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Canadian Integrated Program for Antimicrobial Resistance Surveillance (CIPARS)

2007

PRELIMINARY RESULTS

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For further information or to provide comments please contact:

Denise Coleman
Public Health Agency
160 Research Lane, Suite 103
Guelph, ON
N1G 5B2
Canada

or send an e-mail to cipars-picra@phac-aspc.gc.ca.

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Preamble

We are posting preliminary[1] antimicrobial resistance (AMR) findings for the most recent complete calendar year 2007 on the CIPARS website. New in this 3rd edition of the 'Preliminary Results' is the addition of AMR temporal variation figures (from 2003 to 2007) and of MIC tables. Data from the following program components are available in this report:

- ***Surveillance of Human Clinical Isolates***
- ***Abattoir Surveillance***
- ***Retail Meat Surveillance***
- ***Surveillance of Animal Clinical Isolates***

Integrated analysis results based on human and agri-food AMR data will be presented in the full 2007 CIPARS Annual Report, as well as On-Farm Surveillance AMR and antimicrobial use results from pigs, human antimicrobial consumption estimates in the Canadian community (Canadian CompuScript- IMS Health) and kilograms of antimicrobials distributed in Canada in animals (Canadian Animal Health Institute).

What is New in the 2007 'Preliminary Results'

Antimicrobials Categorization

- No changes have been made to the Veterinary Drug Directorate antimicrobial categorization since November 30, 2006 (For more details see the website http://www.hc-sc.gc.ca/dhp-mps/consultation/vet/consultations/amr_ram_hum-med_e.html). This categorization (from I to IV) is based on the importance of antimicrobials in human medicine. All figures and tables representing individual AMR prevalence results are based on this categorization.

New data

- The province of British Columbia was added to the *Retail Meat Surveillance* component. Please note that in this province, retail meat samples have not been collected over a full year of sampling.
- Results from equine clinical isolates were added to the S*urveillance of Animal Clinical Isolates* section because of the level of antimicrobial resistance and the number of *Salmonella* that were received for that species in 2007.

Laboratory method changes

- *Enterococcus* plate: bacitracin (Category III) was removed, and tigecycline (Category I) added.
- In an effort to harmonise CIPARS results interpretation with the National Antimicrobial Resistance Monitoring System, new *Enterococcus* resistance breakpoints were adopted in 2007 for lincomycin (from ≥32 to ≥8 ug/ml), kanamycin (from ≥256 to ≥1024 ug/ml), and streptomycin (from >1000 to ≥1000 ug/ml). These changes had little or no impact on the proportion of resistant isolates, except for lincomycin where this change resulted in an increase of 15 to 20% of the resistance.
- In 2007, a new *Salmonella* recovery method was adopted for the Retail Meat Surveillance component which resulted in an important increase in recovery. Details regarding the impact of

[1] 2007 Data were extracted from dataset as of February 27th and March 13th 2008 for the the human and the agri-food isolates respectively.

this change are presented in the full 2006 CIPARS Annual Report. A description of this new recovery method will be presented in the Methods section of the full 2007 Annual report.

- For further information on our methodology, please consult the most recent CIPARS Annual Report at: http://www.phac-aspc.gc.ca/cipars-picra/index.html.

CIPARS Surveillance Components

Surveillance of Human Clinical Isolates

The *Surveillance of Human Clinical Isolates* component is designed to provide representative data on *Salmonella* isolates at the provincial level. All human *Salmonella* isolates received by the provincial public health laboratories in New Brunswick, Newfoundland, Nova Scotia, Manitoba, Prince Edward Island, and Saskatchewan are forwarded to the National Microbiology Laboratory of the Public Health Agency of Canada in Winnipeg, Manitoba. More populated provinces (Alberta, British Columbia, Ontario, and Québec) forward isolates received from the first to the 15th of each month. In addition, in 2007, all human isolates of *S*. Newport and *S*. Typhi were forwarded to the National Microbiology Laboratory because of concerns of emerging multidrug resistance and clinical importance respectively. Once we produced this document, only a subset of *Salmonella* isolates had been tested. The full annual report should include all isolates received in 2007.

Note: In Canada, while there are legislative requirements to report all new cases of salmonellosis to local and provincial public health authorities, forwarding of isolates from these cases by local laboratories is voluntary. When interpreting CIPARS data, it should be noted that most but not all isolates from reported cases are sent to provincial public health laboratories for reference testing. The total number of *Salmonella* isolates by serovar must be considered when interpreting the proportion of resistant isolates. Other limitations of surveillance data include disease under-diagnosing and under-reporting, which can lead to underestimating the true incidence of salmonellosis cases.

Abattoir Surveillance (chickens, swine, and beef cattle)

The *Abattoir Surveillance* component is designed to provide nationally representative antimicrobial resistance data from bacteria isolated from animals entering the food chain. Caecal contents (not carcass) from slaughtered food-producing animals are sampled to avoid misinterpretation related to cross-contamination and to better reflect the antimicrobial resistance at the farm level. All samples are shipped to the PHAC Laboratory for Foodborne Zoonoses (Saint-Hyacinthe) for microbiological analyses.

This program was initiated in September 2002 with sampling designed to target *Escherichia coli* and *Salmonella* from beef cattle, swine, and broiler chicken. *Salmonella* recovery from beef cattle was interrupted in 2003 due to low prevalence in this commodity. Program refinement in September 2005 included the addition of *Campylobacter* isolation from beef cattle.

Over 90% of all food-producing animals in Canada are slaughtered in federally inspected abattoirs. Forty-six federally inspected slaughter plants (24 poultry plants, 13 swine plants, and 9 beef cattle plants) from across Canada participated in the 2007 CIPARS abattoir component. The “beef cattle” dataset may include a small number of samples from dairy cattle, as a small number of plants slaughter both commodities, however veal is excluded.

Our collection periods are uniformly distributed over a 12-month course to avoid any potential seasonal bias in bacteria prevalence and antimicrobial susceptibility. Our sampling program is designed to yield approximately 150 isolates per targeted bacterial and animal species per year across Canada.

Retail Meat Surveillance (chicken, pork, and beef)

The objective of our *Retail Meat Surveillance* component is to examine antimicrobial resistance of select bacteria found in raw meat at the retail level. Retail sampling provides a measure of human exposure to antimicrobial resistant bacteria via undercooked meat consumption or cross-contamination with raw food products. In 2007, we collected samples in British Columbia, Saskatchewan, Ontario, and Québec.

We are interested in bacterial isolates cultured from specific meat products commonly consumed by Canadians such as poultry (chicken legs or wings), pork (chops), and beef (ground beef). These meat selection mirrors the animal productions studied in the *Abattoir Surveillance* component of our program. For ground beef, we systematically select samples from extra lean, lean, medium and regular ground beef to reflect the heterogeneity of this product in terms of the commodity combinations of fed beef and cull dairy, and the domestic vs. imported meat content.

The bacteria of interest in poultry are *Campylobacter*, *Salmonella*, *Enterococcus*, and *E. coli*. In pork and beef we only perform antimicrobial resistance test on *E. coli*[2], since there is a low prevalence of *Campylobacter* and *Salmonella* (less than three percent each) at retail in these commodities, as determined during the early phase of the program.

The sampling protocol involves continuous weekly sample submissions from randomly selected census divisions, weighted by population, in each of the selected provinces. Using prevalence estimates from the previous year, our sampling protocols are designed to yield approximately 100 isolates per commodity per province per year, plus 20% for lost or damaged samples.

Note: We did not collect 100 *Salmonella* isolates for retail chicken in 2007 in the provinces of British Columbia and Saskatchewan as resources to expand our sampling capacity were not available at this point in time, and sampling did not occur through the year in British Columbia.

Surveillance of Animal Clinical Isolates (chickens, swine, bovine, turkeys, and equine)

The *Surveillance of Animal Clinical Salmonella Isolates* component originates primarily from veterinary diagnostic submissions collected by veterinarians and/or producers. These isolates are sent by provincial animal health laboratories across the country to the *Salmonella* Typing Laboratory at the Laboratory for Foodborne Zoonoses (Guelph, Ontario), where they are serotyped, susceptibility tested, and in some cases, phagetyped. Isolates from Québec are serotyped by the Laboratoire d'épidémiosurveillance animale du Québec before being shipped to the *Salmonella* Typing Laboratory of Guelph where they are phagetyped when appropriate, and tested for AMR.

Note: The number of submissions varies considerably between provinces. Unlike our *Surveillance of Human Clinical Isolates* program, all isolates received by provincial animal health laboratories may not necessarily be forwarded to the Laboratory for Foodborne Zoonoses of Guelph, with the exception of the provinces of Ontario and Québec. Most samples are obtained from diseased animals and sample submissions may have followed therapeutic failure. Generally, these animals do not enter the food chain. Despite the fact that contamination through direct contact with a diseased animal is possible, we assume that this risk is lower at the national level than exposure through contaminated food. For these reasons, estimates from these animal isolates are judged not appropriate for evaluating general human exposure to antimicrobial resistance. Information from these animal isolates is however valuable for detecting emerging resistance, identifying new multidrug resistance patterns, and assessing the occurrence of resistance in sick animals.

[2] We perform *Salmonella* recovery tests from retail pork to obtain a prevalence estimate of contamination, but due to the small number of isolates recovered annually, we do not report AMR in *Salmonella* isolated from pork.

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Humans

Salmonella

Salmonella Enteritidis

(n=494)

Table 1. Antimicrobial drug resistance observed in human *Salmonella* Enteritidis isolates (N=494) across provinces; *Surveillance of Human Clinical Isolates*, 2007.

	Antimicrobial	BC N=66 n (%)	AB N=86 n (%)	SK N=21 n (%)	MB N=35 n (%)	ON N=187 n (%)	QC N=53 n (%)	NB N=21 n (%)	NS N=17 n (%)	PEI N=4 n (%)	NL N=4 n (%)	Canada %
I	amoxicillin-clavulanic acid	0 (0)	0 (0)	0 (0)	0 (0)	1 (1)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	<1
	ceftiofur	0 (0)	0 (0)	0 (0)	0 (0)	1 (1)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	<1
	ceftriaxone	0 (0)	0 (0)	0 (0)	0 (0)	1 (1)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	<1
	ciprofloxacin	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0
II	amikacin	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0
	ampicillin	2 (3)	2 (2)	1 (5)	0 (0)	4 (2)	0 (0)	1 (5)	1 (6)	0 (0)	0 (0)	2
	cefoxitin	0 (0)	0 (0)	0 (0)	0 (0)	1 (1)	1 (2)	0 (0)	0 (0)	0 (0)	0 (0)	<1
	gentamicin	1 (2)	1 (1)	0 (0)	0 (0)	0 (0)	2 (4)	0 (0)	0 (0)	0 (0)	0 (0)	<1
	kanamycin	1 (2)	0 (0)	0 (0)	0 (0)	0 (0)	2 (4)	0 (0)	0 (0)	0 (0)	0 (0)	<1
	nalidixic acid	16 (24)	19 (22)	4 (19)	6 (17)	34 (18)	15 (28)	8 (38)	8 (47)	2 (50)	0 (0)	23
	streptomycin	1 (2)	1 (1)	1 (5)	0 (0)	0 (0)	2 (4)	0 (0)	0 (0)	0 (0)	0 (0)	1
	trimethoprim-sulfamethoxazole	0 (0)	2 (2)	1 (5)	1 (3)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	<1
III	chloramphenicol	1 (2)	0 (0)	1 (5)	0 (0)	1 (1)	1 (2)	0 (0)	0 (0)	0 (0)	0 (0)	<1
	sulfisoxazole	2 (3)	2 (2)	1 (5)	1 (3)	1 (1)	2 (4)	0 (0)	0 (0)	0 (0)	0 (0)	2
	tetracycline	7 (11)	13 (15)	0 (0)	0 (0)	14 (7)	5 (9)	7 (33)	7 (41)	1 (25)	0 (0)	11
IV												

Note: Estimated percentage for Canada was corrected for non-proportional submission scheme between provinces (see Methods section of the most recent CIPARS Annual Report).

Salmonella Heidelberg

(n=120)

Table 2.Antimicrobial drug resistance observed in human *Salmonella* Heidelberg isolates (n=120) across provinces; *Surveillance of Human Clinical Isolates*, 2007.

	Antimicrobial	BC N=5 n (%)	AB N=12 n (%)	SK N=5 n (%)	MB N=12 n (%)	ON N=40 n (%)	QC N=25 n (%)	NB N=16 n (%)	NS N=3 n (%)	PEI N=1 n (%)	NL N=1 n (%)	Canada %
I	amoxicillin-clavulanic acid	1 (20)	3 (25)	0 (0)	0 (0)	3 (8)	1 (4)	0 (0)	0 (0)	1 (100)	1 (100)	9
	ceftiofur	1 (20)	3 (25)	0 (0)	0 (0)	3 (8)	1 (4)	0 (0)	0 (0)	1 (100)	1 (100)	9
	ceftriaxone	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0
	ciprofloxacin	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0
II	amikacin	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0
	ampicillin	1 (20)	3 (25)	2 (40)	0 (0)	9 (23)	9 (36)	3 (19)	0 (0)	1 (100)	1 (100)	25
	cefoxitin	1 (20)	3 (25)	0 (0)	0 (0)	3 (8)	1 (4)	0 (0)	0 (0)	1 (100)	1 (100)	9
	gentamicin	0 (0)	0 (0)	0 (0)	0 (0)	1 (3)	1 (4)	0 (0)	0 (0)	0 (0)	0 (0)	2
	kanamycin	0 (0)	0 (0)	0 (0)	0 (0)	1 (3)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	<1
	nalidixic acid	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0
	streptomycin	0 (0)	1 (8)	0 (0)	7 (58)	4 (10)	4 (16)	1 (6)	0 (0)	0 (0)	0 (0)	13
	trimethoprim-sulfamethoxazole	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	2 (13)	0 (0)	0 (0)	0 (0)	<1
III	chloramphenicol	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0
	sulfisoxazole	0 (0)	0 (0)	0 (0)	8 (67)	1 (3)	1 (4)	0 (0)	0 (0)	0 (0)	0 (0)	6
	tetracycline	2 (40)	1 (8)	1 (20)	0 (0)	2 (5)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	5
IV												

Note:Estimated percentage for Canada was corrected for non-proportional submission scheme between provinces (see Methods section of the most recent CIPARS Annual Report).

Salmonella Newport

(n=44)

Table 3. Antimicrobial drug resistance observed in human *Salmonella* Newport isolates (n=44) across provinces; *Surveillance of Human Clinical Isolates*, 2007.

	Antimicrobial	BC N=7 n (%)	AB N=6 n (%)	SK N=2 n (%)	MB N=2 n (%)	ON N=23 n (%)	QC N=3 n (%)	NB N=1 n (%)	NS N=0 n (%)	PEI N=0 n (%)	NL N=0 n (%)	Canada %
I	amoxicillin-clavulanic acid	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)				0
	ceftiofur	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)				0
	ceftriaxone	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)				0
	ciprofloxacin	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)				0
II	amikacin	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)				0
	ampicillin	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)				0
	cefoxitin	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)				0
	gentamicin	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)				0
	kanamycin	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)				0
	nalidixic acid	0 (0)	0 (0)	0 (0)	0 (0)	1 (4)	0 (0)	0 (0)				2
	streptomycin	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)				0
	trimethoprim-sulfamethoxazole	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)				0
III	chloramphenicol	1 (14)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)				2
	sulfisoxazole	0 (0)	0 (0)	1 (50)	0 (0)	2 (9)	0 (0)	0 (0)				7
	tetracycline	1 (14)	0 (0)	0 (0)	0 (0)	1 (4)	1 (33)	0 (0)				7
IV												

Salmonella Paratyphi A and B

(n=10)

Table 4. Antimicrobial drug resistance observed in human *Salmonella* Paratyphi A and B isolates (n=10) across provinces; Surveillance of Human Clinical Isolates, 2007.

	Antimicrobial	BC N=0 n (%)	AB N=3 n (%)	SK N=0 n (%)	MB N=0 n (%)	ON N=4 n (%)	QC N=3 n (%)	NB N=0 n (%)	NS N=0 n (%)	PEI N=0 n (%)	NL N=0 n (%)	Canada %
I	amoxicillin-clavulanic acid	0 (0)	0 (0)			0 (0)	0 (0)					0
	ceftiofur	0 (0)	0 (0)			0 (0)	0 (0)					0
	ceftriaxone	0 (0)	0 (0)			0 (0)	0 (0)					0
	ciprofloxacin	0 (0)	0 (0)			0 (0)	0 (0)					0
II	amikacin	0 (0)	0 (0)			0 (0)	0 (0)					0
	ampicillin	0 (0)	0 (0)			0 (0)	1 (33)					10
	cefoxitin	0 (0)	0 (0)			0 (0)	0 (0)					0
	gentamicin	0 (0)	0 (0)			0 (0)	0 (0)					0
	kanamycin	0 (0)	0 (0)			0 (0)	0 (0)					0
	nalidixic acid	0 (0)	2 (67)			3 (75)	0 (0)					50
	streptomycin	0 (0)	0 (0)			0 (0)	1 (33)					10
	trimethoprim-sulfamethoxazole	0 (0)	0 (0)			0 (0)	0 (0)					0
III	chloramphenicol	0 (0)	0 (0)			0 (0)	1 (33)					10
	sulfisoxazole	0 (0)	0 (0)			0 (0)	1 (33)					10
	tetracycline	0 (0)	0 (0)			0 (0)	1 (33)					10
IV												

Note: Estimated percentage for Canada was corrected for non-proportional submission scheme between provinces (see Methods section of the most recent CIPARS Annual Report).

Salmonella Typhi

(n=79)

Table 5. Antimicrobial drug resistance observed in human *Salmonella* Typhi isolates (n=79) across provinces; *Surveillance of Human Clinical Isolates*, 2007.

	Antimicrobial	BC N=23 n (%)	AB N=9 n (%)	SK N=0 n (%)	MB N=1 n (%)	ON N=37 n (%)	QC N=9 n (%)	NB N=0 n (%)	NS N=0 n (%)	PEI N=0 n (%)	NL N=0 n (%)	Canada %
I	amoxicillin-clavulanic acid	0 (0)	0 (0)		0 (0)	0 (0)	0 (0)					0
I	ceftiofur	0 (0)	0 (0)		0 (0)	0 (0)	0 (0)					0
I	ceftriaxone	0 (0)	0 (0)		0 (0)	0 (0)	0 (0)					0
I	ciprofloxacin	0 (0)	0 (0)		0 (0)	1 (3)	0 (0)					1
II	amikacin	0 (0)	0 (0)		0 (0)	0 (0)	0 (0)					0
II	ampicillin	1 (4)	0 (0)		0 (0)	5 (14)	3 (33)					11
II	cefoxitin	0 (0)	0 (0)		0 (0)	0 (0)	0 (0)					0
II	gentamicin	0 (0)	0 (0)		0 (0)	0 (0)	0 (0)					0
II	kanamycin	0 (0)	0 (0)		0 (0)	0 (0)	0 (0)					0
II	nalidixic acid	22 (96)	7 (78)		1 (100)	29 (78)	6 (67)					82
II	streptomycin	1 (4)	0 (0)		0 (0)	5 (14)	3 (33)					11
II	trimethoprim-sulfamethoxazole	1 (4)	0 (0)		0 (0)	5 (14)	3 (33)					11
III	chloramphenicol	1 (4)	0 (0)		0 (0)	5 (14)	3 (33)					11
III	sulfisoxazole	2 (9)	0 (0)		0 (0)	6 (16)	3 (33)					14
III	tetracycline	2 (9)	0 (0)		0 (0)	3 (8)	1 (11)					8
IV												

Salmonella Typhimurium

(n=262)

Table 6. Antimicrobial drug resistance observed in human *Salmonella* Typhimurium isolates (n=262) across provinces; *Surveillance of Human Clinical Isolates*, 2007.

	Antimicrobial	BC N=21 n (%)	AB N=23 n (%)	SK N=9 n (%)	MB N=12 n (%)	ON N=151 n (%)	QC N=33 n (%)	NB N=5 n (%)	NS N=5 n (%)	PEI N=1 n (%)	NL N=2 n (%)	Canada %
I	amoxicillin-clavulanic acid	1 (5)	0 (0)	0 (0)	0 (0)	1 (1)	1 (3)	0 (0)	1 (20)	0 (0)	1 (50)	2
	ceftiofur	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (3)	0 (0)	0 (0)	0 (0)	1 (50)	<1
	ceftriaxon	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0
	ciprofloxacin	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (20)	0 (0)	0 (0)	<1
II	amikacin	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0
	ampicillin	7 (33)	5 (22)	3 (33)	2 (17)	26 (17)	9 (26)	2 (40)	1 (20)	0 (0)	1 (50)	21
	cefoxitin	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (3)	0 (0)	0 (0)	0 (0)	1 (50)	<1
	gentamicin	1 (5)	0 (0)	0 (0)	0 (0)	3 (2)	1 (3)	0 (0)	1 (20)	0 (0)	0 (0)	2
	kanamycin	2 (10)	8 (35)	0 (0)	0 (0)	2 (1)	5 (15)	0 (0)	0 (0)	0 (0)	0 (0)	7
	nalidixic acid	2 (10)	0 (0)	1 (11)	0 (0)	5 (3)	2 (6)	0 (0)	2 (40)	0 (0)	0 (0)	4
	streptomycin	9 (43)	14 (61)	3 (33)	3 (25)	27 (18)	6 (18)	1 (20)	1 (20)	0 (0)	0 (0)	24
	trimethoprim-sulfamethoxazole	2 (10)	0 (0)	0 (0)	1 (8)	7 (5)	1 (3)	1 (20)	1 (20)	0 (0)	1 (50)	5
III	chloramphenicol	6 (29)	3 (13)	2 (22)	2 (17)	19 (13)	6 (18)	1 (20)	1 (20)	0 (0)	0 (0)	15
	sulfisoxazole	9 (43)	14 (61)	3 (33)	4 (33)	32 (21)	10 (29)	2 (40)	3 (60)	0 (0)	1 (50)	29
	tetracycline	10 (48)	7 (30)	2 (22)	5 (42)	35 (23)	14 (42)	2 (40)	1 (20)	0 (0)	0 (0)	29
IV												

Note:Estimated percentage for Canada was corrected for non-proportional submission scheme between provinces (see Methods section of the most recent CIPARS Annual Report).

Other *Salmonella* Serovars

(n=306)

Table 7. Antimicrobial drug resistance observed in other human of *Salmonella* serovars (n=306) across provinces; *Surveillance of Human Clinical Isolates*, 2007.

	Antimicrobial	BC N=31	AB N=51	SK N=11	MB N=24	ON N=121	QC N=37	NB N=17	NS N=5	PEI N=1	NL N=8	Canada
		n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	%
I	amoxicillin-clavulanic acid	1 (3)	1 (2)	0 (0)	0 (0)	5 (4)	1 (3)	0 (0)	0 (0)	0 (0)	0 (0)	3
	ceftiofur	0 (0)	1 (2)	0 (0)	0 (0)	4 (3)	1 (3)	0 (0)	0 (0)	0 (0)	0 (0)	2
	ceftriaxone	0 (0)	0 (0)	0 (0)	0 (0)	1 (1)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	<1
	ciprofloxacin	0 (0)	0 (0)	0 (0)	0 (0)	1 (1)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	<1
II	amikacin	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0
	ampicillin	2 (6)	3 (6)	2 (18)	2 (8)	8 (7)	2 (5)	2 (12)	1 (20)	0 (0)	0 (0)	7
	cefoxitin	0 (0)	1 (2)	0 (0)	0 (0)	4 (3)	1 (3)	0 (0)	0 (0)	0 (0)	0 (0)	2
	gentamicin	0 (0)	0 (0)	1 (9)	0 (0)	1 (1)	0 (0)	1 (6)	0 (0)	0 (0)	0 (0)	<1
	kanamycin	0 (0)	0 (0)	1 (9)	1 (4)	2 (2)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1
	nalidixic acid	1 (3)	3 (6)	1 (9)	2 (8)	5 (4)	0 (0)	2 (12)	0 (0)	0 (0)	1 (13)	4
	streptomycin	4 (13)	5 (10)	2 (18)	3 (13)	9 (7)	3 (8)	2 (12)	1 (20)	0 (0)	0 (0)	9
	trimethoprim-sulfamethoxazole	0 (0)	1 (2)	1 (9)	3 (13)	3 (2)	1 (3)	2 (12)	0 (0)	0 (0)	0 (0)	3
III	chloramphenicol	0 (0)	1 (2)	1 (9)	3 (13)	0 (0)	0 (0)	1 (6)	1 (20)	0 (0)	1 (13)	2
	sulfisoxazole	3 (10)	6 (12)	2 (18)	3 (13)	5 (4)	2 (5)	3 (18)	1 (20)	0 (0)	1 (13)	8
	tetracycline	8 (26)	6 (12)	2 (18)	7 (29)	23 (19)	6 (16)	5 (29)	2 (40)	0 (0)	1 (13)	19
IV												

Note:Estimated percentage for Canada was corrected for non-proportional submission scheme between provinces (see Methods section of the most recent CIPARS Annual Report).

Table 8. Number of antimicrobials in resistance pattern of the most frequent human *Salmonella* serovars across provinces; *Surveillance of Human Clinical Isolates*, 2007.

Serovar	n (%total)	Number of antimicrobials in resistance pattern			
		0	1-4	5-8	9-16
		Number of isolates			
British Columbia					
Enteritidis	66 (43.1)	50	14	2	0
Typhi	23 (15)	1	21	1	0
Typhimurium	21 (13.7)	9	5	7	0
Newport	7 (4.6)	6	1	0	0
Hadar	6 (3.9)	1	5	0	0
Heidelberg	5 (3.3)	2	3	0	0
I 4,5,12:i:-	4 (2.6)	4	0	0	0
Oranienburg	4 (2.6)	4	0	0	0
Less frequent serovars	17 (11.1)	13	3	1	0
Total	**153 (100)**	**90**	**52**	**11**	**0**
Alberta					
Enteritidis	86 (45.3)	66	19	1	0
Typhimurium	23 (12.1)	8	12	3	0
Heidelberg	12 (6.3)	7	5	0	0
Oranienburg	12 (6.3)	12	0	0	0
Typhi	9 (4.7)	2	7	0	0
Newport	6 (3.2)	6	0	0	0
Paratyphi B var. L(+) tartrate +	5 (2.6)	3	2	0	0
I 4,5,12:i:-	4 (2.1)	3	1	0	0
Less frequent serovars	33 (17.4)	22	11	0	0
Total	**190 (100)**	**129**	**57**	**4**	**0**
Saskatchewan					
Enteritidis	21 (43.8)	17	3	1	0
Typhimurium	9 (18.8)	4	3	2	0
Heidelberg	5 (10.4)	2	3	0	0
Paratyphi B var. L(+) tartrate +	5 (10.4)	5	0	0	0
Newport	2 (4.2)	1	1	0	0
Saintpaul	2 (4.2)	2	0	0	0
Choleraesuis	1 (2.1)	0	0	0	1
I 4,5,12:i:-	1 (2.1)	0	1	0	0
Infantis	1 (2.1)	1	0	0	0
Oranienburg	1 (2.1)	1	0	0	0
Total	**48 (100)**	**33**	**11**	**3**	**1**
Manitoba					
Enteritidis	35 (40.7)	28	7	0	0
Heidelberg	12 (14)	4	8	0	0
Typhimurium	12 (14)	7	3	2	0
Hadar	3 (3.5)	0	3	0	0
Oranienburg	3 (3.5)	3	0	0	0
Newport	2 (2.3)	2	0	0	0
Saintpaul	2 (2.3)	0	0	2	0
Less frequent serovars	17 (19.8)	13	3	1	0
Total	**86 (100)**	**57**	**24**	**5**	**0**

Note: Serovars with less than 2% prevalence within province are classified as ‘Less frequent serovars’.

Table 8 (continued). Number of antimicrobials in resistance pattern of the most frequent human *Salmonella* serovars across provinces; *Surveillance of Human Clinical Isolates*, 2007.

Serovar	n (%total)	Number of antimicrobials in resistance pattern			
		0	1-4	5-8	9-16
		Number of isolates			
Ontario					
Enteritidis	187 (33.2)	149	38	0	0
Typhimurium	151 (26.8)	108	26	17	0
Heidelberg	40 (7.1)	28	12	0	0
Typhi	37 (6.6)	6	26	5	0
Newport	23 (4.1)	20	3	0	0
Oranienburg	17 (3)	16	1	0	0
Hadar	14 (2.5)	0	14	0	0
Infantis	12 (2.1)	9	3	0	0
Thompson	12 (2.1)	12	0	0	0
Less frequent serovars	70 (12.4)	53	16	1	0
Total	**563 (100)**	**401**	**139**	**23**	**0**
Québec					
Enteritidis	53 (32.3)	34	17	2	0
Typhimurium	34 (20.7)	18	10	6	0
Heidelberg	25 (15.2)	15	10	0	0
Typhi	9 (5.5)	3	3	3	0
Infantis	7 (4.3)	6	1	0	0
I 4,5,12:i:-	5 (3)	3	1	1	0
Hadar	4 (2.4)	0	4	0	0
Less frequent serovars	27 (16.5)	24	2	1	0
Total	**164 (100)**	**103**	**48**	**13**	**0**
New Brunswick					
Enteritidis	21 (35)	13	8	0	0
Heidelberg	16 (26.7)	13	3	0	0
Typhimurium	5 (8.3)	3	1	1	0
Saintpaul	4 (6.7)	3	1	0	0
Agona	2 (3.3)	2	0	0	0
Javiana	2 (3.3)	2	0	0	0
Muenchen	2 (3.3)	0	2	0	0
Less frequent serovars	8 (13.3)	5	1	2	0
Total	**60 (100)**	**41**	**16**	**3**	**0**
Nova Scotia					
Enteritidis	17 (56.7)	8	9	0	0
Typhimurium	5 (16.7)	1	3	0	1
Heidelberg	3 (10)	3	0	0	0
I 4,12:i:-	1 (3.3)	1	0	0	0
I OR:z38:-	1 (3.3)	0	1	0	0
Paratyphi B var. L(+) tartrate+	1 (3.3)	0	0	1	0
Poona	1 (3.3)	1	0	0	0
Senftenberg	1 (3.3)	1	0	0	0
Total	**30 (100)**	**15**	**13**	**1**	**1**
Prince Edward Island					
Enteritidis	4 (57.1)	2	2	0	0
Heidelberg	1 (14.3)	0	1	0	0
Infantis	1 (14.3)	1	0	0	0
Typhimurium	1 (14.3)	1	0	0	0
Total	**7 (100)**	**4**	**3**	**0**	**0**

Note: Serovars with less than 2% prevalence within province are classified as ‘Less frequent serovars’.

Table 8 (continued). Number of antimicrobials in resistance pattern of the most frequent human *Salmonella* serovars across provinces; *Surveillance of Human Clinical Isolates*, 2007.

Serovar	n (%total)	Number of antimicrobials in resistance pattern			
		0	1-4	5-8	9-16
		Number of isolates			
Newfoundland and Labrador					
Enteritidis	4 (26.7)	4	0	0	0
Saintpaul	3 (20)	2	1	0	0
Oranienburg	2 (13.3)	2	0	0	0
Typhimurium	2 (13.3)	1	0	1	0
Heidelberg	1 (6.7)	0	1	0	0
I 4,5,12:d:-	1 (6.7)	1	0	0	0
Infantis	1 (6.7)	1	0	0	0
Schwarzengrund	1 (6.7)	1	0	0	0
Total	**15 (100)**	**12**	**2**	**1**	**0**
Canada total	**1316 (100)**	**885**	**365**	**64**	**2**

Note: Serovars with less than 2% prevalence within province are classified as 'Less frequent serovars'.

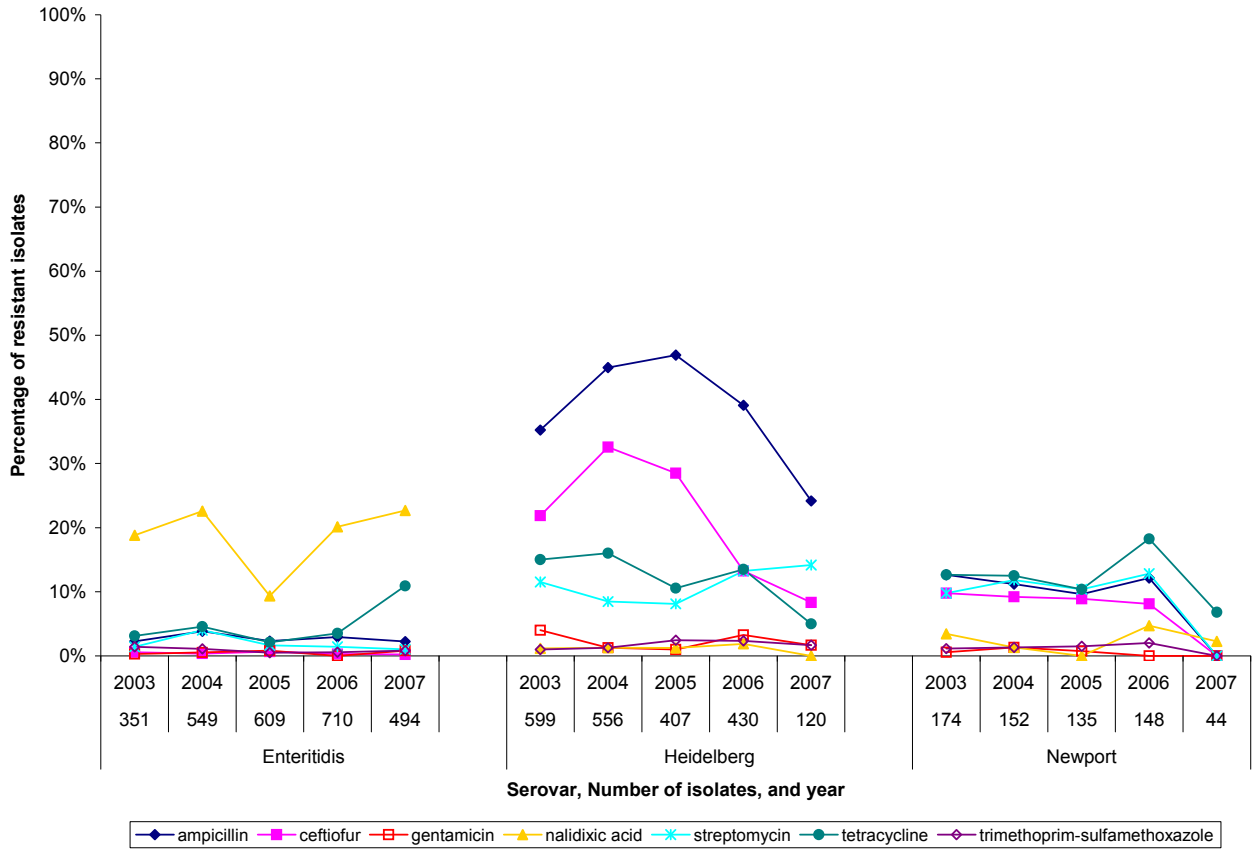
Table 9. Details regarding age and province distribution of human *Salmonella* isolates; *Surveillance of Human Clinical Isolates*, 2007.

Age distribution n/N (%)	Province n/N (%)
Less than 5 years: 137/1316 (10%)	Alberta: 190/1316 (14%)
5 to 12 years: 121/1316 (9%)	British Columbia: 153/1316 (12%)
13 to 17 years: 72/1316 (5%)	Manitoba: 86/1316 (7%)
18 to 29 years: 241/1316 (18%)	New Brunswick: 60/1316 (5%)
30 to 49 years: 321/1316 (24%)	Newfoundland and Labrador: 15/1316 (1%)
50 to 69 years: 222/1316 (17%)	Nova Scotia: 30/1316 (2%)
70+ years: 106/1316 (8%)	Ontario: 563/1316 (43%)
N/A: 96/1316 (7%)	Prince Edward Island: 7/1316 (<1%)
	Québec: 164/1316 (13%)
	Saskatchewan: 48/1316 (4%)

Table 10. Details regarding specimen source of the human *Salmonella* serovars; *Surveillance of Human Clinical Isolates*, 2007.

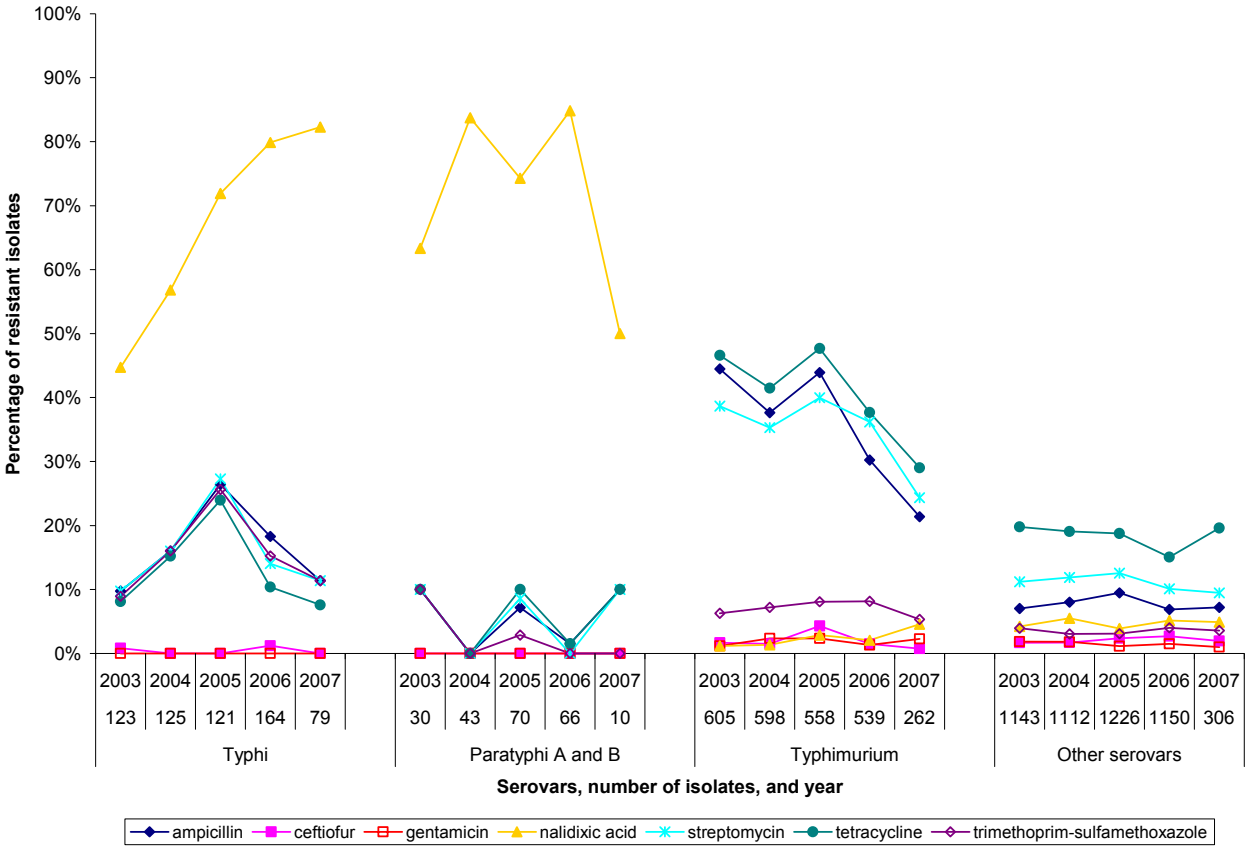
Specimen Source	Enteritidis N=494 n (%)	Heidelberg N=120 n (%)	Newport N=44 n (%)	Paratyphi A and B N=10 n (%)	Typhi N=79 n (%)	Typhimurium N=263 n (%)	Other serovars N=306 n (%)	Total N=1316 n (%)
Stool	365 (74)	84 (70)	30 (68)	5 (50)	13 (16)	218 (83)	204 (67)	919 (70)
Blood	14 (3)	10 (8)		5 (50)	42 (53)	8 (3)	7 (2)	86 (7)
Urine	9 (2)	3 (3)	4 (9)		1 (1)	5 (2)	19 (6)	41 (3)
Abscess								0 (0)
Anatomy			1 (<1)		1 (1)		1 (<1)	3 (<1)
Fluid					1 (1)			1 (<1)
Unknown	106 (21)	23 (19)	9 (20)		21 (27)	32 (12)	75 (25)	266 (20)

Figure 1. Temporal variation of the resistance observed to selected antimicrobials in human *S.* Enteritidis, *S.* Heidelberg, and *S.* Newport serovars; *Surveillance of Human Clinical Isolates*, 2003-2007.



Note: 2007 data are incomplete.

Figure 2. Temporal variation of the resistance observed to selected antimicrobials in human *S.* Paratyphi A and B, *S.* Typhi , *S.* Typhimurium, and Other *Salmonella* serovars; *Surveillance of Human Clinical Isolates*, 2003-2007.



Note: 2007 data are incomplete.

Agri-Food Sector

Chickens

Salmonella

Abattoir Surveillance

(n=202)

Figure 3. Antimicrobial drug resistance observed in chicken *Salmonella* isolates; *Abattoir Surveillance*, 2007.

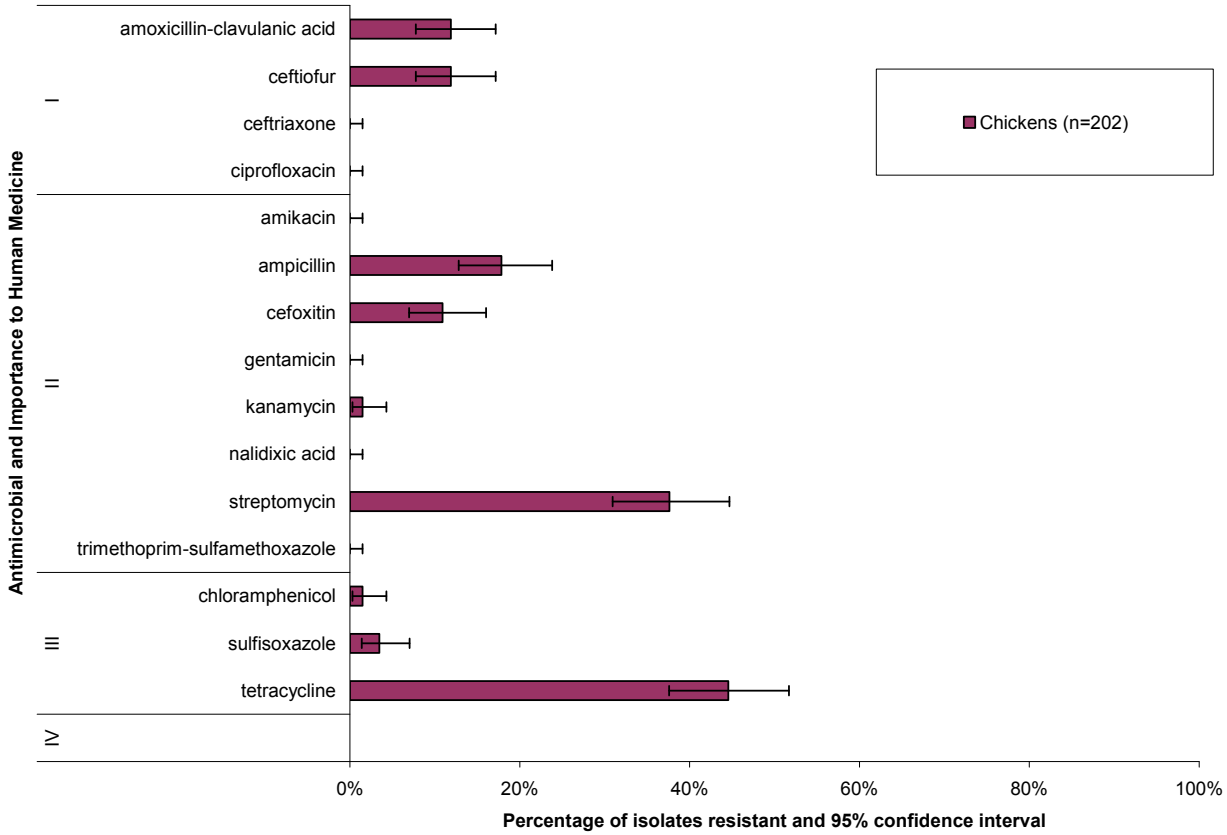
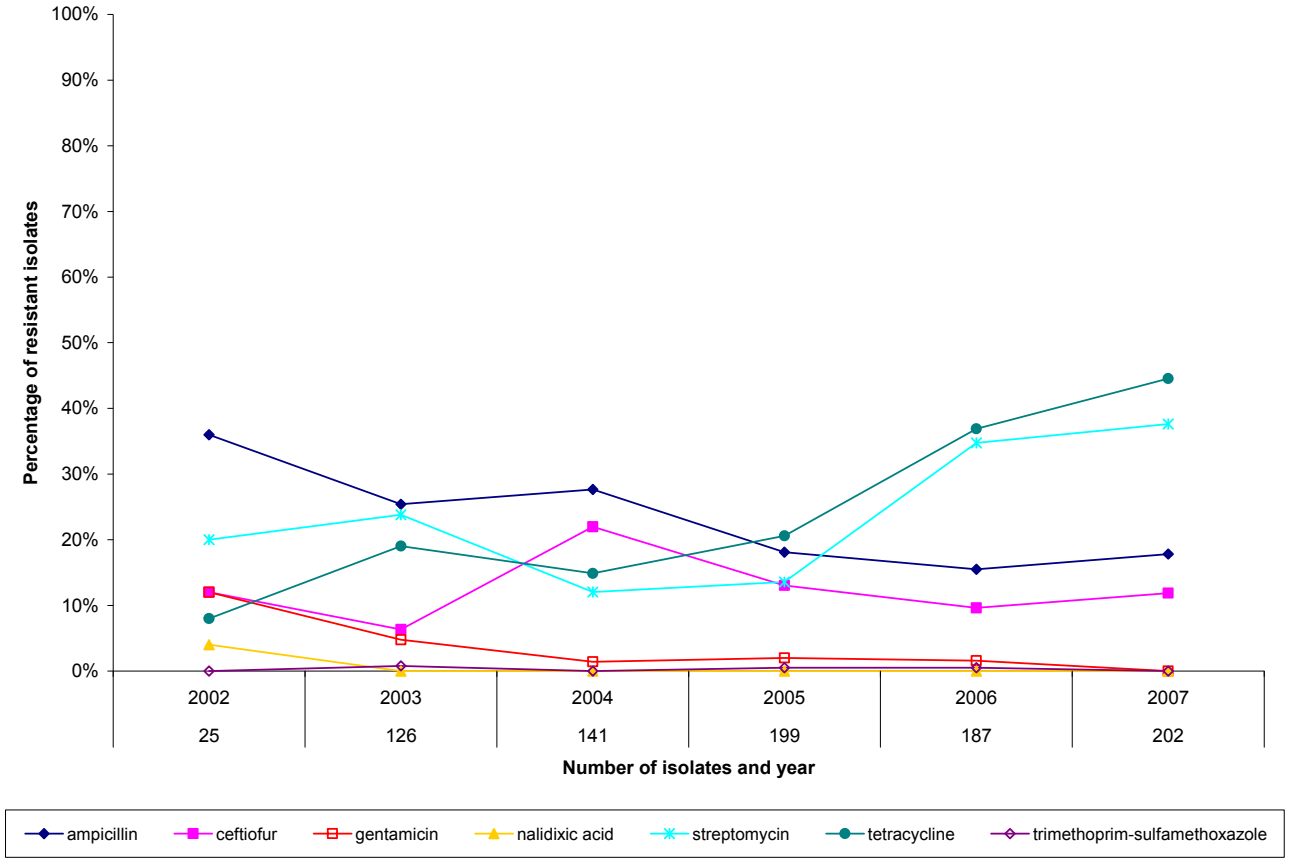


Table 11. Number of antimicrobials in resistance pattern of the most frequent chicken *Salmonella* serovars; *Abattoir Surveillance*, 2007.

Serovar	n (%total)	Number of antimicrobials in resistance pattern			
		0	1-4	5-8	9-16
		Number of isolates			
Kentucky	87 (43.1)	21	55	11	0
Heidelberg	36 (17.8)	22	14	0	0
Enteritidis	20 (9.9)	19	1	0	0
Hadar	10 (5)	1	9	0	0
I 4:i:-	7 (3.5)	3	4	0	0
Kiambu	6 (3)	4	2	0	0
Typhimurium	6 (3)	3	1	2	0
Less frequent serovars	30 (14.9)	19	10	1	0
Total	**202 (100)**	**92**	**96**	**14**	**0**

Note: Serovars with less than 2% prevalence are classified as 'Less frequent serovars'.

Figure 4. Temporal variation of the resistance observed to selected antimicrobials of chicken *Salmonella* isolates; *Abattoir Surveillance*, 2002-2007.



Retail Surveillance

(N=346; British Columbia n=18, Saskatchewan n=43; Ontario n=172; Québec n=113)

Figure 5. Individual antimicrobial drug resistance in chicken *Salmonella* isolates from British Columbia, Saskatchewan, Ontario, and Québec; *Retail Meat Surveillance*, 2007.

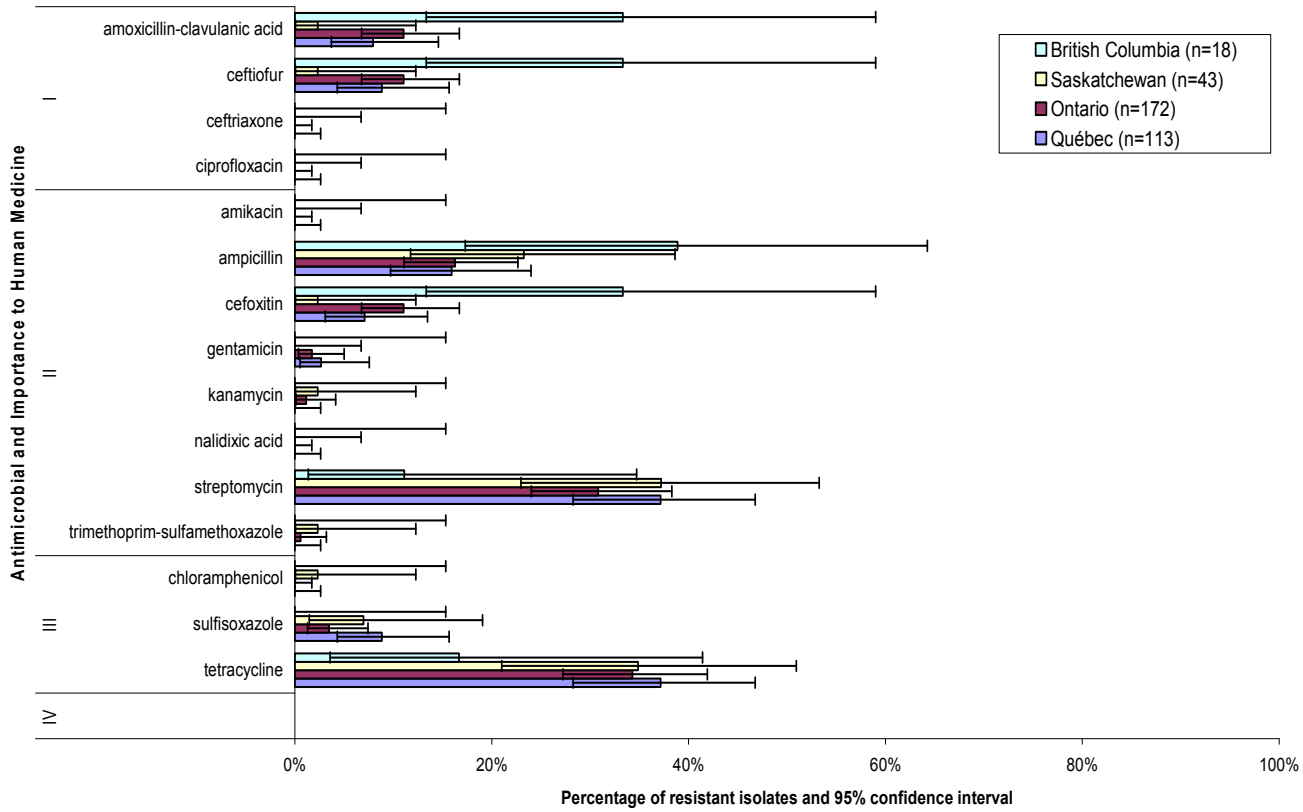


Table 12. Number of antimicrobials in resistance patterns of the most frequent chicken *Salmonella* serovars from British Columbia, Saskatchewan, Ontario, and Québec; *Retail Meat Surveillance*, 2007.

Serovar	n (%total)	Number of antimicrobials in resistance pattern			
		0	1-4	5-8	9-16
		Number of isolates			
British Columbia					
Heidelberg	4 (22.2)	1	3	0	0
Kentucky	4 (22.2)	1	2	1	0
Brandenburg	2 (11.1)	2	0	0	0
Hadar	1 (5.6)	0	1	0	0
I 4:l,v:-	1 (5.6)	1	0	0	0
I 4:r:-	1 (5.6)	0	1	0	0
I 6,7,14:k:-	1 (5.6)	1	0	0	0
Montevideo	1 (5.6)	1	0	0	0
Rissen	1 (5.6)	0	1	0	0
Schwarzengrund	1 (5.6)	1	0	0	0
Thompson	1 (5.6)	1	0	0	0
Total	**18 (100)**	**9**	**8**	**1**	**0**
Saskatchewan					
Heidelberg	9 (20.9)	2	7	0	0
Hadar	8 (18.6)	1	7	0	0
Kentucky	6 (14)	2	4	0	0
Infantis	3 (7)	3	0	0	0
Typhimurium	3 (7)	2	0	1	0
Berta	2 (4.7)	1	1	0	0
Enteritidis	2 (4.7)	2	0	0	0
Agona	1 (2.3)	1	0	0	0
Alachua	1 (2.3)	1	0	0	0
Albany	1 (2.3)	1	0	0	0
I 4:i:-	1 (2.3)	0	1	0	0
I 6,7,14:-:5	1 (2.3)	1	0	0	0
Kiambu	1 (2.3)	0	1	0	0
Mbandaka	1 (2.3)	0	1	0	0
Orion	1 (2.3)	0	1	0	0
Schwarzengrund	1 (2.3)	1	0	0	0
Thompson	1 (2.3)	1	0	0	0
Total	**43 (100)**	**19**	**23**	**1**	**0**
Ontario					
Kentucky	70 (40.7)	20	46	4	0
Heidelberg	42 (24.4)	27	15	0	0
Enteritidis	10 (5.8)	10	0	0	0
Kiambu	10 (5.8)	6	4	0	0
Hadar	8 (4.7)	0	8	0	0
I 4:i:-	5 (2.9)	3	2	0	0
Typhimurium	5 (2.9)	5	0	0	0
Less frequent serovars	22 (12.8)	15	7	0	0
Total	**172 (100)**	**86**	**82**	**4**	**0**

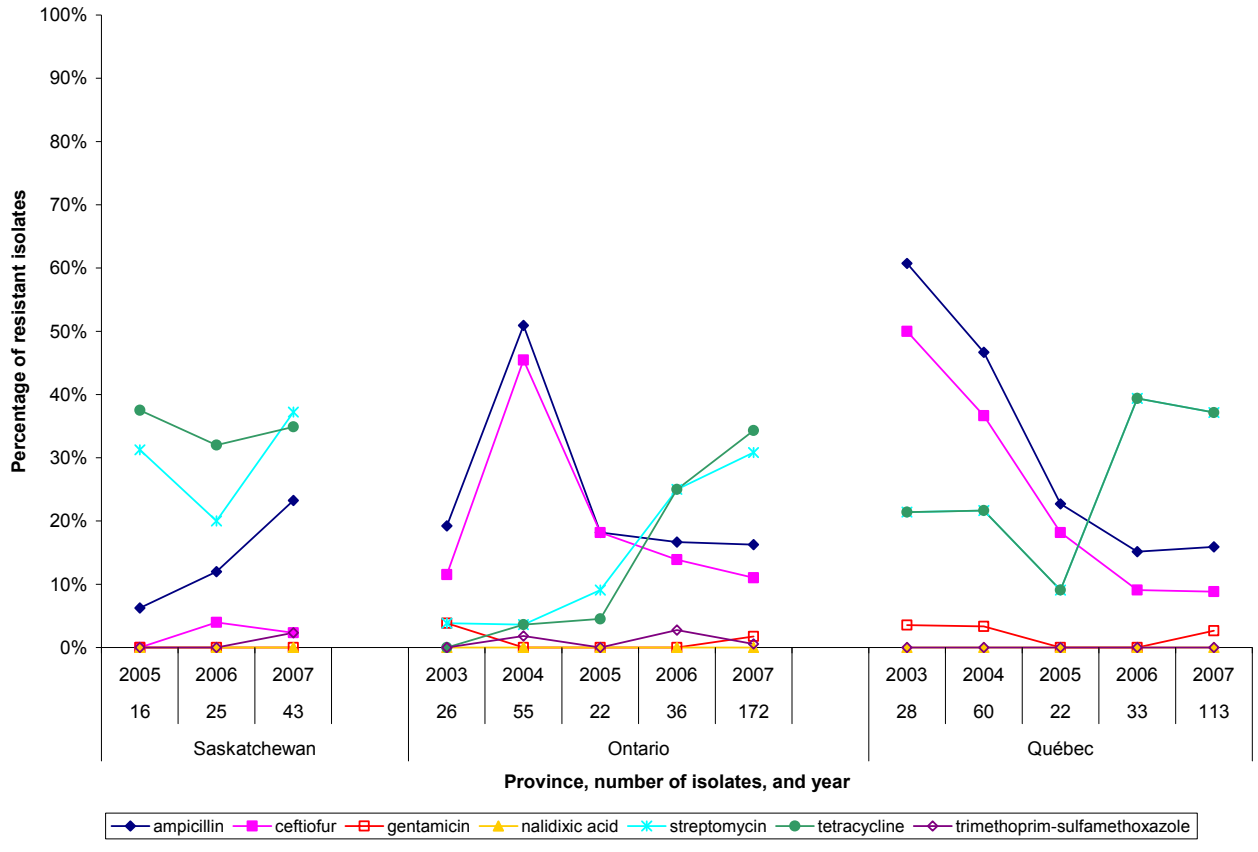
Note: Serovars with less than 2% prevalence within province are classified as ‘Less frequent serovars’.

Table 12 (continued). Number of antimicrobials in resistance patterns of the most frequent chicken *Salmonella* serovars from British Columbia, Saskatchewan, Ontario, and Québec; *Retail Meat Surveillance*, 2007.

Serovar	n (%total)	Number of antimicrobials in resistance pattern			
		0	1-4	5-8	9-16
		Number of isolates			
Québec					
Heidelberg	32 (28.3)	18	12	2	0
Kentucky	30 (26.5)	4	25	1	0
Thompson	11 (9.7)	11	0	0	0
Schwarzengrund	6 (5.3)	0	6	0	0
Enteritidis	5 (4.4)	5	0	0	0
Hadar	5 (4.4)	0	5	0	0
Infantis	5 (4.4)	5	0	0	0
Agona	4 (3.5)	2	2	0	0
Kiambu	3 (2.7)	1	1	1	0
Less frequent serovars	12 (10.6)	7	5	0	0
Total	**113 (100)**	**53**	**56**	**4**	**0**
Grand Total	**346 (100)**	**167**	**169**	**10**	**0**

Note: Serovars with less than 2% prevalence within province are classified as 'Less frequent serovars'.

Figure 6. Temporal variation of the resistance observed to selected antimicrobials of chicken *Salmonella* isolates; *Retail Meat Surveillance*, 2003-2007



Animal Clinical Isolates

(n=95)

Figure 7. Antimicrobial drug resistance observed in chicken *Salmonella* isolates; *Surveillance of Animal Clinical Isolates*, 2007.

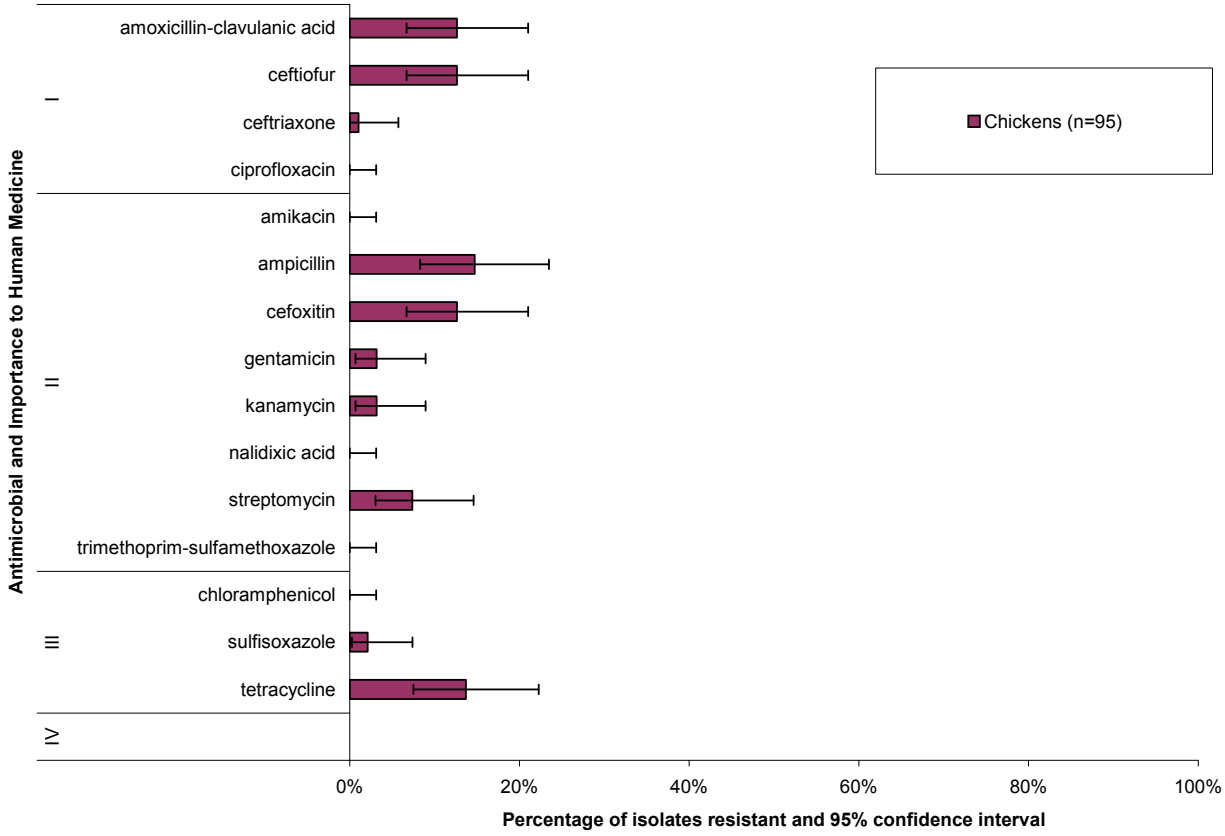


Table 13. Number of antimicrobials in resistance pattern of the most frequent chicken *Salmonella* serovars; *Surveillance of Animal Clinical Isolates*, 2007.

Serovar	n (%total)	Number of antimicrobials in resistance pattern			
		0	1-4	5-8	9-16
		Number of isolates			
Enteritidis	35 (36.8)	35	0	0	0
Heidelberg	21 (22.1)	11	10	0	0
Typhimurium	9 (9.5)	9	0	0	0
I 4:i:-	6 (6.3)	4	2	0	0
Kentucky	6 (6.3)	2	3	1	0
Infantis	4 (4.2)	2	2	0	0
I 8,20:-:z6	3 (3.2)	0	3	0	0
I -:gm:-	2 (2.1)	2	0	0	0
Senftenberg	2 (2.1)	1	0	1	0
Typhimurium var. 5-	2 (2.1)	2	0	0	0
Less frequent serovars	5 (5.3)	2	2	0	1
Total	**95 (100)**	**68**	**20**	**2**	**0**

Note: Serovars with less than 2% prevalence are classified as 'Less frequent serovars'.

Escherichia coli

Abattoir Surveillance

(n=180)

Figure 8. Antimicrobial drug resistance observed in chicken *E. coli* isolates; *Abattoir Surveillance*, 2007.

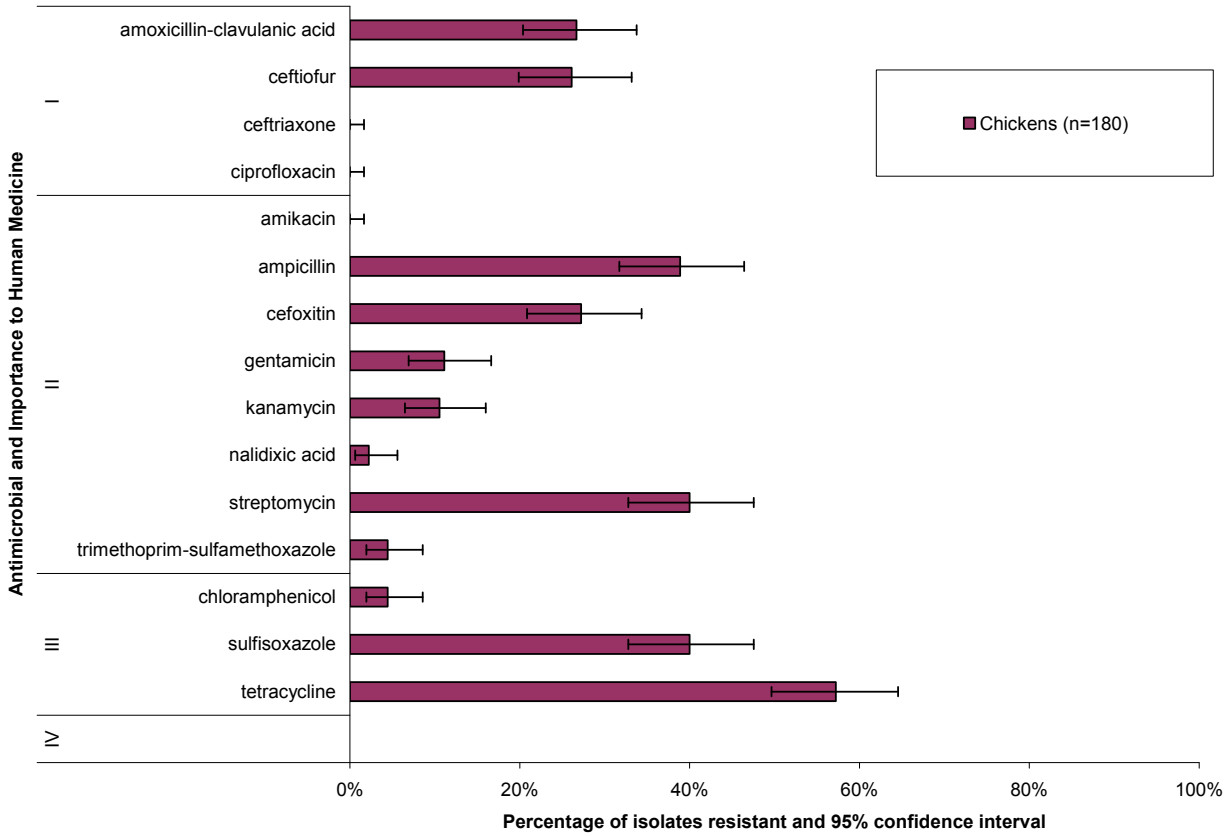
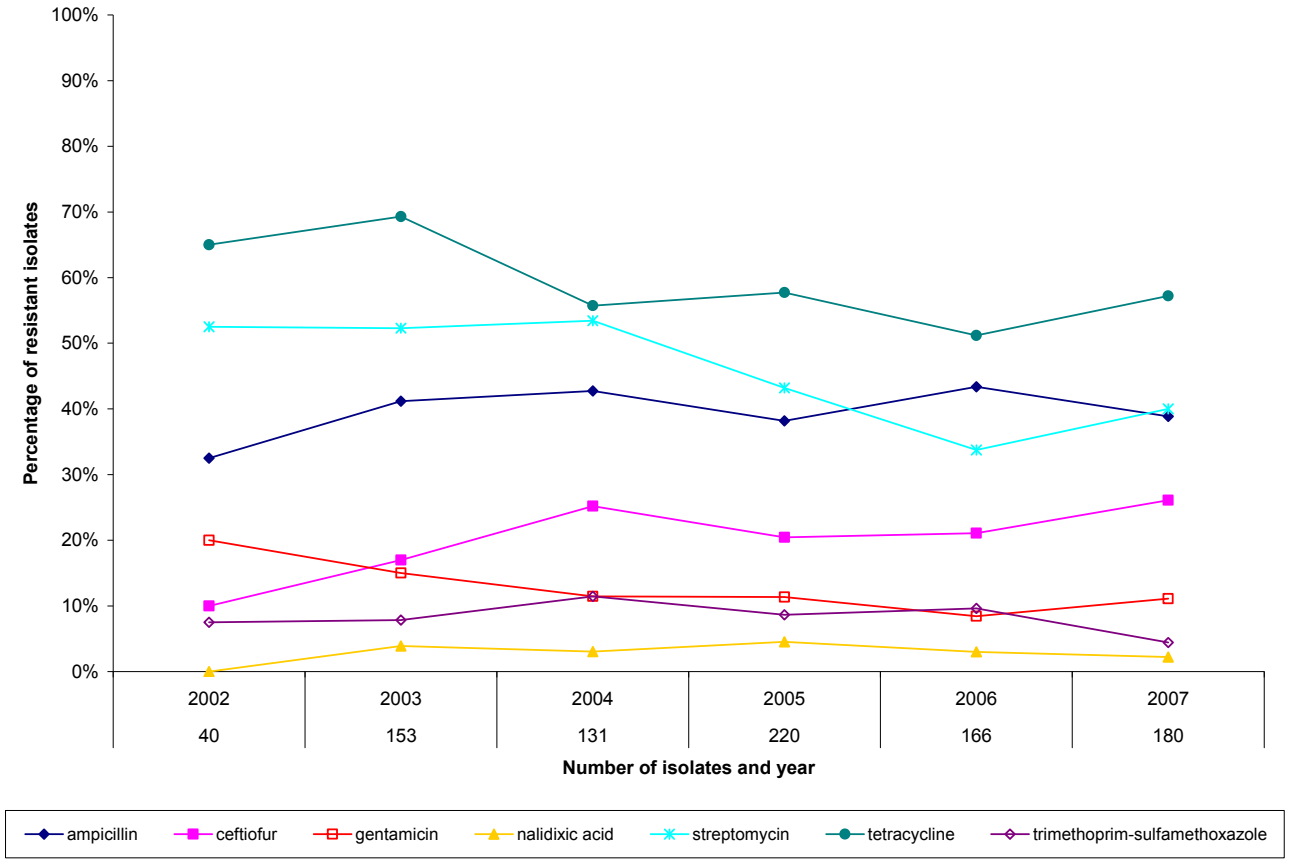


Figure 9. Temporal variation of the resistance observed to selected antimicrobials of chicken *E. coli* isolates; *Abattoir Surveillance*, 2002-2007.



Retail Surveillance

(N=402; British Columbia n=42, Saskatchewan n=75, Ontario n=157, Québec n=128)

Figure 10. Individual antimicrobial drug resistance in chicken *E. coli* isolates from British Columbia, Saskatchewan, Ontario, and Québec; *Retail Meat Surveillance*, 2007.

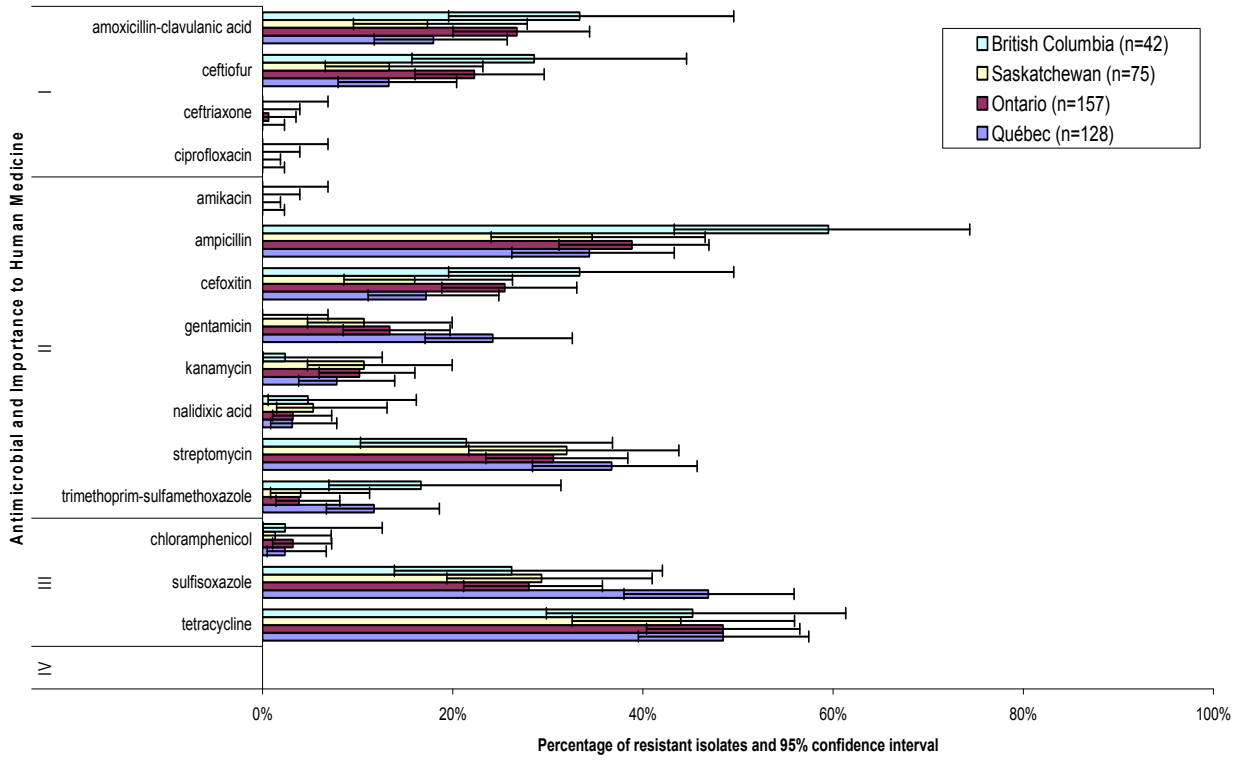
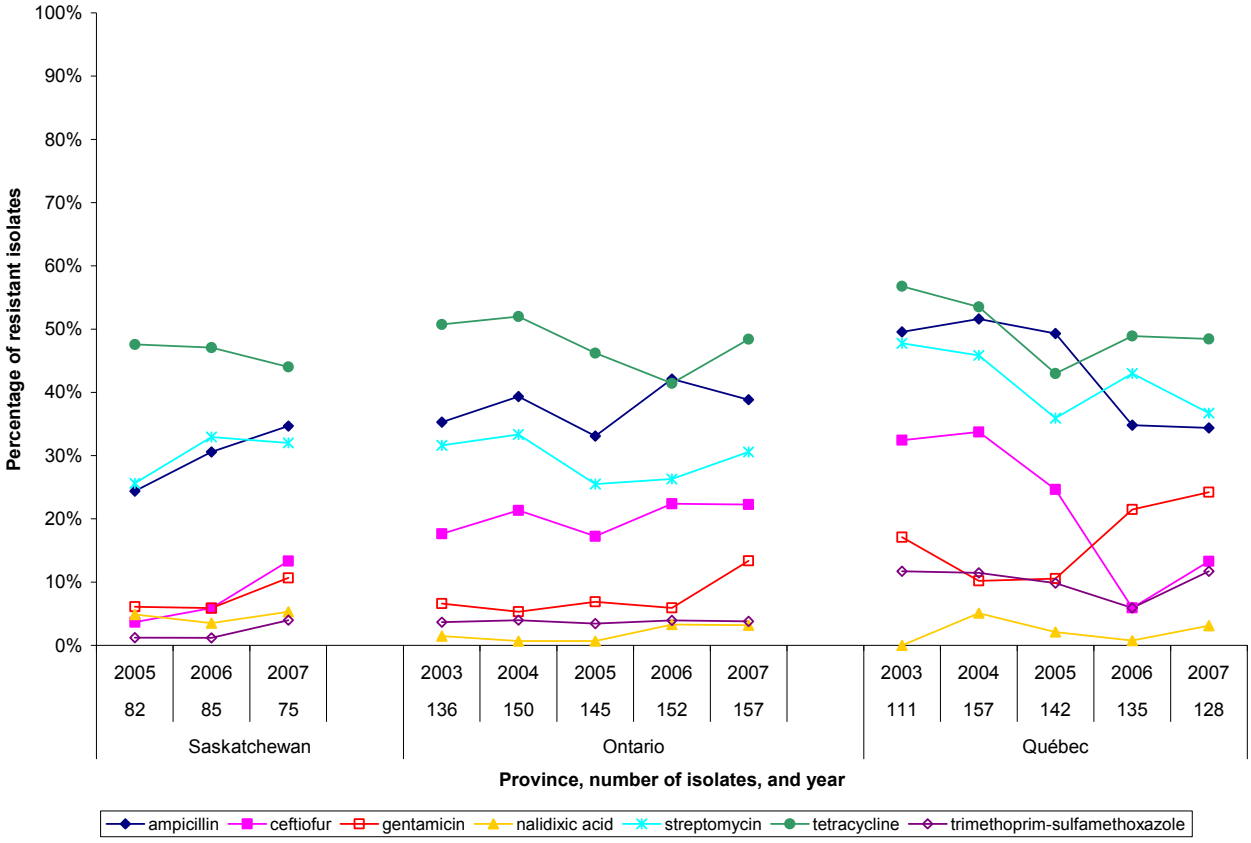


Figure 11. Temporal variation of the resistance observed to selected antimicrobials in chicken *E. coli* isolates; *Retail Meat Surveillance*, 2003-2007.



Campylobacter

Retail Surveillance

(N=253; British Columbia n=28, Saskatchewan n=49; Ontario n=117; Québec n=59)

Figure 12. Antimicrobial drug resistance observed in chicken *Campylobacter* isolates from British Columbia, Saskatchewan, Ontario, and Québec; *Retail Meat Surveillance*, 2007.

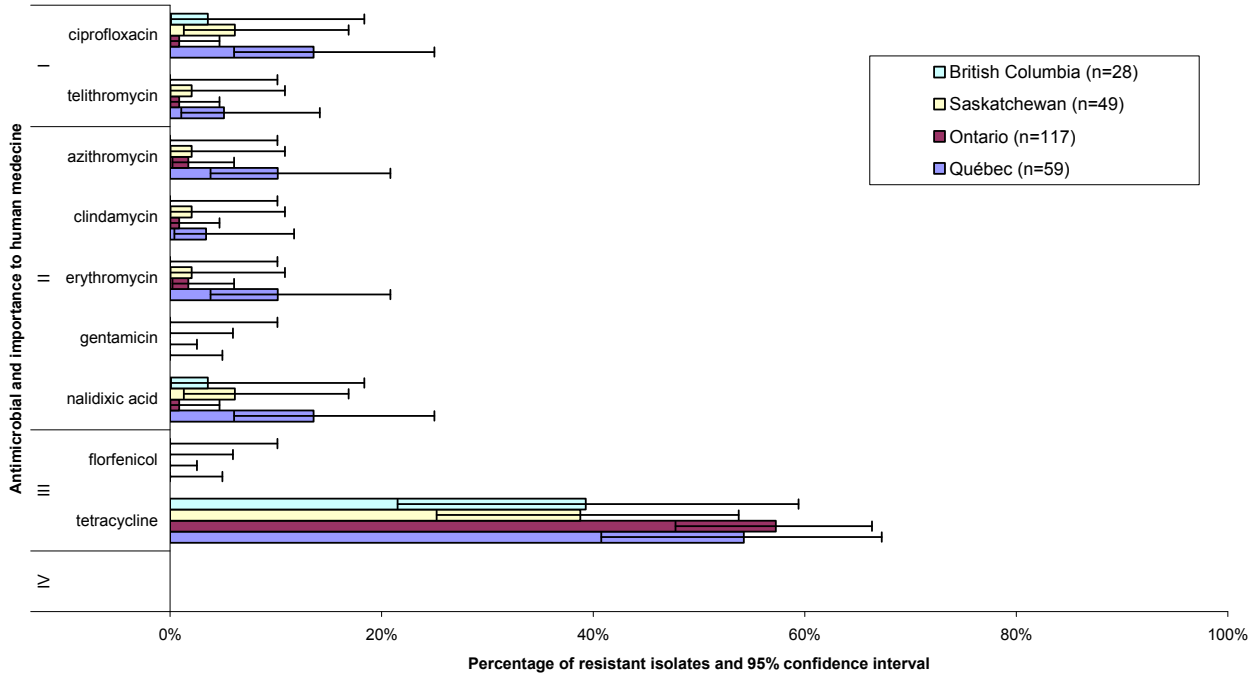
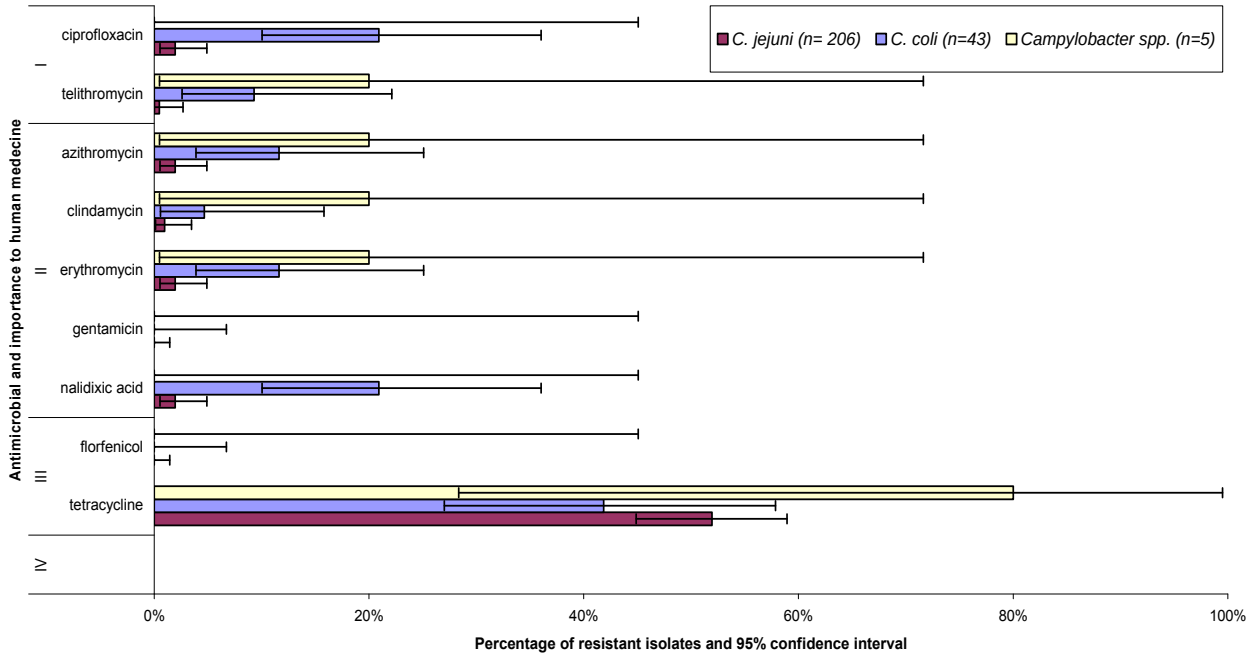


Figure 13. Individual antimicrobial drug resistance in chicken *Campylobacter* isolates among species; *Retail Meat Surveillance*, 2007.

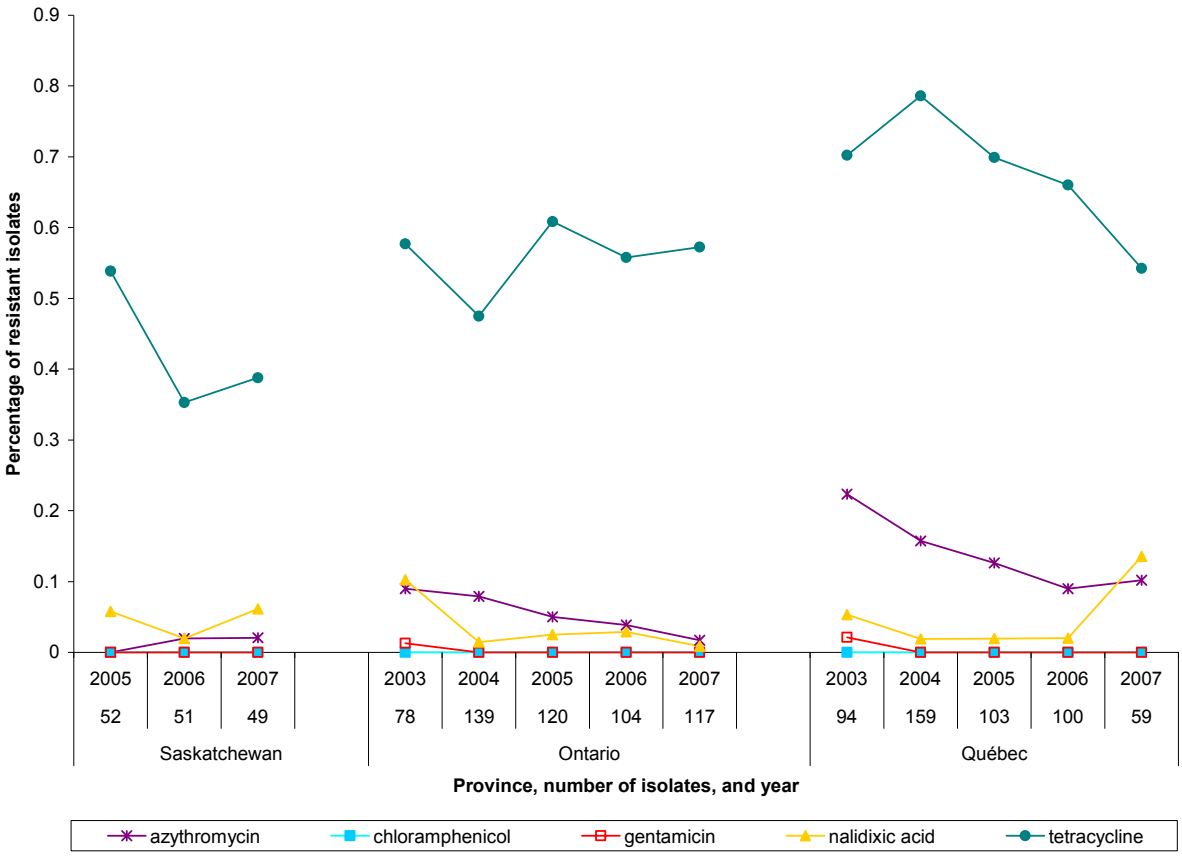


Note: *Campylobacter* spp. may include some species that are intrinsically resistant to nalidixic acid and ciprofloxacin.

Table 14. Number of antimicrobials in resistance pattern in chicken *Campylobacter* isolates among species; *Retail Meat Surveillance*, 2007.

Species	n (%total)	Number of antimicrobials in resistance pattern			
		0	1-2	3-4	5-9
		Number of isolates			
British Columbia					
C. jejuni	26 (92.9)	15	10	1	0
C. coli	2 (7.1)	2	0	0	0
Total	**28 (100)**	**17**	**10**	**1**	**0**
Saskatchewan					
C. jejuni	39 (79.6)	27	11	1	0
C. coli	10 (20.4)	3	4	2	1
Total	**49 (100)**	**27**	**11**	**1**	**0**
Ontario					
C. jejuni	97 (82.9)	41	54	1	1
C. coli	17 (14.5)	8	9	0	0
Campylobacter spp.	3 (2.6)	0	3	0	0
Total	**117 (100)**	**49**	**63**	**1**	**1**
Québec					
C. jejuni	44 (74.6)	14	28	2	0
C. coli	14 (23.7)	3	7	3	1
Campylobacter spp.	1 (1.7)	0	1	0	0
Total	**59 (100)**	**14**	**28**	**2**	**0**
Grand total	**253**	**113**	**127**	**10**	**3**

Figure 14. Temporal variation of resistance to selected antimicrobials in chicken *Campylobacter* isolates; *Retail Meat Surveillance*, 2003-2007.

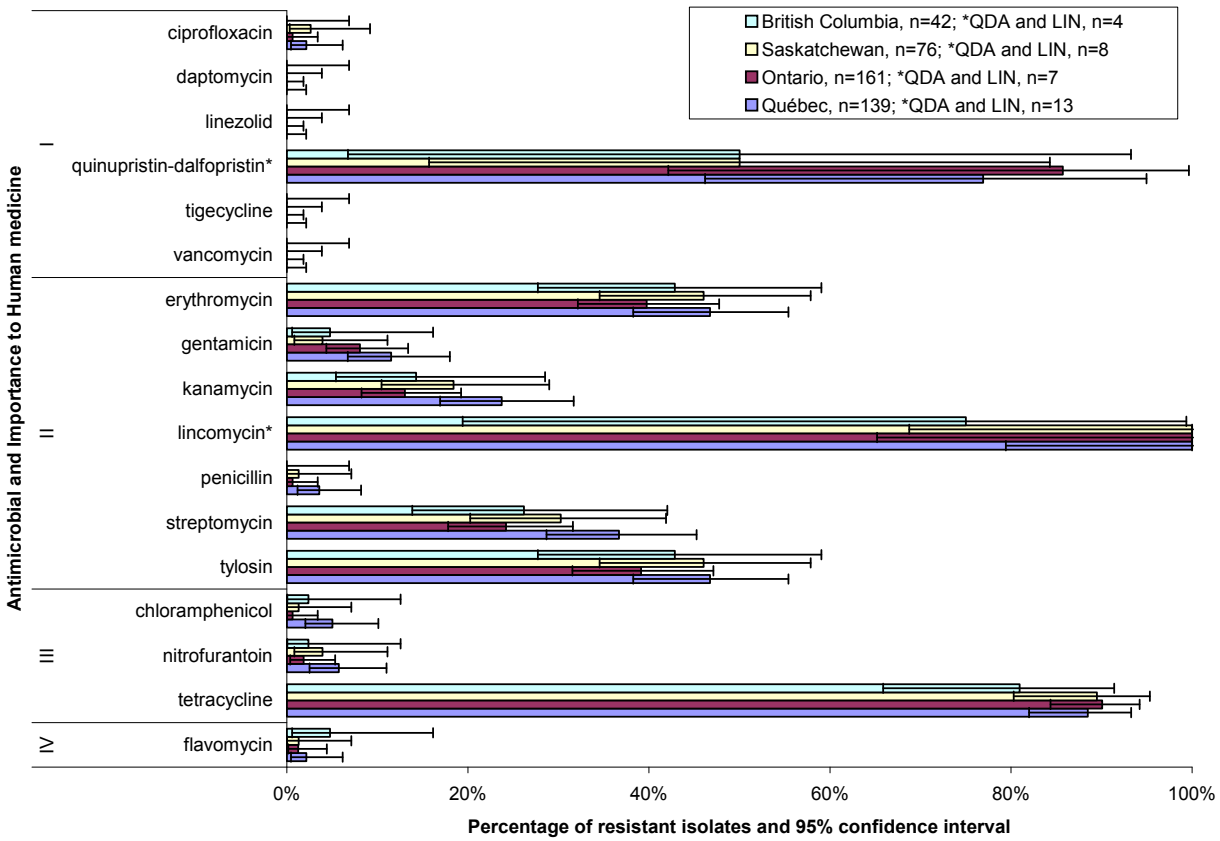


Enterococcus

Retail Surveillance

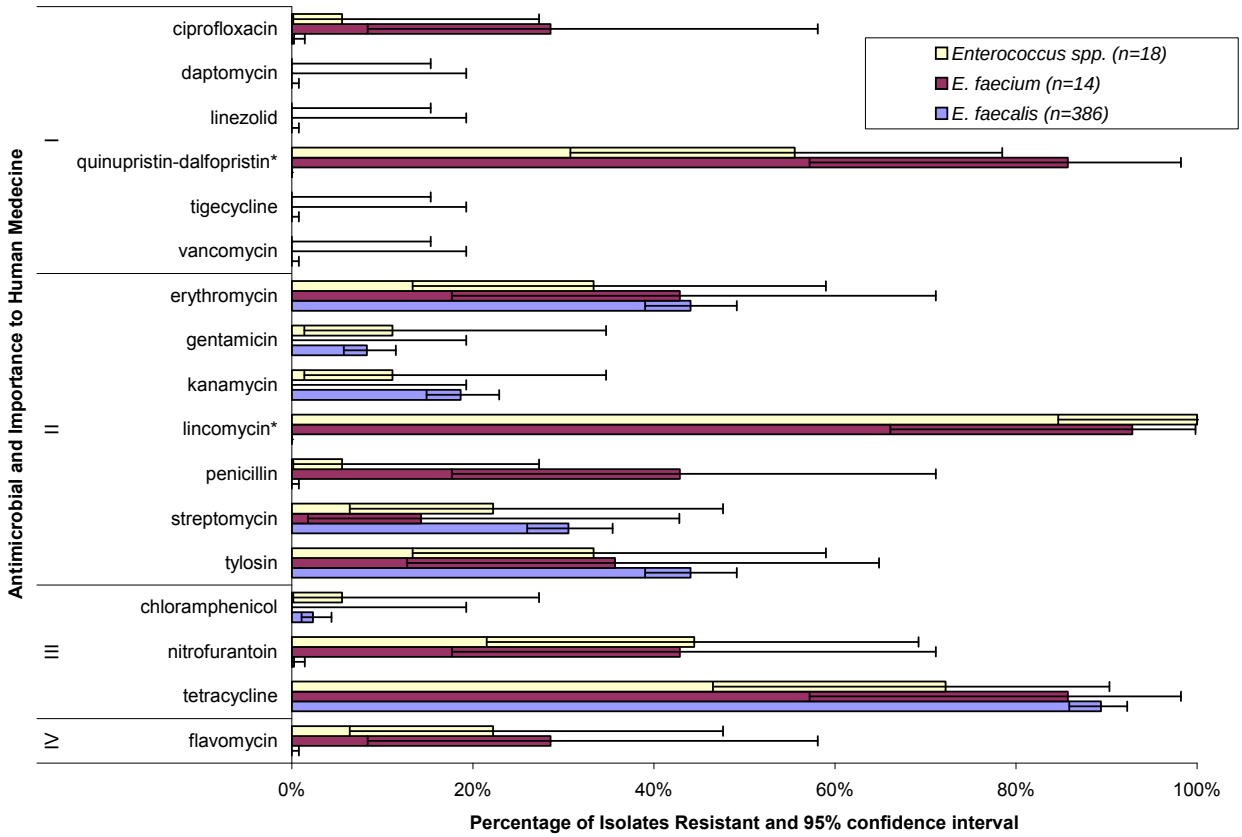
(N=418; British Columbia n=42, Saskatchewan n=76; Ontario n=161; Québec n=139)

Figure 15. Antimicrobial drug resistance observed in chicken *Enterococcus* isolates from British Columbia, Saskatchewan, Ontario, and Québec; *Retail Meat Surveillance*, 2007.



Note: Resistance to quinupristine-dalfopristine (QDA) and lincomycin (LIN) is not reported for *E. faecalis* because of its intrinsic resistance to these antimicrobials. There were changes of breakpoints for lincomycin, kanamycin, and streptomycin in 2007 for *Enterococcus* (see Preamble).

Figure 16. Antimicrobial drug resistance observed in chicken *Enterococcus* isolates among species; *Retail Meat Surveillance*, 2007.

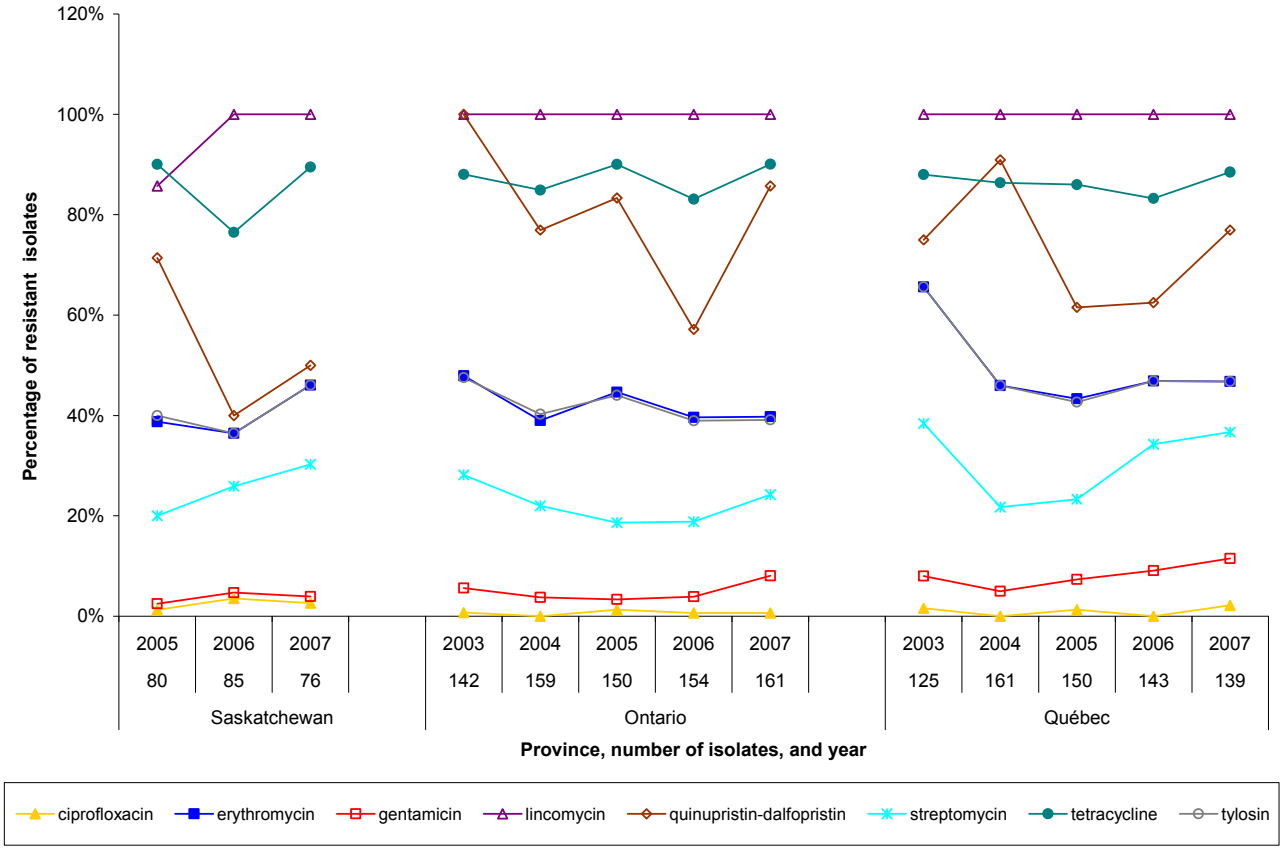


Note: Resistance to quinupristine-dalfopristine (QDA) and lincomycin (LIN) is not reported for *E. faecalis* because of its intrinsic resistance to these antimicrobials. There were changes of breakpoints for lincomycin, kanamycin, and streptomycin in 2007 for Enterococcus (see Preamble).

Table 15. Number of antimicrobials in resistance pattern of chicken *Enterococcus* isolates among species; *Retail Meat Surveillance*, 2007.

Species	n (%total)	Number of antimicrobials in resistance pattern			
		0	1-4	5-8	9-16
		Number of isolates			
British Columbia					
E. faecalis	38 (90.5)	4	28	6	0
E. faecium	2 (4.8)	0	2	0	0
Enterococcus spp.	2 (4.8)	0	1	1	0
Total	**42**	**4**	**31**	**7**	**0**
Saskatchewan					
E. faecalis	68 (89.5)	4	54	10	0
Enterococcus spp.	5 (6.6)	0	4	1	0
E. faecium	3 (3.9)	0	1	2	0
Total	**76**	**4**	**59**	**13**	**0**
Ontario					
E. faecalis	154 (95.7)	14	121	19	0
E. faecium	4 (2.5)	0	3	1	0
Enterococcus spp.	3 (1.9)	0	2	1	0
Total	**161**	**14**	**126**	**21**	**0**
Québec					
E. faecalis	126 (90.6)	14	80	32	0
Enterococcus spp.	8 (5.8)	0	5	2	1
E. faecium	5 (3.6)	0	0	5	0
Total	**139**	**14**	**85**	**39**	**1**
Grand Total	**418**	**36**	**301**	**80**	**1**

Figure 17. Temporal variation of the resistance observed to selected antimicrobials in chicken *Enterococcus* isolates; *Retail Meat Surveillance*, 2003-2007.



Note : There were changes of breakpoints for lincomycin, kanamycin, and streptomycin in 2007 for *Enterococcus* (see Preamble). The new breakpoints were applied to all surveillance years.

Swine

Salmonella

Abattoir Surveillance

(n= 105)

Figure 18. Antimicrobial drug resistance observed in swine *Salmonella* isolates ; *Abattoir Surveillance*, 2007.

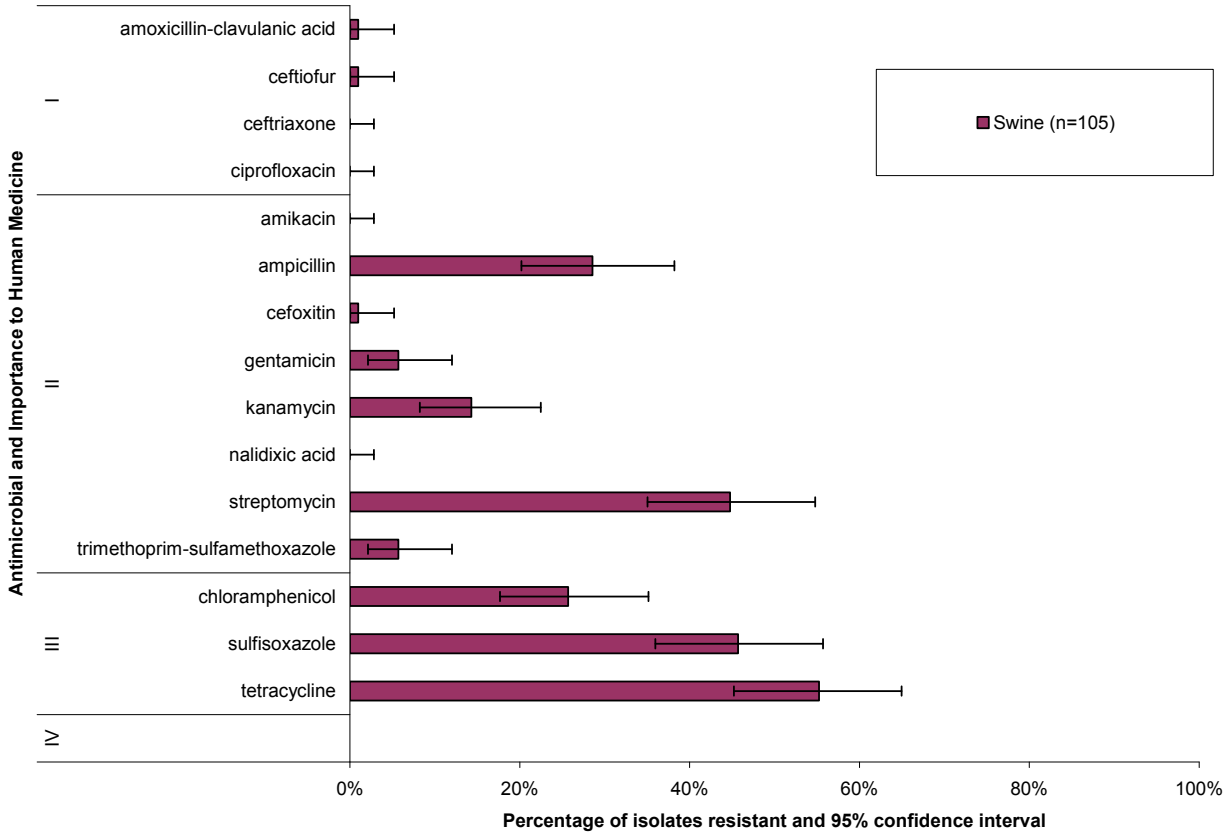


Figure 19. Temporal variation of the resistance observed to selected antimicrobials in swine *Salmonella* isolates; *Abattoir Surveillance*, 2002-2007.

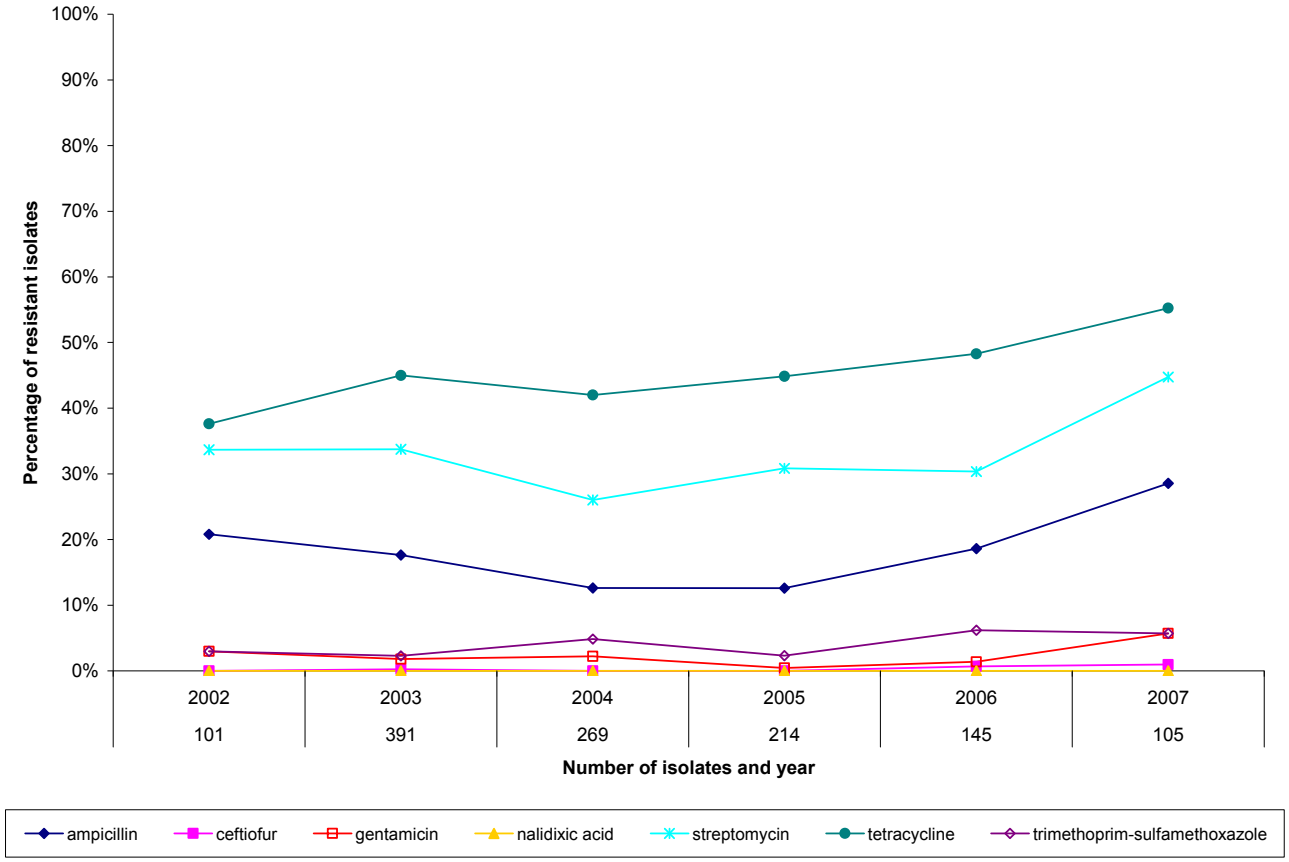


Table 16. Number of antimicrobials in resistance pattern of the most frequent swine *Salmonella* serovars; *Abattoir Surveillance*, 2007.

Serovar	n (%total)	Number of antimicrobials in resistance pattern			
		0	1-4	5-8	9-16
		Number of isolates			
Derby	18 (17.1)	3	15	0	0
Typhimurium	16 (15.2)	3	1	12	0
Typhimurium var. 5-	16 (15.2)	1	5	10	0
Brandenburg	6 (5.7)	5	1	0	0
Infantis	6 (5.7)	5	1	0	0
London	5 (4.8)	5	0	0	0
Mbandaka	4 (3.8)	2	1	1	0
Agona	3 (2.9)	1	2	0	0
California	3 (2.9)	1	2	0	0
Heidelberg	3 (2.9)	0	3	0	0
Krefeld	3 (2.9)	1	2	0	0
Less frequent serovars	22 (21)	13	5	3	1
Total	**105 (100)**	**40**	**38**	**26**	**1**

Note: Serovars with less than 2% prevalence are classified as 'Less frequent serovars'.

Animal Clinical Isolates

(n=176)

Figure 20. Antimicrobial drug resistance observed in swine *Salmonella* isolates; *Surveillance of Animal Clinical Isolates*, 2007.

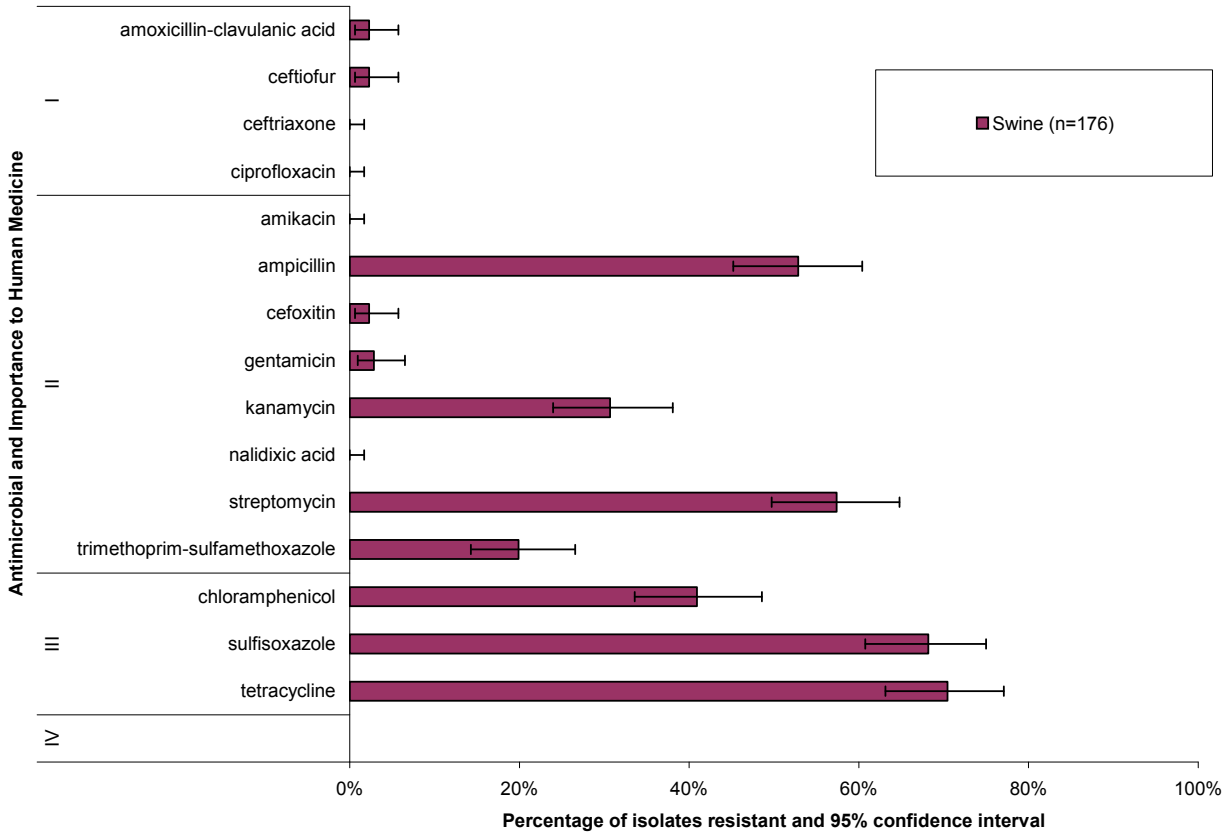


Table 17. Number of antimicrobials in resistance pattern of the most frequent swine *Salmonella* serovars; *Surveillance of Animal Clinical Isolates*, 2007.

Serovar	n (%total)	Number of antimicrobials in resistance pattern			
		0	1-4	5-8	9-16
		Number of isolates			
Typhimurium	64 (36.6)	6	19	39	0
Typhimurium var. 5-	37 (21.1)	2	11	24	0
Derby	23 (13.1)	9	10	4	0
Infantis	7 (4)	7	0	0	0
Schwarzengrund	5 (2.9)	2	3	0	0
Brandenburg	4 (2.3)	2	1	1	0
Mbandaka	4 (2.3)	1	2	1	0
Ohio	4 (2.3)	0	0	2	2
Less frequent serovars	27 (15.4)	14	5	7	1
Total	**175 (100)**	**43**	**51**	**78**	**3**

Note: Serovars with less than 2% prevalence are classified as 'Less frequent serovars'. Serovar identification is missing for one isolate.

Escherichia coli

Abattoir Surveillance

(n=93)

Figure 21. Antimicrobial drug resistance observed in swine *E. coli* isolates; *Abattoir surveillance*, 2007.

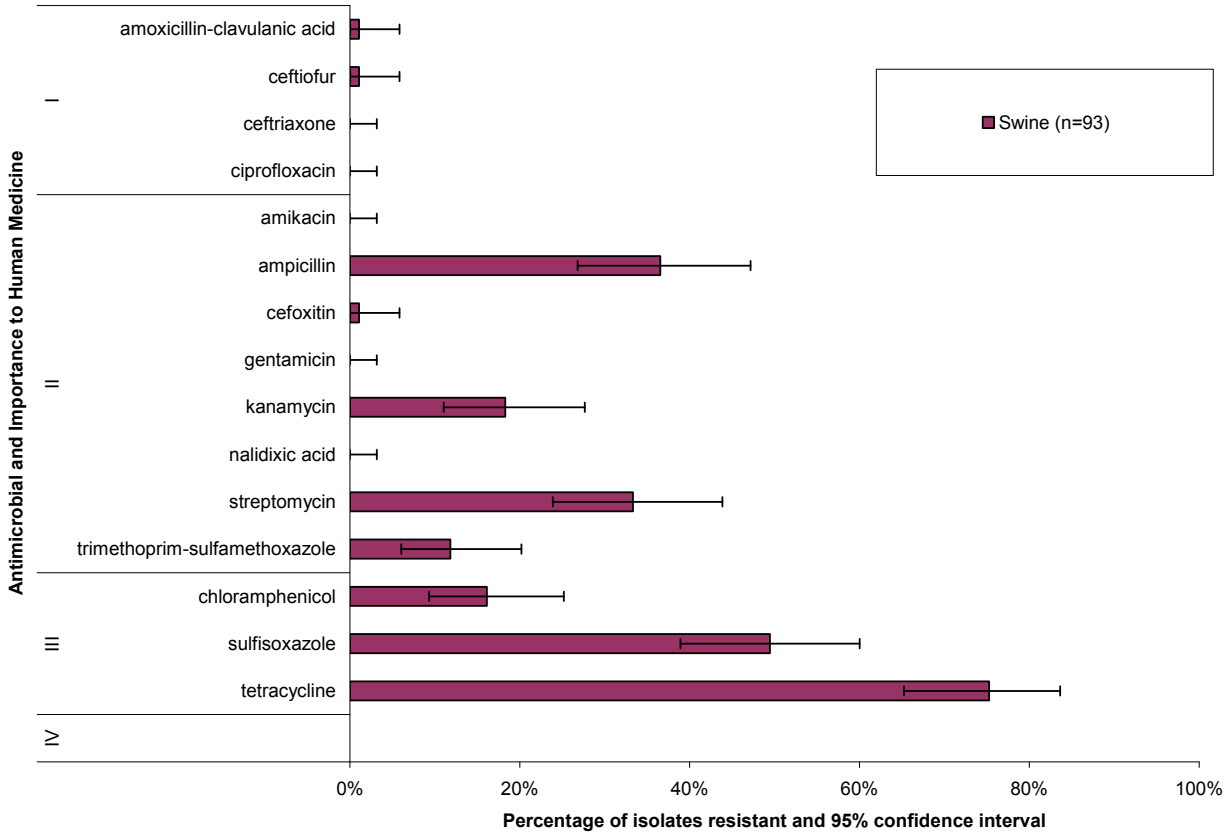
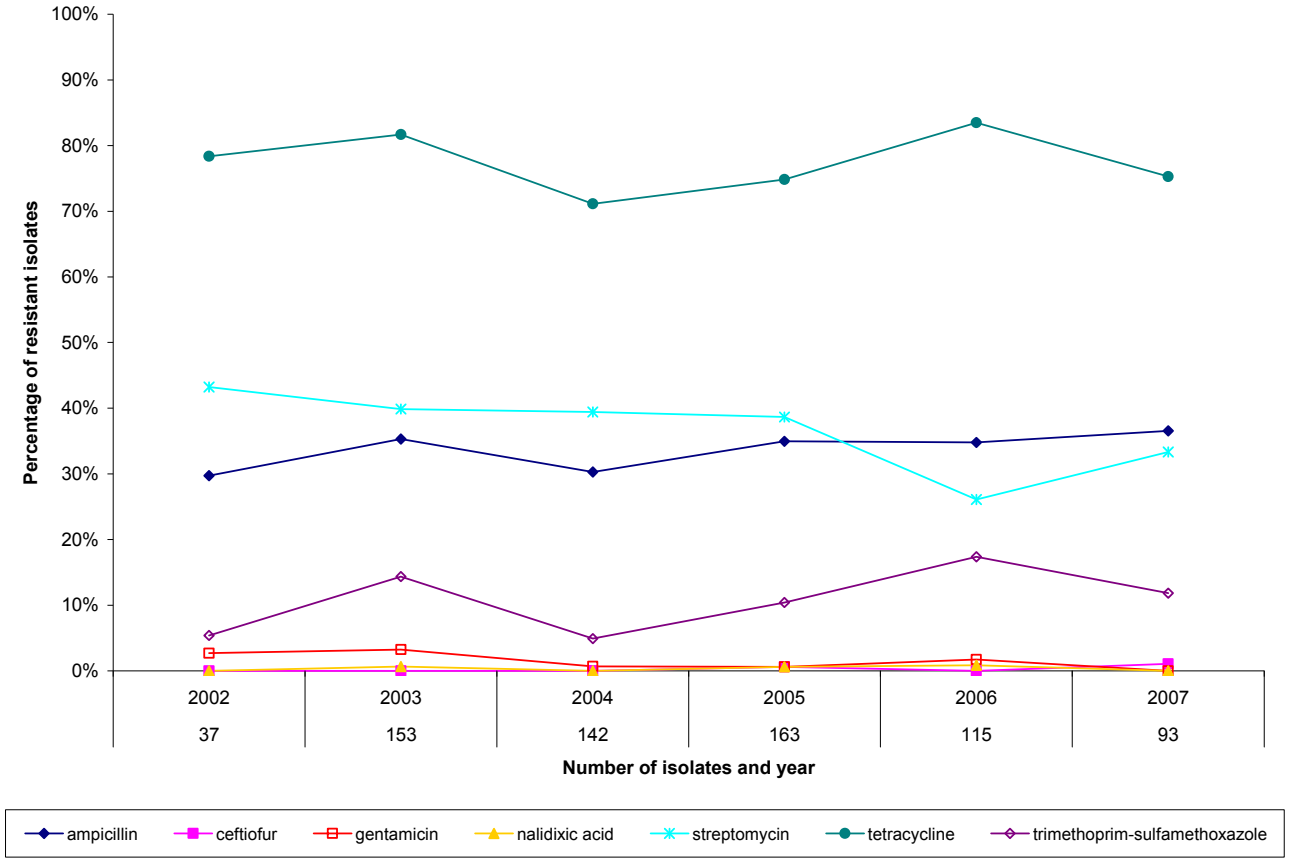


Figure 22. Temporal variation of the resistance observed to selected antimicrobials in swine *E. coli* isolates; *Abattoir Surveillance*, 2002-2007.



Retail Meat Surveillance

(N=297; British Columbia n=23, Saskatchewan n=38; Ontario n=172; Québec n=64)

Figure 23. Antimicrobial drug resistance observed in pork *E. coli* isolates from British Columbia, Saskatchewan, Ontario, and Québec; *Retail Meat Surveillance*, 2007.

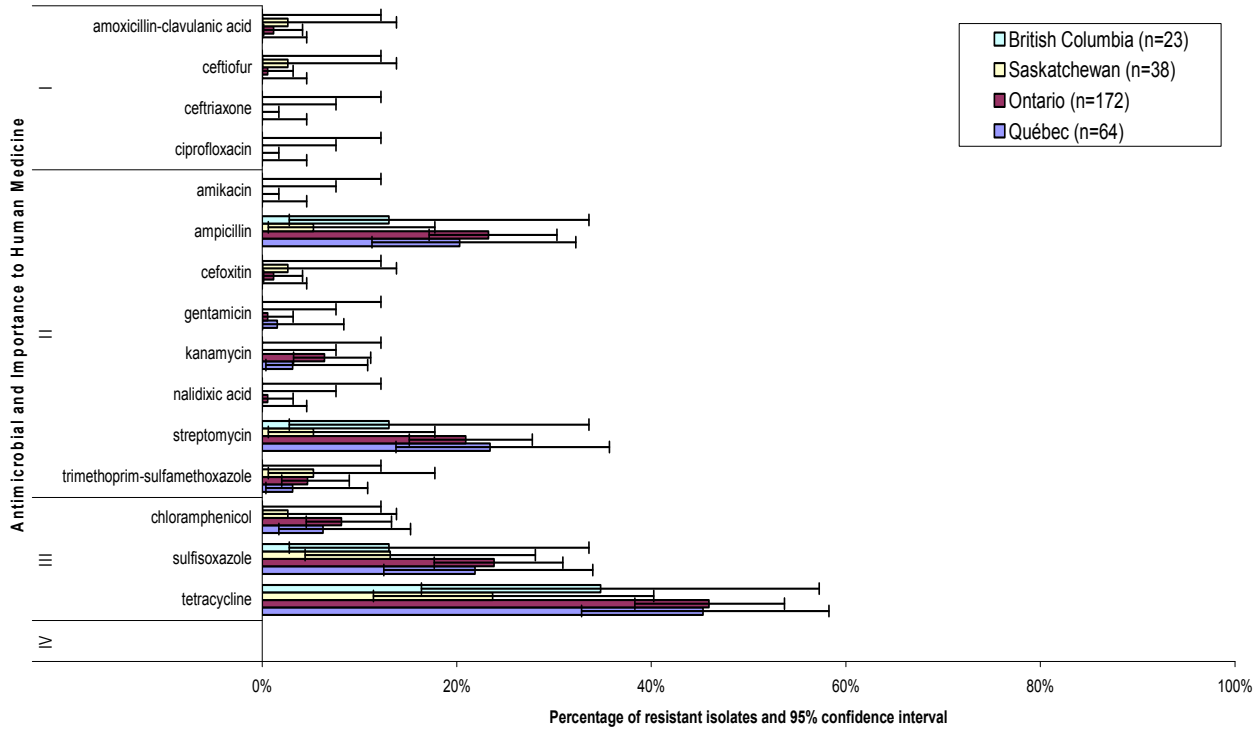
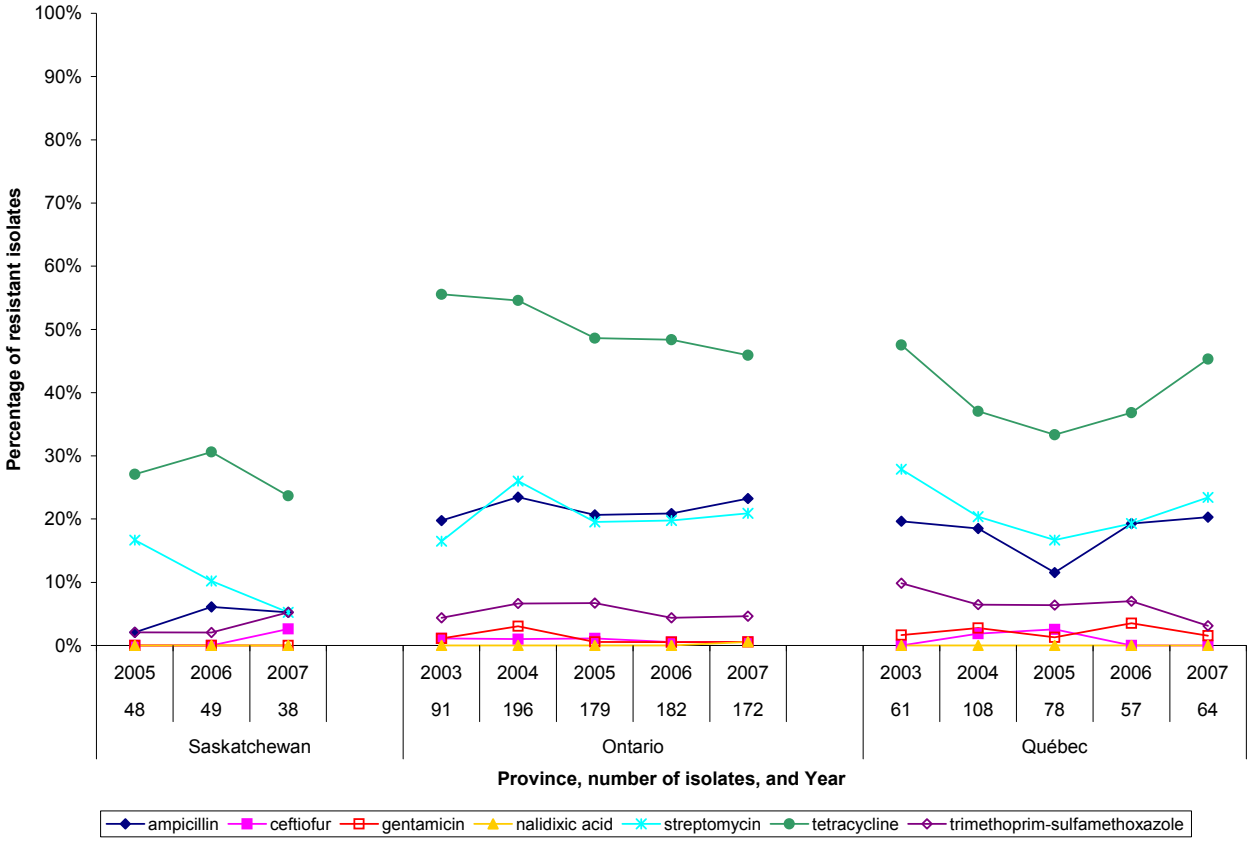


Figure 24. Temporal variation of the resistance observed to selected antimicrobials in pork *E. coli* isolates; *Retail Meat Surveillance*, 2003-2007.



Bovine

Salmonella

Animal Clinical Isolates

(N=133)

Figure 25. Antimicrobial drug resistance observed in bovine *Salmonella* isolates; *Surveillance of Animal Clinical Isolates*, 2007.

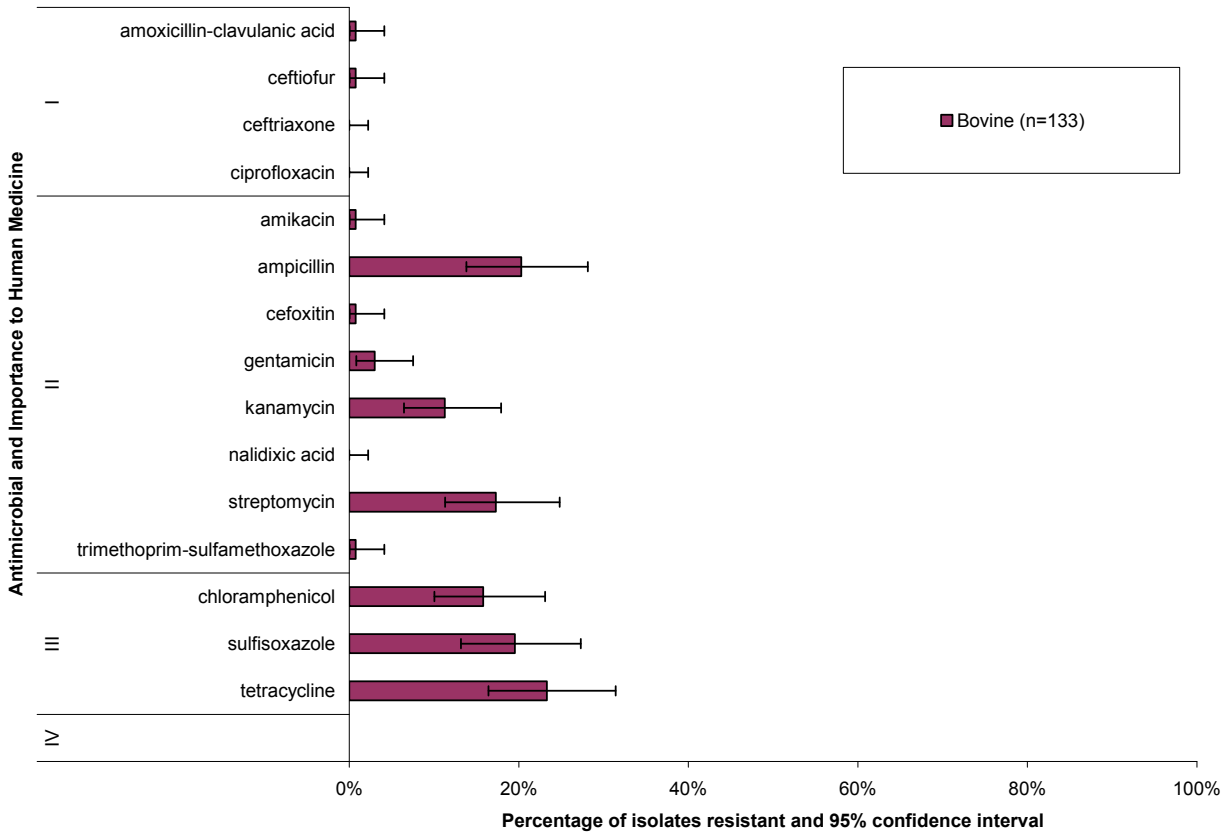


Table 18. Number of antimicrobials in resistance pattern of the most frequent bovine *Salmonella* serovars; *Surveillance of Animal Clinical Isolates*, 2007.

Serovar	n (%total)	Number of antimicrobials in resistance pattern			
		0	1-4	5-8	9-16
		Number of isolates			
Typhimurium	35 (26.5)	19	2	14	0
Kentucky	28 (21.2)	27	1	0	0
Cerro	13 (9.8)	12	1	0	0
I 6,14,18:-:-	11 (8.3)	11	0	0	0
Typhimurium var. 5-	8 (6.1)	0	3	5	0
Thompson	6 (4.5)	6	0	0	0
I 4:i:-	5 (3.8)	4	1	0	0
Schwarzengrund	4 (3)	4	0	0	0
Anatum	3 (2.3)	0	3	0	0
Montevideo	3 (2.3)	3	0	0	0
Less frequent serovars	16 (12.1)	15	1	0	0
Total	**132 (100)**	**101**	**12**	**19**	**0**

Note: Serovars with less than 2% prevalence are classified as 'Less frequent serovars'. Serovar identification is missing for one isolate.

Escherichia coli

Abattoir Surveillance

(n=188)

Figure 26. Antimicrobial drug resistance observed in beef cattle *E. coli* isolates; *Abattoir Surveillance*, 2007.

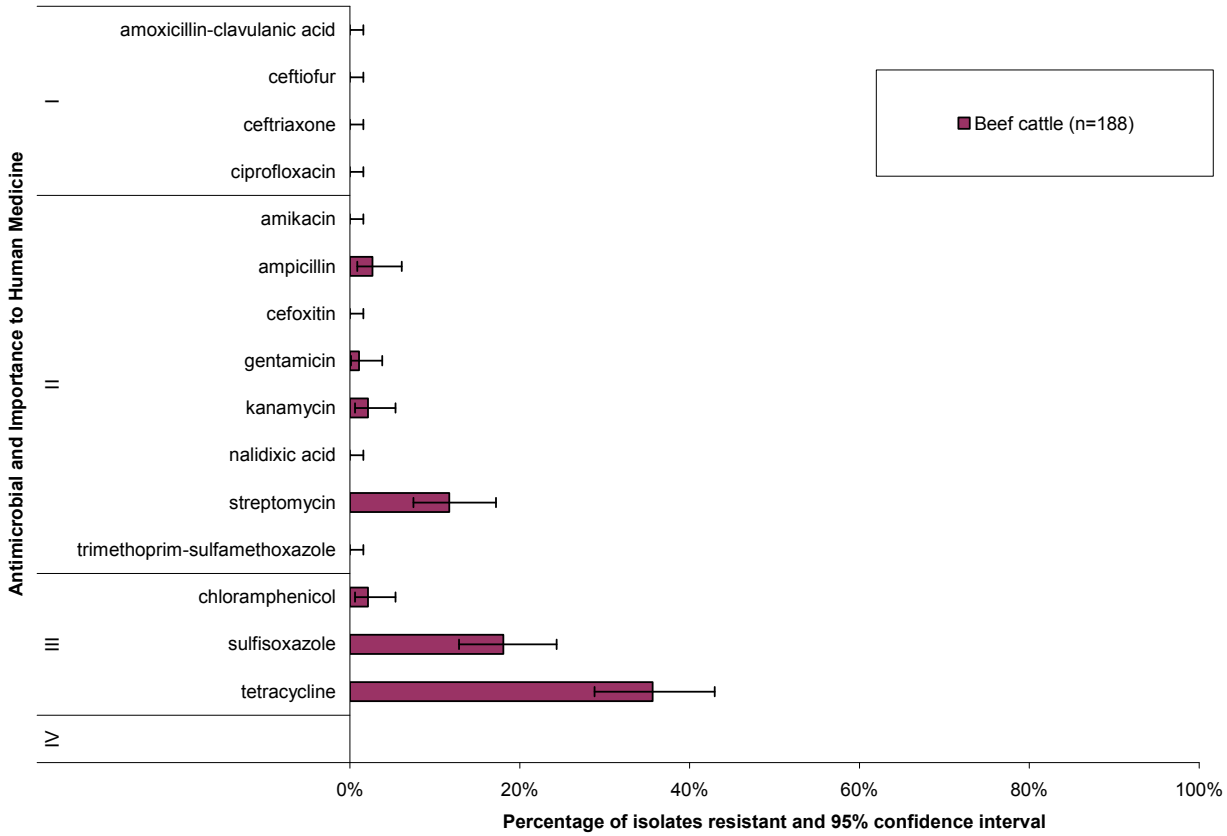
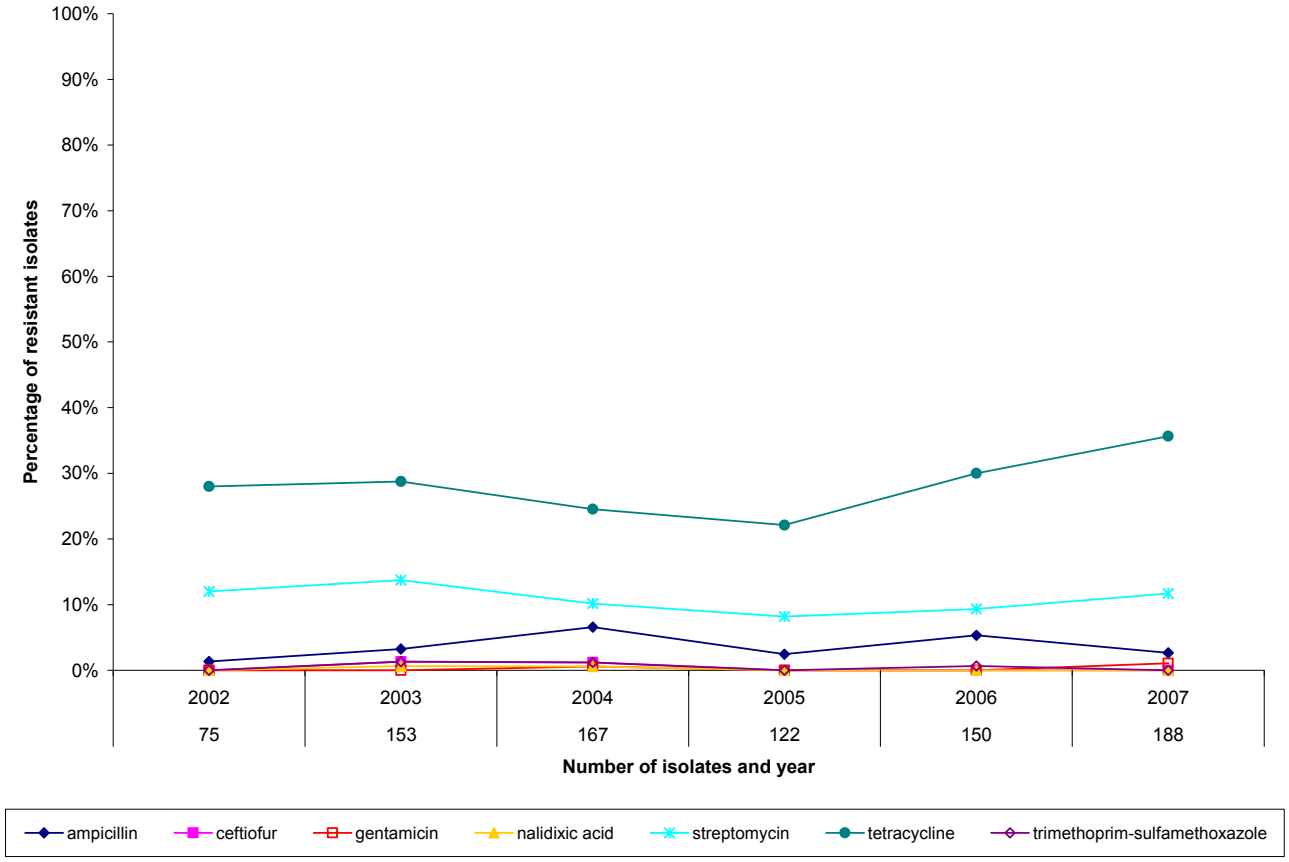


Figure 27. Temporal variation of the resistance observed to selected antimicrobials in beef cattle *E. coli* isolates; *Abattoir Surveillance*, 2002-2007.



Retail Surveillance

(N=501, British Columbia n=49, Saskatchewan n=118, Ontario n=187, and Québec n=147)

Figure 28. Antimicrobial drug resistance observed in beef *E. coli* isolates from British Columbia, Saskatchewan, Ontario, and Québec; *Retail Meat Surveillance*, 2007.

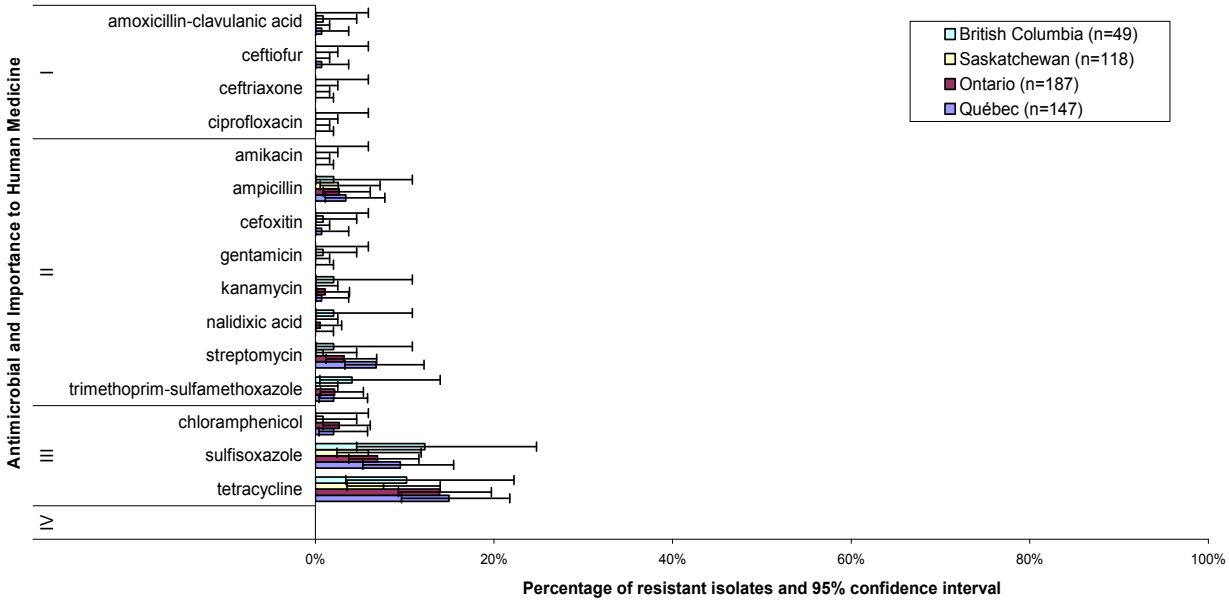
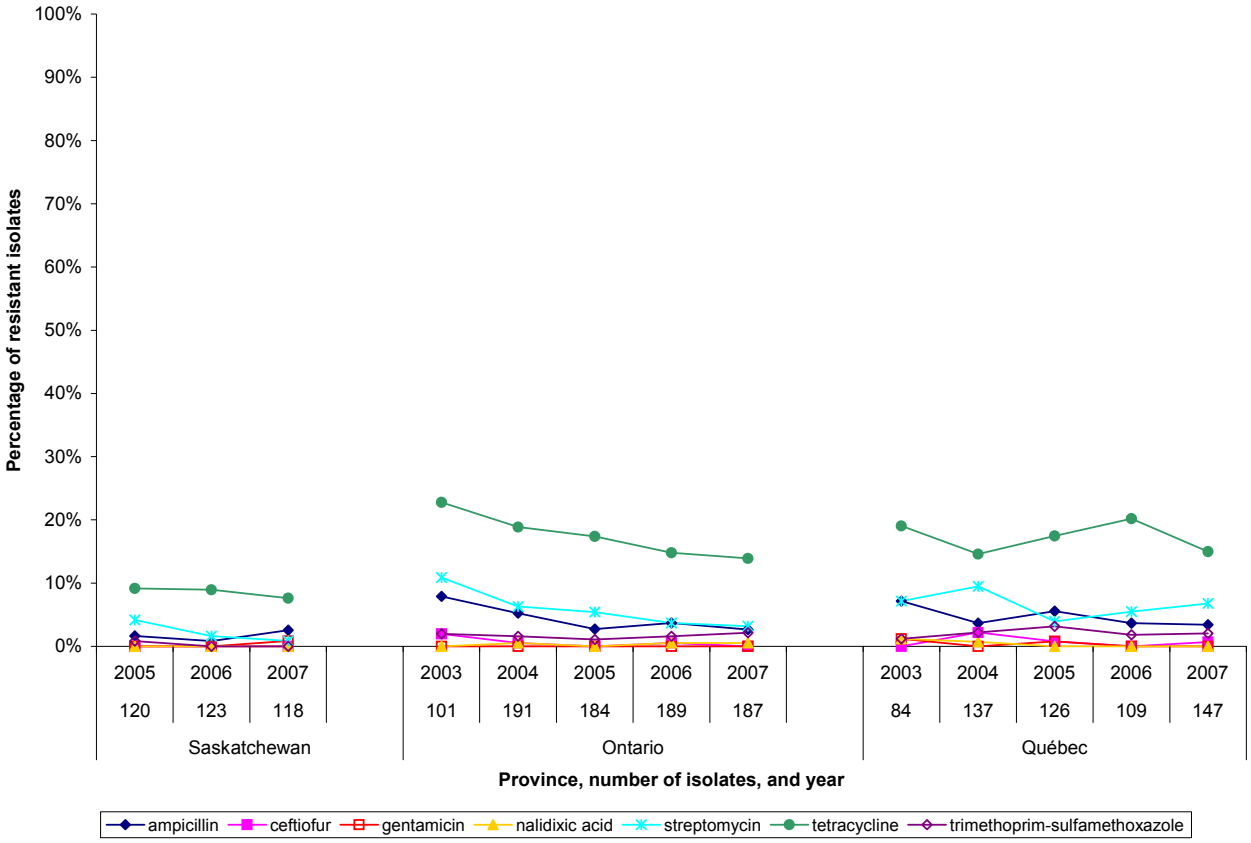


Figure 29. Temporal variation of the resistance observed to selected antimicrobials in beef *E. coli* isolates; *Retail Meat Surveillance*, 2003-2007.

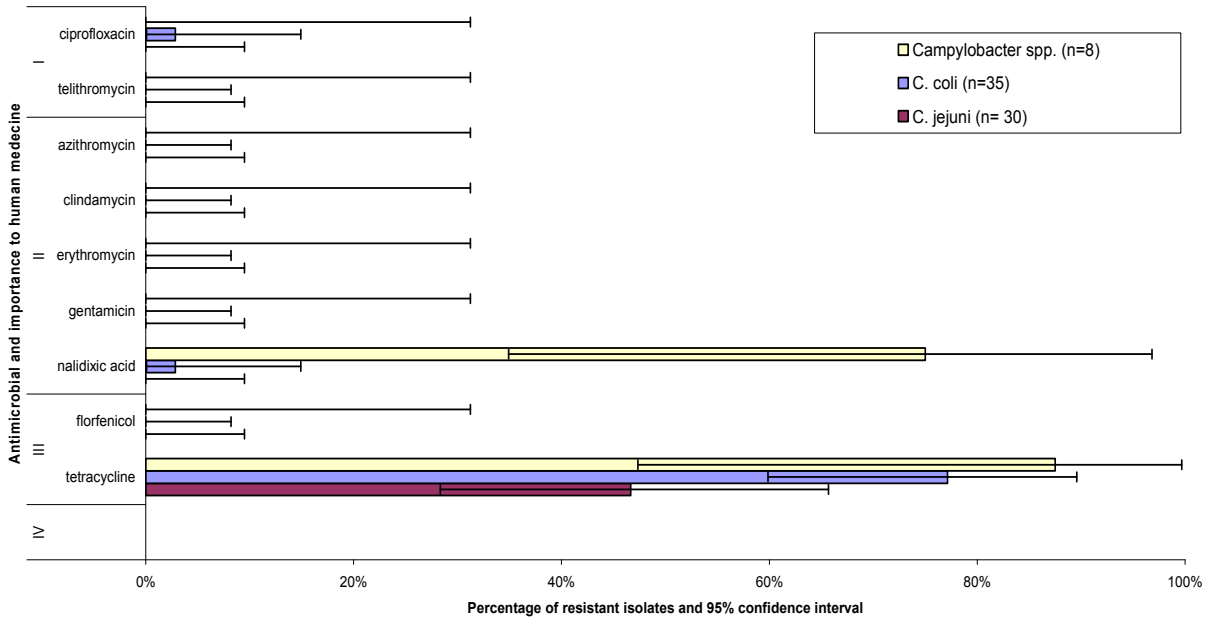


Campylobacter

Abattoir Surveillance

(n=73)

Figure 30. Antimicrobial drug resistance observed in bovine *Campylobacter* isolates among species; *Abattoir Surveillance*, 2007.



Note: *Campylobacter* spp. may include some species that are intrinsically resistant to nalidixic acid and ciprofloxacin.

Table 19. Number of antimicrobials in resistance pattern in beef cattle *Campylobacter* isolates among species; *Abattoir Surveillance*, 2007.

Species	n (%total)	Number of antimicrobials in resistance pattern			
		0	1-2	3-4	5-9
		Number of isolates			
C. coli	35 (47.9)	8	27	0	0
C. jejuni	30 (41.1)	16	14	0	0
Campylobacter spp.	8 (11)	1	7	0	0
Total	**73**	**25**	**48**	**0**	**0**

Turkeys

Salmonella

Animal Clinical Isolates

(n=45)

Figure 31. Antimicrobial drug resistance observed in turkey *Salmonella* isolates; *Surveillance of Animal Clinical Isolates*, 2007.

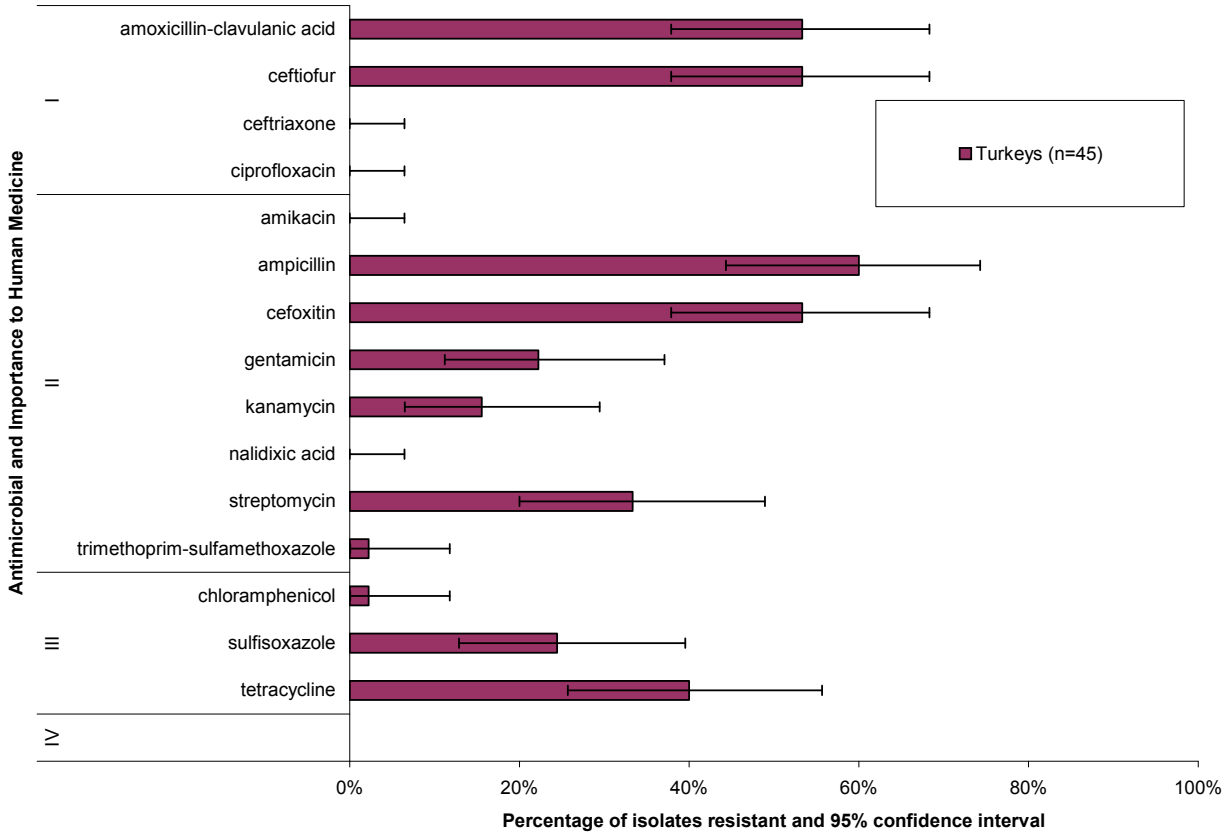


Table 20. Number of antimicrobials in resistance pattern of the most frequent turkey *Salmonella* serovars; *Surveillance of Animal Clinical Isolates*, 2007.

Serovar	n (%total)	Number of antimicrobials in resistance pattern			
		0	1-4	5-8	9-16
		Number of isolates			
Typhimurium	10 (22.2)	0	9	1	0
Senftenberg	7 (15.6)	1	2	3	1
Heidelberg	6 (13.3)	1	3	2	0
Agona	5 (11.1)	0	3	2	0
Hadar	3 (6.7)	0	3	0	0
Anatum	2 (4.4)	0	2	0	0
Bredeney	2 (4.4)	0	0	0	2
Derby	2 (4.4)	0	2	0	0
I 4:-:-	2 (4.4)	0	2	0	0
Albany	1 (2.2)	0	1	0	0
Brandenburg	1 (2.2)	1	0	0	0
Enteritidis	1 (2.2)	1	0	0	0
I -:eh:5	1 (2.2)	0	1	0	0
Thompson	1 (2.2)	1	0	0	0
Typhimurium var. 5-	1 (2.2)	1	0	0	0
Total	**45 (100)**	**5**	**28**	**8**	**3**

Equine

Salmonella

Animal Clinical Isolates

(n=65)

Figure 32. Antimicrobial drug resistance observed in equine *Salmonella* isolates; *Surveillance of Animal Clinical Isolates*, 2007.

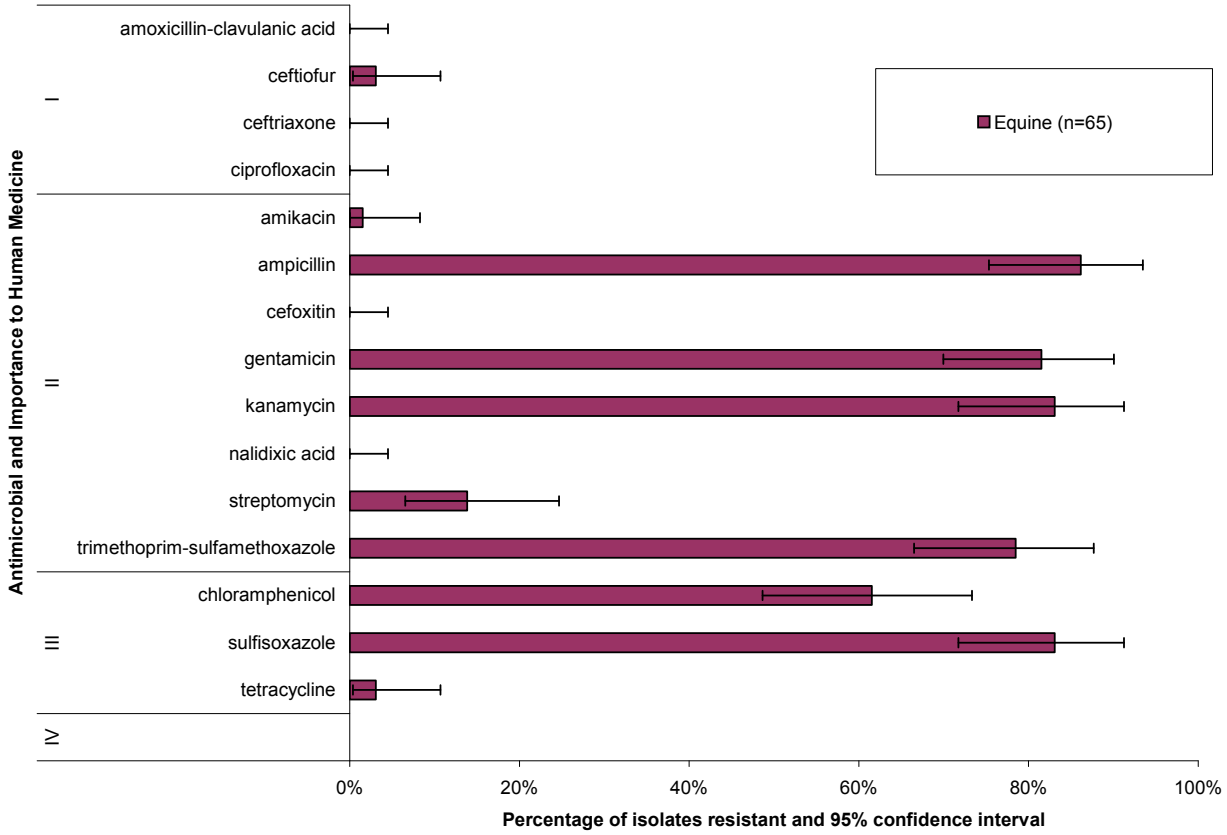


Table 21. Number of antimicrobials in resistance pattern of the most frequent equine *Salmonella* serovars; *Surveillance of Animal Clinical Isolates*, 2007.

Serovar	n (%total)	Number of antimicrobials in resistance pattern			
		0	1-4	5-8	9-16
		Number of isolates			
Heidelberg	54 (83.1)	0	3	51	0
Typhimurium	5 (7.7)	3	0	2	0
Newport	2 (3.1)	2	0	0	0
Less frequent serovars	4 (6.2)	4	0	0	0
Total	**65 (100)**	**9**	**3**	**53**	**0**

Note: Serovars with less than 2% prevalence are classified as 'Less frequent serovars'. Several *S*. Heidelberg isolates are epidemiologically related.

Appendix

MIC Tables - Humans

Table 22. Distribution of MICs and antimicrobial resistance observed in human *Salmonella* Enteritidis isolates; *Surveillance of Human Clinical Isolates*, 2007.

*	Antimicrobial	n	MIC Percentiles		%R	Distribution (%) of MICs														
			MIC_{50}	MIC_{90}		≤ 0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	>256
	amoxicillin-clavulanic acid	493	<=1	2	0.2							88.6	8.9		2.2		**0.2**				
	ceftiofur	493	1	1	0.2						3.4	94.7	1.4	0.2		**0.2**					
I	ceftriaxone	493	<=0.25	<=0.25	0.2					99.8									**0.2**		
	ciprofloxacin	493	<=0.015	0.25	0.0	58.0	17.2	1.6	5.9	16.6	0.4	0.2									
	amikacin	493	1	2	0.0						14.6	70.6	13.0	1.4	0.2	0.2					
	ampicillin	493	<=1	2	2.2							76.3	20.1	0.8	0.6			**2.2**			
	cefoxitin	493	2	4	0.4							2.4	87.2	9.5	0.2	0.2	**0.2**	**0.2**			
II	gentamicin	493	<=0.25	0.50	0.8					81.5	15.4	1.8	0.4			**0.6**	**0.2**				
	kanamycin	493	<=8	<=8	0.6										99.2	0.2		**0.4**	**0.2**		
	nalidixic acid	493	4	>32	22.7								14.6	58.6	3.4	0.6		**22.7**			
	streptomycin	493	<=32	<=32	1.0												99.0		**1.0**		
	trimethoprim-sulphamethoxazole	493	<=0.12	<=0.12	0.8				96.6	2.2	0.2	0.2			**0.8**						
	chloramphenicol	493	4	8	0.8								0.2	60.2	37.9	0.8		**0.8**			
III	sulfisoxazole	493	64	128	1.8											2.8	25.4	42.4	26.4	1.2	**1.8**
	tetracycline	493	<=4	>32	11.0									88.6	0.4	**0.2**	**0.4**	**10.3**			
IV																					

Note: * Roman numerals I-IV indicate the ranking of human medicine importance (VDD). The unshaded fields indicate the range tested for each antimicrobial in the plate configuration. Numbers in bold red font indicate the percentage of resistant isolates. Numbers at the right of the largest dilution are those isolates with growth in all wells within the tested range, indicating the actual MIC is greater than that range of dilutions. The numbers in the smallest dilution of the range tested indicate isolates susceptible to this level or to lower concentration of the antimicrobial. Solid bars represent the resistance breakpoints. Dotted bars represent the susceptibility breakpoints.

Table 23. Distribution of MICs and antimicrobial resistance observed in human *Salmonella* Heidelberg isolates; *Surveillance of Human Clinical Isolates*, 2007.

*	Antimicrobial	n	MIC Percentiles		%R	Distribution (%) of MICs														
			MIC_{50}	MIC_{90}		≤ 0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	>256
	amoxicillin-clavulanic acid	120	<=1	16	8.33							72.5	3.3		10.0	5.8	**1.7**	**6.7**			
	ceftiofur	120	1	1	8.3						20.0	70.8	0.8			**8.3**					
I	ceftriaxone	120	<=0.25	<=0.25	0.0					90.8		0.8				6.7	1.7				
	ciprofloxacin	120	<=0.015	<=0.015	0.0	95.8	2.5	1.7													
	amikacin	120	1	2	0.0						0.8	60.0	34.2	4.2	0.8						
	ampicillin	120	<=1	>32	24.2							69.2	4.2	0.8	1.7			**24.2**			
	cefoxitin	120	2	4	8.3							16.7	66.7	8.3				**8.3**			
II	gentamicin	120	<=0.25	0.50	1.7					66.7	30.0	1.7					**1.7**				
	kanamycin	120	<=8	<=8	0.8										97.5	0.8	0.8		**0.8**		
	nalidixic acid	120	4	4	0.0								10.0	88.3	1.7						
	streptomycin	120	<=32	64	14.2												85.8	**10.8**	**3.3**		
	trimethoprim-sulphamethoxazole	120	<=0.12	<=0.12	1.7				93.3	4.2			0.8		**1.7**						
	chloramphenicol	120	8	8	0.0									15.8	83.3	0.8					
III	sulfisoxazole	120	64	256	8.3											8.3	36.7	39.2	5.8	1.7	**8.3**
	tetracycline	120	<=4	<=4	5.0									94.2	0.8			**5.0**			
IV																					

Note: * Roman numerals I-IV indicate the ranking of human medicine importance (VDD). The unshaded fields indicate the range tested for each antimicrobial in the plate configuration. Numbers in bold red font indicate the percentage of resistant isolates. Numbers at the right of the largest dilution are those isolates with growth in all wells within the tested range, indicating the actual MIC is greater than that range of dilutions. The numbers in the smallest dilution of the range tested indicate isolates susceptible to this level or to lower concentration of the antimicrobial. Solid bars represent the resistance breakpoints. Dotted bars represent the susceptibility breakpoints.

Table 24. Distribution of MICs and antimicrobial resistance observed in human *Salmonella* Newport isolates; *Surveillance of Human Clinical Isolates*, 2007.

*	Antimicrobial	n	MIC Percentiles		%R	Distribution (%) of MICs														
			MIC_{50}	MIC_{90}		≤ 0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	>256
	amoxicillin-clavulanic acid	43	<=1	2	0							88.4	9.3		2.3						
	ceftiofur	43	1	1	0.0						23.3	76.7									
I	ceftriaxone	43	<=0.25	<=0.25	0.0					100.0											
	ciprofloxacin	43	<=0.015	0.03	0.0	81.4		14.0		2.3		2.3									
	amikacin	43	1	2	0.0						4.7	55.8	39.5								
	ampicillin	43	<=1	2	0.0							88.4	11.6								
	cefoxitin	43	2	4	0.0							4.7	74.4	20.9							
II	gentamicin	43	<=0.25	0.50	0.0					55.8	44.2										
	kanamycin	43	<=8	<=8	0.0										100.0						
	nalidixic acid	43	4	4	2.3								25.6	72.1				2.3			
	streptomycin	43	<=32	<=32	0.0												100.0				
	trimethoprim-sulphamethoxazole	43	<=0.12	<=0.12	0.0				100.0												
	chloramphenicol	43	4	8	2.3									72.1	25.6		2.3				
III	sulfisoxazole	43	64	256	7.0												23.3	27.9	32.6	9.3	7.0
	tetracycline	43	<=4	<=4	7.0									93.0		2.3		4.7			
IV																					

Note: * Roman numerals I-IV indicate the ranking of human medicine importance (VDD). The unshaded fields indicate the range tested for each antimicrobial in the plate configuration. Numbers in bold red font indicate the percentage of resistant isolates. Numbers at the right of the largest dilution are those isolates with growth in all wells within the tested range, indicating the actual MIC is greater than that range of dilutions. The numbers in the smallest dilution of the range tested indicate isolates susceptible to this level or to lower concentration of the antimicrobial. Solid bars represent the resistance breakpoints. Dotted bars represent the susceptibility breakpoints.

Table 25. Distribution of MICs and antimicrobial resistance observed in human *Salmonella* Paratyphi A and B isolates; *Surveillance of Human Clinical Isolates*, 2007.

*	Antimicrobial	n	MIC Percentiles		%R	Distribution (%) of MICs														
			MIC_{50}	MIC_{90}		≤ 0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	>256
	amoxicillin-clavulanic acid	9	<=1	16	0							66.7	11.1	11.1		11.1					
	ceftiofur	9	1	1	0.0							100.0									
I	ceftriaxone	9	<=0.25	<=0.25	0.0					100.0											
	ciprofloxacin	9	0.06	0.50	0.0	33.3	11.1	11.1			44.4										
	amikacin	9	0.50	2	0.0						55.6	33.3	11.1								
	ampicillin	9	2	>32	11.1							33.3	44.4	11.1				**11.1**			
	cefoxitin	9	4	8	0.0								11.1	66.7	22.2						
II	gentamicin	9	<=0.25	0.50	0.0					77.8	22.2										
	kanamycin	9	<=8	<=8	0.0										100.0						
	nalidixic acid	9	4	>32	44.4									55.6				**44.4**			
	streptomycin	9	<=32	64	11.1												88.9	**11.1**			
	trimethoprim-sulphamethoxazole	9	<=0.12	0.50	0.0				88.9		11.1										
	chloramphenicol	9	8	>32	11.1										88.9			**11.1**			
III	sulfisoxazole	9	32	>256	11.1											11.1	44.4	22.2	11.1		**11.1**
	tetracycline	9	<=4	32	11.1									88.9			**11.1**				
IV																					

Note: * Roman numerals I-IV indicate the ranking of human medicine importance (VDD). The unshaded fields indicate the range tested for each antimicrobial in the plate configuration. Numbers in bold red font indicate the percentage of resistant isolates. Numbers at the right of the largest dilution are those isolates with growth in all wells within the tested range, indicating the actual MIC is greater than that range of dilutions. The numbers in the smallest dilution of the range tested indicate isolates susceptible to this level or to lower concentration of the antimicrobial. Solid bars represent the resistance breakpoints. Dotted bars represent the susceptibility breakpoints.

Table 26. Distribution of MICs and antimicrobial resistance observed in human *Salmonella* Typhi isolates; *Surveillance of Human Clinical Isolates*, 2007.

*	Antimicrobial	n	MIC Percentiles		%R	Distribution (%) of MICs														
			MIC_{50}	MIC_{90}		≤ 0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	>256
	amoxicillin-clavulanic acid	79	<=1	4	0							86.1	2.5	2.5	7.6	1.3					
	ceftiofur	79	0.50	1	0.0						54.4	45.6									
I	ceftriaxone	79	<=0.25	<=0.25	0.0					100.0											
	ciprofloxacin	79	0.25	0.25	1.3	17.7	1.3		3.8	72.2	3.8				**1.3**						
	amikacin	79	1	2	0.0							72.2	25.3	2.5							
	ampicillin	79	<=1	>32	11.4							86.1	2.5					**11.4**			
	cefoxitin	79	4	8	0.0							22.8	20.3	31.6	24.1	1.3					
II	gentamicin	79	<=0.25	0.50	0.0					79.7	15.2	5.1									
	kanamycin	79	<=8	<=8	0.0										100.0						
	nalidixic acid	79	>32	>32	82.3							1.3	10.1	5.1	1.3		**1.3**	**81.0**			
	streptomycin	79	<=32	>64	11.4												88.6		**11.4**		
	trimethoprim-sulphamethoxazole	79	<=0.12	>4	11.4				87.3	1.3					**11.4**						
	chloramphenicol	79	4	>32	11.4									57.0	31.6			**11.4**			
III	sulfisoxazole	79	64	>256	13.9											6.3	22.8	43.0	13.9		**13.9**
	tetracycline	79	<=4	<=4	7.6									91.1	1.3		**1.3**	**6.3**			
IV																					

Note: * Roman numerals I-IV indicate the ranking of human medicine importance (VDD). The unshaded fields indicate the range tested for each antimicrobial in the plate configuration. Numbers in bold red font indicate the percentage of resistant isolates. Numbers at the right of the largest dilution are those isolates with growth in all wells within the tested range, indicating the actual MIC is greater than that range of dilutions. The numbers in the smallest dilution of the range tested indicate isolates susceptible to this level or to lower concentration of the antimicrobial. Solid bars represent the resistance breakpoints. Dotted bars represent the susceptibility breakpoints.

Table 27. Distribution of MICs and antimicrobial resistance observed in human *Salmonella* Typhimurium isolates; *Surveillance of Human Clinical Isolates*, 2007.

*	Antimicrobial	n	MIC Percentiles		%R	Distribution (%) of MICs														
			MIC_{50}	MIC_{90}		≤ 0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	>256
	amoxicillin-clavulanic acid	261	<=1	16	1.92							70.5	8.0	0.8	5.0	13.8	**1.5**	**0.4**			
	ceftiofur	261	1	1	0.8						4.6	91.6	2.7	0.4		**0.8**					
I	ceftriaxone	261	<=0.25	<=0.25	0.0					98.9	0.4				0.4	0.4					
	ciprofloxacin	261	<=0.015	0.06	0.4	69.3	19.9	1.5	1.1	3.1	4.6				**0.4**						
	amikacin	261	1	2	0.0							54.4	42.1	3.1	0.4						
	ampicillin	261	<=1	>32	21.5							64.0	13.8	0.4	0.4			**21.5**			
	cefoxitin	261	2	4	0.8							2.3	73.9	21.1	1.9		**0.4**	**0.4**			
II	gentamicin	261	0.50	0.50	2.3					41.8	51.7	3.8	0.4			**0.8**	**1.5**				
	kanamycin	261	<=8	<=8	6.5										93.1	0.4			**6.5**		
	nalidixic acid	261	4	8	4.6								8.8	80.8	1.9	3.8	**0.4**	**4.2**			
	streptomycin	261	<=32	>64	24.1												75.9	**10.3**	**13.8**		
	trimethoprim-sulphamethoxazole	261	<=0.12	0.25	5.0				76.2	17.6	1.1				**5.0**						
	chloramphenicol	261	8	>32	14.9								0.4	19.2	65.1	0.4	**0.4**	**14.6**			
III	sulfisoxazole	261	64	>256	29.5											0.4	21.5	34.9	13.0	0.8	**29.5**
	tetracycline	261	<=4	>32	28.7									71.3		**3.1**	**9.6**	**16.1**			
IV																					

Note: * Roman numerals I-IV indicate the ranking of human medicine importance (VDD). The unshaded fields indicate the range tested for each antimicrobial in the plate configuration. Numbers in bold red font indicate the percentage of resistant isolates. Numbers at the right of the largest dilution are those isolates with growth in all wells within the tested range, indicating the actual MIC is greater than that range of dilutions. The numbers in the smallest dilution of the range tested indicate isolates susceptible to this level or to lower concentration of the antimicrobial. Solid bars represent the resistance breakpoints. Dotted bars represent the susceptibility breakpoints.

Table 28. Distribution of MICs and antimicrobial resistance observed in other human *Salmonella* serovars; *Surveillance of Human Clinical Isolates*, 2007.

*	Antimicrobial	n	MIC Percentiles		%R	Distribution (%) of MICs														
			MIC_{50}	MIC_{90}		≤ 0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	>256
	amoxicillin-clavulanic acid	306	<=1	2	2.61							88.2	3.6	1.0	2.9	1.6	**1.0**	**1.6**			
	ceftiofur	306	1	1	2.0					0.3	23.9	72.2	1.6			**2.0**					
I	ceftriaxone	306	<=0.25	<=0.25	0.3					97.7	0.3				0.3	1.0	0.3		**0.3**		
	ciprofloxacin	306	<=0.015	0.03	0.3	77.1	16.0		2.3	2.0	2.0	0.3			**0.3**						
	amikacin	306	1	2	0.0						2.3	65.7	30.1	2.0							
	ampicillin	306	<=1	2	7.2							84.0	7.8	1.0				**7.2**			
	cefoxitin	306	2	4	2.0							9.5	52.9	33.3	2.0	0.3	**1.0**	**1.0**			
II	gentamicin	306	<=0.25	0.50	1.0					57.8	39.2	2.0				**0.3**	**0.7**				
	kanamycin	306	<=8	<=8	1.3										98.4	0.3		**0.3**	**1.0**		
	nalidixic acid	306	4	4	4.9								23.9	68.3	2.0	1.0		**4.9**			
	streptomycin	306	<=32	<=32	9.5												90.5	**4.2**	**5.2**		
	trimethoprim-sulphamethoxazole	306	<=0.12	<=0.12	3.6				93.1	2.9	0.3				**3.6**						
	chloramphenicol	306	8	8	2.6								0.3	38.9	56.2	2.0	**0.3**	**2.3**			
III	sulfisoxazole	306	64	128	8.5											3.6	24.5	51.3	10.8	1.3	**8.5**
	tetracycline	306	<=4	>32	19.6									79.4	1.0	**1.6**	**2.3**	**15.7**			
IV																					

Note: * Roman numerals I-IV indicate the ranking of human medicine importance (VDD). The unshaded fields indicate the range tested for each antimicrobial in the plate configuration. Numbers in bold red font indicate the percentage of resistant isolates. Numbers at the right of the largest dilution are those isolates with growth in all wells within the tested range, indicating the actual MIC is greater than that range of dilutions. The numbers in the smallest dilution of the range tested indicate isolates susceptible to this level or to lower concentration of the antimicrobial. Solid bars represent the resistance breakpoints. Dotted bars represent the susceptibility breakpoints.

MIC Tables - Agri-Food Sector

Table 29. Distribution of MICs and antimicrobial resistance observed in chicken *Salmonella* isolates; *Abattoir Surveillance*, 2007.

*	Antimicrobial	n	MIC Percentiles		%R	Distribution (%) of MICs														
			MIC50	MIC90		≤ 0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	>256
I	amoxicillin-clavulanic acid	202	<=1	>32	11.9							78.2	4.0		2.5	3.5	**1.0**	**10.9**			
	ceftiofur	202	1	>8	11.9				0.5		28.7	57.4	1.5			**11.9**					
	ceftriaxone	202	<=0.25	8	0.0					88.1					5.4	4.5	2.0				
	ciprofloxacin	202	<=0.015	0.03	0.0	83.2	16.8														
II	amikacin	202	1	2	0.0						12.4	51.5	33.2	3.0							
	ampicillin	202	<=1	>32	17.8							78.2	4.0					**17.8**			
	cefoxitin	202	2	32	10.9						0.5	19.3	53.0	12.4	3.0	1.0	**7.4**	**3.5**			
	gentamicin	202	<=0.25	0.50	0.0					59.4	36.1	4.5									
	kanamycin	202	<=8	<=8	1.5										98.5				**1.5**		
	nalidixic acid	202	4	4	0.0							3.0	41.1	54.0	2.0						
	streptomycin	202	<=32	>64	37.6												62.4	**21.3**	**16.3**		
	trimethoprim-sulphamethoxazole	202	<=0.12	0.25	0.0				86.6	13.4											
III	chloramphenicol	202	4	8	1.5								5.4	46.5	45.0	1.5		**1.5**			
	sulfisoxazole	202	32	64	3.5											20.3	58.4	17.3	0.5		**3.5**
	tetracycline	202	<=4	>32	44.6									55.0	0.5		**3.0**	**41.6**			
IV																					

Note: * Roman numerals I-IV indicate the ranking of human medicine importance (VDD). The unshaded fields indicate the range tested for each antimicrobial in the plate configuration. Numbers in bold red fonts indicate the percentage of isolates resistant. Numbers at the right of the largest dilution are those isolates with growth in all wells within the tested range, indicating the actual MIC is greater than that range of dilutions. The numbers in the smallest dilution of the range tested indicate isolates susceptible to this level or to lower concentration of the antimicrobial. Solid bars represent the resistance breakpoints. Dotted bars represent the susceptibility breakpoints.

Table 30. Distribution of MICs and antimicrobial resistance observed in chicken *Salmonella* isolates from British Columbia, Saskatchewan, Ontario, and Québec; *Retail Meat Surveillance,* 2007.

*	Antimicrobial	Province	n	MIC Percentiles		%R	Distribution (%) of MICs														
				MIC50	MIC90		≤ 0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	> 256
	amoxicillin-clavulanic acid	British Columbia	18	<=1	>32	33.3							61.1			5.6		5.6	27.8			
		Ontario	172	<=1	32	11.0							82.0	1.7		2.9	2.3	3.5	7.6			
		Quebec	113	<=1	8	8.0							82.3	1.8		6.2	1.8		8.0			
		Saskatchewan	43	<=1	8	2.3							76.7		2.3	14.0	4.7		2.3			
	ceftiofur	British Columbia	18	1	>8	33.3						16.7	50.0				33.3					
		Ontario	172	1	>8	11.0					1.2	35.5	51.7	0.6		0.6	10.5					
		Quebec	113	1	1	8.8					0.9	37.2	52.2	0.9			8.8					
I		Saskatchewan	43	1	1	2.3						30.2	67.4				2.3					
	ceftriaxone	British Columbia	18	<=0.25	16	0.0					66.7					16.7	11.1	5.6				
		Ontario	172	<=0.25	8	0.0					89.0				0.6	3.5	5.2	1.7				
		Quebec	113	<=0.25	<=0.25	0.0					91.2					2.7	2.7	3.5				
		Saskatchewan	43	<=0.25	<=0.25	0.0					97.7							2.3				
	ciprofloxacin	British Columbia	18	<=0.015	0.03	0.0	83.3	16.7														
		Ontario	172	<=0.015	0.03	0.0	78.5	21.5														
		Quebec	113	<=0.015	0.03	0.0	85.0	15.0														
		Saskatchewan	43	<=0.015	0.03	0.0	86.0	14.0														
	amikacin	British Columbia	18	1	2	0.0						5.6	72.2	22.2								
		Ontario	172	1	2	0.0						12.2	72.1	13.4	1.7	0.6						
		Quebec	113	1	2	0.0						12.4	63.7	22.1	0.9	0.9						
		Saskatchewan	43	1	2	0.0						4.7	67.4	27.9								
	ampicillin	British Columbia	18	2	>32	38.9							50.0	11.1					38.9			
		Ontario	172	<=1	>32	16.3							80.8	2.9					16.3			
		Quebec	113	<=1	>32	15.9							80.5	3.5					15.9			
		Saskatchewan	43	<=1	>32	23.3							76.7						23.3			
II	cefoxitin	British Columbia	18	4	32	33.3								50.0	11.1	5.6		27.8	5.6			
		Ontario	172	2	32	11.0							22.7	54.1	11.6	0.6		7.6	3.5			
		Quebec	113	2	4	7.1							19.5	52.2	18.6	1.8	0.9	2.7	4.4			
		Saskatchewan	43	2	4	2.3							16.3	53.5	25.6	2.3			2.3			
	gentamicin	British Columbia	18	<=0.25	0.50	0.0					66.7	33.3										
		Ontario	172	<=0.25	0.50	1.7					77.9	19.2	0.6	0.6			0.6	1.2				
		Quebec	113	<=0.25	0.50	2.7					69.0	27.4		0.9			0.9	1.8				
		Saskatchewan	43	<=0.25	0.50	0.0					60.5	39.5										

Note: * Roman numerals I-IV indicate the ranking of human medicine importance (VDD). The unshaded fields indicate the range tested for each antimicrobial in the plate configuration. Numbers in bold red fonts indicate the percentage of isolates resistant. Numbers at the right of the largest dilution are those isolates with growth in all wells within the tested range, indicating the actual MIC is greater than that range of dilutions. The numbers in the smallest dilution of the range tested indicate isolates susceptible to this level or to lower concentration of the antimicrobial. Solid bars represent the resistance breakpoints. Dotted bars represent the susceptibility breakpoints.

Table 30 (continued). Distribution of MICs and antimicrobial resistance observed in chicken *Salmonella* isolates from British Columbia, Saskatchewan, Ontario, and Québec; *Retail Meat Surveillance,* 2007.

*	Antimicrobial	Province	n	MIC Percentiles		%R	Distribution (%) of MICs														
				MIC50	MIC90		≤ 0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	> 256
	kanamycin	British Columbia	18	<=8	<=8	0.0										100.0						
		Ontario	172	<=8	<=8	1.2										98.3	0.6			1.2		
		Quebec	113	<=8	<=8	0.0										100.0						
		Saskatchewan	43	<=8	<=8	2.3										97.7				2.3		
	nalidixic acid	British Columbia	18	4	4	0.0								33.3	61.1	5.6						
		Ontario	172	4	4	0.0							2.3	33.1	58.7	5.8						
		Quebec	113	4	4	0.0							1.8	32.7	64.6	0.9						
		Saskatchewan	43	4	4	0.0								34.9	65.1							
II	streptomycin	British Columbia	18	<=32	64	11.1												88.9	5.6	5.6		
		Ontario	172	<=32	>64	30.8												69.2	18.6	12.2		
		Quebec	113	<=32	>64	37.2												62.8	24.8	12.4		
		Saskatchewan	43	<=32	>64	37.2												62.8	16.3	20.9		
	trimethoprim-sulphamethoxazole	British Columbia	18	<=0.12	0.25	0.0				83.3	16.7											
		Ontario	172	<=0.12	0.25	0.6				87.8	11.6					0.6						
		Quebec	113	<=0.12	0.25	0.0				85.0	12.4	0.9		1.8								
		Saskatchewan	43	<=0.12	0.25	2.3				88.4	9.3					2.3						
	chloramphenicol	British Columbia	18	4	8	0.0								5.6	50.0	44.4						
		Ontario	172	4	8	0.0								2.9	53.5	43.0	0.6					
		Quebec	113	8	8	0.0								5.3	41.6	53.1						
		Saskatchewan	43	8	8	2.3								4.7	41.9	51.2			2.3			
	sulfisoxazole	British Columbia	18	32	64	0.0											38.9	44.4	16.7			
III		Ontario	172	32	64	3.5											32.0	56.4	7.6	0.6		3.5
		Quebec	113	32	64	8.8											27.4	50.4	13.3			8.8
		Saskatchewan	43	32	64	7.0											20.9	67.4	4.7			7.0
	tetracycline	British Columbia	18	<=4	>32	16.7									77.8	5.6		5.6	11.1			
		Ontario	172	<=4	>32	34.3									64.5	1.2		2.3	32.0			
		Quebec	113	<=4	>32	37.2									62.8			2.7	34.5			
		Saskatchewan	43	<=4	>32	34.9									65.1			4.7	30.2			
IV																						

Note: * Roman numerals I-IV indicate the ranking of human medicine importance (VDD). The unshaded fields indicate the range tested for each antimicrobial in the plate configuration. Numbers in bold red fonts indicate the percentage of isolates resistant. Numbers at the right of the largest dilution are those isolates with growth in all wells within the tested range, indicating the actual MIC is greater than that range of dilutions. The numbers in the smallest dilution of the range tested indicate isolates susceptible to this level or to lower concentration of the antimicrobial. Solid bars represent the resistance breakpoints. Dotted bars represent the susceptibility breakpoints.

Table 31. Distribution of MICs and antimicrobial resistance observed in chicken *Salmonella* isolates; *Surveillance of Animal Clinical Isolates*, 2007.

*	Antimicrobial	n	MIC Percentiles		%R	Distribution (%) of MICs														
			MIC50	MIC90		≤ 0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	>256
	amoxicillin-clavulanic acid	95	<=1	32	12.6							84.2	1.1			2.1	3.2	9.5			
	ceftiofur	95	1	>8	12.6						8.4	78.9				12.6					
I	ceftriaxone	95	<=0.25	8	1.1					87.4					5.3	3.2	3.2	1.1			
	ciprofloxacin	95	<=0.015	0.03	0.0	80.0	20.0														
	amikacin	95	1	2	0.0						6.3	77.9	11.6	4.2							
	ampicillin	95	<=1	>32	14.7							82.1	3.2					14.7			
	cefoxitin	95	2	32	12.6							9.5	68.4	9.5			7.4	5.3			
II	gentamicin	95	<=0.25	0.50	3.2					69.5	24.2	3.2				1.1	2.1				
	kanamycin	95	<=8	<=8	3.2										95.8		1.1		3.2		
	nalidixic acid	95	4	4	0.0								31.6	68.4							
	streptomycin	95	<=32	<=32	7.4												92.6	5.3	2.1		
	trimethoprim-sulphamethoxazole	95	<=0.12	<=0.12	0.0				92.6	7.4											
	chloramphenicol	95	8	8	0.0									33.7	66.3						
III	sulfisoxazole	95	32	64	2.1											13.7	71.6	12.6			2.1
	tetracycline	95	<=4	>32	13.7									86.3				13.7			
IV																					

Note: * Roman numerals I-IV indicate the ranking of human medicine importance (VDD). The unshaded fields indicate the range tested for each antimicrobial in the plate configuration. Numbers in bold red fonts indicate the percentage of isolates resistant. Numbers at the right of the largest dilution are those isolates with growth in all wells within the tested range, indicating the actual MIC is greater than that range of dilutions. The numbers in the smallest dilution of the range tested indicate isolates susceptible to this level or to lower concentration of the antimicrobial. Solid bars represent the resistance breakpoints. Dotted bars represent the susceptibility breakpoints.

Table 32. Distribution of MICs and antimicrobial resistance observed in chicken *E. coli* isolates; *Abattoir Surveillance*, 2007.

*	Antimicrobial	n	MIC Percentiles		%R	Distribution (%) of MICs														
			MIC50	MIC90		≤ 0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	>256
	amoxicillin-clavulanic acid	180	4	32	26.7							3.3	27.2	30.6	11.1	1.1	**20.6**	**6.1**			
	ceftiofur	180	0.50	>8	26.1				3.3	35.0	32.2	1.7	1.7		**15.0**	**11.1**					
I	ceftriaxone	180	<=0.25	16	0.0					71.7	0.6	1.7		1.7	10.0	12.8	1.7				
	ciprofloxacin	180	<=0.015	<=0.015	0.0	97.2	0.6	0.6	1.1	0.6											
	amikacin	180	2	4	0.0						0.6	25.0	62.8	10.6	1.1						
	ampicillin	180	4	>32	38.9							12.2	35.6	12.8	0.6		**0.6**	**38.3**			
	cefoxitin	180	4	>32	27.2						0.6	0.6	16.7	41.1	13.3	0.6	**5.0**	**22.2**			
II	gentamicin	180	0.50	16	11.1					12.2	61.7	11.1		2.2	1.7	**5.6**	**5.6**				
	kanamycin	180	<=8	>64	10.6										86.7	1.7	1.1	**0.6**	**10.0**		
	nalidixic acid	180	2	2	2.2							23.3	68.3	6.1			**1.1**	**1.1**			
	streptomycin	180	<=32	>64	40.0												60.0	**17.8**	**22.2**		
	trimethoprim-sulphamethoxazole	180	<=0.12	0.50	4.4				55.0	34.4	5.6	0.6			**4.4**						
	chloramphenicol	180	4	8	4.4								5.6	48.9	39.4	1.7		**4.4**			
III	sulfisoxazole	180	<=16	>256	40.0											53.3	6.7				**40.0**
	tetracycline	180	>32	>32	57.2									42.8			**5.0**	**52.2**			
IV																					

Note: * Roman numerals I-IV indicate the ranking of human medicine importance (VDD). The unshaded fields indicate the range tested for each antimicrobial in the plate configuration. Numbers in bold red fonts indicate the percentage of isolates resistant. Numbers at the right of the largest dilution are those isolates with growth in all wells within the tested range, indicating the actual MIC is greater than that range of dilutions. The numbers in the smallest dilution of the range tested indicate isolates susceptible to this level or to lower concentration of the antimicrobial. Solid bars represent the resistance breakpoints. Dotted bars represent the susceptibility breakpoints.

Table 33. Distribution of MICs and antimicrobial resistance observed in chicken *E. coli* isolates from British Columbia, Saskatchewan, Ontario, and Québec; *Retail Meat Surveillance*, 2007.

*	Antimicrobial	Province	n	MIC Percentiles		%R	Distribution (%) of MICs														
				MIC50	MIC90		≤ 0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	> 256
	amoxicillin-clavulanic acid	British Columbia	42	8	32	33.3							2.4	11.9	33.3	19.0		31.0	2.4			
		Ontario	157	4	32	26.8							4.5	26.8	29.3	10.8	1.9	22.3	4.5			
		Quebec	128	4	32	18.0							5.5	34.4	24.2	15.6	2.3	14.8	3.1			
		Saskatchewan	75	4	32	17.3							9.3	26.7	33.3	13.3		17.3				
	ceftiofur	British Columbia	42	0.50	8	28.6				2.4	23.8	26.2	7.1	7.1	4.8	19.0	9.5					
		Ontario	157	0.50	8	22.3				1.3	38.9	32.5	1.3		3.8	15.9	6.4					
		Quebec	128	0.50	8	13.3				4.7	38.3	37.5	1.6	0.8	3.9	10.2	3.1					
I		Saskatchewan	75	0.50	8	13.3				6.7	41.3	33.3	2.7		2.7	8.0	5.3					
	ceftriaxone	British Columbia	42	<=0.25	8	0.0					54.8	2.4	9.5		4.8	21.4	7.1					
		Ontario	157	<=0.25	8	0.6					72.6		1.3	0.6	4.5	14.6	5.1	0.6	0.6			
		Quebec	128	<=0.25	8	0.0					82.0		0.8	0.8	4.7	5.5	5.5	0.8				
		Saskatchewan	75	<=0.25	8	0.0					81.3	1.3	1.3		4.0	6.7	5.3					
	ciprofloxacin	British Columbia	42	<=0.015	<=0.015	0.0	95.2			2.4	2.4											
		Ontario	157	<=0.015	<=0.015	0.0	96.8			1.3	1.9											
		Quebec	128	<=0.015	<=0.015	0.0	94.5	2.3		2.3	0.8											
		Saskatchewan	75	<=0.015	<=0.015	0.0	94.7			2.7	2.7											
	amikacin	British Columbia	42	2	4	0.0							26.2	57.1	11.9	4.8						
		Ontario	157	2	4	0.0						1.3	17.2	65.0	14.0	1.9	0.6					
		Quebec	128	2	2	0.0						2.3	27.3	60.9	8.6	0.8						
		Saskatchewan	75	2	2	0.0							25.3	69.3	4.0	1.3						
	ampicillin	British Columbia	42	>32	>32	59.5							7.1	23.8	9.5				59.5			
		Ontario	157	4	>32	38.9							14.0	31.8	14.6		0.6		38.9			
		Quebec	128	2	>32	34.4							18.0	38.3	9.4			0.8	33.6			
		Saskatchewan	75	2	>32	34.7							18.7	33.3	12.0		1.3		34.7			
II	cefoxitin	British Columbia	42	8	>32	33.3								21.4	28.6	14.3	2.4	11.9	21.4			
		Ontario	157	4	>32	25.5								16.6	49.7	6.4	1.9	3.8	21.7			
		Quebec	128	4	>32	17.2							0.8	21.9	53.9	4.7	1.6	6.3	10.9			
		Saskatchewan	75	4	32	16.0							1.3	30.7	42.7	8.0	1.3	8.0	8.0			
	gentamicin	British Columbia	42	0.50	1	0.0					4.8	73.8	14.3	2.4	2.4	2.4						
		Ontario	157	0.50	16	13.4					7.0	63.1	15.3	0.6		0.6	3.8	9.6				
		Quebec	128	0.50	>16	24.2					18.0	49.2	7.8			0.8	10.9	13.3				
		Saskatchewan	75	0.50	16	10.7					16.0	61.3	8.0		2.7	1.3	4.0	6.7				

Note: * Roman numerals I-IV indicate the ranking of human medicine importance (VDD). The unshaded fields indicate the range tested for each antimicrobial in the plate configuration. Numbers in bold red fonts indicate the percentage of isolates resistant. Numbers at the right of the largest dilution are those isolates with growth in all wells within the tested range, indicating the actual MIC is greater than that range of dilutions. The numbers in the smallest dilution of the range tested indicate isolates susceptible to this level or to lower concentration of the antimicrobial. Solid bars represent the resistance breakpoints. Dotted bars represent the susceptibility breakpoints.

Table 33 (continued). Distribution of MICs and antimicrobial resistance observed in chicken *E. coli* isolates from British Columbia, Saskatchewan, Ontario, and Québec; *Retail Meat Surveillance*, 2007.

*	Antimicrobial	Province	n	MIC Percentiles		%R	Distribution (%) of MICs														
				MIC50	MIC90		≤ 0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	> 256
	kanamycin	British Columbia	42	<=8	<=8	2.4										97.6				2.4		
		Ontario	157	<=8	>64	10.2										86.6	3.2			10.2		
		Quebec	128	<=8	16	7.8										87.5	4.7		0.8	7.0		
		Saskatchewan	75	<=8	>64	10.7										85.3	4.0			10.7		
	nalidixic acid	British Columbia	42	2	4	4.8							4.8	78.6	9.5	2.4			4.8			
		Ontario	157	2	4	3.2							10.8	77.7	7.6	0.6			3.2			
		Quebec	128	2	2	3.1							18.8	72.7	5.5			0.8	2.3			
		Saskatchewan	75	2	2	5.3						1.3	22.7	69.3	1.3			2.7	2.7			
II	streptomycin	British Columbia	42	<=32	64	21.4												78.6	11.9	9.5		
		Ontario	157	<=32	>64	30.6												69.4	12.7	17.8		
		Quebec	128	<=32	>64	36.7												63.3	18.0	18.8		
		Saskatchewan	75	<=32	>64	32.0												68.0	14.7	17.3		
	trimethoprim-sulphamethoxazole	British Columbia	42	<=0.12	>4	16.7				59.5	19.0	4.8				16.7						
		Ontario	157	<=0.12	0.50	3.8				58.0	31.2	6.4		0.6		3.8						
		Quebec	128	<=0.12	>4	11.7				53.1	28.1	5.5	1.6			11.7						
		Saskatchewan	75	<=0.12	0.25	4.0				62.7	30.7	2.7				4.0						
	chloramphenicol	British Columbia	42	8	8	2.4								2.4	47.6	47.6			2.4			
		Ontario	157	4	8	3.2								3.8	54.8	38.2			3.2			
		Quebec	128	4	8	2.3								7.8	57.8	31.3	0.8		2.3			
		Saskatchewan	75	4	8	1.3								1.3	68.0	29.3			1.3			
	sulfisoxazole	British Columbia	42	32	>256	26.2											47.6	23.8	2.4			26.2
III		Ontario	157	<=16	>256	28.0											61.1	10.8				28.0
		Quebec	128	32	>256	46.9											46.1	7.0				46.9
		Saskatchewan	75	<=16	>256	29.3											62.7	8.0				29.3
	tetracycline	British Columbia	42	<=4	>32	45.2									54.8				45.2			
		Ontario	157	<=4	>32	48.4									50.3	1.3	0.6	1.9	45.9			
		Quebec	128	<=4	>32	48.4									50.8	0.8	0.8	3.1	44.5			
		Saskatchewan	75	<=4	>32	44.0									56.0			4.0	40.0			
IV																						

Note: * Roman numerals I-IV indicate the ranking of human medicine importance (VDD). The unshaded fields indicate the range tested for each antimicrobial in the plate configuration. Numbers in bold red fonts indicate the percentage of isolates resistant. Numbers at the right of the largest dilution are those isolates with growth in all wells within the tested range, indicating the actual MIC is greater than that range of dilutions. The numbers in the smallest dilution of the range tested indicate isolates susceptible to this level or to lower concentration of the antimicrobial. Solid bars represent the resistance breakpoints. Dotted bars represent the susceptibility breakpoints.

Table 34. Distribution of MICs and antimicrobial resistance observed in chicken *Campylobacter* species from British Columbia, Saskatchewan, Ontario, and Québec; *Retail Meat Surveillance,* 2007.

*	Antimicrobial	Species	Province	n	MIC Percentiles		%R	Distribution (%) of MICs												
					MIC50	MIC90		≤0.016	0.032	0.064	0.125	0.25	0.5	1	2	4	8	16	32	64	>64
	ciprofloxacin	*C. coli*	British Columbia	2	0.125	0.125	0.0			50.0	50.0										
	ciprofloxacin	*C. coli*	Ontario	17	0.125	0.25	5.9			23.5	58.8	11.8					**5.9**				
	ciprofloxacin	*C. coli*	Québec	14	0.25	8	42.9				14.3	42.9					**35.7**		**7.1**		
	ciprofloxacin	*C. coli*	Saskatchewan	10	0.125	16	20.0			40.0	20.0	20.0					**10.0**	**10.0**			
	ciprofloxacin	*C. jejuni*	British Columbia	26	0.125	0.125	3.8			46.2	50.0						**3.8**				
	ciprofloxacin	*C. jejuni*	Ontario	97	0.064	0.25	0.0			56.7	29.9	13.4									
	ciprofloxacin	*C. jejuni*	Québec	44	0.064	0.25	4.5			63.6	20.5	11.4					**4.5**				
	ciprofloxacin	*C. jejuni*	Saskatchewan	39	0.125	0.125	2.6			41.0	53.8	2.6					**2.6**				
	ciprofloxacin	*Campylobacter* spp.	British Columbia																		
	ciprofloxacin	*Campylobacter* spp.	Ontario	3	0.064	0.125	0.0			66.7	33.3										
	ciprofloxacin	*Campylobacter* spp.	Québec	1	0.064	0.064	0.0			100.0											
I	ciprofloxacin	*Campylobacter* spp.	Saskatchewan																		
	telithromycine	*C. coli*	British Columbia	2	0.5	0.5	0.0					50.0	50.0								
	telithromycine	*C. coli*	Ontario	17	1	2	0.0					5.9	29.4	52.9	11.8						
	telithromycine	*C. coli*	Québec	14	1	16	21.4					7.1	28.6	21.4		7.1	14.3	**21.4**			
	telithromycine	*C. coli*	Saskatchewan	10	0.5	16	10.0					10.0	50.0	20.0	10.0			**10.0**			
	telithromycine	*C. jejuni*	British Columbia	26	0.5	1	0.0					15.4	53.8	26.9	3.8						
	telithromycine	*C. jejuni*	Ontario	97	0.5	2	1.0					14.4	51.5	17.5	14.4		1.0	**1.0**			
	telithromycine	*C. jejuni*	Québec	44	0.5	2	0.0					18.2	52.3	15.9	9.1	2.3	2.3				
	telithromycine	*C. jejuni*	Saskatchewan	39	0.5	1	0.0					10.3	51.3	33.3	5.1						
	telithromycine	*Campylobacter* spp.	British Columbia																		
	telithromycine	*Campylobacter* spp.	Ontario	3	0.5	0.5	0.0						100.0								
	telithromycine	*Campylobacter* spp.	Québec	1	0.25	0.25	0.0					100.0									
	telithromycine	*Campylobacter* spp.	Saskatchewan																		
	azythromycin	*C. coli*	British Columbia	2	0.032	0.032	0.0		100.0												
	azythromycin	*C. coli*	Ontario	17	0.064	0.125	0.0	5.9	23.5	52.9	17.6										
	azythromycin	*C. coli*	Québec	14	0.064	>64	28.6	28.6	21.4	14.3	7.1										**28.6**
	azythromycin	*C. coli*	Saskatchewan	10	0.064	>64	10.0		50.0	40.0											**10.0**
	azythromycin	*C. jejuni*	British Columbia	26	0.064	0.064	0.0	3.8	38.5	57.7											
II	azythromycin	*C. jejuni*	Ontario	97	0.064	0.125	2.1	5.2	33.0	45.4	14.4										**2.1**
	azythromycin	*C. jejuni*	Québec	44	0.064	0.125	4.5	4.5	45.5	34.1	11.4										**4.5**
	azythromycin	*C. jejuni*	Saskatchewan	39	0.064	0.064	0.0		38.5	56.4	5.1										
	azythromycin	*Campylobacter* spp.	British Columbia																		
	azythromycin	*Campylobacter* spp.	Ontario	3	0.032	0.032	0.0		100.0												
	azythromycin	*Campylobacter* spp.	Québec	1	0.032	0.032	0.0		100.0												
	azythromycin	*Campylobacter* spp.	Saskatchewan																		

Note: * Roman numerals I-IV indicate the ranking of human medicine importance (VDD). The unshaded fields indicate the range tested for each antimicrobial in the plate configuration. Numbers in bold red fonts indicate the percentage of isolates resistant. Numbers at the right of the largest dilution are those isolates with growth in all wells within the tested range, indicating the actual MIC is greater than that range of dilutions. The numbers in the smallest dilution of the range tested indicate isolates susceptible to this level or to lower concentration of the antimicrobial. Solid bars represent the resistance breakpoints. Dotted bars represent the susceptibility breakpoints.

Campylobacter spp. may include some species that are intrinsically resistant to nalidixic acid and ciprofloxacin.

Table 34 (continued). Distribution of MICs and antimicrobial resistance observed in chicken *Campylobacter* species from British Columbia, Saskatchewan, Ontario, and Québec; *Retail Meat Surveillance*, 2007.

*	Antimicrobial	Species	Province	n	MIC Percentiles		%R	Distribution (%) of MICs													
					MIC50	MIC90		≤0.016	0.032	0.064	0.125	0.25	0.5	1	2	4	8	16	32	64	>64
	clindamycin	*C. coli*	British Columbia	2	0.125	0.125	0.0				100.0										
	clindamycin	*C. coli*	Ontario	17	0.125	1	0.0			17.6	41.2	23.5		11.8		5.9					
	clindamycin	*C. coli*	Québec	14	0.125	4	7.1			28.6	28.6	7.1	7.1			21.4	**7.1**				
	clindamycin	*C. coli*	Saskatchewan	10	0.125	16	10.0			10.0	50.0	20.0	10.0					**10.0**			
	clindamycin	*C. jejuni*	British Columbia	26	0.125	0.25	0.0			7.7	46.2	38.5	3.8	3.8							
	clindamycin	*C. jejuni*	Ontario	97	0.125	0.25	1.0		1.0	9.3	58.8	24.7	4.1			1.0	**1.0**				
	clindamycin	*C. jejuni*	Québec	44	0.125	0.25	2.3			11.4	61.4	18.2	4.5			2.3	**2.3**				
	clindamycin	*C. jejuni*	Saskatchewan	39	0.125	0.25	0.0			10.3	56.4	30.8	2.6								
	clindamycin	*Campylobacter* spp.	British Columbia																		
	clindamycin	*Campylobacter* spp.	Ontario	3	0.125	0.125	0.0			33.3	66.7										
	clindamycin	*Campylobacter* spp.	Québec	1	0.125	0.125	0.0				100.0										
	clindamycin	*Campylobacter* spp.	Saskatchewan																		
	erythromycin	*C. coli*	British Columbia	2	0.25	0.25	0.0					100.0									
	erythromycin	*C. coli*	Ontario	17	0.5	1	0.0					35.3	35.3	23.5	5.9						
	erythromycin	*C. coli*	Québec	14	0.5	>64	28.6				7.1	28.6	21.4		14.3						**28.6**
	erythromycin	*C. coli*	Saskatchewan	10	0.25	>64	10.0				20.0	40.0	20.0	10.0							**10.0**
	erythromycin	*C. jejuni*	British Columbia	26	0.25	0.5	0.0				11.5	65.4	23.1								
II	erythromycin	*C. jejuni*	Ontario	97	0.25	1	2.1				9.3	48.5	27.8	10.3	2.1						**2.1**
	erythromycin	*C. jejuni*	Québec	44	0.25	1	4.5				13.6	47.7	22.7	9.1	2.3						**4.5**
	erythromycin	*C. jejuni*	Saskatchewan	39	0.25	0.5	0.0				5.1	56.4	33.3	5.1							
	erythromycin	*Campylobacter* spp.	British Columbia																		
	erythromycin	*Campylobacter* spp.	Ontario	3	0.25	0.25	0.0					100.0									
	erythromycin	*Campylobacter* spp.	Québec	1	0.125	0.125	0.0				100.0										
	erythromycin	*Campylobacter* spp.	Saskatchewan																		
	gentamicin	*C. coli*	British Columbia	2	0.5	0.5	0.0						100.0								
	gentamicin	*C. coli*	Ontario	17	0.5	1	0.0						70.6	23.5	5.9						
	gentamicin	*C. coli*	Québec	14	0.5	0.5	0.0					21.4	71.4	7.1							
	gentamicin	*C. coli*	Saskatchewan	10	0.5	1	0.0				10.0		70.0	20.0							
	gentamicin	*C. jejuni*	British Columbia	26	0.5	0.5	0.0					3.8	92.3	3.8							
	gentamicin	*C. jejuni*	Ontario	97	0.5	1	0.0					2.1	77.3	20.6							
	gentamicin	*C. jejuni*	Québec	44	0.5	0.5	0.0					4.5	93.2	2.3							
	gentamicin	*C. jejuni*	Saskatchewan	39	0.5	1	0.0						76.9	23.1							
	gentamicin	*Campylobacter* spp.	British Columbia																		
	gentamicin	*Campylobacter* spp.	Ontario	3	0.5	0.5	0.0						100.0								
	gentamicin	*Campylobacter* spp.	Québec	1	0.5	0.5	0.0						100.0								
	gentamicin	*Campylobacter* spp.	Saskatchewan																		

Note: * Roman numerals I-IV indicate the ranking of human medicine importance (VDD). The unshaded fields indicate the range tested for each antimicrobial in the plate configuration. Numbers in bold red fonts indicate the percentage of isolates resistant. Numbers at the right of the largest dilution are those isolates with growth in all wells within the tested range, indicating the actual MIC is greater than that range of dilutions. The numbers in the smallest dilution of the range tested indicate isolates susceptible to this level or to lower concentration of the antimicrobial. Solid bars represent the resistance breakpoints. Dotted bars represent the susceptibility breakpoints.

Campylobacter spp. may include some species that are intrinsically resistant to nalidixic acid and ciprofloxacin.

Table 34 (continued). Distribution of MICs and antimicrobial resistance observed in chicken *Campylobacter* species from British Columbia, Saskatchewan, Ontario, and Québec; *Retail Meat Surveillance*, 2007.

*	Antimicrobial	Species	Province	n	MIC Percentiles		%R	Distribution (%) of MICs												
					MIC50	MIC90		≤0.016	0.032	0.064	0.125	0.25	0.5	1	2	4	8	16	32	64	>64
II	nalidixic acid	*C. coli*	British Columbia	2	<=4	<=4	0.0									100.0					
	nalidixic acid	*C. coli*	Ontario	17	<=4	16	5.9									58.8	29.4	5.9			**5.9**
	nalidixic acid	*C. coli*	Québec	14	8	>64	42.9									14.3	42.9				**42.9**
	nalidixic acid	*C. coli*	Saskatchewan	10	8	>64	20.0									50.0	30.0				**20.0**
	nalidixic acid	*C. jejuni*	British Columbia	26	<=4	8	3.8									88.5	7.7			**3.8**	
	nalidixic acid	*C. jejuni*	Ontario	97	<=4	8	0.0									80.4	19.6				
	nalidixic acid	*C. jejuni*	Québec	44	<=4	8	4.5									81.8	13.6				**4.5**
	nalidixic acid	*C. jejuni*	Saskatchewan	39	<=4	8	2.6									82.1	15.4				**2.6**
	nalidixic acid	*Campylobacter* spp.	British Columbia																		
	nalidixic acid	*Campylobacter* spp.	Ontario	3	<=4	8	0.0									66.7	33.3				
	nalidixic acid	*Campylobacter* spp.	Québec	1	<=4	<=4	0.0									100.0					
	nalidixic acid	*Campylobacter* spp.	Saskatchewan																		
III	florfenicol	*C. coli*	British Columbia	2	1	1	0.0						50.0	50.0							
	florfenicol	*C. coli*	Ontario	17	1	1	0.0						23.5	70.6	5.9						
	florfenicol	*C. coli*	Québec	14	1	2	0.0							78.6	21.4						
	florfenicol	*C. coli*	Saskatchewan	10	1	1	0.0						40.0	60.0							
	florfenicol	*C. jejuni*	British Columbia	26	1	1	0.0						30.8	69.2							
	florfenicol	*C. jejuni*	Ontario	97	1	1	0.0						27.8	64.9	7.2						
	florfenicol	*C. jejuni*	Québec	44	1	1	0.0						25.0	65.9	9.1						
	florfenicol	*C. jejuni*	Saskatchewan	39	1	1	0.0					2.6	20.5	71.8	5.1						
	florfenicol	*Campylobacter* spp.	British Columbia																		
	florfenicol	*Campylobacter* spp.	Ontario	3	1	1	0.0							100.0							
	florfenicol	*Campylobacter* spp.	Québec	1	0.5	0.5	0.0						100.0								
	florfenicol	*Campylobacter* spp.	Saskatchewan																		
IV	tetracycline	*C. coli*	British Columbia	2	0.125	0.125	0.0				100.0										
	tetracycline	*C. coli*	Ontario	17	2	>64	47.1				17.6	11.8	5.9	11.8	5.9					**23.5**	**23.5**
	tetracycline	*C. coli*	Québec	14	0.5	>64	21.4				28.6	7.1	28.6	14.3						**7.1**	**14.3**
	tetracycline	*C. coli*	Saskatchewan	10	32	>64	70.0				20.0	10.0							**40.0**	**10.0**	**20.0**
	tetracycline	*C. jejuni*	British Columbia	26	0.25	>64	42.3				30.8	26.9							**3.8**	**15.4**	**23.1**
	tetracycline	*C. jejuni*	Ontario	97	64	>64	57.7			1.0	15.5	12.4	5.2	6.2	1.0		1.0		**1.0**	**36.1**	**20.6**
	tetracycline	*C. jejuni*	Québec	44	64	>64	63.6				18.2	11.4	4.5				2.3		**4.5**	**36.4**	**22.7**
	tetracycline	*C. jejuni*	Saskatchewan	39	0.25	>64	30.8				33.3	28.2	5.1		2.6				**7.7**	**12.8**	**10.3**
	tetracycline	*Campylobacter* spp.	British Columbia																		
	tetracycline	*Campylobacter* spp.	Ontario	3	64	>64	100.0													**66.7**	**33.3**
	tetracycline	*Campylobacter* spp.	Québec	1	64	64	100.0													**100.0**	
	tetracycline	*Campylobacter* spp.	Saskatchewan																		

Note: * Roman numerals I-IV indicate the ranking of human medicine importance (VDD). The unshaded fields indicate the range tested for each antimicrobial in the plate configuration. Numbers in bold red fonts indicate the percentage of isolates resistant. Numbers at the right of the largest dilution are those isolates with growth in all wells within the tested range, indicating the actual MIC is greater than that range of dilutions. The numbers in the smallest dilution of the range tested indicate isolates susceptible to this level or to lower concentration of the antimicrobial. Solid bars represent the resistance breakpoints. Dotted bars represent the susceptibility breakpoints.

Campylobacter spp. may include some species that are intrinsically resistant to nalidixic acid and ciprofloxacin.

Table 35. Distribution of MICs and antimicrobial resistance observed in chicken *Enterococcus* species from British Columbia, Saskatchewan, Ontario, and Québec; *Retail Meat Surveillance*, 2007.

*	Antimicrobial	Species	Province	n	MIC Percentiles		%R	Distribution (%) of MICs														
					MIC50	MIC90		≤ 0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	> 2048
	ciprofloxacin	*E. faecalis*	British Columbia	38	1	2	0.0			2.6	60.5	36.8										
	ciprofloxacin	*E. faecalis*	Ontario	154	1	2	0.6			1.9	70.8	26.6	**0.6**									
	ciprofloxacin	*E. faecalis*	Québec	126	1	2	0.0		0.8	1.6	78.6	19.0										
	ciprofloxacin	*E. faecalis*	Saskatchewan	68	1	2	0.0			2.9	67.6	29.4										
	ciprofloxacin	*E. faecium*	British Columbia	2	2	2	0.0			50.0		50.0										
	ciprofloxacin	*E. faecium*	Ontario	4	1	2	0.0				75.0	25.0										
	ciprofloxacin	*E. faecium*	Québec	5	4	4	60.0				20.0	20.0	**60.0**									
	ciprofloxacin	*E. faecium*	Saskatchewan	3	2	4	33.3				33.3	33.3	**33.3**									
	ciprofloxacin	*Enterococcus* spp.	British Columbia	2	0.5	0.5	0.0		50.0	50.0												
	ciprofloxacin	*Enterococcus* spp.	Ontario	3	0.5	2	0.0		33.3	33.3		33.3										
	ciprofloxacin	*Enterococcus* spp.	Québec	8	1	2	0.0	12.5	12.5		62.5	12.5										
	ciprofloxacin	*Enterococcus* spp.	Saskatchewan	5	1	4	20.0		40.0		20.0	20.0	**20.0**									
	daptomycin	*E. faecalis*	British Columbia	38	<=0.5	1	0.0			55.3	42.1	2.6										
	daptomycin	*E. faecalis*	Ontario	154	1	1	0.0			44.8	54.5	0.6										
	daptomycin	*E. faecalis*	Québec	126	1	1	0.0			40.5	55.6	4.0										
	daptomycin	*E. faecalis*	Saskatchewan	68	1	1	0.0			48.5	51.5											
	daptomycin	*E. faecium*	British Columbia	2	2	2	0.0					100.0										
	daptomycin	*E. faecium*	Ontario	4	2	4	0.0				25.0	50.0	25.0									
	daptomycin	*E. faecium*	Québec	5	2	4	0.0					60.0	40.0									
	daptomycin	*E. faecium*	Saskatchewan	3	1	2	0.0			33.3	33.3	33.3										
	daptomycin	*Enterococcus* spp.	British Columbia	2	2	2	0.0			50.0		50.0										
	daptomycin	*Enterococcus* spp.	Ontario	3	<=0.5	<=0.5	0.0			100.0												
I	daptomycin	*Enterococcus* spp.	Québec	8	<=0.5	2	0.0			62.5	25.0	12.5										
	daptomycin	*Enterococcus* spp.	Saskatchewan	5	<=0.5	1	0.0			80.0	20.0											
	linezolid	*E. faecalis*	British Columbia	38	2	2	0.0				15.8	84.2										
	linezolid	*E. faecalis*	Ontario	154	2	2	0.0				14.9	84.4	0.6									
	linezolid	*E. faecalis*	Québec	126	2	2	0.0				13.5	86.5										
	linezolid	*E. faecalis*	Saskatchewan	68	2	2	0.0				8.8	91.2										
	linezolid	*E. faecium*	British Columbia	2	1	1	0.0				100.0											
	linezolid	*E. faecium*	Ontario	4	2	2	0.0					100.0										
	linezolid	*E. faecium*	Québec	5	2	2	0.0				20.0	80.0										
	linezolid	*E. faecium*	Saskatchewan	3	1	2	0.0				66.7	33.3										
	linezolid	*Enterococcus* spp.	British Columbia	2	2	2	0.0				50.0	50.0										
	linezolid	*Enterococcus* spp.	Ontario	3	2	2	0.0				33.3	66.7										
	linezolid	*Enterococcus* spp.	Québec	8	2	2	0.0				37.5	62.5										
	linezolid	*Enterococcus* spp.	Saskatchewan	5	1	2	0.0				60.0	40.0										
	quinupristin-dalfopristin	*E. faecium*	British Columbia	2	4	4	50.0				50.0		**50.0**									
	quinupristin-dalfopristin	*E. faecium*	Ontario	4	8	16	100.0						**25.0**	**50.0**	**25.0**							
	quinupristin-dalfopristin	*E. faecium*	Québec	5	16	16	100.0						**20.0**	**20.0**	**60.0**							
	quinupristin-dalfopristin	*E. faecium*	Saskatchewan	3	8	32	66.7					33.3		**33.3**		**33.3**						
	quinupristin-dalfopristin	*Enterococcus* spp.	Ontario	2	8	8	50.0					50.0		**50.0**								
	quinupristin-dalfopristin	*Enterococcus* spp.	British Columbia	3	4	8	66.7					33.3	**33.3**	**33.3**								
	quinupristin-dalfopristin	*Enterococcus* spp.	Québec	8	8	16	62.5					37.5	**12.5**	**37.5**	**12.5**							
	quinupristin-dalfopristin	*Enterococcus* spp.	Saskatchewan	5	2	16	40.0				20.0	40.0		**20.0**	**20.0**							

Note: * Roman numerals I-IV indicate the ranking of human medicine importance (VDD). The unshaded fields indicate the range tested for each antimicrobial in the plate configuration. Numbers in bold red fonts indicate the percentage of isolates resistant. Numbers at the right of the largest dilution are those isolates with growth in all wells within the tested range, indicating the actual MIC is greater than that range of dilutions. The numbers in the smallest dilution of the range tested indicate isolates susceptible to this level or to lower concentration of the antimicrobial. Solid bars represent the resistance breakpoints. Dotted bars represent the susceptibility breakpoints.

Table 35 (continued). Distribution of MICs and antimicrobial resistance observed in chicken *Enterococcus* species from British Columbia, Saskatchewan, Ontario, and Québec; *Retail Meat Surveillance*, 2007.

*	Antimicrobial	Species	Province	n	MIC Percentiles		%R	Distribution (%) of MICs														
					MIC50	MIC90		≤ 0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	> 2048
	tigecycline	*E. faecalis*	British Columbia	38	0.25	0.25	0.0	34.2	65.79														
	tigecycline	*E. faecalis*	Ontario	154	0.25	0.25	0.0	41.6	58.44														
	tigecycline	*E. faecalis*	Québec	126	0.25	0.25	0.0	47.6	52.38														
	tigecycline	*E. faecalis*	Saskatchewan	68	0.25	0.25	0.0	48.5	51.47														
	tigecycline	*E. faecium*	British Columbia	2	<=0.12	<=0.12	0.0	100.0															
	tigecycline	*E. faecium*	Ontario	4	<=0.12	<=0.12	0.0	100.0															
	tigecycline	*E. faecium*	Québec	5	<=0.12	<=0.12	0.0	100.0															
	tigecycline	*E. faecium*	Saskatchewan	3	<=0.12	<=0.12	0.0	100.0															
	tigecycline	*Enterococcus* spp.	British Columbia	2	<=0.12	<=0.12	0.0	100.0															
	tigecycline	*Enterococcus* spp.	Ontario	3	<=0.12	<=0.12	0.0	100.0															
	tigecycline	*Enterococcus* spp.	Québec	8	<=0.12	0.25	0.0	75.0	25,0														
I	tigecycline	*Enterococcus* spp.	Saskatchewan	5	<=0.12	<=0.12	0.0	100.0															
	vancomycin	*E. faecalis*	British Columbia	38	1	2	0.0				76.3	23.7											
	vancomycin	*E. faecalis*	Ontario	154	1	2	0.0				72.1	27.9											
	vancomycin	*E. faecalis*	Québec	126	1	2	0.0				71.4	28.6											
	vancomycin	*E. faecalis*	Saskatchewan	68	1	2	0.0				70.6	29.4											
	vancomycin	*E. faecium*	British Columbia	2	2	2	0.0			50.0		50.0											
	vancomycin	*E. faecium*	Ontario	4	<=0.5	1	0.0			75.0	25.0												
	vancomycin	*E. faecium*	Québec	5	<=0.5	1	0.0			60.0	40.0												
	vancomycin	*E. faecium*	Saskatchewan	3	<=0.5	1	0.0			66.7	33.3												
	vancomycin	*Enterococcus* spp.	British Columbia	2	1	1	0.0			50.0	50.0												
	vancomycin	*Enterococcus* spp.	Ontario	3	<=0.5	2	0.0			66.7		33.3											
	vancomycin	*Enterococcus* spp.	Québec	8	1	8	0.0			25.0	50.0	12.5		12.5									
	vancomycin	*Enterococcus* spp.	Saskatchewan	5	<=0.5	2	0.0			60.0	20.0	20.0											
	erythromycin	*E. faecalis*	British Columbia	38	1	>8	47.4			39.5	13.2				**47.4**								
	erythromycin	*E. faecalis*	Ontario	154	1	>8	39.6			43.5	11.7	5.2			**39.6**								
	erythromycin	*E. faecalis*	Québec	126	2	>8	48.4			34.9	12.7	4.0		**0.8**	**47.6**								
	erythromycin	*E. faecalis*	Saskatchewan	68	2	>8	44.1			38.2	11.8	5.9			**44.1**								
	erythromycin	*E. faecium*	British Columbia	2	2	2	0.0			50.0		50.0											
	erythromycin	*E. faecium*	Ontario	4	8	>8	50.0			25.0		25.0		**25.0**	**25.0**								
	erythromycin	*E. faecium*	Québec	5	<=0.5	>8	20.0			80.0					**20.0**								
	erythromycin	*E. faecium*	Saskatchewan	3	>8	>8	100.0								**100.0**								
	erythromycin	*Enterococcus* spp.	British Columbia	2	<=0.5	<=0.5	0.0			100.0													
	erythromycin	*Enterococcus* spp.	Ontario	3	1	>8	33.3			33.3	33.3				**33.3**								
	erythromycin	*Enterococcus* spp.	Québec	8	2	>8	37.5			50.0		12.5			**37.5**								
II	erythromycin	*Enterococcus* spp.	Saskatchewan	5	1	>8	40.0			40.0	20.0				**40.0**								
	gentamicin	*E. faecalis*	British Columbia	38	<=128	<=128	5.3											94.7		**2.6**	**2.6**		
	gentamicin	*E. faecalis*	Ontario	154	<=128	<=128	8.4											90.9	0.6	**2.6**	**0.6**	**5.2**	
	gentamicin	*E. faecalis*	Québec	126	<=128	512	11.1											87.3	1.6	**4.0**	**4.0**	**3.2**	
	gentamicin	*E. faecalis*	Saskatchewan	68	<=128	<=128	4.4											95.6		**1.5**	**1.5**	**1.5**	
	gentamicin	*E. faecium*	British Columbia	2	<=128	<=128	0.0											100.0					
	gentamicin	*E. faecium*	Ontario	4	<=128	<=128	0.0											100.0					
	gentamicin	*E. faecium*	Québec	5	<=128	<=128	0.0											100.0					
	gentamicin	*E. faecium*	Saskatchewan	3	<=128	<=128	0.0											100.0					
	gentamicin	*Enterococcus* spp.	British Columbia	2	<=128	<=128	0.0											100.0					
	gentamicin	*Enterococcus* spp.	Ontario	3	<=128	<=128	0.0											100.0					
	gentamicin	*Enterococcus* spp.	Québec	8	<=128	>1024	25.0											75.0			**12.5**	**12.5**	
	gentamicin	*Enterococcus* spp.	Saskatchewan	5	<=128	<=128	0.0											100.0					

Note: * Roman numerals I-IV indicate the ranking of human medicine importance (VDD). The unshaded fields indicate the range tested for each antimicrobial in the plate configuration. Numbers in bold red fonts indicate the percentage of isolates resistant. Numbers at the right of the largest dilution are those isolates with growth in all wells within the tested range, indicating the actual MIC is greater than that range of dilutions. The numbers in the smallest dilution of the range tested indicate isolates susceptible to this level or to lower concentration of the antimicrobial. Solid bars represent the resistance breakpoints. Dotted bars represent the susceptibility breakpoints.

Table 35 (continued). Distribution of MICs and antimicrobial resistance observed in chicken *Enterococcus* species from British Columbia, Saskatchewan, Ontario, and Québec; *Retail Meat Surveillance*, 2007.

*	Antimicrobial	Species	Province	n	MIC Percentiles		%R	Distribution (%) of MICs															
					MIC50	MIC90		≤ 0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	> 2048
	kanamycin	*E. faecalis*	British Columbia	38	<=128	>1024	15.8											84.2				**15.8**	
	kanamycin	*E. faecalis*	Ontario	154	<=128	>1024	13.6											85.1	1.299			**13.6**	
	kanamycin	*E. faecalis*	Québec	126	<=128	>1024	24.6											75.4				**24.6**	
	kanamycin	*E. faecalis*	Saskatchewan	68	<=128	>1024	20.6											79.4			**1.5**	**19.1**	
	kanamycin	*E. faecium*	Ontario	2	<=128	<=128	0.0											100.0					
	kanamycin	*E. faecium*	Ontario	4	256	512	0.0											50.0	25	25.0			
	kanamycin	*E. faecium*	Québec	5	256	512	0.0											20.0	40	40.0			
	kanamycin	*E. faecium*	Saskatchewan	3	<=128	<=128	0.0											100.0					
	kanamycin	*Enterococcus* spp.	British Columbia	2	<=128	<=128	0.0											100.0					
	kanamycin	*Enterococcus* spp.	Ontario	3	<=128	<=128	0.0											100.0					
	kanamycin	*Enterococcus* spp.	Québec	8	<=128	>1024	25.0											75.0				**25.0**	
	kanamycin	*Enterococcus* spp.	Saskatchewan	5	<=128	<=128	0.0											100.0					
	lincomycin	*E. faecalis*	British Columbia	2	16	16	50.0					50.0			**50**								
	lincomycin	*E. faecalis*	Ontario	4	>32	>32	100.0									**25.0**	**75.0**						
	lincomycin	*E. faecalis*	Québec	5	>32	>32	100.0										**100.0**						
	lincomycin	*E. faecalis*	Saskatchewan	3	>32	>32	100.0										**100.0**						
	lincomycin	*Enterococcus* spp.	British Columbia	2	>32	>32	100.0								**50**		**50.0**						
	lincomycin	*Enterococcus* spp.	Ontario	3	32	>32	100.0								**33.333**	**33.3**	**33.3**						
	lincomycin	*Enterococcus* spp.	Québec	8	>32	>32	100.0								**12.5**	**25.0**	**62.5**						
	lincomycin	*Enterococcus* spp.	Saskatchewan	5	>32	>32	100.0								**20**		**80.0**						
	penicillin	*E. faecalis*	British Columbia	38	4	4	0.0					39.5	60.5										
II	penicillin	*E. faecalis*	Ontario	154	4	4	0.0					24.0	76.0										
	penicillin	*E. faecalis*	Québec	126	4	4	0.0					26.2	73.8										
	penicillin	*E. faecalis*	Saskatchewan	68	4	4	0.0					29.4	70.6										
	penicillin	*E. faecium*	British Columbia	2	4	4	0.0					50.0	50.0										
	penicillin	*E. faecium*	Ontario	4	4	16	25.0				25.0		50.0		**25.0**								
	penicillin	*E. faecium*	Québec	5	16	>16	100.0								**60.0**	**40.0**							
	penicillin	*E. faecium*	Saskatchewan	3	8	8	0.0					33.3		66.7									
	penicillin	*Enterococcus* spp.	British Columbia	2	1	1	0.0			50.0	50.0												
	penicillin	*Enterococcus* spp.	Ontario	3	4	4	0.0			33.3			66.7										
	penicillin	*Enterococcus* spp.	Québec	8	1	4	0.0			25.0	37.5		37.5										
	penicillin	*Enterococcus* spp.	Saskatchewan	5	<=0.5	16	20.0			60.0		20.0			**20.0**								
	streptomycin	*E. faecalis*	British Columbia	38	<=512	>2048	26.3													73.7		**2.6**	**23.7**
	streptomycin	*E. faecalis*	Ontario	154	<=512	>2048	24.7													75.3	3.2	**9.1**	**12.3**
	streptomycin	*E. faecalis*	Québec	126	<=512	>2048	38.1													61.9	3.2	**12.7**	**22.2**
	streptomycin	*E. faecalis*	Saskatchewan	68	<=512	>2048	32.4													67.6		**7.4**	**25.0**
	streptomycin	*E. faecium*	British Columbia	2	<=512	<=512	0.0													100.0			
	streptomycin	*E. faecium*	Ontario	4	<=512	1024	25.0													75.0	25.0		
	streptomycin	*E. faecium*	Québec	5	<=512	1024	20.0													80.0	20.0		
	streptomycin	*E. faecium*	Saskatchewan	3	<=512	<=512	0.0													100.0			
	streptomycin	*Enterococcus* spp.	British Columbia	2	1024	1024	50.0													50.0	50.0		
	streptomycin	*Enterococcus* spp.	Ontario	3	<=512	<=512	0.0													100.0			
	streptomycin	*Enterococcus* spp.	Québec	8	<=512	>2048	25.0													75.0			**25.0**
	streptomycin	*Enterococcus* spp.	Saskatchewan	5	<=512	>2048	20.0													80.0			**20.0**

Note: * Roman numerals I-IV indicate the ranking of human medicine importance (VDD). The unshaded fields indicate the range tested for each antimicrobial in the plate configuration. Numbers in bold red fonts indicate the percentage of isolates resistant. Numbers at the right of the largest dilution are those isolates with growth in all wells within the tested range, indicating the actual MIC is greater than that range of dilutions. The numbers in the smallest dilution of the range tested indicate isolates susceptible to this level or to lower concentration of the antimicrobial. Solid bars represent the resistance breakpoints. Dotted bars represent the susceptibility breakpoints.

Table 35 (continued). Distribution of MICs and antimicrobial resistance observed in chicken *Enterococcus* species from British Columbia, Saskatchewan, Ontario, and Québec; *Retail Meat Surveillance*, 2007.

*	Antimicrobial	Species	Province	n	MIC Percentiles		%R	Distribution (%) of MICs														
					MIC50	MIC90		≤ 0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	> 2048
	tylosin	*E. faecalis*	British Columbia	38	2	>32	47.4				2.6	50.0					47.4						
	tylosin	*E. faecalis*	Ontario	154	2	>32	39.6				5.2	52.6	2.6				39.6						
	tylosin	*E. faecalis*	Québec	126	4	>32	48.4				2.4	46.8	2.4				48.4						
	tylosin	*E. faecalis*	Saskatchewan	68	2	>32	44.1				5.9	45.6	4.4				44.1						
	tylosin	*E. faecium*	British Columbia	2	4	4	0.0						100.0										
II	tylosin	*E. faecium*	Ontario	4	8	>32	25.0				25.0	25.0		25.0			25.0						
	tylosin	*E. faecium*	Québec	5	4	>32	20.0					20.0	40.0	20.0			20.0						
	tylosin	*E. faecium*	Saskatchewan	3	>32	>32	100.0										100.0						
	tylosin	*Enterococcus* spp.	British Columbia	2	2	2	0.0				50.0	50.0											
	tylosin	*Enterococcus* spp.	Ontario	3	4	>32	33.3					33.3	33.3				33.3						
	tylosin	*Enterococcus* spp.	Québec	8	4	>32	37.5				12.5	37.5	12.5				37.5						
	tylosin	*Enterococcus* spp.	Saskatchewan	5	8	>32	40.0				20.0	20.0		20.0			40.0						
	chloramphenicol	*E. faecalis*	British Columbia	38	8	16	2.6						13.2	76.3	7.9		2.6						
	chloramphenicol	*E. faecalis*	Ontario	154	8	8	0.6						3.2	93.5	2.6		0.6						
	chloramphenicol	*E. faecalis*	Québec	126	8	8	4.8						4.8	85.7	4.8		4.8						
	chloramphenicol	*E. faecalis*	Saskatchewan	68	8	8	1.5							91.2	7.4		1.5						
	chloramphenicol	*E. faecium*	British Columbia	2	4	4	0.0						100.0										
	chloramphenicol	*E. faecium*	Ontario	4	8	8	0.0						50.0	50.0									
	chloramphenicol	*E. faecium*	Québec	5	4	8	0.0						80.0	20.0									
	chloramphenicol	*E. faecium*	Saskatchewan	3	8	8	0.0						33.3	66.7									
	chloramphenicol	*Enterococcus spp.*	British Columbia	2	4	4	0.0						100.0										
	chloramphenicol	*Enterococcus spp.*	Ontario	3	8	8	0.0						33.3	66.7									
	chloramphenicol	*Enterococcus spp.*	Québec	8	4	32	12.5						62.5	25.0		12.5							
	chloramphenicol	*Enterococcus spp.*	Saskatchewan	5	4	8	0.0						80.0	20.0									
	nitrofurantoin	*E. faecalis*	British Columbia	38	8	16	0.0							63.2	28.9	2.6	5.3						
	nitrofurantoin	*E. faecalis*	Ontario	154	8	16	0.6						1.3	54.5	34.4	6.5	2.6	0.6					
	nitrofurantoin	*E. faecalis*	Québec	126	8	16	0.0							65.9	29.4	3.2	1.6						
	nitrofurantoin	*E. faecalis*	Saskatchewan	68	8	16	0.0							55.9	42.6		1.5						
	nitrofurantoin	*E. faecium*	British Columbia	2	64	64	0.0									50.0	50.0						
III	nitrofurantoin	*E. faecium*	Ontario	4	64	64	0.0										100.0						
	nitrofurantoin	*E. faecium*	Québec	5	>64	>64	100.0											100.0					
	nitrofurantoin	*E. faecium*	Saskatchewan	3	64	>64	33.3										66.7	33.3					
	nitrofurantoin	*Enterococcus* spp.	British Columbia	2	>64	>64	50.0									50.0		50.0					
	nitrofurantoin	*Enterococcus* spp.	Ontario	3	>64	>64	66.7								33.3			66.7					
	nitrofurantoin	*Enterococcus* spp.	Québec	8	32	>64	37.5							50.0		12.5		37.5					
	nitrofurantoin	*Enterococcus* spp.	Saskatchewan	5	32	>64	40.0								40.0	20.0		40.0					
	tetracycline	*E. faecalis*	British Columbia	38	>32	>32	86.8						13.2			5.3	81.6						
	tetracycline	*E. faecalis*	Ontario	154	>32	>32	90.3						9.7		1.9	11.7	76.6						
	tetracycline	*E. faecalis*	Québec	126	>32	>32	88.1						11.9			10.3	77.8						
	tetracycline	*E. faecalis*	Saskatchewan	68	>32	>32	91.2						8.8			10.3	80.9						
	tetracycline	*E. faecium*	British Columbia	2	<=4	<=4	0.0						100.0										
	tetracycline	*E. faecium*	Ontario	4	>32	>32	100.0									25.0	75.0						
	tetracycline	*E. faecium*	Québec	5	>32	>32	100.0									20.0	80.0						
	tetracycline	*E. faecium*	Saskatchewan	3	>32	>32	100.0									33.3	66.7						
	tetracycline	*Enterococcus* spp.	British Columbia	2	>32	>32	50.0						50.0				50.0						
	tetracycline	*Enterococcus* spp.	Ontario	3	>32	>32	66.7						33.3				66.7						
	tetracycline	*Enterococcus* spp.	Québec	8	>32	>32	87.5						12.5				87.5						

Note: * Roman numerals I-IV indicate the ranking of human medicine importance (VDD). The unshaded fields indicate the range tested for each antimicrobial in the plate configuration. Numbers in bold red fonts indicate the percentage of isolates resistant. Numbers at the right of the largest dilution are those isolates with growth in all wells within the tested range, indicating the actual MIC is greater than that range of dilutions. The numbers in the smallest dilution of the range tested indicate isolates susceptible to this level or to lower concentration of the antimicrobial. Solid bars represent the resistance breakpoints. Dotted bars represent the susceptibility breakpoints.

Table 35 (continued). Distribution of MICs and antimicrobial resistance observed in chicken *Enterococcus* species from British Columbia, Saskatchewan, Ontario, and Québec; *Retail Meat Surveillance*, 2007.

*	Antimicrobial	Species	Province	n	MIC Percentiles		%R	Distribution (%) of MICs														
					MIC50	MIC90		≤ 0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	512	1024	2048	> 2048
	flavomycin	*E. faecalis*	British Columbia	38	<=1	<=1	0.0				94.7	5.3											
	flavomycin	*E. faecalis*	Ontario	154	<=1	<=1	0.0				98.7	1.3											
	flavomycin	*E. faecalis*	Québec	126	<=1	<=1	0.0				100.0												
	flavomycin	*E. faecalis*	Saskatchewan	68	<=1	<=1	0.0				98.5		1.5										
	flavomycin	*E. faecium*	British Columbia	2	>16	>16	50.0								50.0	**50.0**							
IV	flavomycin	*E. faecium*	Ontario	4	16	>16	25.0					25.0		25.0	25.0	**25.0**							
	flavomycin	*E. faecium*	Québec	5	2	>16	20.0				20.0	40.0	20.0			**20.0**							
	flavomycin	*E. faecium*	Saskatchewan	3	4	>16	33.3				33.3		33.3			**33.3**							
	flavomycin	*Enterococcus* spp.	British Columbia	2	>16	>16	50.0					50.0				**50.0**							
	flavomycin	*Enterococcus* spp.	Ontario	3	4	>16	33.3					33.3	33.3			**33.3**							
	flavomycin	*Enterococcus* spp.	Québec	8	4	>16	25.0				50.0		25.0			**25.0**							
	flavomycin	*Enterococcus* spp.	Saskatchewan	5	<=1	4	0.0				80.0		20.0										

Note: * Roman numerals I-IV indicate the ranking of human medicine importance (VDD). The unshaded fields indicate the range tested for each antimicrobial in the plate configuration. Numbers in bold red fonts indicate the percentage of isolates resistant. Numbers at the right of the largest dilution are those isolates with growth in all wells within the tested range, indicating the actual MIC is greater than that range of dilutions. The numbers in the smallest dilution of the range tested indicate isolates susceptible to this level or to lower concentration of the antimicrobial. Solid bars represent the resistance breakpoints. Dotted bars represent the susceptibility breakpoints.

Table 36. Distribution of MICs and antimicrobial resistance observed in swine *Salmonella* isolates; *Abattoir Surveillance*, 2007.

*	Antimicrobial	n	MIC Percentiles		%R	Distribution (%) of MICs														
			MIC50	MIC90		≤ 0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	>256
	amoxicillin-clavulanic acid	105	<=1	16	0.95							61.9	9.5		18.1	9.5		**1.0**			
	ceftiofur	105	1	1	1.0						12.4	79.0	7.6			**1.0**					
I	ceftriaxone	105	<=0.25	<=0.25	0.0					99.0						1.0					
	ciprofloxacin	105	<=0.015	0.03	0.0	66.7	29.5	3.8													
	amikacin	105	1	2	0.0						6.7	55.2	35.2	2.9							
	ampicillin	105	<=1	>32	28.6							58.1	11.4	1.9				**28.6**			
	cefoxitin	105	4	4	1.0							1.0	45.7	46.7	3.8	1.9		**1.0**			
II	gentamicin	105	0.50	1	5.7					46.7	42.9	4.8				**3.8**	**1.9**				
	kanamycin	105	<=8	>64	14.3										85.7			**1.9**	**12.4**		
	nalidixic acid	105	4	4	0.0								26.7	66.7	4.8	1.9					
	streptomycin	105	<=32	>64	44.8												55.2	**17.1**	**27.6**		
	trimethoprim-sulphamethoxazole	105	<=0.12	0.50	5.7				54.3	26.7	10.5	1.9	1.0		**5.7**						
	chloramphenicol	105	8	>32	25.7								1.9	11.4	55.2	5.7	**1.0**	**24.8**			
III	sulfisoxazole	105	64	>256	45.7											9.5	26.7	16.2	1.9		**45.7**
	tetracycline	105	32	>32	55.2									44.8		**1.0**	**12.4**	**41.9**			
IV																					

Note: * Roman numerals I-IV indicate the ranking of human medicine importance (VDD). The unshaded fields indicate the range tested for each antimicrobial in the plate configuration. Numbers in bold red fonts indicate the percentage of isolates resistant. Numbers at the right of the largest dilution are those isolates with growth in all wells within the tested range, indicating the actual MIC is greater than that range of dilutions. The numbers in the smallest dilution of the range tested indicate isolates susceptible to this level or to lower concentration of the antimicrobial. Solid bars represent the resistance breakpoints. Dotted bars represent the susceptibility breakpoints.

Table 37. Distribution of MICs and antimicrobial resistance observed in swine *Salmonella* isolates; *Surveillance of Animal Clinical Isolates*, 2007.

*	Antimicrobial	n	MIC Percentiles		%R	Distribution (%) of MICs														
			MIC50	MIC90		≤ 0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	>256
	amoxicillin-clavulanic acid	176	2	16	2.27							35.8	14.8	1.7	12.5	33.0	**1.1**	**1.1**			
	ceftiofur	176	1	2	2.3						5.1	83.0	9.7			**2.3**					
I	ceftriaxone	176	<=0.25	<=0.25	0.0					97.7						1.1	1.1				
	ciprofloxacin	176	<=0.015	0.03	0.0	84.1	11.4	4.5													
	amikacin	176	1	2	0.0						0.6	59.1	36.9	2.8	0.6						
	ampicillin	176	>32	>32	52.8							35.8	5.7	2.8		2.8	**2.8**	**50.0**			
	cefoxitin	176	2	8	2.3							2.8	49.4	36.9	5.7	2.8		**2.3**			
II	gentamicin	176	0.50	0.50	2.8					41.5	51.7	3.4			0.6	**0.6**	**2.3**				
	kanamycin	176	<=8	>64	30.7										69.3				**30.7**		
	nalidixic acid	176	4	4	0.0								43.8	48.3	8.0						
	streptomycin	176	64	>64	57.4												42.6	**27.8**	**29.5**		
	trimethoprim-sulphamethoxazole	176	0.25	>4	19.9				39.8	30.7	9.1	0.6			**19.9**						
	chloramphenicol	176	8	>32	40.9								1.1	6.3	44.3	7.4		**40.9**			
III	sulfisoxazole	176	>256	>256	68.2											2.8	22.2	6.8			**68.2**
	tetracycline	176	>32	>32	70.5									29.0	0.6		**14.8**	**55.7**			
IV																					

Note: * Roman numerals I-IV indicate the ranking of human medicine importance (VDD). The unshaded fields indicate the range tested for each antimicrobial in the plate configuration. Numbers in bold red fonts indicate the percentage of isolates resistant. Numbers at the right of the largest dilution are those isolates with growth in all wells within the tested range, indicating the actual MIC is greater than that range of dilutions. The numbers in the smallest dilution of the range tested indicate isolates susceptible to this level or to lower concentration of the antimicrobial. Solid bars represent the resistance breakpoints. Dotted bars represent the susceptibility breakpoints.

Table 38. Distribution of MICs and antimicrobial resistance observed in swine *E. coli*; *Abattoir Surveillance*, 2007.

*	Antimicrobial	n	MIC Percentiles		%R	Distribution (%) of MICs														
			MIC50	MIC90		≤ 0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	>256
	amoxicillin-clavulanic acid	93	4	8	1.08							4.3	21.5	35.5	35.5	2.2		1.1			
	ceftiofur	93	0.25	0.50	1.1				3.2	64.5	31.2				1.1						
I	ceftriaxone	93	<=0.25	<=0.25	0.0					98.9					1.1						
	ciprofloxacin	93	<=0.015	<=0.015	0.0	100.0															
	amikacin	93	2	2	0.0						1.1	32.3	61.3	4.3	1.1						
	ampicillin	93	4	>32	36.6							16.1	28.0	17.2	1.1	1.1	1.1	35.5			
	cefoxitin	93	4	4	1.1							2.2	38.7	55.9	2.2			1.1			
II	gentamicin	93	0.50	0.50	0.0					18.3	72.0	8.6	1.1								
	kanamycin	93	<=8	>64	18.3										80.6		1.1	1.1	17.2		
	nalidixic acid	93	2	4	0.0							8.6	80.6	10.8							
	streptomycin	93	<=32	>64	33.3												66.7	10.8	22.6		
	trimethoprim-sulphamethoxazole	93	0.25	>4	11.8				38.7	43.0	5.4	1.1			11.8						
	chloramphenicol	93	8	32	16.1								2.2	38.7	37.6	5.4	9.7	6.5			
III	sulfisoxazole	93	32	>256	49.5											46.2	4.3				49.5
	tetracycline	93	>32	>32	75.3									24.7		1.1	5.4	68.8			
IV																					

Note: * Roman numerals I-IV indicate the ranking of human medicine importance (VDD). The unshaded fields indicate the range tested for each antimicrobial in the plate configuration. Numbers in bold red fonts indicate the percentage of isolates resistant. Numbers at the right of the largest dilution are those isolates with growth in all wells within the tested range, indicating the actual MIC is greater than that range of dilutions. The numbers in the smallest dilution of the range tested indicate isolates susceptible to this level or to lower concentration of the antimicrobial. Solid bars represent the resistance breakpoints. Dotted bars represent the susceptibility breakpoints.

Table 39. Distribution of MICs and antimicrobial resistance observed in pork *E. coli* isolates from British Columbia, Saskatchewan, Ontario, and Québec; *Retail Meat Surveillance*, 2007.

*	Antimicrobial	Province	n	MIC Percentiles		%R	Distribution (%) of MICs														
				MIC50	MIC90		≤ 0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	> 256
	amoxicillin-clavulanic acid	British Columbia	23	4	4	0.0							4.3	39.1	47.8	8.7						
		Ontario	172	4	8	1.2							4.7	23.8	50.6	19.8		**0.6**	**0.6**			
		Quebec	64	4	8	0.0							1.6	23.4	57.8	17.2						
		Saskatchewan	38	4	4	2.6							5.3	26.3	60.5	2.6	2.6	**2.6**				
	ceftiofur	British Columbia	23	0.25	0.50	0.0				4.3	73.9	21.7										
		Ontario	172	0.25	0.50	0.6				8.1	42.4	46.5	1.7		0.6	**0.6**						
		Quebec	64	0.25	0.50	0.0				4.7	57.8	37.5										
I		Saskatchewan	38	0.25	0.50	2.6				2.6	71.1	21.1	2.6			**2.6**						
	ceftriaxone	British Columbia	23	<=0.25	<=0.25	0.0					100.0											
		Ontario	172	<=0.25	<=0.25	0.0					98.8				0.6	0.6						
		Quebec	64	<=0.25	<=0.25	0.0					98.4	1.6										
		Saskatchewan	38	<=0.25	<=0.25	0.0					97.4					2.6						
	ciprofloxacin	British Columbia	23	<=0.015	<=0.015	0.0	100.0															
		Ontario	172	<=0.015	<=0.015	0.0	98.8	0.6			0.6											
		Quebec	64	<=0.015	<=0.015	0.0	100.0															
		Saskatchewan	38	<=0.015	<=0.015	0.0	97.4	2.6														
	amikacin	British Columbia	23	2	4	0.0							21.7	65.2	13.0							
		Ontario	172	2	4	0.0						0.6	22.1	62.2	14.5	0.6						
		Quebec	64	2	4	0.0							23.4	65.6	10.9							
		Saskatchewan	38	2	4	0.0							36.8	52.6	5.3	5.3						
	ampicillin	British Columbia	23	2	>32	13.0							4.3	60.9	21.7				**13.0**			
		Ontario	172	2	>32	23.3							15.1	41.9	19.8				**23.3**			
		Quebec	64	2	>32	20.3							9.4	53.1	15.6	1.6			**20.3**			
		Saskatchewan	38	2	4	5.3							15.8	60.5	18.4				**5.3**			
II	cefoxitin	British Columbia	23	4	4	0.0							4.3	34.8	56.5	4.3						
		Ontario	172	4	4	1.2						0.6	1.7	29.7	61.0	5.8		**0.6**	**0.6**			
		Quebec	64	4	4	0.0								35.9	57.8	6.3						
		Saskatchewan	38	4	4	2.6							5.3	42.1	44.7	5.3		**2.6**				
	gentamicin	British Columbia	23	0.50	0.50	0.0					4.3	87.0	8.7									
		Ontario	172	0.50	1	0.6					15.7	68.6	15.1				**0.6**					
		Quebec	64	0.50	1	1.6					15.6	59.4	21.9	1.6			**1.6**					
		Saskatchewan	38	0.50	1	0.0					15.8	73.7	10.5									

Note: * Roman numerals I-IV indicate the ranking of human medicine importance (VDD). The unshaded fields indicate the range tested for each antimicrobial in the plate configuration. Numbers in bold red fonts indicate the percentage of isolates resistant. Numbers at the right of the largest dilution are those isolates with growth in all wells within the tested range, indicating the actual MIC is greater than that range of dilutions. The numbers in the smallest dilution of the range tested indicate isolates susceptible to this level or to lower concentration of the antimicrobial. Solid bars represent the resistance breakpoints. Dotted bars represent the susceptibility breakpoints.

Table 39 (continued). Distribution of MICs and antimicrobial resistance observed in pork *E. coli* isolates from British Columbia, Saskatchewan, Ontario, and Québec; *Retail Meat Surveillance*, 2007.

*	Antimicrobial	Province	n	MIC Percentiles		%R	Distribution (%) of MICs														
				MIC50	MIC90		≤ 0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	> 256
	kanamycin	British Columbia	23	<=8	<=8	0.0										95.7		4.3				
		Ontario	172	<=8	<=8	6.4										93.0	0.6			6.4		
		Quebec	64	<=8	<=8	3.1										96.9				3.1		
		Saskatchewan	38	<=8	<=8	0.0										97.4	2.6					
	nalidixic acid	British Columbia	23	2	2	0.0							17.4	82.6								
		Ontario	172	2	4	0.6							16.3	72.1	11.0				0.6			
		Quebec	64	2	2	0.0							17.2	78.1	4.7							
		Saskatchewan	38	2	2	0.0							13.2	78.9	7.9							
II	streptomycin	British Columbia	23	<=32	64	13.0												87.0	4.3	8.7		
		Ontario	172	<=32	64	20.9												79.1	12.8	8.1		
		Quebec	64	<=32	64	23.4												76.6	14.1	9.4		
		Saskatchewan	38	<=32	<=32	5.3												94.7	5.3			
	trimethoprim-sulphamethoxazole	British Columbia	23	<=0.12	0.25	0.0				82.6	17.4											
		Ontario	172	<=0.12	0.50	4.7				63.4	25.0	5.8	1.2			4.7						
		Quebec	64	<=0.12	0.25	3.1				70.3	23.4	3.1				3.1						
		Saskatchewan	38	<=0.12	0.25	5.3				68.4	26.3					5.3						
	chloramphenicol	British Columbia	23	4	8	0.0								8.7	65.2	21.7	4.3					
		Ontario	172	4	16	8.1								3.5	51.7	32.0	4.7	5.2	2.9			
		Quebec	64	8	8	6.3								3.1	45.3	43.8	1.6	4.7	1.6			
		Saskatchewan	38	8	8	2.6								7.9	42.1	42.1	5.3	2.6				
	sulfisoxazole	British Columbia	23	<=16	>256	13.0											78.3	4.3	4.3			13.0
III		Ontario	172	<=16	>256	23.8											70.3	5.2	0.6			23.8
		Quebec	64	<=16	>256	21.9											76.6	1.6				21.9
		Saskatchewan	38	<=16	>256	13.2											84.2	2.6				13.2
	tetracycline	British Columbia	23	<=4	>32	34.8									65.2			4.3	30.4			
		Ontario	172	<=4	>32	45.9									53.5	0.6		4.7	41.3			
		Quebec	64	<=4	>32	45.3									54.7			3.1	42.2			
		Saskatchewan	38	<=4	>32	23.7									76.3			5.3	18.4			
IV																						

Note: * Roman numerals I-IV indicate the ranking of human medicine importance (VDD). The unshaded fields indicate the range tested for each antimicrobial in the plate configuration. Numbers in bold red fonts indicate the percentage of isolates resistant. Numbers at the right of the largest dilution are those isolates with growth in all wells within the tested range, indicating the actual MIC is greater than that range of dilutions. The numbers in the smallest dilution of the range tested indicate isolates susceptible to this level or to lower concentration of the antimicrobial. Solid bars represent the resistance breakpoints. Dotted bars represent the susceptibility breakpoints.

Table 40. Distribution of MICs and antimicrobial resistance observed in bovine *Salmonella* isolates; *Surveillance of Animal Clinical Isolates*, 2007.

*	Antimicrobial	n	MIC Percentiles		%R	Distribution (%) of MICs														
			MIC50	MIC90		≤ 0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	>256
	amoxicillin-clavulanic acid	133	<=1	16	0.75							78.2	1.5	0.8	7.5	11.3		**0.8**			
	ceftiofur	133	1	1	0.8						36.8	60.9	1.5			**0.8**					
I	ceftriaxone	133	<=0.25	<=0.25	0.0					99.2					0.8						
	ciprofloxacin	133	<=0.015	<=0.015	0.0	97.7	2.3														
	amikacin	133	1	2	0.8						2.3	57.9	31.6	6.8	0.8				**0.8**		
	ampicillin	133	<=1	>32	20.3							78.9	0.8				**0.8**	**19.5**			
	cefoxitin	133	2	4	0.8							16.5	70.7	9.8	1.5	0.8	**0.8**				
II	gentamicin	133	0.50	0.50	3.0					44.4	48.9	3.8				**2.3**	**0.8**				
	kanamycin	133	<=8	>64	11.3										88.0	0.8			**11.3**		
	nalidixic acid	133	2	4	0.0								54.1	45.1	0.8						
	streptomycin	133	<=32	64	17.3												82.7	**7.5**	**9.8**		
	trimethoprim-sulphamethoxazole	133	<=0.12	0.25	0.8				75.2	24.1					**0.8**						
	chloramphenicol	133	8	>32	15.8								6.8	41.4	36.1			**15.8**			
III	sulfisoxazole	133	32	>256	19.5											12.8	58.6	9.0			**19.5**
	tetracycline	133	<=4	>32	23.3									76.7		**0.8**	**5.3**	**17.3**			
IV																					

Note: * Roman numerals I-IV indicate the ranking of human medicine importance (VDD). The unshaded fields indicate the range tested for each antimicrobial in the plate configuration. Numbers in bold red fonts indicate the percentage of isolates resistant. Numbers at the right of the largest dilution are those isolates with growth in all wells within the tested range, indicating the actual MIC is greater than that range of dilutions. The numbers in the smallest dilution of the range tested indicate isolates susceptible to this level or to lower concentration of the antimicrobial. Solid bars represent the resistance breakpoints. Dotted bars represent the susceptibility breakpoints.

Table 41. Distribution of MICs and antimicrobial resistance observed in beef cattle *E. coli* isolates; *Abattoir Surveillance*, 2007.

*	Antimicrobial	n	MIC Percentiles		%R	Distribution (%) of MICs														
			MIC50	MIC90		≤ 0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	>256
	amoxicillin-clavulanic acid	188	4	4	0							10.6	38.3	48.9	2.1						
	ceftiofur	188	0.25	0.50	0.0				9.0	53.2	37.8										
I	ceftriaxone	188	<=0.25	<=0.25	0.0					100.0											
	ciprofloxacin	188	<=0.015	<=0.015	0.0	98.9	1.1														
	amikacin	188	2	2	0.0						1.6	31.9	60.1	5.9	0.5						
	ampicillin	188	2	4	2.7							22.9	56.4	17.6		0.5		**2.7**			
	cefoxitin	188	4	8	0.0						0.5	4.3	30.9	54.3	10.1						
II	gentamicin	188	0.50	0.50	1.1					16.0	75.0	5.3		0.5	2.1	**1.1**					
	kanamycin	188	<=8	<=8	2.1										95.2	0.5	2.1	**1.1**	**1.1**		
	nalidixic acid	188	2	2	0.0							14.4	81.9	3.7							
	streptomycin	188	<=32	64	11.7												88.3	**10.1**	**1.6**		
	trimethoprim-sulphamethoxazole	188	<=0.12	0.25	0.0				73.9	23.9	2.1										
	chloramphenicol	188	4	8	2.1								5.9	57.4	34.0	0.5		**2.1**			
III	sulfisoxazole	188	<=16	>256	18.1											76.6	5.3				**18.1**
	tetracycline	188	<=4	>32	35.6									53.7	10.6	**5.9**	**4.8**	**25.0**			
IV																					

Note: * Roman numerals I-IV indicate the ranking of human medicine importance (VDD). The unshaded fields indicate the range tested for each antimicrobial in the plate configuration. Numbers in bold red fonts indicate the percentage of isolates resistant. Numbers at the right of the largest dilution are those isolates with growth in all wells within the tested range, indicating the actual MIC is greater than that range of dilutions. The numbers in the smallest dilution of the range tested indicate isolates susceptible to this level or to lower concentration of the antimicrobial. Solid bars represent the resistance breakpoints. Dotted bars represent the susceptibility breakpoints.

Table 42. Distribution of MICs and antimicrobial resistance observed in beef *E. coli* isolates recovered from British Columbia, Saskatchewan, Ontario, and Québec; *Retail Meat Surveillance*, 2007.

*	Antimicrobial	Province	n	MIC Percentiles		%R	Distribution (%) of MICs														
				MIC50	MIC90		≤ 0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	> 256
	amoxicillin-clavulanic acid	British Columbia	49	4	4	0.0							8.2	28.6	55.1	8.2						
		Ontario	187	4	4	0.0							4.3	31.0	58.8	5.9						
		Quebec	147	4	4	0.7							4.1	30.6	60.5	4.1		**0.7**				
		Saskatchewan	118	4	4	0.8							1.7	26.3	66.1	5.1		**0.8**				
	ceftiofur	British Columbia	49	0.25	0.50	0.0				14.3	51.0	34.7										
		Ontario	187	0.25	0.50	0.0				5.9	45.5	48.1	0.5									
		Quebec	147	0.25	0.50	0.7				5.4	59.2	34.7					**0.7**					
I		Saskatchewan	118	0.25	0.50	0.0				5.1	55.1	39.0		0.8								
	ceftriaxone	British Columbia	49	<=0.25	<=0.25	0.0					100.0											
		Ontario	187	<=0.25	<=0.25	0.0					100.0											
		Quebec	147	<=0.25	<=0.25	0.0					99.3					0.7						
		Saskatchewan	118	<=0.25	<=0.25	0.0					97.5	1.7	0.8									
	ciprofloxacin	British Columbia	49	<=0.015	<=0.015	0.0	98.0			2.0												
		Ontario	187	<=0.015	<=0.015	0.0	99.5				0.5											
		Quebec	147	<=0.015	<=0.015	0.0	100.0															
		Saskatchewan	118	<=0.015	<=0.015	0.0	100.0															
	amikacin	British Columbia	49	2	4	0.0							18.4	71.4	10.2							
		Ontario	187	2	2	0.0							27.3	66.3	6.4							
		Quebec	147	2	2	0.0						1.4	31.3	61.2	5.4	0.7						
		Saskatchewan	118	2	2	0.0							20.3	72.0	6.8	0.8						
	ampicillin	British Columbia	49	2	4	2.0							20.4	51.0	24.5		2.0		**2.0**			
		Ontario	187	2	4	2.7							17.1	58.3	20.3	1.1	0.5	**0.5**	**2.1**			
		Quebec	147	2	4	3.4							13.6	63.3	19.0	0.7			**3.4**			
		Saskatchewan	118	2	4	2.5							10.2	60.2	27.1				**2.5**			
II	cefoxitin	British Columbia	49	4	4	0.0						2.0	6.1	40.8	46.9	4.1						
		Ontario	187	4	4	0.0							2.1	29.9	60.4	7.5						
		Quebec	147	4	4	0.7							3.4	27.9	63.9	4.1			**0.7**			
		Saskatchewan	118	4	4	0.8							1.7	33.1	58.5	5.9			**0.8**			
	gentamicin	British Columbia	49	0.50	0.50	0.0					10.2	83.7	6.1									
		Ontario	187	0.50	0.50	0.0					19.8	72.2	8.0									
		Quebec	147	0.50	1	0.0					14.3	72.1	12.9			0.7						
		Saskatchewan	118	0.50	0.50	0.8					13.6	78.8	5.9	0.8				**0.8**				

Note: * Roman numerals I-IV indicate the ranking of human medicine importance (VDD). The unshaded fields indicate the range tested for each antimicrobial in the plate configuration. Numbers in bold red fonts indicate the percentage of isolates resistant. Numbers at the right of the largest dilution are those isolates with growth in all wells within the tested range, indicating the actual MIC is greater than that range of dilutions. The numbers in the smallest dilution of the range tested indicate isolates susceptible to this level or to lower concentration of the antimicrobial. Solid bars represent the resistance breakpoints. Dotted bars represent the susceptibility breakpoints.

Table 42 (continued). Distribution of MICs and antimicrobial resistance observed in beef *E. coli* isolates recovered from British Columbia, Saskatchewan, Ontario, and Québec; *Retail Meat Surveillance*, 2007.

*	Antimicrobial	Province	n	MIC Percentiles		%R	Distribution (%) of MICs														
				MIC50	MIC90		≤ 0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	> 256
	kanamycin	British Columbia	49	<=8	<=8	2.0										98.0				2.0		
		Ontario	187	<=8	<=8	1.1										98.4	0.5			1.1		
		Quebec	147	<=8	<=8	0.7										97.3	2.0			0.7		
		Saskatchewan	118	<=8	<=8	0.0										100.0						
	nalidixic acid	British Columbia	49	2	4	2.0						2.0	14.3	73.5	8.2				2.0			
		Ontario	187	2	4	0.5						1.6	10.7	77.0	10.2				0.5			
		Quebec	147	2	2	0.0							10.2	81.0	8.8							
		Saskatchewan	118	2	2	0.0							11.0	82.2	6.8							
II	streptomycin	British Columbia	49	<=32	<=32	2.0												98.0		2.0		
		Ontario	187	<=32	<=32	3.2												96.8	1.1	2.1		
		Quebec	147	<=32	<=32	6.8												93.2	2.7	4.1		
		Saskatchewan	118	<=32	<=32	0.8												99.2	0.8			
	trimethoprim-sulphamethoxazole	British Columbia	49	<=0.12	0.25	4.1				79.6	16.3					4.1						
		Ontario	187	<=0.12	0.25	2.1				78.1	19.3	0.5				2.1						
		Quebec	147	<=0.12	0.25	2.0				78.2	17.0	2.7				2.0						
		Saskatchewan	118	<=0.12	0.25	0.0				83.1	15.3	1.7										
	chloramphenicol	British Columbia	49	4	8	0.0								8.2	57.1	34.7						
		Ontario	187	4	8	2.7								2.7	52.4	41.2	1.1		2.7			
		Quebec	147	4	8	2.0								5.4	51.0	41.5		0.7	1.4			
		Saskatchewan	118	4	8	0.8								5.9	49.2	43.2	0.8		0.8			
	sulfisoxazole	British Columbia	49	<=16	>256	12.2											75.5	12.2				12.2
III		Ontario	187	<=16	32	7.0											84.0	9.1				7.0
		Quebec	147	<=16	32	9.5											85.7	4.8				9.5
		Saskatchewan	118	<=16	32	5.9											88.1	5.9				5.9
	tetracycline	British Columbia	49	<=4	>32	10.2									85.7	4.1			10.2			
		Ontario	187	<=4	32	13.9									81.3	4.8	2.1	2.7	9.1			
		Quebec	147	<=4	>32	15.0									81.6	3.4	1.4	0.7	12.9			
		Saskatchewan	118	<=4	8	7.6									88.1	4.2		1.7	5.9			
IV																						

Note: * Roman numerals I-IV indicate the ranking of human medicine importance (VDD). The unshaded fields indicate the range tested for each antimicrobial in the plate configuration. Numbers in bold red fonts indicate the percentage of isolates resistant. Numbers at the right of the largest dilution are those isolates with growth in all wells within the tested range, indicating the actual MIC is greater than that range of dilutions. The numbers in the smallest dilution of the range tested indicate isolates susceptible to this level or to lower concentration of the antimicrobial. Solid bars represent the resistance breakpoints. Dotted bars represent the susceptibility breakpoints.

Table 43. Distribution of MICs and antimicrobial resistance observed in beef cattle *Campylobacter* species; *Abattoir Surveillance*, 2007.

*	Antimicrobial	Species	n	MIC Percentiles		%R	Distribution (%) of MICs													
				MIC50	MIC90		≤0.016	0.032	0.064	0.125	0.25	0.5	1	2	4	8	16	32	64	>64
I	ciprofloxacin	*C. coli*	35	0.125	0.25	2.9			2.9	85.7	8.6						**2.9**			
	ciprofloxacin	*C. jejuni*	30	0.064	0.125	0.0			53.3	43.3	3.3									
	ciprofloxacin	*Campylobacter* spp.	8	0.25	0.5	0.0			25.0		62.5	12.5								
	telithromycine	*C. coli*	35	2	4	0.0							11.4	54.3	34.3					
	telithromycine	*C. jejuni*	30	0.5	2	0.0					3.3	53.3	33.3	10.0						
	telithromycine	*Campylobacter* spp.	8	1	1	0.0						50.0	50.0							
II	azythromycin	*C. coli*	35	0.125	0.25	0.0		5.7	8.6	51.4	34.3									
	azythromycin	*C. jejuni*	30	0.064	0.064	0.0	3.3	26.7	63.3	6.7										
	azythromycin	*Campylobacter* spp.	8	0.125	0.125	0.0		25.0	25.0	50.0										
	clindamycin	*C. coli*	35	1	1	0.0				5.7	5.7	11.4	74.3	2.9						
	clindamycin	*C. jejuni*	30	0.125	0.5	0.0		3.3	6.7	53.3	23.3	13.3								
	clindamycin	*Campylobacter* spp.	8	0.25	0.5	0.0			12.5	12.5	37.5	37.5								
	erythromycin	*C. coli*	35	2	2	0.0					5.7	8.6	2.9	80.0	2.9					
	erythromycin	*C. jejuni*	30	0.25	1	0.0				3.3	56.7	20.0	20.0							
	erythromycin	*Campylobacter* spp.	8	0.25	0.5	0.0				12.5	50.0	37.5								
	gentamicin	*C. coli*	35	0.5	1	0.0						74.3	25.7							
	gentamicin	*C. jejuni*	30	0.5	1	0.0					3.3	66.7	30.0							
	gentamicin	*Campylobacter* spp.	8	0.25	0.5	0.0				37.5	37.5	25.0								
	nalidixic acid	*C. coli*	35	16	16	2.9									11.4	14.3	71.4		**2.9**	
	nalidixic acid	*C. jejuni*	30	<=4	8	0.0									76.7	23.3				
	nalidixic acid	*Campylobacter* spp.	8	64	>64	75.0									25.0				**37.5**	**37.5**
III	florfenicol	*C. coli*	35	2	2	0.0						2.9	20.0	74.3	2.9					
	florfenicol	*C. jejuni*	30	1	1	0.0						30.0	70.0							
	florfenicol	*Campylobacter* spp.	8	1	1	0.0						12.5	87.5							
	tetracycline	*C. coli*	35	>64	>64	77.1					5.7	2.9		14.3					**2.9**	**74.3**
	tetracycline	*C. jejuni*	30	0.25	>64	46.7					30.0	23.3					**3.3**	**6.7**	**20.0**	**16.7**
	tetracycline	*Campylobacter* spp.	8	32	64	87.5						12.5					**25.0**	**50.0**	**12.5**	
IV																				

Note: * Roman numerals I-IV indicate the ranking of human medicine importance (VDD). The unshaded fields indicate the range tested for each antimicrobial in the plate configuration. Numbers in bold red fonts indicate the percentage of isolates resistant. Numbers at the right of the largest dilution are those isolates with growth in all wells within the tested range, indicating the actual MIC is greater than that range of dilutions. The numbers in the smallest dilution of the range tested indicate isolates susceptible to this level or to lower concentration of the antimicrobial. Solid bars represent the resistance breakpoints. Dotted bars represent the susceptibility breakpoints.

Campylobacter spp. may include some species that are intrinsically resistant to nalidixic acid and ciprofloxacin

Table 44. Distribution of MICs and antimicrobial resistance observed in turkey *Salmonella* isolates; *Surveillance of Animal Clinical Isolates*, 2007.

*	Antimicrobial	n	MIC Percentiles		%R	Distribution (%) of MICs														
			MIC50	MIC90		≤ 0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	>256
I	amoxicillin-clavulanic acid	45	32	>32	53.3							35.6	4.4		4.4	2.2	**6.7**	**46.7**			
	ceftiofur	45	>8	>8	53.3						8.9	35.6	2.2			**53.3**					
	ceftriaxone	45	16	32	0.0					46.7						35.6	17.8				
	ciprofloxacin	45	<=0.015	<=0.015	0.0	95.6	4.4														
II	amikacin	45	2	2	0.0						6.7	42.2	51.1								
	ampicillin	45	>32	>32	60.0							37.8	2.2					**60.0**			
	cefoxitin	45	32	>32	53.3							6.7	15.6	22.2	2.2		**13.3**	**40.0**			
	gentamicin	45	0.50	>16	22.2					33.3	42.2		2.2			**2.2**	**20.0**				
	kanamycin	45	<=8	64	15.6										80.0	2.2	2.2	**8.9**	**6.7**		
	nalidixic acid	45	4	4	0.0								31.1	68.9							
	streptomycin	45	<=32	>64	33.3												66.7	**20.0**	**13.3**		
	trimethoprim-sulphamethoxazole	45	<=0.12	0.25	2.2				71.1	26.7					**2.2**						
III	chloramphenicol	45	8	8	2.2								2.2	22.2	68.9	4.4		**2.2**			
	sulfisoxazole	45	32	>256	24.4											26.7	42.2	6.7			**24.4**
	tetracycline	45	<=4	>32	40.0									60.0				**40.0**			
IV																					

Note: * Roman numerals I-IV indicate the ranking of human medicine importance (VDD). The unshaded fields indicate the range tested for each antimicrobial in the plate configuration. Numbers in bold red fonts indicate the percentage of isolates resistant. Numbers at the right of the largest dilution are those isolates with growth in all wells within the tested range, indicating the actual MIC is greater than that range of dilutions. The numbers in the smallest dilution of the range tested indicate isolates susceptible to this level or to lower concentration of the antimicrobial. Solid bars represent the resistance breakpoints. Dotted bars represent the susceptibility breakpoints.

Table 45. Distribution of MICs and antimicrobial resistance in equine *Salmonella* isolates; *Surveillance of Animal Clinical Isolates*, 2007.

*	Antimicrobial	n	MIC Percentiles		%R	Distribution (%) of MICs														
			MIC50	MIC90		≤ 0.015	0.03	0.06	0.12	0.25	0.5	1	2	4	8	16	32	64	128	256	>256
	amoxicillin-clavulanic acid	66	16	16	0							13.6		1.5	33.3	51.5					
	ceftiofur	66	1	4	3.0						6.1	83.3		7.6	**3.0**						
I	ceftriaxone	66	<=0.25	4	0.0					89.4				7.6	3.0						
	ciprofloxacin	66	0.25	0.25	0.0	31.8				68.2											
	amikacin	66	16	32	1.5							15.2	10.6		13.6	48.5	10.6	**1.5**			
	ampicillin	66	>32	>32	86.4							13.6						**86.4**			
	cefoxitin	66	1	2	0.0							62.1	34.8	3.0							
II	gentamicin	66	>16	>16	81.8					6.1	10.6	1.5					**81.8**				
	kanamycin	66	>64	>64	83.3										16.7				**83.3**		
	nalidixic acid	66	8	16	0.0								9.1	22.7	43.9	24.2					
	streptomycin	66	<=32	64	13.6												86.4	**9.1**	**4.5**		
	trimethoprim-sulphamethoxazole	66	>4	>4	78.8				16.7	4.5					**78.8**						
	chloramphenicol	66	>32	>32	60.6									6.1	33.3			**60.6**			
III	sulfisoxazole	66	>256	>256	83.3											3.0	12.1	1.5			**83.3**
	tetracycline	66	<=4	<=4	3.0									97.0			**1.5**	**1.5**			
IV																					

Note: * Roman numerals I-IV indicate the ranking of human medicine importance (VDD). The unshaded fields indicate the range tested for each antimicrobial in the plate configuration. Numbers in bold red fonts indicate the percentage of isolates resistant. Numbers at the right of the largest dilution are those isolates with growth in all wells within the tested range, indicating the actual MIC is greater than that range of dilutions. The numbers in the smallest dilution of the range tested indicate isolates susceptible to this level or to lower concentration of the antimicrobial. Solid bars represent the resistance breakpoints. Dotted bars represent the susceptibility breakpoints.

Recovery Table

Table 46. Recovery rates observed among surveillance components, animal species, provinces, years for *E. coli*, *Salmonella*, *Campylobacter*, and *Enterococcus*; *CIPARS*, 2007.

CIPARS Component/ Animal species	Province	Year	*E. coli*		*Salmonella*		*Campylobacter* spp.		*Enterococcus* spp.	
			Recovery rate	n/N[1]	Recovery rate	n/N[1]	Recovery rate	n/N[1]	Recovery rate	n/N[1]
Abattoir Surveillance										
Beef cattle	Canada	2002	97%	76/78	1%	3/78				
		2003	97%	155/159	<1 %	1/114				
		2004	98%	167/170						
		2005	97%	122/126			66%	23/ 35		
		2006	100%	150/150			36%	31/87		
		2007	99%	188/190			39%	75/190		
Swine	Canada	2002	97%	38/39	27%	103/385				
		2003	98%	153/155	28%	395/1393				
		2004	99%	142/143	38%	270/703				
		2005	99%	163/164	42%	212/486				
		2006	98%	115/117	40%	145/359				
		2007	98%	93/95	36%	105/296				
Chickens	Canada	2002	100%	40/40	13%	25/195				
		2003	97%	150/153	16%	126/803				
		2004	99%	130/131	16%	142/893				
		2005	99%	218/220	18%	200/1103				
		2006	100%	166/166	23%	187/824				
		2007	99%	180/181	25%	204/808				

Table 46 (continued). Recovery rates observed among surveillance components, animal species, provinces, years for *E. coli*, *Salmonella*, *Campylobacter*, and *Enterococcus*.

CIPARS Component/ Animal species	Province	Year	*E. coli*		*Salmonella*		*Campylobacter* spp.		*Enterococcus* spp.	
			Recovery rate	n/N[1]	Recovery rate	n/N[1]	Recovery rate	n/N[1]	Recovery rate	n/N[1]
Retail Meat Surveillance										
Beef	British Columbia	2003	25%	2/8	0%	0/8	0%	0/8	50%	4/8
		2005	93%	27/29						
		2006	83%	5/6						
		2007	79%	49/62						
	Saskatchewan	2005	79%	120/151						
		2006	76%	123/161						
		2007	78%	118/151						
	Ontario	2003	66%	101/154	2%	2/84 [3]	3%	2/76	91%	69/76
		2004	80%	190/237						
		2005	81%	184/227						
		2006	81%	189/235						
		2007	77%	187/242						
	Québec	2003	57%	84/147	0%	0/33	0%	0/33	80%	28/35
		2004	56%	137/245						
		2005	56%	126/225						
		2006	50%	109/215						
		2007	68%	147/216						
	Atlantic province	2004	67%	16/24						
		2007	52%	16/31						
Pork	British Columbia	2003	38%	3/8	0%	0/8	0%	0/8	75%	6/8
		2005	31%	10/32						
		2006	20%	2/8	33%	4/12				
		2007	29%	23/79	1%	1/79				
	Saskatchewan	2005	30%	48/162						
		2006	30%	49/165	2%	3/134				
		2007	25%	38/154	2%	3/154				

Table 46 (continued). Recovery rates observed among surveillance components, animal species, provinces, years for *E. coli*, *Salmonella*, *Campylobacter*, and *Enterococcus* isolates.

CIPARS Component/ Animal species	Province	Year	*E. coli*		*Salmonella*		*Campylobacter* spp.		*Enterococcus* spp.	
			Recovery rate	n/N[1]	Recovery rate	n/N[1]	Recovery rate	n/N[1]	Recovery rate	n/N[1]
Retail Meat Surveillance										
Pork	Ontario	2003	58%	90/154	1%	1/93	0%	0/76	87%	66/76
		2004	71%	198/279						
		2005	59%	179/303						
		2006	59%	182/311	<1%	1/255				
		2007	54%	172/320	2%	6/319				
	Québec	2003	42%	61/147	3%	1/32	9%	3/32	82%	28/34
		2004	38%	109/290						
		2005	26%	79/300						
		2006	20%	57/287	0%	0/232				
		2007	22%	64/287	1%	3/288				
Chicken	British Columbia	2003	100%	8/8	0%	0/8	38%	3/8	87%	7/8
		2005	95%	19/20	13%	5/39	69%	27/39	100%	20/20
		2006	100%	4/4	0%	0/8	62%	5/8	100%	4/4
		2007	98%	42/43	22%[2]	18/81	35%	28/80	100%	34/34
	Saskatchewan	2005	98%	81/83	14%	21/153	37%	53/145	98%	83/85
		2006	98%	85/86	16%	25/153	33%	51/155	98%	85/87
		2007	97%	75/77	31%[2]	43/141	35%	49/141	100%	77/77
	Ontario	2003	95%	137/144	16%	27/167	47%	78/166	99%	143/144
		2004	95%	150/158	17%	54/315	45%	143/315	100%	158/158
		2005	95%	145/153	9%	26/303	40%	120/303	99%	150/152
		2006	97%	152/156	12%	36/311	34%	104/311	98%	154/156
		2007	98%	157/161	54%[2]	172/320	37%	117/320	100%	161/161
	Québec	2003	89%	112/126	16%	29/171	55%	94/170	100%	125/125
		2004	96%	157/161	17%	53/320	50%	161/322	100%	161/161
		2005	95%	142/149	9%	26/300	34%	103/299	100%	150/150
		2006	94%	135//144	12%	33/288	35%	100/288	100%	144/144
		2007	90%	129/144	40%[2]	113/287	21%	59/287	99%	143/144

[1] total number of isolates recovered / total number of specimen tested.

[2] Enhancement to Salmonella recovery method explains higher prevalence in 2007 in retail chicken isolates (see our 2006 CIPARS Report for further details).

[3] Results appearing in gray shaded area indicate isolates that were recovered but where AMR was not tested or reported.