Spread of antibiotic resistance



Source: Canadian Food Inspection Agency, Science Fact sheet: Antimicrobial Resistance (2017)

INTRODUCTION

- **Benefits of probiotics**

Yeast

- Antibacterial properties
- Balance of intestinal microbiota

Lactic acid bacteria

- Antimicrobial activity
- Improvement of immune system

Objective

- To investigate the effect of **yeast (*Candida famata*)** and **bacteria (*Lactobacillus plantarum*)** administration in drinking water on the prevalence of **antimicrobial resistance (AMR)** in *E.coli* isolated from broiler caecum

Experimental design

- **Animals:** Total 220 male chicks (Ross 308), 5-week feeding trial
- **Four treatment:** Control, *Candida famata* (CF),
Lactobacillus plantarum (LP), combination (CFLP)
- Probiotics administration (10^5 - 10^8 per ml) via drinking water two days each week
- **Six replicate pens for each probiotic treatment**

MATERIALS AND METHODS

Counting of viable cells

- Population of *Lactobacillus sp.* and *E.coli* from gut

Antimicrobial susceptibility

- Phenotypic test**
(Ampicillin, Tetracycline, Nalidixic acid, Chloramphenicol; 50µg/ml)

Virulence genotyping of *E.coli*

- papC, iucD, tsh, irp2, iss, astA, hlyA**

RESULTS

THE POPULATION OF *E.COLI* FROM CAECUM (DAY 8-DAY 35)

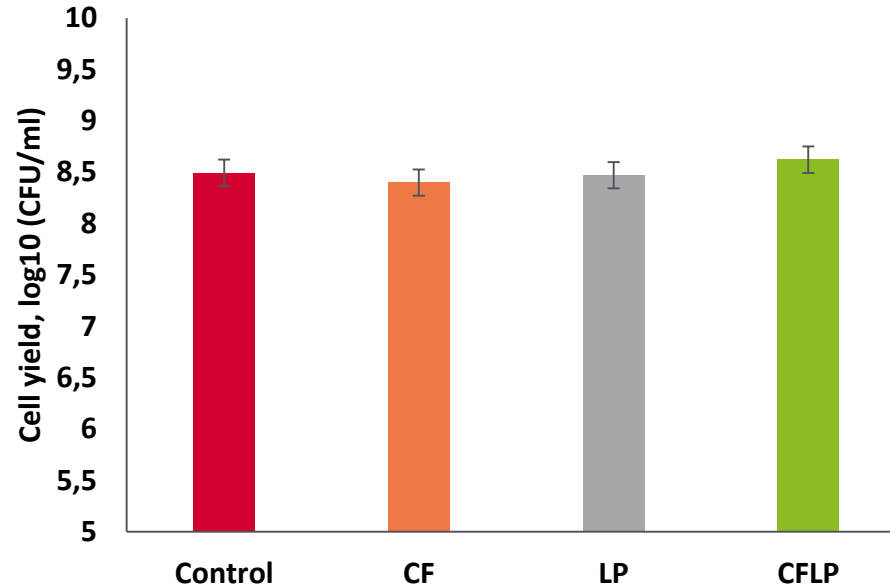


Figure 1. Growth of total *E.coli* from caecum of chicken from day 8 to 35

CF, *Candida famata*; LP, *Lactobacillus plantarum*, CFLP, combination of *Candida famata* and *Lactobacillus plantarum*

RESULTS

THE POPULATION OF *LACTOBACILLUS SP.* FROM GUT (DAY 8-DAY 35)

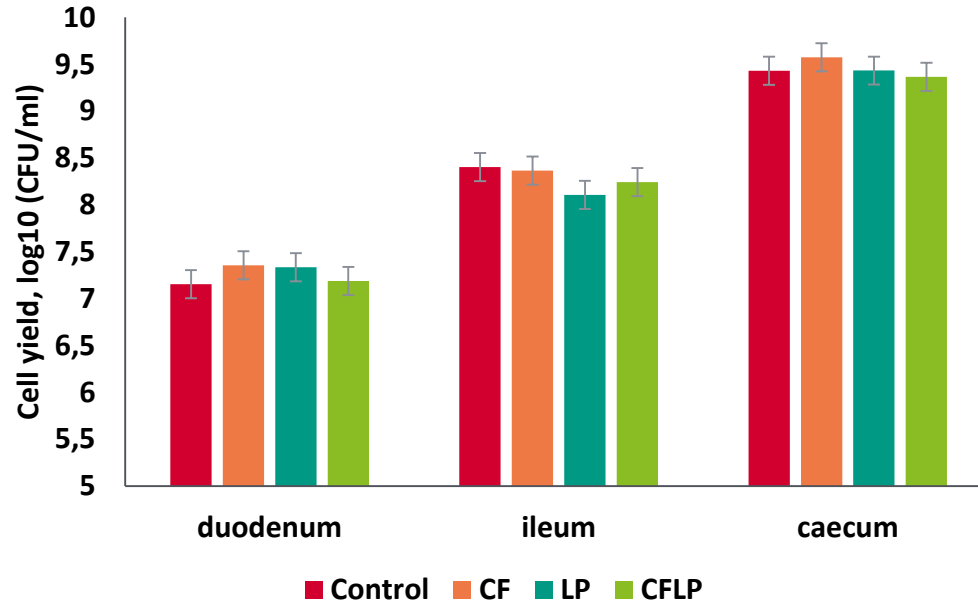
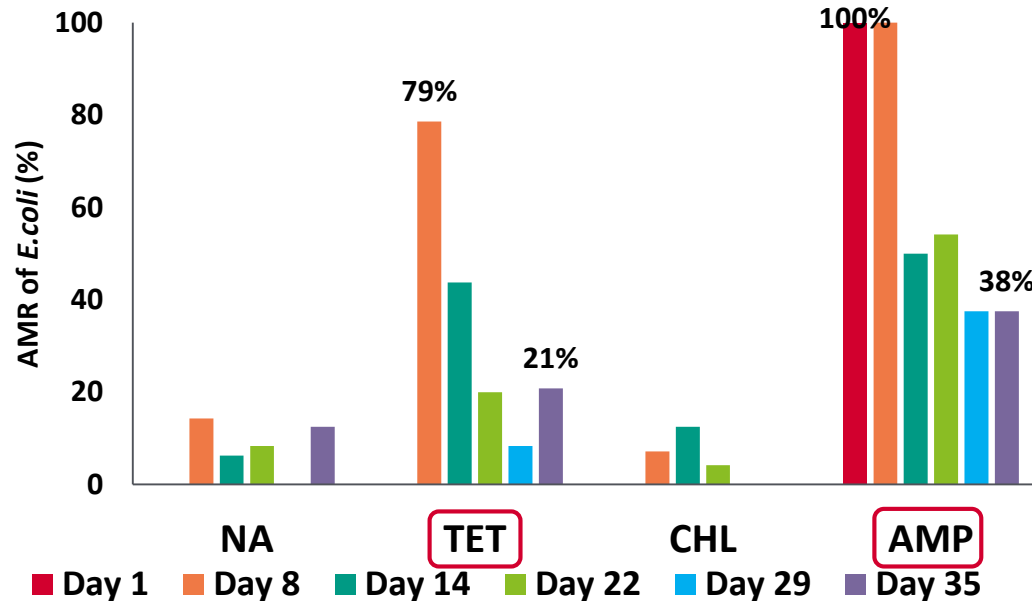


Figure 2. Growth of total *Lactobacillus sp.* from duodenum, ileum and caecum from day 8 to 35

CF, *Candida famata*; LP, *Lactobacillus plantarum*, CFLP, combination of *Candida famata* and *Lactobacillus plantarum*

RESULTS

THE PERCENTAGE OF ANTIMICROBIAL RESISTANT *E. COLI* (DAY 1 - DAY 35)



- Percentage of *E. coli* that were AMP^R and TET^R declined as birds aged ($P < 0.001$)

Figure 3. The rate of antibiotic resistant *E. coli* from caecum between day 1 and day 35

NA, Nalidixic acid; TET, Tetracycline; CHL, Chloramphenicol; AMP, Ampicillin

RESULTS

THE EFFECT OF PROBIOTIC ON AMPICILLIN RESISTANT *E. COLI*

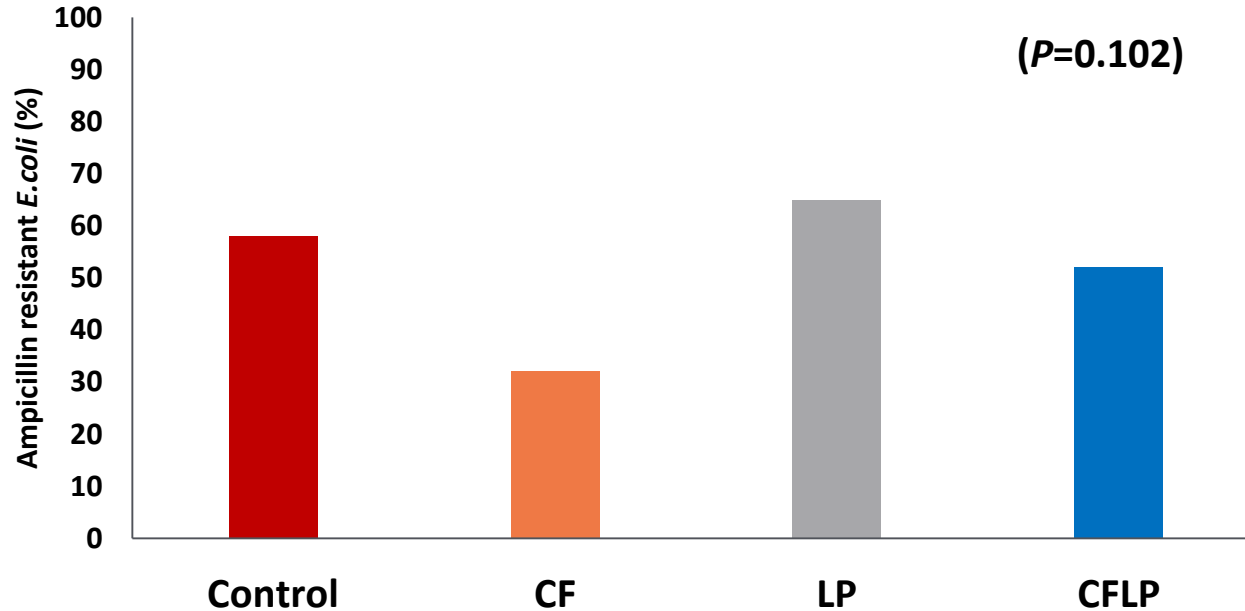


Figure 4. The rate of ampicillin resistant *E. coli* from caecum

CF, *Candida famata*; LP, *Lactobacillus plantarum*, CFLP, combination of *Candida famata* and *Lactobacillus plantarum*

RESULTS

VIRULENCE GENOTYPING

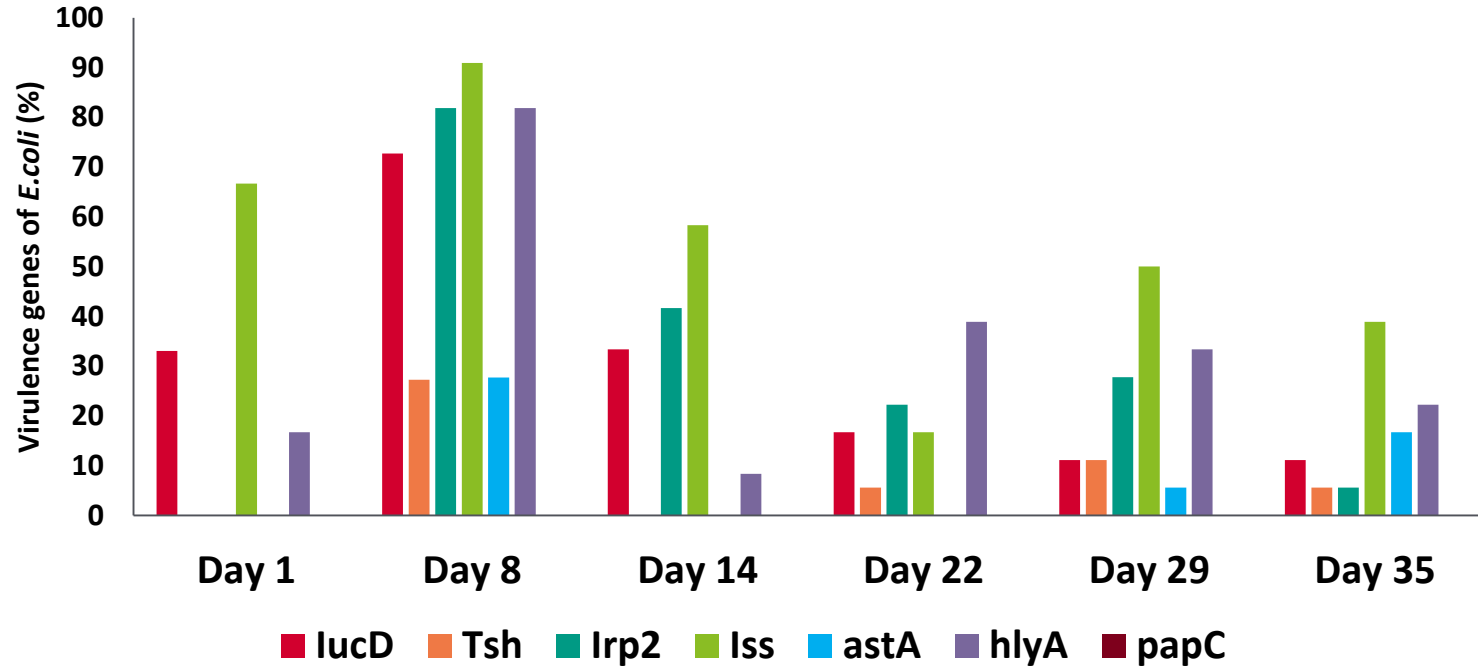
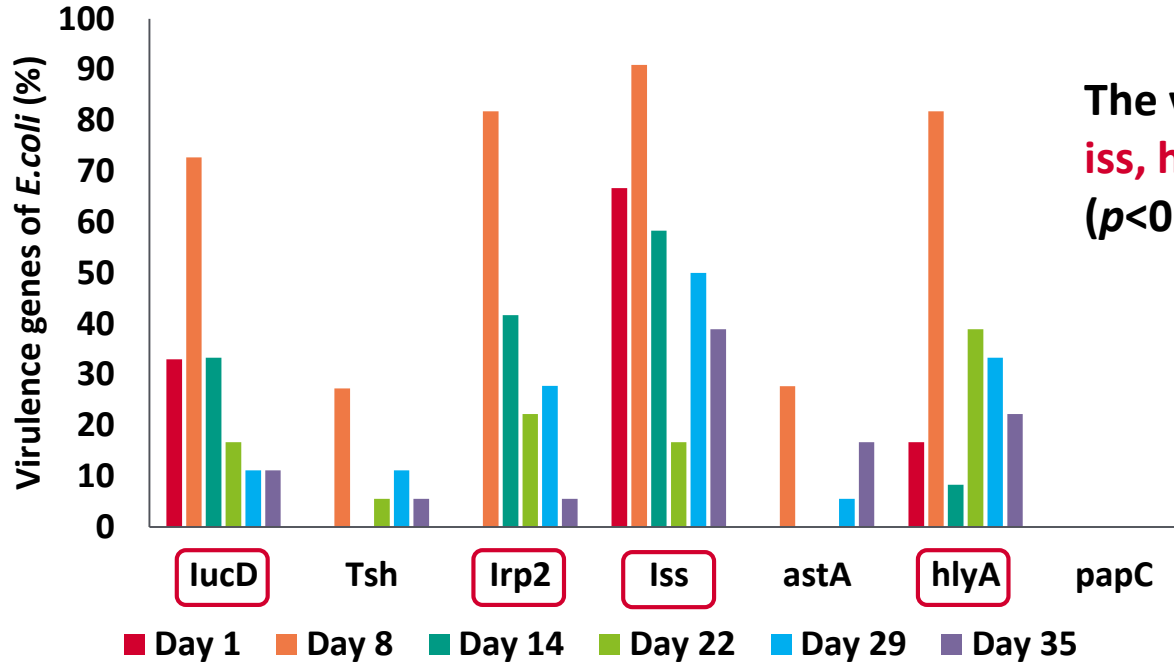


Figure 5. The percentage of virulence-associated genes in *E. coli*

RESULTS

VIRULENCE GENOTYPING



The virulence genes of **lucD**, **Irp2**, **iss**, **hlyA** decreased after day 8 ($p < 0.01$)

Figure 6. The percentage of virulence-associated genes in *E. coli*

CONCLUSIONS

- **High prevalence** of **ampicillin** and **tetracycline resistance** and **virulence genes** in *E.coli* taken from birds at **day 8**
- AMR and virulence genes in *E.coli* decreased as birds aged
- **Tendency** for **CF** to reduce the prevalence of **Ampicillin resistance**

Question & Answer

