Prevalence of *Campylobacter* and *Salmonella* and their antimicrobial resistance in broilers at slaughter in Ecuador

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Introduction

Campylobacter and *Salmonella* are frequently found in poultry and represent an important source for human gastrointestinal infections worldwide. Despite of its importance, prevalence and drug resistance of these pathogens are still unknown or poorly studied in developing countries.

Objectives

The aim of this study was to estimate the prevalence and antimicrobial resistance of *Campylobacter* and *Salmonella* serotypes in broilers at slaughter age in the province of Pichincha in Ecuador.

Methods

Caeca content from 379 broiler batches in 6 slaughterhouses were collected during 1 year. *Campylobacter* was isolated by direct plating on mCCDA Agar and isolates were speciated using a multiplex PCR. For *Salmonella* isolation ISO 6579/Amd 1 was applied. From 178 *Campylobacter* strains MIC values for ciprofloxacin, nalidixic acid, tetracycline, erythromycin, streptomycin, chloramphenicol and gentamicin were obtained using a EUCAMP kit. For *Salmonella* MIC values for sulfamethoxazole, gentamicin, ciprofloxacin, ampicillin, cefotaxime, ceftazidime, tetracycline, streptomycin, trimethropim, chloramphenicol, colistin, florfenicol, kanamycin and nalidixic acid were obtained using EUMVS2 kit. Epidemiological breakpoint values from EUCAST were considered to determine bacterial antibiotic resistance.

Results

Prevalence:

In total 249 (65.7%) batches were *Campylobacter* positive: 158 (63.5%) batches were colonized with *C. coli*, 46 (18.5%) with *C. jejuni* and 30 (12.0%) with *C. coli* and *C. jejuni*. From 15 positive batches *Campylobacter* isolates could not be speciated. For *Salmonella*, sixty two (16.4%) batches were positive. From all positives batches 9 (14.5%) were colonized with S. Enteritidis, 52 (83.9%) with S. Infantis and 1 (1.6%) with S. Corvallis.

Figure 1. *Campylobacter* species found at farm level.

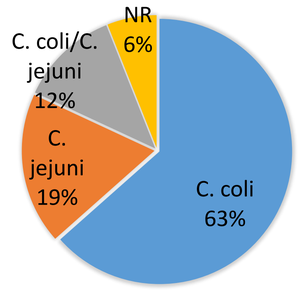

Table 1. Number of *C. coli* (n=137) *and C. jejuni* (n=41) strains resistant to each tested antibiotic.

Antibiotic	*C. coli*	*C. jejuni*	Rate
CIP	136	40	98.9%
NAL	136	41	99.4%
TET	90	33	69.1%
ERY	28	5	18.5%
STR	14	5	10.7%
CHL	4	1	2.8%
GEN	2	1	1.7%

Nalidixic acid (NAL), Ciprofloxacin (CIP), eritromicyn (ERY) tetracycline (TET), streptomycin (STR), gentamicin (GEN), chloramphenicol (CHL).

Table 2. Resistance against number of antibiotics in isolated *Campylobacter* strains

No. of Antibiotics	*C. coli*	*C. jejuni*	Rate
7	2	1	1.7%
5	9	3	6.7%
4	19	2	11.8%
3	63	26	50.0%
2	43	9	29.2%
0	1	0	0.6%
Total	137	41	

Table 3. Number of *Salmonella* strains resistant to each tested antibiotic.

	S. Infantis	S. Enteritidis	S. Corvallis	Rate
SMX	51	3	1	88.7%
NAL	51	2		85.5%
CIP	49	2	1	83.9%
TET	49	1		80.6%
STR	47	2		79.0%
TMP	47	2	1	80.6%
FOT	42	2		71.0%
AMP	41	1		67.7%
FFN	40	2		67.7%
GEN	39	2		66.1%
CHL	39	1		64.5%
KAN	30	2		51.6%
TAZ	3	1		6.5%
COL	1	9		16.1%

Sulfamethoxazole (SMX), Nalidixic acid (NAL), Ciprofloxacin (CIP), Tetracycline (TET), Trimethropim (TMP), Streptomycin (STR), Cefotaxime (FOT), Ampicillin (AMP), Florfenicol (FFN), Gentamicin (GEN), Chloramphenicol (CHL), Kanamycin (KAN), Colistin (COL) and Ceftazidime (TAZ).

Table 4. Resistance against number of antibiotics in isolated *Salmonella* strains

No of antibiotics	S. Infantis	S. Enteritidis	S. Corvallis
13	2		
12	21	2	
11	8		
10	7		
9	2		
8	2		
7	4		
6	4		
5	1		
3			1
2	1	1	
1		6	
Total	52	9	1

Resistance:

Overall antimicrobial resistance rates for *Campylobacter* are shown in Table 1 and 2. *C. coli and C. jejuni did not show* difference in their antimicrobial resistance rates. The highest resistance rates (above 98%) were found for nalidixic acid and ciprofloxacin, while *Campylobacter* were most sensible to chloramphenicol and gentamicin. Additionally, most of *Campylobacter* strains were resistant to more than 2 antibiotics.

Overall antimicrobial rates of *Salmonella* are shown in Table 3 and 4. 12 out of 14 tested antibiotics showed high resistance rates for S. Infantis strains (above 58%). In contrast all S. Enteritidis isolates showed only high resistance to colistin. S. Infantis isolates showed higher multiresistant patterns than S. Enteritidis. 44.2% of S. Infantis strains showed resistance to 12 antibiotics.

Conclusions

To our knowledge, this is the first study estimating the prevalence and the antibiotic resistance profiles of *Salmonella* and *Campylobacter* in broilers at slaughter age in Ecuador. The prevalence of *Campylobacter* in this study is higher than reported from Argentina (1) while *Salmonella* prevalence is lower than reported from Colombia (2). Rates of antimicrobial resistance in isolated strains were higher than the reported ones in Europe (3). High antimicrobial resistant profiles for both bacteria have also been reported for Latin America (2, 4).

References

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