Antimicrobial resistance in *E. coli* isolated from food producing animals

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Introduction

Commensal *E. coli* are regarded as general indicators for resistance among Gram negative bacteria. They are present in large numbers in nearly all animal species. Consequently, commensal *E. coli* from the intestinal flora can be isolated at almost every sampling occasion. This approach allows the surveillance of antimicrobial resistance among *E. coli* isolates from different animal sources. Because they have been studied worldwide, *E. coli* are also useful in comparing geographic distribution of antimicrobial resistances. Moreover, the genetic background of resistance is well known in this species, which allows a scientific interpretation of the resistance data.

Materials and methods

Faecal material was taken from 4 animal categories [broiler chickens, pigs, bovines (for meat production) and veal calves] in 2011. *E. coli* strains were identified by conventional isolation procedures. A total of 765 isolates (poultry: 420, pigs: 157, bovines: 154, veal calves: 34) were tested for susceptibility by a micro broth dilution method using Eucast breakpoints.

Results

Antimicrobial resistance in commensal *E. coli*

Table 1. Antimicrobial resistance in commensal E. coli

Antimicrobial	Pigs		Poultry		Bovines		Veal calves	
	%R	CI	%R	CI	%R	CI	%R	CI
AMP	51.0	42.9-59.0	85.0	81.2-88.0	26.6	19.8-34.0	70.6	52.5-85.0
CHL	26.8	20.0-34.0	24.3	20.5-29.0	14.3	9.2-21.0	50.0	32.4-68.0
CIP	14.0	9.0-20.0	62.9	58.0-67.0	11.0	6.6-17.0	41.2	24.6-59.0
COL	0.6	0.0-3.0	0.5	0.1-2.0	0.6	0.0-4.0	14.7	5.0-31.0
FFN	4.5	1.8-9.0	0.7	0.1-2.0	6.5	3.2-12.0	14.7	5.0-31.0
FOT	4.5	1.8-9.0	19.1	15.4-23.0	4.5	1.8-9.0	0.0	0.0-10.0
GEN	4.5	1.8-9.0	5.0	3.1-8.0	3.9	1.4-8.0	20.6	8.7-38.0
KAN	3.2	1.0-7.0	6.9	4.7-10.0	5.2	2.3-10.0	29.4	15.1-47.0
NAL	12.7	8.0-19.0	63.1	58.3-68.0	12.3	7.6-19.0	41.2	24.6-59.0
SMX	58.6	50.5-66.0	74.3	69.8-78.0	28.6	21.6-36.0	79.4	62.1-91.0
STR	43.3	35.4-51.0	60.1	55.1-65.0	23.4	16.9-31.0	52.9	35.1-70.0
TAZ	2.5	0.7-6.0	10.0	7.3-13.0	3.9	1.4-8.0	0.0	0.0-10.0
TET	56.7	48.6-65.0	64.8	60.0-69.0	19.5	13.5-27.0	73.5	55.6-87.0
TMP	50.3	42.2-58.0	63.1	58.3-68.0	19.5	13.5- 27.0	70.6	52.5-85.0

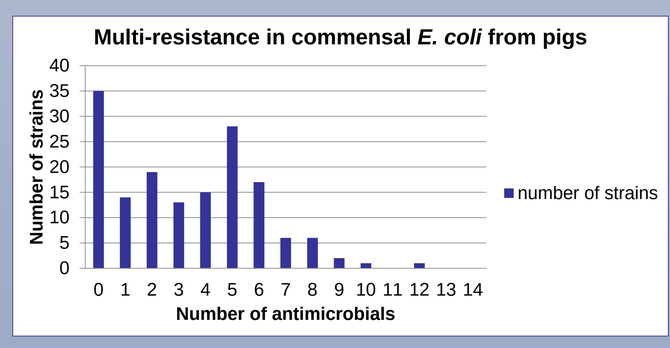
Table 2. List of abbreviations

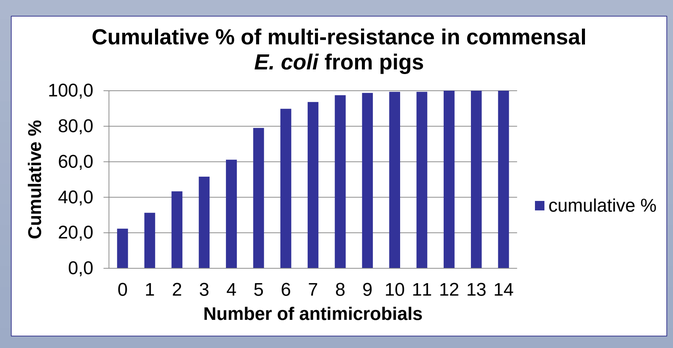
%R	Resistant isolates (%)
CI	Confidence interval
N	Number of strains
AMP	Ampicillin
CHL	Chloramphenicol
CIP	Ciprofloxacin
COL	Colistin
FFN	Florphenicol
FOT	Cefotaxime
GEN	Gentamicin
KAN	Kanamycin
NAL	Nalidixic acid
SMX	Sulfonamide
STR	Streptomycin
TAZ	Ceftazidime
TET	Tetracycline
TMP	Trimethoprim

Multi-resistance in commensal *E. coli*



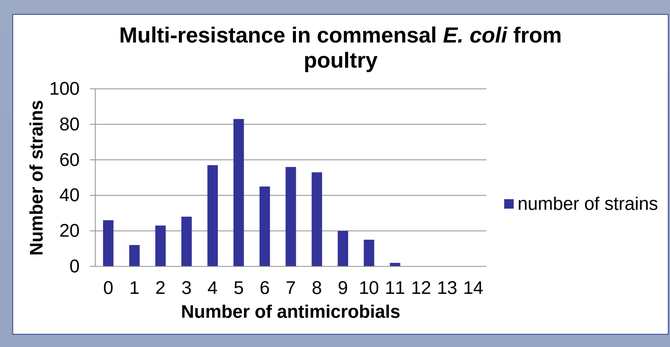
N= 157

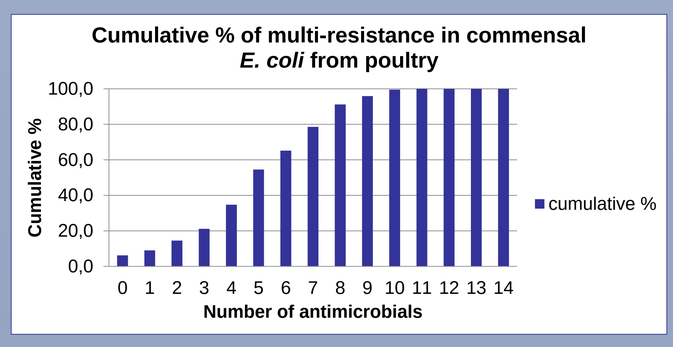


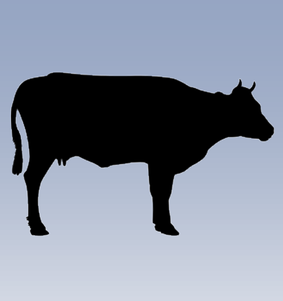




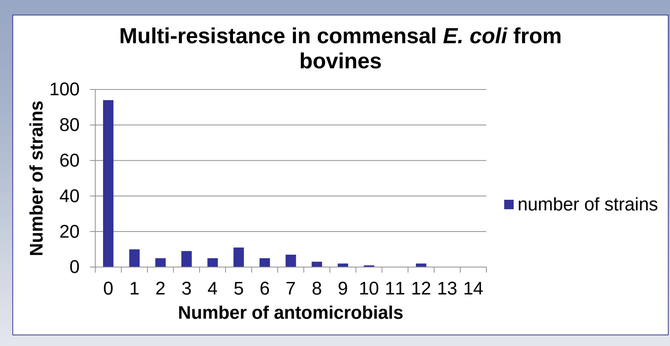
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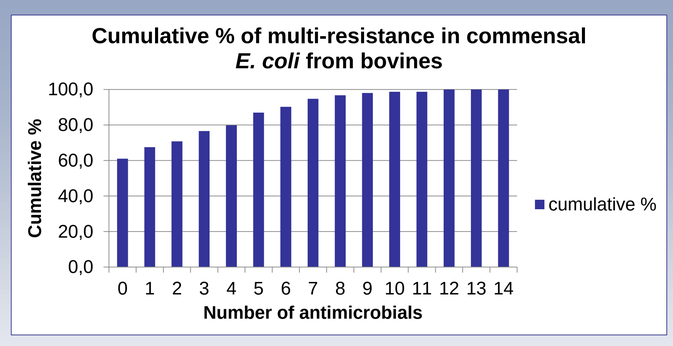






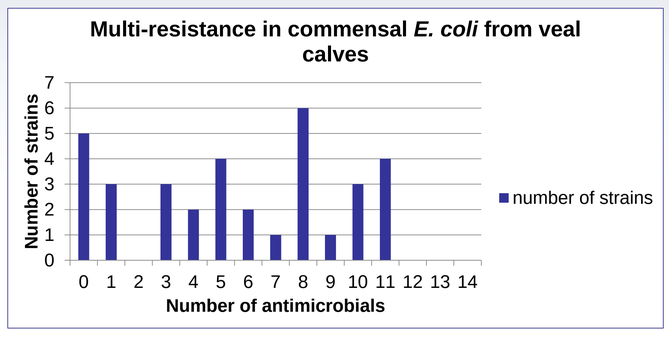
N= 154

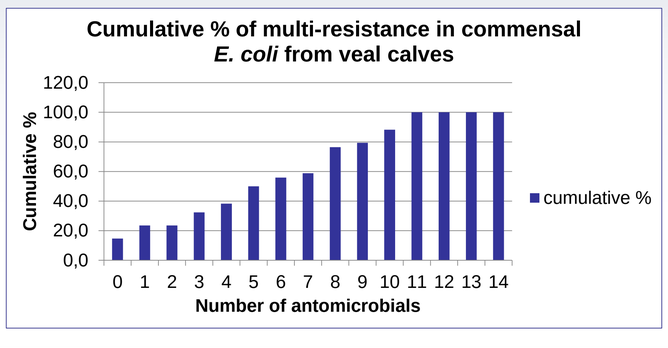






N= 34





Conclusion

In general, it can be stated that resistance frequencies in poultry isolates are higher than in pig and bovine isolates. Resistance percentages in veal calves are similar to those in pigs, however it should be noted that the number of isolates tested was much lower. Noteworthy is the difference between calves and older bovines: veal calf isolates are clearly more multi-resistant than bovine isolates.