

Guidance for Readers

Organization of data tables

The data tables are sectioned according to the organism tested.

Non-typhoidal *Salmonella*: (Tables 5 through 50): Antimicrobial susceptibility data are first presented for all non-typhoidal *Salmonella enterica* serotypes. Data are then presented for the top non-typhoidal *Salmonella enterica* serotypes in humans, which vary slightly year-to-year, followed by the overall top serotypes in chickens, turkeys, cattle, and swine.

Please note: Although Javiana is typically one of the most common non-typhoidal *Salmonella* serotypes in humans, it is not presented separately in the Integrated Report because isolates of this serotype have not been recovered from retail meats and very few are recovered from food animals. *Salmonella* serotype I 4,[5]12:i:- includes *Salmonella enterica* strains with the antigenic formulas I 4,12:i:- and I 4,5,12:i:-. Food animal data for *Salmonella enterica* serotype I 4,[5],12:i:- are not available before 2004 because the National Veterinary Services Laboratory, which conducted the serotyping, did not report antigenic formulae for most monophasic serotypes.

Campylobacter (Tables 51 through 59): Antimicrobial susceptibility data are presented for *Campylobacter* recovered from humans, retail poultry and food animals. Data for *C. jejuni* and *C. coli* are presented separately.

Please note: Due to low recovery of *Campylobacter* from retail ground beef and pork chops, this testing was discontinued in 2008. All NARMS data on *Campylobacter* isolated from ground beef and pork chops can be found in reports of data collected before 2008.

E. coli (Tables 60 through 65): Antimicrobial susceptibility data are presented for *E. coli* from retail meats and food animals.

Enterococcus (Tables 66 through 77): Antimicrobial susceptibility data are presented for *Enterococcus* recovered from retail meats and food animals. Antimicrobial susceptibility data for *E. faecalis*, *E. faecium*, and *E. hirae* are presented separately.

Each section is divided into:

Number of isolates tested by source and year

Isolation from retail meats

Antimicrobial resistance (including multidrug resistance)

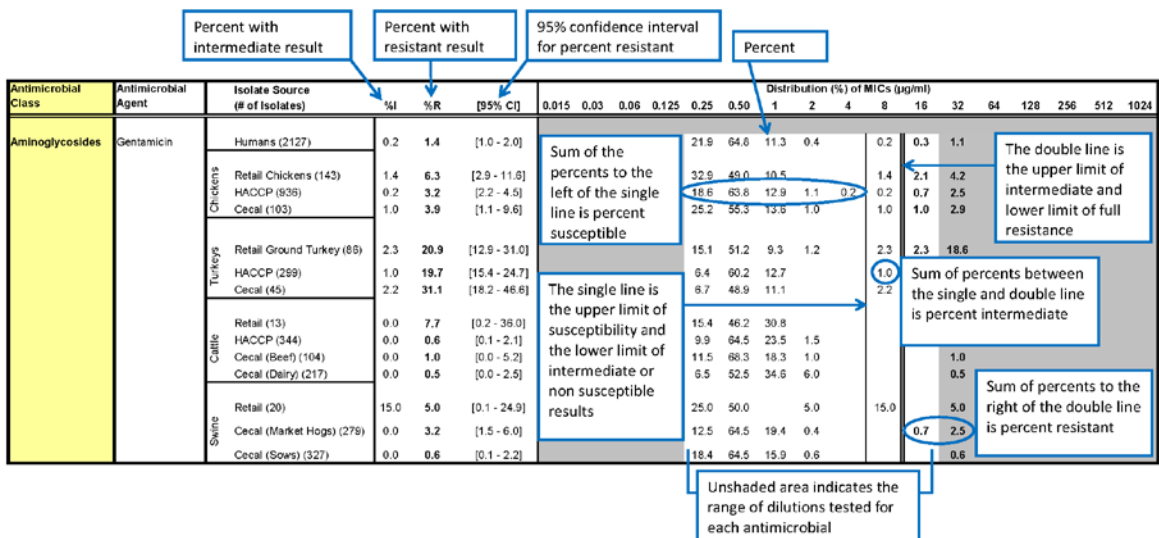
Due to space constraints, only data collected since 2003 are shown in the resistance tables. Data from 1996-2002 can be found in previous reports. The total number of isolates tested per year for each source is listed at the top of each table. An empty cell indicates that surveillance was not conducted for that particular source, whereas a zero indicates that surveillance was conducted, but no isolates were available for testing. Below the section containing the number of isolates tested, empty shaded boxes indicate that there are no data to report, because surveillance was not conducted or isolates were not available for testing.

Historical data contained in this report differ in a few cases from those in previous NARMS reports. These differences may be due to changes in breakpoints, reporting of non-typhoidal *Salmonella* rather than non-Typhi *Salmonella*, and the dynamic nature of the data, which are updated if new information is obtained about the bacterial isolates or when specific isolates are retested. In a few cases, differences may be due to other reasons. For example, *Salmonella* variants are grouped together in this report (e.g., Typhimurium var. 5- is grouped with Typhimurium, and Anatum var. 15+ is grouped with Anatum), whereas USDA’s annual report lists these *Salmonella* variants separately.

How to read Minimum Inhibitory Concentration (MIC) Tables

An explanation of MIC tables is provided below. These tables contain a great deal of helpful information in one place. By comparing MICs distributions over time, emerging resistances may be detected before strains become categorically resistant. This data display also permits other surveillance programs to directly compare results regardless of different criteria for interpretation. For most antimicrobial agents, three categories (susceptible, intermediate, and resistant) are used to interpret MICs.

How to read MIC tables



Interpreting Results

Isolates of indicator bacteria and *Salmonella* are classified as *susceptible*, *intermediate*, or *resistant* using clinical breakpoints established by the Food and Drug Administration and published by the Clinical Laboratory Standards Institute (CLSI) where available (See CLSI documents M45-A2, M31-A3, and M100-S26.^{1 2 3}). The breakpoints used are shown in the Breakpoints section (Table 1) of the report.

For *Salmonella* and *E. coli*, CLSI breakpoints were available for all antimicrobial agents tested except streptomycin and azithromycin. For *Enterococcus*, CLSI breakpoints were available for all agents except kanamycin, tigecycline, lincomycin, daptomycin for *E. faecium* and tylosin. Beginning in 2012, NARMS began using epidemiological cut-off values (ECVs) for *Campylobacter* isolates. For more information on ECOFFs, see **Interpreting Antimicrobial Susceptibility Data** below.

Interpreting Antimicrobial Susceptibility Data

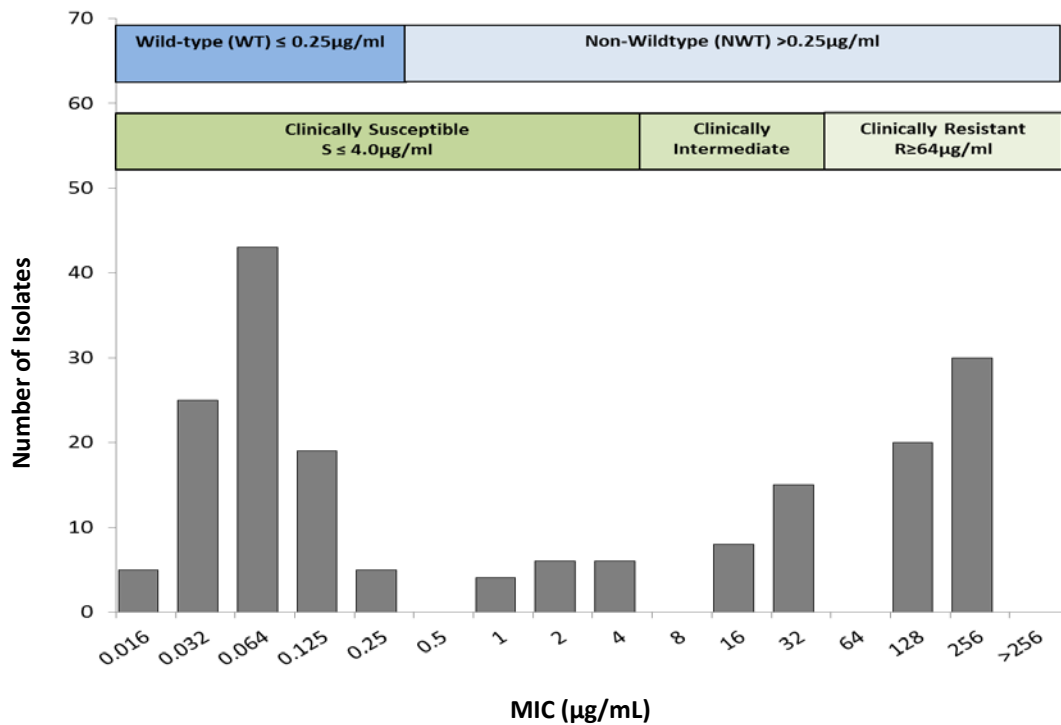
An integral part of antimicrobial susceptibility testing is interpreting the results in order to categorize bacteria as ***susceptible*** or ***resistant***. The most commonly used criteria for interpreting lab results are ***clinical breakpoints***. These are used to guide the selection of antibiotics most likely to successfully treat infections. Several standards organizations determine clinical breakpoints. In the United States, clinical breakpoints are set by the Food and Drug Administration (FDA) and the Clinical and Laboratory Standards Institute (CLSI). In Europe, this role is played by the European Committee on Antimicrobial Susceptibility Testing (EUCAST).

When determining clinical breakpoints, three major kinds of data are considered: 1) minimum inhibitory concentration (MIC) data for clinical isolates; 2) clinical outcome data; and 3) pharmacological properties of the drug at the site of infection, and how different dosing regimens may affect outcome. Since the primary purpose of clinical breakpoints is to guide therapy and predict clinical efficacy, they can have limitations for other purposes, such as detecting emerging resistance in laboratory based surveillance programs.

In contrast to clinical breakpoints, ECVs distinguish bacteria without resistance mechanisms (“wild type; WT”) from those with an acquired resistance mechanism (“non-wild type; NWT”). ECV determinations are based on the testing of large numbers of strains from different institutions to determine the MIC range of WT populations. The ECV is defined as the highest MIC value of the susceptible population. The ECVs for a certain organism/drug combination is expressed as $WT \leq X \text{ mg/L}$. Thus, while the clinical breakpoint is set to guide therapy, ECVs are useful for detecting isolates with acquired resistance. ECVs do not take into consideration any data on dosages or clinical efficacy. Therefore, an isolate that is considered non-wild type using ECVs may still be considered susceptible using clinical breakpoints (Figure 1). ECVs have been determined for a large number of organisms and drugs. Information on ECVs can be found on the EUCAST webpage (<http://www.eucast.org/>⁴).

In this report NARMS has adopted ECVs to interpret results for *Campylobacter*. To highlight the fact that wild type isolates are “microbiologically susceptible” and non-wild type isolates “microbiologically resistant” isolates are being reported as “susceptible” or “resistant” (rather than “wild type” or “non-wild type”) in the present report. Thus, tables in this report that describe number and percentage resistant, resistance patterns and MIC distributions for *Campylobacter* all reflect the use of ECVs (as determined by EUCAST).

Figure 1. Constructed example illustrating the difference between clinical breakpoints and epidemiological cut-off values (ECVs)



Limitations to the Report

The results on meats samples cannot be generalized at the state or at the country level due the limitation on the sampling scheme. It should be noted that due to sampling and design limitations, the temporal data comparisons made in the narrative for some food commodities and sampling points are more meaningful than for others. Resistance trends that are similar among human, retail and food sources may indicate causal correlations, but more information is needed to confirm this. . Additional information on temporal analysis can be found in the [NARMS Methodology](#) section.

¹CLSI. 2010. Methods for Antimicrobial Dilution and Disk Susceptibility Testing of Infrequently Isolated or Fastidious Bacteria; Approved Guideline- Second Edition. CLSI document M45-A2. CLSI, Wayne, PA.

²CLSI. 2008. Performance Standards for Antimicrobial Disk and Dilution Susceptibility Tests for Bacteria Isolated from Animals; Approved Standard—Third Edition. CLSI document M31-A3. CLSI, Wayne, PA.

³CLSI. 2015. Performance Standards for Antimicrobial Susceptibility Testing; Twenty-second Informational Supplement. CLSI document M100-S26. CLSI, Wayne, PA.

Breakpoints

Table 1. Interpretive Criteria Used for Susceptibility Testing of *Salmonella* and *E. coli* ¹

Antimicrobial Class	Antimicrobial Agent	Breakpoints (µg/ml)		
		Susceptible	Intermediate	Resistant
Aminoglycosides	Gentamicin	≤ 4	8	≥ 16
	Streptomycin before 2014 beginning in 2014	≤ 32 ≤ 16	N/A N/A	≥ 64 ≥ 32
β-Lactam/β-Lactamase Inhibitor Combinations	Amoxicillin–Clavulanic Acid	≤ 8 / 4	16 / 8	≥ 32 / 16
Cephems	Cefoxitin	≤ 8	16	≥ 32
	Ceftiofur	≤ 2	4	≥ 8
	Ceftriaxone	≤ 1	2	≥ 4
Folate Pathway Inhibitors	Sulfamethoxazole/Sulfisoxazole ²	≤ 256	N/A	≥ 512
	Trimethoprim–Sulfamethoxazole	≤ 2 / 38	N/A	≥ 4 / 76
Macrolides	Azithromycin	≤ 16	N/A	≥ 32
Penicillins	Ampicillin	≤ 8	16	≥ 32
Phenicol	Chloramphenicol	≤ 8	16	≥ 32
Quinolones	Ciprofloxacin ³	≤ 0.06	0.12-0.5	≥ 1
	Nalidixic acid	≤ 16	N/A	≥ 32
Tetracyclines	Tetracycline	≤ 4	8	≥ 16

¹ Breakpoints were adopted from CLSI (Clinical and Laboratory Standards Institute) M100-S26 document, except for streptomycin and azithromycin, which has no CLSI breakpoints

² Sulfamethoxazole was tested from 1996 through 2003 and was replaced by sulfisoxazole in 2004

³ Ciprofloxacin breakpoints for invasive *Salmonella* serotypes from the CLSI M100-S26 document are used for all *Salmonella* and *E. coli* analyses

Table 2. Interpretive Criteria Used for Susceptibility Testing of *Campylobacter* ¹

Antimicrobial Class	Antimicrobial Agent	Breakpoints (µg/ml)			
		<i>C. jejuni</i>		<i>C. coli</i>	
		Susceptible	Resistant	Susceptible	Resistant
Aminoglycosides	Gentamicin	≤ 2	≥ 4	≤ 2	≥ 4
Ketolides	Telithromycin	≤ 4	≥ 8	≤ 4	≥ 8
Lincosamides	Clindamycin	≤ 0.5	≥ 1	≤ 1	≥ 2
Macrolides	Azithromycin	≤ 0.25	≥ 0.5	≤ 0.5	≥ 1
	Erythromycin	≤ 4	≥ 8	≤ 8	≥ 16
Phenicol	Chloramphenicol	≤ 16	≥ 32	≤ 16	≥ 32
	Florfenicol	≤ 4	≥ 8	≤ 4	≥ 8
Quinolones	Ciprofloxacin	≤ 0.5	≥ 1	≤ 0.5	≥ 1
	Nalidixic acid	≤ 16	≥ 32	≤ 16	≥ 32
Tetracyclines	Doxycycline	≤ 0.5	≥ 1	≤ 1	≥ 2
	Tetracycline	≤ 1	≥ 2	≤ 2	≥ 4

¹ Breakpoints were adopted from epidemiological cut off values

Table 3. Interpretive Criteria Used for Susceptibility Testing of *Enterococcus* ¹

Antimicrobial Class	Antimicrobial Agent	Breakpoints (µg/ml)		
		Susceptible	Intermediate	Resistant
Aminoglycosides	Gentamicin	≤ 500	N/A	>500
	Kanamycin ²	≤ 512	N/A	≥ 1024
	Streptomycin	≤ 512	N/A	≥ 1024
Glycopeptides	Vancomycin	≤ 4	8 -16	≥ 32
Glycylcycline	Tigecycline ^{2,3}	≤ 0.25	N/A	N/A
Lincosamides	Lincomycin ²	≤ 2	4	≥ 8
Lipopeptides	Daptomycin ⁴	≤ 4	N/A	N/A
Macrolides	Erythromycin	≤ 0.5	1 - 4	≥ 8
	Tylosin ²	≤ 8	16	≥ 32
Nitrofurans	Nitrofurantoin	≤ 32	64	≥ 128
Oxazolidinones	Linezolid	≤ 2	4	≥ 8
Penicillins	Penicillin	≤ 8	N/A	≥ 16
Phenicol	Chloramphenicol	≤ 8	16	≥ 32
Quinolone	Ciprofloxacin	≤ 1	2	≥ 4
Streptogramins	Quinupristin/Dalfopristin	≤ 1	2	≥ 4
Tetracyclines	Tetracycline	≤ 4	8	≥ 16

Table 4. Interpretive Criteria Used for Susceptibility Testing of *Salmonella* and *E. coli* Resistant to Ceftriaxone or Ceftiofur¹

Antimicrobial Class	Antimicrobial Agent	Breakpoints (µg/ml)		
		Susceptible	Intermediate	Resistant
β-Lactam/β-Lactamase Inhibitor Combinations	Piperacillin-tazobactam	≤ 16	32 - 64	≥ 128
Penems	Imipenem	≤ 1	2	≥ 4
Cephems	Cefepime ⁵	≤ 2	4 - 8	≥ 16
	Cefotaxime	≤ 1	2	≥ 4
	Ceftazidime	≤ 4	8	≥ 16
Monobactams	Aztreonam	≤ 4	8	≥ 16

¹ Breakpoints were adopted from CLSI (Clinical and Laboratory Standards Institute) M100-S26 document, where available

² No CLSI interpretive criteria for this bacterium/antimicrobial combination currently available

³ Only a susceptible breakpoint (≤0.25 µg/ml) has been established. Isolates with an MIC ≥0.5 µg/ml are reported as resistant

⁴ Only a susceptible breakpoint (≤4 µg/ml) has been established for *E. faecalis*. Isolates with an MIC ≥8 µg/ml are reported as resistant. There are no established CLSI breakpoints for *E. faecium* and *E. hirae*

⁵ Cefepime MICs above the susceptible range and below the resistant range are Susceptible Dose Dependent (SDD) according to the CLSI guidelines in the M100-S24 document

Non-Typhoidal *Salmonella* Data

Non-Typhoidal *Salmonella* Isolates Tested

Table 5. Number of Non-Typhoidal *Salmonella* Isolates Tested, 1996-2014¹

Source		Year																		
		1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
	Humans	1318	1297	1454	1493	1372	1409	1998	1855	1782	2036	2170	2145	2384	2192	2448	2335	2233	2178	2127
Chickens	Retail Chickens							60	83	157	153	152	99	198	272	171	158	229	208	143
	HACCP Cecal		214	561	1438	1173	1307	1500	1158	1280	1989	1380	994	624	551	564	491	864	520	936
Turkeys	Retail Ground Turkey							74	114	142	183	159	190	246	193	202	162	91	106	86
	HACCP Cecal		107	240	713	518	550	244	262	236	227	304	271	148	121	151	103	175	87	299
Cattle	Retail Ground Beef							9	10	14	8	19	13	24	14	7	9	13	15	13
	HACCP		24	284	1610	1388	893	1008	670	607	329	389	439	443	200	247	340	280	310	344
	Cecal (Beef) Cecal (Dairy)																		124	104
Swine	Retail Pork Chops							10	5	11	9	8	18	23	8	20	28	12	24	20
	Cecal (Market Swine)																		260	279
	Cecal (Sows)																		289	327

¹ NARMS reports for the years 1996-2006 combined data for all non-Typhi *Salmonella* isolates from humans. Beginning in 2007, NARMS reported data separately for all typhoidal *Salmonella* serotypes (i.e. Typhi, Paratyphi A, tartrate-negative Paratyphi B, and Paratyphi C). This report includes data only for non-typhoidal isolates from humans. Data for typhoidal *Salmonella* can be found in the NARMS Human Isolates Final Reports, published by CDC.

Isolation of Non-Typhoidal *Salmonella* from Retail Meats

Table 6. Number and Percent of Retail Meat Samples Culture Positive for *Salmonella*, 2014

	Retail Chickens	Retail Ground Turkey	Retail Ground Beef	Retail Pork Chops
Number of Meat Samples Tested	1570	1557	1557	1567
Number Positive for <i>Salmonella</i>	143	86	13	20
Percent Positive for <i>Salmonella</i>	9.1%	5.5%	0.8%	1.3%

Figure 1. Percent of Retail Meat Samples Culture Positive for *Salmonella*, 2014

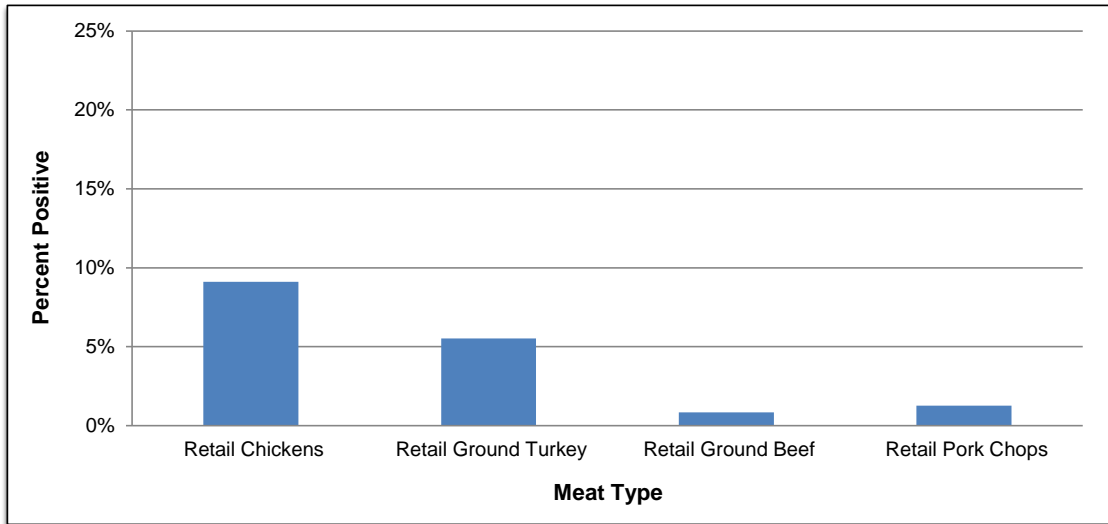
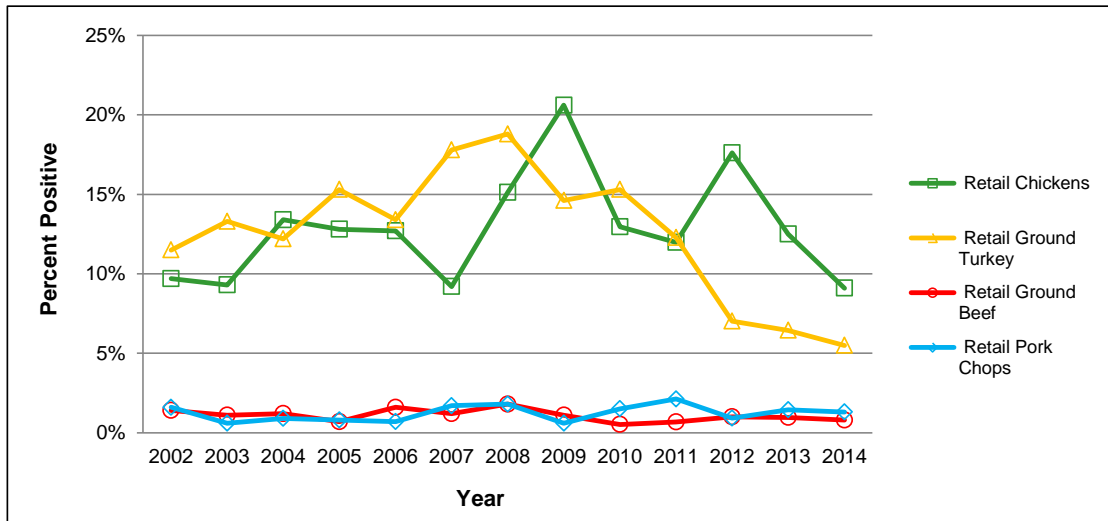


Figure 2. Percent of Retail Meat Samples Culture Positive for *Salmonella*, 2002-2014



Non-Typhoidal *Salmonella* Serotypes

Table 7. Top Serotypes among Non-Typhoidal *Salmonella* Isolates, 2014

Humans				Chickens											
Source	Serotype	n	%	Source	Serotype	n	%								
Humans (N=2127)	Enteritidis	438	20.6	Retail Chickens (N=143)	Typhimurium	38	26.6	HACCP (N=936)	Kentucky	361	38.6	Cecal (N=103)	Kentucky	27	26.2
	Typhimurium	262	12.3		Kentucky	35	24.5		Enteritidis	130	13.9		Typhimurium	27	26.2
	Newport	235	11.0		Enteritidis	27	18.9		Heidelberg	108	11.5		Enteritidis	17	16.5
	Javiana	128	6.0		Heidelberg	24	16.8		Typhimurium	81	8.7		Schwarzengrund	8	7.8
	I 4,[5],12:i:-	110	5.2		Infantis	4	2.8		Schwarzengrund	61	6.5		Heidelberg	7	6.8
	Infantis	73	3.4		Schwarzengrund	4	2.8		Infantis	43	4.6		Senftenberg	5	4.9
	Heidelberg	71	3.3		Mbandaka	3	2.1		I 4,[5],12:i:-	37	4.0		Other	12	11.7
	Saintpaul	52	2.4	Other	8	5.6	Thompson	23	2.5						
	Muenchen	45	2.1				Montevideo	16	1.7						
	Montevideo	44	2.1				Other	76	8.1						
	Oranienburg	36	1.7												
	Braenderup	31	1.5												
	Mississippi	26	1.2												
	Agona	25	1.2												
	Thompson	24	1.1												
	Berta	19	0.9												
	Rubislaw	19	0.9												
	Paratyphi B var. L(+) tartrate+	18	0.8												
	Poona	18	0.8												
	Bareilly	16	0.8												
Panama	16	0.8													
Unknown serotype	25	1.2													
Partially serotyped	2	0.1													
Rough/Nonmotile isolates	6	0.3													
Other	388	18.2													

Turkeys			
Source	Serotype	n	%
Retail Ground Turkey (N=86)	Reading	18	20.9
	Hadar	13	15.1
	Saintpaul	12	14.0
	Berta	8	9.3
	Albany	6	7.0
	Heidelberg	6	7.0
	Muenchen	4	4.7
	Schwarzengrund	3	3.5
	Senftenberg	3	3.5
	I 4,12:d:-	2	2.3
	Anatum	2	2.3
	Brandenburg	2	2.3
	Infantis	2	2.3
Typhimurium	2	2.3	
Other	3	3.5	

Cattle				
Source	Serotype	n	%	
Retail Ground Beef (N=13)	Dublin	3	23.1	
	Typhimurium	3	23.1	
	Montevideo	2	15.4	
	Newport	2	15.4	
	Anatum	1	7.7	
	Bredeney	1	7.7	
	Infantis	1	7.7	

Cattle			
Source	Serotype	n	%
HACCP (N=344)	Montevideo	91	26.5
	Dublin	31	9.0
	Cerro	29	8.4
	Anatum	18	5.2
	Newport	17	4.9
	Muenchen	16	4.7
	Typhimurium	14	4.1
	Kentucky	13	3.8
	6,7:g,m,s,e,n,z15	10	2.9
	Agona	10	2.9
	Muenster	10	2.9
	I 4,[5],12:i:-	7	2.0
	Meleagridis	7	2.0
	Mbandaka	7	2.0
	Reading	7	2.0
	Infantis	6	1.7
	Derby	5	1.5
	Other	46	13.4

Cattle			
Source	Serotype	n	%
Cecal (Beef) (N=104)	Anatum	25	24.0
	Montevideo	14	13.5
	6,7:g,m,s,e,n,z15	8	7.7
	Cerro	6	5.8
	Mbandaka	6	5.8
	Altona	4	3.8
	Senftenberg	4	3.8
	Typhimurium	4	3.8
	Kentucky	3	2.9
	Other	30	28.8

Cattle			
Source	Serotype	n	%
Cecal (Dairy) (N=217)	Cerro	70	32.3
	Montevideo	38	17.5
	Agona	16	7.4
	Anatum	15	6.9
	Newport	15	6.9
	Meleagridis	10	4.6
	Typhimurium	10	4.6
	Kentucky	7	3.2
	Mbandaka	4	1.8
	Havana	3	1.4
Muenchen	3	1.4	
Muenster	3	1.4	
Other	23	10.6	

Swine			
Source	Serotype	n	%
Retail Pork Chops (N=20)	Derby	5	25.0
	Infantis	5	25.0
	I 4,[5],12:i:-	2	10.0
	Anatum	1	5.0
	Brandenburg	1	5.0
	Bredeney	1	5.0
	Cerro	1	5.0
	London	1	5.0
	Muenchen	1	5.0
	Ohio	1	5.0
Typhimurium	1	5.0	

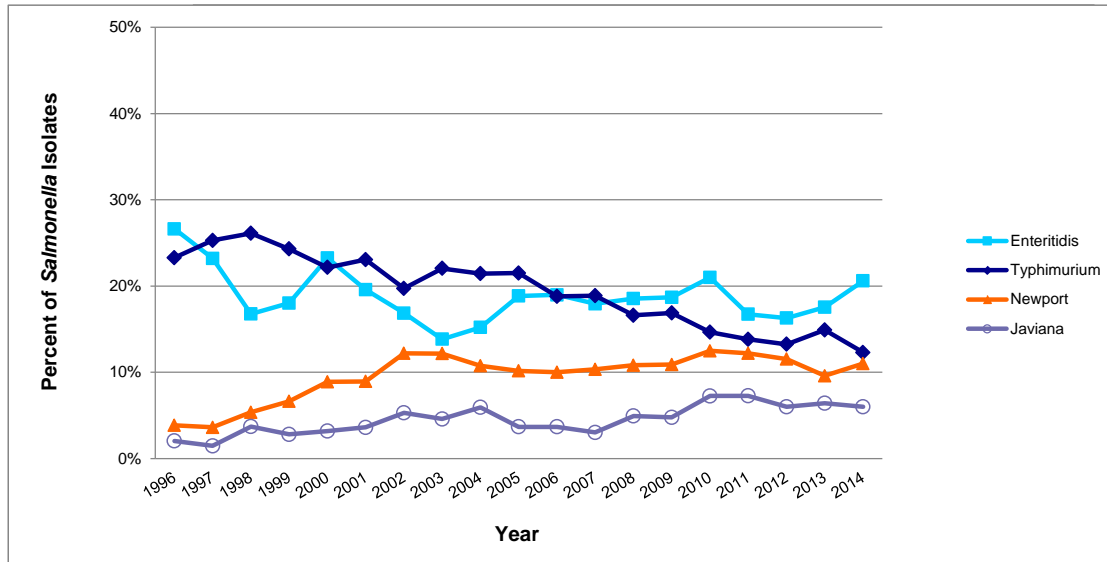
Swine			
Source	Serotype	n	%
Cecal (Market Swine) (N=279)	Derby	49	17.6
	Anatum	29	10.4
	Johannesburg	28	10.0
	Infantis	22	7.9
	Agona	17	6.1
	Typhimurium	13	4.7
	I 4,[5],12:i:-	9	3.2
	Saintpaul	9	3.2
	Adelaide	8	2.9
	Cerro	8	2.9
	London	8	2.9
	Muenchen	8	2.9
	Brandenburg	7	2.5
	Other	64	22.9

Swine			
Source	Serotype	n	%
Cecal (Sows) (N=327)	Anatum	67	20.5
	Johannesburg	42	12.8
	Infantis	36	11.0
	Derby	26	8.0
	Agona	13	4.0
	Uganda	13	4.0
	I 4,[5],12:i:-	10	3.1
	Muenchen	9	2.8
	Saintpaul	8	2.4
	London	7	2.1
	Cerro	6	1.8
	Ohio	6	1.8
Typhimurium	6	1.8	
Other	78	23.9	

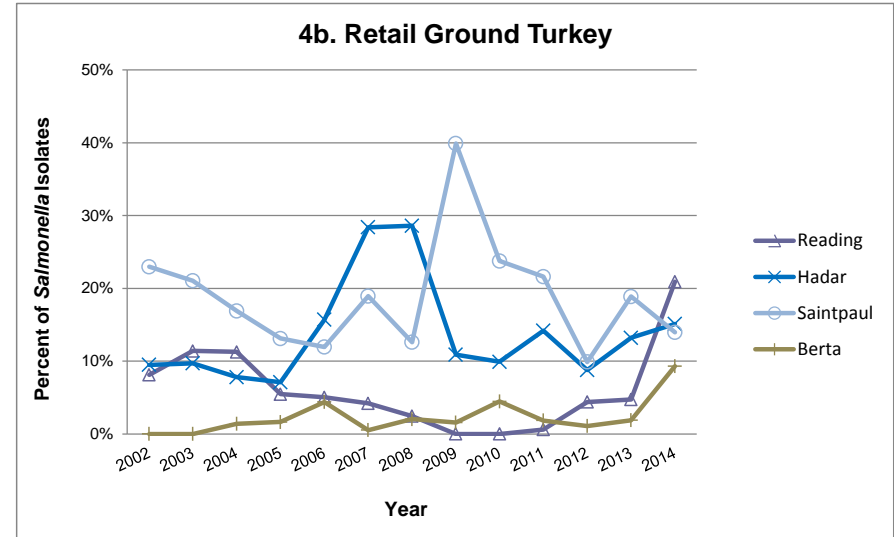
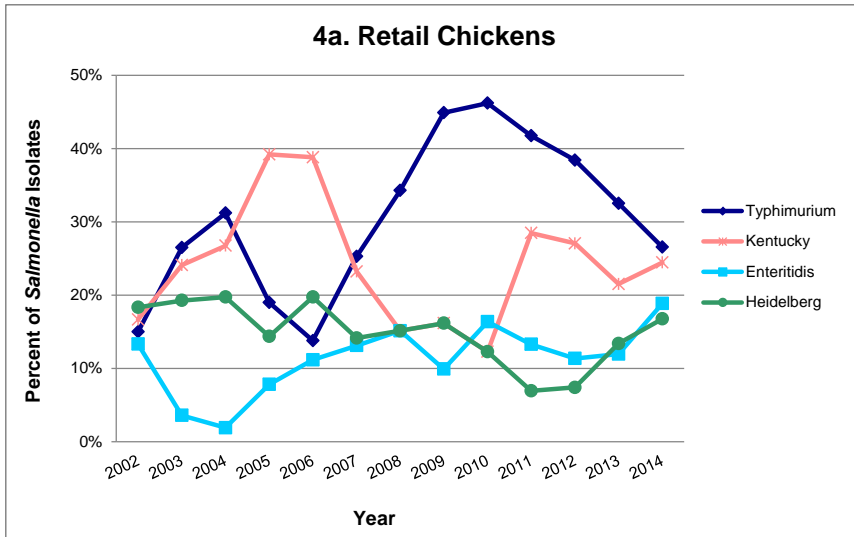
Table 8. Top Non-Typhoidal *Salmonella* Serotypes in Humans and their Distributions among Retail Meat and Food Animal Isolates, 2014

	Humans	Chickens			Turkeys			Cattle				Swine		
	Humans (N=2127)	Retail Chickens (N=143)	HACCP (N=936)	Cecal (N=103)	Retail Ground Turkeys (N=86)	HACCP (N=299)	Cecal (N=45)	Retail Ground Beef (N=13)	HACCP (N=345)	Cecal (Beef) (N=104)	Cecal (Dairy) (N=217)	Retail Pork Chops (N=20)	Cecal (Market Swine) (N=279)	Cecal (Sows) (N=327)
1. Enteritidis	20.6% 438	18.9% 27	13.9% 130	16.5% 17	0.0% 0	1.7% 5	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.5% 1	0.0% 0	0.4% 1	0.0% 0
2. Typhimurium	12.3% 262	26.6% 38	8.7% 81	26.2% 27	2.3% 2	1.0% 3	4.4% 2	23.1% 3	4.1% 14	3.8% 4	4.6% 10	5.0% 1	4.7% 13	1.8% 6
3. Newport	11.0% 235	0.0% 0	0.2% 2	0.0% 0	0.0% 0	2.0% 6	0.0% 0	15.4% 2	4.9% 17	1.0% 1	6.9% 15	0.0% 0	1.8% 5	0.3% 1
4. Javiana	6.0% 128	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
5. I 4,[5],12:i:-	5.2% 110	1.4% 2	4.0% 37	0.0% 0	0.0% 0	2.0% 6	0.0% 0	0.0% 0	2.0% 7	0.0% 0	0.0% 0	10.0% 2	3.2% 9	3.1% 10
6. Infantis	3.4% 73	2.8% 4	4.6% 43	1.0% 1	2.3% 2	0.0% 0	0.0% 0	7.7% 1	1.7% 6	0.0% 0	0.9% 2	25.0% 5	7.9% 22	11.0% 36
7. Heidelberg	3.3% 71	16.8% 24	11.5% 108	6.8% 7	7.0% 6	10.0% 30	6.7% 3	0.0% 0	0.3% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
8. Saintpaul	2.4% 52	0.0% 0	0.1% 1	0.0% 0	14.0% 12	6.7% 20	6.7% 3	0.0% 0	0.3% 1	1.0% 1	0.5% 1	0.0% 0	3.2% 9	2.4% 8
9. Muenchen	2.1% 45	0.0% 0	0.2% 2	0.0% 0	4.7% 4	4.0% 12	2.2% 1	0.0% 0	4.7% 16	1.9% 2	1.4% 3	5.0% 1	2.9% 8	2.8% 9
10. Montevideo	2.1% 44	0.0% 0	1.7% 16	0.0% 0	1.2% 1	5.7% 17	2.2% 1	15.4% 2	26.5% 91	13.5% 14	17.5% 38	0.0% 0	0.7% 2	1.5% 5

Figure 3. Top Non-Typhoidal *Salmonella* Serotypes from Humans in 2014 and their Relative Frequencies, 1996-2014



Figures 4. Top Non-Typhoidal *Salmonella* Serotypes from Retail Poultry in 2014 and their Relative Frequencies, 2002-2014



Figures 5. Top Non-Typhoidal *Salmonella* Serotypes from Food Animals in 2014 and their Relative Frequencies, 1997-2014

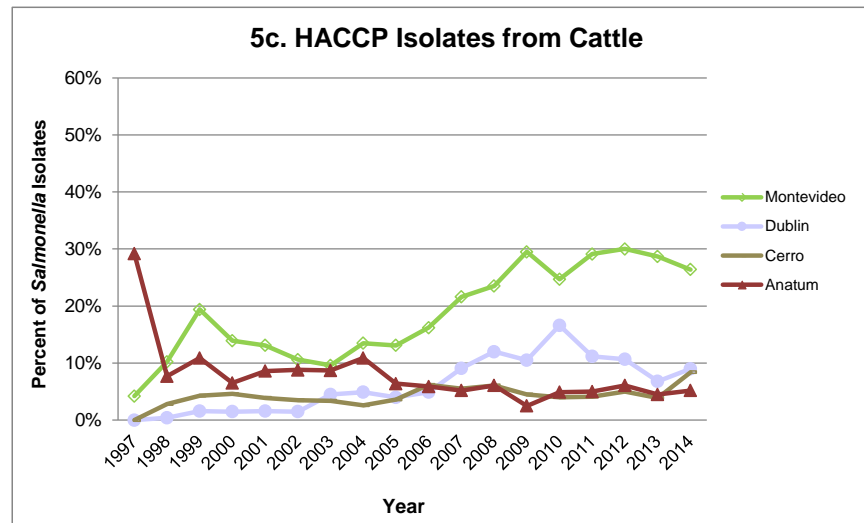
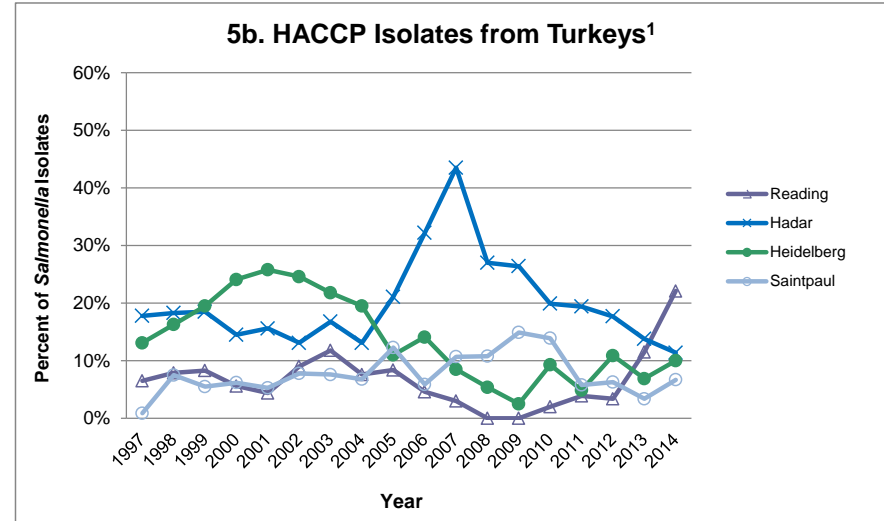
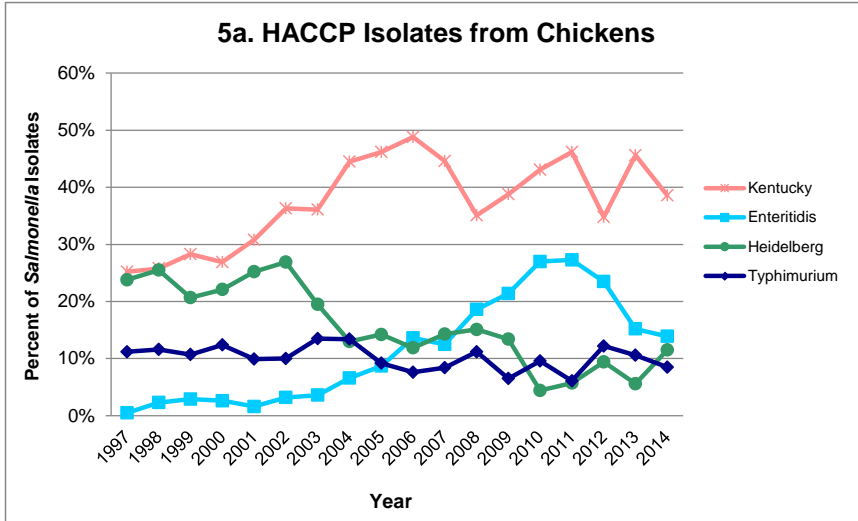


Table 9a. Distribution of MICs and Occurrence of Resistance among all Non-Typhoidal *Salmonella* Isolates, 2014

Antimicrobial Class	Antimicrobial Agent	Isolate Source (# of Isolates)	%I ¹	%R ²	[95% CI] ³	Distribution (%) of MICs (µg/ml) ⁴														
						0.015	0.03	0.06	0.125	0.25	0.50	1	2	4	8	16	32	64	128	256
Aminoglycosides	Gentamicin	Humans (2127)	0.2	1.4	[1.0 - 2.0]															
		Chickens	Retail Chickens (143)	1.4	6.3															[2.9 - 11.6]
			HACCP (936)	0.2	3.2															[2.2 - 4.5]
			Cecal (103)	1.0	3.9															[1.1 - 9.6]
			Turkeys	Retail Ground Turkey (86)	2.3															20.9
		HACCP (299)	1.0	19.7	[15.4 - 24.7]															
		Cecal (45)	2.2	31.1	[18.2 - 46.6]															
		Cattle	Retail (13)	0.0	7.7															[0.2 - 36.0]
			HACCP (344)	0.0	0.6															[0.1 - 2.1]
			Cecal (Beef) (104)	0.0	1.0															[0.0 - 5.2]
			Cecal (Dairy) (217)	0.0	0.5															[0.0 - 2.5]
		Swine	Retail (20)	15.0	5.0															[0.1 - 24.9]
			Cecal (Market Swine) (279)	0.0	3.2															[1.5 - 6.0]
			Cecal (Sows) (327)	0.0	0.6															[0.1 - 2.2]
			Streptomycin	Humans (2127)	N/A															11.2
	Chickens	Retail Chickens (143)	N/A	31.5	[24.0 - 39.8]															
		HACCP (936)	N/A	41.9	[38.7 - 45.1]															
		Cecal (103)	N/A	30.1	[21.5 - 39.9]															
		Turkeys	Retail Ground Turkey (86)	N/A	52.3	[41.3 - 63.2]														
	HACCP (299)	N/A	52.8	[47.0 - 58.6]																
	Cecal (45)	N/A	57.8	[42.2 - 72.3]																
	Cattle	Retail (13)	N/A	38.5	[13.9 - 68.4]															
		HACCP (344)	N/A	16.9	[13.1 - 21.2]															
		Cecal (Beef) (104)	N/A	10.6	[5.4 - 18.1]															
		Cecal (Dairy) (217)	N/A	13.4	[9.1 - 18.6]															
	Swine	Retail (20)	N/A	35.0	[15.4 - 59.2]															
		Cecal (Market Swine) (279)	N/A	22.2	[17.5 - 27.6]															
		Cecal (Sows) (327)	N/A	9.8	[6.8 - 13.5]															
		β-Lactam/β-Lactamase Inhibitor Combinations	Humans (2127)	2.1	2.1	[1.5 - 2.8]														
	Chickens	Retail Chickens (143)	0.7	16.8	[11.1 - 23.9]															
		HACCP (936)	0.3	6.5	[5.0 - 8.3]															
		Cecal (103)	1.0	8.7	[4.1 - 15.9]															
Turkeys		Retail Ground Turkey (86)	12.8	7.0	[2.6 - 14.6]															
HACCP (299)	11.7	12.0	[8.6 - 16.3]																	
Cecal (45)	17.8	11.1	[3.7 - 24.1]																	
Cattle	Retail (13)	0.0	38.5	[13.9 - 68.4]																
	HACCP (344)	0.6	7.6	[5.0 - 10.9]																
	Cecal (Beef) (104)	0.0	0.0	[0.0 - 3.5]																
	Cecal (Dairy) (217)	1.4	5.5	[2.9 - 9.5]																
Swine	Retail (20)	5.0	0.0	[0.0 - 16.8]																
	Cecal (Market Swine) (279)	2.5	3.6	[1.7 - 6.5]																
	Cecal (Sows) (327)	0.6	1.5	[0.5 - 3.5]																

¹ Percent of isolates with intermediate susceptibility

² Percent of isolates with resistance. Discrepancies between %R and sums of distribution %'s, to the right of the double vertical bars, are due to rounding

³ 95% confidence intervals for percent resistant (%R) were calculated using the Clopper-Pearson exact method

⁴ The unshaded areas indicate the range of dilutions tested for each antimicrobial. Single vertical bars indicate the breakpoints for susceptibility, while double vertical bars indicate the breakpoints for resistance. Numbers in the shaded areas indicate the percentages of isolates with MICs greater than the highest tested concentrations. Numbers listed for the lowest tested concentrations represent the percentages of isolates with MICs equal to or less than the lowest tested concentration.

Table 9b. Distribution of MICs and Occurrence of Resistance among all Non-Typhoidal *Salmonella* Isolates, 2014

Antimicrobial Class	Antimicrobial Agent	Isolate Source (# of Isolates)	%I ¹	%R ²	[95% CI] ³	Distribution (%) of MICs (µg/ml) ⁴																									
						0.015	0.03	0.06	0.125	0.25	0.50	1	2	4	8	16	32	64	128	256	512	1024									
Cepheids	Cefoxitin	Humans (2127)	0.2	2.2	[1.6 - 2.9]							<0.1	5.6	71.1	19.7	1.2	0.2	1.0	1.1												
		Chickens	Retail Chickens (143)	2.8	14.7	[9.3 - 21.6]								4.2	49.0	26.6	2.8	2.8	10.5	4.2											
			HACCP (936)	1.0	5.7	[4.3 - 7.3]								8.3	63.4	20.1	1.6	1.0	4.3	1.4											
			Cecal (103)	2.9	5.8	[2.2 - 12.2]									58.3	30.1	2.9	2.9	2.9	2.9											
		Turkeys	Retail Ground Turkey (86)	0.0	7.0	[2.6 - 14.6]								7.0	34.9	32.6	18.6		2.3	4.7											
			HACCP (299)	1.7	12.0	[8.6 - 16.3]								2.3	39.1	37.1	7.7	1.7	3.3	8.7											
			Cecal (45)	2.2	8.9	[2.5 - 21.2]									31.1	46.7	11.1	2.2	4.4	4.4											
		Cattle	Retail (13)	0.0	38.5	[13.9 - 68.4]										46.2	15.4				38.5										
			HACCP (344)	1.2	7.3	[4.8 - 10.5]								2.6	46.5	34.9	7.6	1.2	2.0	5.2											
			Cecal (Beef) (104)	0.0	0.0	[0.0 - 3.5]								3.9	29.8	63.5	2.9														
			Cecal (Dairy) (217)	0.5	5.5	[2.9 - 9.5]								5.5	54.4	31.3	2.8	0.5	2.3	3.2											
		Swine	Retail (20)	0.0	0.0	[0.0 - 16.8]										25.0	70.0	5.0													
	Cecal (Market Swine) (279)		0.7	3.6	[1.7 - 6.5]								1.8	35.1	53.4	5.4	0.7	0.7	2.9												
	Cecal (Sows) (327)		0.3	1.5	[0.5 - 3.5]								1.2	34.6	55.4	7.0	0.3		1.5												
	Ceftiofur	Humans (2127)	0.1	2.4	[1.8 - 3.1]									0.1	0.3	29.0	66.3	1.7	0.1	0.2	2.2										
		Chickens	Retail Chickens (143)	0.0	17.5	[11.6 - 24.7]										20.3	58.7	3.5		8.4	9.1										
			HACCP (936)	0.3	6.3	[4.8 - 8.1]										44.3	48.7	0.3	0.3	1.2	5.1										
			Cecal (103)	0.0	8.7	[4.1 - 15.9]										35.0	54.4	1.9		2.9	5.8										
		Turkeys	Retail Ground Turkey (86)	0.0	7.0	[2.6 - 14.6]										12.8	70.9	9.3			7.0										
			HACCP (299)	0.3	13.0	[9.4 - 17.4]										13.0	70.6	3.0	0.3	0.3	12.7										
			Cecal (45)	0.0	11.1	[3.7 - 24.1]										13.3	71.1	4.4		2.2	8.9										
		Cattle	Retail (13)	0.0	38.5	[13.9 - 68.4]										7.7	53.8				38.5										
			HACCP (344)	0.0	7.6	[5.0 - 10.9]										1.7	23.0	65.7	2.0		0.6	7.0									
			Cecal (Beef) (104)	1.0	0.0	[0.0 - 3.5]										1.0	24.0	74.0		1.0											
			Cecal (Dairy) (217)	0.0	5.5	[2.9 - 9.5]										0.5	37.8	53.5	2.8		5.5										
		Swine	Retail (20)	0.0	0.0	[0.0 - 16.8]										10.0	65.0	25.0													
	Cecal (Market Swine) (279)		0.4	3.6	[1.7 - 6.5]										0.4	25.8	67.0	2.9	0.4	3.6											
	Cecal (Sows) (327)		0.0	1.5	[0.5 - 3.5]										0.3	0.6	33.9	62.1	1.5		1.5										
	Ceftriaxone	Humans (2127)	0.0	2.4	[1.8 - 3.1]										97.4	0.2			<0.1	0.2	1.1	0.6	0.2	0.2							
		Chickens	Retail Chickens (143)	0.0	17.5	[11.6 - 24.7]										81.8	0.7				10.5	4.2	0.7	2.1							
			HACCP (936)	0.0	6.6	[5.1 - 8.4]										93.4					0.5	1.2	3.5	1.2	0.1	0.1					
			Cecal (103)	0.0	8.7	[4.1 - 15.9]										91.3					1.0	1.9	3.9	1.0	1.0						
		Turkeys	Retail Ground Turkey (86)	0.0	7.0	[2.6 - 14.6]										93.0						1.2	5.8								
HACCP (299)			0.0	13.4	[9.7 - 17.8]										86.3	0.3					1.0	3.3	4.7	3.3	1.0						
Cecal (45)			0.0	11.1	[3.7 - 24.1]										88.9						2.2	2.2	2.2	4.4							
Cattle		Retail (13)	0.0	38.5	[13.9 - 68.4]										61.5							15.4	15.4	7.7							
		HACCP (344)	0.0	7.6	[5.0 - 10.9]										92.4						0.3	0.6	2.6	2.9	1.2						
		Cecal (Beef) (104)	0.0	1.0	[0.0 - 5.2]										99.0							1.0									
		Cecal (Dairy) (217)	0.0	5.5	[2.9 - 9.5]										94.5						2.3	2.8	0.5								
Swine		Retail (20)	0.0	0.0	[0.0 - 16.8]										100.0																
	Cecal (Market Swine) (279)	0.0	3.9	[2.0 - 6.9]										96.1						0.4	0.7	2.9									
	Cecal (Sows) (327)	0.0	1.5	[0.5 - 3.5]										98.2	0.3						0.9	0.6									

¹ Percent of isolates with intermediate susceptibility

² Percent of isolates with resistance. Discrepancies between %R and sums of distribution %'s, to the right of the double vertical bars, are due to rounding

³ 95% confidence intervals for percent resistant (%R) were calculated using the Clopper-Pearson exact method

⁴ The unshaded areas indicate the range of dilutions tested for each antimicrobial. Single vertical bars indicate the breakpoints for susceptibility, while double vertical bars indicate the breakpoints for resistance. Numbers in the shaded areas indicate the percentages of isolates with MICs greater than the highest tested concentrations. Numbers listed for the lowest tested concentrations represent the percentages of isolates with MICs equal to or less than the lowest tested concentration.

Table 9c. Distribution of MICs and Occurrence of Resistance among all Non-Typhoidal *Salmonella* Isolates, 2014

Antimicrobial Class	Antimicrobial Agent	Isolate Source (# of Isolates)	%I ¹	%R ²	[95% CI] ³	Distribution (%) of MICs (µg/ml) ⁴														
						0.015	0.03	0.06	0.125	0.25	0.50	1	2	4	8	16	32	64	128	256
Folate Pathway Inhibitors	Sulfisoxazole ⁵	Humans (2127)	N/A	9.4	[8.2 - 10.8]															
		Chickens	Retail Chickens (143)	N/A	30.8															[23.3 - 39.0]
			HACCP (936)	N/A	9.6															[7.8 - 11.7]
			Cecal (103)	N/A	29.1															[20.6 - 38.9]
			Turkeys	Retail Ground Turkey (86)	N/A															26.7
		HACCP (299)		N/A	29.1															[24.0 - 34.6]
		Cecal (45)		N/A	26.7															[14.6 - 41.9]
		Cattle		Retail (13)	N/A															38.5
			HACCP (344)	N/A	16.0															[12.3 - 20.3]
			Cecal (Beef) (104)	N/A	8.7															[4.0 - 15.8]
			Cecal (Dairy) (217)	N/A	11.1															[7.2 - 16.0]
		Swine	Retail (20)	N/A	30.0															[11.9 - 54.3]
	Cecal (Market Swine) (279)		N/A	21.9	[17.2 - 27.2]															
	Cecal (Sows) (327)		N/A	6.7	[4.3 - 10.0]															
	Trimethoprim-Sulfamethoxazole		Humans (2127)	N/A	1.3	[0.9 - 1.9]														
		Chickens	Retail Chickens (143)	N/A	0.0	[0.0 - 2.5]														
			HACCP (936)	N/A	0.4	[0.1 - 1.1]														
			Cecal (103)	N/A	1.9	[0.2 - 6.8]														
			Turkeys	Retail Ground Turkey (86)	N/A	0.0														
		HACCP (299)		N/A	0.7	[0.1 - 2.4]														
		Cecal (45)		N/A	6.7	[1.4 - 18.3]														
		Cattle		Retail (13)	N/A	0.0														
			HACCP (344)	N/A	1.7	[0.6 - 3.8]														
			Cecal (Beef) (104)	N/A	1.9	[0.2 - 6.8]														
			Cecal (Dairy) (217)	N/A	0.9	[0.1 - 3.3]														
		Swine	Retail (20)	N/A	5.0	[0.1 - 24.9]														
Cecal (Market Swine) (279)			N/A	2.5	[1.0 - 5.1]															
Cecal (Sows) (327)			N/A	0.0	[0.0 - 1.1]															
Macrolides	Azithromycin		Humans (2127)	N/A	<0.1	[0.0 - 0.3]														
		Chickens	Retail Chickens (143)	N/A	0.0	[0.0 - 2.5]														
			HACCP (936)	N/A	0.0	[0.0 - 0.4]														
			Cecal (103)	N/A	1.0	[0.0 - 5.3]														
			Turkeys	Retail Ground Turkey (86)	N/A	0.0														
		HACCP (299)		N/A	0.3	[0.0 - 1.8]														
		Cecal (45)		N/A	2.2	[0.1 - 11.8]														
		Cattle		Retail (13)	N/A	0.0														
			HACCP (344)	N/A	0.0	[0.0 - 1.1]														
			Cecal (Beef) (104)	N/A	0.0	[0.0 - 3.5]														
			Cecal (Dairy) (217)	N/A	0.5	[0.0 - 2.5]														
		Swine	Retail (20)	N/A	0.0	[0.0 - 16.8]														
			Cecal (Market Swine) (279)	N/A	0.7	[0.1 - 2.6]														
			Cecal (Sows) (327)	N/A	0.0	[0.0 - 1.1]														

¹ Percent of isolates with intermediate susceptibility

² Percent of isolates with resistance. Discrepancies between %R and sums of distribution %'s, to the right of the double vertical bars, are due to rounding

³ 95% confidence intervals for percent resistant (%R) were calculated using the Clopper-Pearson exact method

⁴ The unshaded areas indicate the range of dilutions tested for each antimicrobial. Single vertical bars indicate the breakpoints for susceptibility, while double vertical bars indicate the breakpoints for resistance. Numbers in the shaded areas indicate the percentages of isolates with MICs greater than the highest tested concentrations. Numbers listed for the lowest tested concentrations represent the percentages of isolates with MICs equal to or less than the lowest tested concentration.

⁵ Sulfisoxazole replaced sulfamethoxazole in 2004

Table 9d. Distribution of MICs and Occurrence of Resistance among all Non-Typhoidal *Salmonella* Isolates, 2014

Antimicrobial Class	Antimicrobial Agent	Isolate Source (# of Isolates)	%I ¹	%R ²	[95% CI] ³	Distribution (%) of MICs (µg/ml) ⁴																						
						0.015	0.03	0.06	0.125	0.25	0.50	1	2	4	8	16	32	64	128	256	512	1024						
Penicillins	Ampicillin	Humans (2127)	0.0	9.1	[7.9 - 10.4]							80.6	9.4	0.7	0.2			0.2	8.9									
		Chickens	Retail Chickens (143)	0.0	19.6	[13.4 - 27.0]							67.1	12.6	0.7					19.6								
			HACCP (936)	0.0	8.3	[6.6 - 10.3]							80.3	11.3					8.0									
			Cecal (103)	0.0	10.7	[5.5 - 18.3]							78.6	10.7					10.7									
		Turkeys	Retail Ground Turkey (86)	0.0	26.7	[17.8 - 37.4]							60.5	12.8					26.7									
			HACCP (299)	0.0	34.8	[29.4 - 40.5]							55.9	7.7	1.0	0.7					34.8							
			Cecal (45)	2.2	44.4	[29.6 - 60.0]							48.9	4.4			2.2			44.4								
		Cattle	Retail (13)	0.0	38.5	[13.9 - 68.4]							61.5							38.5								
			HACCP (344)	0.0	9.9	[6.9 - 13.5]							82.8	6.7	0.6					9.9								
			Cecal (Beef) (104)	0.0	1.9	[0.2 - 6.8]							95.2	2.9					1.9									
			Cecal (Dairy) (217)	0.0	8.3	[5.0 - 12.8]							86.2	5.5					8.3									
		Swine	Retail (20)	0.0	20.0	[5.7 - 43.7]							75.0	5.0					20.0									
			Cecal (Market Swine) (279)	0.0	10.8	[7.4 - 15.0]							83.9	5.0	0.4					10.8								
			Cecal (Sows) (327)	0.0	4.0	[2.1 - 6.7]							90.5	5.5					4.0									
		Phenicols	Chloramphenicol	Humans (2178)	1.2	4.0	[3.2 - 4.9]									0.5	52.8	41.5	1.2	0.3	3.7							
Chickens	Retail Chickens (143)			0.0	4.2	[1.6 - 8.9]									2.1	49.7	44.1					4.2						
	HACCP (936)			0.7	0.9	[0.4 - 1.7]									1.0	49.0	48.3	0.7					0.9					
	Cecal (103)			1.9	0.0	[0.0 - 3.5]									41.8	56.3	1.9											
Turkeys	Retail Ground Turkey (86)			0.0	2.3	[0.3 - 8.1]									1.2	37.2	59.3					2.3						
	HACCP (299)			2.3	2.3	[0.9 - 4.8]									0.7	26.1	68.6	2.3					2.3					
	Cecal (45)			0.0	6.7	[1.4 - 18.3]									17.8	75.6					6.7							
Cattle	Retail (13)			0.0	38.5	[13.9 - 68.4]									7.7	53.8					38.5							
	HACCP (344)			2.0	12.5	[9.2 - 16.5]									0.3	23.3	61.9	2.0					12.5					
	Cecal (Beef) (104)			1.0	1.0	[0.0 - 5.2]									24.0	74.0	1.0					1.0						
	Cecal (Dairy) (217)			3.7	8.3	[5.0 - 12.8]									1.4	48.4	38.3	3.7					8.3					
Swine	Retail (20)			5.0	5.0	[0.1 - 24.9]									10.0	80.0	5.0					5.0						
	Cecal (Market Swine) (279)			4.7	4.3	[2.2 - 7.4]									0.4	14.3	76.3	4.7					4.3					
	Cecal (Sows) (327)			3.7	1.5	[0.5 - 3.5]									0.6	16.5	77.7	3.7	0.3	1.2								
Quinolones	Ciprofloxacin			Humans (2178)	3.9	0.4	[0.2 - 0.8]	90.6	4.7	0.4	1.6	1.1	1.2	0.3			0.1											
		Chickens	Retail Chickens (143)	0.7	0.0	[0.0 - 2.5]	67.1	31.5	0.7	0.7																		
			HACCP (936)	0.0	0.0	[0.0 - 0.4]																						
			Cecal (103)	0.0	0.0	[0.0 - 3.5]																						
		Turkeys	Retail Ground Turkey (86)	0.0	0.0	[0.0 - 4.2]	59.3	39.5	1.2																			
			HACCP (299)	0.6	0.0	[0.0 - 1.2]	84.6	14.7			0.3	0.3																
			Cecal (45)	0.0	0.0	[0.0 - 7.9]	82.2	17.8																				
		Cattle	Retail (13)	7.7	0.0	[0.0 - 24.7]	53.8	30.8	7.7			7.7																
			HACCP (344)	2.6	0.3	[0.0 - 1.6]	84.6	11.3	1.2	0.6	0.6	1.4	0.3															
			Cecal (Beef) (104)	1.0	0.0	[0.0 - 3.5]	86.5	12.5			1.0																	
			Cecal (Dairy) (217)	0.5	0.0	[0.0 - 1.7]	90.3	9.2					0.5															
		Swine	Retail (20)	5.0	5.0	[0.1 - 24.9]	50.0	40.0					5.0			5.0												
			Cecal (Market Swine) (279)	3.6	0.7	[0.1 - 2.6]	79.9	15.8					3.6			0.7												
			Cecal (Sows) (327)	2.7	0.3	[0.0 - 1.7]	78.6	18.0	0.3	0.3	0.6	1.8	0.3															

¹ Percent of isolates with intermediate susceptibility

² Percent of isolates with resistance. Discrepancies between %R and sums of distribution %'s, to the right of the double vertical bars, are due to rounding

³ 95% confidence intervals for percent resistant (%R) were calculated using the Clopper-Pearson exact method

⁴ The unshaded areas indicate the range of dilutions tested for each antimicrobial. Single vertical bars indicate the breakpoints for susceptibility, while double vertical bars indicate the breakpoints for resistance. Numbers in the shaded areas indicate the percentages of isolates with MICs greater than the highest tested concentrations. Numbers listed for the lowest tested concentrations represent the percentages of isolates with MICs equal to or less than the lowest tested concentration.

Table 9e. Distribution of MICs and Occurrence of Resistance among all Non-Typhoidal *Salmonella* Isolates, 2014

Antimicrobial Class	Antimicrobial Agent	Isolate Source (# of Isolates)	%I ¹	%R ²	[95% CI] ³	Distribution (%) of MICs (µg/ml) ⁴																																							
						0.015	0.03	0.06	0.125	0.25	0.50	1	2	4	8	16	32	64	128	256	512	1024																							
Quinolones	Nalidixic Acid	Humans (2178)	N/A	3.5	[2.7 - 4.3]												<0.1	0.1	27.1	67.0	1.7	0.6	0.5	3.0																					
		Chickens	Retail Chickens (143)	N/A	0.7												[0.0 - 3.8]	55.9	42.7	0.7										0.7	0.2														
			HACCP (936)	N/A	0.2												[0.0 - 0.8]	0.7	44.7	52.6										1.7	0.1														
			Cecal (103)	N/A	0.0												[0.0 - 3.5]	32.0	68.0																										
		Turkeys	Retail Ground Turkey (86)	N/A	0.0												[0.0 - 4.2]	52.3	47.7																										
			HACCP (299)	N/A	0.7												[0.1 - 2.4]	26.1	71.9	1.3																									
			Cecal (45)	N/A	0.0												[0.0 - 7.9]	17.8	82.2																										
		Cattle	Retail (13)	N/A	7.7												[0.2 - 36.0]	46.2	46.2																										
			HACCP (344)	N/A	2.3												[1.0 - 4.5]	39.5	57.0	0.6	0.6	0.6	0.6	0.6																1.7					
			Cecal (Beef) (104)	N/A	0.0												[0.0 - 3.5]	39.4	59.6	1.0																									
			Cecal (Dairy) (217)	N/A	0.0												[0.0 - 1.7]	41.5	57.6	0.5																				0.5					
		Swine	Retail (20)	N/A	5.0												[0.1 - 24.9]	50.0	35.0	5.0	5.0																								
			Cecal (Market Swine) (279)	N/A	1.1												[0.2 - 3.1]	0.4	24.7	69.5	1.1														3.2	1.1	1.1								
			Cecal (Sows) (327)	N/A	0.9												[0.2 - 2.7]	0.3	20.8	75.2	0.6														2.1	0.6	0.3								
Tetracyclines	Tetracycline	Humans (2178)	0.8	10.4	[9.1 - 11.8]												88.8	0.8	0.2	1.1	9.1																								
		Chickens	Retail Chickens (143)	0.7	47.6												[39.1 - 56.1]	51.7	0.7																										
			HACCP (936)	0.5	36.9												[33.8 - 40.0]	62.6	0.5													0.2	0.4	36.2											
			Cecal (103)	0.0	36.9												[27.6 - 47.0]	63.1																											
		Turkeys	Retail Ground Turkey (86)	0.0	60.5												[49.3 - 70.8]	39.5														2.3	58.1												
			HACCP (299)	0.0	54.2												[48.3 - 59.9]	45.8	0.7	53.5																									
			Cecal (45)	0.0	64.4												[48.8 - 78.1]	35.6	2.2	62.2																									
		Cattle	Retail (13)	0.0	46.2												[19.2 - 74.9]	53.8									7.7	38.5																	
			HACCP (344)	0.3	25.0												[20.5 - 29.9]	74.7									0.3	2.6						22.4											
			Cecal (Beef) (104)	0.0	17.3												[10.6 - 26.0]	82.7									2.9	14.4																	
			Cecal (Dairy) (217)	0.5	15.7												[11.1 - 21.2]	83.9									0.5	2.3											13.4						
		Swine	Retail (20)	0.0	55.0												[31.5 - 76.9]	45.0																											
			Cecal (Market Swine) (279)	0.0	40.5												[34.7 - 46.5]	59.5														5.7	34.8												
			Cecal (Sows) (327)	0.0	23.2												[18.8 - 28.2]	76.8														0.3	5.5						17.4						

¹ Percent of isolates with intermediate susceptibility

² Percent of isolates with resistance. Discrepancies between %R and sums of distribution %'s, to the right of the double vertical bars, are due to rounding

³ 95% confidence intervals for percent resistant (%R) were calculated using the Clopper-Pearson exact method

⁴ The unshaded areas indicate the range of dilutions tested for each antimicrobial. Single vertical bars indicate the breakpoints for susceptibility, while double vertical bars indicate the breakpoints for resistance. Numbers in the shaded areas indicate the percentages of isolates with MICs greater than the highest tested concentrations. Numbers listed for the lowest tested concentrations represent the percentages of isolates with MICs equal to or less than the lowest tested concentration.

Resistance by Year

Table 10a. Antimicrobial Resistance among all Non-Typhoidal *Salmonella* Isolates, 2003-2014

Year			2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
Number of Isolates Tested	Humans		1855	1782	2036	2170	2145	2384	2192	2448	2335	2233	2178	2127	
	Chickens	Retail Chickens	83	157	153	152	99	198	272	171	158	229	208	143	
		HACCP	1158	1280	1989	1380	994	624	551	564	491	864	520	936	
		Cecal											55	103	
	Turkeys	Retail Ground Turkey	114	142	183	159	190	246	193	202	162	91	106	86	
		HACCP	262	236	227	304	271	148	121	151	103	175	87	299	
		Cecal											28	45	
	Cattle	Retail Ground Beef	10	14	8	19	13	24	14	7	9	13	15	13	
		HACCP	670	607	329	389	439	443	200	247	340	280	310	344	
		Cecal (Beef)											124	104	
Cecal (Dairy)												310	217		
Swine	Retail Pork Chops	5	11	9	8	18	23	8	20	28	12	24	20		
	Cecal (Market Swine)											260	279		
	Cecal (Sows)											289	327		
Antimicrobial Class	Antimicrobial (Resistance Breakpoint)	Isolate Source													
Aminoglycosides	Gentamicin (MIC ≥ 16 µg/ml)	Humans	1.4%	1.3%	2.2%	2.0%	2.1%	1.5%	1.3%	1.0%	1.7%	1.2%	2.0%	1.4%	
		Chickens	26	24	44	44	45	35	28	24	40	26	43	30	
		Retail Chickens	6.0%	3.8%	3.3%	9.2%	6.1%	7.1%	3.3%	5.8%	3.8%	5.2%	5.3%	6.3%	
		HACCP	5	6	5	14	6	14	9	10	6	12	11	9	
		Cecal	6.3%	4.9%	4.3%	5.7%	4.5%	5.6%	5.6%	4.6%	3.5%	4.6%	2.3%	3.2%	
		Turkeys	73	63	85	79	45	35	31	26	17	40	12	30	
		Retail Ground Turkey	22.8%	20.4%	26.8%	28.9%	24.7%	27.6%	18.7%	16.3%	32.1%	26.4%	27.4%	20.9%	
		HACCP	26	29	49	46	47	68	36	33	52	24	29	18	
		Cecal	21.0%	25.4%	22.9%	16.4%	12.9%	16.9%	14.9%	19.9%	14.6%	24.6%	23.0%	19.7%	
		Cattle	55	60	52	50	35	25	18	30	15	43	43	59	
	Retail Ground Beef	0.0%	0.0%	25.0%	0.0%	7.7%	8.3%	14.3%	0.0%	0.0%	0.0%	13.3%	7.7%		
	HACCP	0	0	2	0	1	2	2	0	0	0	2	1		
	Cecal (Beef)	2.7%	1.8%	2.4%	3.9%	1.6%	1.6%	2.0%	4.9%	2.1%	2.1%	1.9%	0.6%		
	Cecal (Dairy)	18	11	8	15	7	7	4	12	7	6	6	2		
	Swine	Retail Pork Chops	0.0%	0.0%	0.0%	50.0%	5.6%	13.0%	0.0%	10.0%	3.6%	8.3%	0.0%	5.0%	
	Cecal (Market Swine)	0	0	0	4	1	3	0	2	1	1	0	1		
	Cecal (Sows)											3.1%	3.2%		
												8	9		
												0.7%	0.6%		
												2	2		
Streptomycin (MIC ≥ 64 µg/ml)	Humans	15.0%	12.0%	11.1%	10.7%	10.3%	10.0%	8.9%	8.6%	9.8%	8.4%	11.5%	11.2%		
	Chickens	279	213	225	233	222	238	196	210	229	187	251	239		
	Retail Chickens	26.5%	28.0%	30.1%	36.2%	30.3%	23.7%	23.2%	25.1%	38.6%	30.6%	20.7%	31.5%		
	HACCP	22	44	46	55	30	47	63	43	61	70	57	45		
	Cecal	19.6%	22.2%	23.3%	21.2%	19.3%	25.2%	30.5%	36.0%	35.8%	32.1%	42.7%	41.9%		
	Turkeys	227	284	464	293	192	157	168	203	176	277	222	392		
	Retail Ground Turkey	45.6%	34.5%	44.3%	40.9%	45.3%	58.5%	28.0%	31.7%	56.2%	44.0%	48.1%	52.3%		
	HACCP	52	49	81	65	86	144	54	64	91	40	51	45		
	Cecal	29.4%	33.9%	40.1%	28.9%	34.7%	32.4%	38.8%	27.8%	22.3%	38.3%	35.6%	52.8%		
	Cattle	77	80	91	88	94	48	47	42	23	67	31	158		
Retail Ground Beef	40.0%	14.3%	25.0%	10.5%	0.0%	20.8%	28.6%	42.9%	33.3%	23.1%	20.0%	38.5%			
HACCP	4	2	2	2	0	5	4	3	3	3	3	5			
Cecal (Beef)	28.7%	20.9%	24.3%	23.7%	19.8%	23.0%	22.0%	26.7%	19.4%	18.9%	20.0%	16.9%			
Cecal (Dairy)	192	127	80	92	87	102	44	66	66	53	62	58			
Swine	Retail Pork Chops	40.0%	27.3%	33.3%	25.0%	16.7%	13.0%	37.5%	45.0%	57.1%	41.7%	41.7%	35.0%		
Cecal (Market Swine)	2	3	3	2	3	3	3	9	16	5	10	7			
Cecal (Sows)											18.1%	22.2%			
											47	62			
											9.3%	9.8%			
											27	32			
β-Lactam/β-Lactamase Inhibitor Combinations	Amoxicillin-Clavulanic Acid (MIC ≥ 32 / 16 µg/ml)	Humans	4.6%	3.7%	3.2%	3.7%	3.3%	3.1%	3.4%	2.9%	2.6%	2.9%	2.4%	2.1%	
		Chickens	86	66	65	81	70	73	75	70	60	65	53	45	
		Retail Chickens	25.3%	24.8%	21.6%	19.1%	16.2%	22.2%	37.5%	33.3%	33.5%	27.9%	19.7%	16.8%	
		HACCP	21	39	33	29	16	44	102	57	53	64	41	24	
		Cecal	9.7%	12.4%	12.1%	12.9%	15.6%	8.7%	12.9%	11.7%	6.3%	11.3%	8.8%	6.5%	
		Turkeys	112	159	241	178	155	54	71	66	31	98	46	61	
		Retail Ground Turkey	11.4%	7.7%	8.7%	5.0%	5.3%	5.7%	5.7%	16.3%	21.0%	17.6%	7.5%	7.0%	
		HACCP	13	11	16	8	10	14	11	33	34	16	8	6	
		Cecal	1.5%	4.7%	3.5%	5.6%	11.1%	5.4%	13.2%	15.2%	11.7%	15.4%	9.2%	12.0%	
		Cattle	4	11	8	17	30	8	16	23	12	27	8	36	
		Retail Ground Beef	40.0%	14.3%	0.0%	0.0%	0.0%	8.3%	14.3%	28.6%	11.1%	15.4%	26.7%	38.5%	
		HACCP	4	2	0	0	0	2	2	2	1	2	4	5	
		Cecal (Beef)	21.0%	13.5%	21.0%	18.5%	15.5%	16.5%	15.0%	21.5%	14.7%	11.1%	14.8%	7.6%	
		Cecal (Dairy)	141	82	69	72	68	73	30	53	50	31	46	26	
		Swine	Retail Pork Chops	20.0%	0.0%	0.0%	0.0%	0.0%	0.0%	25.0%	0.0%	3.6%	0.0%	0.0%	0.0%
		Cecal (Market Swine)	1	0	0	0	0	0	2	0	1	0	0	0	
		Cecal (Sows)											1.9%	3.6%	
													5	10	
											2.4%	1.5%			
											7	5			

Table 10b. Antimicrobial Resistance among all Non-Typhoidal *Salmonella* Isolates, 2003-2014

Year		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014		
Number of Isolates Tested	Humans	1855	1782	2036	2170	2145	2384	2192	2448	2335	2233	2178	2127		
	Chickens	Retail Chickens	83	157	153	152	99	198	272	171	158	229	208	143	
		HACCP	1158	1280	1989	1380	994	624	551	564	491	864	520	936	
		Cecal											55	103	
	Turkeys	Retail Ground Turkey	114	142	183	159	190	246	193	202	162	91	106	86	
		HACCP	262	236	227	304	271	148	121	151	103	175	87	299	
		Cecal											28	45	
	Cattle	Retail Ground Beef	10	14	8	19	13	24	14	7	9	13	15	13	
		HACCP	670	607	329	389	439	443	200	247	340	280	310	344	
		Cecal (Beef)											124	104	
	Swine	Cecal (Dairy)											310	217	
		Retail Pork Chops	5	11	9	8	18	23	8	20	28	12	24	20	
		Cecal (Market Swine)											260	279	
Cecal (Sows)											289	327			
Antimicrobial Class	Antimicrobial (Resistance Breakpoint)	Isolate													
Cepheims		Source													
Cefoxitin (MIC ≥ 32 µg/ml)	Humans	Humans	4.3%	3.4%	3.0%	3.5%	2.9%	3.0%	3.2%	2.6%	2.6%	2.7%	2.4%	2.2%	
			79	61	62	77	63	72	71	63	60	61	53	46	
		Chickens	Retail Chickens	25.3%	24.8%	20.9%	18.4%	15.2%	21.2%	33.1%	28.7%	25.9%	22.7%	17.3%	14.7%
				21	39	32	28	15	42	90	49	41	52	36	21
			HACCP	8.2%	12.4%	12.0%	12.8%	13.0%	8.0%	11.4%	11.3%	6.5%	8.6%	7.1%	5.7%
		Turkeys	Cecal											3.6%	5.8%
														2	6
			Retail Ground Turkey	2.6%	4.9%	7.1%	5.0%	5.3%	4.9%	5.7%	15.3%	17.9%	15.4%	7.5%	7.0%
		Cattle		3	7	13	8	10	12	11	31	29	14	8	6
			HACCP	1.1%	5.1%	3.5%	5.3%	9.2%	5.4%	12.4%	15.2%	11.7%	14.9%	9.2%	12.0%
			Cecal											7.1%	8.9%
		Swine		3	12	8	16	25	8	15	23	12	26	2	4
	Retail Ground Beef		40.0%	14.3%	0.0%	0.0%	0.0%	8.3%	14.3%	28.6%	0.0%	15.4%	20.0%	38.5%	
			4	2	0	0	0	2	2	2	0	2	3	5	
	Cattle	HACCP	17.8%	13.2%	19.8%	17.7%	15.0%	14.7%	13.5%	20.6%	13.8%	10.4%	14.5%	7.3%	
			119	80	65	69	66	65	27	51	47	29	45	25	
		Cecal (Beef)											10.5%	0.0%	
	Swine	Cecal (Dairy)											6.8%	5.5%	
		Retail Pork Chops	20.0%	0.0%	0.0%	0.0%	0.0%	0.0%	25.0%	0.0%	10.7%	0.0%	0.0%	0.0%	
			1	0	0	0	0	0	2	0	3	0	0	0	
	Cattle	Cecal (Market Swine)											1.9%	3.6%	
													5	10	
		Cecal (Sows)											2.4%	1.5%	
												7	5		
Ceftiofur (MIC ≥ 8 µg/ml)	Humans	Humans	4.5%	3.4%	2.9%	3.6%	3.3%	3.1%	3.4%	2.8%	2.5%	2.9%	2.5%	2.4%	
			83	60	59	79	70	73	75	69	58	64	55	51	
		Chickens	Retail Chickens	25.3%	24.8%	20.9%	19.1%	16.2%	22.2%	37.1%	33.3%	34.2%	27.5%	19.7%	17.5%
				21	39	32	29	16	44	101	57	54	63	41	25
			HACCP	9.8%	12.4%	12.2%	12.8%	15.4%	8.7%	12.7%	12.1%	6.1%	10.2%	8.1%	6.3%
		Turkeys	Cecal											7.3%	8.7%
														4	9
			Retail Ground Turkey	2.6%	4.9%	7.1%	5.0%	5.3%	4.9%	5.7%	15.8%	20.4%	16.5%	8.5%	7.0%
		Cattle		3	7	13	8	10	12	11	32	33	15	9	6
			HACCP	1.5%	4.7%	3.5%	5.3%	11.1%	5.4%	12.4%	15.2%	11.7%	14.9%	10.3%	13.0%
			Cecal											7.1%	11.1%
		Swine		4	11	8	16	30	8	15	23	12	26	2	5
	Retail Ground Beef		40.0%	14.3%	0.0%	0.0%	0.0%	8.3%	14.3%	28.6%	11.1%	15.4%	20.0%	38.5%	
			4	2	0	0	0	2	2	2	1	2	3	5	
	Cattle	HACCP	21.0%	13.3%	21.6%	18.8%	15.5%	16.3%	14.5%	21.5%	13.2%	11.1%	14.8%	7.6%	
			141	81	71	73	68	72	29	53	45	31	46	26	
		Cecal (Beef)											10.5%	0.0%	
	Swine	Cecal (Dairy)											6.8%	5.5%	
		Retail Pork Chops	20.0%	0.0%	0.0%	0.0%	0.0%	0.0%	25.0%	0.0%	7.1%	0.0%	0.0%	0.0%	
			1	0	0	0	0	0	2	0	2	0	0	0	
	Cattle	Cecal (Market Swine)											2.3%	3.6%	
													6	10	
		Cecal (Sows)											2.4%	1.5%	
												7	5		
Ceftriaxone (MIC ≥ 4 µg/ml)	Humans	Humans	4.4%	3.3%	2.9%	3.7%	3.3%	3.1%	3.4%	2.9%	2.5%	2.9%	2.5%	2.4%	
			81	59	59	79	70	73	75	70	58	64	55	51	
		Chickens	Retail Chickens	26.5%	24.8%	21.6%	19.1%	16.2%	22.2%	37.9%	34.5%	33.5%	27.9%	19.7%	17.5%
				22	39	33	29	16	44	103	59	53	64	41	25
			HACCP	9.7%	12.3%	12.2%	12.8%	15.6%	8.7%	12.9%	11.9%	6.3%	11.2%	8.7%	6.6%
		Turkeys	Cecal											7.3%	8.7%
														4	9
			Retail Ground Turkey	2.6%	5.6%	7.1%	5.0%	5.8%	4.9%	5.7%	16.3%	22.2%	17.6%	8.5%	7.0%
		Cattle		3	8	13	8	11	12	11	33	36	16	9	6
			HACCP	1.1%	4.7%	3.5%	5.3%	11.1%	5.4%	12.4%	15.2%	11.7%	16.0%	10.3%	13.4%
			Cecal											7.1%	11.1%
		Swine		3	11	8	16	30	8	15	23	12	28	2	5
	Retail Ground Beef		40.0%	14.3%	0.0%	0.0%	0.0%	8.3%	14.3%	28.6%	11.1%	15.4%	26.7%	38.5%	
			4	2	0	0	0	2	2	2	1	2	4	5	
	Cattle	HACCP	21.0%	13.5%	20.7%	18.5%	15.9%	16.0%	14.5%	21.5%	14.4%	10.7%	14.8%	7.6%	
			141	82	68	72	70	71	29	53	49	30	46	26	
		Cecal (Beef)											10.5%	1.0%	
	Swine	Cecal (Dairy)											6.8%	5.5%	
		Retail Pork Chops	20.0%	0.0%	0.0%	0.0%	0.0%	0.0%	25.0%	0.0%	7.1%	0.0%	0.0%	0.0%	
			1	0	0	0	0	0	2	0	2	0	0	0	
	Cattle	Cecal (Market Swine)											2.3%	3.9%	
													6	11	
		Cecal (Sows)											2.4%	1.5%	
												7	5		

Table 10c. Antimicrobial Resistance among all Non-Typhoidal *Salmonella* Isolates, 2003-2014

Year		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014				
Number of Isolates Tested	Humans	1855	1782	2036	2170	2145	2384	2192	2448	2335	2233	2178	2127				
	Chickens	Retail Chickens	83	157	153	152	99	198	272	171	158	229	208	143			
		HACCP	1158	1280	1989	1380	994	624	551	564	491	864	520	936			
		Cecal											55	103			
	Turkeys	Retail Ground Turkey	114	142	183	159	190	246	193	202	162	91	106	86			
		HACCP	262	236	227	304	271	148	121	151	103	175	87	299			
		Cecal											28	45			
	Cattle	Retail Ground Beef	10	14	8	19	13	24	14	7	9	13	15	13			
		HACCP	670	607	329	389	439	443	200	247	340	280	310	344			
		Cecal (Beef)											124	104			
	Swine	Cecal (Dairy)											310	217			
		Retail Pork Chops	5	11	9	8	18	23	8	20	28	12	24	20			
		Cecal (Market Swine)											260	279			
	Cecal (Sows)											289	327				
Antimicrobial Class	Antimicrobial (Resistance Breakpoint)	Isolate Source															
Folate Pathway Inhibitor	Sulfamethoxazole/ Sulfisoxazole ¹ (MIC ≥ 512 µg/ml)	Humans	15.1%	13.3%	12.6%	12.1%	12.3%	10.1%	9.9%	9.0%	8.6%	8.4%	10.3%	9.4%			
		Chickens	Retail Chickens	280	237	256	263	264	240	217	221	201	188	225	201		
			HACCP	14.5%	28.7%	17.0%	23.0%	25.3%	38.9%	48.2%	44.4%	44.9%	37.1%	33.7%	30.8%		
			Cecal	12	45	26	35	25	77	131	76	71	85	70	44		
		Turkeys	HACCP	10.3%	11.9%	8.5%	10.7%	10.4%	13.3%	10.0%	12.4%	7.9%	14.4%	11.0%	9.6%		
			Cecal	119	152	169	148	103	83	55	70	39	124	57	90		
			Cecal											30.9%	29.1%		
		Cattle	Retail Ground Turkey	33.3%	28.2%	34.4%	32.1%	34.7%	27.6%	20.2%	24.8%	26.5%	27.5%	27.4%	26.7%		
			HACCP	38	40	63	51	66	68	39	50	43	25	29	23		
			Cecal	28.2%	36.4%	37.0%	27.3%	25.5%	24.3%	28.9%	25.2%	22.3%	22.3%	29.9%	29.1%		
		Swine	Cecal (Beef)	74	86	84	83	69	36	35	38	23	39	26	87		
			Cecal (Dairy)											14.3%	26.7%		
			Cecal (Sows)											4	12		
	Trimethoprim- Sulfamethoxazole (MIC ≥ 4 / 76 µg/ml)	Chickens	Retail Chickens	40.0%	14.3%	25.0%	10.5%	7.7%	20.8%	35.7%	42.9%	0.0%	23.1%	33.3%	38.5%		
			HACCP	4	2	2	2	1	5	5	3	0	3	5	5		
			Cecal	25.1%	22.7%	27.4%	24.2%	21.6%	24.8%	24.5%	26.3%	20.0%	19.6%	20.6%	16.0%		
		Turkeys	Cecal (Beef)	168	138	90	94	95	110	49	65	68	55	64	55		
			Cecal (Dairy)											18.6%	8.7%		
			Cecal (Sows)											23	9		
		Swine	Retail Pork Chops	40.0%	18.2%	33.3%	75.0%	16.7%	30.4%	37.5%	50.0%	25.0%	33.3%	29.2%	30.0%		
			Cecal (Market Swine)	2	2	3	6	3	7	3	10	7	4	7	6		
			Cecal (Sows)											20.8%	21.9%		
		Macrolides	Azithromycin (MIC ≥ 32 µg/ml)	Humans													
				Chickens	Retail Chickens	1.9%	1.7%	1.7%	1.7%	1.5%	1.6%	1.7%	1.6%	1.2%	1.3%	1.4%	1.3%
					HACCP	36	31	34	36	33	37	38	38	28	29	31	28
					Cecal	0.0%	0.0%	0.0%	1.3%	0.0%	0.0%	0.4%	0.0%	1.3%	0.0%	0.0%	0.0%
				Turkeys	HACCP	0	0	0	2	0	0	1	0	2	0	0	0
Cecal	0.3%				0.2%	0.2%	0.1%	0.0%	0.3%	0.2%	0.0%	0.2%	0.5%	0.2%	0.4%		
Cecal	4				3	4	1	0	2	1	0	1	4	1	4		
Cattle	Retail Ground Turkey													3.6%	1.9%		
	HACCP													2	2		
	Cecal			0.0%	0.0%	0.5%	0.0%	0.5%	0.4%	1.6%	0.0%	3.7%	0.0%	0.9%	0.0%		
Swine	HACCP			0	0	1	0	1	1	3	0	6	0	1	0		
	Cecal (Beef)			2.3%	0.8%	1.8%	1.0%	1.1%	1.4%	1.7%	0.0%	0.0%	0.6%	1.1%	0.7%		
	Cecal (Dairy)			6	2	4	3	3	2	2	0	0	1	1	2		
Swine	Cecal												0.0%	6.7%			
	Retail Ground Beef	0.0%	7.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%				
	HACCP	0	1	0	0	0	0	0	0	0	0	0	0				
Cattle	Cecal (Beef)	3.3%	1.5%	4.9%	4.6%	3.0%	4.5%	1.5%	4.5%	1.8%	1.1%	1.3%	1.7%				
	Cecal (Dairy)	22	9	16	18	13	20	3	11	6	3	4	6				
	Cecal (Sows)											2.4%	1.9%				
Swine	Retail Pork Chops											3	2				
	Cecal (Market Swine)											0.6%	0.9%				
	Cecal (Sows)											2	2				
Azithromycin (MIC ≥ 32 µg/ml)	Chickens	Retail Chickens	0.0%	0.0%	11.1%	50.0%	5.6%	0.0%	25.0%	0.0%	0.0%	0.0%	0.0%	5.0%			
		HACCP	0	0	1	4	1	0	2	0	0	0	0	1			
		Cecal											0.8%	2.5%			
	Turkeys	Cecal (Sows)											1.0%	0.0%			
		Retail Ground Turkey															
		HACCP															
	Cattle	Cecal											0.0%	1.0%			
		Retail Ground Turkey											0.0%	0.0%			
		HACCP											0.0%	0.0%			
	Swine	Cecal (Beef)											0.0%	0.0%			
		Cecal (Dairy)											0.0%	0.5%			
		Cecal (Sows)											0.0%	1			
	Swine	Retail Pork Chops											0.0%	0.0%			
Cecal (Market Swine)												0.4%	0.7%				
Cecal (Sows)												1	0				

¹ Sulfamethoxazole was tested from 1996-2003 and was replaced by sulfisoxazole in 2004

Table 10d. Antimicrobial Resistance among all Non-Typhoidal *Salmonella* Isolates, 2003-2014

Year			2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Number of Isolates Tested	Humans Chickens Turkeys Cattle Swine	Humans	1855	1782	2036	2170	2145	2384	2192	2448	2335	2233	2178	2127
		Retail Chickens	83	157	153	152	99	198	272	171	158	229	208	143
		HACCP	1158	1280	1989	1380	994	624	551	564	491	864	520	936
		Cecal											55	103
		Retail Ground Turkey	114	142	183	159	190	246	193	202	162	91	106	86
		HACCP	670	607	329	389	439	443	200	247	340	280	310	344
		Cecal											124	104
		Retail Ground Beef	10	14	8	19	13	24	14	7	9	13	15	13
		HACCP	670	607	329	389	439	443	200	247	340	280	310	344
		Cecal (Beef)											124	104
		Cecal (Dairy)											310	217
		Retail Pork Chops	5	11	9	8	18	23	8	20	28	12	24	20
		Cecal (Market Swine)											260	279
Cecal (Sows)											289	327		
Antimicrobial Class	Antimicrobial (Resistance Breakpoint)	Isolate Source												
Penicillins	Ampicillin (MIC ≥ 32 µg/ml)	Humans	13.6% 253	12.1% 216	11.3% 231	10.9% 237	10.1% 217	9.7% 232	9.8% 216	9.1% 223	9.1% 213	8.8% 196	10.4% 227	9.1% 194
		Retail Chickens	33.7% 28	30.6% 48	26.8% 41	22.4% 34	18.2% 18	28.3% 56	45.6% 124	38.0% 65	40.5% 64	29.3% 67	22.1% 46	19.6% 28
		HACCP	13.7% 159	14.5% 185	14.0% 279	14.9% 205	17.0% 169	10.6% 66	13.8% 76	13.7% 77	7.3% 36	12.2% 105	10.4% 54	8.3% 78
		Cecal											12.7% 7	10.7% 11
		Retail Ground Turkey	28.9% 33	20.4% 29	26.8% 49	25.8% 41	42.6% 81	51.2% 126	58.0% 112	48.0% 97	58.0% 94	40.7% 37	47.2% 50	26.7% 23
		HACCP	18.7% 49	22.0% 52	22.9% 52	25.3% 77	36.9% 100	32.4% 48	38.8% 47	44.4% 67	27.2% 28	42.3% 74	26.4% 23	34.8% 104
		Cecal											35.7% 10	44.4% 20
		Retail Ground Beef	40.0% 4	21.4% 3	25.0% 2	10.5% 2	0.0% 0	12.5% 3	28.6% 4	28.6% 2	11.1% 1	23.1% 3	26.7% 4	38.5% 5
		HACCP	28.1% 188	19.3% 117	26.7% 88	22.4% 87	20.0% 88	21.7% 96	22.5% 45	26.3% 65	17.1% 58	15.4% 43	17.1% 53	9.9% 34
		Cecal (Beef)											14.5% 18	1.9% 2
		Cecal (Dairy)											8.1% 25	8.3% 18
		Retail Pork Chops	40.0% 2	9.1% 1	22.2% 2	25.0% 2	5.6% 1	13.0% 3	37.5% 3	15.0% 3	46.4% 13	16.7% 2	25.0% 6	20.0% 4
		Cecal (Market Swine)											9.6% 25	10.8% 30
Cecal (Sows)											3.5% 10	4.0% 13		
Phenicolns	Chloramphenicol (MIC ≥ 32 µg/ml)	Humans	10.1% 187	7.6% 136	7.8% 159	6.4% 139	7.3% 156	6.1% 146	5.7% 125	5.0% 122	4.4% 103	3.9% 87	3.9% 85	4.0% 85
		Retail Chickens	2.4% 2	1.9% 3	0.7% 1	2.6% 4	1.0% 1	0.5% 1	0.0% 0	2.3% 4	0.6% 1	0.0% 0	0.5% 1	4.2% 6
		HACCP	2.1% 24	1.3% 16	1.8% 36	1.7% 24	1.8% 18	1.8% 11	1.6% 9	3.0% 17	0.4% 2	0.6% 5	0.4% 2	0.9% 8
		Cecal											0.0% 0	0.0% 0
		Retail Ground Turkey	0.9% 1	2.8% 4	0.5% 1	0.6% 1	1.6% 3	1.6% 4	1.6% 3	2.5% 5	3.7% 6	3.3% 3	2.8% 3	2.3% 2
		HACCP	4.2% 11	4.7% 11	4.8% 11	3.9% 12	5.5% 15	2.7% 4	3.3% 4	4.6% 7	1.0% 1	1.1% 2	1.1% 1	2.3% 7
		Cecal											0.0% 0	6.7% 3
		Retail Ground Beef	40.0% 4	14.3% 2	12.5% 1	5.3% 1	0.0% 0	12.5% 3	21.4% 3	42.9% 3	0.0% 0	23.1% 3	26.7% 4	38.5% 5
		HACCP	25.1% 168	17.6% 107	21.9% 72	19.8% 77	20.0% 88	19.6% 87	21.0% 42	25.1% 62	17.9% 61	15.0% 42	15.5% 48	12.5% 43
		Cecal (Beef)											12.9% 16	1.0% 1
		Cecal (Dairy)											7.4% 23	8.3% 18
		Retail Pork Chops	40.0% 2	18.2% 2	22.2% 2	0.0% 0	0.0% 0	0.0% 0	12.5% 1	15.0% 3	17.9% 5	0.0% 0	12.5% 3	5.0% 1
		Cecal (Market Swine)											3.5% 9	4.3% 12
Cecal (Sows)											2.4% 7	1.5% 5		
Quinolones	Ciprofloxacin (MIC ≥ 1 µg/ml)	Humans	0.2% 4	0.3% 5	0.1% 2	0.1% 3	0.1% 2	0.2% 5	0.3% 7	0.2% 6	0.2% 4	0.3% 7	0.5% 11	0.4% 9
		Retail Chickens	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		HACCP	0.1% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Cecal											0.0% 0	0.0% 0
		Retail Ground Turkey	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Cecal											0.0% 0	0.0% 0
		Retail Ground Beef	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		HACCP	0.0% 0	0.0% 0	0.0% 0	0.3% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.6% 2	0.0% 0	0.0% 0	0.3% 1
		Cecal (Beef)											0.0% 0	0.0% 0
		Cecal (Dairy)											0.3% 1	0.0% 0
		Retail Pork Chops	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	5.0% 1
		Cecal (Market Swine)											0.4% 1	0.7% 2
Cecal (Sows)											0.3% 1	0.3% 1		

Table 10e. Antimicrobial Resistance among all Non-Typhoidal *Salmonella* Isolates, 2003-2014

Year			2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014				
Number of Isolates Tested	Humans		1855	1782	2036	2170	2145	2384	2192	2448	2335	2233	2178	2127				
	Chickens	Retail Chickens	83	157	153	152	99	198	272	171	158	229	208	143				
		HACCP	1158	1280	1989	1380	994	624	551	564	491	864	520	936				
		Cecal											55	103				
	Turkeys	Retail Ground Turkey	114	142	183	159	190	246	193	202	162	91	106	86				
		HACCP	262	236	227	304	271	148	121	151	103	175	87	299				
		Cecal											28	45				
	Cattle	Retail Ground Beef	10	14	8	19	13	24	14	7	9	13	15	13				
		HACCP	670	607	329	389	439	443	200	247	340	280	310	344				
		Cecal (Beef)											124	104				
	Swine	Cecal (Dairy)											310	217				
		Retail Pork Chops	5	11	9	8	18	23	8	20	28	12	24	20				
		Cecal (Market Swine)											260	279				
	Cecal (Sows)											289	327					
Antimicrobial Class	Antimicrobial (Resistance Breakpoint)	Isolate Source																
Quinolones	Nalidixic Acid (MIC ≥ 32 µg/ml)	Humans		1.9% 36	2.2% 39	1.9% 38	2.4% 51	2.2% 48	2.1% 49	1.8% 39	2.0% 48	2.2% 51	2.4% 54	2.8% 61	3.5% 74			
		Chickens	Retail Chickens	1.2% 1	0.0% 0	0.7% 1	0.7% 1	0.0% 0	0.0% 0	0.4% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.7% 1		
			HACCP	0.4% 5	0.5% 6	0.3% 6	0.1% 2	0.1% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.1% 1	0.0% 0	0.2% 2		
			Cecal												0.0% 0	0.0% 0		
		Turkeys	Retail Ground Turkey	4.4% 5	0.0% 0	1.1% 2	0.0% 0	2.6% 5	0.4% 1	0.0% 0	0.5% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		
			HACCP	3.8% 10	2.1% 5	2.2% 5	0.7% 2	1.1% 3	0.7% 1	0.8% 1	0.7% 1	0.0% 0	0.0% 0	1.7% 3	1.1% 1	0.7% 2		
			Cecal												0.0% 0	0.0% 0		
		Cattle	Retail Ground Beef	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	14.3% 2	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	7.7% 1	
			HACCP	0.4% 3	2.0% 12	1.5% 5	0.5% 2	0.7% 3	0.7% 3	1.0% 2	2.8% 7	1.8% 6	3.6% 10	2.3% 7	2.3% 8			
			Cecal (Beef)												1.6% 2	0.0% 0		
			Cecal (Dairy)												0.3% 1	0.0% 0		
		Swine	Retail Pork Chops	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	5.0% 1		
			Cecal (Market Swine)												1.2% 3	1.1% 3		
			Cecal (Sows)												0.7% 2	0.9% 3		
		Tetracyclines	Tetracycline (MIC ≥ 16 µg/ml)	Humans		16.3% 302	13.6% 242	13.9% 282	13.5% 293	14.5% 310	11.5% 275	11.9% 261	11.0% 270	10.5% 245	11.1% 247	12.6% 275	10.4% 221	
				Chickens	Retail Chickens	27.7% 23	46.5% 73	43.8% 67	46.7% 71	41.4% 41	46.5% 92	60.3% 164	56.7% 97	65.8% 104	48.5% 111	48.1% 111	48.1% 100	47.6% 68
					HACCP	26.2% 303	27.4% 351	28.3% 563	31.8% 439	35.5% 353	30.4% 190	33.9% 187	41.8% 236	40.9% 201	33.7% 291	42.7% 222	42.7% 222	36.9% 345
					Cecal												38.1% 21	36.9% 38
				Turkeys	Retail Ground Turkey	39.5% 45	56.3% 80	39.9% 73	56.0% 89	67.4% 128	66.3% 163	64.8% 125	54.0% 109	64.8% 105	45.1% 41	62.3% 41	62.3% 66	60.5% 52
HACCP	58.8% 154				48.3% 114	54.6% 124	61.8% 188	73.8% 200	64.2% 95	63.6% 77	57.6% 87	45.6% 47	46.3% 81	43.7% 38	43.7% 38	54.2% 162		
Cecal															46.4% 13	64.4% 29		
Cattle	Retail Ground Beef			40.0% 4	14.3% 2	12.5% 1	21.1% 4	0.0% 0	20.8% 5	42.9% 6	42.9% 3	44.4% 4	23.1% 3	40.0% 6	40.0% 6	46.2% 6		
	HACCP			36.9% 247	31.8% 193	34.0% 112	30.3% 118	27.3% 120	29.3% 130	29.0% 58	33.6% 83	30.6% 104	28.9% 81	24.8% 77	25.0% 86			
	Cecal (Beef)														29.0% 36	17.3% 18		
Swine	Cecal (Dairy)														12.3% 38	15.7% 34		
	Retail Pork Chops			80.0% 4	54.5% 6	55.6% 5	25.0% 2	50.0% 9	34.8% 8	37.5% 3	45.0% 9	39.3% 11	41.7% 5	45.8% 11	45.8% 11	55.0% 11		
	Cecal (Market Swine)														31.2% 81	40.5% 113		
	Cecal (Sows)												24.6% 71	23.2% 76				

Ceftriaxone Resistance

Table 11. Ceftriaxone-Resistant Non-Typhoidal *Salmonella* Isolates, 2014

Humans				Chickens													
Source	Serotype	n	%	Source	Serotype	n	%	Source	Serotype	n	%	Source	Serotype	n	%		
Humans (N=51)	Typhimurium	14	27.5	Retail Chickens (N=25)	Typhimurium	18	72.0	HACCP (N=62)	Kentucky	42	67.7	Cecal (N=9)	Kentucky	5	55.6		
	Newport	7	13.7		Heidelberg	3	12.0		Heidelberg	9	14.5		Typhimurium	4	44.4		
	Dublin	6	11.8		Kentucky	3	12.0		Typhimurium	9	14.5						
	Heidelberg	6	11.8		Infantis	1	4.0		Infantis	1	1.6						
	I 4,[5],12:i:-	5	9.8				Thompson		1	1.6							
	Infantis	3	5.9	Turkeys													
	Enteritidis	2	3.9	Source	Serotype	n	%	Source	Serotype	n	%	Source	Serotype	n	%		
	Saintpaul	2	3.9	Retail Ground Turkey (N=6)	Infantis	2	33.3	HACCP (N=40)	Heidelberg	9	22.5	Cecal (N=5)	Heidelberg	3	60.0		
	I 4,[5],12:r:-	1	2.0		I 4,12:non-motile	1	16.7		Senftenberg	6	15.0		Senftenberg	1	20.0		
	Agona	1	2.0		Hadar	1	16.7		Albany	4	10.0		Typhimurium	1	20.0		
	Braenderup	1	2.0		Montevideo	1	16.7		Agona	3	7.5						
	Javiana	1	2.0		Saintpaul	1	16.7		Reading	3	7.5						
	Montevideo	1	2.0						Saintpaul	3	7.5						
	Panama	1	2.0				Schwarzengrund		3	7.5							
							Other		9	22.5							
	Cattle																
					Source	Serotype	n		%	Source	Serotype	n	%	Source	Serotype	n	%
				Retail Ground Beef (N=5)	Dublin	3	60.0	HACCP (N=26)	Dublin	9	34.6	Cecal (Beef) (N=1)	Agona	1	100.0		
					Newport	2	40.0		Newport	9	34.6						
							Reading		4	15.4							
							Agona		1	3.8							
							I 4,[5],12:i:-		1	3.8							
							Meleagridis		1	3.8							
							Montevideo		1	3.8							
										Cecal (Dairy) (N=12)	Newport	8	66.7				
											Typhimurium	3	25.0				
											Montevideo	1	8.3				
Swine																	
				Source	Serotype	n	%	Source	Serotype	n	%						
				Retail Pork Chops (N=0)				Cecal (Market Swine) (N=11)	Agona	3	27.3						
									Derby	2	18.2						
									Albany	1	9.1						
									I 4,[5],12:i:-	1	9.1						
									Johannesburg	1	9.1						
									Newport	1	9.1						
									Senftenberg	1	9.1						
									Typhimurium	1	9.1						
												Cecal (Sows) (N=5)	Typhimurium	2	40.0		
													Agona	1	20.0		
													Derby	1	20.0		
											Muenster	1	20.0				

Nalidixic Acid Resistance

Table 12. Nalidixic Acid-Resistant Non-Typhoidal *Salmonella* Isolates, 2014

Humans				Chickens																						
Source	Serotype	n	%	Source	Serotype	n	%	Source	Serotype	n	%	Source	Serotype	n	%											
Humans (N=74)	Enteritidis	35	47.3	Retail Chickens (N=1)	Infantis	1	100.0	HACCP (N=2)	Infantis	2	100.0	Cecal (N=0)														
	I 4,[5],12:i:-	7	9.5																							
	Typhimurium	7	9.5	Turkeys																						
	Heidelberg	3	4.1	Source	Serotype	n	%	Source	Serotype	n	%	Source	Serotype	n	%											
	Infantis	3	4.1	Retail Ground Turkey (N=0)				HACCP (N=2)	Albert	1	50.0	Cecal (N=0)														
	Kentucky	3	4.1						Ohio	1	50.0															
	Potsdam	2	2.7	Cattle																						
	Saintpaul	2	2.7	Source	Serotype	n	%	Source	Serotype	n	%	Source	Serotype	n	%											
	Virchow	2	2.7	Retail Ground Beef (N=1)	Dublin	1	100.0	HACCP (N=8)	Dublin	5	62.5	Cecal (Beef) (N=0)														
	I 4,[5],12:-:1,2	1	1.4						Muenster	1	12.5															
	Anatum	1	1.4						Reading	2	25.0	Cecal (Dairy) (N=0)														
	Dublin	1	1.4						Swine																	
	Give	1	1.4						Source	Serotype	n					%	Source	Serotype	n	%						
	Grumpensis	1	1.4						Retail Pork Chops (N=1)	Derby	1					100.0										
	Hadar	1	1.4																				Cecal (Market Swine) (N=3)	Adelaide	1	33.3
	Newport	1	1.4																					Brandenburg	1	33.3
	Oslo	1	1.4																					Muenchen	1	33.3
Paratyphi B car. L(+)-tartrate+	1	1.4	Cecal (Sows) (N=3)																				Anatum	1	33.3	
Urbana	1	1.4		Derby	1	33.3																				
				Muenchen	1	33.3																				

Resistance among the Top *Salmonella* Serotypes

Table 13. Number of Non-Typhoidal *Salmonella* Isolates among the Top Serotypes from Humans with the Number of Resistant Isolates by Class and Agent, 2014

Sources	<i>Salmonella</i> Serotype	No. of Isolates	% of Isolates	Number of Isolates						Number of Resistant Isolates by Antimicrobial Class and Agent ¹																	
				Number of Antimicrobial Classes to which Isolates are Resistant						Aminoglycosides		β-Lactam/β-Lactamase Inhibitor Combinations	Cephems			Folate Pathway Inhibitors		Macrolides	Penicillins	Phenicols	Quinolones		Tetracyclines				
				0	1	2-3	4-5	6-7	8-9	GEN	STR		FOX	TIO	AXO	FIS	COT				AZI	AMP		CHL	CIP	NAL	TET
Humans	Enteritidis	438	20.6%	384	38	10	4	1	1		13		2	3	2	2	8	2			14	5	1	35	11		
	Typhimurium	262	12.3%	180	13	20	38	10	1	8	65	14	14	14	14	66	6		1		52	42	1	7	59		
	Newport	235	11.0%	219	5	1	3	7		1	11	7	7	7	7	11	1			9	10		1	12			
	Javiana	128	6.0%	115	9	4					10	1	1	1	1	2	2				3				3		
	I 4,[5],12:i:-	110	5.2%	42	6	10	50	2		2	58	3	3	5	5	55	2			56	4		2	7	59		
	Infantis	73	3.4%	62	6	1	2	2		1	5	1	1	3	3	4	2			5	3			3	6		
	Heidelberg	71	3.3%	44	8	10	9			11	18	6	6	6	6	11	2			16	7			3	11		
	Saintpaul	52	2.4%	42	4	5	1			3	3	1	1	2	2	3	2			5					2	6	
	Muenchen	45	2.1%	44	1						1					1										1	
	Montevideo	44	2.1%	42	1	1						1	1	1	1					1						1	
	Oranienburg	36	1.7%	35			1				1					1	1			1						1	
	Unknown serotype	25	1.2%	21	4						2									1						1	
	Partially serotyped	2	0.1%	2																							
	Rough/Nonmotile isolates	6	0.3%	5		1					1					1											
	Other	600	28.2%	514	31	35	13	7		4	51	9	9	10	10	38	8				31	14	5	16	50		
Total		2127	100.0%	1751	125	99	121	29	2	30	239	45	46	51	51	201	28		1	194	85	9	74	221			

¹ GEN= Gentamicin, KAN= Kanamycin, STR= Streptomycin, AMC= Amoxicillin/Clavulanic Acid, FOX= Cefoxitin, TIO= Ceftiofur, AXO= Ceftriaxone, FIS= Sulfisoxazole, COT= Trimethoprim/Sulfamethoxazole, AZI= Azithromycin, AMP= Ampicillin, CHL= Chloramphenicol, CIP= Ciprofloxacin, NAL= Nalidixic Acid, TET= Tetracycline

Table 14. Number of Non-Typhoidal *Salmonella* Isolates among the Top Serotypes from Chickens with the Number of Resistant Isolates by Class and Agent, 2014

Sources	<i>Salmonella</i> Serotype	No. of Isolates	% of Isolates	Number of Isolates						Number of Resistant Isolates by Antimicrobial Class and Agent ¹																	
				Number of Antimicrobial Classes to which Isolates are Resistant						Aminoglycosides		β-Lactam/β-Lactamase Inhibitor Combinations	Cephems			Folate Pathway Inhibitors		Macrolides	Penicillins	Phenicols	Quinolones		Tetracyclines				
				0	1	2-3	4-5	6-7	8-9	GEN	STR		FOX	TIO	AXO	FIS	COT				AZI	AMP		CHL	CIP	NAL	TET
Retail Chickens	Typhimurium	38	26.6%	1	18	19				2	1	18	16	18	18	37				19					37		
	Kentucky	35	24.5%	4	7	21	3				31	3	2	3	3					3					23		
	Enteritidis	27	18.9%																								
	Heidelberg	24	16.8%	14	2	3	2	3		7	9	3	3	3	3	7				5	5					5	
	Infantis	4	2.8%	3		1								1	1					1	1			1		1	
	Schwarzengrund	4	2.8%		4						4																2
	Mbandaka	3	2.1%	1	2																						
	Other	8	5.6%	8																							
Total		143	100.0%	58	15	42	25	3		9	45	24	21	25	25	44				28	6		1		68		
Chickens	HACCP	Kentucky	361	38.6%	58	49	215	39		4	296	42	35	39	42	6	2			43						243	
		Enteritidis	130	13.9%	125	4	1													5						1	
		Heidelberg	108	11.5%	73	11	16	4	4		13	27	9	8	9	9	12	2			13	6				17	
		Typhimurium	81	8.7%	14	3	54	7	3		2	10	9	8	9	9	62				13	2				63	
		Schwarzengrund	61	6.5%	25	34	2				1	36					1									1	
		Infantis	43	4.6%	38	2	2	1				1	1	1	1	1					1				2	4	
		I 4,[5],12:i:-	37	4.0%	32	2	2	1			2	4					2				1					3	
		Thompson	23	2.5%	20	2	1				2	3		1	1	1	3				1					1	
		Other	92	9.8%	74	7	11				6	15					3				1					12	
Total		936	100.0%	459	112	305	53	7		30	392	61	53	59	62	90	4		78	8		2		345			
Cecal	Kentucky	27	26.2%	7	9	6	5			18	5	4	5	5	1	1			5						10		
	Typhimurium	27	26.2%	1	22	4			2	4	4	2	4	4	26				5						25		
	Enteritidis	17	16.5%	17																							
	Schwarzengrund	8	7.8%	1	5	1	1			2	7					2	1	1	1	1	1				1		
	Heidelberg	7	6.8%	7																				1		0	
	Senftenberg	5	4.9%	5																						0	
	Other	12	11.7%	10	2						2					1									2		
Total		103	100.0%	459	14	31	10			4	31	9	6	9	9	30	2		11	2				38			

¹ GEN= Gentamicin, KAN= Kanamycin, STR= Streptomycin, AMC= Amoxicillin/Clavulanic Acid, FOX= Cefoxitin, TIO= Ceftiofur, AXO= Ceftriaxone, FIS= Sulfisoxazole, COT= Trimethoprim/Sulfamethoxazole, AZI= Azithromycin, AMP= Ampicillin, CHL= Chloramphenicol, CIP= Ciprofloxacin, NAL= Nalidixic Acid, TET= Tetracycline

Table 15. Number of Non-Typhoidal *Salmonella* Isolates among the Top Serotypes from Turkey with the Number of Resistant Isolates by Class and Agent, 2014

Sources	<i>Salmonella</i> Serotype	No. of Isolates	% of Isolates	Number of Isolates						Number of Resistant Isolates by Antimicrobial Class and Agent ¹													
				Number of Antimicrobial Classes to which Isolates are Resistant						Aminoglycosides		β-Lactam/β-Lactamase Inhibitor Combinations	Cephems			Folate Pathway Inhibitors		Macrolides	Penicillins	Phenicols	Quinolones		Tetracyclines
				0	1	2-3	4-5	6-7	8-9	GEN	STR		AMC	FOX	TIO	AXO	FIS	COT	AZI	AMP	CHL	CIP	NAL
Retail Ground Turkey	Reading	18	20.9%	6	3	7	2	2	11						9			5					7
	Hadar	13	15.1%			12	1	1	13		1		1	1	1	1		5					13
	Saintpaul	12	14.0%	6	1	4	1	4	4		1		1	1	1			5					6
	Berta	8	9.3%			8																	8
	Albany	6	7.0%	2	2	2		3	2														2
	Heidelberg	6	7.0%			5	1	5	6						5			2					3
	Muenchen	4	4.7%			4				4													4
	Schwarzengrund	3	3.5%			3																	
	Senftenberg	3	3.5%			3																	
	I 4,12:d:-	2	2.3%			2																	2
	Anatum	2	2.3%	1	1																		1
	Brandenburg	2	2.3%	2																			
	Infantis	2	2.3%				2	2	2	2	2	2	2	2	2			2		2			2
	Typhimurium	2	2.3%			2		1	1						1			1					2
	Other	3	3.5%			1	2			2		2	2	2	1			3					2
	Total	86	100.0%	23	17	37	6	3	18	45	6	6	6	6	23	2	23	2	2	2	2	2	52
HACCP	Reading	66	22.1%	22	8	30	5	1	3	36	3	3	3	3	32			16					32
	Hadar	34	11.4%	1	1	31	1		1	33					1			15					32
	Heidelberg	30	10.0%	3	6	13	6	1	15	21	9	9	9	9	13	1	1	13		1			13
	Saintpaul	20	6.7%	2	1	11	6		12	12	3	3	3	3	3	1		17					17
	Montevideo	17	5.7%	14	2	1			2	2								1					1
	Schwarzengrund	17	5.7%	10	1	3	1	2	2	4	3	3	3	3	3			4		1			5
	Agona	16	5.4%	4		9	1	2	6	8	3	3	3	3	9			7		1			7
	Senftenberg	14	4.7%	1		4	3	6	6	12	6	6	6	10				12		2			10
	Anatum	12	4.0%			10	2				2	2	2					2					12
	Muenchen	12	4.0%	5		6	1		1	7					7			1					7
	Other	61	20.4%	23	16	11	7	3	1	11	23	7	7	10	11	9		16		2		2	26
	Total	299	100.0%	85	45	119	33	15	2	59	158	36	36	39	40	87	2	1	104	7	2	2	162
Cecal	Hadar	7	15.6%			7				6								5					7
	Senftenberg	7	15.6%	2	1	3	1		4	4	1		1	1	1	2		3		1			3
	Reading	6	13.3%	1	1	3	1		1	4					4	1		2					3
	Anatum	4	8.9%	1	3																		3
	Heidelberg	3	6.7%				2	1	2	2	3	3	3	3	3	1	1	3		1			2
	Saintpaul	3	6.7%			3			3	3								3					3
	Schwarzengrund	3	6.7%	1		2			2	2								2					2
	Agona	2	4.4%	2																			
	Berta	2	4.4%	1	1																		1
	Kentucky	2	4.4%			1	1			2					1	1					1		2
	Typhimurium	2	4.4%			1	1	1	1	2	1			1	1	2		1					2
	Other	4	8.9%	3		1			1	1								1					1
Total	45	100.0%	11	6	21	4	2	1	14	26	5	4	5	5	12	3	1	20	3	3	3	29	

¹ GEN= Gentamicin, KAN= Kanamycin, STR= Streptomycin, AMC= Amoxicillin/Clavulanic Acid, FOX= Cefoxitin, TIO= Ceftiofur, AXO= Ceftriaxone, FIS= Sulfisoxazole, COT= Trimethoprim/Sulfamethoxazole, AZI= Azithromycin, AMP= Ampicillin, CHL= Chloramphenicol, CIP= Ciprofloxacin, NAL= Nalidixic Acid, TET= Tetracycline

Table 16. Number of Non-Typhoidal *Salmonella* Isolates among the Top Serotypes from Cattle with the Number of Resistant Isolates by Class and Agent, 2014

Sources	<i>Salmonella</i> Serotype	No. of Isolates	% of Isolates	Number of Isolates					Number of Resistant Isolates by Antimicrobial Class and Agent ¹																	
				Number of Antimicrobial Classes to which Isolates are Resistant					Aminoglycosides		β-Lactam/β-Lactamase Inhibitor Combinations	Cephems			Folate Pathway Inhibitors		Macrolides	Penicillins	Phenicol	Quinolones		Tetracyclines				
				0	1	2-3	4-5	6-7	8-9	GEN		STR	AMC	FOX	TIO	AXO	FIS	COT	AZI	AMP	CHL	CIP	NAL	TET		
Cattle	Retail Ground Beef	Dublin	3	23.1%				2	1	1	3		3	3	3	3		3	3		1		2			
		Typhimurium	3	23.1%	3																					
		Montevideo	2	15.4%	2																					
		Newport	2	15.4%				2											2		2			2		
		Anatum	1	7.7%		1																		1		
		Bredeney	1	7.7%		1																		1		
		Infantis	1	7.7%	1																			1		
		Total	13	100.0%	6	2		4	1	1	5		5	5	5	5		5	5		1		6			
	HACCP	Montevideo	91	26.5%	80	9	1	1			2		1	1	1	1			1		1			9		
		Dublin	31	9.0%	5	1	1	14	8	2	1	24		9	8	9	9	24	4		11	24	1	5	25	
		Cerro	29	8.4%	25	4						1													3	
		Anatum	18	5.2%	14	4																			4	
		Newport	17	4.9%	8				9			9		9	9	9	8	1			9		9		9	
		Muenchen	16	4.7%	13	1	2										2								3	
		Typhimurium	14	4.1%	10	1	1	2				2					3				3		1		3	
		Kentucky	13	3.8%	5	8							1									3				7
		6,7:g,m,s:e,n,z15	10	2.9%	8	2							1													1
		Agona	10	2.9%	8		1	1				2			1	1	1	2			1		1			2
		Muenster	10	2.9%	8		1	1				2			1			2	1				1		1	2
		Other	85	24.7%	64	6	7	4	2	2		1	14		6	6	6	13			9	6		2		18
			Total	344	100.0%	248	36	14	22	20	4	2	58		26	25	26	26	55	6		34	43	1	8	86
	Cecal (Beef)	Anatum	25	24.0%	21	4						1													3	
		Montevideo	14	13.5%	10	3		1				1										1			4	
		6,7:g,m,s:e,n,z15	8	7.7%	6	2						1													1	
		Cerro	6	5.8%	6																					1
		Mbandaka	6	5.8%	5	1																				1
		Altona	4	3.8%	2	1	1					2														1
Senftenberg		4	3.8%	3	1						1														1	
Typhimurium		4	3.8%	3			1				1									1					1	
Kentucky		3	2.9%	2	1																1				1	
Other		30	28.8%	23	1	5	1				1	4			1	6	2			1					6	
		Total	104	100.0%	81	14	6	3			1	11				1	9	2		2	1				18	
Cecal (Dairy)	Cerro	70	32.3%	66	3	1					4														1	
	Montevideo	38	17.5%	33	3	1		1			2		1	1	1	1	1	1		1		1		5		
	Agona	16	7.4%	13	1	2					1														3	
	Anatum	15	6.9%	14	1						1														1	
	Newport	15	6.9%	7			8				8		8	8	8	8				8		8			8	
	Meleagridis	10	4.6%	6	2	1	1				2					2				1		1			4	
	Typhimurium	10	4.6%	1			6	3			9		3	3	3	9				8		7			9	
	Kentucky	7	3.2%	6	1						1														1	
	Mbandaka	4	1.8%	2	2																				2	
	Havana	3	1.4%	3																					1	
	Muenchen	3	1.4%	2		1										1									1	
	Muenster	3	1.4%	3																					1	
	Other	23	10.6%	22		1					1	1				1	1					1			1	
	Total	217	100.0%	178	13	6	8	11	1	29			12	12	12	12	24	2		1	18	18		34		

¹ GEN= Gentamicin, KAN= Kanamycin, STR= Streptomycin, AMC= Amoxicillin/Clavulanic Acid, FOX= Cefoxitin, TIO= Ceftiofur, AXO= Ceftriaxone, FIS= Sulfisoxazole, COT= Trimethoprim/Sulfamethoxazole, AZI= Azithromycin, AMP= Ampicillin, CHL= Chloramphenicol, CIP= Ciprofloxacin, NAL= Nalidixic Acid, TET= Tetracycline

Table 17. Number of Non-Typhoidal *Salmonella* Isolates among the Top Serotypes from Swine with the Number of Resistant Isolates by Class and Agent, 2014

Sources	<i>Salmonella</i> Serotype	No. of Isolates	% of Isolates	Number of Isolates						Number of Resistant Isolates by Antimicrobial Class and Agent ¹															
				Number of Antimicrobial Classes to which Isolates are Resistant						Aminoglycosides		β-Lactam/β-Lactamase Inhibitor Combinations	Cephems			Folate Pathway Inhibitors		Macrolides	Penicillins	Phenicols	Quinolones		Tetracyclines		
				0	1	2-3	4-5	6-7	8-9	GEN	STR		AMC	FOX	TIO	AXO	FIS	COT	AZI	AMP	CHL	CIP	NAL	TET	
Retail Pork Chops	Derby	5	25.0%	1	3			1					1	1			1	1	1	1	4				
	Infantis	5	25.0%	3		2			2													2			
	I 4,[5],12:i:-	2	10.0%				2						2				2					2			
	Anatum	1	5.0%	1																					
	Brandenburg	1	5.0%			1								1								1			
	Bredeney	1	5.0%	1																					
	Cerro	1	5.0%	1																					
	London	1	5.0%		1																		1		
	Muenchen	1	5.0%	1																					
	Ohio	1	5.0%			1			1	1					1										
	Typhimurium	1	5.0%				1			1					1			1					1		
Total	20	100.0%	8	4	4	3	1	1	7				6	1		4	1	1	1	1	11				
Cecal (Market Swine)	Derby	49	17.6%	10	13	23	1	2		3	26		1	1	2	25	1			3	1			37	
	Anatum	29	10.4%	8	21																			21	
	Johannesburg	28	10.0%	25	2	1							1	1	1					1				2	
	Infantis	22	7.9%	19	3						2				1					2				3	
	Agona	17	6.1%	8	2	4	2	1		1	7		3	3	3	7	2		1	3		3		8	
	Typhimurium	13	4.7%	3	1	3	4	2		1	8		1	1	1	9	1		1	7		6		9	
	I 4,[5],12:i:-	9	3.2%		1		7	1			8		1	1	1	8				8				9	
	Saintpaul	9	3.2%	6	2	1				1	1									1				3	
	Adelaide	8	2.9%	6	2																	1	1	1	
	Cerro	8	2.9%	8																					
	London	8	2.9%	7		1									1	1								1	
	Muenchen	8	2.9%	5	1	2										2							1	2	
	Brandenburg	7	2.5%	3		4				1	1				3				1		1	1	1	4	
	Other	64	22.9%	50	4	6	2	2		2	9		3	3	3	3	5	2		4		1		13	
Total	279	100.0%	158	49	48	14	9	1	9	62		10	10	10	11	61	7	2	30	12	2	3	113		
Cecal (Sows)	Anatum	67	20.5%	40	25	2					1											1	1	27	
	Johannesburg	42	12.8%	37	4	1				1	2									1				4	
	Infantis	36	11.0%	36																					
	Derby	26	8.0%	14	5	6	1			6		1	1	1	4				1				1	11	
	Agona	13	4.0%	2	4	7				4		1	1	1	6					1				10	
	Uganda	13	4.0%	13																0					
	I 4,[5],12:i:-	10	3.1%	2	3		5			5						5				5				8	
	Muenchen	9	2.8%	8	1																		1		
	Saintpaul	8	2.4%	6	2						1														1
	London	7	2.1%	7																					
	Cerro	6	1.8%	5	1						1														
	Ohio	6	1.8%	6																					
	Typhimurium	6	1.8%	1		2	1	2			4		2	2	2	5			4		3			4	
	Other	78	23.9%	63	9	5	1			1	8		1	1	1	2			1		2			11	
Total	327	100.0%	240	54	23	7	3		2	32		5	5	5	22			13	5	1	3	76			

¹ GEN= Gentamicin, KAN= Kanamycin, STR= Streptomycin, AMC= Amoxicillin/Clavulanic Acid, FOX= Cefoxitin, TIO= Ceftiofur, AXO= Ceftriaxone, FIS= Sulfisoxazole, COT= Trimethoprim/Sulfamethoxazole, AZI= Azithromycin, AMP= Ampicillin, CHL= Chloramphenicol, CIP= Ciprofloxacin, NAL= Nalidixic Acid, TET= Tetracycline

Multidrug Resistance

Table 18a. Resistance Patterns among all Non-Typhoidal *Salmonella* Isolates, 2003-2014¹

Year		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
Number of Isolates Tested	Humans	1855	1782	2036	2170	2145	2384	2192	2448	2335	2233	2178	2127	
	Chickens	Retail Chickens	83	157	153	152	99	198	272	171	158	229	208	143
		HACCP	1158	1280	1989	1380	994	624	551	564	491	864	520	936
		Cecal											55	103
	Turkeys	Retail Ground Turkey	114	142	183	159	190	246	193	202	162	91	106	86
		HACCP	262	236	227	304	271	148	121	151	103	175	87	299
		Cecal											28	45
	Cattle	Retail Ground Beef	10	14	8	19	13	24	14	7	9	13	15	13
		HACCP	670	607	329	389	439	443	200	247	340	280	310	344
		Cecal (Beef)											124	104
	Cecal (Dairy)											310	217	
	Swine	Retail Pork Chops	5	11	9	8	18	23	8	20	28	12	24	20
		Cecal (Market Swine)											260	279
Cecal (Sows)												289	327	
Resistance Pattern	Source													
1. No Resistance Detected	Humans	78.0%	79.9%	81.0%	80.6%	81.1%	83.9%	83.3%	84.7%	84.9%	84.7%	80.8%	82.3%	
		1447	1424	1649	1749	1739	2001	1825	2073	1982	1892	1760	1751	
	Chickens	Retail Chickens	45.8%	40.1%	46.4%	39.5%	47.5%	46.0%	29.0%	36.3%	29.1%	37.1%	40.4%	40.6%
		HACCP	38	63	71	60	47	91	79	62	46	85	84	58
		Cecal	61.2%	62.7%	61.2%	57.2%	53.9%	60.6%	56.1%	49.3%	50.7%	52.0%	44.4%	49.0%
		709	803	1217	790	536	378	309	278	249	449	231	459	
	Turkeys	Retail Ground Turkey	34.2%	28.9%	30.1%	18.2%	15.8%	21.1%	22.3%	31.7%	27.2%	36.3%	22.6%	26.7%
		HACCP	39	41	55	29	30	52	43	64	44	33	24	23
		Cecal	24.0%	33.5%	27.8%	28.0%	15.5%	21.6%	20.7%	25.2%	40.8%	29.1%	35.6%	28.4%
		63	79	63	85	42	32	25	38	42	51	31	85	
	Cattle	Retail Ground Beef	60.0%	78.6%	75.0%	73.7%	92.3%	79.2%	57.1%	57.1%	55.6%	76.9%	60.0%	46.2%
		HACCP	6	11	6	14	12	19	8	4	5	10	9	6
		Cecal (Beef)	61.2%	65.6%	63.2%	67.6%	72.0%	68.8%	68.5%	61.1%	67.6%	69.3%	72.6%	72.1%
	Cecal (Dairy)	410	398	208	263	316	305	137	151	230	194	225	248	
	Swine	Retail Pork Chops	20.0%	45.5%	44.4%	25.0%	44.4%	65.2%	50.0%	35.0%	28.6%	33.3%	54.2%	40.0%
		Cecal (Market Swine)	1	5	4	2	8	15	4	7	8	4	13	8
		Cecal (Sows)											66.5%	56.6%
												173	158	
												74.4%	73.4%	
												215	240	
	2. Resistant to ≥ 3 Antimicrobial Classes	Humans	14.1%	11.3%	11.8%	11.7%	11.0%	9.5%	9.6%	9.1%	9.1%	8.6%	9.8%	9.3%
		262	202	240	253	236	226	210	223	213	193	214	197	
Chickens		Retail Chickens	30.1%	28.7%	24.8%	21.7%	23.2%	33.8%	47.4%	40.9%	40.5%	33.6%	25.0%	20.3%
		HACCP	25	45	38	33	23	67	129	70	64	77	52	29
		Cecal	13.1%	15.5%	14.9%	15.7%	17.8%	11.1%	15.4%	14.4%	7.7%	12.7%	10.2%	8.3%
		152	198	296	217	177	69	85	81	38	110	53	78	
Turkeys		Retail Ground Turkey	28.1%	25.4%	26.8%	24.5%	40.5%	50.8%	25.9%	32.7%	42.6%	37.4%	39.6%	36.0%
		HACCP	32	36	49	39	77	125	50	66	69	34	42	31
		Cecal	21.0%	26.7%	26.0%	26.3%	32.1%	28.4%	30.6%	35.8%	22.3%	40.0%	34.4%	41.1%
		55	63	59	80	87	42	37	54	23	70	30	123	
Cattle		Retail Ground Beef	40.0%	14.3%	25.0%	10.5%	0.0%	20.8%	35.7%	42.9%	0.0%	23.1%	33.3%	38.5%
		HACCP	4	2	2	2	0	5	5	3	0	3	5	5
		Cecal (Beef)	29.6%	21.1%	27.7%	23.9%	22.1%	23.5%	26.0%	28.7%	20.0%	19.3%	20.3%	16.6%
Cecal (Dairy)		198	128	91	93	97	104	52	71	68	54	63	57	
Swine		Retail Pork Chops	40.0%	18.2%	22.2%	25.0%	5.6%	17.4%	50.0%	50.0%	28.6%	25.0%	33.3%	20.0%
		Cecal (Market Swine)	2	2	2	2	1	4	4	10	8	3	8	4
		Cecal (Sows)											17.7%	20.1%
												46	56	
												9.0%	6.4%	
												26	21	
3. Resistant to ≥ 4 Antimicrobial Classes		Humans	11.2%	9.0%	8.8%	7.9%	8.1%	7.4%	7.2%	6.8%	6.5%	6.1%	7.7%	7.1%
		208	161	180	171	174	176	157	166	152	137	167	152	
	Chickens	Retail Chickens	16.9%	24.2%	18.3%	15.1%	13.1%	21.2%	33.5%	32.2%	25.9%	28.8%	19.7%	19.6%
		HACCP	14	38	28	23	13	42	91	55	41	66	41	28
		Cecal	6.8%	9.8%	8.7%	10.3%	12.3%	7.4%	10.9%	11.3%	4.9%	7.9%	6.9%	6.4%
		79	126	173	142	122	46	60	64	24	68	36	60	
	Turkeys	Retail Ground Turkey	14.9%	12.7%	7.1%	8.2%	14.2%	15.4%	11.4%	17.3%	16.0%	13.2%	13.2%	10.5%
		HACCP	17	18	13	13	27	38	22	35	26	12	14	9
		Cecal	9.5%	9.7%	11.0%	11.8%	14.8%	10.1%	11.6%	13.9%	8.7%	11.4%	11.5%	16.7%
		25	23	25	36	40	15	14	21	9	20	10	50	
	Cattle	Retail Ground Beef	40.0%	14.3%	12.5%	5.3%	0.0%	12.5%	35.7%	42.9%	0.0%	23.1%	26.7%	38.5%
		HACCP	4	2	1	1	0	3	5	3	0	3	4	5
		Cecal (Beef)	27.5%	18.8%	24.3%	21.9%	20.7%	21.9%	24.0%	25.5%	19.4%	17.5%	17.4%	13.4%
	Cecal (Dairy)	184	114	80	85	91	97	48	63	66	49	54	46	
	Swine	Retail Pork Chops	40.0%	18.2%	22.2%	25.0%	5.6%	13.0%	25.0%	5.0%	14.3%	8.3%	20.8%	20.0%
		Cecal (Market Swine)	2	2	2	2	1	3	2	1	4	1	5	4
		Cecal (Sows)											6.9%	8.6%
												18	24	
												3.1%	3.1%	
												9	10	

¹ Starting in 2011, testing included nine antimicrobial classes with the addition of the macrolide azithromycin. Because resistance to azithromycin is low (in this case, <1%), antimicrobial class resistance data from 2011 and beyond are comparable to the data from previous years.

Table 18b. Resistance Patterns among all Non-Typhoidal *Salmonella* Isolates, 2003-2014¹

Year			2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014		
Number of Isolates Tested	Humans		1855	1782	2036	2170	2145	2384	2192	2448	2335	2233	2178	2127		
		Chickens	Retail Chickens	83	157	153	152	99	198	272	171	158	229	208	143	
			HACCP	1158	1280	1989	1380	994	624	551	564	491	864	520	936	
	Cecal												55	103		
	Turkeys	Retail Ground Turkey	114	142	183	159	190	246	193	202	162	91	106	86		
		HACCP	262	236	227	304	271	148	121	151	103	175	87	299		
		Cecal											28	45		
	Cattle	Retail Ground Beef	10	14	8	19	13	24	14	7	9	13	15	13		
		HACCP	670	607	329	389	439	443	200	247	340	280	310	344		
		Cecal (Beef)											124	104		
		Cecal (Dairy)											310	217		
	Swine	Retail Pork Chops	5	11	9	8	18	23	8	20	28	12	24	20		
		Cecal (Market Swine)											260	279		
Cecal (Sows)												289	327			
Resistance Pattern	Source															
4. Resistant to ≥ 5 Antimicrobial Classes	Humans		9.8%	7.9%	7.2%	6.3%	6.9%	6.6%	6.1%	5.2%	4.6%	3.9%	4.0%	3.9%		
			181	140	146	137	149	157	133	128	108	87	87	82		
		Chickens	Retail Chickens	12.0%	22.3%	17.6%	14.5%	11.1%	18.7%	31.6%	30.4%	23.4%	24.5%	18.8%	17.5%	
				10	35	27	22	11	37	86	52	37	56	39	25	
	HACCP		4.9%	8.0%	5.8%	6.6%	7.4%	6.1%	7.8%	9.0%	3.5%	5.9%	5.4%	5.3%		
	Cecal		56	103	116	91	74	38	43	51	17	51	28	50		
	Turkeys	Retail Ground Turkey	4.4%	4.9%	2.7%	2.5%	2.6%	3.3%	3.6%	11.4%	11.7%	7.7%	6.6%	5.8%		
			5	7	5	4	5	8	7	23	19	7	6	5		
		HACCP	3.1%	5.5%	6.2%	5.6%	6.3%	4.1%	9.1%	9.3%	5.8%	5.7%	2.2%	8.0%		
		Cecal	8	13	14	17	17	6	11	14	6	10	2	24		
	Cattle	Retail Ground Beef	40.0%	14.3%	12.5%	5.3%	0.0%	12.5%	14.3%	28.6%	0.0%	23.1%	26.7%	38.5%		
			4	2	1	1	0	3	2	2	0	3	4	5		
		HACCP	23.6%	17.6%	23.1%	20.1%	18.2%	19.0%	20.0%	23.1%	16.2%	13.6%	14.8%	8.5%		
		Cecal (Beef)	158	107	76	78	80	84	40	57	55	38	46	29		
	Swine	Retail Pork Chops	40.0%	9.1%	22.2%	0.0%	0.0%	0.0%	25.0%	5.0%	10.7%	0.0%	12.5%	5.0%		
			2	1	2	0	0	0	2	1	3	0	3	1		
		Cecal (Market Swine)											4.2%	5.4%		
		Cecal (Sows)											11	15		
	5. At Least ACSSuT ² Resistant	Humans		9.3%	7.2%	6.9%	5.6%	6.3%	5.8%	5.1%	4.4%	3.9%	3.4%	3.4%	3.1%	
				173	129	141	121	136	138	112	107	91	77	74	67	
			Chickens	Retail Chickens	2.4%	1.9%	0.7%	2.6%	0.0%	0.5%	0.0%	1.8%	0.0%	0.0%	0.5%	2.1%
					2	3	1	4	0	1	0	3	0	0	1	3
		HACCP		1.5%	0.9%	1.6%	1.6%	1.5%	1.4%	1.3%	2.3%	0.4%	0.3%	0.2%	1.5%	
		Cecal		17	12	31	22	15	9	7	13	2	3	1	5	
Turkeys		Retail Ground Turkey	0.9%	2.8%	0.5%	0.6%	1.6%	1.6%	0.5%	2.5%	2.5%	3.3%	2.8%	2.3%		
			1	4	1	1	3	4	1	5	4	3	3	2		
		HACCP	2.3%	4.7%	4.0%	3.9%	4.8%	2.0%	3.3%	4.0%	1.0%	1.1%	1.1%	2.0%		
		Cecal	6	11	9	12	13	3	4	6	1	2	1	6		
Cattle		Retail Ground Beef	40.0%	14.3%	12.5%	5.3%	0.0%	12.5%	14.3%	28.6%	0.0%	23.1%	20.0%	30.8%		
			4	2	1	1	0	3	2	2	0	3	3	4		
		HACCP	18.1%	16.3%	20.4%	18.3%	16.2%	18.1%	15.0%	18.6%	12.6%	9.3%	12.9%	7.0%		
		Cecal (Beef)	121	99	67	71	71	80	30	46	43	26	40	24		
Swine		Retail Pork Chops	40.0%	9.1%	22.2%	0.0%	0.0%	0.0%	12.5%	5.0%	10.7%	0.0%	12.5%	5.0%		
			2	1	2	0	0	0	1	1	3	0	3	1		
		Cecal (Market Swine)											3.5%	4.3%		
		Cecal (Sows)											9	12		
6. At Least ACT/S ³ Resistant		Humans		1.2%	0.6%	0.9%	0.7%	0.7%	0.5%	0.7%	0.4%	0.4%	0.3%	0.5%	0.6%	
				23	10	18	15	16	11	15	11	9	7	10	12	
			Chickens	Retail Chickens	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
					0	0	0	0	0	0	0	0	0	0	0	0
		HACCP		0.0%	0.1%	0.1%	0.0%	0.0%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	
		Cecal		0	1	2	0	0	1	0	0	0	0	0	1	
	Turkeys	Retail Ground Turkey	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2.5%	0.0%	0.9%	0.0%		
			0	0	0	0	0	0	0	0	4	0	1	0		
		HACCP	0.0%	0.4%	0.0%	0.3%	0.0%	0.7%	0.8%	0.0%	0.0%	0.0%	0.0%	0.1%		
		Cecal	0	1	0	1	0	1	1	0	0	0	0	1		
	Cattle	Retail Ground Beef	0.0%	7.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		
			0	1	0	0	0	0	0	0	0	0	0	0		
		HACCP	2.7%	1.2%	4.3%	4.1%	2.5%	3.8%	1.5%	4.5%	1.5%	0.4%	1.0%	1.2%		
		Cecal (Beef)	18	7	14	16	11	17	3	11	5	1	3	4		
	Swine	Retail Pork Chops	0.0%	0.0%	11.1%	0.0%	0.0%	0.0%	12.5%	0.0%	0.0%	0.0%	0.0%	5.0%		
			0	0	1	0	0	0	1	0	0	0	0	1		
		Cecal (Market Swine)											0.0%	1.4%		
		Cecal (Sows)											0	4		

¹ Starting in 2011, testing included nine antimicrobial classes with the addition of the macrolide azithromycin. Because resistance to azithromycin is low (in this case, <1%), antimicrobial class resistance data from 2011 and beyond are comparable to the data from previous years.

² ACSSuT = ampicillin, chloramphenicol, streptomycin, sulfamethoxazole/sulfisoxazole, and tetracycline

³ ACT/S = ampicillin, chloramphenicol, and trimethoprim-sulfamethoxazole

Table 18c. Resistance Patterns among all Non-Typhoidal *Salmonella* Isolates, 2003-2014

Year			2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
Number of Isolates Tested	Humans		1855	1782	2036	2170	2145	2384	2192	2448	2335	2233	2178	2127	
		Chickens	Retail Chickens	83	157	153	152	99	198	272	171	158	229	208	143
			HACCP	1158	1280	1989	1380	994	624	551	564	491	864	520	936
	Turkeys	Retail Ground Turkey	114	142	183	159	190	246	193	202	162	91	106	86	
		HACCP	262	236	227	304	271	148	121	151	103	175	87	299	
		Cecal											28	45	
	Cattle	Retail Ground Beef	10	14	8	19	13	24	14	7	9	13	15	13	
		HACCP	670	607	329	389	439	443	200	247	340	280	310	344	
		Cecal (Beef)											124	104	
	Swine	Cecal (Dairy)											310	217	
		Retail Pork Chops	5	11	9	8	18	23	8	20	28	12	24	20	
		Cecal (Market Swine)											260	279	
		Cecal (Sows)											289	327	
Resistance Pattern	Source														
7. At Least ACSSuTAuCx¹ Resistant	Humans		3.2%	2.4%	2.0%	2.0%	2.1%	1.8%	1.4%	1.3%	1.5%	1.5%	1.4%	1.2%	
	Chickens	Retail Chickens	60	42	41	43	46	44	30	33	36	34	31	26	
		HACCP	0.0%	1.9%	0.0%	2.6%	0.0%	0.0%	0.0%	0.6%	0.0%	0.0%	0.0%	1.4%	
		Cecal	0	3	0	4	0	0	0	1	0	0	0	2	
			1.0%	0.4%	0.9%	1.1%	1.4%	1.1%	1.3%	2.0%	0.4%	0.2%	0.2%	0.1%	
	Turkeys	Retail Ground Turkey	0.9%	2.1%	0.5%	0.0%	1.1%	1.2%	0.5%	2.0%	2.5%	3.3%	1.9%	2.3%	
		HACCP	1	3	1	0	2	3	1	4	4	3	2	2	
		Cecal	0.8%	2.1%	1.8%	2.3%	4.1%	2.0%	3.3%	1.3%	1.0%	0.0%	0.0%	1.7%	
			2	5	4	7	11	3	4	2	1	0	0	5	
	Cattle	Retail Ground Beef	40.0%	14.3%	0.0%	0.0%	0.0%	8.3%	14.3%	28.6%	0.0%	15.4%	20.0%	30.8%	
		HACCP	4	2	0	0	0	2	2	2	0	2	3	4	
		Cecal (Beef)	15.1%	12.0%	17.3%	16.2%	13.9%	14.7%	9.5%	16.2%	11.2%	6.8%	12.6%	6.1%	
			101	73	57	63	61	65	19	40	38	19	39	21	
	Swine	Cecal (Dairy)											9.7%	0.0%	
		Retail Pork Chops	20.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	3.6%	0.0%	0.0%	0.0%	
		Cecal (Market Swine)	1	0	0	0	0	0	0	0	1	0	0	0	
													1.2%	1.8%	
		Cecal (Sows)											3	5	
													1.7%	0.9%	
													5	3	
	8. At Least Ceftriaxone and Nalidixic Acid Resistant	Humans		0.1%	0.1%	<0.1%	0.1%	0.2%	<0.1%	0.2%	0.1%	0.1%	0.3%	0.2%	0.2%
Chickens		Retail Chickens	1	2	1	3	5	1	4	2	2	6	5	5	
		HACCP	0.0%	0.0%	0.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.7%	
		Cecal	0	0	1	0	0	0	0	0	0	0	0	1	
			0.0%	0.2%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
Turkeys		Retail Ground Turkey	0.9%	0.0%	0.0%	0.0%	0.5%	0.0%	0.0%	0.5%	0.0%	0.0%	0.0%	0.0%	
		HACCP	1	0	0	0	1	0	0	1	0	0	0	0	
		Cecal	0.4%	0.8%	0.9%	0.3%	0.7%	0.0%	0.0%	0.7%	0.0%	0.0%	0.0%	0.3%	
			1	2	2	1	2	0	0	1	0	0	0	1	
Cattle		Retail Ground Beef	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	14.3%	0.0%	0.0%	0.0%	0.0%	7.7%	
		HACCP	0	0	0	0	0	0	2	0	0	0	0	1	
		Cecal (Beef)	0.4%	1.0%	0.9%	0.3%	0.2%	0.7%	0.0%	1.2%	0.9%	1.8%	1.9%	1.2%	
			3	6	3	1	1	3	0	3	3	5	6	4	
Swine		Cecal (Dairy)											0.8%	0.0%	
		Retail Pork Chops	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
	Cecal (Market Swine)	0	0	0	0	0	0	0	0	0	0	0	0		
												0.4%	0.0%		
	Cecal (Sows)											1	0		
												0.3%	0.0%		
												1	0		

¹ ACSSuTAuCx = ACSSuT, amoxicillin-clavulanic acid, and ceftriaxone

Table 19. Non-Typhoidal *Salmonella* Isolates that are Resistant to ≥ 3 Antimicrobial Classes, by Serotype, 2014

Humans				Chickens											
Source	Serotype	n	%	Source	Serotype	n	%	Source	Serotype	n	%	Source	Serotype	n	%
Humans (N=197)	Typhimurium	57	28.9	Retail Chickens (N=29)	Typhimurium	20	69.0	HACCP (N=78)	Kentucky	45	57.7	Cecal (N=15)	Typhimurium	8	53.3
	I 4,[5],12:i:-	55	27.9		Heidelberg	5	17.2		Heidelberg	14	17.9		Kentucky	5	33.3
	Heidelberg	15	7.6		Kentucky	3	10.3		Typhimurium	13	16.7		Idikan	1	6.7
	Newport	11	5.6		Infantis	1	3.4		Infantis	2	2.6		Schwarzengrund	1	6.7
	Enteritidis	9	4.6				I 4,[5],12:i:-		1	1.3					
	Dublin	6	3.0				Braenderup		1	1.3					
	Infantis	5	2.5				Saintpaul		1	1.3					
	Agona	4	2.0				Thompson	1	1.3						
	Derby	4	2.0												
	Reading	4	2.0												
	Saintpaul	4	2.0												
	Javiana	3	1.5												
	Hadar	2	1.0												
	Mbandaka	2	1.0												
	Panama	2	1.0												
	I 4,[5],12:r:-	1	0.5												
	Agbeni	1	0.5												
	Bareilly	1	0.5												
	Give	1	0.5												
Hartford	1	0.5													
Hvittingfloss	1	0.5													
Kentucky	1	0.5													
Monschau	1	0.5													
Montevideo	1	0.5													
Muenchen	1	0.5													
Oranienburg	1	0.5													
Oslo	1	0.5													
Paratyphi B var. L(+) tartrate+	1	0.5													
Stanley	1	0.5													
Turkeys															
				Source	Serotype	n	%	Source	Serotype	n	%	Source	Serotype	n	%
				Retail Ground Turkey (N=31)	Reading	9	29.0	HACCP (N=123)	Reading	34	27.6	Cecal (N=21)	Hadar	4	19.0
			Hadar		5	16.1	Hadar		15	12.2	Heidelberg		3	14.3	
			Muenchen		4	12.9	Heidelberg		14	11.4	Reading		3	14.3	
			Saintpaul		4	12.9	Saintpaul		14	11.4	Saintpaul		3	14.3	
			Heidelberg		3	9.7	Senftenberg		10	8.1	Schwarzengrund		2	9.5	
			Infantis		2	6.5	Agona		7	5.7	Senftenberg		2	9.5	
			I 4,12: nonmotile		1	3.2	Muenchen		7	5.7	Typhimurium		2	9.5	
			Montevideo		1	3.2	I 4,[5],12:i:-		5	4.1	Albany		1	4.8	
			Typhimurium		1	3.2	Albany		4	3.3	Kentucky		1	4.8	
			Worthington		1	3.2	Schwarzengrund		3	2.4					
							Anatum		2	1.6					
							Kentucky		2	1.6					
							Typhimurium		2	1.6					
						Albert	1	0.8							
						Litchfield	1	0.8							
						Montevideo	1	0.8							
						Tennessee	1	0.8							
Cattle															
				Source	Serotype	n	%	Source	Serotype	n	%	Source	Serotype	n	%
				Retail Ground Beef (N=5)	Dublin	3	60.0	HACCP (N=57)	Dublin	25	43.9	Cecal (Beef) (N=6)	Agona	1	16.7
			Newport		2	40.0	Newport		9	15.8	Altona		1	16.7	
						Derby	4		7.0	Derby	1		16.7		
						Reading	4		7.0	Liverpool	1		16.7		
						I 4,[5],12:i:-	3		5.3	Montevideo	1		16.7		
						Agona	2		3.5	Typhimurium	1		16.7		
						Meleagridis	2		3.5						
						Montevideo	2		3.5	Cecal (Dairy) (N=22)	Typhimurium	9	40.9		
						Muenster	2		3.5		Newport	8	36.4		
						Typhimurium	2		3.5		Meleagridis	2	9.1		
						Heidelberg	1		1.8		Agona	1	4.5		
					Ohio	1	1.8	Montevideo	1		4.5				
								Uganda	1	4.5					
Swine															
				Source	Serotype	n	%	Source	Serotype	n	%				
				Retail Pork Chops (N=4)	I 4,[5],12:i:-	2	50.0	Cecal (Market Swine) (N=56)	Derby	23	41.1				
			Derby		1	25.0	I 4,[5],12:i:-		8	14.3					
			Typhimurium		1	25.0	Typhimurium		8	14.3					
						Agona	6		10.7						
									Brandenburg	2	3.6				
									Infantis	2	3.6				
									Albany	1	1.8				
									Johannesburg	1	1.8				
									Krefeld	1	1.8				
									Newport	1	1.8				
									Saintpaul	1	1.8				
									Senftenberg	1	1.8				
									Soerenga	1	1.8				
								Cecal (Sows) (N=21)	Agona	5	23.8				
									Derby	5	23.8				
									I 4,[5],12:i:-	5	23.8				
									Typhimurium	4	19.0				
									Johannesburg	1	4.8				
								Muenster	1	4.8					

Table 20. Non-Typhoidal *Salmonella* Isolates that are Resistant to ≥ 4 Antimicrobial Classes, by Serotype, 2014

Humans				Chickens				Chickens				Chickens												
Source	Serotype	n	%	Source	Serotype	n	%	Source	Serotype	n	%	Source	Serotype	n	%									
Humans (N=152)	I 4,[5]12:i:-	52	34.2	Retail	Typhimurium	19	67.9	HACCP (N=60)	Kentucky	39	65.0	Cecal (N=10)	Kentucky	5	50.0									
	Typhimurium	49	32.2	Chickens (N=28)	Heidelberg	5	17.9		Typhimurium	10	16.7		Typhimurium	4	40.0									
	Newport	10	6.6		Kentucky	3	10.7		Heidelberg	8	13.3		Schwarzengrund	1	10.0									
	Heidelberg	9	5.9		Infantis	1	3.6		Thompson	1	1.7													
	Dublin	6	3.9						I 4,[5],12:i:-	1	1.7													
	Enteritidis	6	3.9						Infantis	1	1.7													
	Infantis	4	2.6	Turkeys																				
	Agona	2	1.3	Source			Serotype			n			%											
	Mbandaka	2	1.3	Source			Serotype			n			%											
	Derby	1	0.7	Retail	Infantis	2	22.2	HACCP (N=50)	Senftenberg	9	18.0	Cecal (N=7)	Heidelberg	3	42.9									
	Give	1	0.7		Reading	2	22.2		Heidelberg	8	16.0		Kentucky	1	14.3									
	Hadar	1	0.7	Ground Turkey (N=9)	I 4,12: nonmotile	1	11.1		Reading	6	12.0		Reading	1	14.3									
	Hvittingfloss	1	0.7		Hadar	1	11.1		Saintpaul	6	12.0		Senftenberg	1	14.3									
	Kentucky	1	0.7		Heidelberg	1	11.1		I 4,[5],12:i:-	4	8.0		Typhimurium	1	14.3									
	Oranienburg	1	0.7		Montevideo	1	11.1		Agona	3	6.0													
	Oslo	1	0.7		Saintpaul	1	11.1		Schwarzengrund	3	6.0													
	Panama	1	0.7						Albany	2	4.0													
	Paratyphi B var. L(+) tartrate+	1	0.7						Anatum	2	4.0													
	Reading	1	0.7						Typhimurium	2	4.0													
	Saintpaul	1	0.7						Albert	1	2.0													
	Stanley	1	0.7						Hadar	1	2.0													
									Kentucky	1	2.0													
									Muenchen	1	2.0													
									Tennessee	1	2.0													
	Cattle																							
	Source			Serotype			n			%			Source			Serotype			n			%		
	Retail Ground Beef (N=5)	Dublin	3	60.0	HACCP (N=46)	Dublin	24	52.2	Cecal (Beef) (N=3)	Agona	1	33.3												
	Newport	2	40.0		Newport	9	19.6		Montevideo	1	33.3													
					Reading	4	8.7		Typhimurium	1	33.3													
					I 4,[5],12:i:-	2	4.3	Cecal (Dairy) (N=20)	Typhimurium	9	45.0													
					Typhimurium	2	4.3		Newport	8	40.0													
					Agona	1	2.2		Meleagridis	1	5.0													
					Heidelberg	1	2.2		Montevideo	1	5.0													
					Montevideo	1	2.2		Uganda	1	5.0													
					Muenster	1	2.2																	
					Ohio	1	2.2																	
Swine																								
Source			Serotype			n			%			Source			Serotype			n			%			
Retail Pork Chops (N=4)	I 4,[5],12:i:-	2	50.0	Cecal (Market Swine) (N=24)	I 4,[5],12:i:-	8	33.3																	
	Derby	1	25.0		Typhimurium	6	25.0																	
	Typhimurium	1	25.0		Agona	3	12.5																	
					Derby	3	12.5																	
					Albany	1	4.2																	
					Krefeld	1	4.2																	
					Newport	1	4.2																	
					Senftenberg	1	4.2																	
				Cecal (Sows) (N=10)	I 4,[5],12:i:-	5	50.0																	
					Typhimurium	3	30.0																	
					Derby	1	10.0																	
					Muenster	1	10.0																	

Table 21. Non-Typhoidal *Salmonella* Isolates that are Resistant to ≥ 5 Antimicrobial Classes, by Serotype, 2014

Humans				Chickens												
Source	Serotype	n	%	Source	Serotype	n	%	Source	Serotype	n	%	Source	Serotype	n	%	
Humans (N=82)	Typhimurium	41	50.0	Retail Chickens (N=25)	Typhimurium	18	72.0	HACCP (N=50)	Kentucky	31	62.0	Cecal (N=8)	Typhimurium	4	50.0	
	I 4,[5],12:i:-	8	9.8		Heidelberg	4	16.0		Typhimurium	10	20.0		Kentucky	3	37.5	
	Heidelberg	8	9.8		Kentucky	2	8.0		Heidelberg	8	16.0		Schwarzengrund	1	12.5	
	Newport	7	8.5		Infantis	1	4.0		Thompson	1	2.0					
	Dublin	6	7.3													
	Enteritidis	4	4.9	Turkeys												
	Infantis	3	3.7	Source	Serotype	n	%	Source	Serotype	n	%	Source	Serotype	n	%	
	Agona	1	1.2	Retail Ground Turkey (N=5)	Infantis	2	40.0	HACCP (N=24)	Senftenberg	7	29.2	Cecal (N=5)	Heidelberg	3	60.0	
	Kentucky	1	1.2		I 4,5: nonmotile	1	20.0		Heidelberg	6	25.0		Senftenberg	1	20.0	
	Oslo	1	1.2		Hadar	1	20.0		Agona	2	8.3		Typhimurium	1	20.0	
	Paratyphi B var. L(+)-tartrate+	1	1.2		Saintpaul	1	20.0		Schwarzengrund	2	8.3					
	Saintpaul	1	1.2						Typhimurium	2	8.3					
						Albany	1	4.2								
						Albert	1	4.2								
						Kentucky	1	4.2								
						Reading	1	4.2								
						Tennessee	1	4.2								
Cattle																
Source	Serotype	n	%	Source	Serotype	n	%	Source	Serotype	n	%	Source	Serotype	n	%	
Retail Ground Beef (N=5)	Dublin	3	60.0	HACCP (N=29)	Dublin	12	41.4	Cecal (Beef) (N=1)	Agona	1	100.0	Cecal (Dairy) (N=16)	Newport	8	50.0	
	Newport	2	40.0		Newport	9	31.0						Typhimurium	6	37.5	
					Reading	4	13.8				Meleagridis		1	6.3		
					Agona	1	3.4				Montevideo		1	6.3		
					Muenster	1	3.4									
			Ohio	1	3.4											
			Typhimurium	1	3.4											
Swine																
Source	Serotype	n	%	Source	Serotype	n	%	Source	Serotype	n	%	Source	Serotype	n	%	
Retail Pork Chops (N=4)	Derby	1	100.0	Cecal (Market Swine) (N=15)	Typhimurium	6	40.0	Cecal (Sows) (N=4)	Typhimurium	3	75.0					
					Agona	3	20.0			Muenster	1	25.0				
					Derby	2	13.3									
					I 4,[5],12:i:-	1	6.7									
					Krefeld	1	6.7									
			Newport	1	6.7											
			Senftenberg	1	6.7											

Table 22. Non-Typhoidal *Salmonella* Isolates that are at least ACSSuT¹ Resistant, by Serotype, 2014

Humans				Chickens													
Source	Serotype	n	%	Source	Serotype	n	%	Source	Serotype	n	%	Source	Serotype	n	%		
Humans (N=67)	Typhimurium	38	56.7	Retail Chickens (N=3)	Heidelberg	3	100.0	HACCP (N=5)	Heidelberg	3	60.0	Cecal (N=0)					
	Heidelberg	7	10.4						Typhimurium	2	40.0						
	Newport	7	10.4														
	Dublin	6	9.0														
	I 4,[5],12:i:-	4	6.0														
	Enteritidis	2	3.0														
	Agona	1	1.5														
	Infantis	1	1.5														
Paratyphi B var. L(+) tartrate+	1	1.5															
				Turkeys													
				Source	Serotype	n	%	Source	Serotype	n	%	Source	Serotype	n	%		
				Retail Ground Turkey (N=2)	Infantis	2	100.0	HACCP (N=6)	Senftenberg	2	33.3	Cecal (N=2)	Heidelberg	1	50.0		
					Albany	1	16.7			Senftenberg	1		50.0				
										Albert	1	16.7					
										Heidelberg	1	16.7					
										Schwarzengrund	1	16.7					
				Cattle													
				Source	Serotype	n	%	Source	Serotype	n	%	Source	Serotype	n	%		
				Retail Ground Beef (N=4)	Dublin	2	50.0	HACCP (N=24)	Dublin	9	37.5	Cecal (Beef) (N=0)					
					Newport	2	50.0			Newport	8		33.3				
										Reading	4		16.7				
										Agona	1		4.2				
										Ohio	1		4.2				
								Typhimurium	1	4.2							
												Cecal (Dairy) (N=16)	Newport	8	50.0		
													Typhimurium	6	37.5		
													Meleagridis	1	6.3		
													Montevideo	1	6.3		
				Swine													
				Source	Serotype	n	%	Source	Serotype	n	%						
				Retail Pork Chops (N=1)	Derby	1	100.0	Cecal (Market Swine) (N=12)	Typhimurium	6	50.0	Cecal (Sows) (N=4)	Typhimurium	3	75.0		
										Agona	3		25.0		Muenster	1	25.0
										Derby	1		8.3				
										Krefeld	1		8.3				
										Newport	1		8.3				

¹ACSSuT = ampicillin, chloramphenicol, streptomycin, sulfamethoxazole/sulfisoxazole, and tetracycline

Table 23. Non-Typhoidal *Salmonella* Isolates that are at least ACT/S¹ Resistant, by Serotype, 2014

Humans				Chickens													
Source	Serotype	n	%	Source	Serotype	n	%	Source	Serotype	n	%	Source	Serotype	n	%		
Humans (N=12)	Typhimurium	4	33.3	Retail Chickens (N=0)				HACCP (N=1)	Heidelberg	1	100.0	Cecal (N=0)					
	Infantis	2	16.7														
	I 4,[5],12:i:-	1	8.3														
	Agona	1	8.3														
	Give	1	8.3														
	Heidelberg	1	8.3														
	Panama	1	8.3														
	Stanley	1	8.3														
				Turkeys													
				Source	Serotype	n	%	Source	Serotype	n	%	Source	Serotype	n	%		
				Retail Ground Turkey (N=0)				HACCP (N=1)	Heidelberg	1	100.0	Cecal (N=1)	Heidelberg	1	100.0		
				Cattle													
				Source	Serotype	n	%	Source	Serotype	n	%	Source	Serotype	n	%		
				Retail Ground Beef (N=0)				HACCP (N=4)	Dublin	3	75.0	Cecal (Beef) (N=0)					
										Newport	1		25.0				
													Cecal (Dairy) (N=1)	Montevideo	1	100.0	
				Swine													
				Source	Serotype	n	%	Source	Serotype	n	%						
				Retail Pork Chops (N=1)	Derby	1	100.0	Cecal (Market Swine) (N=4)	Agona	2	50.0	Cecal (Sows) (N=0)					
										Derby	1		25.0				
										Typhimurium	1		25.0				

¹ACT/S = ampicillin, chloramphenicol, and trimethoprim-sulfamethoxazole

Table 24. Non-Typhoidal *Salmonella* Isolates that are at least ACSSuTAuCx¹ Resistant, by Serotype, 2014

Humans				Chickens												
Source	Serotype	n	%	Source	Serotype	n	%	Source	Serotype	n	%	Source	Serotype	n	%	
Humans (N=26)	Typhimurium	11	42.3	Retail Chickens (N=2)	Heidelberg	2	100.0	HACCP (N=1)	Typhimurium	1	100.0	Cecal (N=0)				
	Newport	7	26.9													
	Dublin	6	23.1													
	Agona	1	3.8													
Enteritidis	1	3.8														
				Turkeys												
Source	Serotype	n	%	Source	Serotype	n	%	Source	Serotype	n	%	Source	Serotype	n	%	
Retail Ground Turkey (N=2)	Infantis	2	50.0	HACCP (N=5)	Albany	1	20.0	Cecal (N=2)	Heidelberg	1	50.0					
					Albert	1	20.0		Senftenberg	1	50.0					
					Heidelberg	1	20.0									
					Schwarzengrund	1	20.0									
					Senftenberg	1	20.0									
				Cattle												
Source	Serotype	n	%	Source	Serotype	n	%	Source	Serotype	n	%	Source	Serotype	n	%	
Retail Ground Beef (N=4)	Dublin	2	50.0	HACCP (N=21)	Dublin	8	38.1	Cecal (Beef) (N=0)								
	Newport	2	50.0		Newport	8	38.1									
					Reading	4	19.0									
					Agona	1	4.8									
								Cecal (Dairy) (N=12)	Newport	8	66.7					
									Typhimurium	3	25.0					
									Montevideo	1	8.3					
				Swine												
Source	Serotype	n	%	Source	Serotype	n	%	Source	Serotype	n	%	Source	Serotype	n	%	
Retail Pork Chops (N=0)				Cecal (Market Swine) (N=5)	Agona	3	60.0									
					Newport	1	20.0									
					Typhimurium	1	20.0									
								Cecal (Sows) (N=3)	Typhimurium	2	66.7					
									Muenster	1	33.3					

¹ ACSSuTAuCx = ACSSuT, amoxicillin-clavulanic acid, and ceftriaxone

Table 25. Non-Typhoidal *Salmonella* Isolates that are at least Ceftriaxone and Nalidixic Acid Resistant, by Serotype, 2014

Humans				Chickens												
Source	Serotype	n	%	Source	Serotype	n	%	Source	Serotype	n	%	Source	Serotype	n	%	
Humans (N=5)	Infantis	2	40.0	Retail Chickens (N=1)	Infantis	1	100.0	HACCP (N=0)				Cecal (N=0)				
	Enteritidis	1	20.0													
	Heidelberg	1	20.0													
	Typhimurium	1	20.0													
				Turkeys												
Source	Serotype	n	%	Source	Serotype	n	%	Source	Serotype	n	%	Source	Serotype	n	%	
Retail Ground Turkey (N=0)				HACCP (N=1)	Albert	1	100.0	Cecal (N=0)								
				Cattle												
Source	Serotype	n	%	Source	Serotype	n	%	Source	Serotype	n	%	Source	Serotype	n	%	
Retail Ground Beef (N=1)	Dublin	1	100.0	HACCP (N=4)	Dublin	2	50.0	Cecal (Beef) (N=0)								
					Reading	2	50.0									
								Cecal (Dairy) (N=0)								
				Swine												
Source	Serotype	n	%	Source	Serotype	n	%	Source	Serotype	n	%	Source	Serotype	n	%	
Retail Pork Chops (N=0)				Cecal (Market Swine) (N=0)												
					Cecal (Sows) (N=0)											

Table 26. Distribution of MICs and Occurrence of Resistance to Selected Beta-Lactam Agents among Non-Typhoidal *Salmonella* Isolates Resistant to Ceftiofur or Ceftriaxone, 2014

Antimicrobial Class	Antimicrobial Agent	Isolate Source (# of Isolates)	%I ¹ (or S-DD) ²	%R ³	[95% CI] ⁴	Distribution (%) of MICs (µg/ml) ⁵												
						0.015	0.03	0.06	0.125	0.25	0.50	1	2	4	8	16	32	64
β-Lactam/β-Lactamase Inhibitor Combinations	Piperacillin-tazobactam	Humans (51)	5.9	2.0	[0.0 - 10.4]													
		Chickens Retail Chickens (24)	0.0	4.2	[0.1 - 21.1]													
		Turkeys Retail Ground Turkey (7)	14.3	0.0	[0.0 - 41.0]													
		Cattle Retail Ground Beef (5)	0.0	20.0	[0.5 - 71.6]													
Cephems	Cefepime	Humans (51)	3.9	3.9	[0.5 - 13.5]													
		Chickens Retail Chickens (24)	4.2	0.0	[0.0 - 14.2]													
		Turkeys Retail Ground Turkey (7)	0.0	0.0	[0.0 - 41.0]													
		Cattle Retail Ground Beef (5)	20.0	0.0	[0.0 - 52.2]													
	Cefotaxime	Humans (51)	0.0	100.0	[93.0 - 100.0]													
		Chickens Retail Chickens (24)	0.0	100.0	[85.8 - 100.0]													
		Turkeys Retail Ground Turkey (7)	0.0	85.7	[42.1 - 99.6]													
		Cattle Retail Ground Beef (5)	0.0	100.0	[47.8 - 100.0]													
	Ceftazidime	Humans (51)	3.9	90.2	[78.6 - 96.7]													
		Chickens Retail Chickens (24)	54.2	41.7	[22.1 - 63.4]													
		Turkeys Retail Ground Turkey (7)	14.3	71.4	[29.0 - 96.3]													
		Cattle Retail Ground Beef (5)	0.0	100.0	[47.8 - 100.0]													
Monobactam	Aztreonam	Humans (51)	47.1	27.5	[15.9 - 41.7]													
		Chickens Retail Chickens (24)	8.3	12.5	[2.7 - 32.4]													
		Turkeys Retail Ground Turkey (7)	28.6	14.3	[0.4 - 57.9]													
		Cattle Retail Ground Beef (5)	20.0	40.0	[5.3 - 85.3]													
Penems	Imipenem	Humans (51)	0.0	0.0	[0.0 - 7.0]													
		Chickens Retail Chickens (24)	0.0	0.0	[0.0 - 14.2]													
		Turkeys Retail Ground Turkey (7)	0.0	0.0	[0.0 - 41.0]													
		Cattle Retail Ground Beef (5)	0.0	0.0	[0.0 - 52.2]													

¹ Percent of isolates with intermediate susceptibility

² Percent of isolates that are susceptible-dose dependent (S-DD). Cefepime MIC's above the susceptible range but below the resistant range are designated by CLSI to be S-DD.

³ Percent of isolates with resistance. Discrepancies between %R and sums of distribution %s, to the right of the double vertical bars, are due to rounding.

⁴ 95% confidence intervals for percent resistant (%R) were calculated using the Clopper-Pearson exact method

⁵ The unshaded areas indicate the range of dilutions tested for each antimicrobial. Single vertical bars indicate the breakpoints for susceptibility, while double vertical bars indicate the breakpoints for resistance. Numbers in the shaded areas indicate the percentages of isolates with MICs greater than the highest tested concentrations. Numbers listed for the lowest tested concentrations represent the percentages of isolates with MICs equal to or less than the lowest tested concentration.

Resistance by Year

Table 27a. Antimicrobial Resistance among *Salmonella* Enteritidis Isolates, 2003-2014

Year		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014		
Number of Isolates Tested	Humans	257	271	384	412	385	442	410	513	391	364	382	438		
	Chickens	Retail Chickens	3	3	12	17	13	30	27	28	21	26	25	27	
		HACCP	42	84	173	188	124	116	118	152	134	203	79	130	
		Cecal											6	17	
	Turkeys	Retail Ground Turkey	1	0	0	0	0	2	0	0	1	4	2	0	
		HACCP	0	0	0	3	0	1	0	1	0	1	1	5	
		Cecal											1	0	
	Cattle	Retail Ground Beef	1	0	0	0	0	1	0	1	0	0	0	0	
		HACCP	3	2	2	2	4	5	0	1	0	1	1	0	
		Cecal (Beef)											0	0	
	Swine	Retail Pork Chops													
		Cecal (Market Swine)											0	1	
		Cecal (Sows)											1	0	
	Antimicrobial Class	Antimicrobial (Resistance Breakpoint)	Isolate Source												
Aminoglycosides	Gentamicin (MIC ≥ 16 µg/ml)	Humans	0.4% 1	0.4% 1	0.8% 3	0.2% 1	0.0% 0	0.2% 1	0.0% 0	0.2% 1	0.5% 2	0.0% 0	0.0% 0	0.0% 0	
		Chickens	Retail Chickens	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	3.3% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
			HACCP	0.0% 0	1.2% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.7% 1	0.0% 0	0.0% 0	1.3% 1	0.0% 0
			Cecal											0.0% 0	0.0% 0
		Turkeys	Retail Ground Turkey	0.0% 0					0.0% 0			0.0% 0	0.0% 0	0.0% 0	0.0% 0
			HACCP				0.0% 0		0.0% 0		0.0% 0		0.0% 0	0.0% 0	0.0% 0
			Cecal											0.0% 0	
		Cattle	Retail Ground Beef	0.0% 0					0.0% 0		0.0% 0				
			HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0		0.0% 0	0.0% 0	
			Cecal (Beef)												
		Swine	Retail Pork Chops												
			Cecal (Market Swine)												0.0% 0
			Cecal (Sows)											0.0% 0	
		Streptomycin (MIC ≥ 64 µg/ml)	Humans	1.2% 3	2.2% 6	1.0% 4	1.2% 5	0.5% 2	0.7% 3	1.2% 5	0.6% 3	1.8% 7	1.9% 7	2.6% 10	3.0% 13
	Chickens		Retail Chickens	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	3.3% 1	0.0% 0	0.0% 0	14.3% 3	0.0% 0	0.0% 0	0.0% 0
			HACCP	0.0% 0	1.2% 1	0.6% 1	0.0% 0	0.8% 1	0.0% 0	0.0% 0	1.3% 2	0.0% 0	1.5% 3	2.5% 2	0.0% 0
			Cecal											0.0% 0	0.0% 0
	Turkeys		Retail Ground Turkey	0.0% 0					0.0% 0			0.0% 0	25.0% 1	0.0% 0	
			HACCP				0.0% 0		0.0% 0		0.0% 0		0.0% 0	0.0% 0	0.0% 0
			Cecal											0.0% 0	
	Cattle		Retail Ground Beef	0.0% 0					0.0% 0		0.0% 0	0.0% 0			
			HACCP	0.0% 0	0.0% 0	0.0% 0	50.0% 1	0.0% 0	0.0% 0		100.0% 1		0.0% 0	0.0% 0	
			Cecal (Beef)												
	Swine		Retail Pork Chops												
			Cecal (Market Swine)												0.0% 0
		Cecal (Sows)											0.0% 0		
β-Lactam/β-Lactamase Inhibitor Combinations	Amoxicillin-Clavulanic Acid (MIC ≥ 32 / 16 µg/ml)	Humans	0.0% 0	0.0% 0	0.8% 3	0.5% 2	0.5% 2	0.0% 0	0.0% 0	0.4% 2	0.3% 1	0.5% 2	0.0% 0	0.5% 2	
		Chickens	Retail Chickens	33.3% 1	33.3% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	3.7% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
			HACCP	0.0% 0	1.2% 1	0.6% 1	0.0% 0	0.0% 0	0.9% 1	0.8% 1	0.0% 0	0.7% 1	0.5% 1	0.0% 0	0.0% 0
			Cecal											0.0% 0	0.0% 0
		Turkeys	Retail Ground Turkey	0.0% 0					0.0% 0			0.0% 0	0.0% 0	0.0% 0	0.0% 0
			HACCP				0.0% 0		0.0% 0		0.0% 0		0.0% 0	0.0% 0	0.0% 0
			Cecal											0.0% 0	
		Cattle	Retail Ground Beef	0.0% 0					0.0% 0		0.0% 0				
			HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0		0.0% 0	0.0% 0	
			Cecal (Beef)												
		Swine	Retail Pork Chops												
			Cecal (Market Swine)												0.0% 0
			Cecal (Sows)											0.0% 0	

Table 27b. Antimicrobial Resistance among *Salmonella* Enteritidis Isolates, 2003-2014

Year		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014		
Number of Isolates Tested	Humans	257	271	384	412	385	442	410	513	391	364	382	438		
	Chickens	Retail Chickens	3	3	12	17	13	30	27	28	21	26	25	27	
		HACCP	42	84	173	188	124	116	118	152	134	203	79	130	
		Cecal											6	17	
	Turkeys	Retail Ground Turkey	1	0	0	0	0	2	0	0	1	4	2	0	
		HACCP	0	0	0	3	0	1	0	1	0	1	1	5	
		Cecal											1	0	
	Cattle	Retail Ground Beef	1	0	0	0	0	1	0	1	0	0	0	0	
		HACCP	3	2	2	2	4	5	0	1	0	1	1	0	
		Cecal (Beef)											0	0	
		Cecal (Dairy)											0	1	
	Swine	Retail Pork Chops	0	0	0	0	0	0	0	0	0	0	0	0	
		Cecal (Market Swine)											0	1	
		Cecal (Sows)											1	0	
Antimicrobial Class	Antimicrobial (Resistance Breakpoint)	Isolate Source													
Cephems	Cefoxitin (MIC ≥ 32 µg/ml)	Humans	0.0% 0	0.0% 0	1.0% 4	0.5% 2	0.3% 1	0.0% 0	0.0% 0	0.0% 0	0.3% 1	0.5% 2	0.0% 0	0.7% 3	
		Chickens	Retail Chickens	33.3% 1	33.3% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	3.7% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
			HACCP	0.0% 0	1.2% 1	0.6% 1	0.0% 0	0.0% 0	0.9% 1	0.0% 0	0.0% 0	0.7% 1	0.5% 1	0.0% 0	0.0% 0
			Cecal											0.0% 0	0.0% 0
		Turkeys	Retail Ground Turkey	0.0% 0					0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0	
			HACCP				0.0% 0		0.0% 0		0.0% 0		0.0% 0	0.0% 0	0.0% 0
			Cecal											0.0% 0	
		Cattle	Retail Ground Beef	0.0% 0					0.0% 0		0.0% 0				
			HACCP	0.0% 0	0.0% 0	0.0% 0	50.0% 1	0.0% 0	0.0% 0		0.0% 0		0.0% 0	0.0% 0	
			Cecal (Beef)												
			Cecal (Dairy)												0.0% 0
		Swine	Retail Pork Chops												
			Cecal (Market Swine)												0.0% 0
			Cecal (Sows)											0.0% 0	
	Ceftiofur (MIC ≥ 8 µg/ml)	Humans	0.0% 0	0.0% 0	0.3% 1	0.5% 2	0.3% 1	0.2% 1	0.0% 0	0.0% 0	0.3% 1	0.5% 2	0.3% 1	0.5% 2	
		Chickens	Retail Chickens	33.3% 1	33.3% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	3.7% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
			HACCP	0.0% 0	1.2% 1	1.2% 2	0.0% 0	0.0% 0	0.9% 1	0.8% 1	1.3% 2	0.7% 1	0.5% 1	0.0% 0	0.0% 0
			Cecal											0.0% 0	0.0% 0
		Turkeys	Retail Ground Turkey	0.0% 0					0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0	
			HACCP				0.0% 0		0.0% 0		0.0% 0		0.0% 0	0.0% 0	0.0% 0
			Cecal											0.0% 0	
		Cattle	Retail Ground Beef	0.0% 0					0.0% 0		0.0% 0				
			HACCP	0.0% 0	0.0% 0	0.0% 0	50.0% 1	0.0% 0	0.0% 0		0.0% 0		0.0% 0	0.0% 0	
			Cecal (Beef)												
			Cecal (Dairy)												0.0% 0
		Swine	Retail Pork Chops												
			Cecal (Market Swine)												0.0% 0
			Cecal (Sows)											0.0% 0	
	Ceftriaxone (MIC ≥ 4 µg/ml)	Humans	0.0% 0	0.0% 0	0.3% 1	0.5% 2	0.3% 1	0.2% 1	0.0% 0	0.0% 0	0.3% 1	0.5% 2	0.3% 1	0.5% 2	
		Chickens	Retail Chickens	33.3% 1	33.3% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	3.7% 1	3.6% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0
			HACCP	0.0% 0	1.2% 1	0.6% 1	0.0% 0	0.0% 0	0.9% 1	0.8% 1	0.6% 1	0.7% 1	0.5% 1	0.0% 0	0.0% 0
			Cecal											0.0% 0	0.0% 0
		Turkeys	Retail Ground Turkey	0.0% 0					0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0	
HACCP						0.0% 0		0.0% 0		0.0% 0		0.0% 0	0.0% 0	0.0% 0	
Cecal													0.0% 0		
Cattle		Retail Ground Beef	0.0% 0					0.0% 0		0.0% 0					
		HACCP	0.0% 0	0.0% 0	0.0% 0	50.0% 1	0.0% 0	0.0% 0		0.0% 0		0.0% 0	0.0% 0		
		Cecal (Beef)													
		Cecal (Dairy)												0.0% 0	
Swine		Retail Pork Chops													
		Cecal (Market Swine)												0.0% 0	
		Cecal (Sows)											0.0% 0		

Table 27c. Antimicrobial Resistance among *Salmonella* Enteritidis Isolates, 2003-2014

Year		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014		
Number of Isolates Tested	Humans	257	271	384	412	385	442	410	513	391	364	382	438		
	Chickens	Retail Chickens	3	3	12	17	13	30	27	28	21	26	25	27	
		HACCP	42	84	173	188	124	116	118	152	134	203	79	130	
		Cecal											6	17	
	Turkeys	Retail Ground Turkey	1	0	0	0	0	2	0	0	1	4	2	0	
		HACCP	0	0	0	3	0	1	0	1	0	1	1	5	
		Cecal											1	0	
	Cattle	Retail Ground Beef	1	0	0	0	0	1	0	1	0	0	0	0	
		HACCP	3	2	2	2	4	5	0	1	0	1	1	0	
		Cecal (Beef) Cecal (Dairy)											0	0	
	Swine	Retail Pork Chops													
		Cecal (Market Swine)											0	1	
		Cecal (Sows)											1	0	
Antimicrobial Class	Antimicrobial (Resistance Breakpoint)	Isolate Source													
Folate Pathway Inhibitor	Sulfamethoxazole/ Sulfisoxazole ¹ (MIC ≥ 512 µg/ml)	Humans	1.2% 3	1.8% 5	1.6% 6	1.5% 6	1.6% 6	1.4% 6	1.7% 7	1.9% 10	2.0% 8	2.7% 10	1.6% 6	1.8% 8	
		Chickens	Retail Chickens	0.0% 0	33.3% 1	0.0% 0	0.0% 0	0.0% 0	3.3% 1	3.7% 1	0.0% 0	9.5% 2	0.0% 0	0.0% 0	0.0% 0
			HACCP	2.4% 1	1.2% 1	0.0% 0	0.0% 0	0.8% 1	0.9% 1	0.0% 0	2.0% 3	0.0% 0	0.0% 0	2.5% 2	0.0% 0
			Cecal											0.0% 0	0.0% 0
		Turkeys	Retail Ground Turkey	0.0% 0					50.0% 1			0.0% 0	0.0% 0	0.0% 0	
			HACCP				0.0% 0		0.0% 0		0.0% 0		0.0% 0	0.0% 0	0.0% 0
			Cecal											0.0% 0	
		Cattle	Retail Ground Beef	0.0% 0					0.0% 0		0.0% 0				
			HACCP	0.0% 0	0.0% 0	0.0% 0	50.0% 1	0.0% 0	0.0% 0		0.0% 0		0.0% 0	0.0% 0	
			Cecal (Beef) Cecal (Dairy)												0.0% 0
		Swine	Retail Ground Turkey												
			Cecal (Market Swine)												0.0% 0
	Cecal (Sows)												0.0% 0		
	Trimethoprim- Sulfamethoxazole (MIC ≥ 4 / 76 µg/ml)	Humans	0.8% 2	0.0% 0	0.5% 2	0.5% 2	1.0% 4	0.9% 4	0.7% 3	1.0% 5	0.5% 2	1.1% 4	0.5% 2	0.5% 2	
		Chickens	Retail Chickens	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	3.7% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
			HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
			Cecal											0.0% 0	0.0% 0
		Turkeys	Retail Ground Turkey	0.0% 0					0.0% 0			0.0% 0	0.0% 0	0.0% 0	
			HACCP				0.0% 0		0.0% 0		0.0% 0		0.0% 0	0.0% 0	0.0% 0
			Cecal											0.0% 0	
		Cattle	Retail Ground Beef	0.0% 0					0.0% 0		0.0% 0				
			HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0		0.0% 0	0.0% 0	
			Cecal (Beef) Cecal (Dairy)												0.0% 0
		Swine	Retail Pork Chops												
Cecal (Market Swine)														0.0% 0	
Cecal (Sows)												0.0% 0			
Macrolides	Azithromycin (MIC ≥ 32 µg/ml)	Humans								0.0% 0	0.0% 0	0.0% 0	0.0% 0		
		Chickens	Retail Chickens								0.0% 0	0.0% 0	0.0% 0	0.0% 0	
			HACCP								0.0% 0	0.0% 0	0.0% 0	0.0% 0	
			Cecal										0.0% 0	0.0% 0	
		Turkeys	Retail Ground Turkey								0.0% 0	0.0% 0	0.0% 0		
			HACCP									0.0% 0	0.0% 0	0.0% 0	
			Cecal										0.0% 0		
		Cattle	Retail Ground Beef												
			HACCP									0.0% 0	0.0% 0		
			Cecal (Beef) Cecal (Dairy)											0.0% 0	
		Swine	Retail Pork Chops												
			Cecal (Market Swine)											0.0% 0	
Cecal (Sows)												0.0% 0			

¹ Sulfamethoxazole was tested from 1996-2003 and was replaced by sulfisoxazole in 2004

Table 27d. Antimicrobial Resistance among *Salmonella* Enteritidis Isolates, 2003-2014

Year			2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
Number of Isolates Tested	Humans		257	271	384	412	385	442	410	513	391	364	382	438	
		Chickens	Retail Chickens	3	3	12	17	13	30	27	28	21	26	25	27
			HACCP	42	84	173	188	124	116	118	152	134	203	79	130
	Cecal												6	17	
	Turkeys	Retail Ground Turkey	1	0	0	0	0	2	0	0	1	4	2	0	
		HACCP	3	2	2	2	4	5	0	1	0	1	1	0	
		Cecal											0	0	
	Cattle	Retail Ground Beef	1	0	0	0	0	1	0	1	0	0	0	0	
		HACCP	3	2	2	2	4	5	0	1	0	1	1	0	
		Cecal (Beef)											0	0	
	Swine	Cecal (Dairy)											0	1	
		Retail Pork Chops	0	0	0	0	0	0	0	0	0	0	0	0	
		Cecal (Market Swine)											0	1	
		Cecal (Sows)											1	0	
Antimicrobial Class	Antimicrobial (Resistance Breakpoint)	Isolate Source													
Penicillins	Ampicillin (MIC ≥ 32 µg/ml)	Humans	2.3% 6	4.1% 11	2.6% 10	4.1% 17	2.1% 8	4.1% 18	3.9% 16	2.3% 12	5.1% 20	4.1% 15	5.8% 22	3.2% 14	
		Chickens	Retail Chickens	66.7% 2	33.3% 1	0.0% 0	17.6% 3	0.0% 0	6.7% 2	18.5% 5	0.0% 0	9.5% 2	0.0% 0	0.0% 0	0.0% 0
			HACCP	0.0% 0	1.2% 1	1.2% 2	1.6% 3	1.6% 2	2.6% 3	2.5% 3	2.6% 4	1.5% 2	2.5% 5	3.8% 3	3.8% 5
			Cecal											0.0% 0	0.0% 0
		Turkeys	Retail Ground Turkey	0.0% 0					0.0% 0			0.0% 0	0.0% 0	50.0% 1	
			HACCP				0.0% 0		0.0% 0		0.0% 0		0.0% 0	0.0% 0	0.0% 0
			Cecal											0.0% 0	
		Cattle	Retail Ground Beef	0.0% 0					0.0% 0		0.0% 0				
			HACCP	0.0% 0	0.0% 0	0.0% 0	50.0% 1	0.0% 0	0.0% 0		100.0% 1		0.0% 0	0.0% 0	
			Cecal (Beef)												
		Swine	Cecal (Dairy)												0.0% 0
			Retail Pork Chops												
			Cecal (Market Swine)												0.0% 0
			Cecal (Sows)											0.0% 0	
Phenicolis	Chloramphenicol (MIC ≥ 32 µg/ml)	Humans	0.4% 1	0.4% 1	0.5% 2	0.0% 0	0.5% 2	0.5% 2	0.0% 0	0.6% 3	0.0% 0	0.5% 2	0.3% 1	1.1% 5	
		Chickens	Retail Chickens	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
			HACCP	0.0% 0	0.0% 0	0.6% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	1.3% 2	0.0% 0	0.0% 0	0.0% 0	0.0% 0
			Cecal											0.0% 0	0.0% 0
		Turkeys	Retail Ground Turkey	0.0% 0					0.0% 0			0.0% 0	0.0% 0	0.0% 0	
			HACCP				0.0% 0		0.0% 0		0.0% 0		0.0% 0	0.0% 0	0.0% 0
			Cecal											0.0% 0	
		Cattle	Retail Ground Beef	0.0% 0					0.0% 0		0.0% 0				
			HACCP	0.0% 0	0.0% 0	0.0% 0	50.0% 1	0.0% 0	0.0% 0		100.0% 1		0.0% 0	0.0% 0	
			Cecal (Beef)												
		Swine	Cecal (Dairy)												0.0% 0
			Retail Pork Chops												
			Cecal (Market Swine)												0.0% 0
			Cecal (Sows)											0.0% 0	
Quinolones	Ciprofloxacin (MIC ≥ 1 µg/ml)	Humans	0.0% 0	0.4% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.2% 1	0.0% 0	0.0% 0	0.0% 0	0.2% 1	
		Chickens	Retail Chickens	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
			HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
			Cecal											0.0% 0	0.0% 0
		Turkeys	Retail Ground Turkey	0.0% 0					0.0% 0			0.0% 0	0.0% 0	0.0% 0	
			HACCP				0.0% 0		0.0% 0		0.0% 0		0.0% 0	0.0% 0	0.0% 0
			Cecal											0.0% 0	
		Cattle	Retail Ground Beef	0.0% 0					0.0% 0		0.0% 0				
			HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0		0.0% 0	0.0% 0	
			Cecal (Beef)												
		Swine	Cecal (Dairy)												0.0% 0
			Retail Pork Chops												
			Cecal (Market Swine)												0.0% 0
			Cecal (Sows)											0.0% 0	

Table 27e. Antimicrobial Resistance among *Salmonella* Enteritidis Isolates, 2003-2014

Year			2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014		
Number of Isolates Tested	Humans		257	271	384	412	385	442	410	513	391	364	382	438		
		Chickens	Retail Chickens	3	3	12	17	13	30	27	28	21	26	25	27	
			HACCP	42	84	173	188	124	116	118	152	134	203	79	130	
	Cecal															
		Turkeys	Retail Ground Turkey	1	0	0	0	0	2	0	0	1	4	2	0	
			HACCP	0	0	0	3	0	1	0	1	0	1	1	5	
	Cecal															
		Cattle	Retail Ground Beef	1	0	0	0	0	1	0	1	0	0	0	0	
			HACCP	3	2	2	2	4	5	0	1	0	1	1	0	
	Cecal (Beef)															
		Cecal (Dairy)														
	Swine	Retail Pork Chops	0	0	0	0	0	0	0	0	0	0	0	0		
		Cecal (Market Swine)														
Cecal (Sows)												1	0			
Antimicrobial Class	Antimicrobial (Resistance Breakpoint)	Isolate Source														
Quinolones	Nalidixic Acid (MIC ≥ 32 µg/ml)	Humans		4.7%	6.6%	4.7%	7.0%	5.7%	7.2%	3.7%	5.3%	7.2%	7.7%	5.8%	8.0%	
				12	18	18	29	22	32	15	27	28	28	22	35	
				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	3.7%	0.0%	0.0%	0.0%	0.0%	0.0%	
		Chickens	Retail Chickens	0	0	0	0	0	0	0	1	0	0	0	0	0
			HACCP	0.0%	0.0%	0.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
			Cecal	0	0	1	0	0	0	0	0	0	0	0	0	0
		Turkeys	Retail Ground Turkey	0.0%					0.0%				0.0%	0.0%	0.0%	0.0%
			HACCP	0			0.0%		0.0%		0.0%		0.0%	0.0%	0.0%	0.0%
			Cecal												0.0%	0.0%
		Cattle	Retail Ground Beef	0.0%					0.0%		0.0%					
			HACCP	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		0.0%		0.0%	0.0%	0.0%	
			Cecal (Beef)													
		Cecal (Dairy)														
																0.0%
														0		
Swine	Retail Pork Chops															
	Cecal (Market Swine)													0.0%		
	Cecal (Sows)												0.0%	0		
Tetracyclines	Tetracycline (MIC ≥ 16 µg/ml)	Humans		1.6%	3.3%	2.3%	1.7%	3.9%	1.8%	1.2%	2.1%	1.8%	3.6%	4.5%	2.5%	
				4	9	9	7	15	8	5	11	7	13	17	11	
				0.0%	33.3%	0.0%	11.8%	0.0%	3.3%	3.7%	0.0%	19.1%	0.0%	0.0%	0.0%	0.0%
		Chickens	Retail Chickens	0	1	0	2	0	1	1	0	4	0	0	0	0
			HACCP	2.4%	2.4%	0.6%	1.6%	2.4%	0.9%	2.5%	3.3%	0.7%	1.5%	2.5%	0.8%	
			Cecal	1	2	1	3	3	1	3	5	1	3	2	1	
		Turkeys	Retail Ground Turkey	0.0%					50.0%			0.0%	25.0%	50.0%		
			HACCP	0			0.0%		0.0%		0.0%		0.0%	0.0%	0.0%	
			Cecal												0.0%	
		Cattle	Retail Ground Beef	0.0%					0.0%		0.0%					
			HACCP	0.0%	0.0%	0.0%	50.0%	25.0%	0.0%		100.0%		0.0%	0.0%		
			Cecal (Beef)	0	0	0	1	1	0		1		0	0		
		Cecal (Dairy)														
													0.0%			
Swine	Retail Pork Chops															
	Cecal (Market Swine)															
	Cecal (Sows)												0.0%			

Multidrug Resistance

Table 28a. Resistance Patterns among *Salmonella* Enteritidis Isolates, 2003-2014¹

Year		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014		
Number of Isolates Tested	Humans	257	271	384	412	385	442	410	513	391	364	382	438		
	Chickens	Retail Chickens	3	3	12	17	13	30	27	28	21	26	25	27	
		HACCP	42	84	173	188	124	116	118	152	134	203	79	130	
		Cecal											6	17	
	Turkeys	Retail Ground Turkey	1	0	0	0	0	2	0	0	1	4	2	0	
		HACCP	0	0	0	3	0	1	0	1	0	1	1	5	
		Cecal											1	0	
	Cattle	Retail Ground Beef	1	0	0	0	0	1	0	1	0	0	0	0	
		HACCP	3	2	2	2	4	5	0	1	0	1	1	0	
		Cecal (Beef)											0	0	
		Cecal (Dairy)											0	1	
	Swine	Retail Pork Chops	0	0	0	0	0	0	0	0	0	0	0	0	
		Cecal (Market Swine)											0	1	
		Cecal (Sows)											1	0	
Resistance Pattern	Source														
1. No Resistance Detected	Humans	91.8% 236	86.7% 235	91.4% 351	88.8% 366	90.4% 348	87.3% 386	92.2% 378	92.0% 472	88.0% 344	88.2% 321	87.4% 334	87.7% 384		
	Chickens	Retail Chickens	33.3% 1	66.7% 2	100.0% 12	82.4% 14	100.0% 13	90.0% 27	74.1% 20	96.4% 27	81.0% 17	100.0% 26	100.0% 25	100.0% 27	
		HACCP	97.6% 41	97.6% 82	97.1% 168	97.9% 184	96.0% 119	97.4% 113	96.6% 114	95.4% 145	97.8% 131	96.1% 195	96.2% 76	96.2% 125	
		Cecal											100.0% 6	100.0% 17	
	Turkeys	Retail Ground Turkey	100.0% 1					50.0% 1			100.0% 1	75.0% 3	50.0% 1		
		HACCP				100.0% 3		100.0% 1		100.0% 1		100.0% 1	100.0% 1	100.0% 5	
		Cecal											100.0% 1		
	Cattle	Retail Ground Beef	100.0% 1					100.0% 1		100.0% 1					
		HACCP	100.0% 3	100.0% 2	100.0% 2	50.0% 1	75.0% 3	100.0% 5		0.0% 0		100.0% 1	100.0% 1		
		Cecal (Beef)													
		Cecal (Dairy)												100.0% 1	
	Swine	Retail Pork Chops													
		Cecal (Market Swine)												100.0% 1	
		Cecal (Sows)											100.0% 1		
	2. Resistant to ≥ 3 Antimicrobial Classes	Humans	0.4% 1	1.1% 3	1.3% 5	1.7% 7	0.8% 3	0.7% 3	1.0% 4	2.1% 11	2.3% 9	2.7% 10	1.6% 6	2.1% 9	
		Chickens	Retail Chickens	33.3% 1	33.3% 1	0.0% 0	0.0% 0	0.0% 0	3.3% 1	3.7% 1	0.0% 0	9.5% 2	0.0% 0	0.0% 0	0.0% 0
			HACCP	0.0% 0	2.4% 2	0.6% 1	0.0% 0	0.0% 0	0.9% 1	0.8% 1	2.6% 4	0.7% 1	0.5% 1	2.5% 2	0.0% 0
			Cecal											0.0% 0	0.0% 0
Turkeys		Retail Ground Turkey	0.0% 0					0.0% 0			0.0% 0	0.0% 0	0.0% 0		
		HACCP				0.0% 0		0.0% 0		0.0% 0		0.0% 0	0.0% 0	0.0% 0	
		Cecal											0.0% 0		
Cattle		Retail Ground Beef	0.0% 0					0.0% 0		0.0% 0					
		HACCP	0.0% 0	0.0% 0	0.0% 0	50.0% 1	0.0% 0	0.0% 0		100.0% 1		0.0% 0	0.0% 0		
		Cecal (Beef)													
		Cecal (Dairy)												0.0% 0	
Swine		Retail Pork Chops													
		Cecal (Market Swine)												0.0% 0	
		Cecal (Sows)											0.0% 0		
3. Resistant to ≥ 4 Antimicrobial Classes		Humans	0.4% 1	0.7% 2	1.0% 4	0.7% 3	0.3% 1	0.2% 1	0.5% 2	0.4% 2	1.3% 5	1.6% 6	1.6% 6	1.4% 6	
		Chickens	Retail Chickens	0.0% 0	33.3% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	3.7% 1	0.0% 0	4.8% 1	0.0% 0	0.0% 0	0.0% 0
			HACCP	0.0% 0	1.2% 1	0.0% 0	0.0% 0	0.0% 0	0.9% 1	0.8% 1	0.6% 1	0.0% 0	0.0% 0	1.3% 1	0.0% 0
			Cecal											0.0% 0	0.0% 0
	Turkeys	Retail Ground Turkey	0.0% 0					0.0% 0			0.0% 0	0.0% 0	0.0% 0		
		HACCP				0.0% 0		0.0% 0		0.0% 0		0.0% 0	0.0% 0	0.0% 0	
		Cecal											0.0% 0		
	Cattle	Retail Ground Beef	0.0% 0					0.0% 0		0.0% 0					
		HACCP	0.0% 0	0.0% 0	0.0% 0	50.0% 1	0.0% 0	0.0% 0		100.0% 1		0.0% 0	0.0% 0		
		Cecal (Beef)													
		Cecal (Dairy)												0.0% 0	
	Swine	Retail Pork Chops													
		Cecal (Market Swine)												0.0% 0	
		Cecal (Sows)											0.0% 0		

¹ Starting in 2011, testing included nine antimicrobial classes with the addition of the macrolide azithromycin. Because resistance to azithromycin is low (in this case, <1%), antimicrobial class resistance data from 2011 and beyond are comparable to the data from previous years.

Table 28b. Resistance Patterns among *Salmonella* Enteritidis Isolates, 2003-2014¹

Year		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
Number of Isolates Tested	Humans	257	271	384	412	385	442	410	513	391	364	382	438	
	Chickens	Retail Chickens	3	3	12	17	13	30	27	28	21	26	25	27
		HACCP	42	84	173	188	124	116	118	152	134	203	79	130
		Cecal											6	17
	Turkeys	Retail Ground Turkey	1	0	0	0	0	2	0	0	1	4	2	0
		HACCP	0	0	0	3	0	1	0	1	0	1	1	5
		Cecal											1	0
	Cattle	Retail Ground Beef	1	0	0	0	0	1	0	1	0	0	0	0
		HACCP	3	2	2	2	4	5	0	1	0	1	1	0
		Cecal (Beef)											0	0
	Swine	Cecal (Dairy)											0	1
		Retail Pork Chops	0	0	0	0	0	0	0	0	0	0	0	0
		Cecal (Market Swine)											0	1
	Cecal (Sows)											1	0	
Resistance Pattern		Source												
4. Resistant to ≥ 5 Antimicrobial Classes	Humans	0.4% 1	0.7% 2	0.5% 2	0.2% 1	0.3% 1	0.0% 0	0.2% 1	0.0% 0	0.5% 2	0.5% 2	0.3% 1	0.9% 4	
	Chickens	Retail Chickens	0.0% 0	33.3% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	3.7% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.9% 1	0.0% 0	0.6% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Cecal											0.0% 0	0.0% 0
	Turkeys	Retail Ground Turkey	0.0% 0					0.0% 0			0.0% 0	0.0% 0	0.0% 0	
		HACCP				0.0% 0		0.0% 0		0.0% 0		0.0% 0	0.0% 0	0.0% 0
		Cecal											0.0% 0	
	Cattle	Retail Ground Beef	0.0% 0					0.0% 0		0.0% 0				
		HACCP	0.0% 0	0.0% 0	0.0% 0	50.0% 1	0.0% 0	0.0% 0		0.0% 0		0.0% 0	0.0% 0	
		Cecal (Beef)												
	Swine	Cecal (Dairy)												0.0% 0
		Retail Pork Chops												
		Cecal (Market Swine)												0.0% 0
	Cecal (Sows)											0.0% 0		
5. At Least ACSSuT ² Resistant	Humans	0.4% 1	0.4% 1	0.5% 2	0.0% 0	0.3% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.3% 1	0.5% 2	
	Chickens	Retail Chickens	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.6% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Cecal											0.0% 0	0.0% 0
	Turkeys	Retail Ground Turkey	0.0% 0					0.0% 0			0.0% 0	0.0% 0	0.0% 0	
		HACCP				0.0% 0		0.0% 0		0.0% 0		0.0% 0	0.0% 0	0.0% 0
		Cecal											0.0% 0	
	Cattle	Retail Ground Beef	0.0% 0					0.0% 0		0.0% 0				
		HACCP	0.0% 0	0.0% 0	0.0% 0	50.0% 1	0.0% 0	0.0% 0		0.0% 0		0.0% 0	0.0% 0	
		Cecal (Beef)												
	Swine	Cecal (Dairy)												0.0% 0
		Retail Pork Chops												
		Cecal (Market Swine)												0.0% 0
	Cecal (Sows)											0.0% 0		
6. At Least ACT/S ³ Resistant	Humans	0.4% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
	Chickens	Retail Chickens	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Cecal											0.0% 0	0.0% 0
	Turkeys	Retail Ground Turkey	0.0% 0					0.0% 0			0.0% 0	0.0% 0	0.0% 0	
		HACCP				0.0% 0		0.0% 0		0.0% 0		0.0% 0	0.0% 0	0.0% 0
		Cecal											0.0% 0	
	Cattle	Retail Ground Beef	0.0% 0					0.0% 0		0.0% 0				
		HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0		0.0% 0	0.0% 0	
		Cecal (Beef)												
	Swine	Cecal (Dairy)												0.0% 0
		Retail Pork Chops												
		Cecal (Market Swine)												0.0% 0
	Cecal (Sows)											0.0% 0		

¹ Starting in 2011, testing included nine antimicrobial classes with the addition of the macrolide azithromycin. Because resistance to azithromycin is low (in this case, <1%), antimicrobial class resistance data from 2011 and beyond are comparable to the data from previous years.

² ACSSuT = ampicillin, chloramphenicol, streptomycin, sulfamethoxazole/sulfisoxazole, and tetracycline

³ ACT/S = ampicillin, chloramphenicol, and trimethoprim-sulfamethoxazole

Table 28c. Resistance Patterns among *Salmonella* Enteritidis Isolates, 2003-2014

Year	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014			
Number of Isolates Tested	Humans		257	271	384	412	385	442	410	513	391	364	382	438	
	Chickens	Retail Chickens	3	3	12	17	13	30	27	28	21	26	25	27	
		HACCP	42	84	173	188	124	116	118	152	134	203	79	130	
		Cecal											6	17	
	Turkeys	Retail Ground Turkey	1	0	0	0	0	2	0	0	1	4	2	0	
		HACCP	0	0	0	3	0	1	0	1	0	1	1	5	
		Cecal											1	0	
	Cattle	Retail Ground Beef	1	0	0	0	0	1	0	1	0	0	0	0	
		HACCP	3	2	2	2	4	5	0	1	0	1	1	0	
		Cecal (Beef)											0	0	
		Cecal (Dairy)											0	1	
	Swine	Retail Pork Chops	0	0	0	0	0	0	0	0	0	0	0	0	
		Cecal (Market Swine)											0	1	
		Cecal (Sows)											1	0	
Resistance Pattern	Source														
7. At Least ACSSuTAuCx¹ Resistant	Humans		0.0% 0	0.0% 0	0.3% 1	0.0% 0	0.3% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.2% 1	
	Chickens	Retail Chickens	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
		HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
		Cecal											0.0% 0	0.0% 0	
	Turkeys	Retail Ground Turkey	0.0% 0					0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0		
		HACCP				0.0% 0		0.0% 0		0.0% 0		0.0% 0	0.0% 0	0.0% 0	
		Cecal											0.0% 0		
	Cattle	Retail Ground Beef	0.0% 0					0.0% 0		0.0% 0					
		HACCP	0.0% 0	0.0% 0	0.0% 0	50.0% 1	0.0% 0	0.0% 0		0.0% 0		0.0% 0	0.0% 0		
		Cecal (Beef)													
		Cecal (Dairy)												0.0% 0	
	Swine	Retail Pork Chops													
		Cecal (Market Swine)												0.0% 0	
		Cecal (Sows)											0.0% 0		
	8. At Least Ceftriaxone and Nalidixic Acid Resistant	Humans		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.3% 1	0.2% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.3% 1	0.2% 1
		Chickens	Retail Chickens	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
HACCP			0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
Cecal													0.0% 0	0.0% 0	
Turkeys		Retail Ground Turkey	0.0% 0					0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0		
		HACCP				0.0% 0		0.0% 0		0.0% 0		0.0% 0	0.0% 0	0.0% 0	
		Cecal											0.0% 0		
Cattle		Retail Ground Beef	0.0% 0					0.0% 0		0.0% 0					
		HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0		0.0% 0	0.0% 0		
		Cecal (Beef)													
		Cecal (Dairy)												0.0% 0	
Swine		Retail Pork Chops													
		Cecal (Market Swine)												0.0% 0	
		Cecal (Sows)											0.0% 0		

¹ ACSSuTAuCx = ACSSuT, amoxicillin-clavulanic acid, and ceftriaxone

Table 29b. Antimicrobial Resistance among *Salmonella* Typhimurium Isolates, 2003-2014

Year			2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014			
Number of Isolates Tested	Humans		394	409	382	438	408	405	396	370	359	323	296	325	262			
		Chickens	Retail Chickens	9	22	49	29	21	25	68	122	79	66	88	68	38		
			HACCP Cecal	150 9	156 22	171 49	183 29	105 21	83 25	70 68	36 122	54 79	30 66	105 88	55 68	81 15		
	Turkeys	Retail Ground Turkey	2	2	2	1	0	1	1	1	1	6	8	9	1	2		
		HACCP Cecal	9 0	6 0	14 0	7 0	5 0	6 0	3 0	2 0	4 0	2 0	4 0	5 0	3 0			
		Cattle	Retail Ground Beef	2	1	0	0	1	3	2	0	0	0	1	0	3		
	Cattle	HACCP Cecal (Beef) Cecal (Dairy)	98 0 0	78 0 0	48 0 0	34 0 0	22 1 0	26 3 0	28 2 0	18 0 0	15 0 0	14 0 0	16 0 0	23 14 21	14 4 10			
		Swine	Retail Pork Chops	2	1	2	2	2	3	3	1	5	7	6	4	1		
			Cecal (Market Swine) Cecal (Sows)	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 4	0 21		
															6			
	Antimicrobial Class	Antimicrobial (Resistance Breakpoint)	Isolate Source															
Cepheids	Cefoxitin (MIC ≥ 32 µg/ml)	Humans		4.3%	4.6%	4.7%	2.5%	3.9%	5.7%	3.5%	5.4%	3.3%	6.8%	5.4%	3.4%	5.3%		
			Chickens	Retail Chickens	17	19	18	11	16	23	14	20	12	22	16	11	14	
				HACCP Cecal	3 0	14 0	24 0	15 1	11 0	10 0	31 0	58 0	41 0	23 0	40 0	30 0	16 0	
		Turkeys	Retail Ground Turkey	0.0%	100.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	50.0%	50.0%	11.1%	0.0%	0.0%	
			HACCP Cecal	22.2% 0	16.7% 0	14.3% 0	0.0% 0	0.0% 0	16.7% 0	0.0% 0	50.0% 0	0.0% 0	0.0% 0	50.0% 0	0.0% 0	66.7% 0		
			Cattle	Retail Ground Beef	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
		Cattle	HACCP Cecal (Beef) Cecal (Dairy)	11.2% 0 0	16.7% 0 0	25.0% 0 0	35.3% 0 0	27.3% 0 0	26.9% 0 0	17.9% 0 0	22.2% 0 0	20.0% 0 0	35.7% 0 0	12.5% 0 0	30.4% 3 11	0.0% 0 3	0.0% 0 30.0%	
			Swine	Retail Pork Chops	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
				Cecal (Market Swine) Cecal (Sows)	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
		Ceftiofur (MIC ≥ 8 µg/ml)	Humans		4.3%	5.1%	4.5%	2.5%	4.2%	6.4%	3.5%	6.5%	4.7%	6.8%	5.7%	3.4%	5.3%	
				Chickens	Retail Chickens	17	21	17	11	17	26	14	24	17	22	17	11	14
	HACCP Cecal				3 0	14 0	24 0	15 1	12 0	11 0	33 0	69 0	48 0	36 0	49 0	34 0	18 0	
	Turkeys		Retail Ground Turkey	0.0%	100.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	50.0%	50.0%	22.2%	0.0%	0.0%	
			HACCP Cecal	22.2% 0	16.7% 0	14.3% 0	0.0% 0	0.0% 0	16.7% 0	0.0% 0	50.0% 0	0.0% 0	0.0% 0	50.0% 0	0.0% 0	66.7% 0		
			Cattle	Retail Ground Beef	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
	Cattle		HACCP Cecal (Beef) Cecal (Dairy)	15.3% 0 0	20.5% 0 0	25.0% 0 0	35.3% 0 0	27.3% 0 0	26.9% 0 0	21.4% 0 0	27.8% 0 0	20.0% 0 0	35.7% 0 0	12.5% 0 0	30.4% 7 11	0.0% 0 3	0.0% 0 30.0%	
			Swine	Retail Pork Chops	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
				Cecal (Market Swine) Cecal (Sows)	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	4.8% 0	7.7% 0	1 0
	Ceftriaxone (MIC ≥ 4 µg/ml)		Humans		4.3%	5.1%	4.5%	2.5%	4.2%	6.4%	3.5%	6.5%	4.7%	6.8%	5.7%	3.4%	5.3%	
				Chickens	Retail Chickens	17	21	17	11	17	26	14	24	17	22	17	11	14
		HACCP Cecal			3 0	14 0	24 0	15 1	12 0	11 0	33 0	70 0	48 0	36 0	49 0	34 0	18 0	
		Turkeys	Retail Ground Turkey	0.0%	100.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	50.0%	62.5%	22.2%	0.0%	0.0%	
			HACCP Cecal	22.2% 0	16.7% 0	14.3% 0	0.0% 0	0.0% 0	16.7% 0	0.0% 0	50.0% 0	0.0% 0	0.0% 0	50.0% 0	0.0% 0	66.7% 0		
			Cattle	Retail Ground Beef	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
		Cattle	HACCP Cecal (Beef) Cecal (Dairy)	15.3% 0 0	20.5% 0 0	25.0% 0 0	35.3% 0 0	27.3% 0 0	26.9% 0 0	21.4% 0 0	27.8% 0 0	20.0% 0 0	35.7% 0 0	12.5% 0 0	30.4% 7 11	0.0% 0 3	0.0% 0 30.0%	
			Swine	Retail Pork Chops	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
				Cecal (Market Swine) Cecal (Sows)	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	4.8% 0	7.7% 0	1 0

Table 29d. Antimicrobial Resistance among *Salmonella* Typhimurium Isolates, 2003-2014

Year		2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014				
Number of Isolates Tested	Humans	394	409	382	438	408	405	396	370	359	323	296	325	262				
	Chickens	Retail Chickens	9	22	49	29	21	25	68	122	79	66	88	68	38			
		HACCP	150	156	171	183	105	83	70	36	54	30	105	55	81			
		Cecal												15	27			
	Turkeys	Retail Ground Turkey	2	2	2	1	0	1	1	1	6	8	9	1	2			
		HACCP	9	6	14	7	5	6	3	2	4	2	4	5	3			
		Cecal												2	2			
	Cattle	Retail Ground Beef	2	1	0	0	1	3	2	0	0	0	1	0	3			
		HACCP	98	78	48	34	22	26	28	18	15	14	16	23	14			
		Cecal (Beef)												14	4			
	Swine	Retail Pork Chops		1	2	2	2	3	3	1	5	7	6	4	1			
		Cecal (Market Swine)												21	13			
		Cecal (Sows)												4	6			
	Antimicrobial Class	Antimicrobial (Resistance Breakpoint)	Isolate Source															
Penicillins	Ampicillin (MIC \geq 32 μ g/ml)	Humans	33.8%	36.4%	32.2%	29.0%	28.2%	31.6%	26.3%	28.1%	26.2%	26.0%	23.6%	16.6%	19.8%			
		Chickens	Retail Chickens	133	149	123	127	115	128	104	104	94	84	70	54	52		
			HACCP	3	16	26	16	12	12	41	83	55	44	50	38	19		
			Cecal	45.3%	32.1%	46.8%	26.8%	42.9%	37.3%	28.6%	33.3%	35.2%	10.0%	27.6%	10.9%	16.0%		
		Turkeys	Retail Ground Turkey	0	100.0%	50.0%	100.0%		100.0%	0.0%	0.0%	66.7%	87.5%	44.4%	100.0%	50.0%		
			HACCP	55.6%	66.7%	28.6%	57.1%	80.0%	83.3%	33.3%	50.0%	50.0%	0.0%	75.0%	20.0%	66.7%		
			Cecal												20.0%	18.5%		
		Cattle	Retail Ground Beef	0	0			100.0%	0	50.0%				0		0		
			HACCP	71.4%	59.0%	60.4%	73.5%	63.6%	61.5%	50.0%	83.3%	53.3%	57.1%	37.5%	39.1%	3.7%		
			Cecal (Beef)												57.1%	25.0%		
		Swine	Retail Pork Chops	50.0%	100.0%	50.0%	100.0%	100.0%	0	0	100.0%	20.0%	28.6%	16.7%	75.0%	100.0%		
			Cecal (Market Swine)												66.7%	53.8%		
			Cecal (Sows)												50.0%	66.7%		
		Phenicol	Chloramphenicol (MIC \geq 32 μ g/ml)	Humans	23.4%	28.4%	24.3%	24.4%	22.1%	25.4%	23.5%	20.5%	20.3%	19.8%	18.2%	13.5%	16.0%	
				Chickens	Retail Chickens	0	9.1%	4.1%	3.4%	0.0%	0.0%	0.0%	0.0%	3.8%	0.0%	0.0%	0.0%	0.0%
					HACCP	16.0%	5.1%	1.8%	8.2%	7.6%	1.2%	1.4%	0.0%	3.7%	0.0%	0.0%	0.0%	2.5%
Cecal															0.0%	0.0%		
Turkeys	Retail Ground Turkey			0	50.0%	50.0%	0		100.0%	0	0	16.7%	0	0	100.0%	0		
	HACCP			66.7%	50.0%	28.6%	57.1%	60.0%	66.7%	33.3%	0	50.0%	0	25.0%	0	0		
	Cecal														0	0		
Cattle	Retail Ground Beef			0	0			100.0%	0	50.0%				0		0		
	HACCP			49.0%	42.3%	54.2%	47.1%	50.0%	65.4%	35.7%	66.7%	46.7%	42.9%	43.8%	30.4%	1.2%		
	Cecal (Beef)														28.6%	0		
Swine	Retail Pork Chops			50.0%	100.0%	100.0%	100.0%	0	0	0	100.0%	60.0%	28.6%	0	75.0%	0		
	Cecal (Market Swine)														28.6%	46.2%		
	Cecal (Sows)														25.0%	50.0%		
Quinolones	Ciprofloxacin (MIC \geq 1 μ g/ml)			Humans	0.0%	0.0%	0.0%	0.2%	0.2%	0.0%	0.0%	0.8%	0.0%	0.0%	0.3%	0.0%	0.4%	
				Chickens	Retail Chickens	0	0	0	0	0	0	0	0	0	0	0	0	0
					HACCP	0.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
		Cecal													0.0%	0.0%		
		Turkeys	Retail Ground Turkey	0	0	0	0		0	0	0	0	0	0	0	0		
			HACCP	0	0	0	0	0	0	0	0	0	0	0	0	0		
			Cecal												0	0		
		Cattle	Retail Ground Beef	0	0			0	0	0				0		0		
			HACCP	0	0	0	0	0	0	0	0	0	0	0	0	0		
			Cecal (Beef)												0	0		
		Swine	Retail Pork Chops	0	0	0	0	0	0	0	0	0	0	0	0	0		
			Cecal (Market Swine)												4.8%	0		
			Cecal (Sows)												1	0		

Table 29e. Antimicrobial Resistance among *Salmonella* Typhimurium Isolates, 2003-2014

Year		2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014		
Number of Isolates Tested	Humans	394	409	382	438	408	405	396	370	359	323	296	325	262		
	Chickens	Retail Chickens	9	22	49	29	21	25	68	122	79	66	88	68	38	
		HACCP	150	156	171	183	105	83	70	36	54	30	105	55	81	
		Cecal												15	27	
	Turkeys	Retail Ground Turkey	2	2	2	1	0	1	1	1	6	8	9	1	2	
		HACCP	9	6	14	7	5	6	3	2	4	2	4	5	3	
		Cecal												2	2	
	Cattle	Retail Ground Beef	2	1	0	0	1	3	2	0	0	0	1	0	3	
		HACCP	98	78	48	34	22	26	28	18	15	14	16	23	14	
		Cecal (Beef) Cecal (Dairy)												14	4	
	Swine	Retail Pork Chops		1	2	2	2	3	3	1	5	7	6	4	1	
		Cecal (Market Swine)												21	13	
		Cecal (Sows)												4	6	
	Antimicrobial Class	Antimicrobial (Resistance Breakpoint)	Isolate Source													
	Quinolones	Nalidixic Acid (MIC ≥ 32 µg/ml)	Humans	1.3%	1.2%	0.5%	0.9%	0.7%	1.5%	1.0%	2.2%	1.4%	0.3%	1.7%	1.5%	2.7%
Chickens			Retail Chickens	5	5	2	4	3	6	4	8	5	1	5	5	7
			HACCP	0	0	0	0	0	0	0	0	0	0	0	0	0
			Cecal	2.7%	0.0%	0.0%	1.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Turkeys			Retail Ground Turkey	0.0%	50.0%	0.0%	0.0%		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
			HACCP	0	1	0	0	0	0	0	0	0	0	0	0	0
			Cecal	1.0%	0.0%	6.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Cattle			Retail Ground Beef	0.0%	0.0%			0.0%	0.0%	0.0%				0.0%		0.0%
			HACCP	0	0			0	0	0				0		0
			Cecal (Beef)	1.0%	0.0%	6.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	6.2%	8.7%	0.0%
			Cecal (Dairy)	1	0	3	0	0	0	0	0	0	0	1	2	0
Swine			Retail Pork Chops	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
			Cecal (Market Swine)	0	0	0	0	0	0	0	0	0	0	0	0	0
			Cecal (Sows)												4.8%	0.0%
															1	0
													0.0%	0.0%		
													0	0		
Tetracyclines	Tetracycline (MIC ≥ 16 µg/ml)	Humans	32.0%	38.1%	30.4%	30.4%	31.6%	36.8%	27.8%	28.9%	29.0%	27.2%	27.0%	21.2%	22.5%	
		Chickens	Retail Chickens	126	156	116	133	129	149	110	107	104	88	80	69	59
			HACCP	44.4%	31.8%	71.4%	69.0%	90.5%	72.0%	92.6%	95.9%	92.4%	92.4%	88.6%	92.7%	97.4%
			Cecal	4	7	35	20	19	18	63	117	73	61	78	63	37
		Turkeys	Retail Ground Turkey	28.0%	33.3%	44.4%	34.4%	61.0%	60.2%	64.3%	55.6%	72.2%	66.7%	81.9%	74.5%	77.8%
			HACCP	42	52	76	63	64	50	45	20	39	20	86	41	63
			Cecal												93.3%	92.6%
		Cattle	Retail Ground Turkey	0.0%	50.0%	100.0%	0.0%		100.0%	0.0%	100.0%	66.7%	87.5%	44.4%	100.0%	100.0%
			HACCP	0	1	2	0		1	0	1	4	7	4	1	2
			Cecal	77.8%	100.0%	78.6%	57.1%	100.0%	66.7%	66.7%	50.0%	50.0%	0.0%	75.0%	40.0%	100.0%
		Swine	Retail Pork Chops												100.0%	100.0%
			Cecal (Market Swine)												2	3
			Cecal (Sows)												100.0%	100.0%
															2	2
		Cattle	Retail Ground Beef	0.0%	0.0%			100.0%	0.0%	50.0%				0.0%		0.0%
HACCP	0		0			1	0	1				0		0		
Cecal (Beef)	64.3%		53.8%	60.4%	67.6%	54.5%	65.4%	50.0%	88.9%	60.0%	57.1%	62.5%	39.1%	3.7%		
Swine	Retail Pork Chops	63	42	29	23	12	17	14	16	9	8	10	9	3		
	Cecal (Market Swine)												71.4%	25.0%		
	Cecal (Sows)												10	1		
													66.7%	90.0%		
													14	9		
													75.0%	100.0%		
													3	1		
													61.9%	69.2%		
													13	9		
													75.0%	66.7%		
													3	4		

Table 30c. Resistance Patterns among *Salmonella* Typhimurium Isolates, 2003-2014

Year		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
Number of Isolates Tested	Humans	409	382	438	408	405	396	370	359	323	296	325	262	
	Chickens	Retail Chickens	22	49	29	21	25	68	122	79	66	88	68	38
		HACCP	156	171	183	105	83	70	36	54	30	105	55	81
		Cecal											15	27
	Turkeys	Retail Ground Turkey	2	2	1	0	1	1	1	6	8	9	1	2
		HACCP	6	14	7	5	6	3	2	4	2	4	5	3
		Cecal											2	2
	Cattle	Retail Ground Beef	1	0	0	1	3	2	0	0	0	1	0	3
		HACCP	78	48	34	22	26	28	18	15	14	16	23	14
		Cecal (Beef)											14	4
		Cecal (Dairy)											21	10
	Swine	Retail Pork Chops	1	2	2	2	3	3	1	5	7	6	4	1
		HACCP ¹	27	53	42	25	44	10	20	13	5	0	0	0
Cecal (Market Swine)												21	13	
	Cecal (Sows)											4	6	
Resistance Pattern	Source													
7. At Least ACSSuTAuCx ¹ Resistant	Humans	2.4% 10	2.6% 10	1.8% 8	2.9% 12	3.7% 15	2.3% 9	1.6% 6	1.7% 6	5.3% 17	4.1% 12	2.2% 7	4.2% 11	
	Chickens	Retail Chickens	0.0% 0	4.1% 2	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		HACCP	0.6% 1	0.0% 0	1.1% 2	0.0% 0	0.0% 0	0.0% 0	0.0% 0	1.9% 1	0.0% 0	0.0% 0	0.0% 0	1.2% 1
		Cecal											0.0% 0	0.0% 0
	Turkeys	Retail Ground Turkey	50.0% 1	0.0% 0	0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		HACCP	16.7% 1	14.2% 2	0.0% 0	0.0% 0	16.7% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Cecal											0.0% 0	0.0% 0
	Cattle	Retail Ground Beef	0.0% 0			0.0% 0	0.0% 0	0.0% 0				0.0% 0		0.0% 0
		HACCP	12.8% 10	20.8% 10	26.5% 9	22.7% 5	26.9% 7	21.4% 6	16.7% 3	20.0% 3	35.7% 5	12.5% 2	30.4% 7	0.0% 0
		Cecal (Beef)											14.3% 2	0.0% 0
		Cecal (Dairy)											52.4% 11	50.0% 3
	Swine	Retail Pork Chops	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Cecal (Market Swine)											0.0% 0	7.7% 1
Cecal (Sows)												0.0% 0	33.3% 2	
8. At Least Ceftriaxone and Nalidixic Acid Resistant	Humans	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.2% 1	0.0% 0	0.5% 2	0.3% 1	0.0% 0	0.7% 2	0.0% 0	0.4% 1	
	Chickens	Retail Chickens	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		HACCP	0.0% 0	0.0% 0	0.5% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Cecal											0.0% 0	0.0% 0
	Turkeys	Retail Ground Turkey	50.0% 1	0.0% 0	0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		HACCP	16.7% 1	14.3% 2	0.0% 0	0.0% 0	16.7% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Cecal											0.0% 0	0.0% 0
	Cattle	Retail Ground Beef	0.0% 0			0.0% 0	0.0% 0	0.0% 0				0.0% 0		0.0% 0
		HACCP	0.0% 0	4.2% 2	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	8.7% 2	0.0% 0
		Cecal (Beef)											0.0% 0	0.0% 0
		Cecal (Dairy)											0.0% 0	0.0% 0
	Swine	Retail Pork Chops	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Cecal (Market Swine)											0.0% 0	0.0% 0
Cecal (Sows)												0.0% 0	0.0% 0	

¹ ACSSuTAuCx = ACSSuT, amoxicillin-clavulanic acid, and ceftriaxone

Resistance by Year

Table 31a. Antimicrobial Resistance among *Salmonella* Newport Isolates, 2003-2014

Year		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014		
Number of Isolates Tested	Humans	226	192	207	219	222	258	239	306	285	258	209	235		
	Chickens	Retail Chickens	0	0	0	0	0	0	1	0	0	1	2	0	
		HACCP	7	0	6	0	3	1	0	1	1	2	2	2	
		Cecal											0	0	
	Turkeys	Retail Ground Turkey	2	2	3	0	0	3	3	2	0	2	0	0	
		HACCP	19	7	5	4	15	8	3	5	4	4	4	6	
		Cecal											0	0	
	Cattle	Retail Ground Beef	1	2	0	0	0	3	2	2	0	1	0	2	
		HACCP	75	44	27	30	30	31	17	5	13	5	13	17	
		Cecal (Beef)											8	1	
		Cecal (Dairy)											7	15	
	Swine	Retail Pork Chops	1	0	0	0	0	0	0	0	0	0	0	0	
		Cecal (Market Swine)											3	5	
		Cecal (Sows)											4	1	
Antimicrobial Class	Antimicrobial (Resistance Breakpoint)	Isolate Source													
Aminoglycosides	Gentamicin (MIC ≥ 16 µg/ml)	Humans	3.1% 7	0.5% 1	1.0% 2	0.9% 2	0.9% 2	0.4% 1	0.4% 1	0.3% 1	0.7% 2	0.0% 0	0.5% 1	0.4% 1	
		Chickens	Retail Chickens							0.0% 0			0.0% 0	0.0% 0	
			HACCP	0.0% 0		16.7% 1		0.0% 0	0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
			Cecal												
		Turkeys	Retail Ground Turkey	50.0% 1	0.0% 0	0.0% 0			33.3% 1	33.3% 1	50.0% 1		50.0% 1		
			HACCP	52.6% 10	14.3% 1	80.0% 4	50.0% 2	0.0% 0	25.0% 2	66.7% 2	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
			Cecal												
		Cattle	Retail Ground Beef	0.0% 0	0.0% 0				0.0% 0	0.0% 0	0.0% 0		0.0% 0		0.0% 0
			HACCP	1.3% 1	0.0% 0	0.0% 0	3.3% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
			Cecal (Beef)											0.0% 0	0.0% 0
			Cecal (Dairy)											0.0% 0	0.0% 0
		Swine	Retail Pork Chops	0.0% 0											
			Cecal (Market Swine)											0.0% 0	0.0% 0
			Cecal (Sows)											0.0% 0	0.0% 0
	Streptomycin (MIC ≥ 64 µg/ml)	Humans	24.3% 55	16.1% 31	14.0% 29	14.2% 31	10.4% 23	13.6% 35	8.4% 20	8.5% 26	4.2% 12	3.9% 10	5.7% 12	4.7% 11	
		Chickens	Retail Chickens							0.0% 0			0.0% 0	0.0% 0	
			HACCP	85.7% 6		50.0% 3		0.0% 0	100.0% 1		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
			Cecal												
		Turkeys	Retail Ground Turkey	50.0% 1	0.0% 0	0.0% 0			33.3% 1	33.3% 1	50.0% 1		50.0% 1		
			HACCP	31.6% 6	14.3% 1	80.0% 4	0.0% 0	6.7% 1	25.0% 2	66.7% 2	0.0% 0	0.0% 0	25.0% 1	0.0% 0	0.0% 0
			Cecal												
		Cattle	Retail Ground Beef	100.0% 1	100.0% 2				66.7% 2	0.0% 0	100.0% 2		0.0% 0		100.0% 2
			HACCP	84.0% 63	84.1% 37	81.5% 22	83.3% 25	83.3% 25	74.2% 23	70.6% 12	60.0% 3	76.9% 10	80.0% 4	76.9% 10	52.9% 9
			Cecal (Beef)											75.0% 6	0.0% 0
			Cecal (Dairy)											71.4% 5	53.3% 8
		Swine	Retail Pork Chops	100.0% 1											
Cecal (Market Swine)												66.7% 2	20.0% 1		
Cecal (Sows)												0.0% 0	0.0% 0		
β-Lactam/β-Lactamase Inhibitor Combinations	Amoxicillin-Clavulanic Acid (MIC ≥ 32 / 16 µg/ml)	Humans	21.7% 49	15.6% 30	12.6% 26	12.8% 28	8.1% 18	12.4% 32	7.5% 18	7.8% 24	3.9% 11	6.2% 16	5.3% 11	3.0% 7	
		Chickens	Retail Chickens							0.0% 0			0.0% 0	0.0% 0	
			HACCP	85.7% 6		50.0% 3		0.0% 0	100.0% 1		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
			Cecal												
		Turkeys	Retail Ground Turkey	0.0% 0	0.0% 0	0.0% 0			0.0% 0	0.0% 0	0.0% 0		50.0% 1		
			HACCP	10.5% 2	14.3% 1	0.0% 0	25.0% 1	6.7% 1	25.0% 2	33.3% 1	20.0% 1	25.0% 1	0.0% 0	0.0% 0	0.0% 0
			Cecal												
		Cattle	Retail Ground Beef	100.0% 1	100.0% 2				66.7% 2	0.0% 0	50.0% 1		0.0% 0		100.0% 2
			HACCP	81.3% 61	77.3% 34	81.5% 22	76.7% 23	76.7% 23	64.5% 20	58.8% 10	60.0% 3	76.9% 10	40.0% 2	76.9% 10	52.9% 9
			Cecal (Beef)											75.0% 6	0.0% 0
			Cecal (Dairy)											71.4% 5	53.3% 8
		Swine	Retail Pork Chops	100.0% 1											
			Cecal (Market Swine)											33.3% 1	20.0% 1
			Cecal (Sows)											0.0% 0	0.0% 0

Table 31b. Antimicrobial Resistance among *Salmonella* Newport Isolates, 2003-2014

Year		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014		
Number of Isolates Tested	Humans	226	192	207	219	222	258	239	306	285	258	209	235		
	Chickens	Retail Chickens	0	0	0	0	0	0	1	0	0	1	2	0	
		HACCP	7	0	6	0	3	1	0	1	1	2	2	2	
		Cecal											0	0	
	Turkeys	Retail Ground Turkey	2	2	3	0	0	3	3	2	0	2	0	0	
		HACCP	19	7	5	4	15	8	3	5	4	4	4	6	
		Cecal											0	0	
	Cattle	Retail Ground Beef	1	2	0	0	0	3	2	2	0	1	0	2	
		HACCP	75	44	27	30	30	31	17	5	13	5	13	17	
		Cecal (Beef)											8	1	
	Swine	Cecal (Dairy)											7	15	
		Retail Pork Chops	1	0	0	0	0	0	0	0	0	0	0	0	
		Cecal (Market Swine)											3	5	
		Cecal (Sows)											4	1	
Antimicrobial Class	Antimicrobial (Resistance Breakpoint)	Isolate Source													
Cephems	Cefoxitin (MIC ≥ 32 µg/ml)	Humans	21.7% 49	15.6% 30	12.6% 26	13.2% 29	8.1% 18	12.4% 32	6.7% 16	7.5% 23	3.9% 11	6.2% 16	5.3% 11	3.0% 7	
		Chickens	Retail Chickens							0.0% 0			0.0% 0	0.0% 0	
			HACCP	71.4% 5		50.0% 3		0.0% 0	100.0% 1		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
			Cecal												
		Turkeys	Retail Ground Turkey	0.0% 0	0.0% 0	0.0% 0			0.0% 0	0.0% 0	0.0% 0		50.0% 1		
			HACCP	10.5% 2	14.3% 1	0.0% 0	25.0% 1	6.7% 1	25.0% 2	33.3% 1	20.0% 1	25.0% 1	0.0% 0	0.0% 0	0.0% 0
			Cecal												
		Cattle	Retail Ground Beef	100.0% 1	100.0% 2				66.7% 2	0.0% 0	50.0% 1		0.0% 0		100.0% 2
			HACCP	74.7% 56	77.3% 34	81.5% 22	70.0% 21	76.7% 23	64.5% 20	52.9% 6	60.0% 3	76.9% 10	40.0% 2	76.9% 10	52.9% 9
			Cecal (Beef)											75.0% 6	0.0% 0
		Swine	Cecal (Dairy)											71.4% 5	53.3% 8
			Retail Pork Chops	100.0% 1											
			Cecal (Market Swine)											33.3% 1	20.0% 1
			Cecal (Sows)										0.0% 0	0.0% 0	
Cephems	Ceftiofur (MIC ≥ 8 µg/ml)	Humans	22.1% 50	15.6% 30	12.6% 26	12.8% 28	8.1% 18	12.4% 32	7.1% 17	7.5% 23	3.9% 11	6.2% 16	5.3% 11	3.0% 7	
		Chickens	Retail Chickens							0.0% 0			0.0% 0	0.0% 0	0.0% 0
			HACCP	85.7% 6		50.0% 3		0.0% 0	100.0% 1		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
			Cecal												
		Turkeys	Retail Ground Turkey	0.0% 0	0.0% 0	0.0% 0			0.0% 0	0.0% 0	0.0% 0		50.0% 1		
			HACCP	10.5% 2	14.3% 1	0.0% 0	25.0% 1	6.7% 1	25.0% 2	33.3% 1	20.0% 1	25.0% 1	0.0% 0	0.0% 0	0.0% 0
			Cecal												
		Cattle	Retail Ground Beef	100.0% 1	100.0% 2				66.7% 2	0.0% 0	50.0% 1		0.0% 0		100.0% 2
			HACCP	81.3% 61	77.3% 34	81.5% 22	76.7% 23	76.7% 23	64.5% 20	58.8% 10	60.0% 3	76.9% 10	40.0% 2	76.9% 10	52.9% 9
			Cecal (Beef)											75.0% 6	0.0% 0
		Swine	Cecal (Dairy)											71.4% 5	53.3% 8
			Retail Pork Chops	100.0% 1											
			Cecal (Market Swine)											33.3% 1	20.0% 1
			Cecal (Sows)										0.0% 0	0.0% 0	
Cephems	Ceftriaxone (MIC ≥ 4 µg/ml)	Humans	21.7% 49	15.1% 29	12.6% 26	12.8% 28	8.1% 18	12.4% 32	7.1% 17	7.5% 23	3.9% 11	6.2% 16	5.3% 11	3.0% 7	
		Chickens	Retail Chickens							0.0% 0			0.0% 0	0.0% 0	0.0% 0
			HACCP	85.7% 6		50.0% 3		0.0% 0	100.0% 1		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
			Cecal												
		Turkeys	Retail Ground Turkey	0.0% 0	0.0% 0	0.0% 0			0.0% 0	0.0% 0	0.0% 0		50.0% 1		
			HACCP	10.5% 2	14.3% 1	0.0% 0	25.0% 1	6.7% 1	25.0% 2	33.3% 1	20.0% 1	25.0% 1	0.0% 0	0.0% 0	0.0% 0
			Cecal												
		Cattle	Retail Ground Beef	100.0% 1	100.0% 2				66.7% 2	0.0% 0	50.0% 1		0.0% 0		100.0% 2
			HACCP	81.3% 61	77.3% 34	81.5% 22	76.7% 23	76.7% 23	64.5% 20	58.8% 10	60.0% 3	76.9% 10	40.0% 2	76.9% 10	52.9% 9
			Cecal (Beef)											75.0% 6	0.0% 0
		Swine	Cecal (Dairy)											71.4% 5	53.3% 8
			Retail Pork Chops	100.0% 1											
			Cecal (Market Swine)											33.3% 1	20.0% 1
			Cecal (Sows)										0.0% 0	0.0% 0	

Table 31c. Antimicrobial Resistance among *Salmonella* Newport Isolates, 2003-2014

Year		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014		
Number of Isolates Tested	Humans	226	192	207	219	222	258	239	306	285	258	209	235		
	Chickens	Retail Chickens	0	0	0	0	0	0	1	0	0	1	2	0	
		HACCP	7	0	6	0	3	1	0	1	1	2	2	2	
		Cecal											0	0	
	Turkeys	Retail Ground Turkey	2	2	3	0	0	3	3	2	0	2	0	0	
		HACCP	19	7	5	4	15	8	3	5	4	4	4	6	
		Cecal											0	0	
	Cattle	Retail Ground Beef	1	2	0	0	0	3	2	2	0	1	0	2	
		HACCP	75	44	27	30	30	31	17	5	13	5	13	17	
		Cecal (Beef)											8	1	
	Swine	Cecal (Dairy)											7	15	
		Retail Pork Chops	1	0	0	0	0	0	0	0	0	0	0	0	
		Cecal (Market Swine)											3	5	
		Cecal (Sows)											4	1	
Antimicrobial Class	Antimicrobial (Resistance Breakpoint)	Isolate Source													
Folate Pathway Inhibitor	Sulfamethoxazole/ Sulfisoxazole ¹ (MIC ≥ 512 µg/ml)	Humans	24.8% 56	17.2% 33	15.5% 32	15.5% 34	10.4% 23	13.2% 34	8.8% 21	7.8% 24	4.6% 13	3.9% 10	4.8% 10	4.7% 11	
		Chickens	Retail Chickens							0.0% 0			0.0% 0	0.0% 0	0.0% 0
			HACCP	71.4% 5		50.0% 3		0.0% 0	100.0% 1		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
			Cecal												
		Turkeys	Retail Ground Turkey	50.0% 1	0.0% 0	0.0% 0			33.3% 1	33.3% 1	50.0% 1		50.0% 1		
			HACCP	52.6% 10	14.3% 1	80.0% 4	75.0% 3	0.0% 0	37.5% 3	100.0% 3	0.0% 0	25.0% 1	25.0% 1	0.0% 0	0.0% 0
			Cecal												
		Cattle	Retail Ground Beef	100.0% 1	100.0% 2				66.7% 2	0.0% 0	100.0% 2		0.0% 0		100.0% 2
			HACCP	73.3% 55	77.3% 34	85.2% 23	83.3% 25	83.3% 25	74.2% 23	70.6% 12	60.0% 3	76.9% 10	80.0% 4	76.9% 10	47.1% 8
			Cecal (Beef)											75.0% 6	0.0% 0
			Cecal (Dairy)											71.4% 5	53.3% 8
		Swine	Retail Pork Chops	100.0% 1											
			Cecal (Market Swine)											33.3% 1	20.0% 1
			Cecal (Sows)											0.0% 0	0.0% 0
	Trimethoprim- Sulfamethoxazole (MIC ≥ 4 / 76 µg/ml)	Humans	1.3% 3	2.1% 4	1.9% 4	3.7% 8	1.8% 4	3.1% 8	1.3% 3	1.3% 4	0.0% 0	0.4% 1	0.5% 1	0.4% 1	
		Chickens	Retail Chickens							0.0% 0			0.0% 0	0.0% 0	0.0% 0
			HACCP	0.0% 0		16.7% 1		0.0% 0	100.0% 1		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
			Cecal												
		Turkeys	Retail Ground Turkey	0.0% 0	0.0% 0	0.0% 0			0.0% 0	0.0% 0	0.0% 0		0.0% 0		
			HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
			Cecal												
		Cattle	Retail Ground Beef	0.0% 0	50.0% 1				0.0% 0	0.0% 0	0.0% 0		0.0% 0		0.0% 0
			HACCP	0.0% 0	11.4% 5	25.9% 7	16.7% 5	13.3% 4	12.9% 4	0.0% 0	20.0% 1	7.7% 1	0.0% 0	15.4% 2	5.9% 1
			Cecal (Beef)											0.0% 0	0.0% 0
			Cecal (Dairy)											0.0% 0	0.0% 0
		Swine	Retail Pork Chops	0.0% 0											
			Cecal (Market Swine)											0.0% 0	0.0% 0
			Cecal (Sows)											0.0% 0	0.0% 0
Macrolides	Azithromycin (MIC ≥ 32 µg/ml)	Humans								0.0% 0	0.0% 0	0.0% 0	0.0% 0		
		Chickens	Retail Chickens									0.0% 0	0.0% 0		
			HACCP								0.0% 0	0.0% 0	0.0% 0	0.0% 0	
			Cecal												
		Turkeys	Retail Ground Turkey									0.0% 0			
			HACCP								0.0% 0	0.0% 0	0.0% 0	0.0% 0	
			Cecal												
		Cattle	Retail Ground Beef										0.0% 0		0.0% 0
			HACCP								0.0% 0	0.0% 0	0.0% 0	0.0% 0	
			Cecal (Beef)										0.0% 0	0.0% 0	
			Cecal (Dairy)										0.0% 0	0.0% 0	
		Swine	Retail Pork Chops												
			Cecal (Market Swine)											0.0% 0	0.0% 0
			Cecal (Sows)											0.0% 0	0.0% 0

¹ Sulfamethoxazole was tested from 1996-2003 and was replaced by sulfisoxazole in 2004

Table 31d. Antimicrobial Resistance among *Salmonella* Newport Isolates, 2003-2014

Year	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014			
Number of Isolates Tested	Humans	226	192	207	219	222	258	239	306	285	258	209	235		
	Chickens	Retail Chickens	0	0	0	0	0	0	1	0	0	1	2	0	
		HACCP	7	0	6	0	3	1	0	1	1	2	2	2	
		Cecal											0	0	
	Turkeys	Retail Ground Turkey	2	2	3	0	0	3	3	2	0	2	0	0	
		HACCP	75	44	27	30	30	31	17	5	13	5	13	17	
		Cecal											8	1	
	Cattle	Retail Ground Beef	1	2	0	0	0	3	2	2	0	1	0	2	
		HACCP	75	44	27	30	30	31	17	5	13	5	13	17	
		Cecal (Beef)											8	1	
		Cecal (Dairy)											7	15	
	Swine	Retail Pork Chops	1	0	0	0	0	0	0	0	0	0	0	0	
		Cecal (Market Swine)											3	5	
		Cecal (Sows)											4	1	
Antimicrobial Class	Antimicrobial (Resistance Breakpoint)	Isolate Source													
Penicillins	Ampicillin (MIC ≥ 32 µg/ml)	Humans	23.0%	16.1%	14.0%	15.5%	9.9%	14.3%	8.4%	7.8%	3.9%	7.0%	6.2%	3.8%	
		Chickens	Retail Chickens	52	31	29	34	22	37	20	24	11	18	13	9
			HACCP	85.7%		50.0%		0.0%	100.0%		0.0%	0.0%	0.0%	0.0%	0.0%
			Cecal	6		3		0	1		0	0	0	0	0
		Turkeys	Retail Ground Turkey	0.0%	0.0%	0.0%			0.0%	0.0%	0.0%		50.0%		
			HACCP	15.8%	28.6%	20.0%	75.0%	6.7%	25.0%	33.3%	20.0%	25.0%	25.0%	0.0%	0.0%
			Cecal	3	2	1	3	1	2	1	1	1	1	0	0
		Cattle	Retail Ground Beef	100.0%	100.0%				66.7%	0.0%	50.0%		0.0%		100.0%
			HACCP	82.7%	81.8%	85.2%	80.0%	76.7%	74.2%	64.7%	60.0%	76.9%	60.0%	76.9%	52.9%
			Cecal (Beef)	62	36	23	24	23	23	11	3	10	3	10	9
			Cecal (Dairy)											75.0%	0.0%
		Swine	Retail Pork Chops	100.0%											
			Cecal (Market Swine)	1										33.3%	20.0%
			Cecal (Sows)											0.0%	0.0%
Phenicol	Chloramphenicol (MIC ≥ 32 µg/ml)	Humans	22.6%	15.6%	13.5%	12.8%	9.5%	12.0%	7.5%	7.5%	3.5%	3.9%	4.8%	4.3%	
		Chickens	Retail Chickens	51	30	28	28	21	31	18	23	10	10	10	10
			HACCP	85.7%		50.0%		0.0%	100.0%		0.0%	0.0%	0.0%	0.0%	0.0%
			Cecal	6		3		0	1		0	0	0	0	0
		Turkeys	Retail Ground Turkey	0.0%	0.0%	0.0%			0.0%	0.0%	0.0%		0.0%		
			HACCP	21.1%	14.3%	0.0%	0.0%	0.0%	12.5%	0.0%	0.0%	0.0%	25.0%	0.0%	0.0%
			Cecal	4	1	0	0	0	1	0	0	0	1	0	0
		Cattle	Retail Ground Beef	100.0%	100.0%				66.7%	0.0%	100.0%		0.0%		100.0%
			HACCP	78.7%	77.3%	81.5%	66.7%	76.7%	64.5%	52.9%	60.0%	76.9%	40.0%	69.2%	52.9%
			Cecal (Beef)	59	34	22	20	23	20	9	3	10	2	9	9
			Cecal (Dairy)											75.0%	0.0%
		Swine	Retail Pork Chops	100.0%											
			Cecal (Market Swine)	1										33.3%	20.0%
			Cecal (Sows)											0.0%	0.0%
Quinolones	Ciprofloxacin (MIC ≥ 1 µg/ml)	Humans	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
		Chickens	Retail Chickens	0	0	0	0	0	0	0	0	0	0	0	0
			HACCP	0.0%		0.0%		0.0%	0.0%		0.0%	0.0%	0.0%	0.0%	0.0%
			Cecal	0		0		0	0		0	0	0	0	0
		Turkeys	Retail Ground Turkey	0.0%	0.0%	0.0%			0.0%	0.0%	0.0%		0.0%		
			HACCP	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
			Cecal	0	0	0	0	0	0	0	0	0	0	0	0
		Cattle	Retail Ground Beef	0.0%	0.0%				0.0%	0.0%	0.0%		0.0%		0.0%
			HACCP	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
			Cecal (Beef)	0	0	0	0	0	0	0	0	0	0	0	0
			Cecal (Dairy)											0.0%	0.0%
		Swine	Retail Pork Chops	0.0%											
			Cecal (Market Swine)	0										0.0%	0.0%
			Cecal (Sows)											0.0%	0.0%

Table 31e. Antimicrobial Resistance among *Salmonella* Newport Isolates, 2003-2014

Year	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014			
Number of Isolates Tested	Humans	226	192	207	219	222	258	239	306	285	258	209	235		
	Chickens	Retail Chickens	0	0	0	0	0	0	1	0	0	1	2	0	
		HACCP	7	0	6	0	3	1	0	1	1	2	2	2	
		Cecal											0	0	
	Turkeys	Retail Ground Turkey	2	2	3	0	0	3	3	2	0	2	0	0	
		HACCP	19	7	5	4	15	8	3	5	4	4	4	6	
		Cecal											0	0	
	Cattle	Retail Ground Beef	1	2	0	0	0	3	2	2	0	1	0	2	
		HACCP	75	44	27	30	30	31	17	5	13	5	13	17	
		Cecal (Beef)											8	1	
	Swine	Cecal (Dairy)											7	15	
		Retail Pork Chops	1	0	0	0	0	0	0	0	0	0	0	0	
		Cecal (Market Swine)											3	5	
		Cecal (Sows)										4	1		
Antimicrobial Class	Antimicrobial (Resistance Breakpoint)	Isolate Source													
Quinolones	Nalidixic Acid (MIC ≥ 32 µg/ml)	Humans	0.4% 1	0.5% 1	0.0% 0	0.5% 1	0.0% 0	0.4% 1	0.0% 0	0.3% 1	0.3% 1	0.0% 0	0.0% 0	0.4% 1	
		Chickens	Retail Chickens							0.0% 0			0.0% 0	0.0% 0	
			HACCP	0.0% 0		0.0% 0		0.0% 0	0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
			Cecal												
		Turkeys	Retail Ground Turkey	0.0% 0	0.0% 0	0.0% 0			0.0% 0	0.0% 0	0.0% 0		0.0% 0		
			HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
			Cecal												
		Cattle	Retail Ground Beef	0.0% 0	0.0% 0				0.0% 0	0.0% 0	0.0% 0		0.0% 0		0.0% 0
			HACCP	1.3% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
			Cecal (Beef)											0.0% 0	0.0% 0
			Cecal (Dairy)											0.0% 0	0.0% 0
		Swine	Retail Pork Chops	0.0% 0											
			Cecal (Market Swine)											0.0% 0	0.0% 0
			Cecal (Sows)											0.0% 0	0.0% 0
Tetracyclines	Tetracycline (MIC ≥ 16 µg/ml)	Humans	24.3% 55	17.2% 33	14.5% 30	14.6% 32	9.9% 22	14.0% 36	8.8% 21	8.5% 26	4.9% 14	4.3% 11	6.2% 13	5.1% 12	
		Chickens	Retail Chickens							0.0% 0			0.0% 0	0.0% 0	0.0% 0
			HACCP	85.7% 6		50.0% 3		0.0% 0	100.0% 1		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
			Cecal												
		Turkeys	Retail Ground Turkey	0.0% 0	0.0% 0	0.0% 0			66.7% 2	0.0% 0	0.0% 0		50.0% 1		
			HACCP	36.8% 7	28.6% 2	60.0% 3	25.0% 1	20.0% 3	62.5% 5	33.3% 1	0.0% 0	50.0% 2	50.0% 2	0.0% 0	16.7% 1
			Cecal												
		Cattle	Retail Ground Beef	100.0% 1	100.0% 2				66.7% 2	0.0% 0	100.0% 2		0.0% 0		100.0% 2
			HACCP	84.0% 63	84.1% 37	81.5% 22	83.3% 25	86.7% 26	74.2% 23	70.6% 12	60.0% 3	76.9% 10	80.0% 4	76.9% 10	52.9% 9
			Cecal (Beef)											75.0% 6	0.0% 0
			Cecal (Dairy)											71.4% 5	53.3% 8
		Swine	Retail Pork Chops	100.0% 1											
			Cecal (Market Swine)											66.7% 2	40.0% 2
			Cecal (Sows)											25.0% 1	0.0% 0

Multidrug Resistance

Table 32a. Resistance Patterns among *Salmonella* Newport Isolates, 2003-2014¹

Year		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
Number of Isolates Tested	Humans	226	192	207	219	222	258	239	306	285	258	209	235	
	Chickens	Retail Chickens	0	0	0	0	0	0	1	0	0	1	2	0
		HACCP	7	0	6	0	3	1	0	1	1	2	2	2
		Cecal											0	0
	Turkeys	Retail Ground Turkey	2	2	3	0	0	3	3	2	0	2	0	0
		HACCP	19	7	5	4	15	8	3	5	4	4	4	6
		Cecal											0	0
	Cattle	Retail Ground Beef	1	2	0	0	0	3	2	2	0	1	0	2
		HACCP	75	44	27	30	30	31	17	5	13	5	13	17
		Cecal (Beef)											8	1
	Swine	Retail Pork Chops											7	15
		Cecal (Market Swine)	1	0	0	0	0	0	0	0	0	0	3	5
		Cecal (Sows)											4	1
	Resistance Pattern													
Source														
1. No Resistance Detected	Humans	73.5%	81.8%	84.1%	82.2%	89.2%	85.3%	89.5%	90.5%	94.4%	93.0%	91.9%	93.2%	
	Chickens	Retail Chickens	166	157	174	180	198	220	214	277	269	240	192	219
		HACCP	14.3%		50.0%		100.0%	0.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		Cecal	1		3		3	0	1	1	1	2	2	2
	Turkeys	Retail Ground Turkey	50.0%	100.0%	100.0%			0.0%	66.7%	50.0%		50.0%		
		HACCP	1	1	1			0	2	1		1		
		Cecal	21.1%	57.1%	20.0%	25.0%	80.0%	12.5%	0.0%	80.0%	50.0%	50.0%	100.0%	83.3%
	Cattle	Retail Ground Beef	0.0%	0.0%				33.3%	100.0%	0.0%		100.0%		0.0%
		HACCP	14.7%	15.9%	14.8%	16.7%	13.3%	25.8%	29.4%	40.0%	23.1%	20.0%	23.1%	47.1%
		Cecal (Beef)	11	7	4	5	4	8	5	2	3	1	3	8
	Swine	Retail Pork Chops											25.0%	100.0%
		Cecal (Market Swine)	0.0%										2	1
		Cecal (Sows)	0										2	7
	2. Resistant to ≥ 3 Antimicrobial Classes													
	Humans	23.5%	16.7%	14.5%	15.6%	10.8%	13.6%	8.4%	7.8%	3.9%	6.2%	5.7%	4.7%	
	Chickens	Retail Chickens	53	32	30	34	24	35	20	24	11	16	12	11
		HACCP	85.7%		50.0%		0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
		Cecal	6		3		0	1	0	0	0	0	0	0
Turkeys	Retail Ground Turkey	0.0%	0.0%	0.0%			0.0%	0.0%	0.0%		50.0%			
	HACCP	0	0	0			0	0	0		1			
	Cecal	26.3%	14.3%	80.0%	75.0%	6.7%	37.5%	33.3%	20.0%	25.0%	25.0%	0.0%	0.0%	
Cattle	Retail Ground Beef	100.0%	100.0%				66.7%	0.0%	100.0%		0.0%		100.0%	
	HACCP	1	2				2	0	2		0		2	
	Cecal (Beef)	84.0%	84.1%	81.5%	83.3%	83.3%	74.2%	70.6%	60.0%	76.9%	80.0%	76.9%	52.9%	
Swine	Retail Pork Chops											75.0%	0.0%	
	Cecal (Market Swine)	100.0%										6	0	
	Cecal (Sows)	1										5	8	
3. Resistant to ≥ 4 Antimicrobial Classes														
Humans	23.0%	16.1%	14.0%	13.7%	9.5%	13.6%	7.5%	7.8%	3.8%	3.9%	4.8%	4.3%		
Chickens	Retail Chickens	52	31	29	30	21	35	18	24	11	10	10	10	
	HACCP	85.7%		50.0%		0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
	Cecal	6		3		0	1	0	0	0	0	0	0	
Turkeys	Retail Ground Turkey	0.0%	0.0%	0.0%			0.0%	0.0%	0.0%		50.0%			
	HACCP	0	0	0			0	0	0		1			
	Cecal	21.1%	14.3%	0.0%	25.0%	6.7%	25.0%	33.3%	0.0%	25.0%	25.0%	0.0%	0.0%	
Cattle	Retail Ground Beef	100.0%	100.0%				66.7%	0.0%	100.0%		0.0%		100.0%	
	HACCP	1	2				2	0	2		0		2	
	Cecal (Beef)	84.0%	84.1%	81.5%	83.3%	83.3%	74.2%	70.6%	60.0%	76.9%	80.0%	76.9%	52.9%	
Swine	Retail Pork Chops											75.0%	0.0%	
	Cecal (Market Swine)	100.0%										6	0	
	Cecal (Sows)	1										5	8	

¹ Starting in 2011, testing included nine antimicrobial classes with the addition of the macrolide azithromycin. Because resistance to azithromycin is low (in this case, <1%), antimicrobial class resistance data from 2011 and beyond are comparable to the data from previous years.

Table 32b. Resistance Patterns among *Salmonella* Newport Isolates, 2003-2014¹

Year		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
Number of Isolates Tested	Humans	226	192	207	219	222	258	239	306	285	258	209	235	
	Chickens	Retail Chickens	0	0	0	0	0	0	1	0	0	1	2	0
		HACCP	7	0	6	0	3	1	0	1	1	2	2	2
		Cecal											0	0
	Turkeys	Retail Ground Turkey	2	2	3	0	0	3	3	2	0	2	0	0
		HACCP	19	7	5	4	15	8	3	5	4	4	4	6
		Cecal											0	0
	Cattle	Retail Ground Beef	1	2	0	0	0	3	2	2	0	1	0	2
		HACCP	75	44	27	30	30	31	17	5	13	5	13	17
		Cecal (Beef)											8	1
	Swine	Cecal (Dairy)											7	15
		Retail Pork Chops	1	0	0	0	0	0	0	0	0	0	0	0
		Cecal (Market Swine)											3	5
	Cecal (Sows)											4	1	
Resistance Pattern		Source												
4. Resistant to ≥ 5 Antimicrobial Classes	Humans	22.6% 51	15.1% 29	12.6% 26	13.3% 29	8.6% 19	12.8% 33	7.1% 17	7.5% 23	3.5% 10	3.9% 10	4.8% 10	3.0% 7	
	Chickens	Retail Chickens							0.0% 0			0.0% 0	0.0% 0	0.0% 0
		HACCP	85.7% 6		50.0% 3		0.0% 0	100.0% 1		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Cecal												
	Turkeys	Retail Ground Turkey	0.0% 0	0.0% 0	0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 4	0.0% 0	50.0% 1		
		HACCP	10.5% 2	14.3% 1	0.0% 0	25.0% 1	6.7% 1	12.5% 1	33.3% 1	0.0% 0	25.0% 1	25.0% 1	0.0% 0	0.0% 0
		Cecal												
	Cattle	Retail Ground Beef	100.0% 1	100.0% 2				66.7% 2	0.0% 0	50.0% 1		0.0% 0		100.0% 2
		HACCP	81.3% 61	79.5% 35	81.5% 22	76.7% 23	76.7% 23	64.5% 20	58.8% 10	60.0% 3	76.9% 10	40.0% 2	76.9% 10	52.9% 9
		Cecal (Beef)											75.0% 6	0.0% 0
		Cecal (Dairy)											71.4% 5	53.3% 8
	Swine	Retail Pork Chops	100.0% 1											
		Cecal (Market Swine)											33.3% 1	20.0% 1
		Cecal (Sows)											0.0% 0	0.0% 0
	5. At Least ACSSuT² Resistant	Humans	22.1% 50	15.1% 29	12.6% 26	12.3% 27	8.6% 19	11.6% 30	7.1% 17	7.5% 23	3.5% 10	3.9% 10	4.8% 10	3.0% 7
		Chickens	Retail Chickens							0.0% 0			0.0% 0	0.0% 0
HACCP			71.4% 5		50.0% 3		0.0% 0	100.0% 1		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
Cecal														
Turkeys		Retail Ground Turkey	0.0% 0	0.0% 0	0.0% 0			0.0% 0	0.0% 0	0.0% 0		0.0% 0		
		HACCP	5.3% 1	14.3% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	25.0% 1	0.0% 0	0.0% 0
		Cecal												
Cattle		Retail Ground Beef	100.0% 1	100.0% 2				66.7% 2	0.0% 0	50.0% 1		0.0% 0		100.0% 2
		HACCP	66.7% 50	75.0% 33	81.5% 22	63.3% 19	70.0% 21	64.5% 20	47.1% 8	60.0% 3	76.9% 10	20.0% 1	69.2% 9	47.1% 8
		Cecal (Beef)											75.0% 6	0.0% 0
		Cecal (Dairy)											71.4% 5	53.3% 8
Swine		Retail Pork Chops	100.0% 1											
		Cecal (Market Swine)											33.3% 1	20.0% 1
		Cecal (Sows)											0.0% 0	0.0% 0
6. At Least ACT/S³ Resistant		Humans	1.3% 3	1.0% 2	1.9% 4	2.7% 6	0.5% 1	2.7% 7	1.3% 3	1.3% 4	0.0% 0	0.4% 1	0.5% 1	0.0% 0
		Chickens	Retail Chickens							0.0% 0			0.0% 0	0.0% 0
	HACCP		0.0% 0		16.7% 1		0.0% 0	100.0% 1		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
	Cecal													
	Turkeys	Retail Ground Turkey	0.0% 0	0.0% 0	0.0% 0			0.0% 0	0.0% 0	0.0% 0		0.0% 0		
		HACCP	0.0% 0	14.3% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Cecal												
	Cattle	Retail Ground Beef	0.0% 0	50.0% 1				0.0% 0	0.0% 0	0.0% 0		0.0% 0		0.0% 0
		HACCP	0.0% 0	2.3% 1	25.9% 7	10.0% 3	13.3% 4	12.9% 4	0.0% 0	20.0% 1	7.7% 1	0.0% 0	15.4% 2	5.9% 1
		Cecal (Beef)											0.0% 0	0.0% 0
		Cecal (Dairy)											0.0% 0	0.0% 0
	Swine	Retail Pork Chops	0.0% 0											
		Cecal (Market Swine)											0.0% 0	0.0% 0
		Cecal (Sows)											0.0% 0	0.0% 0

¹ Starting in 2011, testing included nine antimicrobial classes with the addition of the macrolide azithromycin. Because resistance to azithromycin is low (in this case, <1%), antimicrobial class resistance data from 2011 and beyond are comparable to the data from previous years.

² ACSSuT = ampicillin, chloramphenicol, streptomycin, sulfamethoxazole/sulfisoxazole, and tetracycline

³ ACT/S = ampicillin, chloramphenicol, and trimethoprim-sulfamethoxazole

Table 32c. Resistance Patterns among *Salmonella* Newport Isolates, 2003-2014

Year		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
Number of Isolates Tested	Humans	226	192	207	219	222	258	239	306	285	258	209	235	
	Chickens	Retail Chickens	0	0	0	0	0	0	1	0	0	1	2	0
		HACCP	7	0	6	0	3	1	0	1	1	2	2	2
		Cecal											0	0
	Turkeys	Retail Ground Turkey	2	2	3	0	0	3	3	2	0	2	0	0
		HACCP	19	7	5	4	15	8	3	5	4	4	4	6
		Cecal											0	0
	Cattle	Retail Ground Beef	1	2	0	0	0	3	2	2	0	1	0	2
		HACCP	75	44	27	30	30	31	17	5	13	5	13	17
		Cecal (Beef)											8	1
	Swine	Cecal (Dairy)											7	15
		Retail Pork Chops	1	0	0	0	0	0	0	0	0	0	0	0
		Cecal (Market Swine)											3	5
	Cecal (Sows)											4	1	
Resistance Pattern	Source													
7. At Least ACSSuTAuCx¹ Resistant	Humans	21.2% 48	15.1% 29	12.6% 26	11.0% 24	8.1% 18	11.6% 30	7.1% 17	7.5% 23	3.5% 10	3.9% 10	4.8% 10	3.0% 7	
	Chickens	Retail Chickens							0.0% 0			0.0% 0	0.0% 0	0.0% 0
		HACCP	71.4% 5		50.0% 3		0.0% 0	100.0% 1		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Cecal												
	Turkeys	Retail Ground Turkey	0.0% 0	0.0% 0	0.0% 0				0.0% 0	0.0% 0		0.0% 0		
		HACCP	5.2% 1	14.3% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Cecal												
	Cattle	Retail Ground Beef	100.0% 1	100.0% 2				66.7% 2	0.0% 0	50.0% 1		0.0% 0		100.0% 2
		HACCP	66.7% 50	72.7% 32	81.5% 22	63.3% 19	70.0% 21	64.5% 20	47.1% 8	60.0% 3	76.9% 10	20.0% 1	69.2% 9	47.1% 8
		Cecal (Beef)											75.0% 6	0.0% 0
		Cecal (Dairy)											71.4% 5	53.3% 8
	Swine	Retail Pork Chops	100.0% 1											
		Cecal (Market Swine)											33.3% 1	20.0% 1
		Cecal (Sows)											0.0% 0	0.0% 0
	8. At Least Ceftriaxone and Nalidixic Acid Resistant	Humans	0.0% 0	0.5% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.3% 1	0.0% 0	0.0% 0	0.0% 0
Chickens		Retail Chickens							0.0% 0			0.0% 0	0.0% 0	0.0% 0
		HACCP	0.0% 0		0.0% 0		0.0% 0	0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Cecal												
Turkeys		Retail Ground Turkey	0.0% 0	0.0% 0	0.0% 0				0.0% 0	0.0% 0		0.0% 0		
		HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Cecal												
Cattle		Retail Ground Beef	0.0% 0	0.0% 0				0.0% 0	0.0% 0	0.0% 0		0.0% 0		0.0% 0
		HACCP	1.3% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Cecal (Beef)											0.0% 0	0.0% 0
Swine		Cecal (Dairy)											0.0% 0	0.0% 0
		Retail Pork Chops	0.0% 0											
		Cecal (Market Swine)											0.0% 0	0.0% 0
		Cecal (Sows)											0.0% 0	0.0% 0

¹ ACSSuTAuCx = ACSSuT, amoxicillin-clavulanic acid, and ceftriaxone

Resistance by Year

Table 33a. Antimicrobial Resistance among *Salmonella* 14,[5],12:- Isolates, 2003-2014

Year		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014		
Number of Isolates Tested	Humans	36	36	33	105	73	84	72	78	82	117	127	110		
	Chickens	Retail Chickens	2	4	9	9	2	4	8	2	0	6	3	2	
		HACCP	N/A ¹	44	102	79	49	29	21	17	6	17	21	37	
		Cecal											0	0	
	Turkeys	Retail Ground Turkey	0	0	0	2	0	0	0	0	0	0	6	0	
		HACCP	N/A	4	2	3	6	1	1	0	2	1	6	6	
		Cecal											0	0	
	Cattle	Retail Ground Beef	0	0	0	0	2	0	0	0	0	0	0	0	
		HACCP	N/A	4	2	3	6	1	1	0	2	3	5	7	
		Cecal (Beef) Cecal (Dairy)											0	0	
	Swine	Retail Pork Chops	0	0	0	0	0	0	0	0	0	0	2	2	
		Cecal (Market Swine)											4	9	
Cecal (Sows)												3	10		
Antimicrobial Class	Antimicrobial (Resistance Breakpoint)	Isolate Source													
Aminoglycosides	Gentamicin (MIC ≥ 16 µg/ml)	Humans	5.6% 2	5.6% 2	0.0% 0	4.8% 5	1.4% 1	3.6% 3	2.8% 2	1.3% 1	2.4% 2	2.6% 3	4.7% 6	1.8% 2	
		Chickens	Retail Chickens	0.0% 0	0.0% 0	11.1% 1	22.2% 2	50.0% 1	0.0% 0	12.5% 1	0.0% 0		0.0% 0	0.0% 0	0.0% 0
			HACCP		11.4% 5	9.8% 10	11.4% 9	0.0% 0	6.9% 2	4.8% 1	23.5% 4	16.7% 1	17.6% 3	9.5% 2	5.4% 2
			Cecal												
		Turkeys	Retail Ground Turkey				50.0% 1							0.0% 0	
			HACCP		100.0% 1	0.0% 0	100.0% 1	100.0% 1				0.0% 0	0.0% 0	16.7% 1	16.7% 1
			Cecal												
		Cattle	Retail Ground Beef					50.0% 1							
			HACCP		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0
			Cecal (Beef) Cecal (Dairy)											0.0% 0	
		Swine	Retail Pork Chops											0.0% 0	0.0% 0
			Cecal (Market Swine)											0.0% 0	0.0% 0
	Cecal (Sows)												0.0% 0	0.0% 0	
	Streptomycin (MIC ≥ 64 µg/ml)	Humans	8.3% 3	5.6% 2	3.0% 1	3.8% 4	8.2% 6	10.7% 9	12.5% 9	19.2% 15	24.4% 20	29.1% 34	53.5% 68	52.7% 58	
		Chickens	Retail Chickens	0.0% 0	0.0% 0	11.1% 1	22.2% 2	0.0% 0	0.0% 0	12.5% 1	0.0% 0		0.0% 0	0.0% 0	0.0% 0
			HACCP		15.9% 7	9.8% 10	6.3% 5	8.2% 4	10.3% 3	9.5% 2	11.8% 2	16.7% 1	17.6% 3	14.3% 3	10.8% 4
			Cecal												
		Turkeys	Retail Ground Turkey				50.0% 1							100.0% 6	
			HACCP		100.0% 1	50.0% 1	100.0% 1	100.0% 1				0.0% 0	100.0% 1	100.0% 6	83.3% 5
			Cecal												
		Cattle	Retail Ground Beef					0.0% 0							
			HACCP		25.0% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0	66.7% 2	100.0% 5	28.6% 2
			Cecal (Beef) Cecal (Dairy)											100.0% 1	
		Swine	Retail Pork Chops											100.0% 2	100.0% 2
			Cecal (Market Swine)											75.0% 3	88.9% 8
Cecal (Sows)													66.7% 2	50.0% 5	
β-Lactam/β-Lactamase Inhibitor Combinations	Amoxicillin-Clavulanic Acid (MIC ≥ 32 / 16 µg/ml)	Humans	5.6% 2	2.8% 1	3.0% 1	3.8% 4	1.4% 1	4.8% 4	4.2% 3	3.8% 3	3.7% 3	1.7% 2	1.6% 2	2.7% 3	
		Chickens	Retail Chickens	0.0% 0	0.0% 0	0.0% 0	11.1% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0		33.3% 2	0.0% 0	0.0% 0
			HACCP		4.5% 2	5.9% 6	16.5% 13	16.3% 8	3.4% 1	9.5% 2	0.0% 0	16.7% 1	11.8% 2	4.8% 1	0.0% 0
			Cecal												
		Turkeys	Retail Ground Turkey				0.0% 0							0.0% 0	
			HACCP		0.0% 0	50.0% 1	0.0% 0	0.0% 0				0.0% 0	0.0% 0	0.0% 0	16.7% 1
			Cecal												
		Cattle	Retail Ground Beef					0.0% 0							
			HACCP		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		50.0% 1	0.0% 0	0.0% 0	14.3% 1
			Cecal (Beef) Cecal (Dairy)											0.0% 0	
		Swine	Retail Pork Chops											0.0% 0	0.0% 0
			Cecal (Market Swine)											0.0% 0	11.1% 1
Cecal (Sows)												0.0% 0	0.0% 0		

¹ N/A = data not available. Antigenic formulas for monophasic *Salmonella* were not determined for food animal isolates prior to 2004

Table 33b. Antimicrobial Resistance among *Salmonella* 14,[5],12:i:- Isolates, 2004-2014

Year		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014		
Number of Isolates Tested	Humans	36	36	33	105	73	84	72	78	82	117	127	110		
	Chickens	Retail Chickens	2	4	9	9	2	4	8	2	0	6	3	2	
		HACCP	N/A ¹	44	102	79	49	29	21	17	6	17	21	37	
		Cecal											0	0	
	Turkeys	Retail Ground Turkey	0	0	0	2	0	0	0	0	0	0	6	0	
		HACCP	N/A	4	2	3	6	1	1	0	2	1	6	6	
		Cecal											0	0	
	Cattle	Retail Ground Beef	0	0	0	0	2	0	0	0	0	0	0	0	
		HACCP	N/A	4	2	3	6	1	1	0	2	3	5	7	
		Cecal (Beef)											0	0	
Cecal (Dairy)												1	0		
Swine	Retail Pork Chops	0	0	0	0	0	0	0	0	0	0	2	2		
	Cecal (Market Swine)											4	9		
	Cecal (Sows)											3	10		
Antimicrobial Class	Antimicrobial (Resistance Breakpoint)	Isolate Source													
Cepheids	Cefoxitin (MIC ≥ 32 µg/ml)	Humans	5.6% 2	2.8% 1	3.0% 1	3.8% 4	1.4% 1	4.8% 4	2.8% 2	2.6% 2	4.9% 4	0.9% 1	1.6% 2	2.7% 3	
		Chickens	Retail Chickens	0.0% 0	0.0% 0	0.0% 0	11.1% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0		33.3% 2	0.0% 0	0.0% 0
			HACCP		4.5% 2	5.9% 6	16.5% 13	16.3% 8	3.4% 1	4.8% 1	0.0% 0	16.7% 1	11.8% 2	4.8% 1	0.0% 0
			Cecal												
		Turkeys	Retail Ground Turkey				0.0% 0							0.0% 0	
			HACCP		0.0% 0	50.0% 1	0.0% 0	0.0% 0				0.0% 0	0.0% 0	0.0% 0	16.7% 1
			Cecal												
		Cattle	Retail Ground Beef					0.0% 0							
			HACCP		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		50.0% 1	0.0% 0	0.0% 0	14.3% 1
			Cecal (Beef)												
		Swine	Retail Pork Chops											0.0% 0	0.0% 0
			Cecal (Market Swine)											0.0% 0	11.1% 1
	Cecal (Sows)												0.0% 0	0.0% 0	
	Ceftiofur (MIC ≥ 8 µg/ml)	Humans	5.6% 2	2.8% 1	3.0% 1	3.8% 4	2.7% 2	4.8% 4	2.8% 2	2.6% 2	3.7% 3	0.9% 1	1.6% 2	4.5% 5	
		Chickens	Retail Chickens	0.0% 0	0.0% 0	0.0% 0	11.1% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0		33.3% 2	0.0% 0	0.0% 0
			HACCP		4.5% 2	5.9% 6	16.5% 13	16.3% 8	3.4% 1	9.5% 2	0.0% 0	16.7% 1	11.8% 2	4.8% 1	0.0% 0
			Cecal												
		Turkeys	Retail Ground Turkey				0.0% 0							0.0% 0	
			HACCP		0.0% 0	50.0% 1	0.0% 0	0.0% 0				0.0% 0	0.0% 0	0.0% 0	16.7% 1
			Cecal												
		Cattle	Retail Ground Beef					0.0% 0							
			HACCP		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		50.0% 1	0.0% 0	0.0% 0	14.3% 1
			Cecal (Beef)												
		Swine	Retail Pork Chops											0.0% 0	0.0% 0
			Cecal (Market Swine)											0.0% 0	11.1% 1
	Cecal (Sows)												0.0% 0	0.0% 0	
	Ceftriaxone (MIC ≥ 4 µg/ml)	Humans	5.6% 2	2.8% 1	3.0% 1	3.8% 4	2.7% 2	4.8% 4	2.8% 2	2.6% 2	3.7% 3	0.9% 1	1.6% 2	4.5% 5	
		Chickens	Retail Chickens	0.0% 0	0.0% 0	0.0% 0	11.1% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0		33.3% 2	0.0% 0	0.0% 0
			HACCP		4.5% 2	5.9% 6	16.5% 13	16.3% 8	3.4% 1	9.5% 2	0.0% 0	16.7% 1	11.8% 2	4.8% 1	0.0% 0
			Cecal												
		Turkeys	Retail Ground Turkey				0.0% 0							0.0% 0	
			HACCP		0.0% 0	50.0% 1	0.0% 0	0.0% 0				0.0% 0	0.0% 0	0.0% 0	33.3% 2
			Cecal												
		Cattle	Retail Ground Beef					0.0% 0							
			HACCP		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		50.0% 1	0.0% 0	0.0% 0	14.3% 1
			Cecal (Beef)												
Swine		Retail Pork Chops											0.0% 0	0.0% 0	
		Cecal (Market Swine)											0.0% 0	11.1% 1	
	Cecal (Sows)											0.0% 0	0.0% 0		

¹ N/A = data not available. Antigenic formulas for monophasic *Salmonella* were not determined for food animal isolates prior to 2004

Table 33c. Antimicrobial Resistance among *Salmonella* 14,[5],12:i:- Isolates, 2003-2014

Year		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014			
Number of Isolates Tested	Humans	36	36	33	105	73	84	72	78	82	117	127	110			
	Chickens	Retail Chickens	2	4	9	9	2	4	8	2	0	6	3	2		
		HACCP	N/A ¹	44	102	79	49	29	21	17	6	17	21	37		
		Cecal											0	0		
	Turkeys	Retail Ground Turkey	0	0	0	2	0	0	0	0	0	0	6	0		
		HACCP	N/A	4	2	3	6	1	1	0	2	1	6	6		
		Cecal											0	0		
	Cattle	Retail Ground Beef	0	0	0	0	2	0	0	0	0	0	0	0		
		HACCP	N/A	4	2	3	6	1	1	0	2	3	5	7		
		Cecal (Beef)											0	0		
		Cecal (Dairy)											1	0		
	Swine	Retail Pork Chops	0	0	0	0	0	0	0	0	0	0	2	2		
		Cecal (Market Swine)											4	9		
		Cecal (Sows)											3	10		
Antimicrobial Class	Antimicrobial (Resistance Breakpoint)	Isolate Source														
Folate Pathway Inhibitor	Sulfamethoxazole/ Sulfisoxazole ² (MIC ≥ 512 µg/ml)	Humans	5.6%	11.1%	0.0%	8.6%	4.1%	13.1%	13.9%	19.2%	23.2%	29.1%	53.5%	50.0%		
		Chickens	Retail Chickens	2	4	0	9	3	11	10	15	19	34	68	55	
			HACCP	0.0%	0.0%	11.1%	22.2%	50.0%	0.0%	25.0%	0.0%		33.3%	0.0%	0.0%	
			Cecal	0	0	1	2	1	0	2	0		2	0	0	
		Turkeys	Retail Ground Turkey		13.6%	9.8%	13.9%	6.1%	6.9%	9.5%	29.4%	33.3%	17.6%	14.3%	5.4%	
			HACCP		6	10	11	3	2	2	5	2	3	3	2	
			Cecal													
		Cattle	Retail Ground Beef				50.0%	1						100.0%		
			HACCP		100.0%	50.0%	100.0%	100.0%				0.0%	100.0%	83.3%	50.0%	
			Cecal		1	1	1	1				0	1	5	3	
		Swine	Retail Ground Beef					50.0%	1							
			HACCP		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		0.0%	66.7%	100.0%	28.6%	
			Cecal (Beef)		0	0	0	0	0	0		0	2	5	2	
			Cecal (Dairy)											100.0%		
	Swine	Retail Pork Chops											100.0%	100.0%		
		Cecal (Market Swine)											75.0%	88.9%		
		Cecal (Sows)											66.7%	50.0%		
													2	2		
	Trimethoprim- Sulfamethoxazole (MIC ≥ 4 / 76 µg/ml)	Humans	0.0%	2.8%	0.0%	0.0%	1.4%	4.8%	1.4%	1.3%	1.2%	0.0%	2.4%	1.8%		
		Chickens	Retail Chickens	0	1	0	0	1	4	1	1	1	0	3	2	
			HACCP	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
			Cecal	0	0	0	0	0	0	0	0	0	0	0	0	
		Turkeys	Retail Ground Turkey				0.0%	0						0.0%		
			HACCP		0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	
			Cecal		0	0	0	0				0	0	0	0	
		Cattle	Retail Ground Beef					0.0%	0							
			HACCP		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		0.0%	0.0%	0.0%	0.0%	
			Cecal (Beef)		0	0	0	0	0	0		0	0	0	0	
			Cecal (Dairy)											0.0%		
		Swine	Retail Pork Chops											0.0%	0.0%	
			Cecal (Market Swine)											0.0%	0.0%	
			Cecal (Sows)											0.0%	0.0%	
													0	0		
	Macrolides	Azithromycin (MIC ≥32 µg/ml)	Humans								0.0%	0.0%	1.6%	0.0%		
			Chickens	Retail Chickens									0	0	0	
				HACCP									0.0%	0.0%	0.0%	
				Cecal									0	0	0	
			Turkeys	Retail Ground Turkey										0.0%		
				HACCP									0.0%	0.0%	0.0%	
				Cecal									0	0	0	
			Cattle	Retail Ground Beef												
				HACCP									0.0%	0.0%	0.0%	
				Cecal (Beef)									0	0	0	
Cecal (Dairy)													0.0%			
Swine			Retail Pork Chops											0.0%	0.0%	
			HACCP									0.0%				
			Cecal (Market Swine)											0.0%	0.0%	
	Cecal (Sows)											0.0%	0.0%			

¹ N/A = data not available. Antigenic formulas for monophasic *Salmonella* were not determined for food animal isolates prior to 2004

² Sulfamethoxazole was tested from 1996-2003 and was replaced by sulfisoxazole in 2004

Table 33d. Antimicrobial Resistance among *Salmonella* 14,[5],12:i:- Isolates, 2003-2014

Year		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014		
Number of Isolates Tested	Humans	36	36	33	105	73	84	72	78	82	117	127	110		
	Chickens	Retail Chickens	2	4	9	9	2	4	8	2	0	6	3	2	
		HACCP	N/A ¹	44	102	79	49	29	21	17	6	17	21	37	
		Cecal											0	0	
	Turkeys	Retail Ground Turkey	0	0	0	2	0	0	0	0	0	0	6	0	
		HACCP	N/A	4	2	3	6	1	1	0	2	3	5	7	
		Cecal											0	0	
	Cattle	Retail Ground Beef	0	0	0	0	2	0	0	0	0	0	0	0	
		HACCP	N/A	4	2	3	6	1	1	0	2	3	5	7	
		Cecal (Beef) Cecal (Dairy)											0	0	
	Swine	Retail Pork Chops	0	0	0	0	0	0	0	0	0	0	2	2	
		Cecal (Market Swine)											4	9	
		Cecal (Sows)											3	10	
Antimicrobial Class	Antimicrobial (Resistance Breakpoint)	Isolate Source													
Penicillins	Ampicillin (MIC ≥ 32 µg/ml)	Humans	8.3% 3	5.6% 2	6.1% 2	6.7% 7	5.5% 4	9.5% 8	11.1% 8	21.8% 17	25.6% 21	29.1% 34	49.6% 63	50.9% 56	
		Chickens	Retail Chickens	0.0% 0	0.0% 0	0.0% 0	11.1% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0		33.3% 2	0.0% 0	0.0% 0
			HACCP		6.8% 3	8.8% 9	17.7% 14	20.4% 10	6.9% 2	9.5% 2	5.9% 1	16.7% 1	11.8% 2	4.8% 1	2.7% 1
			Cecal												
		Turkeys	Retail Ground Turkey				0.0% 0							100.0% 6	
			HACCP		0.0% 0	50.0% 1	0.0% 0	0.0% 0				0.0% 0	100.0% 1	66.7% 4	83.3% 5
			Cecal												
		Cattle	Retail Ground Beef					0.0% 0							
			HACCP		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		50.0% 1	66.7% 2	80.0% 4	42.9% 3
			Cecal (Beef) Cecal (Dairy)												
		Swine	Retail Pork Chops											100.0% 1	
			Cecal (Market Swine)											100.0% 2	100.0% 2
			Cecal (Sows)											75.0% 3	88.9% 8
											33.3% 1	50.0% 5			
Phenicolis	Chloramphenicol (MIC ≥ 32 µg/ml)	Humans	0.0% 0	2.8% 1	0.0% 0	1.9% 2	1.4% 1	6.0% 5	8.3% 6	1.3% 1	1.2% 1	0.0% 0	2.4% 3	3.6% 4	
		Chickens	Retail Chickens	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0	0.0% 0	0.0% 0
			HACCP		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
			Cecal												
		Turkeys	Retail Ground Turkey				0.0% 0							0.0% 0	
			HACCP		0.0% 0	0.0% 0	0.0% 0	0.0% 0				0.0% 0	0.0% 0	0.0% 0	0.0% 0
			Cecal												
		Cattle	Retail Ground Beef					0.0% 0							
			HACCP		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0	33.3% 1	0.0% 0	0.0% 0
			Cecal (Beef) Cecal (Dairy)											0.0% 0	
		Swine	Retail Pork Chops											0.0% 0	0.0% 0
			Cecal (Market Swine)											0.0% 0	0.0% 0
			Cecal (Sows)											0.0% 0	0.0% 0
Quinolones	Ciprofloxacin (MIC ≥ 1 µg/ml)	Humans	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	1.3% 1	0.0% 0	0.0% 0	0.8% 1	1.8% 2	
		Chickens	Retail Chickens	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0	0.0% 0	0.0% 0
			HACCP		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
			Cecal												
		Turkeys	Retail Ground Turkey				0.0% 0							0.0% 0	
			HACCP		0.0% 0	0.0% 0	0.0% 0	0.0% 0				0.0% 0	0.0% 0	0.0% 0	0.0% 0
			Cecal												
		Cattle	Retail Ground Beef					0.0% 0							
			HACCP		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0
			Cecal (Beef) Cecal (Dairy)											0.0% 0	
		Swine	Retail Pork Chops											0.0% 0	0.0% 0
			Cecal (Market Swine)											0.0% 0	0.0% 0
			Cecal (Sows)											0.0% 0	0.0% 0

¹ N/A = data not available. Antigenic formulas for monophasic *Salmonella* were not determined for food animal isolates prior to 2004

Table 33e. Antimicrobial Resistance among *Salmonella* 14,[5],12:i:- Isolates, 2003-2014

Year			2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
Number of Isolates Tested	Humans		36	36	33	105	73	84	72	78	82	117	127	110	
		Chickens	Retail Chickens	2	4	9	9	2	4	8	2	0	6	3	2
			HACCP	N/A ¹	44	102	79	49	29	21	17	6	17	21	37
	Turkeys	Retail Ground Turkey	0	0	0	2	0	0	0	0	0	0	6	0	
		HACCP	N/A	4	2	3	6	1	1	0	2	1	6	6	
		Cecal											0	0	
	Cattle	Retail Ground Beef	0	0	0	0	2	0	0	0	0	0	0	0	
		HACCP	N/A	4	2	3	6	1	1	0	2	3	5	7	
		Cecal (Beef)											0	0	
	Swine	Retail Pork Chops	0	0	0	0	0	0	0	0	0	0	2	2	
		Cecal (Market Swine)											4	9	
		Cecal (Sows)											3	10	
	Antimicrobial Class	Antimicrobial (Resistance Breakpoint)	Isolate Source												
	Quinolones	Nalidixic Acid (MIC ≥ 32 µg/ml)	Humans	2.8% 1	2.8% 1	0.0% 0	1.0% 1	1.4% 1	1.2% 1	0.0% 0	2.6% 2	0.0% 0	0.0% 0	0.8% 1	6.4% 7
Chickens			Retail Chickens	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
			HACCP		2.3% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
			Cecal												
Turkeys			Retail Ground Turkey				0.0% 0							0.0% 0	
			HACCP		0.0% 0	0.0% 0	0.0% 0	0.0% 0				0.0% 0	0.0% 0	16.7% 1	0.0% 0
			Cecal												
Cattle			Retail Ground Beef					0.0% 0							
			HACCP		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0
			Cecal (Beef)												
Swine			Cecal (Dairy)											0.0% 0	
			Retail Pork Chops											0.0% 0	0.0% 0
			Cecal (Market Swine)											0.0% 0	0.0% 0
				Cecal (Sows)										0.0% 0	0.0% 0
Tetracyclines	Tetracycline (MIC ≥ 16 µg/ml)	Humans	0.0% 0	11.1% 4	3.0% 1	8.6% 9	9.6% 7	16.7% 14	16.7% 12	28.2% 22	25.6% 21	33.3% 39	55.1% 70	53.6% 59	
		Chickens	Retail Chickens	0.0% 0	0.0% 0	11.1% 1	11.1% 1	0.0% 0	0.0% 0	25.0% 2	0.0% 0		50.0% 3	0.0% 0	0.0% 0
			HACCP		11.4% 5	4.9% 5	3.8% 3	14.3% 7	3.4% 1	9.5% 2	11.8% 2	33.3% 2	0.0% 0	19.0% 4	8.1% 3
			Cecal												
		Turkeys	Retail Ground Turkey				0.0% 0							100.0% 6	
			HACCP		0.0% 0	50.0% 1	0.0% 0	0.0% 0				100.0% 1	100.0% 1	100.0% 6	66.7% 4
			Cecal												
		Cattle	Retail Ground Beef					0.0% 0							
			HACCP		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0	100.0% 3	100.0% 5	28.6% 2
			Cecal (Beef)												
		Swine	Cecal (Dairy)											0.0% 0	
			Retail Pork Chops											100.0% 2	100.0% 2
			Cecal (Market Swine)											75.0% 3	100.0% 9
				Cecal (Sows)										100.0% 3	80.0% 8

¹ N/A = data not available. Antigenic formulas for monophasic *Salmonella* were not determined for food animal isolates prior to 2004

Multidrug Resistance

Table 34a. Resistance Patterns among *Salmonella* 14, [5], 12: i:- Isolates, 2003-2014¹

Year		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
Number of Isolates Tested	Humans	36	36	33	105	73	84	72	78	82	117	127	110	
	Chickens	Retail Chickens	2	4	9	9	2	4	8	2	0	6	3	2
		HACCP	N/A ²	44	102	79	49	29	21	17	6	17	21	37
		Cecal											0	0
	Turkeys	Retail Ground Turkeys	0	0	0	2	0	0	0	0	0	0	6	0
		HACCP	N/A	1	2	1	1	0	0	0	1	1	6	6
		Cecal											0	0
	Cattle	Retail Ground Beef	0	0	0	0	2	0	0	0	0	0	0	0
		HACCP	N/A	4	2	3	6	1	1	0	2	3	5	7
		Cecal (Beef)											0	0
		Cecal (Dairy)											1	0
	Swine	Retail Pork Chops	0	0	0	0	0	0	0	0	0	0	2	2
		Cecal (Market Swine)											4	9
		Cecal (Sows)											3	10
Resistance Pattern	Source													
1. No Resistance Detected	Humans	77.8% 28	80.6% 29	87.9% 29	85.7% 90	82.2% 60	76.2% 64	76.4% 55	66.7% 52	65.9% 54	62.4% 73	39.4% 50	38.2% 42	
	Chickens	Retail Chickens	100.0% 2	100.0% 4	88.9% 8	55.6% 5	50.0% 1	100.0% 4	75.0% 6	100.0% 2		50.0% 3	100.0% 3	100.0% 2
		HACCP		77.3% 34	76.5% 78	68.4% 54	65.3% 32	82.8% 24	76.2% 16	70.6% 12	50.0% 3	70.6% 12	76.2% 16	86.5% 32
		Cecal												
	Turkeys	Retail Ground Turkeys				50.0% 1							0.0% 0	
		HACCP		0.0% 0	50.0% 1	0.0% 0	0.0% 0				0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Cecal												
	Cattle	Retail Ground Beef					50.0% 1							
		HACCP		75.0% 3	100.0% 2	100.0% 3	100.0% 6	100.0% 1	100.0% 1		50.0% 1	0.0% 0	0.0% 0	57.1% 4
		Cecal (Beef)												
		Cecal (Dairy)											0.0% 0	
	Swine	Retail Pork Chops											0.0% 0	0.0% 0
		Cecal (Market Swine)											25.0% 1	0.0% 0
		Cecal (Sows)											0.0% 0	20.0% 2
2. Resistant to ≥ 3 Antimicrobial Classes	Humans	5.6% 2	8.3% 3	3.0% 1	9.5% 10	5.5% 4	9.5% 8	12.5% 9	21.8% 17	26.8% 22	28.2% 33	51.2% 65	50.0% 55	
	Chickens	Retail Chickens	0.0% 0	0.0% 0	11.1% 1	22.2% 2	0.0% 0	0.0% 0	12.5% 1	0.0% 0		33.3% 2	0.0% 0	0.0% 0
		HACCP		11.4% 5	9.8% 10	19.0% 15	20.4% 10	6.9% 2	9.5% 2	5.9% 1	33.3% 2	11.8% 2	9.5% 2	2.7% 1
		Cecal												
	Turkeys	Retail Ground Turkey				0.0% 0							100.0% 6	
		HACCP		0.0% 0	50.0% 1	0.0% 0	0.0% 0				0.0% 0	100.0% 1	100.0% 6	83.3% 5
		Cecal												
	Cattle	Retail Ground Beef					0.0% 0							
		HACCP		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		50.0% 1	66.6% 2	100.0% 5	42.9% 3
		Cecal (Beef)												
	Swine	Retail Pork Chops											100.0% 2	100.0% 2
		Cecal (Market Swine)											75.0% 3	88.9% 8
		Cecal (Sows)											66.7% 2	50.0% 5
	3. Resistant to ≥ 4 Antimicrobial Classes	Humans	0.0% 0	2.8% 1	0.0% 0	3.8% 4	2.7% 2	7.1% 6	9.7% 7	19.2% 15	19.5% 16	26.5% 31	48.8% 62	47.3% 52
Chickens		Retail Chickens	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		33.3% 2	0.0% 0	0.0% 0
		HACCP		2.3% 1	0.0% 0	1.3% 1	0.0% 0	0.0% 0	4.8% 1	5.9% 1	0.0% 0	0.0% 0	4.8% 1	2.7% 1
		Cecal												
Turkeys		Retail Ground Turkey				0.0% 0							100.0% 6	
		HACCP		0.0% 0	50.0% 1	0.0% 0	0.0% 0				0.0% 0	100.0% 1	66.7% 4	66.7% 4
		Cecal												
Cattle		Retail Ground Beef					0.0% 0							
		HACCP		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0	66.6% 2	80.0% 4	28.6% 2
		Cecal (Beef)												
Swine		Retail Pork Chops											0.0% 0	
		Cecal (Market Swine)											100.0% 2	100.0% 2
		Cecal (Sows)											75.0% 3	88.9% 8

¹ Starting in 2011, testing included nine antimicrobial classes with the addition of the macrolide azithromycin. Because resistance to azithromycin is low (in this case, <1%), antimicrobial class resistance data from 2011 and beyond are comparable to the data from previous years.

² N/A = data not available. Antigenic formulas for monophasic *Salmonella* were not determined for food animal isolates prior to 2004

Table 34b. Resistance Patterns among *Salmonella* 14,[5],12:i:- Isolates, 2003-2014¹

Year			2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
Number of Isolates Tested	Humans		36	36	33	105	73	84	72	78	82	117	127	110	
		Chickens	Retail Chickens	2	4	9	9	2	4	8	2	0	6	3	2
			HACCP	N/A ²	44	102	79	49	29	21	17	6	17	21	37
	Cecal												0	0	
	Turkeys	Retail Ground Turkey	0	0	0	2	0	0	0	0	0	0	0	6	0
		HACCP	N/A	1	2	1	1	0	0	0	0	1	1	6	6
		Cecal												0	0
	Cattle	Retail Ground Beef	0	0	0	0	2	0	0	0	0	0	0	0	0
		HACCP	N/A	4	2	3	6	1	1	0	2	3	5	7	
		Cecal (Beef)												0	0
		Cecal (Dairy)												1	0
	Swine	Retail Pork Chops	0	0	0	0	0	0	0	0	0	0	0	2	2
		Cecal (Market Swine)												4	9
Cecal (Sows)													3	10	
Resistance Pattern	Source														
4. Resistant to ≥ 5 Antimicrobial Classes	Humans		0.0%	2.8%	0.0%	2.9%	1.4%	4.8%	6.9%	3.8%	0.0%	0.9%	2.4%	7.3%	
			0	1	0	3	1	4	5	3	0	1	3	8	
		Chickens	Retail Chickens	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		33.3%	0.0%	0.0%
			HACCP	0	0	0	0	0	0	0	0		2	0	0
	Cecal			2.3%	0.0%	1.3%	0.0%	0.0%	4.8%	0.0%	0.0%	0.0%	4.8%	0.0%	
	Turkeys	Retail Ground Turkey				0.0%							0.0%		
		HACCP		0.0%	50.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	
		Cecal		0	1	0	0				0	0	0	0	
	Cattle	Retail Ground Beef					0.0%								
		HACCP		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	33.3%	0.0%	0.0%	
		Cecal (Beef)													
		Cecal (Dairy)											0.0%		
	Swine	Retail Pork Chops											0.0%	0.0%	
Cecal (Market Swine)												0.0%	11.1%		
Cecal (Sows)												0.0%	0.0%		
5. At Least ACSSuT ³ Resistant	Humans		0.0%	2.8%	0.0%	1.9%	1.4%	3.6%	6.9%	1.3%	0.0%	0.0%	0.8%	3.6%	
			0	1	0	2	1	3	5	1	0	0	1	4	
		Chickens	Retail Chickens	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		0.0%	0.0%	0.0%
			HACCP	0	0	0	0	0	0	0	0		0	0	0
	Cecal			0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
	Turkeys	Retail Ground Turkey				0.0%							0.0%		
		HACCP		0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	
		Cecal		0	0	0	0				0	0	0	0	
	Cattle	Retail Ground Beef					0.0%								
		HACCP		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	33.3%	0.0%	0.0%	
		Cecal (Beef)													
		Cecal (Dairy)											0.0%		
	Swine	Retail Pork Chops											0.0%	0.0%	
Cecal (Market Swine)												0.0%	0.0%		
Cecal (Sows)												0.0%	0.0%		
6. At Least ACT/S ⁴ Resistant	Humans		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.8%	0.9%	
			0	0	0	0	0	0	0	0	0	0	1	1	
		Chickens	Retail Chickens	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		0.0%	0.0%	0.0%
			HACCP	0	0	0	0	0	0	0	0		0	0	0
	Cecal			0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
	Turkeys	Retail Ground Turkey				0.0%							0.0%		
		HACCP		0.0%	0.0%	0.0%	0.0%				0.0%	0.0%	0.0%	0.0%	
		Cecal		0	0	0	0				0	0	0	0	
	Cattle	Retail Ground Beef					0.0%								
		HACCP		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
		Cecal (Beef)													
		Cecal (Dairy)											0.0%		
	Swine	Retail Pork Chops											0.0%	0.0%	
Cecal (Market Swine)												0.0%	0.0%		
Cecal (Sows)												0.0%	0.0%		

¹ Starting in 2011, testing included nine antimicrobial classes with the addition of the macrolide azithromycin. Because resistance to azithromycin is low (in this case, <1%), antimicrobial class resistance data from 2011 and beyond are comparable to the data from previous years.

² N/A = data not available. Antigenic formulas for monophasic *Salmonella* were not determined for food animal isolates prior to 2004

³ ACSSuT = ampicillin, chloramphenicol, streptomycin, sulfamethoxazole/sulfisoxazole, and tetracycline

⁴ ACT/S = ampicillin, chloramphenicol, and trimethoprim-sulfamethoxazole

Table 34c. Resistance Patterns among *Salmonella* 14,[5],12:i:- Isolates, 2003-2014

Year		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
Number of Isolates Tested	Humans	36	36	33	105	73	84	72	78	82	117	127	110	
	Chickens	Retail Chickens	2	4	9	9	2	4	8	2	0	6	3	2
		HACCP	N/A ¹	44	102	79	49	29	21	17	6	17	21	37
		Cecal											0	0
	Turkeys	Retail Ground Turkey	0	0	0	2	0	0	0	0	0	0	6	0
		HACCP	N/A	1	2	1	1	0	0	0	1	1	6	6
		Cecal											0	0
	Cattle	Retail Ground Beef	0	0	0	0	2	0	0	0	0	0	0	0
		HACCP	N/A	4	2	3	6	1	1	0	2	3	5	7
		Cecal (Beef)											0	0
		Cecal (Dairy)											1	0
	Swine	Retail Pork Chops	0	0	0	0	0	0	0	0	0	0	2	2
		Cecal (Market Swine)											4	9
Cecal (Sows)												3	10	
Resistance Pattern	Source													
7. At Least ACSSuTAuCx ² Resistant	Humans	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	2.4% 2	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
	Chickens	Retail Chickens	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
		HACCP		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
		Cecal												
	Turkeys	Retail Ground Turkey				0.0% 0							0.0% 0	
		HACCP		0.0% 0	0.0% 0	0.0% 0	0.0% 0				0.0% 0	0.0% 0	0.0% 0	
		Cecal												
	Cattle	Retail Ground Beef					0.0% 0							
		HACCP		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0			0.0% 0	0.0% 0	0.0% 0	
		Cecal (Beef)												
		Cecal (Dairy)											0.0% 0	
	Swine	Retail Pork Chops											0.0% 0	
		Cecal (Market Swine)											0.0% 0	
Cecal (Sows)												0.0% 0		
8. At Least Ceftriaxone and Nalidixic Acid Resistant	Humans	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
	Chickens	Retail Chickens	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
		HACCP		2.3% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
		Cecal												
	Turkeys	Retail Ground Turkey				0.0% 0							0.0% 0	
		HACCP		0.0% 0	0.0% 0	0.0% 0	0.0% 0				0.0% 0	0.0% 0	0.0% 0	
		Cecal												
	Cattle	Retail Ground Beef					0.0% 0							
		HACCP		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0			0.0% 0	0.0% 0	0.0% 0	
		Cecal (Beef)												
		Cecal (Dairy)											0.0% 0	
	Swine	Retail Pork Chops											0.0% 0	
		Cecal (Market Swine)											0.0% 0	
Cecal (Sows)												0.0% 0		

¹ N/A = data not available. Antigenic formulas for monophasic *Salmonella* were not determined for food animal isolates prior to 2004

² ACSSuTAuCx = ACSSuT, amoxicillin-clavulanic acid, and ceftriaxone

Resistance by Year

Table 35a. Antimicrobial Resistance among *Salmonella* Infantis Isolates, 2003-2014

Year		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014		
Number of Isolates Tested	Humans	31	29	30	22	26	51	44	53	63	90	76	73		
	Chickens	Retail Chickens	0	0	0	1	1	5	3	3	4	3	8	4	
		HACCP	27	19	17	16	16	14	3	4	16	31	35	43	
		Cecal											1	1	
	Turkeys	Retail Ground Turkey	0	0	0	0	0	1	1	2	1	3	2	2	
		HACCP	0	0	0	0	1	0	1	0	0	0	0	0	
		Cecal											0	0	
	Cattle	Retail Ground Beef	1	0	0	0	0	0	0	0	3	1	2	1	
		HACCP	12	18	7	13	13	4	1	5	15	4	7	6	
		Cecal (Beef) Cecal (Dairy)											3	0	
	Swine	Retail Pork Chops	0	0	1	2	5	1	2	1	1	1	1	5	
		Cecal (Market Swine)											20	22	
		Cecal (Sows)											27	36	
Antimicrobial Class	Antimicrobial (Resistance Breakpoint)	Isolate Source													
Aminoglycosides	Gentamicin (MIC ≥ 16 µg/ml)	Humans	0.0% 0	0.0% 0	0.0% 0	4.5% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	1.6% 1	0.0% 0	3.9% 3	1.4% 1	
		Chickens	Retail				0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	12.5% 1	0.0% 0
			HACCP	0.0% 0	5.3% 1	0.0% 0	6.3% 1	0.0% 0	0.0% 0	0.0% 0	25.0% 1	0.0% 0	16.1% 5	0.0% 0	0.0% 0
			Cecal											0.0% 0	0.0% 0
		Turkeys	Retail						0.0% 0	100.0% 1	100.0% 2	100.0% 1	100.0% 3	100.0% 2	100.0% 2
			HACCP					0.0% 0		0.0% 0					
			Cecal												
		Cattle	Retail	0.0% 0								0.0% 0	0.0% 0	0.0% 0	0.0% 0
			HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
			Cecal (Beef) Cecal (Dairy)											0.0% 0	0.0% 0
		Swine	Retail			0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
			Cecal (Market Swine)											0.0% 0	0.0% 0
	Cecal (Sows)												0.0% 0	0.0% 0	
	Streptomycin (MIC ≥ 64 µg/ml)	Humans	9.7% 3	0.0% 0	3.3% 1	4.5% 1	3.8% 1	2.0% 1	6.8% 3	1.9% 1	4.8% 3	0.0% 0	3.9% 3	6.8% 5	
		Chickens	Retail				0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
			HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	25.0% 1	0.0% 0	9.7% 3	2.9% 1	2.3% 1
			Cecal											0.0% 0	0.0% 0
		Turkeys	Retail						0.0% 0	100.0% 1	100.0% 2	100.0% 1	100.0% 3	100.0% 2	100.0% 2
			HACCP					100.0% 1		100.0% 1					
			Cecal												
		Cattle	Retail	0.0% 0								0.0% 0	0.0% 0	0.0% 0	0.0% 0
			HACCP	8.3% 1	0.0% 0	14.3% 1	15.4% 2	0.0% 0	0.0% 0	0.0% 0	0.0% 0	6.7% 1	25.0% 1	0.0% 0	0.0% 0
			Cecal (Beef) Cecal (Dairy)											0.0% 0	0.0% 0
		Swine	Retail			0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	40.0% 2
			Cecal (Market Swine)											15.0% 3	9.1% 2
			Cecal (Sows)											11.1% 3	0.0% 0
		β-Lactam/β-Lactamase Inhibitor Combinations	Amoxicillin-Clavulanic Acid (MIC ≥ 32 / 16 µg/ml)	Humans	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	9.1% 4	3.8% 2	1.6% 1	1.1% 1	3.9% 3
Chickens				Retail				0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	25.0% 1	0.0% 0	0.0% 0
	HACCP			0.0% 0	0.0% 0	5.9% 1	6.3% 1	0.0% 0	0.0% 0	0.0% 0	25.0% 1	6.3% 1	0.0% 0	5.7% 2	2.3% 1
	Cecal													0.0% 0	0.0% 0
Turkeys	Retail								0.0% 0	100.0% 1	100.0% 2	100.0% 1	100.0% 3	50.0% 1	100.0% 2
	HACCP							100.0% 1		100.0% 1					
	Cecal														
Cattle	Retail			0.0% 0								0.0% 0	0.0% 0	0.0% 0	0.0% 0
	HACCP			8.3% 1	0.0% 0	14.3% 1	23.1% 3	0.0% 0	0.0% 0	0.0% 0	0.0% 0	6.7% 1	0.0% 0	0.0% 0	0.0% 0
	Cecal (Beef) Cecal (Dairy)													0.0% 0	0.0% 0
Swine	Retail					0.0% 0	0.0% 0	0.0% 0	0.0% 0	50.0% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
	Cecal (Market Swine)													10.0% 2	0.0% 0
	Cecal (Sows)													7.4% 2	0.0% 0

Table 35b. Antimicrobial Resistance among *Salmonella* Infantis Isolates, 2003-2014

Year		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014		
Number of Isolates Tested	Humans	31	29	30	22	26	51	44	53	63	90	76	73		
	Chickens	Retail Chickens	0	0	0	1	1	5	3	3	4	3	8	4	
		HACCP	27	19	17	16	16	14	3	4	16	31	35	43	
		Cecal											1	1	
	Turkeys	Retail Ground Turkey	0	0	0	0	0	1	1	2	1	3	2	2	
		HACCP	0	0	0	0	1	0	1	0	0	0	0	0	
		Cecal											0	0	
	Cattle	Retail Ground Beef	1	0	0	0	0	0	0	0	3	1	2	1	
		HACCP	12	18	7	13	13	4	1	5	15	4	7	6	
		Cecal (Beef)											3	0	
	Cecal (Dairy)											0	2		
	Swine	Retail Pork Chops	0	0	1	2	5	1	2	1	1	1	1	5	
		Cecal (Market Swine)											20	22	
		Cecal (Sows)											27	36	
Antimicrobial Class	Antimicrobial (Resistance Breakpoint)	Isolate													
Cepheids															
Cefoxitin (MIC ≥ 32 µg/ml)	Humans	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	11.4% 5	3.8% 2	1.6% 1	1.1% 1	3.9% 3	1.4% 1		
	Chickens	Retail				0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	25.0% 1	0.0% 0	0.0% 0	0.0% 0	
		HACCP	0.0% 0	0.0% 0	5.9% 1	12.5% 2	0.0% 0	0.0% 0	0.0% 0	25.0% 1	6.3% 1	0.0% 0	5.7% 2	2.3% 1	
		Cecal											0.0% 0	0.0% 0	
	Turkeys	Retail						0.0% 0	100.0% 1	100.0% 2	100.0% 1	100.0% 3	50.0% 1	100.0% 2	
		HACCP					100.0% 1		100.0% 1						
		Cecal													
	Cattle	Retail	0.0% 0								0.0% 0	0.0% 0	0.0% 0	0.0% 0	
		HACCP	8.3% 1	0.0% 0	14.3% 1	23.1% 3	0.0% 0	0.0% 0	0.0% 0	0.0% 0	6.7% 1	0.0% 0	0.0% 0	0.0% 0	
		Cecal (Beef)											0.0% 0		
	Cecal (Dairy)											0.0% 0	0.0% 0		
	Swine	Retail			0.0% 0	0.0% 0	0.0% 0	0.0% 0	50.0% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
		Cecal (Market Swine)											10.0% 2	0.0% 0	
		Cecal (Sows)											7.4% 2	0.0% 0	
	Ceftiofur (MIC ≥ 8 µg/ml)	Humans	0.0% 0	0.0% 0	0.0% 0	0.0% 0	3.8% 1	0.0% 0	11.4% 5	3.8% 2	1.6% 1	2.2% 2	6.6% 5	4.1% 3	
		Chickens	Retail				0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	25.0% 1	0.0% 0	0.0% 0	25.0% 1
			HACCP	0.0% 0	0.0% 0	5.9% 1	6.3% 1	0.0% 0	0.0% 0	0.0% 0	25.0% 1	6.3% 1	0.0% 0	5.7% 2	2.3% 1
			Cecal											0.0% 0	0.0% 0
Turkeys		Retail						0.0% 0	100.0% 1	100.0% 2	100.0% 1	100.0% 3	50.0% 1	100.0% 2	
		HACCP					100.0% 1		100.0% 1						
		Cecal													
Cattle		Retail	0.0% 0								0.0% 0	0.0% 0	0.0% 0	0.0% 0	
		HACCP	8.3% 1	0.0% 0	14.3% 1	23.1% 3	0.0% 0	0.0% 0	0.0% 0	0.0% 0	6.7% 1	0.0% 0	0.0% 0	0.0% 0	
		Cecal (Beef)											0.0% 0		
Cecal (Dairy)												0.0% 0	0.0% 0		
Swine		Retail			0.0% 0	0.0% 0	0.0% 0	0.0% 0	50.0% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
		Cecal (Market Swine)											10.0% 2	0.0% 0	
		Cecal (Sows)											7.4% 2	0.0% 0	
Ceftriaxone (MIC ≥ 4 µg/ml)		Humans	0.0% 0	0.0% 0	0.0% 0	0.0% 0	3.8% 1	0.0% 0	11.4% 5	3.8% 2	1.6% 1	2.2% 2	6.6% 5	4.1% 3	
		Chickens	Retail				0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	25.0% 1	0.0% 0	0.0% 0	25.0% 1
			HACCP	0.0% 0	0.0% 0	5.9% 1	6.3% 1	0.0% 0	0.0% 0	0.0% 0	25.0% 1	6.3% 1	0.0% 0	5.7% 2	2.3% 1
			Cecal											0.0% 0	0.0% 0
	Turkeys	Retail						0.0% 0	100.0% 1	100.0% 2	100.0% 1	100.0% 3	50.0% 1	100.0% 2	
		HACCP					100.0% 1		100.0% 1						
		Cecal													
	Cattle	Retail	0.0% 0								0.0% 0	0.0% 0	0.0% 0	0.0% 0	
		HACCP	8.3% 1	0.0% 0	14.3% 1	23.1% 3	0.0% 0	0.0% 0	0.0% 0	0.0% 0	6.7% 1	0.0% 0	0.0% 0	0.0% 0	
		Cecal (Beef)											0.0% 0		
	Cecal (Dairy)											0.0% 0	0.0% 0		
	Swine	Retail			0.0% 0	0.0% 0	0.0% 0	0.0% 0	50.0% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
		Cecal (Market Swine)											10.0% 2	0.0% 0	
		Cecal (Sows)											7.4% 2	0.0% 0	

Table 35c. Antimicrobial Resistance among *Salmonella* Infantis Isolates, 2003-2014

Year			2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
Number of Isolates Tested	Humans		31	29	30	22	26	51	44	53	63	90	76	73	
		Retail Chickens	0	0	0	1	1	5	3	3	4	3	8	4	
	Chickens	HACCP	27	19	17	16	16	14	3	4	16	31	35	43	
		Cecal											1	1	
		Retail Ground Turkey	0	0	0	0	0	1	1	2	1	3	2	2	
	Turkeys	HACCP	0	0	0	0	1	0	1	0	0	0	0	0	
		Cecal											0	0	
		Retail Ground Beef	1	0	0	0	0	0	0	0	3	1	2	1	
	Cattle	HACCP	12	18	7	13	13	4	1	5	15	4	7	6	
		Cecal (Beef)											3	0	
		Cecal (Dairy)											0	2	
	Swine	Retail Pork Chops	0	0	1	2	5	1	2	1	1	1	1	5	
		Cecal (Market Swine)											20	22	
		Cecal (Sows)											27	36	
Antimicrobial Class	Antimicrobial (Resistance Breakpoint)	Isolate Source													
Folate Pathway Inhibitor	Sulfamethoxazole/ Sulfisoxazole ¹ (MIC ≥ 512 µg/ml)	Humans	9.7% 3	3.4% 1	6.7% 2	9.1% 2	3.8% 1	3.9% 2	6.8% 3	7.5% 4	4.8% 3	3.3% 3	9.2% 7	5.5% 4	
		Chickens	Retail				0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	12.5% 1	0.0% 0
			HACCP	0.0% 0	10.5% 2	0.0% 0	6.3% 1	0.0% 0	0.0% 0	0.0% 0	25.0% 1	0.0% 0	16.1% 5	0.0% 0	2.3% 1
			Cecal											0.0% 0	0.0% 0
		Turkeys	Retail						0.0% 0	100.0% 1	100.0% 2	100.0% 1	100.0% 3	100.0% 2	100.0% 2
			HACCP					100.0% 1		100.0% 1					
			Cecal												
		Cattle	Retail	0.0% 0								0.0% 0	0.0% 0	0.0% 0	0.0% 0
			HACCP	8.3% 1	0.0% 0	14.3% 1	15.4% 2	0.0% 0	0.0% 0	0.0% 0	0.0% 0	6.7% 1	25.0% 1	0.0% 0	0.0% 0
			Cecal (Beef)											0.0% 0	
			Cecal (Dairy)											0.0% 0	0.0% 0
		Swine	Retail			0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
			Cecal (Market Swine)											10.0% 2	4.5% 1
			Cecal (Sows)											7.4% 2	0.0% 0
	Trimethoprim- Sulfamethoxazole (MIC ≥ 4 / 76 µg/ml)	Humans	3.2% 1	3.4% 1	0.0% 0	0.0% 0	0.0% 0	2.0% 1	2.3% 1	1.9% 1	1.6% 1	4.4% 4	3.9% 3	2.7% 2	
		Chickens	Retail				0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
			HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
			Cecal											0.0% 0	0.0% 0
		Turkeys	Retail						0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
			HACCP					0.0% 0		0.0% 0					
			Cecal												
		Cattle	Retail	0.0% 0								0.0% 0	0.0% 0	0.0% 0	0.0% 0
			HACCP	0.0% 0	0.0% 0	0.0% 0	7.7% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	6.7% 1	0.0% 0	0.0% 0	0.0% 0
			Cecal (Beef)											0.0% 0	
			Cecal (Dairy)											0.0% 0	0.0% 0
		Swine	Retail			0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
			Cecal (Market Swine)											0.0% 0	0.0% 0
			Cecal (Sows)											3.7% 1	0.0% 0
Macrolides	Azithromycin (MIC ≥ 32 µg/ml)	Humans									0.0% 0	0.0% 0	0.0% 0	0.0% 0	
		Chickens	Retail									0.0% 0	0.0% 0	0.0% 0	0.0% 0
			HACCP									0.0% 0	0.0% 0	0.0% 0	0.0% 0
			Cecal											0.0% 0	0.0% 0
		Turkeys	Retail									0.0% 0	0.0% 0	0.0% 0	0.0% 0
			HACCP									0.0% 0	0.0% 0	0.0% 0	
			Cecal												
		Cattle	Retail									0.0% 0	0.0% 0	0.0% 0	0.0% 0
			HACCP									0.0% 0	0.0% 0	0.0% 0	0.0% 0
			Cecal (Beef)											0.0% 0	
			Cecal (Dairy)											0.0% 0	0.0% 0
		Swine	Retail									0.0% 0	0.0% 0	0.0% 0	0.0% 0
			Cecal (Market Swine)											0.0% 0	0.0% 0
			Cecal (Sows)											3.7% 1	0.0% 0

¹ Sulfamethoxazole was tested from 1996-2003 and was replaced by sulfisoxazole in 2004

Table 35d. Antimicrobial Resistance among *Salmonella* Infantis Isolates, 2003-2014

Year			2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014		
Number of Isolates Tested	Humans		31	29	30	22	26	51	44	53	63	90	76	73		
	Chickens	Retail Chickens	0	0	0	1	1	5	3	3	4	3	8	4		
		HACCP	27	19	17	16	16	14	3	4	16	31	35	43		
		Cecal											1	1		
	Turkeys	Retail Ground Turkey	0	0	0	0	0	1	1	2	1	3	2	2		
		HACCP	12	18	7	13	13	4	1	5	15	4	7	6		
		Cecal											3	0		
	Cattle	Retail Ground Beef	1	0	0	0	0	0	0	0	0	3	1	2		
		HACCP	12	18	7	13	13	4	1	5	15	4	7	6		
		Cecal (Beef)											3	0		
	Swine	Retail Pork Chops	0	0	1	2	5	1	2	1	1	1	1	1		
		Cecal (Market Swine)												20		
		Cecal (Sows)											27	36		
	Antimicrobial Class	Antimicrobial (Resistance Breakpoint)	Isolate Source													
Penicillins	Ampicillin (MIC ≥ 32 µg/ml)	Humans		0.0% 0	0.0% 0	0.0% 0	0.0% 0	3.8% 1	2.0% 1	13.6% 6	5.7% 3	1.6% 1	2.2% 2	9.2% 7	6.8% 5	
		Chickens	Retail				0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	25.0% 1	0.0% 0	0.0% 0	25.0% 1	
			HACCP	0.0% 0	0.0% 0	5.9% 1	18.8% 3	0.0% 0	0.0% 0	0.0% 0	25.0% 1	6.3% 1	0.0% 0	5.7% 2	2.3% 1	
			Cecal											0.0% 0	0.0% 0	
		Turkeys	Retail						0.0% 0	100.0% 1	100.0% 2	100.0% 1	100.0% 3	50.0% 1	100.0% 2	
			HACCP						100.0% 1		100.0% 1					
			Cecal													
		Cattle	Retail	0.0% 0									0.0% 0	0.0% 0	0.0% 0	0.0% 0
			HACCP	8.3% 1	14.3% 1	23.1% 3	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	6.7% 1	0.0% 0	0.0% 0	0.0% 0
			Cecal (Beef)												0.0% 0	
		Swine	Retail			0.0% 0	0.0% 0	0.0% 0	0.0% 0	50.0% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
			Cecal (Market Swine)												10.0% 2	9.1% 2
			Cecal (Sows)												7.4% 2	0.0% 0
		Phenicolis	Chloramphenicol (MIC ≥ 32 µg/ml)	Humans		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	2.0% 1	4.5% 2	3.8% 2	1.6% 1	1.1% 1	3.9% 3
Chickens	Retail						0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	25.0% 1	
	HACCP			0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
	Cecal														0.0% 0	
Turkeys	Retail								0.0% 0	100.0% 1	100.0% 2	100.0% 1	100.0% 3	50.0% 1	100.0% 2	
	HACCP								0.0% 0		0.0% 0					
	Cecal															
Cattle	Retail			0.0% 0									0.0% 0	0.0% 0	0.0% 0	0.0% 0
	HACCP			8.3% 1	0.0% 0	14.3% 1	15.4% 2	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	6.7% 1	0.0% 0	0.0% 0	0.0% 0
	Cecal (Beef)														0.0% 0	
Swine	Retail					0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
	Cecal (Market Swine)														5.0% 1	0.0% 0
	Cecal (Sows)														7.4% 2	0.0% 0
Quinolones	Ciprofloxacin (MIC ≥ 1 µg/ml)			Humans		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Chickens	Retail				0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
			HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
			Cecal												0.0% 0	
		Turkeys	Retail						0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
			HACCP						0.0% 0		0.0% 0					
			Cecal													
		Cattle	Retail	0.0% 0									0.0% 0	0.0% 0	0.0% 0	0.0% 0
			HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
			Cecal (Beef)												0.0% 0	
		Swine	Retail			0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
			Cecal (Market Swine)												0.0% 0	
			Cecal (Sows)												0.0% 0	

Table 35e. Antimicrobial Resistance among *Salmonella* Infantis Isolates, 2003-2014

Year			2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014				
Number of Isolates Tested	Humans		31	29	30	22	26	51	44	53	63	90	76	73				
	Chickens	Retail Chickens	0	0	0	1	1	5	3	3	4	3	8	4				
		HACCP	27	19	17	16	16	14	3	4	16	31	35	43				
		Cecal											1	1				
	Turkeys	Retail Ground Turkey	0	0	0	0	0	1	1	2	1	3	2	2				
		HACCP	0	0	0	0	1	0	1	0	0	0	0	0				
		Cecal											0	0				
	Cattle	Retail Ground Beef	1	0	0	0	0	0	0	0	3	1	2	1				
		HACCP	12	18	7	13	13	4	1	5	15	4	7	6				
		Cecal (Beef)											3	0				
	Swine	Retail Pork Chops	0	0	1	2	5	1	2	1	1	1	1	5				
		Cecal (Market Swine)											20	22				
		Cecal (Sows)											27	36				
Antimicrobial Class	Antimicrobial (Resistance Breakpoint)	Isolate Source																
Quinolones	Nalidixic Acid (MIC ≥ 32 µg/ml)	Humans		6.5% 2	3.4% 1	3.3% 1	0.0% 0	0.0% 0	2.0% 1	2.3% 1	0.0% 0	1.6% 1	4.4% 4	5.3% 4	4.1% 3			
		Chickens	Retail				0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	25.0% 1		
			HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	4.7% 2			
			Cecal												0.0% 0	0.0% 0		
		Turkeys	Retail						0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		
			HACCP						0.0% 0	0.0% 0								
			Cecal															
		Cattle	Retail	0.0% 0									0.0% 0	0.0% 0	0.0% 0	0.0% 0		
			HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0			
			Cecal (Beef)												0.0% 0	0.0% 0		
		Swine	Retail			0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		
			Cecal (Market Swine)												0.0% 0	0.0% 0		
			Cecal (Sows)												0.0% 0	0.0% 0		
		Tetracyclines	Tetracycline (MIC ≥ 16 µg/ml)	Humans		6.5% 2	0.0% 0	3.3% 1	4.5% 1	7.7% 2	3.9% 2	11.4% 5	3.8% 2	4.8% 3	4.4% 4	13.2% 10	8.2% 6	
				Chickens	Retail				0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	25.0% 1
					HACCP	0.0% 0	5.3% 1	0.0% 0	12.5% 2	0.0% 0	0.0% 0	0.0% 0	25.0% 1	0.0% 0	0.0% 0	5.7% 2	9.3% 4	
					Cecal												0.0% 0	0.0% 0
Turkeys	Retail								0.0% 0	100.0% 1	100.0% 2	100.0% 1	100.0% 3	100.0% 2	100.0% 2			
	HACCP							100.0% 1		100.0% 1								
	Cecal																	
Cattle	Retail			0.0% 0									0.0% 0	0.0% 0	0.0% 0	0.0% 0		
	HACCP			8.3% 1	0.0% 0	28.6% 2	15.4% 2	0.0% 0	0.0% 0	0.0% 0	20.0% 1	6.7% 1	25.0% 1	0.0% 0	0.0% 0			
	Cecal (Beef)														0.0% 0	0.0% 0		
Swine	Retail					0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	40.0% 2			
	Cecal (Market Swine)														15.0% 3	13.6% 3		
	Cecal (Sows)														11.1% 3	0.0% 0		

Multidrug Resistance

Table 36a. Resistance Patterns among *Salmonella* Infantis Isolates, 2003-2014¹

Year		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
Number of Isolates Tested	Humans	31	29	30	22	26	51	44	53	63	90	76	73	
	Chickens	Retail Chickens	0	0	0	1	1	5	3	3	4	3	8	4
		HACCP	27	19	17	16	16	14	3	4	16	31	35	43
		Cecal											1	1
	Turkeys	Retail Ground Turkeys	0	0	0	0	0	1	1	2	1	3	2	2
		HACCP	0	0	0	0	1	0	1	0	0	0	0	0
		Cecal											0	0
	Cattle	Retail Ground Beef	1	0	0	0	0	0	0	0	3	1	2	1
		HACCP	12	18	7	13	13	4	1	5	15	4	7	6
		Cecal (Beef)											1	0
		Cecal (Dairy)											3	2
	Swine	Retail Pork Chops	0	0	1	2	5	1	2	1	1	1	1	5
		Cecal (Market Swine)											20	22
Cecal (Sows)												27	36	
Resistance Pattern	Source													
1. No Resistance Detected	Humans	83.9% 26	93.1% 27	90.0% 27	90.9% 20	92.3% 24	96.1% 49	84.1% 37	88.7% 47	93.7% 59	92.2% 83	81.6% 62	84.9% 62	
	Chickens	Retail Chickens				100.0% 1	100.0% 1	100.0% 5	100.0% 3	100.0% 3	75.0% 3	100.0% 3	87.5% 7	75.0% 3
		HACCP	100.0% 27	89.5% 17	94.1% 16	81.3% 13	100.0% 16	100.0% 14	100.0% 3	75.0% 3	93.8% 15	83.9% 26	88.6% 31	88.4% 38
		Cecal											100.0% 1	100.0% 1
	Turkeys	Retail Ground Turkeys						100.0% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		HACCP					0.0% 0		0.0% 0					
		Cecal												
	Cattle	Retail Ground Beef	100.0% 1								100.0% 3	100.0% 1	100.0% 2	100.0% 1
		HACCP	91.7% 11	100.0% 18	71.4% 5	76.9% 10	100.0% 13	100.0% 4	100.0% 1	80.0% 4	93.3% 14	75.0% 3	100.0% 7	100.0% 6
		Cecal (Beef)											100.0% 1	
		Cecal (Dairy)											100.0% 3	100.0% 2
	Swine	Retail Pork Chops			100.0% 1	100.0% 2	10.0% 5	100.0% 1	50.0% 1	100.0% 1	100.0% 1	100.0% 1	100.0% 1	60.0% 3
		Cecal (Market Swine)											80.0% 19	86.4% 19
Cecal (Sows)												88.9% 24	100.0% 36	
2. Resistant to ≥ 3 Antimicrobial Classes	Humans	3.2% 1	0.0% 0	3.3% 1	4.5% 1	7.7% 2	3.9% 2	13.6% 6	3.8% 2	6.3% 4	4.4% 4	10.5% 8	6.8% 5	
	Chickens	Retail Chickens				0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	25.0% 1	0.0% 0	0.0% 0	25.0% 1
		HACCP	0.0% 0	5.3% 1	5.9% 1	18.8% 3	0.0% 0	0.0% 0	0.0% 0	25.0% 1	6.3% 1	0.0% 0	5.7% 2	4.7% 2
		Cecal											0.0% 0	0.0% 0
	Turkeys	Retail Ground Turkeys						0.0% 0	100.0% 1	100.0% 2	100.0% 1	100.0% 3	100.0% 2	100.0% 2
		HACCP					100.0% 1		100.0% 1					
		Cecal												
	Cattle	Retail Ground Beef	0.0% 0								0.0% 0	0.0% 0	0.0% 0	0.0% 0
		HACCP	8.3% 1	0.0% 0	14.3% 1	23.1% 3	0.0% 0	0.0% 0	0.0% 0	0.0% 0	6.7% 1	25.0% 1	0.0% 0	0.0% 0
		Cecal (Beef)											0.0% 0	
		Cecal (Dairy)											0.0% 0	0.0% 0
	Swine	Retail Pork Chops			0.0% 0	0.0% 0	0.0% 0	0.0% 0	50.0% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Cecal (Market Swine)											15.0% 3	9.1% 2
Cecal (Sows)												7.4% 2	0.0% 0	
3. Resistant to ≥ 4 Antimicrobial Classes	Humans	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	2.0% 1	6.8% 3	1.9% 1	3.2% 2	2.2% 2	5.3% 4	5.5% 4	
	Chickens	Retail Chickens				0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	25.0% 1
		HACCP	0.0% 0	0.0% 0	0.0% 0	6.3% 1	0.0% 0	0.0% 0	0.0% 0	25.0% 1	0.0% 0	0.0% 0	0.0% 0	2.3% 1
		Cecal											0.0% 0	0.0% 0
	Turkeys	Retail Ground Turkeys						0.0% 0	100.0% 1	100.0% 2	100.0% 1	100.0% 3	50.0% 1	100.0% 2
		HACCP					100.0% 1		100.0% 1					
		Cecal												
	Cattle	Retail Ground Beef	0.0% 0								0.0% 0	0.0% 0	0.0% 0	0.0% 0
		HACCP	8.3% 1	0.0% 0	14.3% 1	15.4% 2	0.0% 0	0.0% 0	0.0% 0	0.0% 0	6.7% 1	0.0% 0	0.0% 0	0.0% 0
		Cecal (Beef)											0.0% 0	
		Cecal (Dairy)											0.0% 0	0.0% 0
	Swine	Retail Pork Chops			0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Cecal (Market Swine)											5.0% 1	0.0% 0
Cecal (Sows)												7.4% 2	0.0% 0	

¹ Starting in 2011, testing included nine antimicrobial classes with the addition of the macrolide azithromycin. Because resistance to azithromycin is low (in this case, <1%), antimicrobial class resistance data from 2011 and beyond are comparable to the data from previous years.

Table 36b. Resistance Patterns among *Salmonella* Infantis Isolates, 2003-2014¹

Year		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
Number of Isolates Tested	Humans	31	29	30	22	26	51	44	53	63	90	76	73	
	Chickens	Retail Chickens	0	0	0	1	1	5	3	3	4	3	8	4
		HACCP	27	19	17	16	16	14	3	4	16	31	35	43
		Cecal											1	1
	Turkeys	Retail Ground Turkeys	0	0	0	0	0	1	1	2	1	3	2	2
		HACCP	0	0	0	0	1	0	1	0	0	0	0	0
		Cecal											0	0
	Cattle	Retail Ground Beef	1	0	0	0	0	0	0	0	3	1	2	1
		HACCP	12	18	7	13	13	4	1	5	15	4	7	6
		Cecal (Beef)											1	0
	Swine	Retail Pork Chops	0	0	1	2	5	1	2	1	1	1	1	5
		Cecal (Market Swine)											20	22
		Cecal (Sows)											27	36
	Resistance Pattern		Source											
4. Resistant to ≥ 5 Antimicrobial Classes	Humans	0.0%	0.0%	0.0%	0.0%	0.0%	2.0%	4.5%	1.9%	0.0%	1.1%	5.3%	4.1%	
	Chickens	Retail Chickens	0	0	0	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	25.0%
		HACCP	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	25.0%	0.0%	0.0%	0.0%	0.0%
		Cecal								1	0	0	0.0%	0.0%
	Turkeys	Retail Ground Turkeys						0.0%	100.0%	100.0%	100.0%	100.0%	50.0%	100.0%
		HACCP					100.0%	1	1	2	1	3	1	2
		Cecal												
	Cattle	Retail Ground Beef	0.0%								0.0%	0.0%	0.0%	0.0%
		HACCP	8.3%	0.0%	14.3%	15.4%	0.0%	0.0%	0.0%	0.0%	6.7%	0.0%	0.0%	0.0%
		Cecal (Beef)	0	0	1	2	0	0	0	0	1	0	0.0%	0.0%
	Swine	Retail Pork Chops			0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
		Cecal (Market Swine)											5.0%	0.0%
		Cecal (Sows)											1	0
													7.4%	0.0%
													2	0
	5. At Least ACSSuT² Resistant	Humans	0.0%	0.0%	0.0%	0.0%	0.0%	2.0%	4.5%	1.9%	0.0%	0.0%	1.3%	1.4%
Chickens		Retail Chickens				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
		HACCP	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	25.0%	0.0%	0.0%	0.0%	0.0%
		Cecal								1	0	0	0.0%	0.0%
Turkeys		Retail Ground Turkeys						0.0%	100.0%	100.0%	100.0%	100.0%	50.0%	100.0%
		HACCP					0.0%	0	0	2	1	3	1	2
		Cecal												
Cattle		Retail Ground Beef	0.0%								0.0%	0.0%	0.0%	0.0%
		HACCP	8.3%	0.0%	14.3%	15.4%	0.0%	0.0%	0.0%	0.0%	6.7%	0.0%	0.0%	0.0%
		Cecal (Beef)	0	0	1	2	0	0	0	0	1	0	0.0%	0.0%
Swine		Retail Pork Chops			0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
		Cecal (Market Swine)											5.0%	0.0%
		Cecal (Sows)											1	0
												7.4%	0.0%	
												2	0	
6. At Least ACT/S³ Resistant		Humans	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.3%	2.7%
	Chickens	Retail Chickens				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
		HACCP	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
		Cecal											0.0%	0.0%
	Turkeys	Retail Ground Turkeys						0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
		HACCP					0.0%	0	0	0	0	0	0	0
		Cecal												
	Cattle	Retail Ground Beef	0.0%								0.0%	0.0%	0.0%	0.0%
		HACCP	0.0%	0.0%	0.0%	7.7%	0.0%	0.0%	0.0%	0.0%	6.7%	0.0%	0.0%	0.0%
		Cecal (Beef)	0	0	0	1	0	0	0	0	1	0	0.0%	0.0%
	Swine	Retail Pork Chops			0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
		Cecal (Market Swine)											0.0%	0.0%
		Cecal (Sows)											0	0
													3.7%	0.0%
													1	0

¹ Starting in 2011, testing included nine antimicrobial classes with the addition of the macrolide azithromycin. Because resistance to azithromycin is low (in this case, <1%), antimicrobial class resistance data from 2011 and beyond are comparable to the data from previous years.

² ACSSuT = ampicillin, chloramphenicol, streptomycin, sulfamethoxazole/sulfisoxazole, and tetracycline

³ ACT/S = ampicillin, chloramphenicol, and trimethoprim-sulfamethoxazole

Table 36c. Resistance Patterns among *Salmonella* Infantis Isolates, 2003-2014

Year			2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Number of Isolates Tested	Humans		31	29	30	22	26	51	44	53	63	90	76	73
	Chickens	Retail Chickens	0	0	0	1	1	5	3	3	4	3	8	4
		HACCP	27	19	17	16	16	14	3	4	16	31	35	43
		Cecal											1	1
	Turkeys	Retail Ground Turkeys	0	0	0	0	0	1	1	2	1	3	2	2
		HACCP	0	0	0	0	1	0	1	0	0	0	0	0
		Cecal											0	0
	Cattle	Retail Ground Beef	1	0	0	0	0	0	0	0	3	1	2	1
		HACCP	12	18	7	13	13	4	1	5	15	4	7	6
		Cecal (Beef)											1	0
	Swine	Retail Pork Chops	0	0	1	2	5	1	2	1	1	1	1	5
		Cecal (Market Swine)											20	22
		Cecal (Sows)											27	36
Resistance Pattern		Source												
7. At Least ACSSuTAuCx ¹ Resistant	Humans		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	4.5% 2	1.9% 1	0.0% 0	0.0% 0	1.3% 1	0.0% 0
	Chickens	Retail Chickens				0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	25.0% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Cecal											0.0% 0	0.0% 0
	Turkeys	Retail Ground Turkeys						0.0% 0	100.0% 1	100.0% 2	100.0% 1	100.0% 3	50.0% 1	100.0% 2
		HACCP					0.0% 0		0.0% 0					
		Cecal												
	Cattle	Retail Ground Beef	0.0% 0								0.0% 0	0.0% 0	0.0% 0	0.0% 0
		HACCP	8.3% 1	0.0% 0	14.3% 1	15.4% 2	0.0% 0	0.0% 0	0.0% 0	0.0% 0	6.7% 1	0.0% 0	0.0% 0	0.0% 0
		Cecal (Beef)											0.0% 0	
	Swine	Retail Pork Chops			0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Cecal (Market Swine)											5.0% 1	0.0% 0
		Cecal (Sows)											7.4% 2	0.0% 0
8. At Least Ceftriaxone and Nalidixic Acid Resistant	Humans		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	1.1% 1	2.6% 2	2.7% 2
	Chickens	Retail Chickens				0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	25.0% 1
		HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Cecal											0.0% 0	0.0% 0
	Turkeys	Retail Ground Turkeys						0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		HACCP					0.0% 0		0.0% 0					
		Cecal												
	Cattle	Retail Ground Beef	0.0% 0								0.0% 0	0.0% 0	0.0% 0	0.0% 0
		HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Cecal (Beef)											0.0% 0	
	Swine	Retail Pork Chops			0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Cecal (Market Swine)											0.0% 0	0.0% 0
		Cecal (Sows)											0.0% 0	0.0% 0

¹ ACSSuTAuCx = ACSSuT, amoxicillin-clavulanic acid, and ceftriaxone

Table 37b. Antimicrobial Resistance among *Salmonella* Heidelberg Isolates, 2003-2014

Year		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014		
Number of Isolates Tested	Humans	96	92	125	102	98	75	86	62	70	41	60	71		
	Chickens	Retail Chickens	16	31	22	30	14	30	44	21	11	17	28	24	
		HACCP	226	167	283	164	142	94	74	25	28	81	29	108	
		Cecal											9	7	
	Turkeys	Retail Ground Turkey	32	37	53	35	41	57	10	17	28	5	17	6	
		HACCP	57	46	25	43	23	8	3	14	5	19	6	30	
		Cecal											2	3	
	Cattle	Retail Ground Beef	0	0	0	0	0	1	0	0	0	0	1	0	
		HACCP	9	1	6	4	0	3	0	2	0	2	2	1	
		Cecal (Beef) Cecal (Dairy)											1	0	
	Swine	Retail Pork Chops	0	3	0	4	0	0	1	0	1	1	2	0	
		Cecal (Market Swine)											1	0	
		Cecal (Sows)											3	0	
Antimicrobial Class	Antimicrobial (Resistance Breakpoint)	Isolate Source													
Cephems	Cefoxitin (MIC ≥ 32 µg/ml)	Humans	5.2% 5	7.6% 7	8.8% 11	8.8% 9	7.1% 7	8.0% 6	19.8% 17	24.2% 15	8.6% 6	22.0% 9	15.0% 9	8.5% 6	
		Chickens	Retail	6.3% 1	9.7% 3	9.1% 2	10.0% 3	21.4% 3	16.7% 5	31.8% 14	14.3% 3	0.0% 0	0.0% 0	0.0% 0	12.5% 3
			HACCP	7.1% 16	10.2% 17	21.6% 61	15.2% 25	16.9% 24	8.5% 8	17.6% 13	32.0% 8	17.9% 5	6.2% 5	6.9% 2	7.4% 8
			Cecal											11.1% 1	0.0% 0
		Turkeys	Retail	0.0% 0	5.4% 2	9.4% 5	17.1% 6	9.8% 4	3.5% 2	10.0% 1	23.5% 4	35.7% 10	0.0% 0	23.5% 4	0.0% 0
			HACCP	0.0% 0	6.5% 3	0.0% 0	9.3% 4	17.4% 4	12.5% 1	33.3% 1	35.7% 5	20.0% 1	10.5% 2	66.7% 4	30.0% 9
			Cecal											0.0% 0	100.0% 3
		Cattle	Retail						0.0% 0					0.0% 0	
			HACCP	44.4% 4	100.0% 1	66.7% 4	0.0% 0		33.3% 1		50.0% 1		0.0% 0	50.0% 1	0.0% 0
			Cecal (Beef) Cecal (Dairy)											100.0% 1	
		Swine	Retail		0.0% 0		0.0% 0			100.0% 1		0.0% 0	2.0% 0	0.0% 0	
			Cecal (Market Swine)											0.0% 0	
	Cecal (Sows)												66.7% 2		
	Ceftiofur (MIC ≥ 8 µg/ml)	Humans	5.2% 5	8.7% 8	8.8% 11	9.8% 10	7.1% 7	8.0% 6	20.9% 18	24.2% 15	8.6% 6	22.0% 9	15.0% 9	8.5% 6	
		Chickens	Retail	6.3% 1	9.7% 3	9.1% 2	10.0% 3	21.4% 3	16.7% 5	31.8% 14	19.0% 4	0.0% 0	0.0% 0	0.0% 0	12.5% 3
			HACCP	9.3% 21	10.2% 17	21.9% 62	15.9% 26	16.9% 24	8.5% 8	17.6% 13	32.8% 8	17.9% 5	7.4% 6	10.3% 3	8.3% 9
			Cecal											11.1% 1	0.0% 0
		Turkeys	Retail	0.0% 0	5.4% 2	9.4% 5	17.1% 6	9.8% 4	3.5% 2	10.0% 1	23.5% 4	39.3% 11	0.0% 0	23.5% 4	0.0% 0
			HACCP	0.0% 0	6.5% 3	0.0% 0	9.3% 4	26.1% 6	12.5% 1	33.3% 1	35.7% 5	20.0% 1	10.5% 2	66.7% 4	30.0% 9
			Cecal											0.0% 0	100.0% 3
		Cattle	Retail						0.0% 0					0.0% 0	
			HACCP	55.6% 5	100.0% 1	83.3% 5	0.0% 0		33.3% 1		50.0% 1		0.0% 0	50.0% 1	0.0% 0
			Cecal (Beef) Cecal (Dairy)											100.0% 1	
		Swine	Retail		0.0% 0		0.0% 0			100.0% 1		0.0% 0	0.0% 0	0.0% 0	
			Cecal (Market Swine)											0.0% 0	
	Cecal (Sows)												66.7% 2		
	Ceftriaxone (MIC ≥ 4 µg/ml)	Humans	5.2% 5	8.7% 8	8.8% 11	9.8% 10	7.1% 7	8.0% 6	20.9% 18	24.2% 15	8.6% 6	22.0% 9	15.0% 9	8.5% 6	
		Chickens	Retail	6.3% 1	9.7% 3	9.1% 2	10.0% 3	21.4% 3	16.7% 5	31.8% 14	23.8% 5	0.0% 0	0.0% 0	0.0% 0	12.5% 3
			HACCP	9.3% 21	10.2% 17	21.9% 62	15.9% 26	17.6% 25	8.5% 8	17.6% 13	32.0% 8	17.9% 5	7.4% 6	10.3% 3	8.3% 9
			Cecal											11.1% 1	0.0% 0
		Turkeys	Retail	0.0% 0	5.4% 2	9.4% 5	17.1% 6	9.8% 4	3.5% 2	10.0% 1	23.5% 4	39.3% 11	0.0% 0	23.5% 4	0.0% 0
			HACCP	0.0% 0	6.5% 3	0.0% 0	9.3% 4	26.1% 6	12.5% 1	33.3% 1	35.7% 5	20.0% 1	10.5% 2	66.7% 4	30.0% 9
			Cecal											0.0% 0	100.0% 3
		Cattle	Retail						0.0% 0					0.0% 0	
			HACCP	55.6% 5	100.0% 1	83.3% 5	0.0% 0		33.3% 1		50.0% 1		0.0% 0	50.0% 1	0.0% 0
			Cecal (Beef) Cecal (Dairy)											100.0% 1	
Swine		Retail		0.0% 0		0.0% 0			100.0% 1		0.0% 0	0.0% 0	0.0% 0		
		Cecal (Market Swine)											0.0% 0		
	Cecal (Sows)											66.7% 2			

Table 37c. Antimicrobial Resistance among *Salmonella* Heidelberg Isolates, 2003-2014

Year		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014		
Number of Isolates Tested	Humans	96	92	125	102	98	75	86	62	70	41	60	71		
	Chickens	Retail Chickens	16	31	22	30	14	30	44	21	11	17	28	24	
		HACCP	226	167	283	164	142	94	74	25	28	81	29	108	
		Cecal											9	7	
	Turkeys	Retail Ground Turkey	32	37	53	35	41	57	10	17	28	5	17	6	
		HACCP	57	46	25	43	23	8	3	14	5	19	6	30	
		Cecal											2	3	
	Cattle	Retail Ground Beef	0	0	0	0	0	1	0	0	0	0	1	0	
		HACCP	9	1	6	4	0	3	0	2	0	2	2	1	
		Cecal (Beef) Cecal (Dairy)											1	0	
	Swine	Retail Pork Chops	0	3	0	4	0	0	1	0	1	1	2	0	
		Cecal (Market Swine)											1	0	
		Cecal (Sows)											3	0	
Antimicrobial Class	Antimicrobial (Resistance Breakpoint)	Isolate Source													
Folate Pathway Inhibitor	Sulfamethoxazole/ Sulfisoxazole ¹ (MIC ≥ 512 µg/ml)	Humans	7.3%	7.6%	8.0%	4.9%	18.4%	12.0%	7.0%	11.3%	7.1%	2.4%	15.0%	15.5%	
		Chickens	Retail	7	7	10	5	18	9	6	7	5	1	9	11
			HACCP	12.5%	12.9%	13.6%	26.7%	7.1%	26.7%	2.3%	9.5%	0.0%	0.0%	17.9%	29.2%
			Cecal	2	4	3	8	1	8	1	2	0	0	5	7
		Turkeys	HACCP	11.1%	12.6%	10.6%	7.9%	13.4%	12.8%	21.6%	36.0%	17.9%	13.6%	10.3%	11.1%
			Cecal	25	21	30	13	19	12	16	9	5	11	3	12
			Cecal											11.1%	0.0%
		Cattle	Retail	15.6%	37.8%	35.8%	37.1%	26.8%	29.8%	50.0%	35.3%	32.1%	20.0%	29.4%	83.3%
			HACCP	5	14	19	13	11	17	5	6	9	1	5	5
			Cecal	19.3%	26.1%	52.0%	30.2%	34.8%	37.5%	0.0%	28.6%	40.0%	21.1%	50.0%	43.3%
		Swine	Cecal	11	12	13	13	8	3	0	4	2	4	3	13
			Cecal											50.0%	100.0%
			Cecal											1	3
		Cattle	Retail						100.0%					100.0%	
			HACCP	44.4%	100.0%	50.0%	0.0%		33.3%		50.0%		50.0%	50.0%	100.0%
	Cecal (Beef) Cecal (Dairy)		4	1	3	0		1		1		1	1	1	
	Swine	Retail		0.0%		100.0%			100.0%		0.0%	0.0%	0.0%		
		Cecal (Market Swine)		0		4			1		0	0	0		
		Cecal (Sows)											33.3%		
	Trimethoprim- Sulfamethoxazole (MIC ≥ 4 / 76 µg/ml)	Humans	2.1%	0.0%	0.8%	0.0%	0.0%	2.7%	3.5%	0.0%	1.4%	0.0%	1.7%	2.8%	
		Chickens	Retail	2	0	1	0	0	2	3	0	1	0	1	2
			HACCP	0.0%	0.0%	0.0%	6.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
			Cecal	0	0	0	2	0	0	0	0	0	0	0	0
		Turkeys	HACCP	0.9%	0.0%	0.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.9%
			Cecal	2	0	1	0	0	0	0	0	0	0	0	2
			Cecal											0.0%	0.0%
		Cattle	Retail	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	10.7%	0.0%	0.0%	0.0%
			HACCP	0	0	0	0	0	0	0	0	3	0	0	0
			Cecal	3.5%	0.0%	0.0%	0.0%	4.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	3.3%
		Swine	Cecal	2	0	0	0	1	0	0	0	0	0	0	1
			Cecal											0.0%	33.3%
			Cecal											0	1
		Cattle	Retail						0.0%					0.0%	
HACCP			55.6%	100.0%	50.0%	0.0%		0.0%		0.0%		50.0%	0.0%	0.0%	
Cecal (Beef) Cecal (Dairy)			5	1	3	0		0		0		1	0	0	
Swine		Retail		0.0%		100.0%			100.0%		0.0%	0.0%	0.0%		
		Cecal (Market Swine)		0		4			1		0	0	0		
	Cecal (Sows)											0.0%			
Macrolides	Azithromycin (MIC ≥ 32 µg/ml)	Humans								0.0%	0.0%	0.0%	0.0%		
		Chickens	Retail								0	0	0	0	
			HACCP								0	0	0	0	
			Cecal								0	0	0	0	
		Turkeys	Retail								0	0	0	0	
			HACCP								0	0	0	3.3%	
			Cecal								0	0	0	33.3%	
		Cattle	Retail											0.0%	
			HACCP										0.0%	0.0%	
			Cecal (Beef) Cecal (Dairy)										0	0	
		Swine	Retail									0.0%	0.0%	0.0%	
			Cecal (Market Swine)									0	0	0	
			Cecal (Sows)											0.0%	

¹ Sulfamethoxazole was tested from 1996-2003 and was replaced by sulfisoxazole in 2004

Table 37d. Antimicrobial Resistance among *Salmonella* Heidelberg Isolates, 2003-2014

Year			2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
Number of Isolates Tested	Humans		96	92	125	102	98	75	86	62	70	41	60	71	
		Chickens	Retail Chickens	16	31	22	30	14	30	44	21	11	17	28	24
			HACCP	226	167	283	164	142	94	74	25	28	81	29	108
	Turkeys	Retail Ground Turkey	32	37	53	35	41	57	10	17	28	5	17	6	
		HACCP	9	1	6	4	0	3	0	2	0	2	2	30	
		Cecal											1	3	
	Cattle	Retail Ground Beef	0	0	0	0	0	1	0	0	0	0	1	0	
		HACCP	9	1	6	4	0	3	0	2	0	2	2	1	
		Cecal (Beef)											1	0	
	Swine	Retail Pork Chops	0	3	0	4	0	0	1	0	1	1	2	0	
		Cecal (Market Swine)											1	0	
		Cecal (Sows)											3	0	
	Antimicrobial Class	Antimicrobial (Resistance Breakpoint)	Isolate Source												
Penicillins	Ampicillin (MIC ≥ 32 µg/ml)	Humans	10.4%	25.0%	20.0%	18.6%	18.4%	28.0%	27.9%	38.7%	30.0%	26.8%	33.3%	22.5%	
		Chickens	Retail	10	23	25	19	18	21	24	24	21	11	20	16
			HACCP	18.8%	25.8%	27.3%	16.7%	21.4%	23.3%	31.8%	19.0%	0.0%	0.0%	3.6%	20.8%
			Cecal	3	8	6	5	3	7	14	4	0	0	1	5
		Turkeys	HACCP	19.0%	16.2%	25.1%	16.5%	20.4%	13.8%	20.3%	40.0%	21.4%	9.9%	24.1%	12.0%
			Cecal	43	27	71	27	29	13	15	10	6	8	7	13
														33.3%	0.0%
		Cattle	Retail	9.4%	13.5%	18.9%	31.4%	53.7%	82.5%	80.0%	70.6%	96.4%	100.0%	82.4%	33.3%
			HACCP	3	5	10	11	22	47	8	12	27	5	14	2
			Cecal (Beef)	3.5%	17.4%	24.0%	37.2%	65.2%	50.0%	66.7%	57.1%	60.0%	57.9%	66.7%	43.3%
		Swine	Cecal (Dairy)	2	8	6	16	15	4	2	8	3	11	4	13
			Retail						0.0%	0			0.0%	0	
			HACCP	55.6%	100.0%	83.3%	0.0%		66.7%		50.0%		0.0%	50.0%	0.0%
		Swine	Cecal (Beef)	5	1	5	0		2		1		0	1	0
			Cecal (Dairy)											100.0%	
			Retail		0.0%		0.0%			100.0%		0.0%	100.0%	50.0%	1
Swine	Cecal (Market Swine)											0.0%			
	Cecal (Sows)											66.7%	2		
													9.9%		
Phenicolns	Chloramphenicol (MIC ≥ 32 µg/ml)	Humans	0.0%	1.1%	0.8%	0.0%	3.1%	1.3%	4.7%	1.6%	4.3%	0.0%	6.7%	7	
		Chickens	Retail	0	1	1	0	3	1	4	1	3	0	4	7
			HACCP	0.0%	3.2%	0.0%	0.0%	7.1%	3.3%	0.0%	0.0%	0.0%	0.0%	3.9%	20.8%
			Cecal	0	1	0	0	1	1	0	0	0	0	1	5
		Turkeys	HACCP	3.1%	4.2%	3.2%	2.4%	4.2%	4.3%	5.4%	20.0%	3.6%	6.2%	3.4%	5.6%
			Cecal	7	7	9	4	6	4	4	5	1	5	1	6
														0.0%	0.0%
		Cattle	Retail	0.0%	5.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	10.7%	0.0%	0.0%	0.0%
			HACCP	0	2	0	0	0	0	0	0	3	0	0	0
			Cecal	0.0%	0.0%	0.0%	4.7%	4.3%	12.5%	0.0%	0.0%	0.0%	0.0%	0.0%	3.3%
		Swine	Cecal	0	0	0	2	1	1	0	0	0	0	0	1
			Retail						0.0%					0.0%	
			HACCP	44.4%	100.0%	50.0%	0.0%		0.0%		0.0%		50.0%	50.0%	100.0%
		Swine	Cecal (Beef)	4	1	3	0		0		0		1	1	1
			Cecal (Dairy)											100.0%	
			Retail		0.0%		0.0%			0.0%		0.0%	0.0%	0.0%	0
Swine	Cecal (Market Swine)											0.0%	0		
	Cecal (Sows)											33.3%	1		
													0.0%		
Quinolones	Ciprofloxacin (MIC ≥ 1 µg/ml)	Humans	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
		Chickens	Retail	0	0	0	0	0	0	0	0	0	0	0	0
			HACCP	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
			Cecal	0	0	0	0	0	0	0	0	0	0	0	0
		Turkeys	Retail												
			HACCP	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
			Cecal	0	0	0	0	0	0	0	0	0	0	0	0
		Cattle	Retail						0.0%					0.0%	
			HACCP	0.0%	0.0%	0.0%	0.0%		0.0%		0.0%		0.0%	0.0%	0.0%
			Cecal (Beef)	0	0	0	0		0		0		0	0	0
		Swine	Cecal (Dairy)											0.0%	0
			Retail		0.0%		0.0%			0.0%		0.0%	0.0%	0.0%	0
			Cecal (Market Swine)											0.0%	0
		Swine	Cecal (Sows)											0.0%	0
															0.0%
															0.0%

Table 37e. Antimicrobial Resistance among *Salmonella* Heidelberg Isolates, 2003-2014

Year			2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014		
Number of Isolates Tested	Humans		96	92	125	102	98	75	86	62	70	41	60	71		
		Chickens	Retail Chickens	16	31	22	30	14	30	44	21	11	17	28	24	
			HACCP	226	167	283	164	142	94	74	25	28	81	29	108	
	Turkeys	Retail Ground Turkey	32	37	53	35	41	57	10	17	28	5	17	6		
		HACCP	57	46	25	43	23	8	3	14	5	19	6	30		
		Cecal											2	3		
	Cattle	Retail Ground Beef	0	0	0	0	0	1	0	0	0	0	0	1	0	
		HACCP	9	1	6	4	0	3	0	2	0	0	2	2	1	
		Cecal (Beef)												1	0	
	Swine	Retail Pork Chops	0	3	0	4	0	0	1	0	1	1	1	2	0	
		Cecal (Market Swine)												1	0	
		Cecal (Sows)												3	0	
	Antimicrobial Class	Antimicrobial (Resistance Breakpoint)	Isolate Source													
	Quinolones	Nalidixic Acid (MIC ≥ 32 µg/ml)	Humans		1.0%	0.0%	0.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	4.2%
Retail				1	0	1	0	0	0	0	0	0	0	0	0	3
HACCP				0	0	0	1	0	0	0	0	0	0	0	0	0
Chickens			Retail	0.0%	0.0%	0.0%	3.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
			HACCP	0	0	0	0	0	0	0	0	0	0	0	0	0
			Cecal	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Turkeys			Retail	0.0%	0.0%	1.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
			HACCP	0	0	1	0	0	0	0	0	0	0	0	0	0
			Cecal	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Cattle			Retail							0.0%					0.0%	
			HACCP	0.0%	0.0%	0.0%	0.0%			0.0%		0.0%		0.0%	0.0%	0.0%
			Cecal (Beef)												100.0%	
Swine			Retail		0.0%		0.0%			0.0%		0.0%	0.0%	0.0%	0.0%	
			Cecal (Market Swine)												0.0%	
	Cecal (Sows)												33.3%			
Tetracyclines	Tetracycline (MIC ≥ 16 µg/ml)	Humans		16.7%	19.6%	18.4%	13.7%	22.4%	36.0%	27.9%	22.6%	34.3%	14.6%	33.3%	15.5%	
			Retail	16	18	23	14	22	27	24	14	24	6	20	11	
			HACCP	0	2	1	1	1	8	7	4	1	0	7	5	
		Chickens	Retail	0.0%	6.5%	4.5%	3.3%	7.1%	26.7%	15.9%	19.0%	9.1%	0.0%	26.9%	20.8%	
			HACCP	16.4%	15.0%	14.5%	12.2%	12.7%	13.8%	14.9%	32.0%	10.7%	12.3%	3.4%	15.7%	
			Cecal	37	25	41	20	18	13	11	8	3	10	1	17	
		Turkeys	Retail	43.8%	70.3%	56.6%	68.6%	70.7%	79.0%	60.0%	82.4%	92.9%	100.0%	88.2%	50.0%	
			HACCP	14	26	30	24	29	45	6	14	26	5	15	3	
			Cecal	84.2%	73.9%	64.0%	62.8%	65.2%	87.5%	66.7%	100.0%	80.0%	57.9%	16.7%	43.3%	
		Cattle	Retail	48	34	16	27	15	7	2	14	4	11	1	13	
			HACCP													
			Cecal (Beef)													
		Swine	Retail		100.0%		0.0%			100.0%		100.0%	100.0%	100.0%	100.0%	
			Cecal (Market Swine)		3		0			1		1	1	1	2	
Cecal (Sows)													33.3%			

Multidrug Resistance

Table 38a. Resistance Patterns among *Salmonella* Heidelberg Isolates, 2003-2014¹

Year		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
Number of Isolates Tested	Humans	96	92	125	102	98	75	86	62	70	41	60	71	
	Chickens	Retail Chickens	16	31	22	30	14	30	44	21	11	17	28	24
		HACCP	226	167	283	164	142	94	74	25	28	81	29	108
		Cecal											9	7
	Turkeys	Retail Ground Turkey	32	37	53	35	41	57	10	17	28	5	17	6
		HACCP	57	46	25	43	23	8	3	14	5	19	6	30
		Cecal											2	3
	Cattle	Retail Ground Beef	0	0	0	0	0	1	0	0	0	0	1	0
		HACCP	9	1	6	4	0	3	0	2	0	2	2	1
		Cecal (Beef) Cecal (Dairy)											1	0
	Swine	Retail Pork Chops	0	3	0	4	0	0	1	0	1	1	2	0
		Cecal (Market Swine)											1	0
		Cecal (Sows)											3	0
	Resistance Pattern		Source											
1. No Resistance Detected	Humans	68.8%	56.5%	62.4%	67.6%	58.2%	57.3%	60.5%	53.2%	55.7%	61.0%	46.7%	62.0%	
	Chickens	Retail Chickens	66	52	78	69	57	43	52	33	39	25	28	44
		HACCP	62.5%	58.1%	54.5%	50.0%	50.0%	50.0%	61.4%	61.9%	100.0%	100.0%	71.7%	58.3%
		Cecal	10	18	12	15	7	15	27	13	11	17	20	14
	Turkeys	Retail Ground Turkey	62.8%	68.3%	59.4%	67.1%	65.5%	70.2%	55.4%	36.0%	71.4%	76.5%	65.5%	67.6%
		HACCP	142	114	168	110	93	66	41	9	20	62	19	73
		Cecal											55.6%	100.0%
	Cattle	Retail Ground Turkey	50.0%	16.2%	20.8%	8.6%	9.8%	1.8%	10.0%	0.0%	0.0%	0.0%	0.0%	0.0%
		HACCP	16	6	11	3	4	1	1	0	0	0	0	0
		Cecal	8.8%	15.2%	16.0%	23.3%	17.4%	0.0%	33.3%	0.0%	0.0%	26.3%	0.0%	10.0%
	Swine	Retail Ground Beef	5	7	4	10	4	0	1	0	0	5	0	3
		HACCP											0.0%	0.0%
		Cecal (Beef) Cecal (Dairy)											0	0
	Swine	Retail Pork Chops		0.0%	0.0%								0.0%	
Cecal (Market Swine)			0	0								0	0	
Cecal (Sows)												33.3%		
2. Resistant to ≥ 3 Antimicrobial Classes	Humans	10.4%	13.0%	15.2%	12.7%	17.3%	28.0%	25.6%	33.9%	30.0%	26.8%	33.3%	21.1%	
	Chickens	Retail Chickens	10	12	19	13	17	21	22	21	21	11	20	15
		HACCP	6.3%	12.9%	13.6%	13.3%	28.6%	33.3%	34.1%	23.8%	0.0%	0.0%	14.3%	20.8%
		Cecal	1	4	3	4	4	10	15	5	0	0	4	5
	Turkeys	Retail Ground Turkey	13.3%	15.6%	24.4%	17.1%	20.4%	12.8%	24.3%	36.0%	17.9%	11.1%	10.3%	13.0%
		HACCP	30	26	69	28	29	12	18	9	5	9	3	14
		Cecal											11.1%	0.0%
	Cattle	Retail Ground Turkey	12.5%	27.0%	34.0%	40.0%	43.9%	80.7%	70.0%	64.7%	92.9%	100.0%	88.2%	50.0%
		HACCP	4	10	18	14	18	46	7	11	26	5	15	3
		Cecal	14.0%	23.9%	36.0%	44.2%	65.2%	50.0%	66.7%	57.1%	60.0%	57.9%	66.7%	46.7%
	Swine	Retail Ground Beef	8	11	9	19	15	4	2	8	3	11	4	14
		HACCP											50.0%	100.0%
		Cecal (Beef) Cecal (Dairy)											1	3
	Swine	Retail Pork Chops		0.0%	0.0%			100.0%					100.0%	
Cecal (Market Swine)			0	0			1			0	1	50.0%	1	
Cecal (Sows)												66.7%	2	
3. Resistant to ≥ 4 Antimicrobial Classes	Humans	0.0%	4.3%	4.0%	2.0%	5.1%	13.3%	17.4%	11.3%	4.3%	2.4%	8.3%	12.7%	
	Chickens	Retail Chickens	0	4	5	2	5	10	15	7	3	1	5	9
		HACCP	0.0%	6.5%	0.0%	0.0%	0.0%	13.3%	9.1%	4.8%	0.0%	0.0%	3.6%	20.8%
		Cecal	0	2	0	0	0	4	4	1	0	0	1	5
	Turkeys	Retail Ground Turkey	5.3%	7.8%	6.7%	4.3%	6.3%	4.2%	8.1%	20.0%	10.7%	6.2%	3.4%	7.4%
		HACCP	12	13	19	7	9	4	6	5	3	5	1	8
		Cecal											11.1%	0.0%
	Cattle	Retail Ground Turkey	9.4%	10.8%	7.6%	17.1%	14.6%	19.3%	30.0%	29.4%	35.7%	20.0%	29.4%	16.7%
		HACCP	3	4	4	6	6	11	3	5	10	1	5	1
		Cecal	1.8%	6.5%	8.0%	14.0%	21.7%	25.0%	33.3%	35.7%	20.0%	15.8%	16.7%	26.7%
	Swine	Retail Ground Beef						0.0%					0.0%	
		HACCP						0					0	
		Cecal (Beef) Cecal (Dairy)						33.0%		50.0%		50.0%	50.0%	100.0%
	Swine	Retail Pork Chops		0.0%	0.0%				100.0%		0.0%	0.0%	0.0%	
Cecal (Market Swine)			0	0			1					0		
Cecal (Sows)												33.3%	1	

¹ Starting in 2011, testing included nine antimicrobial classes with the addition of the macrolide azithromycin. Because resistance to azithromycin is low (in this case, <1%), antimicrobial class resistance data from 2011 and beyond are comparable to the data from previous years.

Table 38b. Resistance Patterns among *Salmonella* Heidelberg Isolates, 2003-2014¹

Year		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014		
Number of Isolates Tested	Humans		96	92	125	102	98	75	86	62	70	41	60	71	
	Chickens	Retail Chickens	16	31	22	30	14	30	44	21	11	17	28	24	
		HACCP	226	167	283	164	142	94	74	25	28	81	29	108	
		Cecal											9	7	
	Turkeys	Retail Ground Turkey	32	37	53	35	41	57	10	17	28	5	17	6	
		HACCP	57	46	25	43	23	8	3	14	5	19	6	30	
		Cecal											2	3	
	Cattle	Retail Ground Beef	0	0	0	0	0	1	0	0	0	0	1	0	
		HACCP	9	1	6	4	0	3	0	2	0	2	2	1	
		Cecal (Beef)											1	0	
	Swine	Retail Pork Chops											0	0	
		Cecal (Market Swine)	0	3	0	4	0	0	1	0	1	1	2	0	
		Cecal (Sows)											1	0	
	Resistance Pattern		Source												
4. Resistant to ≥ 5 Antimicrobial Classes	Humans		0.0%	3.3%	1.6%	2.0%	4.1%	6.7%	11.6%	9.7%	4.3%	0.0%	6.7%	11.3%	
	Chickens	Retail Chickens	0	3	2	2	4	5	10	6	3	0	4	8	
		HACCP	0.0%	3.2%	0.0%	0.0%	0.0%	6.7%	9.1%	4.8%	0.0%	0.0%	3.6%	16.7%	
		Cecal	0	1	0	0	0	2	4	1	0	0	1	4	
		Cecal	4.4%	3.6%	4.6%	4.3%	5.6%	4.2%	8.1%	20.0%	10.7%	6.2%	3.4%	7.4%	
	Turkeys	Retail Ground Turkey	10	6	13	7	8	4	6	5	3	5	1	8	
		HACCP	6.3%	5.4%	0.0%	5.7%	0.0%	1.8%	10.0%	23.5%	28.6%	0.0%	17.6%	0.0%	
		Cecal	2	2	0	2	0	1	1	4	8	0	3	0	
		Cecal	0.0%	2.2%	0.0%	9.3%	4.3%	25.0%	33.3%	35.7%	0.0%	10.5%	16.7%	20.0%	
	Cattle	Retail Ground Beef	0	0	0	0	0	0	0	0	0	0	0	0	
		HACCP	55.6%	100.0%	50.0%	0.0%	0.0%	0.0%	50.0%	0.0%	0.0%	50.0%	0.0%	0.0%	
		Cecal (Beef)	5	1	3	0	0	0	1	0	0	1	0	0	
		Cecal (Dairy)											100.0%		
	Swine	Retail Pork Chops		0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
		Cecal (Market Swine)		0	0	0	0	0	1	0	0	0	0	0	
		Cecal (Sows)											33.3%	1	
	5. At Least ACSSuT² Resistant	Humans		0.0%	1.1%	0.0%	0.0%	3.1%	1.3%	3.5%	1.6%	1.4%	0.0%	6.7%	9.9%
		Chickens	Retail Chickens	0	1	0	0	3	1	3	1	1	0	4	7
HACCP			0.0%	3.2%	0.0%	0.0%	0.0%	3.3%	0.0%	0.0%	0.0%	0.0%	3.6%	12.5%	
Cecal			0	1	0	0	0	1	0	0	0	0	1	3	
Cecal			2.2%	2.4%	2.8%	1.8%	4.2%	4.2%	4.1%	16.0%	3.6%	3.7%	0.0%	2.8%	
Turkeys		Retail Ground Turkey	5	4	8	3	6	4	3	4	1	3	0	3	
		HACCP	0.0%	5.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	10.7%	0.0%	0.0%	0.0%	
		Cecal	0	2	0	0	0	0	0	0	3	0	0	0	
		Cecal	0.0%	0.0%	0.0%	4.7%	4.3%	12.5%	0.0%	0.0%	0.0%	0.0%	0.0%	3.3%	
Cattle		Retail Ground Beef	0	0	0	0	0	0	0	0	0	0	0	0	
		HACCP	33.3%	100.0%	50.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	50.0%	0.0%	
		Cecal (Beef)	3	1	3	0	0	0	0	0	0	0	1	0	
		Cecal (Dairy)											100.0%		
Swine		Retail Pork Chops		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
		Cecal (Market Swine)		0	0	0	0	0	0	0	0	0	0	0	
		Cecal (Sows)											33.3%	1	
6. At Least ACT/S³ Resistant		Humans		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	3.5%	0.0%	1.4%	0.0%	1.7%	1.4%
		Chickens	Retail Chickens	0	0	0	0	0	0	3	0	1	0	1	1
	HACCP		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
	Cecal		0	0	0	0	0	0	0	0	0	0	0	0	
	Cecal		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.9%	
	Turkeys	Retail Ground Turkey	0	0	0	0	0	0	0	0	0	0	0	0	
		HACCP	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	10.7%	0.0%	0.0%	0.0%	
		Cecal	0	0	0	0	0	0	0	0	3	0	0	0	
		Cecal	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	3.3%	
	Cattle	Retail Ground Beef						0.0%					0.0%		
		HACCP	44.4%	100.0%	50.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
		Cecal (Beef)	4	1	3	0	0	0	0	0	0	0	1	0	
		Cecal (Dairy)											100.0%		
	Swine	Retail Pork Chops		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
		Cecal (Market Swine)		0	0	0	0	0	0	0	0	0	0	0	
		Cecal (Sows)											0.0%	0	

¹ Starting in 2011, testing included nine antimicrobial classes with the addition of the macrolide azithromycin. Because resistance to azithromycin is low (in this case, <1%), antimicrobial class resistance data from 2011 and beyond are comparable to the data from previous years.

² ACSSuT = ampicillin, chloramphenicol, streptomycin, sulfamethoxazole/sulfisoxazole, and tetracycline

³ ACT/S = ampicillin, chloramphenicol, and trimethoprim-sulfamethoxazole

Table 38c. Resistance Patterns among *Salmonella* Heidelberg Isolates, 2003-2014

Year			2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
Number of Isolates Tested	Humans		96	92	125	102	98	75	86	62	70	41	60	71	
		Chickens	Retail Chickens	16	31	22	30	14	30	44	21	11	17	28	24
		HACCP	226	167	283	164	142	94	74	25	28	81	29	108	
	Turkeys	Cecal												9	7
		Retail Ground Turkey	32	37	53	35	41	57	10	17	28	5	17	6	
		HACCP	57	46	25	43	23	8	3	14	5	19	6	30	
	Cattle	Cecal												2	3
		Retail Ground Beef	0	0	0	0	0	1	0	0	0	0	0	1	0
		HACCP	9	1	6	4	0	3	0	2	0	2	2	1	1
	Swine	Cecal (Beef)												1	0
		Cecal (Dairy)												0	0
		Retail Pork Chops	0	3	0	4	0	0	1	0	1	1	2	0	0
	Swine	Cecal (Market Swine)												1	0
Cecal (Sows)													3	0	
Source															
Resistance Pattern	Source														
7. At Least ACSSuTAuCx ¹ Resistant	Humans		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.2%	0.0%	1.4%	0.0%	1.7%	0.0%	
		Chickens	Retail Chickens	0	0	0	0	0	0	1	0	1	0	1	0
		HACCP	0.0%	3.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	8.3%
		Cecal	2.2%	2.4%	2.8%	1.8%	4.2%	2.1%	4.1%	16.0%	3.6%	2.5%	0.0%	0.0%	0.0%
	Turkeys	Cecal	5	4	8	3	6	2	3	4	1	2	0	0	0
		Retail Ground Turkey	0.0%	5.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	10.7%	0.0%	0.0%	0.0%	0.0%
		HACCP	0	2	0	0	0	0	0	0	3	0	0	0	0
		Cecal	0.0%	0.0%	0.0%	4.7%	4.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	3.3%
	Cattle	Cecal												0.0%	33.3%
		Retail Ground Beef						0.0%						0.0%	0
		HACCP	33.3%	100.0%	50.0%	0.0%		0.0%		0.0%		0.0%		50.0%	0.0%
		Cecal (Beef)	3	1	3	0		0		0		0		1	0
	Swine	Cecal (Dairy)												100.0%	
		Retail Pork Chops		0.0%		0.0%			0.0%		0.0%	0.0%	0.0%	0.0%	0
		Cecal (Market Swine)		0		0			0		0	0	0	0	0
Cecal (Sows)													33.3%	1	
8. At Least Ceftriaxone and Nalidixic Acid Resistant	Humans		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.4%	
		Chickens	Retail Chickens	0	0	0	0	0	0	0	0	0	0	0	1
		HACCP	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
		Cecal	0	0	0	0	0	0	0	0	0	0	0	0	0
	Turkeys	Cecal												0.0%	0.0%
		Retail Ground Turkey	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
		HACCP	0	0	0	0	0	0	0	0	0	0	0	0	0
		Cecal	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Cattle	Cecal												0.0%	0.0%
		Retail Ground Beef						0.0%						0.0%	0
		HACCP	0.0%	0.0%	0.0%	0.0%		0.0%		0.0%		0.0%		0.0%	0.0%
		Cecal (Beef)	0	0	0	0		0		0		0		0	0
	Swine	Cecal (Dairy)												100.0%	
		Retail Pork Chops		0.0%		0.0%			0.0%		0.0%	0.0%	0.0%	0.0%	0
		Cecal (Market Swine)		0		0			0		0	0	0	0	0
Cecal (Sows)													33.3%	1	

¹ ACSSuTAuCx = ACSSuT, amoxicillin-clavulanic acid, and ceftriaxone

Resistance by Year

Table 39a. Antimicrobial Resistance among *Salmonella* Derby Isolates, 2003-2014

Year		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014		
Number of Isolates Tested	Humans	5	8	3	3	8	11	13	2	6	7	5	7		
	Chickens	Retail Chickens	0	0	0	0	0	1	0	0	0	0	0	0	
		HACCP	0	0	2	1	0	0	0	0	0	0	1	0	
		Cecal											0	0	
	Turkeys	Retail Ground Turkey	0	3	1	2	1	6	5	2	2	1	0	0	
		HACCP	0	15	3	7	1	0	4	1	1	1	2	1	
		Cecal											0	0	
	Cattle	Retail Ground Beef	0	0	0	0	0	0	0	0	0	0	0	0	
		HACCP	13	12	6	2	1	0	0	1	2	0	1	5	
		Cecal (Beef) Cecal (Dairy)											0	2	
	Swine	Retail Pork Chops	0	0	0	0	4	0	3	6	2	1	5	5	
		Cecal (Market Swine)											38	49	
		Cecal (Sows)											24	26	
Antimicrobial Class	Antimicrobial (Resistance Breakpoint)	Isolate Source													
Aminoglycosides	Gentamicin (MIC ≥ 16 µg/ml)	Humans	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	50.0% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
		Chickens	Retail						100.0% 1						
			HACCP			0.0% 0	0.0% 0							0.0% 0	
			Cecal												
		Turkeys	Retail		0.0% 0	0.0% 0	100.0% 2	0.0% 0	66.7% 4	60.0% 3	50.0% 1	100.0% 2	0.0% 0		
			HACCP		20.0% 3	0.0% 0	0.0% 0	0.0% 0		25.0% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
			Cecal												
		Cattle	Retail												
			HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0			0.0% 0	0.0% 0		0.0% 0	0.0% 0
			Cecal (Beef) Cecal (Dairy)											0.0% 0	0.0% 0
		Swine	Retail					0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
			Cecal (Market Swine)											0.0% 0	6.1% 3
			Cecal (Sows)											0.0% 0	0.0% 0
	Streptomycin (MIC ≥ 64 µg/ml)	Humans	40.0% 2	50.0% 4	0.0% 0	66.7% 2	62.5% 5	27.3% 3	46.2% 6	50.0% 1	50.0% 3	57.1% 4	40.0% 2	57.1% 4	
		Chickens	Retail						100.0% 1						
			HACCP			100.0% 2	0.0% 0							0.0% 0	
			Cecal												
		Turkeys	Retail		0.0% 0	0.0% 0	0.0% 2	0.0% 0	83.3% 5	60.0% 3	50.0% 1	100.0% 2	0.0% 0		
			HACCP		40.0% 6	33.3% 1	14.3% 1	0.0% 0		25.0% 1	0.0% 0	0.0% 0	0.0% 0	50.0% 1	0.0% 0
			Cecal												
		Cattle	Retail												
			HACCP	46.2% 6	66.7% 8	66.7% 4	50.0% 1	0.0% 0			0.0% 0	0.0% 0		100.0% 1	80.0% 4
			Cecal (Beef) Cecal (Dairy)												50.0% 1
		Swine	Retail					0.0% 0		33.3% 1	50.0% 3	0.0% 0	100.0% 1	40.0% 2	20.0% 1
			Cecal (Market Swine)											57.9% 22	53.1% 26
			Cecal (Sows)											50.0% 12	23.1% 6
		β-Lactam/β-Lactamase Inhibitor Combinations	Amoxicillin-Clavulanic Acid (MIC ≥ 32 / 16 µg/ml)	Humans	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	7.7% 1	0.0% 0	0.0% 0	14.3% 1	0.0% 0
Chickens	Retail								0.0% 0						
	HACCP					50.0% 1	0.0% 0							0.0% 0	
	Cecal														
Turkeys	Retail				66.7% 2	0.0% 0	0.0% 0	0.0% 0	0.0% 0	40.0% 2	0.0% 0	0.0% 0	0.0% 0		
	HACCP				0.0% 0	0.0% 0	0.0% 0	0.0% 0		25.0% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
	Cecal														
Cattle	Retail														
	HACCP			15.4% 2	0.0% 0	16.7% 1	0.0% 0	0.0% 0			0.0% 0	0.0% 0		0.0% 0	
	Cecal (Beef) Cecal (Dairy)													0.0% 0	
Swine	Retail							0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
	Cecal (Market Swine)													0.0% 0	2.0% 1
	Cecal (Sows)													0.0% 0	3.8% 1

Table 39b. Antimicrobial Resistance among *Salmonella* Derby Isolates, 2003-2014

Year			2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
Number of Isolates Tested	Humans		5	8	3	3	8	11	13	2	6	7	5	7	
		Chickens	Retail Chickens	0	0	0	0	0	1	0	0	0	0	0	0
			HACCP	0	0	2	1	0	0	0	0	0	0	1	0
	Cecal												0	0	
	Turkeys	Retail Ground Turkey	0	3	1	2	1	6	5	2	2	1	0	0	
		HACCP	0	15	3	7	1	0	4	1	1	1	2	1	
		Cecal											0	0	
	Cattle	Retail Ground Beef	0	0	0	0	0	0	0	0	0	0	0	0	
		HACCP	13	12	6	2	1	0	0	1	2	0	1	5	
		Cecal (Beef)											0	2	
	Swine	Retail Pork Chops												2	1
		Cecal (Market Swine)	0	0	0	0	4	0	3	6	2	1	5	5	
		Cecal (Sows)											38	49	
												24	26		
Antimicrobial Class	Antimicrobial (Resistance Breakpoint)	Isolate Source													
Cepheims	Cefoxitin (MIC ≥ 32 µg/ml)	Humans	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	7.7% 1	0.0% 0	0.0% 0	14.3% 1	0.0% 0	0.0% 0	
		Chickens	Retail						0.0% 0						
			HACCP			50.0% 1	0.0% 0							0.0% 0	
			Cecal												
		Turkeys	Retail		66.7% 2	0.0% 0	0.0% 0	0.0% 0	0.0% 0	40.0% 2	0.0% 0	0.0% 0	0.0% 0		
			HACCP		0.0% 0	0.0% 0	0.0% 0	0.0% 0		25.0% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
			Cecal												
		Cattle	Retail												
			HACCP	15.4% 2	0.0% 0	16.7% 1	0.0% 0	0.0% 0			0.0% 0	0.0% 0		0.0% 0	0.0% 0
			Cecal (Beef)												0.0% 0
		Swine	Retail					0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
			Cecal (Market Swine)											0.0% 0	2.0% 1
	Cecal (Sows)												0.0% 0	3.8% 1	
	Ceftiofur (MIC ≥ 8 µg/ml)	Humans	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	7.7% 1	0.0% 0	0.0% 0	14.3% 1	0.0% 0	0.0% 0	
		Chickens	Retail						0.0% 0						
			HACCP			50.0% 1	0.0% 0							0.0% 0	
			Cecal												
		Turkeys	Retail		66.7% 2	0.0% 0	0.0% 0	0.0% 0	0.0% 0	40.0% 2	0.0% 0	0.0% 0	0.0% 0		
			HACCP		0.0% 0	0.0% 0	0.0% 0	0.0% 0		25.0% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
			Cecal												
		Cattle	Retail												
			HACCP	15.4% 2	0.0% 0	16.7% 1	0.0% 0	0.0% 0			0.0% 0	0.0% 0		0.0% 0	0.0% 0
			Cecal (Beef)												0.0% 0
		Swine	Retail					0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
			Cecal (Market Swine)											0.0% 0	2.0% 1
	Cecal (Sows)												0.0% 0	3.8% 1	
	Ceftriaxone (MIC ≥ 4 µg/ml)	Humans	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	7.7% 1	0.0% 0	0.0% 0	14.3% 1	0.0% 0	0.0% 0	
		Chickens	Retail						0.0% 0						
			HACCP			50.0% 1	0.0% 0							0.0% 0	
			Cecal												
		Turkeys	Retail		66.7% 2	0.0% 0	0.0% 0	0.0% 0	0.0% 0	40.0% 2	0.0% 0	0.0% 0	0.0% 0		
			HACCP		0.0% 0	0.0% 0	0.0% 0	0.0% 0		25.0% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
			Cecal												
		Cattle	Retail												
			HACCP	15.4% 2	0.0% 0	16.7% 1	0.0% 0	0.0% 0			0.0% 0	0.0% 0		0.0% 0	0.0% 0
			Cecal (Beef)												0.0% 0
Swine		Retail					0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
		Cecal (Market Swine)											0.0% 0	4.1% 2	
	Cecal (Sows)											0.0% 0	3.8% 1		

Table 39c. Antimicrobial Resistance among *Salmonella* Derby Isolates, 2003-2014

Year			2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014		
Number of Isolates Tested	Humans		5	8	3	3	8	11	13	2	6	7	5	7		
		Chickens														
	Retail Chickens	Retail	0	0	0	0	0	1	0	0	0	0	0	0	0	
		HACCP	0	0	2	1	0	0	0	0	0	0	0	1	0	
		Cecal												0	0	
	Retail Ground Turkey	Retail	0	3	1	2	1	6	5	2	2	1	0	0	0	
		HACCP	0	15	3	7	1	0	4	1	1	1	1	2	1	
		Cecal												0	0	
	Retail Ground Beef	Retail	0	0	0	0	0	0	0	0	0	0	0	0	0	
		HACCP	13	12	6	2	1	0	0	1	2	0	0	1	5	
		Cecal (Beef)												0	2	
	Cecal (Dairy)													2	1	
Retail Pork Chops	Retail	0	0	0	0	4	0	3	6	2	1	5	5	5		
	Cecal (Market Swine)												38	49		
	Cecal (Sows)												24	26		
Antimicrobial Class	Antimicrobial (Resistance Breakpoint)	Isolate Source														
Folate Pathway Inhibitor	Sulfamethoxazole/Sulfisoxazole ¹ (MIC ≥ 512 µg/ml)	Humans	40.0% 2	62.5% 5	33.3% 1	66.7% 2	62.5% 5	36.4% 4	61.5% 8	50.0% 1	50.0% 3	57.1% 4	40.0% 2	57.1% 4		
		Retail Chickens	Retail						100.0% 1							
			HACCP			100.0% 2	0.0% 0								0.0% 0	
			Cecal													
		Retail Turkeys	Retail		0.0% 0	0.0% 0	100.0% 2	0.0% 0	66.7% 4	60.0% 3	50.0% 1	100.0% 2	0.0% 0			
			HACCP		33.3% 5	33.3% 1	14.3% 1	0.0% 0		75.0% 3	0.0% 0	0.0% 0	0.0% 0		50.0% 1	0.0% 0
			Cecal													
		Retail Cattle	Retail													
			HACCP	53.8% 7	66.7% 8	66.7% 4	50.0% 1	100.0% 1			0.0% 0	0.0% 0			100.0% 1	80.0% 4
			Cecal (Beef)													50.0% 1
		Cecal (Dairy)													0.0% 0	0.0% 0
		Retail Swine	Retail					0.0% 0		33.3% 1	50.0% 3	0.0% 0	100.0% 1	40.0% 2	20.0% 1	20.0% 1
	Cecal (Market Swine)												55.3% 21	51.0% 25	51.0% 25	
	Cecal (Sows)												50.0% 12	15.4% 4	15.4% 4	
	Trimethoprim-Sulfamethoxazole (MIC ≥ 4 / 76 µg/ml)	Humans	0.0% 0	25.0% 2	0.0% 0	33.3% 1	0.0% 0	0.0% 0	7.7% 1	0.0% 0	0.0% 0	0.0% 0	14.3% 1	0.0% 0	0.0% 0	
		Retail Chickens	Retail						0.0% 0							
			HACCP			0.0% 0	0.0% 0								0.0% 0	
			Cecal													
		Retail Turkeys	Retail		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
			HACCP		0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
			Cecal													
		Retail Cattle	Retail													
			HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0			0.0% 0	0.0% 0			0.0% 0	0.0% 0
			Cecal (Beef)													0.0% 0
Cecal (Dairy)														0.0% 0	0.0% 0	
Retail Swine	Retail					0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	20.0% 1		
	Cecal (Market Swine)												0.0% 0	2.0% 1		
	Cecal (Sows)												0.0% 0	0.0% 0		
Macrolides	Azithromycin (MIC ≥ 32 µg/ml)	Humans								0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		
		Retail Chickens	Retail													
			HACCP												0.0% 0	
	Cecal															
	Retail Turkeys	Retail									0.0% 0	0.0% 0				
		HACCP									0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
		Cecal														
	Retail Cattle	Retail														
		HACCP									0.0% 0			0.0% 0	0.0% 0	
		Cecal (Beef)													0.0% 0	
	Cecal (Dairy)													0.0% 0	0.0% 0	
	Retail Swine	Retail									0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
Cecal (Market Swine)													0.0% 0	0.0% 0		
Cecal (Sows)													0.0% 0	0.0% 0		

¹ Sulfamethoxazole was tested from 1996-2003 and was replaced by sulfisoxazole in 2004

Table 39d. Antimicrobial Resistance among *Salmonella* Derby Isolates, 2003-2014

Year		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014		
Number of Isolates Tested	Humans	5	8	3	3	8	11	13	2	6	7	5	7		
	Chickens	Retail Chickens	0	0	0	0	0	1	0	0	0	0	0	0	
		HACCP	0	0	2	1	0	0	0	0	0	0	1	0	
		Cecal											0	0	
	Turkeys	Retail Ground Turkey	0	3	1	2	1	6	5	2	2	1	0	0	
		HACCP	0	15	3	7	1	0	4	1	1	1	2	1	
		Cecal											0	0	
	Cattle	Retail Ground Beef	0	0	0	0	0	0	0	0	0	0	0	0	
		HACCP	13	12	6	2	1	0	0	1	2	0	1	5	
		Cecal (Beef)											0	2	
	Cecal (Dairy)											2	1		
	Swine	Retail Pork Chops	0	0	0	0	4	0	3	6	2	1	5	5	
		Cecal (Market Swine)											38	49	
Cecal (Sows)												24	26		
Antimicrobial Class	Antimicrobial (Resistance Breakpoint)	Isolate Source													
Penicillins	Ampicillin (MIC ≥ 32 µg/ml)	Humans	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	9.1% 1	7.7% 1	0.0% 0	16.7% 1	14.3% 1	0.0% 0	14.3% 1	
		Chickens	Retail						0.0% 0						
			HACCP			50.0% 1	0.0% 0							0.0% 0	
			Cecal												
		Turkeys	Retail		66.7% 2	0.0% 0	0.0% 0	0.0% 0	16.7% 1	40.0% 2	0.0% 0	0.0% 0	0.0% 0		
			HACCP		6.7% 1	0.0% 0	0.0% 0	0.0% 0		50.0% 2	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
			Cecal												
		Cattle	Retail												
			HACCP	15.4% 2	0.0% 0	16.7% 1	0.0% 0	0.0% 0			0.0% 0	0.0% 0		0.0% 0	0.0% 0
			Cecal (Beef)												0.0% 0
		Cecal (Dairy)											0.0% 0	0.0% 0	
		Swine	Retail					0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	20.0% 1
			Cecal (Market Swine)											2.6% 1	6.1% 3
Cecal (Sows)												0.0% 0	3.8% 1		
Phenicol	Chloramphenicol (MIC ≥ 32 µg/ml)	Humans	0.0% 0	12.5% 1	0.0% 0	33.3% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	28.6% 2	0.0% 0	0.0% 0	
		Chickens	Retail						0.0% 0						
			HACCP			0.0% 0	0.0% 0							0.0% 0	
			Cecal												
		Turkeys	Retail		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		
			HACCP		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	25.0% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
			Cecal												
		Cattle	Retail												
			HACCP	7.7% 1	0.0% 0	16.7% 1	0.0% 0	0.0% 0			0.0% 0	0.0% 0		0.0% 0	0.0% 0
			Cecal (Beef)												0.0% 0
		Cecal (Dairy)											0.0% 0	0.0% 0	
		Swine	Retail					0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	20.0% 1
			Cecal (Market Swine)											0.0% 0	2.0% 1
Cecal (Sows)												0.0% 0	0.0% 0		
Quinolones	Ciprofloxacin (MIC ≥ 1 µg/ml)	Humans	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
		Chickens	Retail						0.0% 0						
			HACCP			0.0% 0	0.0% 0							0.0% 0	
			Cecal												
		Turkeys	Retail		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		
			HACCP		0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
			Cecal												
		Cattle	Retail												
			HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0			0.0% 0	0.0% 0		0.0% 0	0.0% 0
			Cecal (Beef)												0.0% 0
		Cecal (Dairy)											0.0% 0	0.0% 0	
		Swine	Retail					0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	20.0% 1
			Cecal (Market Swine)											0.0% 0	0.0% 0
Cecal (Sows)												0.0% 0	0.0% 0		

Table 39e. Antimicrobial Resistance among *Salmonella* Derby Isolates, 2003-2014

Year			2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
Number of Isolates Tested	Humans		5	8	3	3	8	11	13	2	6	7	5	7	
		Chickens													
	Chickens	Retail Chickens	0	0	0	0	0	1	0	0	0	0	0	0	0
		HACCP	0	0	2	1	0	0	0	0	0	0	0	1	0
		Cecal												0	0
	Turkeys	Retail Ground Turkey	0	3	1	2	1	6	5	2	2	2	1	0	0
		HACCP	0	15	3	7	1	0	4	1	1	1	1	2	1
		Cecal												0	0
	Cattle	Retail Ground Beef	0	0	0	0	0	0	0	0	0	0	0	0	0
		HACCP	13	12	6	2	1	0	0	1	2	0	0	1	5
		Cecal (Beef)												0	2
	Swine	Cecal (Dairy)												2	1
		Retail Pork Chops	0	0	0	0	4	0	3	6	2	1	5	5	5
		Cecal (Market Swine)												38	49
		Cecal (Sows)										24	26		
Antimicrobial Class	Antimicrobial (Resistance Breakpoint)	Isolate Source													
Quinolones	Nalidixic Acid (MIC ≥ 32 µg/ml)	Humans	0.0%	12.5%	0.0%	0.0%	0.0%	0.0%	7.7%	0.0%	0.0%	0.0%	0.0%	0.0%	
		Chickens	Retail	0	1	0	0	0	0.0%	1	0	0	0	0	0
			HACCP			0.0%	0.0%							0.0%	0
			Cecal												
		Turkeys	Retail		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		
			HACCP		0	0	0	0	0	0	0	0	0	0.0%	0.0%
			Cecal		0	0	0	0						0	0
		Cattle	Retail												
			HACCP	0.0%	0.0%	0.0%	0.0%	0.0%			0.0%	0.0%		0.0%	0.0%
			Cecal (Beef)	0	0	0	0	0			0	0		0	0
		Swine	Cecal (Dairy)											0.0%	0.0%
			Retail					0.0%		0.0%	0.0%	0.0%	0.0%	0.0%	20.0%
			Cecal (Market Swine)											0	0
				Cecal (Sows)										0.0%	3.8%
												0	1		
Tetracyclines	Tetracycline (MIC ≥ 16 µg/ml)	Humans	60.0%	50.0%	33.3%	66.7%	62.5%	36.4%	69.2%	0.0%	83.3%	71.4%	60.0%	71.4%	
		Chickens	Retail	3	4	1	2	5	4	9	0	5	5	3	5
			HACCP			100.0%	100.0%		100.0%					0.0%	0
			Cecal			2	1								
		Turkeys	Retail		100.0%	10.0%	100.0%	100.0%	83.3%	10.0%	100.0%	100.0%	100.0%		
			HACCP		3	1	2	1	5	5	2	2	1		
			Cecal		20.0%	66.7%	85.7%	100.0%		100.0%	100.0%	0.0%	0.0%	100.0%	0.0%
		Cattle	Retail												
			HACCP	69.2%	66.7%	66.7%	50.0%	100.0%			0.0%	0.0%		0.0%	80.0%
			Cecal (Beef)	9	8	4	1	1			0	0		0	4
		Swine	Cecal (Dairy)											0.0%	0.0%
			Retail					100.0%		33.3%	66.7%	50.0%	100.0%	60.0%	20.0%
			Cecal (Market Swine)					4		1	4	1	1	3	1
				Cecal (Sows)										78.9%	75.5%
												30	37		
												62.5%	42.3%		
												15	11		

Multidrug Resistance

Table 40a. Resistance Patterns among *Salmonella* Derby Isolates, 2003-2014¹

Year			2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
Number of Isolates Tested	Humans		5	8	3	3	8	11	13	2	6	7	5	7	
		Chickens	Retail Chickens	0	0	0	0	0	1	0	0	0	0	0	0
			HACCP	0	0	2	1	0	0	0	0	0	0	1	0
	Cecal												0	0	
	Turkeys	Retail Ground Turkey	0	3	1	2	1	6	5	2	2	1	1	0	0
		HACCP	0	15	3	7	1	0	4	1	1	1	1	2	1
		Cecal												0	0
	Cattle	Retail Ground Beef	0	0	0	0	0	0	0	0	0	0	0	0	0
		HACCP	13	12	6	2	1	0	0	1	2	0	0	1	5
		Cecal (Beef)												0	2
	Swine	Cecal (Dairy)												2	1
		Retail Pork Chops	0	0	0	0	4	0	3	6	2	1	1	5	5
		Cecal (Market Swine)												38	49
Cecal (Sows)												24	26		
Resistance Pattern			Source												
1. No Resistance Detected	Humans		40.0%	37.5%	66.7%	33.3%	37.5%	45.5%	23.1%	50.0%	16.7%	28.6%	40.0%	28.6%	
	Chickens	Retail Chickens	2	3	2	1	3	5	3	1	1	2	2	2	
		HACCP						0							
		Cecal			0.0%	0.0%								100.0%	
	Turkeys	Retail Ground Turkey		0.0%	0.0%	0.0%	0.0%	16.7%	0.0%	0.0%	0.0%	0.0%			
		HACCP		53.3%	33.3%	14.3%	0.0%	1	0.0%	0.0%	100.0%	100.0%	0.0%	100.0%	
		Cecal		8	1	1	0							1	
	Cattle	Retail Ground Beef													
		HACCP	30.8%	33.3%	33.3%	50.0%	0.0%			100.0%	100.0%		0.0%		
		Cecal (Beef)	4	4	2	1	0			1	2		0		
	Swine	Cecal (Dairy)												100.0%	
		Retail Pork Chops					0.0%		66.7%	33.3%	50.0%	0.0%	40.0%	20.0%	
		Cecal (Market Swine)					0		2	2	1	0	2	1	
Cecal (Sows)												21.1%			
												8	10		
												37.5%	53.8%		
												9	14		
2. Resistant to ≥ 3 Antimicrobial Classes	Humans		40.0%	37.5%	0.0%	66.7%	62.5%	18.2%	46.2%	0.0%	50.0%	57.1%	40.0%	57.1%	
	Chickens	Retail Chickens	2	3	0	2	5	2	6	0	3	4	2	4	
		HACCP						100.0%							
		Cecal			100.0%	0.0%							0.0%	0	
	Turkeys	Retail Ground Turkey		66.7%	0.0%	100.0%	0.0%	66.7%	100.0%	50.0%	100.0%	0.0%			
		HACCP		20.0%	33.3%	14.3%	0.0%	4	50.0%	0.0%	0.0%	0.0%	50.0%	0.0%	
		Cecal		3	1	1	0		2	0	0	0	1	0	
	Cattle	Retail Ground Beef													
		HACCP	38.5%	66.7%	66.7%	50.0%	0.0%			0.0%	0.0%		0.0%	80.0%	
		Cecal (Beef)	5	8	4	1	0			0	0		0	4	
	Swine	Cecal (Dairy)												50.0%	
		Retail Pork Chops					0.0%		33.3%	50.0%	0.0%	100.0%	40.0%	20.0%	
		Cecal (Market Swine)					0		1	3	0	1	2	1	
Cecal (Sows)												55.3%			
												21	23		
												50.0%	19.2%		
												12	5		
3. Resistant to ≥ 4 Antimicrobial Classes	Humans		0.0%	12.5%	0.0%	33.3%	0.0%	0.0%	7.7%	0.0%	16.7%	28.6%	0.0%	14.3%	
	Chickens	Retail Chickens	0	1	0	1	0	0	1	0	1	2	0	1	
		HACCP						0.0%							
		Cecal			50.0%	0.0%								0.0%	
	Turkeys	Retail Ground Turkey		66.7%	0.0%	0.0%	0.0%	16.7%	40.0%	0.0%	0.0%	0.0%			
		HACCP		0.0%	0.0%	0.0%	0.0%	1	50.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
		Cecal		0	0	0	0		2	0	0	0	0	0	
	Cattle	Retail Ground Beef													
		HACCP	15.4%	0.0%	16.7%	0.0%	0.0%			0.0%	0.0%		0.0%	0.0%	
		Cecal (Beef)	2	0	1	0	0			0	0		0	0	
	Swine	Cecal (Dairy)												0.0%	
		Retail Pork Chops					0.0%		0.0%	0.0%	0.0%	0.0%	0.0%	20.0%	
		Cecal (Market Swine)					0		0	0	0	0	0	1	
Cecal (Sows)												2.6%			
												1	3		
												0.0%	3.8%		
												0	1		

¹ Starting in 2011, testing included nine antimicrobial classes with the addition of the macrolide azithromycin. Because resistance to azithromycin is low (in this case, <1%), antimicrobial class resistance data from 2011 and beyond are comparable to the data from previous years.

Table 40b. Resistance Patterns among *Salmonella* Derby Isolates, 2003-2014¹

Year		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
Number of Isolates Tested	Humans		5	8	3	3	8	11	13	2	6	7	5	7
	Chickens	Retail Chickens	0	0	0	0	0	1	0	0	0	0	0	0
		HACCP	0	0	2	1	0	0	0	0	0	0	1	0
		Cecal											0	0
	Turkeys	Retail Ground Turkey	0	3	1	2	1	6	5	2	2	1	0	0
		HACCP	0	15	3	7	1	0	4	1	1	1	2	1
		Cecal											0	0
	Cattle	Retail Ground Beef	0	0	0	0	0	0	0	0	0	0	0	0
		HACCP	13	12	6	2	1	0	0	1	2	0	1	5
		Cecal (Beef)											0	2
	Swine	Retail Pork Chops	0	0	0	0	4	0	3	6	2	1	5	5
		Cecal (Market Swine)											38	49
		Cecal (Sows)											24	26
Resistance Pattern		Source												
4. Resistant to ≥ 5 Antimicrobial Classes	Humans		0.0%	12.5%	0.0%	0.0%	0.0%	0.0%	7.7%	0.0%	0.0%	14.3%	0.0%	0.0%
	Chickens	Retail Chickens	0	1	0	0	0	0	0	0	0	1	0	0
		HACCP			50.0%	0.0%							0.0%	
		Cecal			1	0							0	
	Turkeys	Retail Ground Turkey		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		
		HACCP		0	0	0	0	0	0	0	0	0	0	0
		Cecal		0.0%	0.0%	0.0%	0.0%	0.0%	25.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Cattle	Retail Ground Beef												
		HACCP	15.4%	0.0%	16.7%	0.0%	0.0%			0.0%	0.0%		0.0%	0.0%
		Cecal (Beef)	2	0	1	0	0			0	0		0	0
	Swine	Retail Pork Chops					0.0%		0.0%	0.0%	0.0%	0.0%	0.0%	20.0%
		Cecal (Market Swine)					0		0	0	0	0	0	1
		Cecal (Sows)											0.0%	4.1%
Humans		0	0	0	0	0	0	0	0	0	1	0	0	
Chickens	Retail Chickens						0.0%							
	HACCP			0.0%	0.0%							0.0%		
	Cecal			0	0							0		
Turkeys	Retail Ground Turkey		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			
	HACCP		0	0	0	0	0	0	0	0	0	0	0	
	Cecal		0.0%	0.0%	0.0%	0.0%	0.0%	25.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
Cattle	Retail Ground Beef													
	HACCP	0.0%	0.0%	16.7%	0.0%	0.0%			0.0%	0.0%		0.0%	0.0%	
	Cecal (Beef)	0	0	1	0	0			0	0		0	0	
Swine	Retail Pork Chops					0.0%		0.0%	0.0%	0.0%	0.0%	0.0%	20.0%	
	Cecal (Market Swine)					0		0	0	0	0	0	1	
	Cecal (Sows)											0.0%	2.0%	
Humans		0	0	0	0	0	0	0	0	0	0	0	0	
Chickens	Retail Chickens						0.0%							
	HACCP			0.0%	0.0%							0.0%		
	Cecal			0	0							0		
Turkeys	Retail Ground Turkey		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			
	HACCP		0	0	0	0	0	0	0	0	0	0	0	
	Cecal		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
Cattle	Retail Ground Beef													
	HACCP	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		0.0%	0.0%		0.0%	0.0%	
	Cecal (Beef)	0	0	0	0	0			0	0		0	0	
Swine	Retail Pork Chops					0.0%		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
	Cecal (Market Swine)					0		0	0	0	0	0	1	
	Cecal (Sows)											0.0%	2.0%	
Humans		0	0	0	0	0	0	0	0	0	0	0	0	
Chickens	Retail Chickens						0.0%							
	HACCP			0.0%	0.0%							0.0%		
	Cecal			0	0							0		
Turkeys	Retail Ground Turkey		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			
	HACCP		0	0	0	0	0	0	0	0	0	0	0	
	Cecal		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
Cattle	Retail Ground Beef													
	HACCP	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		0.0%	0.0%		0.0%	0.0%	
	Cecal (Beef)	0	0	0	0	0			0	0		0	0	
Swine	Retail Pork Chops					0.0%		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
	Cecal (Market Swine)					0		0	0	0	0	0	1	
	Cecal (Sows)											0.0%	2.0%	

¹ Starting in 2011, testing included nine antimicrobial classes with the addition of the macrolide azithromycin. Because resistance to azithromycin is low (in this case, <1%), antimicrobial class resistance data from 2011 and beyond are comparable to the data from previous years.

² ACSSuT = ampicillin, chloramphenicol, streptomycin, sulfamethoxazole/sulfisoxazole, and tetracycline

³ ACT/S = ampicillin, chloramphenicol, and trimethoprim-sulfamethoxazole

Table 40c. Resistance Patterns among *Salmonella* Derby Isolates, 2003-2014

Year		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
Number of Isolates Tested	Humans	5	8	3	3	8	11	13	2	6	7	5	7	
	Chickens	Retail Chickens	0	0	0	0	0	1	0	0	0	0	0	0
		HACCP	0	0	2	1	0	0	0	0	0	0	1	0
		Cecal											0	0
	Turkeys	Retail Ground Turkey	0	3	1	2	1	6	5	2	2	1	0	0
		HACCP	0	15	3	7	1	0	4	1	1	1	2	1
		Cecal											0	0
	Cattle	Retail Ground Beef	0	0	0	0	0	0	0	0	0	0	0	0
		HACCP	13	12	6	2	1	0	0	1	2	0	1	5
		Cecal (Beef)											0	2
	Swine	Cecal (Dairy)											2	1
		Retail Pork Chops	0	0	0	0	4	0	3	6	2	1	5	5
		Cecal (Market Swine)											38	49
Cecal (Sows)											24	26		
Resistance Pattern	Source													
7. At Least ACSSuTAuCx ¹ Resistant	Humans	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	14.3% 1	0.0% 0	0.0% 0
	Chickens	Retail Chickens						0.0% 0						
		HACCP			0.0% 0	0.0% 0							0.0% 0	
		Cecal												
	Turkeys	Retail Ground Turkey		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		
		HACCP		0.0% 0	0.0% 0	0.0% 0	0.0% 0		25.0% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Cecal												
	Cattle	Retail Ground Beef												
		HACCP	0.0% 0	0.0% 0	16.7% 1	0.0% 0	0.0% 0			0.0% 0	0.0% 0		0.0% 0	0.0% 0
		Cecal (Beef)											0.0% 0	0.0% 0
	Swine	Cecal (Dairy)											0.0% 0	0.0% 0
		Retail Pork Chops					0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Cecal (Market Swine)											0.0% 0	0.0% 0
Cecal (Sows)											0.0% 0	0.0% 0		
8. At Least Ceftriaxone and Nalidixic Acid Resistant	Humans	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
	Chickens	Retail Chickens						0.0% 0						
		HACCP			0.0% 0	0.0% 0							0.0% 0	
		Cecal												
	Turkeys	Retail Ground Turkey		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		
		HACCP		0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Cecal												
	Cattle	Retail Ground Beef												
		HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0			0.0% 0	0.0% 0		0.0% 0	0.0% 0
		Cecal (Beef)											0.0% 0	0.0% 0
	Swine	Cecal (Dairy)											0.0% 0	0.0% 0
		Retail Pork Chops					0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Cecal (Market Swine)											0.0% 0	0.0% 0
Cecal (Sows)											0.0% 0	0.0% 0		

¹ ACSSuTAuCx = ACSSuT, amoxicillin-clavulanic acid, and ceftriaxone

Resistance by Year

Table 41a. Antimicrobial Resistance among *Salmonella* Montevideo Isolates, 2003-2014

Year	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014				
Number of Isolates Tested	Humans	43	50	48	62	51	68	57	58	65	60	53	44			
	Chickens	Retail Chickens	1	3	1	2	6	4	0	1	4	1	0			
		HACCP	30	29	62	21	20	13	4	5	1	9	4	16		
		Cecal										0	0			
	Turkeys	Retail Ground Turkey	2	2	4	8	2	1	4	1	1	1	0	1		
		HACCP	1	4	3	3	3	1	1	3	2	5	0	17		
		Cecal										0	1			
	Cattle	Retail Ground Beef	2	0	2	6	3	2	4	1	1	1	4	2		
		HACCP	64	82	43	63	95	104	59	61	99	84	89	91		
		Cecal (Beef)										21	14			
	Cecal (Dairy)											56	38			
	Swine	Retail Pork Chops	0	0	0	0	1	0	0	1	0	0	0	0		
		Cecal (Market Swine)										2	2			
Cecal (Sows)											4	5				
Antimicrobial Class	Antimicrobial (Resistance Breakpoint)	Isolate Source														
Aminoglycosides	Gentamicin (MIC ≥ 16 µg/ml)	Humans	0.0% 0	0.0% 0	27.1% 13	17.7% 11	7.8% 4	2.9% 2	7.0% 4	3.4% 2	0.0% 0	1.7% 1	0.0% 0	0.0% 0		
		Chickens	Retail Chickens	100.0% 1	33.3% 1	100.0% 1	0.0% 0	50.0% 3	0.0% 0	25.0% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
			HACCP	30.0% 9	27.6% 8	11.3% 7	9.5% 2	20.0% 4	53.8% 7	10.0% 1	0.0% 0	0.0% 0	33.3% 3	0.0% 0	0.0% 0	
			Cecal													
		Turkeys	Retail Ground Turkey	0.0% 0	100.0% 2	0.0% 0	37.5% 3	50.0% 1	0.0% 0	25.0% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
			HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0	66.7% 2	0.0% 0	100.0% 1	100.0% 3	50.0% 1	40.0% 2		11.8% 2	
			Cecal												0.0% 0	
		Cattle	Retail Ground Beef	0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
			HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
			Cecal (Beef)											0.0% 0	0.0% 0	
		Cecal (Dairy)											0.0% 0	0.0% 0		
		Swine	Retail Pork Chops					100.0% 1			0.0% 0					
	Cecal (Market Swine)											0.0% 0	0.0% 0			
	Cecal (Sows)											0.0% 0	0.0% 0			
	Streptomycin (MIC ≥ 64 µg/ml)	Humans	0.0% 0	4.0% 2	27.1% 13	19.4% 12	7.8% 4	2.9% 2	5.3% 3	3.4% 2	3.1% 2	1.7% 1	0.0% 0	0.0% 0		
		Chickens	Retail Chickens	100.0% 1	33.3% 1	100.0% 1	0.0% 0	50.0% 3	0.0% 0	25.0% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
			HACCP	36.7% 11	27.6% 8	9.7% 6	9.5% 2	10.0% 2	46.2% 6	10.0% 1	0.0% 0	0.0% 0	33.3% 3	0.0% 0	0.0% 0	
			Cecal													
		Turkeys	Retail Ground Turkey	100.0% 2	50.0% 1	50.0% 2	75.0% 6	50.0% 1	0.0% 0	75.0% 3	100.0% 1	100.0% 1	0.0% 0		100.0% 1	
			HACCP	0.0% 0	0.0% 0	33.3% 1	33.3% 1	0.0% 0	100.0% 1	100.0% 1	100.0% 3	50.0% 1	60.0% 3		11.8% 2	
			Cecal												0.0% 0	
		Cattle	Retail Ground Beef	0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
			HACCP	1.6% 1	2.4% 2	2.3% 1	1.6% 1	0.0% 0	1.0% 1	1.7% 1	3.3% 2	5.1% 5	3.4% 2	3.4% 3	2.2% 2	
			Cecal (Beef)											4.8% 1	7.1% 1	
		Cecal (Dairy)											3.6% 2	5.3% 2		
		Swine	Retail Pork Chops					100.0% 1			0.0% 0					
	Cecal (Market Swine)											0.0% 0	50.0% 1			
	Cecal (Sows)											0.0% 0	0.0% 0			
	β-Lactam/β-Lactamase Inhibitor Combinations	Amoxicillin-Clavulanic Acid (MIC ≥ 32 / 16 µg/ml)	Humans	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	1.5% 1	0.0% 0	0.0% 0	2.3% 1	
			Chickens	Retail Chickens	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
				HACCP	3.3% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
				Cecal												
			Turkeys	Retail Ground Turkey	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	100.0% 1		100.0% 1
				HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0
				Cecal												0.0% 0
			Cattle	Retail Ground Beef	0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
HACCP				1.6% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	1.7% 1	0.0% 0	4.0% 4	2.4% 2	2.2% 2	1.1% 1	
Cecal (Beef)														4.8% 1	0.0% 0	
Cecal (Dairy)													3.6% 2	2.6% 1		
Swine			Retail Pork Chops					0.0% 0			0.0% 0					
	HACCP	0.0% 0		0.0% 0		0.0% 0	0.0% 0	0.0% 0								
	Cecal (Market Swine)										0.0% 0	0.0% 0				
Cecal (Sows)										0.0% 0	0.0% 0					

Table 41b. Antimicrobial Resistance among *Salmonella* Montevideo Isolates, 2003-2014

Year			2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
Number of Isolates Tested	Humans		43	50	48	62	51	68	57	58	65	60	53	44	
	Chickens	Retail Chickens	1	3	1	2	6	4	4	0	1	4	1	0	
		HACCP	30	29	62	21	20	13	10	5	1	9	4	16	
		Cecal											0	0	
	Turkeys	Retail Ground Turkey	2	2	4	8	2	1	4	1	1	1	0	1	
		HACCP	1	4	3	3	3	1	1	3	2	5	0	17	
		Cecal											0	1	
	Cattle	Retail Ground Beef	2	0	2	6	3	2	4	1	1	1	4	2	
		HACCP	64	82	43	63	95	104	59	61	99	84	89	91	
		Cecal (Beef) Cecal (Dairy)											21	14	
	Swine	Retail Pork Chops	0	0	0	0	1	0	0	1	0	0	0	0	
		Cecal (Market Swine)											2	2	
		Cecal (Sows)											4	5	
Antimicrobial Class	Antimicrobial (Resistance Breakpoint)	Isolate Source													
Cephems	Cefoxitin (MIC ≥ 32 µg/ml)	Humans		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	1.5% 1	0.0% 0	0.0% 0	2.3% 1	
		Chickens	Retail Chickens	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
			HACCP	3.3% 1	0.0% 0	0.0% 0	4.8% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
			Cecal												
		Turkeys	Retail Ground Turkey	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	100.0% 1		100.0% 1
			HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0
			Cecal												0.0% 0
		Cattle	Retail Ground Beef	0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
			HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	1.7% 1	0.0% 0	4.0% 4	2.4% 2	2.2% 2	1.1% 1
			Cecal (Beef)											4.8% 1	0.0% 0
			Cecal (Dairy)											3.6% 2	2.6% 1
		Swine	Retail Pork Chops					0.0% 0			0.0% 0				
	Cecal (Market Swine)												0.0% 0	0.0% 0	
	Cecal (Sows)												0.0% 0	0.0% 0	
	Ceftiofur (MIC ≥ 8 µg/ml)	Humans		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	1.5% 1	0.0% 0	0.0% 0	2.3% 1
		Chickens	Retail Chickens	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
			HACCP	3.3% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
			Cecal												
		Turkeys	Retail Ground Turkey	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	100.0% 1		100.0% 1
			HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0
			Cecal												0.0% 0
		Cattle	Retail Ground Beef	0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
			HACCP	0.0% 0	0.0% 0	0.0% 0	1.6% 1	0.0% 0	0.0% 0	1.7% 1	0.0% 0	4.0% 4	2.4% 2	2.2% 2	1.1% 1
			Cecal (Beef)											4.8% 1	0.0% 0
			Cecal (Dairy)											3.6% 2	2.6% 1
		Swine	Retail Pork Chops					0.0% 0			0.0% 0				
	Cecal (Market Swine)												0.0% 0	0.0% 0	
	Cecal (Sows)												0.0% 0	0.0% 0	
	Ceftriaxone (MIC ≥ 4 µg/ml)	Humans		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	1.5% 1	0.0% 0	0.0% 0	2.3% 1
		Chickens	Retail Chickens	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
			HACCP	3.3% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
			Cecal												
		Turkeys	Retail Ground Turkey	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	100.0% 1		100.0% 1
			HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0
			Cecal												0.0% 0
		Cattle	Retail Ground Beef	0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
HACCP			1.6% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	1.7% 1	0.0% 0	4.0% 4	2.4% 2	2.2% 2	1.1% 1	
Cecal (Beef)													4.8% 1	0.0% 0	
Cecal (Dairy)													3.6% 2	2.6% 1	
Swine		Retail Pork Chops					0.0% 0			0.0% 0					
	Cecal (Market Swine)											0.0% 0	0.0% 0		
	Cecal (Sows)											0.0% 0	0.0% 0		

Table 41c. Antimicrobial Resistance among *Salmonella* Montevideo Isolates, 2003-2014

Year		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014		
Number of Isolates Tested	Humans	43	50	48	62	51	68	57	58	65	60	53	44		
	Chickens	Retail Chickens	1	3	1	2	6	4	4	0	1	4	1	0	
		HACCP	30	29	62	21	20	13	10	5	1	9	4	16	
		Cecal											0	0	
	Turkeys	Retail Ground Turkey	2	2	4	8	2	1	4	1	1	1	0	1	
		HACCP	1	4	3	3	3	1	1	3	2	5	0	17	
		Cecal											0	1	
	Cattle	Retail Ground Beef	2	0	2	6	3	2	4	1	1	1	4	2	
		HACCP	64	82	43	63	95	104	59	61	99	84	89	91	
		Cecal (Beef)											21	14	
	Swine	Cecal (Dairy)											56	38	
		Retail Pork Chops	0	0	0	0	1	0	0	1	0	0	0	0	
		Cecal (Market Swine)											2	2	
		Cecal (Sows)											4	5	
Antimicrobial Class	Antimicrobial (Resistance Breakpoint)	Isolate Source													
Folate Pathway Inhibitor	Sulfamethoxazole/ Sulfisoxazole ¹ (MIC ≥ 512 µg/ml)	Humans	0.0%	0.0%	25.0%	19.4%	7.8%	4.4%	7.0%	3.4%	3.1%	1.7%	1.9%	0.0%	
		Chickens	Retail Chickens	100.0%	0.0%	100.0%	0.0%	50.0%	0.0%	75.0%		0.0%	0.0%	0.0%	
			HACCP	1	0	1	0	3	0	3		0	0	0	
			Cecal	16.7%	24.1%	9.7%	14.3%	10.0%	23.1%	10.0%	0.0%	0.0%	11.1%	0.0%	0.0%
		Turkeys	Retail Ground Turkey	0	0	0	1	0	0	0	0	0	0		0
			HACCP	0	0	0	33.3%	0	0	0	66.7%	0	60.0%		0
			Cecal				1	0	0	0	2	0	3		0
		Cattle	Retail Ground Beef	0		0	0	0	0	0	0	0	0	0	0
			HACCP	0	1.2%	0	1.6%	1.1%	1.9%	1.7%	0.0%	4.0%	2.4%	2.2%	1.1%
			Cecal (Beef)		1	0	1	1	2	1	0	4	2	2	1
			Cecal (Dairy)											4.8%	7.1%
		Swine	Retail Pork Chops					100.0%			0.0%				
			Cecal (Market Swine)											0.0%	0.0%
			Cecal (Sows)											0.0%	0.0%
	Trimethoprim-Sulfamethoxazole (MIC ≥ 4 / 76 µg/ml)	Humans	0.0%	2.0%	0.0%	1.6%	0.0%	0.0%	0.0%	0.0%	1.5%	0.0%	1.9%	0.0%	
		Chickens	Retail Chickens	0	1	0	1	0	0	0	0	1	0	1	0
			HACCP	0	0	0	0	0	0	0	0	0	0	0	0
			Cecal	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
		Turkeys	Retail Ground Turkey	0	0	0	0	0	0	0	0	0	0		0
			HACCP	0	0	0	0	0	0	0	0	0	0		0
			Cecal												0.0%
		Cattle	Retail Ground Beef	0		0	0	0	0	0	0	0	0	0	0
			HACCP	0	0	0	0	1.1%	1.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
			Cecal (Beef)											0.0%	0.0%
			Cecal (Dairy)											1.8%	2.6%
		Swine	Retail Pork Chops					0.0%			0.0%				
			Cecal (Market Swine)											0.0%	0.0%
			Cecal (Sows)											0.0%	0.0%
	Macrolides	Azithromycin (MIC ≥ 32 µg/ml)	Humans								0.0%	0.0%	0.0%	0.0%	
			Chickens	Retail Chickens								0	0	0	0
				HACCP								0	0	0	0
				Cecal											
			Turkeys	Retail Ground Turkey								0.0%	0.0%		0.0%
				HACCP								0	0		0
Cecal														0.0%	
Cattle			Retail Ground Beef								0.0%	0.0%	0.0%	0.0%	
			HACCP								0	0	0	0	
			Cecal (Beef)											0.0%	
			Cecal (Dairy)											0.0%	
Swine			Retail Pork Chops											0.0%	
			Cecal (Market Swine)											0.0%	
			Cecal (Sows)											0.0%	

¹ Sulfamethoxazole was tested from 1996-2003 and was replaced by sulfisoxazole in 2004

Table 41d. Antimicrobial Resistance among *Salmonella* Montevideo Isolates, 2003-2014

Year		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014		
Number of Isolates Tested	Humans	43	50	48	62	51	68	57	58	65	60	53	44		
	Chickens	Retail Chickens	1	3	1	2	6	4	4	0	1	4	1	0	
		HACCP	30	29	62	21	20	13	10	5	1	9	4	16	
		Cecal											0	0	
	Turkeys	Retail Ground Turkey	2	2	4	8	2	1	4	1	1	1	0	1	
		HACCP	1	4	3	3	3	1	1	3	2	5	0	17	
		Cecal											0	1	
	Cattle	Retail Ground Beef	2	0	2	6	3	2	4	1	1	1	4	2	
		HACCP	64	82	43	63	95	104	59	61	99	84	89	91	
		Cecal (Beef)											21	14	
	Swine	Retail Pork Chops											56	38	
		Cecal (Market Swine)	0	0	0	0	1	0	0	1	0	0	0	0	
		Cecal (Sows)											2	2	
												4	5		
Antimicrobial Class	Antimicrobial (Resistance Breakpoint)	Isolate Source													
Penicillins	Ampicillin (MIC ≥ 32 µg/ml)	Humans	0.0%	2.0%	0.0%	1.6%	0.0%	0.0%	0.0%	0.0%	1.5%	0.0%	0.0%	2.3%	
		Chickens	Retail Chickens	0	1	0	1	0	0	0	0	1	0	0	1
			HACCP	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	25.0%	0.0%	0.0%	0.0%	0.0%	0.0%
			Cecal	0	0	1	0	0	0	0	0	0	0	0	0
		Turkeys	Retail Ground Turkey	0.0%	0.0%	50.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%		100.0%
			HACCP	0	0	2	0	0	0	0	0	0	1		1
			Cecal	0.0%	0.0%	0.0%	33.3%	0.0%	0.0%	0.0%	33.3%	50.0%	20.0%		5.9%
		Cattle	Retail Ground Beef	0		0	0	0	0	0	0	0	0	0	0
			HACCP	1.6%	0.0%	0.0%	0.0%	0.0%	1.0%	1.7%	0.0%	4.0%	2.4%	2.2%	1.1%
			Cecal (Beef)	1	0	0	0	0	1	1	0	4	2	2	1
		Swine	Retail Pork Chops					0.0%			0.0%				
			Cecal (Market Swine)											0.0%	0.0%
			Cecal (Sows)											0.0%	0.0%
Phenicolis	Chloramphenicol (MIC ≥ 32 µg/ml)	Humans	0.0%	0.0%	0.0%	1.6%	0.0%	0.0%	0.0%	0.0%	1.5%	0.0%	0.0%	0.0%	
		Chickens	Retail Chickens	0	0	0	1	0	0	0	0	1	0	0	0
			HACCP	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
			Cecal	0	0	1	0	0	0	0	0	0	0	0	0
		Turkeys	Retail Ground Turkey	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		0.0%
			HACCP	0	0	0	0	0	0	0	0	0	0		0
			Cecal	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		0.0%
		Cattle	Retail Ground Beef	0.0%		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
			HACCP	0.0%	1.2%	0.0%	1.6%	0.0%	1.0%	1.7%	0.0%	4.0%	2.4%	2.2%	1.1%
			Cecal (Beef)	0	1	0	1	0	1	1	0	4	2	2	1
		Swine	Retail Pork Chops					0.0%			0.0%				
			Cecal (Market Swine)											0.0%	0.0%
			Cecal (Sows)											0.0%	0.0%
Quinolones	Ciprofloxacin (MIC ≥ 1 µg/ml)	Humans	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
		Chickens	Retail Chickens	0	0	0	0	0	0	0	0	0	0	0	0
			HACCP	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
			Cecal	0	0	0	0	0	0	0	0	0	0	0	0
		Turkeys	Retail Ground Turkey	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		0.0%
			HACCP	0	0	0	0	0	0	0	0	0	0		0
			Cecal	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		0.0%
		Cattle	Retail Ground Beef	0.0%		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
			HACCP	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
			Cecal (Beef)	0	0	0	0	0	0	0	0	0	0	0.0%	0.0%
		Swine	Retail Pork Chops					0.0%			0.0%				
			Cecal (Market Swine)											0.0%	0.0%
			Cecal (Sows)											0.0%	0.0%

Table 41e. Antimicrobial Resistance among *Salmonella* Montevideo Isolates, 2003-2014

Year	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014			
Number of Isolates Tested	Humans	43	50	48	62	51	68	57	58	65	60	53	44		
	Chickens	Retail Chickens	1	3	1	2	6	4	4	0	1	4	1	0	
		HACCP	30	29	62	21	20	13	10	5	1	9	4	16	
		Cecal											0	0	
	Turkeys	Retail Ground Turkey	2	2	4	8	2	1	4	1	1	1	0	1	
		HACCP	1	4	3	3	3	1	1	3	2	5	0	17	
		Cecal											0	1	
	Cattle	Retail Ground Beef	2	0	2	6	3	2	4	1	1	1	4	2	
		HACCP	64	82	43	63	95	104	59	61	99	84	89	91	
		Cecal (Beef)											21	14	
	Swine	Cecal (Dairy)											56	38	
		Retail Pork Chops	0	0	0	0	1	0	0	1	0	0	0	0	
		Cecal (Market Swine)											2	2	
	Cecal (Sows)										4	5			
Antimicrobial Class	Antimicrobial (Resistance Breakpoint)	Isolate Source													
Quinolones	Nalidixic Acid (MIC ≥ 32 µg/ml)	Humans	0.0% 0	2.0% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	1.5% 1	0.0% 0	1.9% 1	0.0% 0	
		Chickens	Retail Chickens	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
			HACCP	0.0% 0	3.4% 1	4.8% 3	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
			Cecal												
		Turkeys	Retail Ground Turkey	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
			HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
			Cecal												0.0% 0
		Cattle	Retail Ground Beef	0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
			HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
			Cecal (Beef)											0.0% 0	0.0% 0
		Swine	Cecal (Dairy)											0.0% 0	0.0% 0
			Retail Pork Chops					0.0% 0		0.0% 0					
			Cecal (Market Swine)											0.0% 0	0.0% 0
	Cecal (Sows)										0.0% 0	0.0% 0			
Tetracyclines	Tetracycline (MIC ≥ 16 µg/ml)	Humans	2.3% 1	2.0% 1	25.0% 12	19.4% 12	7.8% 4	1.5% 1	1.8% 1	5.2% 3	6.2% 4	5.0% 3	0.0% 0	2.3% 1	
		Chickens	Retail Chickens	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	25.0% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
			HACCP	13.3% 4	3.4% 1	4.8% 3	9.5% 2	10.0% 2	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
			Cecal												
		Turkeys	Retail Ground Turkey	0.0% 0	0.0% 0	50.0% 2	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
			HACCP	0.0% 0	25.0% 1	0.0% 0	33.3% 1	0.0% 0	0.0% 0	0.0% 0	66.7% 2	0.0% 0	60.0% 3	5.9% 1	0.0% 0
			Cecal												0.0% 0
		Cattle	Retail Ground Beef	0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	50.0% 2	0.0% 0
			HACCP	12.5% 8	9.8% 8	9.3% 4	4.8% 3	7.4% 7	7.7% 8	6.8% 4	11.5% 7	17.2% 17	21.4% 18	11.2% 10	9.9% 9
			Cecal (Beef)											19.0% 4	28.6% 4
		Swine	Cecal (Dairy)											8.9% 5	13.2% 5
			Retail Pork Chops						0.0% 0		0.0% 0				
			Cecal (Market Swine)											0.0% 0	50.0% 1
	Cecal (Sows)										0.0% 0	0.0% 0			

Multidrug Resistance

Table 42a. Resistance Patterns among *Salmonella* Montevideo Isolates, 2003-2014¹

Year		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
Number of Isolates Tested	Humans	43	50	48	62	51	68	57	58	65	60	53	44	
	Chickens	Retail Chickens	1	3	1	2	6	4	4	0	1	4	1	0
		HACCP	30	29	62	21	20	13	10	5	1	9	4	16
		Cecal											0	0
	Turkeys	Retail Ground Turkey	2	2	4	8	2	1	4	1	1	1	0	1
		HACCP	1	4	3	3	3	1	1	3	2	5	0	17
		Cecal											0	1
	Cattle	Retail Ground Beef	2	0	2	6	3	2	4	1	1	1	4	2
		HACCP	64	82	43	63	95	104	59	61	99	84	89	91
		Cecal (Beef)											21	14
		Cecal (Dairy)											56	38
	Swine	Retail Pork Chops	0	0	0	0	1	0	0	1	0	0	0	0
		Cecal (Market Swine)											2	2
		Cecal (Sows)											4	5
Resistance Pattern	Source													
1. No Resistance Detected	Humans	97.7%	0.9%	0.7%	79.0%	92.2%	95.6%	93.0%	94.8%	93.8%	93.3%	96.2%	95.5%	
	Chickens	Retail Chickens	42	44	34	49	47	65	53	55	61	56	51	42
		HACCP	0	66.7%	0.0%	100.0%	50.0%	100.0%	25.0%		100.0%	100.0%	100.0%	
		Cecal	56.7%	65.5%	87.1%	76.2%	80.0%	46.2%	90.0%	100.0%	100.0%	66.7%	100.0%	100.0%
	Turkeys	Retail Ground Turkey	0	0	2	2	1	1	0	0	0	0		0
		HACCP	100.0%	75.0%	66.7%	33.3%	33.3%	0.0%	0.0%	0.0%	50.0%	40.0%		94.1%
		Cecal	1	3	2	1	1	0	0	0	1	2		14
	Cattle	Retail Ground Beef	100.0%		100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	75.0%	100.0%
		HACCP	2		2	6	3	2	4	1	1	1	3	2
		Cecal (Beef)	85.9%	90.2%	90.7%	95.2%	92.6%	92.3%	93.2%	86.9%	81.8%	78.6%	88.8%	88.9%
		Cecal (Dairy)	55	74	39	60	88	96	55	53	81	66	79	80
	Swine	Retail Pork Chops					0.0%			100.0%				
		Cecal (Market Swine)											100.0%	50.0%
		Cecal (Sows)											100.0%	100.0%
2. Resistant to ≥ 3 Antimicrobial Classes	Humans	0.0%	0.0%	2.5%	17.7%	7.8%	0.0%	1.8%	3.4%	3.1%	0.0%	0.0%	2.3%	
	Chickens	Retail Chickens	0	0	12	11	4	0	1	2	2	0	0	1
		HACCP	0	0.0%	0.0%	0.0%	0.0%	0.0%	25.0%		0.0%	0.0%	0.0%	
		Cecal	3.3%	0.0%	6.5%	4.8%	10.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Turkeys	Retail Ground Turkey	0	0	2	0	0	0	0	0	0	100.0%		100.0%
		HACCP	0	0.0%	0.0%	33.3%	0.0%	0.0%	0.0%	66.7%	0.0%	60.0%		5.9%
		Cecal	0	0	0	1	0	0	0	2	0	3		0
	Cattle	Retail Ground Beef	0.0%		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
		HACCP	0		0	0	0	0	0	0	0	0	0	0
		Cecal (Beef)	1.6%	1.2%	0.0%	1.6%	0.0%	1.0%	1.7%	0.0%	4.0%	2.4%	2.2%	2.2%
		Cecal (Dairy)	1	1	0	1	0	1	1	0	4	2	2	2
	Swine	Retail Pork Chops						0.0%			0.0%			
		Cecal (Market Swine)											0.0%	0.0%
		Cecal (Sows)											0.0%	0.0%
3. Resistant to ≥ 4 Antimicrobial Classes	Humans	0.0%	0.0%	0.0%	3.2%	0.0%	0.0%	0.0%	0.0%	1.5%	0.0%	0.0%	0.0%	
	Chickens	Retail Chickens	0	0	0	2	0	0	0	0	1	0	0	0
		HACCP	0	0.0%	0.0%	0.0%	0.0%	0.0%	25.0%		0.0%	0.0%	0.0%	
		Cecal	3.3%	0.0%	4.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Turkeys	Retail Ground Turkey	0	0	0	0	0	0	0	0	0	0		100.0%
		HACCP	0	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	33.3%	0.0%	20.0%		0.0%
		Cecal	0	0	0	0	0	0	0	1	0	1		0
	Cattle	Retail Ground Beef	0.0%		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
		HACCP	0		0	0	0	0	0	0	0	0	0	0
		Cecal (Beef)	1.6%	1.2%	0.0%	1.6%	0.0%	1.0%	1.7%	0.0%	4.0%	2.4%	2.2%	1.1%
		Cecal (Dairy)	1	1	0	1	0	1	1	0	4	2	2	1
	Swine	Retail Pork Chops					0.0%			0.0%				
		Cecal (Market Swine)											0.0%	0.0%
		Cecal (Sows)											0.0%	0.0%

¹ Starting in 2011, testing included nine antimicrobial classes with the addition of the macrolide azithromycin. Because resistance to azithromycin is low (in this case, <1%), antimicrobial class resistance data from 2011 and beyond are comparable to the data from previous years.

Table 42b. Resistance Patterns among *Salmonella* Montevideo Isolates, 2003-2014¹

Year			2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Number of Isolates Tested	Humans		43	50	48	62	51	68	57	58	65	60	53	44
	Chickens	Retail Chickens	1	3	1	2	6	4	4	0	1	4	1	0
		HACCP	30	29	62	21	20	13	10	5	1	9	4	16
		Cecal											0	0
	Turkeys	Retail Ground Turkey	2	2	4	8	2	1	4	1	1	1	0	1
		HACCP	1	4	3	3	3	1	1	3	2	5	0	17
		Cecal											0	1
	Cattle	Retail Ground Beef	2	0	2	6	3	2	4	1	1	1	4	2
		HACCP	64	82	43	63	95	104	59	61	99	84	89	91
		Cecal (Beef)											21	14
	Swine	Retail Pork Chops					1	0	0	1	0	0	0	0
		Cecal (Market Swine)											2	2
		Cecal (Sows)											4	5
Resistance Pattern		Source												
4. Resistant to ≥ 5 Antimicrobial Classes	Humans		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	1.5% 1	0.0% 0	0.0% 0	0.0% 0
	Chickens	Retail Chickens	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		HACCP	0.0% 0	0.0% 0	1.6% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Cecal												
	Turkeys	Retail Ground Turkey	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Cecal												0.0% 0
	Cattle	Retail Ground Beef	0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		HACCP	0.0% 0	0.0% 0	0.0% 0	1.6% 1	0.0% 0	1.0% 1	1.7% 1	0.0% 0	4.0% 4	2.4% 2	2.2% 2	0.0% 0
		Cecal (Beef)											4.8% 1	0.0% 0
		Cecal (Dairy)											3.6% 2	2.6% 1
	Swine	Retail Pork Chops					0.0% 0			0.0% 0				
		Cecal (Market Swine)											0.0% 0	0.0% 0
		Cecal (Sows)											0.0% 0	0.0% 0
	5. At Least ACSSuT ² Resistant	Humans		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	1.5% 1	0.0% 0	0.0% 0
Chickens		Retail Chickens	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		HACCP	0.0% 0	0.0% 0	1.6% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Cecal												
Turkeys		Retail Ground Turkey	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Cecal												0.0% 0
Cattle		Retail Ground Beef	0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	1.0% 1	1.7% 1	0.0% 0	4.0% 4	2.4% 2	2.2% 2	0.0% 0
		Cecal (Beef)											4.8% 1	0.0% 0
		Cecal (Dairy)											3.6% 2	2.6% 1
Swine		Retail Pork Chops					0.0% 0			0.0% 0				
		Cecal (Market Swine)											0.0% 0	0.0% 0
		Cecal (Sows)											0.0% 0	0.0% 0
6. At Least ACT/S ³ Resistant		Humans		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
	Chickens	Retail Chickens	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Cecal												
	Turkeys	Retail Ground Turkey	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Cecal												0.0% 0
	Cattle	Retail Ground Beef	0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Cecal (Beef)											0.0% 0	0.0% 0
		Cecal (Dairy)											0.0% 0	2.6% 1
	Swine	Retail Pork Chops					0.0% 0			0.0% 0				
		Cecal (Market Swine)											0.0% 0	0.0% 0
		Cecal (Sows)											0.0% 0	0.0% 0

¹ Starting in 2011, testing included nine antimicrobial classes with the addition of the macrolide azithromycin. Because resistance to azithromycin is low (in this case, <1%), antimicrobial class resistance data from 2011 and beyond are comparable to the data from previous years.

² ACSSuT = ampicillin, chloramphenicol, streptomycin, sulfamethoxazole/sulfisoxazole, and tetracycline

³ ACT/S = ampicillin, chloramphenicol, and trimethoprim-sulfamethoxazole

Table 42c. Resistance Patterns among *Salmonella* Montevideo Isolates, 2003-2014

Year		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
Number of Isolates Tested	Humans	43	50	48	62	51	68	57	58	65	60	53	44	
	Chickens	Retail Chickens	1	3	1	2	6	4	4	0	1	4	1	0
		HACCP	30	29	62	21	20	13	10	5	1	9	4	16
		Cecal											0	0
	Turkeys	Retail Ground Turkey	2	2	4	8	2	1	4	1	1	1	0	1
		HACCP	1	4	3	3	3	1	1	3	2	5	0	17
		Cecal											0	1
	Cattle	Retail Ground Beef	2	0	2	6	3	2	4	1	1	1	4	2
		HACCP	64	82	43	63	95	104	59	61	99	84	89	91
		Cecal (Beef)											21	14
		Cecal (Dairy)											56	38
	Swine	Retail Pork Chops	0	0	0	0	1	0	0	1	0	0	0	0
		Cecal (Market Swine)											2	2
Cecal (Sows)												4	5	
Resistance Pattern	Source													
7. At Least ACSSuTAuCx ¹ Resistant	Humans	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	1.5% 1	0.0% 0	0.0% 0	0.0% 0	
	Chickens	Retail Chickens	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
		HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
		Cecal												
	Turkeys	Retail Ground Turkey	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0
		HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0
		Cecal												0.0% 0
	Cattle	Retail Ground Beef	0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	1.7% 1	0.0% 0	4.0% 4	2.4% 2	2.2% 2	0.0% 0
		Cecal (Beef)											4.8% 1	0.0% 0
		Cecal (Dairy)											3.6% 2	2.6% 1
	Swine	Retail Pork Chops					0.0% 0			0.0% 0				
		Cecal (Market Swine)											0.0% 0	0.0% 0
Cecal (Sows)												0.0% 0	0.0% 0	
8. At Least Ceftriaxone and Nalidixic Acid Resistant	Humans	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
	Chickens	Retail Chickens	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
		HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
		Cecal												
	Turkeys	Retail Ground Turkey	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0
		HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0
		Cecal												0.0% 0
	Cattle	Retail Ground Beef	0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Cecal (Beef)											0.0% 0	0.0% 0
		Cecal (Dairy)											0.0% 0	0.0% 0
	Swine	Retail Pork Chops					0.0% 0			0.0% 0				
		Cecal (Market Swine)											0.0% 0	0.0% 0
Cecal (Sows)												0.0% 0	0.0% 0	

¹ ACSSuTAuCx = ACSSuT, amoxicillin-clavulanic acid, and ceftriaxone

Resistance by Year

Table 43a. Antimicrobial Resistance among *Salmonella* Anatum Isolates, 2003-2014

Year	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014				
Number of Isolates Tested	Humans	18	16	12	10	18	14	13	19	16	16	20	13			
	Chickens	Retail Chickens	0	0	1	1	0	2	0	1	1	1	0	0		
		HACCP	2	4	1	6	0	1	1	1	1	0	0	6		
		Cecal										0	0	0		
	Turkeys	Retail Ground Turkey	1	0	1	0	1	7	1	0	0	2	2	2		
		HACCP	0	1	1	9	1	1	2	6	0	3	2	12		
		Cecal										0	0	4		
	Cattle	Retail Ground Beef	0	0	0	2	1	0	0	1	0	1	1	1		
		HACCP	61	68	22	26	23	34	7	14	18	18	16	18		
		Cecal (Beef)										18	25	15		
	Swine	Retail Pork Chops	0	0	2	0	0	0	0	1	0	0	0	1		
		Cecal (Market Swine)										33	29	67		
		Cecal (Sows)										43	67			
Antimicrobial Class	Antimicrobial (Resistance Breakpoint)	Isolate Source														
Aminoglycosides	Gentamicin (MIC ≥ 16 µg/ml)	Humans	0.0%	0.0%	0.0%	0.0%	0.0%	7.1%	0.0%	0.0%	0.0%	12.5%	0.0%	0.0%		
		Chickens	Retail Chickens	0	0	0.0%	0.0%	0	0.0%	0	0.0%	0	100.0%			
			HACCP	0.0%	0.0%	0.0%	0.0%	0	0.0%	100.0%	0.0%	0			0.0%	
			Cecal	0	0	0	0	0	0	1	0	0			0	
		Turkeys	Retail Ground Turkey	0.0%		0.0%		100.0%	14.3%	0.0%			100.0%	0.0%	0.0%	
			HACCP	0	0.0%	0	22.2%	0	0.0%	0.0%	66.7%		0	0.0%	0.0%	
			Cecal	0	0	0	2	0	0	0	4		0	0	0.0%	
		Cattle	Retail Ground Beef				0.0%	0.0%		0.0%		0.0%	0.0%	0.0%	0.0%	
			HACCP	0.0%	0.0%	0.0%	0.0%	0	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
			Cecal (Beef)	0	0	0	0	0	0	0	0	0	0	0	0.0%	
		Swine	Retail Pork Chops			0.0%					100.0%				0.0%	
			Cecal (Market Swine)								1				0.0%	
	Cecal (Sows)													0.0%		
	Streptomycin (MIC ≥ 64 µg/ml)	Humans	0.0%	6.3%	0.0%	0.0%	0.0%	7.1%	0.0%	10.5%	6.3%	12.5%	0.0%	7.7%		
		Chickens	Retail Chickens	0	1	100.0%	0.0%	0	0.0%	0	0.0%	100.0%	100.0%			
			HACCP	0.0%	0.0%	0.0%	0.0%	0	0.0%	100.0%	0.0%	0			16.7%	
			Cecal	0	0	0	0	0	0	1	0	0			1	
		Turkeys	Retail Ground Turkey	0.0%		0.0%		0.0%	14.3%	0.0%			100.0%	0.0%	0.0%	
			HACCP	0	0.0%	0	44.4%	0	100.0%	0.0%	0.0%		0	0.0%	0.0%	
			Cecal	0	0	0	4	0	1	0	0		0	0	0.0%	
		Cattle	Retail Ground Beef				0.0%	0.0%		0.0%		0.0%	0.0%	0.0%	0.0%	
			HACCP	3.3%	1.5%	0.0%	7.7%	4.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
			Cecal (Beef)	2	1	0	2	1	0	0	0	0	0	0	4.0%	
		Swine	Retail Pork Chops			0.0%					100.0%				0.0%	
			Cecal (Market Swine)								1				0.0%	
	Cecal (Sows)													1.5%		
	β-Lactam/β-Lactamase Inhibitor Combinations	Amoxicillin-Clavulanic Acid (MIC ≥ 32 / 16 µg/ml)	Humans	0.0%	6.3%	0.0%	0.0%	0.0%	7.1%	0.0%	0.0%	0.0%	0.0%	0.0%		
			Chickens	Retail Chickens			100.0%	0.0%		0.0%		0.0%	0.0%			
				HACCP	0.0%	0.0%	0.0%	0.0%		0.0%	0.0%	0.0%			0.0%	
				Cecal	0	0	0	0		0	0	0			0	
			Turkeys	Retail Ground Turkey	0.0%		0.0%		0.0%	42.9%	0.0%			0.0%	0.0%	0.0%
				HACCP	0	0.0%	0	0.0%	0	0.0%	50.0%	0.0%		33.3%	0.0%	16.7%
				Cecal	0	0	0	0	0	0	1	0		1	0	0.0%
			Cattle	Retail Ground Beef				0.0%	0.0%		0.0%		0.0%	0.0%	0.0%	0.0%
				HACCP	3.3%	1.5%	0.0%	3.8%	4.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
				Cecal (Beef)	2	1	0	1	1	0	0	0	0	0	0	0.0%
Swine			Retail Pork Chops			0.0%					0.0%				0.0%	
			Cecal (Market Swine)												0.0%	
	Cecal (Sows)												0.0%			

Table 43b. Antimicrobial Resistance among *Salmonella* Anatum Isolates, 2003-2014

Year		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014		
Number of Isolates Tested	Humans	18	16	12	10	18	14	13	19	16	16	20	13		
	Chickens	Retail Chickens	0	0	1	1	0	2	0	1	1	1	0	0	
		HACCP	2	4	1	6	0	1	1	1	1	0	0	6	
		Cecal											0	0	
	Turkeys	Retail Ground Turkey	1	0	1	0	1	7	1	0	0	2	2	2	
		HACCP	0	1	1	9	1	1	2	6	0	3	2	12	
		Cecal											0	4	
	Cattle	Retail Ground Beef	0	0	0	2	1	0	0	1	0	1	1	1	
		HACCP	61	68	22	26	23	34	7	14	18	18	16	18	
		Cecal (Beef)											18	25	
		Cecal (Dairy)											18	15	
	Swine	Retail Pork Chops	0	0	2	0	0	0	0	1	0	0	0	1	
		Cecal (Market Swine)											33	29	
		Cecal (Sows)											43	67	
Antimicrobial Class	Antimicrobial (Resistance Breakpoint)	Isolate Source													
Cephems	Cefoxitin (MIC ≥ 32 µg/ml)	Humans	0.0%	6.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
		Chickens	Retail Chickens		1	100.0%	0.0%		0.0%		0.0%	0.0%	0.0%		
			HACCP	0.0%	0.0%	0.0%	0.0%		0.0%	0.0%	0.0%	0.0%			0.0%
			Cecal												
		Turkeys	Retail Ground Turkey	0.0%		0.0%		0.0%	42.9%	0.0%			0.0%	0.0%	0.0%
			HACCP		0.0%	0.0%	0.0%	0.0%	0.0%	50.0%	0.0%		33.3%	0.0%	16.7%
			Cecal												0.0%
		Cattle	Retail Ground Beef				0.0%	0.0%			0.0%		0.0%	0.0%	0.0%
			HACCP	3.3%	1.5%	0.0%	3.8%	4.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
			Cecal (Beef)											0.0%	0.0%
			Cecal (Dairy)											5.6%	0.0%
		Swine	Retail Pork Chops			0.0%					0.0%				0.0%
			Cecal (Market Swine)											0.0%	0.0%
			Cecal (Sows)											0.0%	0.0%
	Ceftiofur (MIC ≥ 8 µg/ml)	Humans	0.0%	6.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
		Chickens	Retail Chickens		1	100.0%	0.0%		0.0%		0.0%	0.0%	0.0%		
			HACCP	0.0%	0.0%	0.0%	0.0%		0.0%	0.0%	0.0%	0.0%			0.0%
			Cecal												
		Turkeys	Retail Ground Turkey	0.0%		0.0%		0.0%	42.9%	0.0%			0.0%	0.0%	0.0%
			HACCP		0.0%	0.0%	0.0%	0.0%	0.0%	50.0%	0.0%		33.3%	0.0%	16.7%
			Cecal												0.0%
		Cattle	Retail Ground Beef				0.0%	0.0%			0.0%		0.0%	0.0%	0.0%
			HACCP	3.3%	1.5%	0.0%	3.8%	4.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
			Cecal (Beef)											0.0%	0.0%
			Cecal (Dairy)											5.6%	0.0%
		Swine	Retail Pork Chops			0.0%					0.0%				0.0%
			Cecal (Market Swine)											0.0%	0.0%
			Cecal (Sows)											0.0%	0.0%
	Ceftriaxone (MIC ≥ 4 µg/ml)	Humans	0.0%	6.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
		Chickens	Retail Chickens		1	100.0%	0.0%		0.0%		0.0%	0.0%	0.0%		
			HACCP	0.0%	0.0%	0.0%	0.0%		0.0%	0.0%	0.0%	0.0%			0.0%
			Cecal												
		Turkeys	Retail Ground Turkey	0.0%		0.0%		0.0%	42.9%	0.0%			0.0%	0.0%	0.0%
HACCP				0.0%	0.0%	0.0%	0.0%	0.0%	50.0%	0.0%		33.3%	0.0%	16.7%	
Cecal														0.0%	
Cattle		Retail Ground Beef				0.0%	0.0%			0.0%		0.0%	0.0%	0.0%	
		HACCP	3.3%	1.5%	0.0%	3.8%	8.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
		Cecal (Beef)											0.0%	0.0%	
		Cecal (Dairy)											5.6%	0.0%	
Swine		Retail Pork Chops			0.0%					0.0%				0.0%	
		Cecal (Market Swine)											0.0%	0.0%	
		Cecal (Sows)											0.0%	0.0%	

Table 43c. Antimicrobial Resistance among *Salmonella* Anatum Isolates, 2003-2014

Year			2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014		
Number of Isolates Tested	Humans		18	16	12	10	18	14	13	19	16	16	20	13		
		Chickens	Retail Chickens	0	0	1	1	0	2	0	1	1	1	0	0	0
			HACCP	2	4	1	6	0	1	1	1	1	1	0	0	6
	Cecal													0	0	
	Turkeys	Retail Ground Turkey	1	0	1	0	1	7	1	0	0	0	2	2	2	
		HACCP	0	1	1	9	1	1	2	6	6	0	3	2	12	
		Cecal												0	4	
	Cattle	Retail Ground Beef	0	0	0	2	1	0	0	1	0	0	1	1	1	
		HACCP	61	68	22	26	23	34	7	14	18	18	18	16	18	
		Cecal (Beef)												18	25	
	Swine	Cecal (Dairy)												18	15	
		Retail Pork Chops	0	0	2	0	0	0	0	1	0	0	0	0	1	
		Cecal (Market Swine)												33	29	
			Cecal (Sows)										43	67		
Antimicrobial Class	Antimicrobial (Resistance Breakpoint)	Isolate Source														
Folate Pathway Inhibitor	Sulfamethoxazole/Sulfisoxazole ¹ (MIC ≥ 512 µg/ml)	Humans	0.0% 0	6.3% 1	0.0% 0	0.0% 0	0.0% 0	7.1% 1	0.0% 0	5.3% 1	0.0% 0	12.5% 2	0.0% 0	0.0% 0		
		Chickens	Retail Chickens			0.0% 0	0.0% 0		0.0% 0		0.0% 0	0.0% 0	0.0% 0			
			HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0	100.0% 1	0.0% 0	0.0% 0			0.0% 0	
			Cecal													
		Turkeys	Retail Ground Turkey	0.0% 0		0.0% 0		100.0% 1	14.3% 1	0.0% 0			0.0% 0	0.0% 0	0.0% 0	
			HACCP		0.0% 0	0.0% 0	33.3% 3	0.0% 0	100.0% 1	0.0% 0	50.0% 3		0.0% 0	0.0% 0	0.0% 0	
			Cecal												0.0% 0	
		Cattle	Retail Ground Beef				0.0% 0	0.0% 0			0.0% 0		0.0% 0	0.0% 0	0.0% 0	
			HACCP	3.3% 2	1.5% 1	0.0% 0	3.8% 1	4.3% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
			Cecal (Beef)												0.0% 0	
		Swine	Cecal (Dairy)												0.0% 0	
			Retail Pork Chops			0.0% 0					100.0% 1				0.0% 0	
			Cecal (Market Swine)											6.1% 2	0.0% 0	
				Cecal (Sows)										0.0% 0	0.0% 0	
		Trimethoprim-Sulfamethoxazole (MIC ≥ 4 / 76 µg/ml)	Humans	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
	Chickens		Retail Chickens			0.0% 0	0.0% 0		0.0% 0		0.0% 0	0.0% 0	0.0% 0			
			HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0			0.0% 0	
			Cecal													
	Turkeys		Retail Ground Turkey	0.0% 0		0.0% 0		0.0% 0	0.0% 0	0.0% 0			0.0% 0	0.0% 0	0.0% 0	
			HACCP		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0	0.0% 0	0.0% 0	
			Cecal												0.0% 0	
	Cattle		Retail Ground Beef				0.0% 0	0.0% 0			0.0% 0		0.0% 0	0.0% 0	0.0% 0	
			HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
			Cecal (Beef)												0.0% 0	
	Swine		Cecal (Dairy)												0.0% 0	
			Retail Pork Chops			0.0% 0					0.0% 0				0.0% 0	
		Cecal (Market Swine)											0.0% 0	0.0% 0		
		Cecal (Sows)										0.0% 0	0.0% 0			
Macrolides	Azithromycin (MIC ≥ 32 µg/ml)	Humans									0.0% 0	0.0% 0	0.0% 0	0.0% 0		
		Chickens	Retail Chickens									0.0% 0	0.0% 0			
			HACCP									0.0% 0			0.0% 0	
			Cecal													
		Turkeys	Retail Ground Turkey										0.0% 0	0.0% 0	0.0% 0	
			HACCP										0.0% 0	0.0% 0	0.0% 0	
			Cecal												0.0% 0	
		Cattle	Retail Ground Beef										0.0% 0	0.0% 0	0.0% 0	
			HACCP									0.0% 0	0.0% 0	0.0% 0	0.0% 0	
			Cecal (Beef)												0.0% 0	
		Swine	Cecal (Dairy)												0.0% 0	
			Retail Pork Chops												0.0% 0	
			Cecal (Market Swine)											0.0% 0	0.0% 0	
				Cecal (Sows)										0.0% 0	0.0% 0	

¹ Sulfamethoxazole was tested from 1996-2003 and was replaced by sulfisoxazole in 2004

Table 43d. Antimicrobial Resistance among *Salmonella* Anatum Isolates, 2003-2014

Year		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014		
Number of Isolates Tested	Humans	18	16	12	10	18	14	13	19	16	16	20	13		
	Chickens	Retail Chickens	0	0	1	1	0	2	0	1	1	1	0	0	
		HACCP	2	4	1	6	0	1	1	1	1	0	0	6	
		Cecal											0	0	
	Turkeys	Retail Ground Turkey	1	0	1	0	1	7	1	0	0	2	2	2	
		HACCP	0	1	1	9	1	1	2	6	0	3	2	12	
		Cecal											0	4	
	Cattle	Retail Ground Beef	0	0	0	2	1	0	0	1	0	1	1	1	
		HACCP	61	68	22	26	23	34	7	14	18	18	16	18	
		Cecal (Beef)											18	25	
	Swine	Cecal (Dairy)											18	15	
		Retail Pork Chops	0	0	2	0	0	0	0	1	0	0	0	1	
		Cecal (Market Swine)											33	29	
	Cecal (Sows)											43	67		
Antimicrobial Class	Antimicrobial (Resistance Breakpoint)	Isolate Source													
Penicillins	Ampicillin (MIC ≥ 32 µg/ml)	Humans	0.0% 0	6.3% 1	0.0% 0	0.0% 0	0.0% 0	14.3% 2	0.0% 0	5.3% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
		Chickens	Retail Chickens			100.0% 1	0.0% 0		0.0% 0		0.0% 0	0.0% 0	0.0% 0		
			HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0			0.0% 0
			Cecal												
		Turkeys	Retail Ground Turkey	0.0% 0		0.0% 0		100.0% 1	42.9% 3	0.0% 0			100.0% 2	0.0% 0	0.0% 0
			HACCP		0.0% 0	0.0% 0	33.3% 3	0.0% 0	100.0% 1	50.0% 1	33.3% 2		33.3% 1	0.0% 0	16.7% 2
			Cecal												0.0% 0
		Cattle	Retail Ground Beef				0.0% 0	0.0% 0			0.0% 0		0.0% 0	0.0% 0	0.0% 0
			HACCP	3.3% 2	1.5% 1	0.0% 0	3.8% 1	4.3% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
			Cecal (Beef)												0.0% 0
		Swine	Cecal (Dairy)											5.6% 1	0.0% 0
			Retail Pork Chops			0.0% 0					100.0% 1				0.0% 0
			Cecal (Market Swine)											3.0% 1	0.0% 0
	Cecal (Sows)											0.0% 0	0.0% 0		
Phenicol	Chloramphenicol (MIC ≥ 32 µg/ml)	Humans	0.0% 0	6.3% 1	0.0% 0	0.0% 0	0.0% 0	14.3% 2	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
		Chickens	Retail Chickens			0.0% 0	0.0% 0		0.0% 0		0.0% 0	0.0% 0	0.0% 0		
			HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0			0.0% 0
			Cecal												
		Turkeys	Retail Ground Turkey	0.0% 0		0.0% 0		0.0% 0	0.0% 0	0.0% 0			0.0% 0	0.0% 0	0.0% 0
			HACCP		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0	0.0% 0	0.0% 0
			Cecal												0.0% 0
		Cattle	Retail Ground Beef				0.0% 0	0.0% 0			0.0% 0		0.0% 0	0.0% 0	0.0% 0
			HACCP	3.3% 2	1.5% 1	0.0% 0	3.8% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
			Cecal (Beef)												0.0% 0
		Swine	Cecal (Dairy)											0.0% 0	0.0% 0
			Retail Pork Chops			0.0% 0					0.0% 0				0.0% 0
			Cecal (Market Swine)											0.0% 0	0.0% 0
	Cecal (Sows)											0.0% 0	0.0% 0		
Quinolones	Ciprofloxacin (MIC ≥ 1 µg/ml)	Humans	5.6% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
		Chickens	Retail Chickens			0.0% 0	0.0% 0		0.0% 0		0.0% 0	0.0% 0	0.0% 0		
			HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0			0.0% 0
			Cecal												
		Turkeys	Retail Ground Turkey	0.0% 0		0.0% 0		0.0% 0	0.0% 0	0.0% 0			0.0% 0	0.0% 0	0.0% 0
			HACCP		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0	0.0% 0	0.0% 0
			Cecal												0.0% 0
		Cattle	Retail Ground Beef				0.0% 0	0.0% 0			0.0% 0		0.0% 0	0.0% 0	0.0% 0
			HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
			Cecal (Beef)												0.0% 0
		Swine	Cecal (Dairy)											0.0% 0	0.0% 0
			Retail Pork Chops			0.0% 0					0.0% 0				0.0% 0
			Cecal (Market Swine)											0.0% 0	0.0% 0
	Cecal (Sows)											0.0% 0	1.5% 1		

Table 43e. Antimicrobial Resistance among *Salmonella* Anatum Isolates, 2003-2014

Year		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014		
Number of Isolates Tested	Humans	18	16	12	10	18	14	13	19	16	16	20	13		
	Chickens	Retail Chickens	0	0	1	1	0	2	0	1	1	1	0	0	
		HACCP	2	4	1	6	0	1	1	1	1	0	0	6	
		Cecal											0	0	
	Turkeys	Retail Ground Turkey	1	0	1	0	1	7	1	0	0	2	2	2	
		HACCP	0	1	1	9	1	1	2	6	0	3	2	12	
		Cecal											0	4	
	Cattle	Retail Ground Beef	0	0	0	2	1	0	0	1	0	1	1	1	
		HACCP	61	68	22	26	23	34	7	14	18	18	16	18	
		Cecal (Beef)											18	25	
	Swine	Cecal (Dairy)											18	15	
		Retail Pork Chops	0	0	2	0	0	0	0	1	0	0	0	1	
		Cecal (Market Swine)											33	29	
	Cecal (Sows)											43	67		
Antimicrobial Class	Antimicrobial (Resistance Breakpoint)	Isolate Source													
Quinolones	Nalidixic Acid (MIC ≥ 32 µg/ml)	Humans	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	7.1% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	5.0% 1	7.7% 1	
		Chickens	Retail Chickens			0.0% 0	0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		
			HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0			0.0% 0
			Cecal												
		Turkeys	Retail Ground Turkey	0.0% 0		0.0% 0		0.0% 0	0.0% 0	0.0% 0			0.0% 0	0.0% 0	0.0% 0
			HACCP		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0	0.0% 0	0.0% 0
			Cecal												0.0% 0
		Cattle	Retail Ground Beef				0.0% 0	0.0% 0			0.0% 0		0.0% 0	0.0% 0	0.0% 0
			HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
			Cecal (Beef)											0.0% 0	0.0% 0
		Swine	Cecal (Dairy)											0.0% 0	0.0% 0
			Retail Pork Chops			0.0% 0					0.0% 0				0.0% 0
			Cecal (Market Swine)											3.0% 1	0.0% 0
	Cecal (Sows)											0.0% 0	1.5% 1		
Tetracyclines	Tetracycline (MIC ≥ 16 µg/ml)	Humans	5.6% 1	12.5% 2	0.0% 0	10.0% 1	16.7% 3	21.4% 3	7.7% 1	0.0% 0	12.5% 2	18.8% 3	0.0% 0	0.0% 0	
		Chickens	Retail Chickens			100.0% 1	100.0% 1		0.0% 0	0.0% 0	0.0% 0	0.0% 0	100.0% 1		
			HACCP	0.0% 0	50.0% 2	0.0% 0	33.3% 2	0.0% 0	100.0% 1	0.0% 0	0.0% 0	0.0% 0			0.0% 0
			Cecal												
		Turkeys	Retail Ground Turkey	0.0% 0		100.0% 1		0.0% 0	42.9% 3	0.0% 0			100.0% 2	100.0% 2	50.0% 1
			HACCP		100.0% 1	100.0% 1	55.6% 5	100.0% 1	100.0% 1	0.0% 0	33.3% 2		33.3% 1	50.0% 1	100.0% 12
			Cecal												75.0% 3
		Cattle	Retail Ground Beef				50.0% 1	0.0% 0			0.0% 0		0.0% 0	0.0% 0	100.0% 1
			HACCP	29.5% 18	29.4% 20	31.8% 7	26.9% 7	26.1% 6	14.7% 5	28.6% 2	7.1% 1	11.1% 2	0.0% 0	12.5% 2	22.2% 4
			Cecal (Beef)											5.6% 1	12.0% 3
		Swine	Cecal (Dairy)											11.1% 2	0.0% 0
			Retail Pork Chops			50.0% 1					0.0% 0				0.0% 0
			Cecal (Market Swine)											36.4% 12	72.4% 21
	Cecal (Sows)											39.5% 17	40.3% 27		

Multidrug Resistance

Table 44a. Resistance Patterns among *Salmonella* Anatum Isolates, 2003-2014¹

Year		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
Number of Isolates Tested	Humans	18	16	12	10	18	14	13	19	16	16	20	13	
	Chickens	Retail Chickens	0	0	1	1	0	2	0	1	1	1	0	0
		HACCP	2	4	1	6	0	1	1	1	1	0	0	6
		Cecal											0	0
	Turkeys	Retail Ground Turkey	1	0	1	0	1	7	1	0	0	2	2	2
		HACCP	0	1	1	9	1	1	2	6	0	3	2	12
		Cecal											0	4
	Cattle	Retail Ground Beef	0	0	0	2	1	0	0	1	0	1	1	1
		HACCP	61	68	22	26	23	34	7	14	18	18	16	18
		Cecal (Beef)											18	25
	Swine	Cecal (Dairy)											18	15
		Retail Pork Chops	0	0	2	0	0	0	0	1	0	0	0	1
		Cecal (Market Swine)											33	29
		Cecal (Sows)											43	67
Resistance Pattern														
Source														
1. No Resistance Detected	Humans	94.4% 17	87.5% 14	100.0% 12	90.0% 9	83.3% 15	78.6% 11	92.3% 12	89.5% 17	81.3% 13	81.3% 13	95.0% 19	84.6% 11	
	Chickens	Retail Chickens			0.0% 0	0.0% 0		100.0% 2		100.0% 1	0.0% 0	0.0% 0		
		HACCP	100.0% 2	50.0% 2	100.0% 1	66.7% 4		100.0% 1	0.0% 0	100.0% 1	100.0% 1			83.3% 5
		Cecal												
	Turkeys	Retail Ground Turkey	100.0% 1		0.0% 0		0.0% 0	42.9% 3	100.0% 3			0.0% 0	0.0% 0	50.0% 1
		HACCP		0.0% 0	0.0% 0	22.2% 2	0.0% 0	0.0% 0	50.0% 1	16.7% 1		33.3% 1	50.0% 1	0.0% 0
		Cecal												25.0% 1
	Cattle	Retail Ground Beef				50.0% 1	100.0% 1			100.0% 1		100.0% 1	100.0% 1	0.0% 0
		HACCP	70.5% 43	70.6% 48	68.2% 15	69.2% 18	73.9% 17	85.3% 29	71.4% 5	92.9% 13	88.9% 16	100.0% 18	87.5% 14	77.8% 14
		Cecal (Beef)											94.4% 17	84.0% 21
	Swine	Cecal (Dairy)											83.3% 15	93.3% 14
		Retail Pork Chops			50.0% 1					0.0% 0				100.0% 1
		Cecal (Market Swine)											63.6% 21	27.6% 8
		Cecal (Sows)											60.5% 26	59.7% 40
2. Resistant to ≥ 3 Antimicrobial Classes	Humans	0.0% 0	6.3% 1	0.0% 0	0.0% 0	0.0% 0	14.3% 2	0.0% 0	5.3% 1	0.0% 0	12.5% 2	0.0% 0	0.0% 0	
	Chickens	Retail Chickens			100.0% 1	0.0% 0		0.0% 0		0.0% 0	0.0% 0	100.0% 1		
		HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0	100.0% 1	0.0% 0	0.0% 0			0.0% 0
		Cecal												
	Turkeys	Retail Ground Turkey	0.0% 0		0.0% 0		100.0% 1	42.9% 3	0.0% 0			100.0% 2	0.0% 0	0.0% 0
		HACCP		0.0% 0	0.0% 0	33.3% 3	0.0% 0	100.0% 1	50.0% 1	33.3% 2		33.3% 1	0.0% 0	16.7% 2
		Cecal												0.0% 0
	Cattle	Retail Ground Beef				0.0% 0	0.0% 0			0.0% 0		0.0% 0	0.0% 0	0.0% 0
		HACCP	3.3% 2	1.5% 1	0.0% 0	3.8% 1	4.3% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Cecal (Beef)											0.0% 0	0.0% 0
	Swine	Cecal (Dairy)											5.6% 1	0.0% 0
		Retail Pork Chops			0.0% 0					100.0% 1				0.0% 0
		Cecal (Market Swine)											3.0% 1	0.0% 0
		Cecal (Sows)											0.0% 0	0.0% 0
3. Resistant to ≥ 4 Antimicrobial Classes	Humans	0.0% 0	6.3% 1	0.0% 0	0.0% 0	0.0% 0	14.3% 2	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
	Chickens	Retail Chickens			100.0% 1	0.0% 0		0.0% 0		0.0% 0	0.0% 0	0.0% 0		
		HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0			0.0% 0
		Cecal												
	Turkeys	Retail Ground Turkey	0.0% 0		0.0% 0		0.0% 0	42.9% 3	0.0% 0			0.0% 0	0.0% 0	0.0% 0
		HACCP		0.0% 0	0.0% 0	11.1% 1	0.0% 0	100.0% 1	0.0% 0	0.0% 0		0.0% 0	0.0% 0	16.7% 2
		Cecal												0.0% 0
	Cattle	Retail Ground Beef				0.0% 0	0.0% 0			0.0% 0		0.0% 0	0.0% 0	0.0% 0
		HACCP	3.3% 2	1.5% 1	0.0% 0	3.8% 1	4.3% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Cecal (Beef)											0.0% 0	0.0% 0
	Swine	Cecal (Dairy)											0.0% 0	0.0% 0
		Retail Pork Chops			0.0% 0					0.0% 0				0.0% 0
		Cecal (Market Swine)											3.0% 1	0.0% 0
		Cecal (Sows)											0.0% 0	0.0% 0

¹ Starting in 2011, testing included nine antimicrobial classes with the addition of the macrolide azithromycin. Because resistance to azithromycin is low (in this case, <1%), antimicrobial class resistance data from 2011 and beyond are comparable to the data from previous years.

Table 44b. Resistance Patterns among *Salmonella* Anatum Isolates, 2003-2014¹

Year		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014		
Number of Isolates Tested	Humans	18	16	12	10	18	14	13	19	16	16	20	13		
	Chickens	Retail Chickens	0	0	1	1	0	2	0	1	1	1	0	0	
		HACCP	2	4	1	6	0	1	1	1	1	0	0	6	
		Cecal											0	0	
	Turkeys	Retail Ground Turkey	1	0	1	0	1	7	1	0	0	2	2	2	
		HACCP	0	1	1	9	1	1	2	6	0	3	2	12	
		Cecal											0	4	
	Cattle	Retail Ground Beef	0	0	0	2	1	0	0	1	0	1	1	1	
		HACCP	61	68	22	26	23	34	7	14	18	18	16	18	
		Cecal (Beef)											18	25	
	Swine	Cecal (Dairy)											18	15	
		Retail Pork Chops	0	0	2	0	0	0	0	1	0	0	0	1	
		Cecal (Market Swine)											33	29	
	Cecal (Sows)											43	67		
Resistance Pattern	Source														
4. Resistant to ≥ 5 Antimicrobial Classes	Humans	0.0% 0	6.3% 1	0.0% 0	0.0% 0	0.0% 0	7.1% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		
	Chickens	Retail Chickens			100.0% 1	0.0% 0		0.0% 0		0.0% 0	0.0% 0	0.0% 0			
		HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0			0.0% 0	
		Cecal													
	Turkeys	Retail Ground Turkey	0.0% 0		0.0% 0		0.0% 0	0.0% 0	0.0% 0			0.0% 0	0.0% 0	0.0% 0	
		HACCP		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0	0.0% 0	0.0% 0	
		Cecal												0.0% 0	
	Cattle	Retail Ground Beef				0.0% 0	0.0% 0			0.0% 0		0.0% 0	0.0% 0	0.0% 0	
		HACCP	3.3% 2	1.5% 1	0.0% 0	3.8% 1	4.3% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
		Cecal (Beef)											0.0% 0	0.0% 0	
	Swine	Cecal (Dairy)											0.0% 0	0.0% 0	
		Retail Pork Chops			0.0% 0					0.0% 0				0.0% 0	
		Cecal (Market Swine)											0.0% 0	0.0% 0	
		Cecal (Sows)											0.0% 0	0.0% 0	
	5. At Least ACSSuT ² Resistant	Humans	0.0% 0	6.3% 1	0.0% 0	0.0% 0	0.0% 0	7.1% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
		Chickens	Retail Chickens			0.0% 0	0.0% 0		0.0% 0		0.0% 0	0.0% 0	0.0% 0		
			HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0			0.0% 0
			Cecal												
Turkeys		Retail Ground Turkey	0.0% 0		0.0% 0		0.0% 0	0.0% 0	0.0% 0			0.0% 0	0.0% 0	0.0% 0	
		HACCP		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0	0.0% 0	0.0% 0	
		Cecal												0.0% 0	
Cattle		Retail Ground Beef				0.0% 0	0.0% 0			0.0% 0		0.0% 0	0.0% 0	0.0% 0	
		HACCP	3.3% 2	1.5% 1	0.0% 0	3.8% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
		Cecal (Beef)											0.0% 0	0.0% 0	
Swine		Cecal (Dairy)											0.0% 0	0.0% 0	
		Retail Pork Chops			0.0% 0					0.0% 0				0.0% 0	
		Cecal (Market Swine)											0.0% 0	0.0% 0	
		Cecal (Sows)											0.0% 0	0.0% 0	
6. At Least ACT/S ³ Resistant		Humans	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
		Chickens	Retail Chickens			0.0% 0	0.0% 0		0.0% 0		0.0% 0	0.0% 0	0.0% 0		
			HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0			0.0% 0
			Cecal												
	Turkeys	Retail Ground Turkey	0.0% 0		0.0% 0		0.0% 0	0.0% 0	0.0% 0			0.0% 0	0.0% 0	0.0% 0	
		HACCP		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0	0.0% 0	0.0% 0	
		Cecal												0.0% 0	
	Cattle	Retail Ground Beef				0.0% 0	0.0% 0			0.0% 0		0.0% 0	0.0% 0	0.0% 0	
		HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
		Cecal (Beef)											0.0% 0	0.0% 0	
	Swine	Cecal (Dairy)											0.0% 0	0.0% 0	
		Retail Pork Chops			0.0% 0					0.0% 0				0.0% 0	
		Cecal (Market Swine)											0.0% 0	0.0% 0	
		Cecal (Sows)											0.0% 0	0.0% 0	

¹ Starting in 2011, testing included nine antimicrobial classes with the addition of the macrolide azithromycin. Because resistance to azithromycin is low (in this case, <1%), antimicrobial class resistance data from 2011 and beyond are comparable to the data from previous years.

² ACSSuT = ampicillin, chloramphenicol, streptomycin, sulfamethoxazole/sulfisoxazole, and tetracycline

³ ACT/S = ampicillin, chloramphenicol, and trimethoprim-sulfamethoxazole

Table 44c. Resistance Patterns among *Salmonella* Anatum Isolates, 2003-2014

Year		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
Number of Isolates Tested	Humans	18	16	12	10	18	14	13	19	16	16	20	13	
	Chickens	Retail Chickens	0	0	1	1	0	2	0	1	1	1	0	0
		HACCP	2	4	1	6	0	1	1	1	1	0	0	6
		Cecal											0	0
	Turkeys	Retail Ground Turkey	1	0	1	0	1	7	1	0	0	2	2	2
		HACCP	0	1	1	9	1	1	2	6	0	3	2	12
		Cecal											0	4
	Cattle	Retail Ground Beef	0	0	0	2	1	0	0	1	0	1	1	1
		HACCP	61	68	22	26	23	34	7	14	18	18	16	18
		Cecal (Beef)											18	25
	Swine	Cecal (Dairy)											18	15
		Retail Pork Chops	0	0	2	0	0	0	0	1	0	0	0	1
		Cecal (Market Swine)											33	29
	Cecal (Sows)											43	67	
Resistance Pattern	Source													
7. At Least ACSSuTAuCx ¹ Resistant	Humans	0.0% 0	6.3% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
	Chickens	Retail Chickens			0.0% 0	0.0% 0		0.0% 0		0.0% 0	0.0% 0	0.0% 0		
		HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0			0.0% 0
		Cecal												
	Turkeys	Retail Ground Turkey	0.0% 0		0.0% 0		0.0% 0	0.0% 0	0.0% 0			0.0% 0	0.0% 0	0.0% 0
		HACCP		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0	0.0% 0	0.0% 0
		Cecal												0.0% 0
	Cattle	Retail Ground Beef				0.0% 0	0.0% 0			0.0% 0		0.0% 0	0.0% 0	0.0% 0
		HACCP	3.3% 2	1.5% 1	0.0% 0	3.8% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Cecal (Beef)											0.0% 0	0.0% 0
	Swine	Cecal (Dairy)											0.0% 0	0.0% 0
		Retail Pork Chops			0.0% 0					0.0% 0				0.0% 0
		Cecal (Market Swine)											0.0% 0	0.0% 0
	Cecal (Sows)											0.0% 0	0.0% 0	
8. At Least Ceftriaxone and Nalidixic Acid Resistant	Humans	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
	Chickens	Retail Chickens			0.0% 0	0.0% 0		0.0% 0		0.0% 0	0.0% 0	0.0% 0		
		HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0			0.0% 0
		Cecal												
	Turkeys	Retail Ground Turkey	0.0% 0		0.0% 0		0.0% 0	0.0% 0	0.0% 0			0.0% 0	0.0% 0	0.0% 0
		HACCP		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0	0.0% 0	0.0% 0
		Cecal												0.0% 0
	Cattle	Retail Ground Beef				0.0% 0	0.0% 0			0.0% 0		0.0% 0	0.0% 0	0.0% 0
		HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Cecal (Beef)											0.0% 0	0.0% 0
	Swine	Cecal (Dairy)											0.0% 0	0.0% 0
		Retail Pork Chops			0.0% 0					0.0% 0				0.0% 0
		Cecal (Market Swine)											0.0% 0	0.0% 0
	Cecal (Sows)											0.0% 0	0.0% 0	

¹ ACSSuTAuCx = ACSSuT, amoxicillin-clavulanic acid, and ceftriaxone

Resistance by Year

Table 45a. Antimicrobial Resistance among *Salmonella* Johannesburg Isolates, 2003-2014

Year			2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
Number of Isolates Tested	Humans		2	2	3	0	7	3	5	2	1	5	1	4	
		Chickens	Retail Chickens	0	0	0	1	0	0	0	0	0	0	0	0
			HACCP	3	0	3	2	1	0	0	8	6	1	0	2
	Cecal												0	1	
	Turkeys	Retail Ground Turkey	0	0	1	0	0	0	0	0	0	0	0	0	
		HACCP	0	0	1	2	1	0	1	0	0	2	0	0	
		Cecal											0	0	
	Cattle	Retail Ground Beef	0	0	0	1	0	0	0	0	0	0	0	0	
		HACCP	0	2	0	1	0	0	0	1	0	2	2	1	
		Cecal (Beef)											0	0	
	Swine	Cecal (Dairy)											0	1	
		Retail Pork Chops	2	0	0	0	0	2	0	0	0	0	3	0	
		Cecal (Market Swine)											21	28	
													33	42	
Antimicrobial Class	Antimicrobial (Resistance Breakpoint)	Isolate Source													
Aminoglycosides	Gentamicin (MIC ≥ 16 µg/ml)	Humans	0.0% 0	0.0% 0	0.0% 0		14.3% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	20.0% 1	0.0% 0	0.0% 0	
		Chickens	Retail Chickens				0.0% 0								
			HACCP	66.7% 2		100.0% 3	50.0% 1	100.0% 1			62.5% 5	66.7% 4	0.0% 0		50.0% 1
			Cecal												0.0% 0
		Turkeys	Retail Ground Turkey			0.0% 0									
			HACCP			0.0% 0	50.0% 1	0.0% 0		100.0% 1			100.0% 2		
			Cecal												
		Cattle	Retail Ground Beef				0.0% 0								
			HACCP		0.0% 0		0.0% 0				0.0% 0		0.0% 0	50.0% 1	0.0% 0
			Cecal (Beef)												
		Swine	Cecal (Dairy)												0.0% 0
			Retail Pork Chops	0.0% 0						0.0% 0					0.0% 0
			Cecal (Market Swine)											0.0% 0	0.0% 0
														0.0% 0	2.4% 2
	Streptomycin (MIC ≥ 64 µg/ml)	Humans	0.0% 0	0.0% 0	0.0% 0		14.3% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	20.0% 1	0.0% 0	0.0% 0	
		Chickens	Retail Chickens				0.0% 0								
			HACCP	66.7% 2		100.0% 3	50.0% 1	100.0% 1			62.5% 5	66.7% 4	0.0% 0		50.0% 1
			Cecal												0.0% 0
		Turkeys	Retail Ground Turkey			0.0% 0									
			HACCP			100.0% 1	0.0% 0	0.0% 0		0.0% 0			50.0% 1		
			Cecal												
		Cattle	Retail Ground Beef				0.0% 0								
			HACCP		0.0% 0		0.0% 0				100.0% 1		0.0% 0	100.0% 2	0.0% 0
			Cecal (Beef)												
		Swine	Cecal (Dairy)												0.0% 0
			Retail Pork Chops	0.0% 0						0.0% 0					0.0% 0
			Cecal (Market Swine)											0.0% 0	0.0% 0
														0.0% 0	4.8% 2
β-Lactam/β-Lactamase Inhibitor Combinations	Amoxicillin-Clavulanic Acid (MIC ≥ 32 / 16 µg/ml)	Humans	0.0% 0	0.0% 0	0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
		Chickens	Retail Chickens				0.0% 0								
			HACCP	0.0% 0		0.0% 0	0.0% 0	0.0% 0			0.0% 0	0.0% 0	0.0% 0		0.0% 0
			Cecal												0.0% 0
		Turkeys	Retail Ground Turkey			0.0% 0									
			HACCP			0.0% 0	0.0% 0	100.0% 1		0.0% 0			0.0% 0		
			Cecal												
		Cattle	Retail Ground Beef				0.0% 0								
			HACCP		0.0% 0		0.0% 0				100.0% 1		0.0% 0	0.0% 0	0.0% 0
			Cecal (Beef)												
		Swine	Cecal (Dairy)												0.0% 0
			Retail Pork Chops	0.0% 0						0.0% 0					0.0% 0
			Cecal (Market Swine)											4.8% 1	3.6% 1
														0.0% 0	0.0% 0

Table 45b. Antimicrobial Resistance among *Salmonella* Johannesburg Isolates, 2003-2014

Year		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014		
Number of Isolates Tested	Humans	2	2	3	0	7	3	5	2	1	5	1	4		
	Chickens	Retail Chickens	0	0	0	1	0	0	0	0	0	0	0	0	
		HACCP	3	0	3	2	1	0	0	8	6	1	0	2	
		Cecal											0	1	
	Turkeys	Retail Ground Turkey	0	0	1	0	0	0	0	0	0	0	0	0	
		HACCP	0	0	1	2	1	0	1	0	0	2	0	0	
		Cecal											0	0	
	Cattle	Retail Ground Beef	0	0	0	1	0	0	0	0	0	0	0	0	
		HACCP	0	2	0	1	0	0	0	1	0	2	2	1	
		Cecal (Beef)											0	0	
	Swine	Retail Pork Chops	2	0	0	0	0	2	0	0	0	0	3	0	
		Cecal (Market Swine)											21	28	
		Cecal (Sows)											33	42	
Antimicrobial Class	Antimicrobial (Resistance Breakpoint)	Isolate Source													
Cephems	Cefoxitin (MIC ≥ 32 µg/ml)	Humans	0.0% 0	0.0% 0	0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
		Chickens	Retail Chickens				0.0% 0								
			HACCP	0.0% 0		0.0% 0	0.0% 0	0.0% 0			0.0% 0	0.0% 0	0.0% 0		0.0% 0
			Cecal												0.0% 0
		Turkeys	Retail Ground Turkey			0.0% 0									
			HACCP			0.0% 0	0.0% 0	0.0% 0		0.0% 0			0.0% 0		
			Cecal												
		Cattle	Retail Ground Beef				0.0% 0								
			HACCP		0.0% 0		0.0% 0				100.0% 1		0.0% 0	0.0% 0	0.0% 0
			Cecal (Beef)												
		Swine	Cecal (Dairy)												0.0% 0
			Retail Pork Chops	0.0% 0					0.0% 0					0.0% 0	
	Cecal (Market Swine)												4.8% 1	3.6% 1	
	Cecal (Sows)											0.0% 0	0.0% 0		
	Ceftiofur (MIC ≥ 8 µg/ml)	Humans	0.0% 0	0.0% 0	0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
		Chickens	Retail Chickens				0.0% 0								
			HACCP	0.0% 0		0.0% 0	0.0% 0	0.0% 0			0.0% 0	0.0% 0	0.0% 0		0.0% 0
			Cecal												0.0% 0
		Turkeys	Retail Ground Turkey			0.0% 0									
			HACCP			0.0% 0	0.0% 0	100.0% 1		0.0% 0			0.0% 0		
			Cecal												
		Cattle	Retail Ground Beef				0.0% 0								
			HACCP		0.0% 0		0.0% 0				100.0% 1		0.0% 0	0.0% 0	0.0% 0
			Cecal (Beef)												
		Swine	Cecal (Dairy)												0.0% 0
			Retail Pork Chops	0.0% 0					0.0% 0					0.0% 0	
	Cecal (Market Swine)												4.8% 1	3.6% 1	
	Cecal (Sows)											0.0% 0	0.0% 0		
	Ceftriaxone (MIC ≥ 4 µg/ml)	Humans	0.0% 0	0.0% 0	0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
		Chickens	Retail Chickens				0.0% 0								
			HACCP	0.0% 0		0.0% 0	0.0% 0	0.0% 0			0.0% 0	0.0% 0	0.0% 0		0.0% 0
			Cecal												0.0% 0
		Turkeys	Retail Ground Turkey			0.0% 0									
HACCP					0.0% 0	0.0% 0	100.0% 1		0.0% 0			0.0% 0			
Cecal															
Cattle		Retail Ground Beef				0.0% 0									
		HACCP		0.0% 0		0.0% 0				100.0% 1		0.0% 0	0.0% 0	0.0% 0	
		Cecal (Beef)													
Swine		Cecal (Dairy)												0.0% 0	
		Retail Pork Chops	0.0% 0					0.0% 0					0.0% 0		
	Cecal (Market Swine)											4.8% 1	3.6% 1		
Cecal (Sows)											0.0% 0	0.0% 0			

Table 45c. Antimicrobial Resistance among *Salmonella* Johannesburg Isolates, 2003-2014

Year		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014		
Number of Isolates Tested	Humans	2	2	3	0	7	3	5	2	1	5	1	4		
	Chickens	Retail Chickens	0	0	0	1	0	0	0	0	0	0	0	0	
		HACCP	3	0	3	2	1	0	0	8	6	1	0	2	
		Cecal											0	1	
	Turkeys	Retail Ground Turkey	0	0	1	0	0	0	0	0	0	0	0	0	
		HACCP	0	0	1	2	1	0	1	0	0	2	0	0	
		Cecal											0	0	
	Cattle	Retail Ground Beef	0	0	0	1	0	0	0	0	0	0	0	0	
		HACCP	0	2	0	1	0	0	0	1	0	2	2	1	
		Cecal (Beef)											0	0	
	Cecal (Dairy)											0	0	1	
	Swine	Retail Pork Chops	2	0	0	0	0	2	0	0	0	0	3	0	
		Cecal (Market Swine)											21	28	
		Cecal (Sows)											33	42	
Antimicrobial Class	Antimicrobial (Resistance Breakpoint)	Isolate Source													
Folate Pathway Inhibitor	Sulfamethoxazole/Sulfisoxazole ¹ (MIC ≥ 512 µg/ml)	Humans	0.0% 0	0.0% 0	0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	20.0% 1	0.0% 0	0.0% 0	
		Chickens	Retail Chickens				0.0% 0								
			HACCP	66.7% 2		100.0% 3	100.0% 2	100.0% 1			25.0% 2	66.7% 4	0.0% 0		0.0% 0
			Cecal												0.0% 0
		Turkeys	Retail Ground Turkey			0.0% 0									
			HACCP			100.0% 1	50.0% 1	0.0% 0		100.0% 1			100.0% 2		
			Cecal												
		Cattle	Retail Ground Beef				0.0% 0								
			HACCP	0.0% 0	0.0% 0		0.0% 0				100.0% 1		0.0% 0	50.0% 1	0.0% 0
			Cecal (Beef)												
		Cecal (Dairy)												0.0% 0	
		Swine	Retail Pork Chops	0.0% 0					0.0% 0					0.0% 0	
			Cecal (Market Swine)											0.0% 0	0.0% 0
			Cecal (Sows)											0.0% 0	0.0% 0
	Trimethoprim-Sulfamethoxazole (MIC ≥ 4 / 76 µg/ml)	Humans	0.0% 0	0.0% 0	0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
		Chickens	Retail Chickens				0.0% 0								
			HACCP	0.0% 0		0.0% 0	0.0% 0	0.0% 0			0.0% 0	0.0% 0	0.0% 0		0.0% 0
			Cecal												0.0% 0
		Turkeys	Retail Ground Turkey			0.0% 0									
			HACCP			0.0% 0	0.0% 0	0.0% 0		0.0% 0			0.0% 0		
			Cecal												
		Cattle	Retail Ground Beef				0.0% 0								
			HACCP		0.0% 0		0.0% 0				100.0% 1		0.0% 0	0.0% 0	0.0% 0
			Cecal (Beef)												
		Cecal (Dairy)												0.0% 0	
		Swine	Retail Pork Chops	0.0% 0					0.0% 0					0.0% 0	
			Cecal (Market Swine)											0.0% 0	0.0% 0
			Cecal (Sows)											0.0% 0	0.0% 0
Macrolides	Azithromycin (MIC ≥ 32 µg/ml)	Humans								0.0% 0	0.0% 0	0.0% 0	0.0% 0		
		Chickens	Retail Chickens												
			HACCP								0.0% 0	0.0% 0		0.0% 0	
			Cecal											0.0% 0	
		Turkeys	Retail Ground Turkey												
			HACCP										0.0% 0		
			Cecal												
		Cattle	Retail Ground Beef												
			HACCP										0.0% 0	0.0% 0	0.0% 0
			Cecal (Beef)												
		Cecal (Dairy)												0.0% 0	
		Swine	Retail Pork Chops											0.0% 0	
			Cecal (Market Swine)											0.0% 0	0.0% 0
			Cecal (Sows)											0.0% 0	0.0% 0

¹ Sulfamethoxazole was tested from 1996-2003 and was replaced by sulfisoxazole in 2004

Table 45d. Antimicrobial Resistance among *Salmonella* Johannesburg Isolates, 2003-2014

Year			2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
Number of Isolates Tested	Humans		2	2	3	0	7	3	5	2	1	5	1	4	
		Chickens	Retail Chickens	0	0	0	1	0	0	0	0	0	0	0	0
			HACCP	3	0	3	2	1	0	0	8	6	1	0	2
	Cecal													0	1
	Turkeys	Retail Ground Turkey	0	0	1	0	0	0	0	0	0	0	0	0	0
		HACCP	0	0	1	2	1	0	1	0	0	0	2	0	0
		Cecal												0	0
	Cattle	Retail Ground Beef	0	0	0	1	0	0	0	0	0	0	0	0	0
		HACCP	0	2	0	1	0	0	0	1	0	0	2	2	1
		Cecal (Beef)												0	0
	Swine	Retail Pork Chops	2	0	0	0	0	2	0	0	0	0	0	3	0
		Cecal (Market Swine)												21	28
		Cecal (Sows)												33	42
Antimicrobial Class	Antimicrobial (Resistance Breakpoint)	Isolate Source													
Penicillins	Ampicillin (MIC ≥ 32 µg/ml)	Humans	0.0% 0	0.0% 0	0.0% 0		0.0% 0	0.0% 0	0.0% 0	50.0% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
		Chickens	Retail Chickens				0.0% 0								
			HACCP	0.0% 0		0.0% 0	0.0% 0	0.0% 0			0.0% 0	16.7% 1	0.0% 0		0.0% 0
			Cecal												0.0% 0
		Turkeys	Retail Ground Turkey			0.0% 0									
			HACCP			0.0% 0	0.0% 0	100.0% 1		0.0% 0				0.0% 0	
			Cecal												
		Cattle	Retail Ground Beef				0.0% 0								
			HACCP		0.0% 0		0.0% 0				100.0% 1		0.0% 0	0.0% 0	0.0% 0
			Cecal (Beef)												
		Swine	Cecal (Dairy)												0.0% 0
			Retail Pork Chops	0.0% 0					0.0% 0						0.0% 0
			HACCP	0.0% 0	0.0% 0	6.7% 1	10.3% 3	9.1% 2	0.0% 0	9.1% 1	0.0% 0	0.0% 0			3.6% 1
Cecal (Sows)												0.0% 0	2.4% 1		
Phenicolns	Chloramphenicol (MIC ≥ 32 µg/ml)	Humans	0.0% 0	0.0% 0	0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
		Chickens	Retail Chickens				0.0% 0								
			HACCP	0.0% 0		0.0% 0	0.0% 0	0.0% 0			0.0% 0	0.0% 0	0.0% 0		0.0% 0
			Cecal												0.0% 0
		Turkeys	Retail Ground Turkey			0.0% 0									
			HACCP			100.0% 1	0.0% 0	0.0% 0		0.0% 0				0.0% 0	
			Cecal												
		Cattle	Retail Ground Beef				0.0% 0								
			HACCP	0.0% 0	0.0% 0		0.0% 0				100.0% 1		0.0% 0	0.0% 0	0.0% 0
			Cecal (Beef)												
		Swine	Cecal (Dairy)												0.0% 0
			Retail Pork Chops	0.0% 0					0.0% 0						0.0% 0
			Cecal (Market Swine)												0.0% 0
Cecal (Sows)												0.0% 0	0.0% 0		
Quinolones	Ciprofloxacin (MIC ≥ 1 µg/ml)	Humans	0.0% 0	0.0% 0	0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
		Chickens	Retail Chickens				0.0% 0								
			HACCP	0.0% 0		0.0% 0	0.0% 0	0.0% 0			0.0% 0	0.0% 0	0.0% 0		0.0% 0
			Cecal												0.0% 0
		Turkeys	Retail Ground Turkey			0.0% 0									
			HACCP			0.0% 0	0.0% 0	0.0% 0		0.0% 0				0.0% 0	
			Cecal												
		Cattle	Retail Ground Beef				0.0% 0								
			HACCP		0.0% 0		0.0% 0				0.0% 0		0.0% 0	0.0% 0	0.0% 0
			Cecal (Beef)												
		Swine	Cecal (Dairy)												0.0% 0
			Retail Pork Chops	0.0% 0					0.0% 0						0.0% 0
			Cecal (Market Swine)												0.0% 0
Cecal (Sows)												0.0% 0	0.0% 0		

Table 45e. Antimicrobial Resistance among *Salmonella* Johannesburg Isolates, 2003-2014

Year			2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
Number of Isolates Tested	Humans		2	2	3	0	7	3	5	2	1	5	1	4	
		Chickens	Retail Chickens	0	0	0	1	0	0	0	0	0	0	0	0
			HACCP	3	0	3	2	1	0	0	8	6	1	0	2
	Cecal												0	1	
	Turkeys	Retail Ground Turkey	0	0	1	0	0	0	0	0	0	0	0	0	
		HACCP	0	0	1	2	1	0	1	0	0	2	0	0	
		Cecal											0	0	
	Cattle	Retail Ground Beef	0	0	0	1	0	0	0	0	0	0	0	0	
		HACCP	0	2	0	1	0	0	0	1	0	2	2	1	
		Cecal (Beef)											0	0	
	Swine	Cecal (Dairy)											0	1	
		Retail Pork Chops	2	0	0	0	0	2	0	0	0	0	3	0	
		Cecal (Market Swine)											21	28	
	Cecal (Sows)											33	42		
Antimicrobial Class	Antimicrobial (Resistance Breakpoint)	Isolate Source													
Quinolones	Nalidixic Acid (MIC ≥ 32 µg/ml)	Humans	0.0% 0	0.0% 0	0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
		Chickens	Retail Chickens				0.0% 0								
			HACCP	0.0% 0		0.0% 0	0.0% 0	0.0% 0		0.0% 0	0.0% 0	0.0% 0			0.0% 0
			Cecal												0.0% 0
		Turkeys	Retail Ground Turkey			0.0% 0									
			HACCP			0.0% 0	0.0% 0	0.0% 0		0.0% 0			0.0% 0		
			Cecal												
		Cattle	Retail Ground Beef				0.0% 0								
			HACCP		0.0% 0		0.0% 0				0.0% 0		0.0% 0	0.0% 0	0.0% 0
			Cecal (Beef)												
		Swine	Cecal (Dairy)												0.0% 0
			Retail Pork Chops	0.0% 0					0.0% 0						0.0% 0
			Cecal (Market Swine)											0.0% 0	0.0% 0
	Cecal (Sows)											0.0% 0	0.0% 0		
Tetracyclines	Tetracycline (MIC ≥ 16 µg/ml)	Humans	50.0% 1	0.0% 0	33.3% 1		28.6% 2	66.7% 2	60.0% 3	50.0% 1	100.0% 1	20.0% 1	0.0% 0	0.0% 0	
		Chickens	Retail Chickens				0.0% 0								
			HACCP	33.3% 1		100.0% 3	50.0% 1	0.0% 0		0.0% 0	16.7% 1	0.0% 0			0.0% 0
			Cecal												0.0% 0
		Turkeys	Retail Ground Turkey			0.0% 0									
			HACCP			100.0% 1	50.0% 1	100.0% 1		0.0% 0			100.0% 2		
			Cecal												
		Cattle	Retail Ground Beef				100.0% 1								
			HACCP		0.0% 0		0.0% 0				100.0% 1		0.0% 0	100.0% 2	100.0% 1
			Cecal (Beef)												
		Swine	Cecal (Dairy)												0.0% 0
			Retail Pork Chops	100.0% 2					50.0% 1						0.0% 0
			Cecal (Market Swine)											0.0% 0	7.1% 2
	Cecal (Sows)											9.1% 3	9.5% 4		

Multidrug Resistance

Table 46a. Resistance Patterns among *Salmonella* Johannesburg Isolates, 2003-2014¹

Year		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
Number of Isolates Tested	Humans	2	2	3	0	7	3	5	2	1	5	1	4	
	Chickens	Retail Chickens	0	0	0	1	0	0	0	0	0	0	0	0
		HACCP	3	0	3	2	1	0	0	8	6	1	0	2
		Cecal											0	1
	Turkeys	Retail Ground Turkey	0	0	1	0	0	0	0	0	0	0	0	0
		HACCP	0	0	1	2	1	0	1	0	0	2	0	0
		Cecal											0	0
	Cattle	Retail Ground Beef	0	0	0	1	0	0	0	0	0	0	0	0
		HACCP	0	2	0	1	0	0	0	1	0	2	2	1
		Cecal (Beef)											0	0
		Cecal (Dairy)											0	1
	Swine	Retail Pork Chops	2	0	0	0	0	2	0	0	0	0	3	0
		Cecal (Market Swine)											21	28
		Cecal (Sows)											33	42
Resistance Pattern	Source													
1. No Resistance Detected	Humans	50.0% 1	100.0% 2	66.7% 2		57.1% 4	33.3% 1	40.0% 2	50.0% 1	0.0% 0	80.0% 4	100.0% 1	100.0% 4	
	Chickens	Retail Chickens				100.0% 1								
		HACCP	33.3% 1		0.0% 0	0.0% 0	0.0% 0			37.5% 3	16.7% 1	100.0% 1		50.0% 1
		Cecal												100.0% 1
	Turkeys	Retail Ground Turkey			100.0% 1									
		HACCP			0.0% 0	50.0% 1	0.0% 0		0.0% 0			0.0% 0		
		Cecal												
	Cattle	Retail Ground Beef				0.0% 0								
		HACCP		100.0% 2		100.0% 1				0.0% 0		100.0% 2	0.0% 0	0.0% 0
		Cecal (Beef)												
		Cecal (Dairy)												100.0% 1
	Swine	Retail Pork Chops	0.0% 0					50.0% 1					100.0% 1	
		Cecal (Market Swine)											95.2% 20	89.3% 25
		Cecal (Sows)											90.9% 30	88.1% 37
2. Resistant to ≥ 3 Antimicrobial Classes	Humans	0.0% 0	0.0% 0	0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	20.0% 1	0.0% 0	0.0% 0	
	Chickens	Retail Chickens				0.0% 0								
		HACCP	33.3% 1		100.0% 3	50.0% 1	0.0% 0			0.0% 0	0.0% 0	0.0% 0		0.0% 0
		Cecal												0.0% 0
	Turkeys	Retail Ground Turkey			0.0% 0									
		HACCP			100.0% 1	50.0% 1	100.0% 1		0.0% 0			100.0% 2		
		Cecal												
	Cattle	Retail Ground Beef				0.0% 0								
		HACCP		0.0% 0		0.0% 0				100.0% 1		0.0% 0	50.0% 1	0.0% 0
		Cecal (Beef)												
		Cecal (Dairy)												0.0% 0
	Swine	Retail Pork Chops	0.0% 0					0.0% 0					0.0% 0	
		Cecal (Market Swine)											4.8% 1	3.6% 1
		Cecal (Sows)											0.0% 0	2.4% 1
3. Resistant to ≥ 4 Antimicrobial Classes	Humans	0.0% 0	0.0% 0	0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
	Chickens	Retail Chickens				0.0% 0								
		HACCP	0.0% 0		0.0% 0	0.0% 0	0.0% 0			0.0% 0	0.0% 0	0.0% 0		0.0% 0
		Cecal												0.0% 0
	Turkeys	Retail Ground Turkey			0.0% 0									
		HACCP			100.0% 1	0.0% 0	100.0% 1		0.0% 0			0.0% 0		
		Cecal												
	Cattle	Retail Ground Beef				0.0% 0								
		HACCP		0.0% 0		0.0% 0				100.0% 1		0.0% 0	0.0% 0	0.0% 0
		Cecal (Beef)												
		Cecal (Dairy)												0.0% 0
	Swine	Retail Pork Chops	0.0% 0					0.0% 0					0.0% 0	
		Cecal (Market Swine)											0.0% 0	0.0% 0
		Cecal (Sows)											0.0% 0	0.0% 0

¹ Starting in 2011, testing included nine antimicrobial classes with the addition of the macrolide azithromycin. Because resistance to azithromycin is low (in this case, <1%), antimicrobial class resistance data from 2011 and beyond are comparable to the data from previous years.

Table 46b. Resistance Patterns among *Salmonella* Johannesburg Isolates, 2003-2014¹

Year		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
Number of Isolates Tested	Humans	2	2	3	0	7	3	5	2	1	5	1	4	
	Chickens	Retail Chickens	0	0	0	1	0	0	0	0	0	0	0	0
		HACCP	3	0	3	2	1	0	0	8	6	1	0	2
		Cecal											0	1
	Turkeys	Retail Ground Turkey	0	0	1	0	0	0	0	0	0	0	0	0
		HACCP	0	0	1	2	1	0	1	0	0	2	0	0
		Cecal											0	0
	Cattle	Retail Ground Beef	0	0	0	1	0	0	0	0	0	0	0	0
		HACCP	0	2	0	1	0	0	0	1	0	2	2	1
		Cecal (Beef)											0	0
	Cecal (Dairy)											0	1	
	Swine	Retail Pork Chops	2	0	0	0	0	2	0	0	0	0	3	0
		Cecal (Market Swine)											21	28
		Cecal (Sows)											33	42
Resistance Pattern	Source													
4. Resistant to ≥ 5 Antimicrobial Classes	Humans	0.0% 0	0.0% 0	0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
	Chickens	Retail Chickens				0.0% 0								
		HACCP	0.0% 0		0.0% 0	0.0% 0	0.0% 0			0.0% 0	0.0% 0	0.0% 0		0.0% 0
		Cecal												0.0% 0
	Turkeys	Retail Ground Turkey			0.0% 0									
		HACCP			0.0% 0	0.0% 0	0.0% 0		0.0% 0			0.0% 0		
		Cecal												
	Cattle	Retail Ground Beef				0.0% 0								
		HACCP		0.0% 0	0.0% 0	0.0% 0				100.0% 1		0.0% 0	0.0% 0	0.0% 0
		Cecal (Beef)												
	Cecal (Dairy)												0.0% 0	
	Swine	Retail Pork Chops	0.0% 0					0.0% 0					0.0% 0	
		Cecal (Market Swine)											0.0% 0	0.0% 0
		Cecal (Sows)											0.0% 0	0.0% 0
5. At Least ACSSuT ² Resistant	Humans	0.0% 0	0.0% 0	0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
	Chickens	Retail Chickens				0.0% 0								
		HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0			0.0% 0	0.0% 0	0.0% 0		0.0% 0
		Cecal												0.0% 0
	Turkeys	Retail Ground Turkey			0.0% 0									
		HACCP			0.0% 0	0.0% 0	0.0% 0		0.0% 0			0.0% 0		
		Cecal												
	Cattle	Retail Ground Beef				0.0% 0								
		HACCP		0.0% 0		0.0% 0				100.0% 1		0.0% 0	0.0% 0	0.0% 0
		Cecal (Beef)												
	Cecal (Dairy)												0.0% 0	
	Swine	Retail Pork Chops	0.0% 0					0.0% 0					0.0% 0	
		Cecal (Market Swine)											0.0% 0	0.0% 0
		Cecal (Sows)											0.0% 0	0.0% 0
6. At Least ACT/S ³ Resistant	Humans	0.0% 0	0.0% 0	0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
	Chickens	Retail Chickens				0.0% 0								
		HACCP	0.0% 0		0.0% 0	0.0% 0	0.0% 0			0.0% 0	0.0% 0	0.0% 0		0.0% 0
		Cecal												0.0% 0
	Turkeys	Retail Ground Turkey			0.0% 0									
		HACCP			0.0% 0	0.0% 0	0.0% 0		0.0% 0			0.0% 0		
		Cecal												
	Cattle	Retail Ground Beef				0.0% 0								
		HACCP		0.0% 0		0.0% 0				100.0% 1		0.0% 0	0.0% 0	0.0% 0
		Cecal (Beef)												
	Cecal (Dairy)												0.0% 0	
	Swine	Retail Pork Chops	0.0% 0					0.0% 0					0.0% 0	
		Cecal (Market Swine)											0.0% 0	0.0% 0
		Cecal (Sows)											0.0% 0	0.0% 0

¹ Starting in 2011, testing included nine antimicrobial classes with the addition of the macrolide azithromycin. Because resistance to azithromycin is low (in this case, <1%), antimicrobial class resistance data from 2011 and beyond are comparable to the data from previous years.

² ACSSuT = ampicillin, chloramphenicol, streptomycin, sulfamethoxazole/sulfisoxazole, and tetracycline

³ ACT/S = ampicillin, chloramphenicol, and trimethoprim-sulfamethoxazole

Table 46c. Resistance Patterns among *Salmonella* Johannesburg Isolates, 2003-2014

Year		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
Number of Isolates Tested	Humans	2	2	3	0	7	3	5	2	1	5	1	4	
	Chickens	Retail Chickens	0	0	0	1	0	0	0	0	0	0	0	0
		HACCP	3	0	3	2	1	0	0	8	6	1	0	2
		Cecal											0	1
	Turkeys	Retail Ground Turkey	0	0	1	0	0	0	0	0	0	0	0	0
		HACCP	0	0	1	2	1	0	1	0	0	2	0	0
		Cecal											0	0
	Cattle	Retail Ground Beef	0	0	0	1	0	0	0	0	0	0	0	0
		HACCP	0	2	0	1	0	0	0	1	0	2	2	1
		Cecal (Beef)											0	0
	Swine	Cecal (Dairy)											0	1
		Retail Pork Chops	2	0	0	0	0	2	0	0	0	0	3	0
		Cecal (Market Swine)											21	28
		Cecal (Sows)											33	42
Resistance Pattern	Source													
7. At Least ACSSuTAuCx ¹ Resistant	Humans	0.0% 0	0.0% 0	0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
	Chickens	Retail Chickens				0.0% 0								
		HACCP	0.0% 0		0.0% 0	0.0% 0	0.0% 0			0.0% 0	0.0% 0	0.0% 0		0.0% 0
		Cecal												0.0% 0
	Turkeys	Retail Ground Turkey			0.0% 0									
		HACCP			0.0% 0	0.0% 0	0.0% 0		0.0% 0			0.0% 0		
		Cecal												
	Cattle	Retail Ground Beef				0.0% 0								
		HACCP		0.0% 0		0.0% 0				100.0% 1		0.0% 0	0.0% 0	0.0% 0
		Cecal (Beef)												0.0% 0
	Swine	Cecal (Dairy)												0.0% 0
		Retail Pork Chops	0.0% 0					0.0% 0					0.0% 0	
		Cecal (Market Swine)											0.0% 0	0.0% 0
		Cecal (Sows)										0.0% 0	0.0% 0	
8. At Least Ceftriaxone and Nalidixic Acid Resistant	Humans	0.0% 0	0.0% 0	0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
	Chickens	Retail Chickens				0.0% 0								
		HACCP	0.0% 0		0.0% 0	0.0% 0	0.0% 0			0.0% 0	0.0% 0	0.0% 0		0.0% 0
		Cecal												0.0% 0
	Turkeys	Retail Ground Turkey			0.0% 0									
		HACCP			0.0% 0	0.0% 0	0.0% 0		0.0% 0			0.0% 0		
		Cecal												
	Cattle	Retail Ground Beef				0.0% 0								
		HACCP		0.0% 0		0.0% 0				0.0% 0		0.0% 0	0.0% 0	0.0% 0
		Cecal (Beef)												0.0% 0
	Swine	Cecal (Dairy)												0.0% 0
		Retail Pork Chops	0.0% 0					0.0% 0					0.0% 0	
		Cecal (Market Swine)											0.0% 0	0.0% 0
		Cecal (Sows)										0.0% 0	0.0% 0	

¹ ACSSuTAuCx = ACSSuT, amoxicillin-clavulanic acid, and ceftriaxone

Resistance by Year

Table 47a. Antimicrobial Resistance among *Salmonella* Kentucky Isolates, 2003-2014

Year		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014		
Number of Isolates Tested	Humans	2	2	3	3	2	5	3	6	4	7	6	9		
	Chickens	Retail Chickens	20	42	60	59	23	30	44	21	45	62	44	35	
		HACCP	418	570	919	674	443	219	214	243	227	301	237	361	
		Cecal											15	27	
	Turkeys	Retail Ground Turkey	4	1	2	1	2	0	2	2	2	1	2	0	
		HACCP	9	6	5	8	1	1	2	0	2	1	0	7	
		Cecal											1	2	
	Cattle	Retail Ground Beef	0	0	0	0	0	1	0	0	3	1	1	0	
		HACCP	30	25	9	14	12	22	10	13	18	12	14	13	
		Cecal (Beef)											6	3	
		Cecal (Dairy)											15	7	
	Swine	Retail Pork Chops	0	0	0	0	0	0	0	0	0	1	0	0	
		Cecal (Market Swine)											1	0	
Cecal (Sows)												3	2		
Antimicrobial Class	Antimicrobial (Resistance Breakpoint)	Isolate Source													
Aminoglycosides	Gentamicin (MIC ≥ 16 µg/ml)	Humans	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	33.3% 1	16.7% 1	25.0% 1	28.6% 2	50.0% 3	11.1% 1	
		Chickens	Retail Chickens	5.0% 1	2.4% 1	0.0% 0	8.5% 5	0.0% 0	6.7% 2	2.3% 1	4.8% 1	4.4% 2	6.5% 4	0.0% 0	0.0% 0
			HACCP	2.6% 11	2.1% 12	1.4% 13	5.5% 37	3.4% 15	3.2% 7	2.3% 5	1.6% 4	1.3% 3	2.7% 8	0.8% 2	1.1% 4
			Cecal											0.0% 0	0.0% 0
		Turkeys	Retail Ground Turkey	25.0% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0		50.0% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
			HACCP	22.2% 2	0.0% 0	20.0% 1	37.5% 3	0.0% 0	0.0% 0	0.0% 0		0.0% 0	0.0% 0		0.0% 0
			Cecal											0.0% 0	0.0% 0
		Cattle	Retail Ground Beef						0.0% 0			0.0% 0	0.0% 0	0.0% 0	
			HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
			Cecal (Beef)											0.0% 0	0.0% 0
			Cecal (Dairy)											0.0% 0	0.0% 0
		Swine	Retail Pork Chops										0.0% 0		
			Cecal (Market Swine)											0.0% 0	
			Cecal (Sows)											0.0% 0	0.0% 0
		Streptomycin (MIC ≥ 64 µg/ml)	Humans	50.0% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	20.0% 1	33.3% 1	66.7% 4	25.0% 1	28.6% 2	0.0% 0	22.2% 2
	Chickens		Retail Chickens	65.0% 13	52.4% 22	50.0% 30	69.5% 41	60.9% 14	66.7% 20	70.5% 31	81.0% 17	80.0% 36	87.1% 54	79.6% 35	88.6% 31
			HACCP	21.5% 90	33.7% 192	36.3% 334	34.9% 235	32.5% 144	51.6% 113	54.7% 117	67.9% 165	69.2% 157	75.1% 226	81.0% 192	82.0% 296
			Cecal											60.0% 9	66.7% 18
	Turkeys		Retail Ground Turkey	50.0% 2	0.0% 0	50.0% 1	0.0% 0	50.0% 1		0.0% 0	0.0% 0	100.0% 2	0.0% 0	100.0% 2	
			HACCP	44.4% 4	16.7% 1	40.0% 2	25.0% 2	0.0% 0	0.0% 0	50.0% 1		0.0% 0	100.0% 1		85.7% 6
			Cecal											0.0% 0	100.0% 2
	Cattle		Retail Ground Beef						0.0% 0			100.0% 3	0.0% 0	0.0% 0	
			HACCP	3.3% 1	4.0% 1	0.0% 0	14.3% 2	0.0% 0	4.5% 1	0.0% 0	23.1% 3	16.7% 3	8.3% 1	7.1% 1	7.7% 1
			Cecal (Beef)											0.0% 0	0.0% 0
			Cecal (Dairy)											6.7% 1	14.3% 1
	Swine		Retail Pork Chops										100.0% 1		
		Cecal (Market Swine)											0.0% 0		
Cecal (Sows)												0.0% 0	50.0% 1		
β-Lactam/β-Lactamase Inhibitor Combinations	Amoxicillin-Clavulanic Acid (MIC ≥ 32 / 16 µg/ml)	Humans	0.0% 0	0.0% 0	0.0% 0	33.3% 1	0.0% 0	20.0% 1	0.0% 0	16.7% 1	0.0% 0	14.3% 1	33.3% 2	0.0% 0	
		Chickens	Retail Chickens	25.0% 5	26.2% 11	21.7% 13	22.0% 13	8.7% 2	20.0% 6	36.4% 16	19.0% 4	28.9% 13	21.0% 13	15.9% 7	8.6% 3
			HACCP	7.2% 30	9.6% 55	13.5% 124	15.4% 104	19.9% 88	11.0% 24	19.2% 41	15.2% 37	8.8% 20	18.3% 55	14.8% 35	11.6% 42
			Cecal											6.7% 1	18.5% 5
		Turkeys	Retail Ground Turkey	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
			HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	100.0% 1		14.3% 1
			Cecal											0.0% 0	0.0% 0
		Cattle	Retail Ground Beef						0.0% 0			33.3% 1	0.0% 0	0.0% 0	
			HACCP	0.0% 0	0.0% 0	0.0% 0	14.3% 2	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	8.3% 1	0.0% 0	0.0% 0
			Cecal (Beef)											0.0% 0	0.0% 0
			Cecal (Dairy)											0.0% 0	0.0% 0
		Swine	Retail Pork Chops										0.0% 0		
			Cecal (Market Swine)											0.0% 0	
			Cecal (Sows)											0.0% 0	0.0% 0

Table 47b. Antimicrobial Resistance among *Salmonella* Kentucky Isolates, 2003-2014

Year		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014		
Number of Isolates Tested	Humans	2	2	3	3	2	5	3	6	4	7	6	9		
	Chickens	Retail Chickens	20	42	60	59	23	30	44	21	45	62	44	35	
		HACCP	418	570	919	674	443	219	214	243	227	301	237	361	
		Cecal											15	27	
	Turkeys	Retail Ground Turkey	4	1	2	1	2	0	2	2	2	1	2	0	
		HACCP	9	6	5	8	1	1	2	0	2	1	0	7	
		Cecal											1	2	
	Cattle	Retail Ground Beef	0	0	0	0	0	1	0	0	3	1	1	0	
		HACCP	30	25	9	14	12	22	10	13	18	12	14	13	
		Cecal (Beef)											6	3	
		Cecal (Dairy)											15	7	
	Swine	Retail Pork Chops	0	0	0	0	0	0	0	0	0	1	0	0	
		Cecal (Market Swine)											1	0	
Cecal (Sows)												3	2		
Antimicrobial Class	Antimicrobial (Resistance Breakpoint)	Isolate Source													
Cephems	Cefoxitin (MIC ≥ 32 µg/ml)	Humans	0.0%	0.0%	0.0%	33.3%	0.0%	20.0%	0.0%	16.7%	0.0%	14.3%	16.7%	11.1%	
		Chickens	Retail Chickens	0	0	0	1	0	1	0	1	0	1	1	1
			HACCP	25.0%	26.2%	21.7%	22.0%	8.7%	20.0%	36.4%	19.0%	31.1%	16.1%	13.6%	5.7%
			Cecal	5	11	13	13	2	6	16	4	14	10	6	2
		Turkeys	Retail Ground Turkey	5.7%	9.6%	13.3%	15.1%	16.3%	10.5%	17.3%	14.8%	8.8%	14.6%	12.7%	9.7%
			HACCP	24	55	122	102	72	23	37	36	20	44	30	35
			Cecal											0.0%	14.8%
		Cattle	Retail Ground Turkey	0	0	0	0	0	0	0	0	0	0	0	0
			HACCP	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	14.3%
			Cecal	0	0	0	0	0	0	0	0	0	0	0	1
		Swine	Retail Ground Beef						0.0%			0.0%	0.0%	0.0%	0
			HACCP	0.0%	0.0%	0.0%	14.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Cecal (Beef)		0	0	0	2	0	0	0	0	0	0	0	0	
	Swine	Cecal (Dairy)											0.0%	0.0%	
		Retail Pork Chops										0.0%	0	0	
		Cecal (Market Swine)											0.0%	0	
	Ceftiofur (MIC ≥ 8 µg/ml)	Humans	0.0%	0.0%	0.0%	33.3%	0.0%	20.0%	0.0%	16.7%	0.0%	0.0%	16.7%	0.0%	
		Chickens	Retail Chickens	0	0	0	1	0	1	0	1	0	0	1	0
			HACCP	25.0%	26.2%	21.7%	22.0%	8.7%	20.0%	36.4%	19.0%	28.9%	19.4%	15.9%	8.6%
			Cecal	5	11	13	13	2	6	16	4	13	12	7	3
		Turkeys	Retail Ground Turkey	7.4%	9.6%	13.5%	15.3%	19.9%	11.0%	18.7%	15.2%	8.4%	15.6%	13.1%	10.8%
			HACCP	31	55	124	103	88	24	40	37	19	47	31	39
			Cecal											6.7%	18.5%
		Cattle	Retail Ground Turkey	0	0	0	0	0	0	0	0	0	0	0	0
			HACCP	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	14.3%
			Cecal	0	0	0	0	0	0	0	0	0	0	0	1
		Swine	Retail Ground Beef						0.0%			33.3%	0.0%	0.0%	0
			HACCP	0.0%	0.0%	0.0%	14.3%	0.0%	0.0%	0.0%	0.0%	0.0%	8.3%	0.0%	0.0%
	Cecal (Beef)		0	0	0	2	0	0	0	0	0	1	0	0	
	Swine	Cecal (Dairy)											0.0%	0.0%	
		Retail Pork Chops										0.0%	0	0	
		Cecal (Market Swine)											0.0%	0	
	Ceftriaxone (MIC ≥ 4 µg/ml)	Humans	0.0%	0.0%	0.0%	33.3%	0.0%	20.0%	0.0%	16.7%	0.0%	0.0%	16.7%	0.0%	
		Chickens	Retail Chickens	0	0	0	1	0	1	0	1	0	0	1	0
			HACCP	25.0%	26.2%	23.3%	22.0%	8.7%	20.0%	36.4%	19.0%	28.9%	21.0%	15.9%	8.6%
			Cecal	5	11	14	13	2	6	16	4	13	13	7	3
Turkeys		Retail Ground Turkey	7.2%	9.5%	13.6%	15.3%	19.9%	11.0%	19.2%	15.2%	8.8%	18.3%	14.3%	11.6%	
		HACCP	30	54	125	103	88	24	41	37	20	55	34	42	
		Cecal											6.7%	18.5%	
Cattle		Retail Ground Turkey	0	0	0	0	0	0	0	0	0	0	0	0	
		HACCP	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0	14.3%	
		Cecal	0	0	0	0	0	0	0	0	0	1	0	1	
Swine		Retail Ground Beef						0.0%			33.3%	0.0%	0.0%	0	
		HACCP	0.0%	0.0%	0.0%	14.3%	0.0%	0.0%	0.0%	0.0%	0.0%	8.3%	0.0%	0.0%	
	Cecal (Beef)	0	0	0	2	0	0	0	0	0	1	0	0		
Swine	Cecal (Dairy)											0.0%	0.0%		
	Retail Pork Chops										0.0%	0	0		
	Cecal (Market Swine)											0.0%	0		
Swine	Cecal (Sows)											0.0%	0.0%		

Table 47c. Antimicrobial Resistance among *Salmonella* Kentucky Isolates, 2003-2014

Year		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014		
Number of Isolates Tested	Humans	2	2	3	3	2	5	3	6	4	7	6	9		
	Chickens	Retail Chickens	20	42	60	59	23	30	44	21	45	62	44	35	
		HACCP	418	570	919	674	443	219	214	243	227	301	237	361	
		Cecal											15	27	
	Turkeys	Retail Ground Turkey	4	1	2	1	2	0	2	2	2	1	2	0	
		HACCP	9	6	5	8	1	1	2	0	2	1	0	7	
		Cecal											1	2	
	Cattle	Retail Ground Beef	0	0	0	0	0	1	0	0	3	1	1	0	
		HACCP	30	25	9	14	12	22	10	13	18	12	14	13	
		Cecal (Beef) Cecal (Dairy)											6 15	3 7	
	Swine	Retail Pork Chops	0	0	0	0	0	0	0	0	0	1	0	0	
		Cecal (Market Swine)											1	0	
		Cecal (Sows)											3	2	
	Antimicrobial Class	Antimicrobial (Resistance Breakpoint)	Isolate Source												
Folate Pathway Inhibitor	Sulfamethoxazole/ Sulfisoxazole ¹ (MIC ≥ 512 µg/ml)	Humans	50.0%	0.0%	0.0%	0.0%	0.0%	0.0%	33.3%	16.7%	25.0%	28.6%	50.0%	11.1%	
		Chickens	Retail Chickens	1	0	0	0	0	0	1	1	1	2	3	1
			HACCP	5.0%	4.8%	0.0%	8.5%	4.3%	6.7%	4.6%	0.0%	8.9%	4.8%	0.0%	0.0%
			Cecal	1	2	0	5	1	2	2	0	4	3	0	0
		Turkeys	Retail Ground Turkey	3.8%	3.3%	2.2%	6.2%	3.8%	4.1%	2.3%	1.6%	1.3%	3.7%	2.1%	1.7%
			HACCP	16	19	20	42	17	9	5	4	3	11	5	6
			Cecal											6.7%	3.7%
		Cattle	Retail Ground Turkey	25.0%	0.0%	0.0%	0.0%	0.0%		0.0%	0.0%	0.0%	100.0%	0.0%	
			HACCP	1	0	0	0	0		0	0	0	1	0	
			Cecal	22.2%	66.7%	20.0%	87.5%	0.0%	100.0%	100.0%		0.0%	0.0%		0.0%
		Swine	Retail Ground Beef	2	4	1	7	0	1	2		0	0		0
			HACCP											0.0%	50.0%
			Cecal											0	1
		Cattle	Retail Ground Beef						0.0%			0.0%	0.0%	0.0%	
	HACCP		0.0%	4.0%	0.0%	7.1%	0.0%	0.0%	0.0%	0.0%	0.0%	8.3%	0.0%	0.0%	
	Cecal (Beef) Cecal (Dairy)		0	1	0	1	0	0	0	0	0	1	0	0	
	Swine	Retail Pork Chops										0.0%			
		Cecal (Market Swine)											0.0%		
		Cecal (Sows)											0.0%	0.0%	
	Trimethoprim- Sulfamethoxazole (MIC ≥ 4 / 76 µg/ml)	Humans	50.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	16.7%	0.0%	0.0%	0.0%	0.0%	
		Chickens	Retail Chickens	1	0	0	0	0	0	0	1	0	0	0	0
			HACCP	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2.2%	0.0%	0.0%	0.0%
			Cecal	0	1	0	1	0	0	0	0	1	3	1	2
		Turkeys	Retail Ground Turkey	0.0%	0.0%	0.0%	0.0%	0.0%		0.0%	0.0%	0.0%	0.0%	0.0%	
			HACCP	0	0	0	0	0		0	0	0	0	0	0
			Cecal	0.0%	0.0%	0.0%	12.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		0.0%
		Cattle	Retail Ground Beef	0	0	0	1	0		0	0	0	0	0	0
			HACCP						0.0%			0.0%	0.0%	0.0%	
Cecal (Beef) Cecal (Dairy)			0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
Swine		Retail Pork Chops										0.0%			
		Cecal (Market Swine)											0.0%		
		Cecal (Sows)											0.0%	0.0%	
Macrolides		Azithromycin (MIC ≥ 32 µg/ml)	Humans								0.0%	0.0%	0.0%	0.0%	
	Chickens		Retail Chickens								2.2%	0.0%	0.0%	0.0%	
			HACCP								1	0	0	0	
			Cecal								0	0	0	0	
	Turkeys		Retail Ground Turkey									0.0%	0.0%	0.0%	
			HACCP									0	0	0	
			Cecal									0	0	0	
	Cattle		Retail Ground Beef									0.0%	0.0%	0.0%	
			HACCP									0	0	0	
			Cecal (Beef) Cecal (Dairy)									0	0	0	
	Swine		Retail Pork Chops										0.0%		
			Cecal (Market Swine)											0.0%	
			Cecal (Sows)											0.0%	

¹ Sulfamethoxazole was tested from 1996-2003 and was replaced by sulfisoxazole in 2004

Table 47d. Antimicrobial Resistance among *Salmonella* Kentucky Isolates, 2003-2014

Year			2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
Number of Isolates Tested	Humans		2	2	3	3	2	5	3	6	4	7	6	9	
		Chickens													
	Retail Chickens		20	42	60	59	23	30	44	21	45	62	44	35	
		HACCP	418	570	919	674	443	219	214	243	227	301	237	361	
		Cecal											15	27	
	Retail Ground Turkey		4	1	2	1	2	0	2	2	2	1	2	0	
		HACCP	9	6	5	8	1	1	2	0	2	1	0	7	
		Cecal											1	2	
	Retail Ground Beef		0	0	0	0	0	1	0	0	3	1	1	0	
		HACCP	30	25	9	14	12	22	10	13	18	12	14	13	
		Cecal (Beef)											6	3	
	Retail Pork Chops		0	0	0	0	0	0	0	0	0	1	0	0	
		Cecal (Market Swine)											1	0	
		Cecal (Sows)											3	2	
Antimicrobial Class	Antimicrobial (Resistance Breakpoint)	Isolate Source													
Penicillins	Ampicillin (MIC ≥ 32 µg/ml)	Humans	0.0% 0	0.0% 0	0.0% 0	33.3% 1	0.0% 0	20.0% 1	33.3% 1	33.3% 2	25.0% 1	71.4% 5	50.0% 3	22.2% 2	
		Retail Chickens		25.0% 5	28.6% 12	21.7% 13	22.0% 13	8.7% 2	20.0% 6	38.6% 17	19.1% 4	28.9% 13	22.6% 14	15.9% 7	8.6% 3
			HACCP	8.4% 35	10.9% 62	14.4% 132	16.2% 109	20.1% 89	11.4% 25	19.6% 42	15.2% 37	8.8% 20	19.3% 58	14.8% 35	11.9% 43
			Cecal											6.7% 1	18.5% 5
		Retail Ground Turkey		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		50.0% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
			HACCP	11.1% 1	0.0% 0	20.0% 1	12.5% 1	0.0% 0	0.0% 0	0.0% 0		0.0% 0	100.0% 1		28.6% 2
			Cecal											0.0% 0	0.0% 0
		Retail Ground Beef							0.0% 0			33.3% 1	0.0% 0	0.0% 0	
			HACCP	0.0% 0	0.0% 0	0.0% 0	14.3% 2	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	8.3% 1	0.0% 0	0.0% 0
			Cecal (Beef)											0.0% 0	0.0% 0
		Retail Pork Chops												0.0% 0	
			Cecal (Market Swine)											0.0% 0	
			Cecal (Sows)											0.0% 0	0.0% 0
		Phenicol	Chloramphenicol (MIC ≥ 32 µg/ml)	Humans	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	14.3% 1	0.0% 0
Retail Chickens				0.0% 0	0.0% 0	0.0% 0	6.8% 4	0.0% 0	0.0% 0	0.0% 0	0.0% 0	2.2% 1	0.0% 0	0.0% 0	0.0% 0
	HACCP			0.2% 1	0.7% 4	0.5% 5	1.8% 12	2.0% 9	2.3% 5	1.9% 4	1.2% 3	0.4% 1	0.0% 0	0.4% 1	0.0% 0
	Cecal													0.0% 0	0.0% 0
Retail Ground Turkey				0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
	HACCP			0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0	0.0% 0		0.0% 0
	Cecal													0.0% 0	50.0% 1
Retail Ground Beef									0.0% 0			0.0% 0	0.0% 0	0.0% 0	
	HACCP			0.0% 0	0.0% 0	0.0% 0	7.1% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
	Cecal (Beef)													0.0% 0	0.0% 0
Retail Pork Chops														0.0% 0	
	Cecal (Market Swine)													0.0% 0	
	Cecal (Sows)													0.0% 0	0.0% 0
Quinolones	Ciprofloxacin (MIC ≥ 1 µg/ml)			Humans	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	33.3% 1	16.7% 1	25.0% 1	42.9% 3	50.0% 3
		Retail Chickens		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
			HACCP	0.2% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
			Cecal											0.0% 0	0.0% 0
		Retail Ground Turkey		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
			HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0	0.0% 0		0.0% 0
			Cecal											0.0% 0	0.0% 0
		Retail Ground Beef							0.0% 0			0.0% 0	0.0% 0	0.0% 0	
			HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
			Cecal (Beef)											0.0% 0	0.0% 0
		Retail Pork Chops												0.0% 0	
			Cecal (Market Swine)											0.0% 0	
			Cecal (Sows)											0.0% 0	0.0% 0

Table 47e. Antimicrobial Resistance among *Salmonella* Kentucky Isolates, 2003-2014

Year			2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
Number of Isolates Tested	Humans		2	2	3	3	2	5	3	6	4	7	6	9	
		Chickens	Retail Chickens	20	42	60	59	23	30	44	21	45	62	44	35
			HACCP	418	570	919	674	443	219	214	243	227	301	237	361
	Turkeys	Retail Ground Turkey	4	1	2	1	2	0	2	2	2	1	2	0	
		HACCP	9	6	5	8	1	1	2	0	2	1	0	7	
		Cecal											1	2	
	Cattle	Retail Ground Beef	0	0	0	0	0	1	0	0	3	1	1	0	
		HACCP	30	25	9	14	12	22	10	13	18	12	14	13	
		Cecal (Beef)											6	3	
	Swine	Retail Pork Chops											15	7	
		Cecal (Market Swine)	0	0	0	0	0	0	0	0	0	1	0	0	
		Cecal (Sows)											3	2	
	Antimicrobial Class	Antimicrobial (Resistance Breakpoint)	Isolate Source												
Quinolones	Nalidixic Acid (MIC ≥ 32 µg/ml)	Humans	0.0% 0	50.0% 1	0.0% 0	33.3% 1	0.0% 0	0.0% 0	33.3% 1	16.7% 1	25.0% 1	42.9% 3	50.0% 3	33.3% 3	
		Chickens	Retail Chickens	0.0% 0	0.0% 0	1.7% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
			HACCP	0.7% 3	0.2% 1	0.0% 0	0.1% 1	0.2% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
			Cecal											0.0% 0	0.0% 0
		Turkeys	Retail Ground Turkey	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
			HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0	0.0% 0		0.0% 0
			Cecal											0.0% 0	0.0% 0
		Cattle	Retail Ground Beef						0.0% 0			0.0% 0	0.0% 0	0.0% 0	
			HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
			Cecal (Beef)											0.0% 0	0.0% 0
		Swine	Cecal (Dairy)											0.0% 0	0.0% 0
			Retail Pork Chops										0.0% 0		
			Cecal (Market Swine)											0.0% 0	
		Cecal (Sows)										0.0% 0	0.0% 0		
Tetracyclines	Tetracycline (MIC ≥ 16 µg/ml)	Humans	50.0% 1	0.0% 0	0.0% 0	33.3% 1	0.0% 0	40.0% 2	33.3% 1	66.7% 4	100.0% 4	42.9% 3	33.3% 2	11.1% 1	
		Chickens	Retail Chickens	60.0% 12	54.8% 23	53.3% 32	72.9% 43	73.9% 17	56.7% 17	68.2% 30	71.4% 15	75.6% 34	40.3% 25	63.6% 28	65.7% 23
			HACCP	32.5% 136	37.5% 214	43.9% 403	47.2% 318	56.9% 252	51.1% 112	57.5% 123	69.5% 169	72.2% 164	59.1% 178	70.5% 167	67.3% 243
			Cecal											20.0% 3	37.0% 10
		Turkeys	Retail Ground Turkey	50.0% 2	0.0% 0	100.0% 2	100.0% 1	100.0% 2		50.0% 1	50.0% 1	100.0% 2	100.0% 1	0.0% 0	
			HACCP	100.0% 9	100.0% 6	60.0% 3	87.5% 7	0.0% 0	100.0% 1	100.0% 2		50.0% 1	0.0% 0		71.4% 5
			Cecal											0.0% 0	100.0% 2
		Cattle	Retail Ground Beef						0.0% 0			100.0% 3	0.0% 0	0.0% 0	
			HACCP	10.0% 3	48.0% 12	22.2% 2	35.7% 5	0.0% 0	13.6% 3	0.0% 0	53.8% 7	38.9% 7	16.7% 2	14.3% 2	53.8% 7
			Cecal (Beef)											50.0% 3	33.3% 1
		Swine	Cecal (Dairy)											13.3% 2	0.0% 0
			Retail Pork Chops										0.0% 0		
			Cecal (Market Swine)											0.0% 0	
		Cecal (Sows)										0.0% 0	50.0% 1		

Multidrug Resistance

Table 48a. Resistance Patterns among *Salmonella* Kentucky Isolates, 2003-2014¹

Year		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014		
Number of Isolates Tested	Humans	2	2	3	3	2	5	3	6	4	7	6	9		
	Chickens	Retail Chickens	20	42	60	59	23	30	44	21	45	62	44	35	
		HACCP	418	570	919	674	443	219	214	243	227	301	237	361	
		Cecal											15	27	
	Turkeys	Retail Ground Turkey	4	1	2	1	2	0	2	2	2	1	2	0	
		HACCP	9	6	5	8	1	1	2	0	2	1	0	7	
		Cecal											1	2	
	Cattle	Retail Ground Beef	0	0	0	0	0	1	0	0	3	1	1	0	
		HACCP	30	25	9	14	12	22	10	13	18	12	14	13	
		Cecal (Beef)											6	3	
		Cecal (Dairy)											15	7	
	Swine	Retail Pork Chops	0	0	0	0	0	0	0	0	0	1	0	0	
		Cecal (Market Swine)											1	0	
Cecal (Sows)												3	2		
Resistance Pattern		Source													
1. No Resistance Detected	Humans	0.0%	50.0%	100.0%	66.7%	100.0%	60.0%	66.7%	33.3%	0.0%	28.6%	33.3%	55.6%		
	Chickens	Retail Chickens	35.0%	45.2%	43.3%	25.4%	26.1%	26.7%	15.9%	14.3%	8.9%	11.3%	13.6%	11.4%	
		HACCP	7	19	26	15	6	8	7	3	4	7	6	4	
		Cecal	63.2%	56.3%	49.3%	42.4%	33.4%	39.7%	34.6%	19.3%	18.1%	15.0%	13.1%	16.1%	
	Turkeys	Retail Ground Turkey	50.0%	100.0%	0.0%	0.0%	0.0%		50.0%	50.0%	0.0%	0.0%	0.0%		
		HACCP	2	1	0	0	0		1	1	0	0	0		
		Cecal	0.0%	0.0%	40.0%	12.5%	100.0%	0.0%	0.0%		50.0%	0.0%		14.3%	
	Cattle	Retail Ground Beef						100.0%			0.0%	100.0%	100.0%		
		HACCP	86.7%	48.0%	77.8%	64.3%	100.0%	81.8%	100.0%	46.2%	55.6%	75.0%	78.6%	38.5%	
		Cecal (Beef)	26	12	7	9	12	18	10	6	10	9	11	5	
		Cecal (Dairy)												50.0%	
	Swine	Retail Pork Chops										0.0%			
		Cecal (Market Swine)											100.0%		
		Cecal (Sows)											100.0%	50.0%	
													3	1	
	2. Resistant to ≥ 3 Antimicrobial Classes	Humans	0.0%	0.0%	0.0%	33.3%	0.0%	20.0%	33.3%	33.3%	25.0%	28.6%	66.7%	11.1%	
		Chickens	Retail Chickens	30.0%	31.0%	23.3%	22.0%	13.0%	26.7%	38.6%	19.0%	33.3%	24.2%	15.9%	8.6%
			HACCP	6	13	14	13	3	8	17	4	15	15	7	3
			Cecal	9.6%	12.3%	15.2%	17.4%	21.2%	13.2%	19.6%	16.0%	9.3%	20.3%	14.8%	12.5%
Turkeys		Retail Ground Turkey	25.0%	0.0%	0.0%	0.0%	0.0%		50.0%	0.0%	0.0%	0.0%	0.0%		
		HACCP	1	0	0	0	0		1	0	0	0	0		
		Cecal	33.3%	0.0%	40.0%	37.5%	0.0%	0.0%	50.0%		0.0%	100.0%		28.6%	
Cattle		Retail Ground Beef						0.0%			0.0%	0.0%	0.0%		
		HACCP	0.0%	0.0%	0.0%	14.3%	0.0%	0.0%	0.0%	0.0%	0.0%	8.3%	0.0%	0.0%	
		Cecal (Beef)	0	0	0	2	0	0	0	0	0	1	0	0	
		Cecal (Dairy)											0.0%	0.0%	
Swine		Retail Pork Chops										0.0%			
		Cecal (Market Swine)											0.0%		
		Cecal (Sows)											0.0%	0.0%	
												0	0		
3. Resistant to ≥ 4 Antimicrobial Classes		Humans	0.0%	0.0%	0.0%	33.3%	0.0%	20.0%	33.3%	33.3%	25.0%	28.6%	50.0%	11.1%	
		Chickens	Retail Chickens	25.0%	28.6%	20.0%	22.0%	8.7%	13.3%	27.3%	19.0%	11.1%	22.6%	8.6%	8.6%
			HACCP	5	12	12	13	2	4	12	4	5	14	4	3
			Cecal	6.0%	7.4%	11.4%	13.6%	18.3%	9.6%	19.2%	14.0%	7.9%	10.3%	11.8%	10.8%
	Turkeys	Retail Ground Turkey	0.0%	0.0%	0.0%	0.0%	0.0%		0.0%	0.0%	0.0%	0.0%	0.0%		
		HACCP	0	0	0	0	0		0	0	0	0	0		
		Cecal	0.0%	0.0%	0.0%	12.5%	0.0%	0.0%	0.0%		0.0%	100.0%		28.6%	
	Cattle	Retail Ground Beef						0.0%			0.0%	0.0%	0.0%		
		HACCP	0.0%	0.0%	0.0%	14.3%	0.0%	0.0%	0.0%	0.0%	0.0%	8.3%	0.0%	0.0%	
		Cecal (Beef)	0	0	0	2	0	0	0	0	0	1	0	0	
		Cecal (Dairy)											0.0%	0.0%	
	Swine	Retail Pork Chops										0.0%			
		Cecal (Market Swine)											0.0%		
		Cecal (Sows)											0.0%	0.0%	
													0	0	

¹ Starting in 2011, testing included nine antimicrobial classes with the addition of the macrolide azithromycin. Because resistance to azithromycin is low (in this case, <1%), antimicrobial class resistance data from 2011 and beyond are comparable to the data from previous years.

Table 48b. Resistance Patterns among *Salmonella* Kentucky Isolates, 2003-2014¹

Year		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014		
Number of Isolates Tested	Humans	2	2	3	3	2	5	3	6	4	7	6	9		
	Chickens	Retail Chickens	20	42	60	59	23	30	44	21	45	62	44	35	
		HACCP	418	570	919	674	443	219	214	243	227	301	237	361	
		Cecal											15	27	
	Turkeys	Retail Ground Turkey	4	1	2	1	2	0	2	2	2	1	2	0	
		HACCP	9	6	5	8	1	1	2	0	2	1	0	7	
		Cecal											1	2	
	Cattle	Retail Ground Beef	0	0	0	0	0	1	0	0	3	1	1	0	
		HACCP	30	25	9	14	12	22	10	13	18	12	14	13	
		Cecal (Beef) Cecal (Dairy)											6	3	
	Swine	Retail Pork Chops	0	0	0	0	0	0	0	0	0	1	0	0	
		Cecal (Market Swine)											1	0	
Cecal (Sows)												3	2		
Resistance Pattern		Source													
4. Resistant to ≥ 5 Antimicrobial Classes	Humans	0.0%	0.0%	0.0%	33.3%	0.0%	20.0%	33.3%	33.3%	25.0%	28.6%	33.3%	11.1%		
	Chickens	Retail Chickens	20.0%	26.2%	18.3%	20.3%	4.3%	10.0%	25.0%	9.5%	8.1%	8.1%	9.1%	5.7%	
		HACCP	4	11	11	12	1	3	11	2	4	5	4	2	
		Cecal	3.1%	5.3%	6.5%	6.8%	8.4%	6.8%	12.6%	9.9%	5.3%	5.3%	8.9%	8.6%	
			13	30	60	46	37	15	27	24	12	16	21	31	
	Turkeys	Retail Ground Turkey	0.0%	0.0%	0.0%	0.0%	0.0%		0.0%	0.0%	0.0%	0.0%	0.0%		
		HACCP	0	0	0	0	0	0	0	0	0	0	0	14.3%	
		Cecal	0	0	0	0	0	0	0	0	0	0	0	1	
	Cattle	Retail Ground Beef						0.0%		0.0%	0.0%	0.0%	0.0%		
		HACCP	0.0%	0.0%	0.0%	14.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
		Cecal (Beef)				2	0	0	0	0	0	0	0	0	
		Cecal (Dairy)											0.0%	0.0%	
	Swine	Retail Pork Chops										0.0%			
		Cecal (Market Swine)										0	0.0%	0.0%	
		Cecal (Sows)										0	0.0%	0.0%	
	5. At Least ACSSu² Resistant	Humans	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	14.3%	0.0%	0.0%	
		Chickens	Retail Chickens	0.0%	0.0%	0.0%	6.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
			HACCP	0	0	0	4	0	0	0	0	0	0	0	0
Cecal			0.2%	0.5%	0.5%	1.8%	1.6%	1.8%	1.9%	1.2%	0.4%	0.0%	0.4%	0.0%	
			1	3	5	12	7	4	4	3	1	0	1	0	
Turkeys		Retail Ground Turkey	0.0%	0.0%	0.0%	0.0%	0.0%		0.0%	0.0%	0.0%	0.0%	0.0%		
		HACCP	0	0	0	0	0	0	0	0	0	0	0	0.0%	
		Cecal	0	0	0	0	0	0	0	0	0	0	0	0	
Cattle		Retail Ground Beef						0.0%		0.0%	0.0%	0.0%	0.0%		
		HACCP	0.0%	0.0%	0.0%	7.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
		Cecal (Beef)				1	0	0	0	0	0	0	0	0	
		Cecal (Dairy)											0.0%	0.0%	
Swine		Retail Pork Chops										0.0%			
		Cecal (Market Swine)										0	0.0%	0.0%	
		Cecal (Sows)										0	0.0%	0.0%	
6. At Least ACT/S³ Resistant		Humans	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
		Chickens	Retail Chickens	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
			HACCP	0	0	0	0	0	0	0	0	0	0	0	0
	Cecal		0.0%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
			0	1	0	0	0	0	0	0	0	0	0	0	
	Turkeys	Retail Ground Turkey	0.0%	0.0%	0.0%	0.0%	0.0%		0.0%	0.0%	0.0%	0.0%	0.0%		
		HACCP	0	0	0	0	0	0	0	0	0	0	0	0.0%	
		Cecal	0	0	0	0	0	0	0	0	0	0	0	0	
	Cattle	Retail Ground Beef						0.0%		0.0%	0.0%	0.0%	0.0%		
		HACCP	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
		Cecal (Beef)											0.0%	0.0%	
		Cecal (Dairy)											0.0%	0.0%	
	Swine	Retail Pork Chops										0.0%			
		Cecal (Market Swine)										0	0.0%	0.0%	
		Cecal (Sows)										0	0.0%	0.0%	

¹ Starting in 2011, testing included nine antimicrobial classes with the addition of the macrolide azithromycin. Because resistance to azithromycin is low (in this case, <1%), antimicrobial class resistance data from 2011 and beyond are comparable to the data from previous years.

² ACSSuT = ampicillin, chloramphenicol, streptomycin, sulfamethoxazole/sulfisoxazole, and tetracycline

³ ACT/S = ampicillin, chloramphenicol, and trimethoprim-sulfamethoxazole

Table 48c. Resistance Patterns among *Salmonella* Kentucky Isolates, 2003-2014

Year		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014		
Number of Isolates Tested	Humans	2	2	3	3	2	5	3	6	4	7	6	9		
		Retail Chickens	20	42	60	59	23	30	44	21	45	62	44	35	
		HACCP	418	570	919	674	443	219	214	243	227	301	237	361	
	Chickens	Cecal											15	27	
		Retail Ground Turkey	4	1	2	1	2	0	2	2	2	1	2	0	
		HACCP	9	6	5	8	1	1	2	0	2	1	0	7	
	Turkeys	Cecal											1	2	
		Retail Ground Beef	0	0	0	0	0	1	0	0	3	1	2	0	
		HACCP	30	25	9	14	12	22	10	13	18	12	14	13	
	Cattle	Cecal (Beef)											6	3	
		Cecal (Dairy)											15	7	
		Cecal (Sows)	0	0	0	0	0	0	0	0	0	1	0	0	
	Swine	Retail Pork Chops											1	0	
Cecal (Market Swine)												1	0		
Cecal (Sows)												3	2		
Resistance Pattern	Source														
7. At Least ACSSuTAuCx¹ Resistant	Humans	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		
	Chickens	Retail Chickens	0.0% 0	0.0% 0	0.0% 0	6.8% 4	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
		HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.4% 1	0.0% 0	
		Cecal											0.0% 0	0.0% 0	
	Turkeys	Retail Ground Turkey	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		
		HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0	0.0% 0		0.0% 0	
		Cecal											0.0% 0	0.0% 0	
	Cattle	Retail Ground Beef						0.0% 0			0.0% 0	0.0% 0	0.0% 0		
		HACCP	0.0% 0	0.0% 0	0.0% 0	7.1% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
		Cecal (Beef)											0.0% 0	0.0% 0	
	Swine	Cecal (Dairy)											0.0% 0	0.0% 0	
		Retail Pork Chops										0.0% 0			
		Cecal (Market Swine)											0.0% 0		
		Cecal (Sows)											0.0% 0	0.0% 0	
	8. At Least Ceftriaxone and Nalidixic Acid Resistant	Humans	0.0% 0	0.0% 0	0.0% 0	33.3% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
		Chickens	Retail Chickens	0.0% 0	0.0% 0	1.7% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
			HACCP	0.2% 1	0.0% 0	0.4% 4	1.8% 12	1.6% 7	1.8% 4	1.9% 4	1.2% 3	0.4% 1	0.0% 0	0.0% 0	0.0% 0
			Cecal											0.0% 0	0.0% 0
Turkeys		Retail Ground Turkey	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		
		HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0	0.0% 0		0.0% 0	
		Cecal											0.0% 0	0.0% 0	
Cattle		Retail Ground Beef						0.0% 0			0.0% 0	0.0% 0	0.0% 0		
		HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
		Cecal (Beef)											0.0% 0	0.0% 0	
Swine		Cecal (Dairy)											0.0% 0	0.0% 0	
		Retail Pork Chops										0.0% 0			
		Cecal (Market Swine)											0.0% 0		
		Cecal (Sows)											0.0% 0	0.0% 0	

¹ ACSSuTAuCx = ACSSuT, amoxicillin-clavulanic acid, and ceftriaxone

Resistance by Year

Table 49a. Antimicrobial Resistance among *Salmonella* Hadar Isolates, 2003-2014

Year		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014		
Number of Isolates Tested	Humans	18	10	11	22	13	19	20	17	14	18	11	8		
	Chickens	Retail Chickens	2	8	9	1	2	1	2	2	1	0	1	0	
		HACCP	51	11	17	8	2	3	6	2	0	6	1	7	
		Cecal											1	1	
	Turkeys	Retail Turkey	11	11	13	25	54	71	21	20	23	8	14	13	
		HACCP	44	31	48	98	118	40	32	30	20	31	12	34	
		Cecal											4	7	
	Cattle	Retail Ground Beef	0	0	0	0	0	0	0	0	0	0	0	0	
		HACCP	0	2	1	0	2	1	1	1	0	1	0	0	
		Cecal (Beef) Cecal (Dairy)											0	1	
	Swine	Retail Pork Chops	0	0	0	0	1	0	0	0	8	0	0	0	
		Cecal (Market Swine)											0	0	
		Cecal (Sows)											3	2	
Antimicrobial Class	Antimicrobial (Resistance Breakpoint)	Isolate Source													
Aminoglycosides	Gentamicin (MIC ≥ 16 µg/ml)	Humans	5.6% 1	10.0% 1	9.1% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	5.9% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
		Chickens	Retail Chickens	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0	0.0% 0
			HACCP	5.9% 3	0.0% 0	5.9% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0	0.0% 0	0.0% 0
			Cecal											0.0% 0	0.0% 0
		Turkeys	Retail Ground Turkey	9.1% 1	0.0% 0	0.0% 0	20.0% 5	22.2% 12	14.1% 10	9.5% 2	5.0% 1	21.7% 5	37.5% 3	7.7% 1	7.7% 1
			HACCP	18.2% 8	29.0% 9	12.5% 6	12.2% 12	9.3% 11	15.0% 6	3.1% 1	10.0% 3	20.0% 4	3.2% 1	16.7% 2	2.9% 1
			Cecal											0.0% 0	0.0% 0
		Cattle	Retail Ground Beef												
			HACCP		0.0% 0	0.0% 0		50.0% 1	0.0% 0	0.0% 0	0.0% 0		0.0% 0		
			Cecal (Beef) Cecal (Dairy)												0.0% 0
		Swine	Retail Pork Chops					0.0% 0				0.0% 0			
			Cecal (Market Swine)												
			Cecal (Sows)											0.0% 0	0.0% 0
Aminoglycosides	Streptomycin (MIC ≥ 64 µg/ml)	Humans	88.9% 16	50.0% 5	45.5% 5	31.8% 7	38.5% 5	78.9% 15	45.0% 9	58.8% 10	71.4% 10	88.9% 16	81.8% 9	75.0% 6	
		Chickens	Retail Chickens	50.0% 1	87.5% 7	88.9% 8	100.0% 1	100.0% 2	100.0% 1	100.0% 2	100.0% 2	100.0% 1		100.0% 1	
			HACCP	54.9% 28	81.8% 9	70.6% 12	62.5% 5	0.0% 0	100.0% 3	100.0% 6	50.0% 1		66.7% 4	100.0% 1	71.4% 5
			Cecal											100.0% 1	100.0% 1
		Turkeys	Retail Ground Turkey	90.9% 10	90.9% 10	92.3% 12	84.0% 21	81.5% 44	98.6% 70	71.4% 15	85.0% 17	100.0% 23	100.0% 8	92.9% 13	100.0% 13
			HACCP	56.8% 25	74.2% 23	66.7% 32	40.8% 40	48.3% 57	75.0% 30	68.8% 22	50.0% 15	50.0% 10	93.5% 29	83.3% 10	97.1% 33
			Cecal											100.0% 1	85.7% 6
		Cattle	Retail Ground Beef												
			HACCP		0.0% 0	0.0% 0		50.0% 1	100.0% 1	0.0% 0	100.0% 1		100.0% 1		
			Cecal (Beef) Cecal (Dairy)												0.0% 0
		Swine	Retail Pork Chops					100.0% 1				100.0% 8			
			Cecal (Market Swine)												
			Cecal (Sows)											33.3% 1	100.0% 2
β-Lactam/β-Lactamase Inhibitor Combinations	Amoxicillin-Clavulanic Acid (MIC ≥ 32 / 16 µg/ml)	Humans	5.6% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	5.3% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
		Chickens	Retail Chickens	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		100.0% 1	
			HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0	0.0% 0	0.0% 0
			Cecal											0.0% 0	0.0% 0
		Turkeys	Retail Ground Turkey	0.0% 0	0.0% 0	7.7% 1	0.0% 0	0.0% 0	1.4% 1	0.0% 0	5.0% 1	13.0% 3	0.0% 0	0.0% 0	7.7% 1
			HACCP	0.0% 0	0.0% 0	0.0% 0	2.0% 2	1.7% 2	0.0% 0	0.0% 0	0.0% 0	10.0% 2	0.0% 0	8.3% 1	0.0% 0
			Cecal											0.0% 0	0.0% 0
		Cattle	Retail Ground Beef												
			HACCP		0.0% 0	0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0		
			Cecal (Beef) Cecal (Dairy)												0.0% 0
		Swine	Retail Pork Chops					0.0% 0				0.0% 0			
			Cecal (Market Swine)												
			Cecal (Sows)											0.0% 0	0.0% 0

Table 49b. Antimicrobial Resistance among *Salmonella* Hadar Isolates, 2003-2014

Year		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014		
Number of Isolates Tested	Humans	18	10	11	22	13	19	20	17	14	18	11	8		
	Chickens	Retail Chickens	2	8	9	1	2	1	2	2	1	0	1	0	
		HACCP	51	11	17	8	2	3	6	2	0	6	1	7	
		Cecal											1	1	
	Turkeys	Retail Turkey	11	11	13	25	54	71	21	20	23	8	14	13	
		HACCP	44	31	48	98	118	40	32	30	20	31	12	34	
		Cecal											4	7	
	Cattle	Retail Ground Beef	0	0	0	0	0	0	0	0	0	0	0	0	
		HACCP	0	2	1	0	2	1	1	1	0	1	0	0	
		Cecal (Beef) Cecal (Dairy)											0	1	
	Swine	Retail Pork Chops	0	0	0	0	1	0	0	0	8	0	0	0	
		Cecal (Market Swine)											0	0	
		Cecal (Sows)											3	2	
Antimicrobial Class	Antimicrobial (Resistance Breakpoint)	Isolate Source													
Cephems	Cefoxitin (MIC ≥ 32 µg/ml)	Humans	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
		Chickens	Retail Chickens	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	100.0% 1		0.0% 0	
			HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0	0.0% 0	0.0% 0
			Cecal											0.0% 0	0.0% 0
		Turkeys	Retail Ground Turkey	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	1.4% 1	0.0% 0	0.0% 0	4.3% 1	0.0% 0	0.0% 0	7.7% 1
			HACCP	0.0% 0	0.0% 0	0.0% 0	1.0% 1	1.7% 2	0.0% 0	0.0% 0	0.0% 0	10.0% 2	0.0% 0	8.3% 1	0.0% 0
			Cecal											0.0% 0	0.0% 0
		Cattle	Retail Ground Beef												
			HACCP		0.0% 0	0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0		
			Cecal (Beef) Cecal (Dairy)												0.0% 0
		Swine	Retail Pork Chops					0.0% 0				0.0% 0			
			Cecal (Market Swine)												
	Cecal (Sows)												0.0% 0	0.0% 0	
	Ceftiofur (MIC ≥ 8 µg/ml)	Humans	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
		Chickens	Retail Chickens	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	100.0% 1		0.0% 0	
			HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0	0.0% 0	0.0% 0
			Cecal											0.0% 0	0.0% 0
		Turkeys	Retail Ground Turkey	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	1.4% 1	0.0% 0	5.0% 1	13.0% 3	0.0% 0	0.0% 0	7.7% 1
			HACCP	2.3% 1	0.0% 0	0.0% 0	1.0% 1	1.7% 2	0.0% 0	0.0% 0	0.0% 0	10.0% 2	0.0% 0	8.3% 1	0.0% 0
			Cecal											0.0% 0	0.0% 0
		Cattle	Retail Ground Beef												
			HACCP		0.0% 0	0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0		
			Cecal (Beef) Cecal (Dairy)												0.0% 0
		Swine	Retail Pork Chops					0.0% 0				0.0% 0			
			Cecal (Market Swine)												
	Cecal (Sows)												0.0% 0	0.0% 0	
	Ceftriaxone (MIC ≥ 4 µg/ml)	Humans	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
		Chickens	Retail Chickens	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	100.0% 1		0.0% 0	
			HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0	0.0% 0	0.0% 0
			Cecal											0.0% 0	0.0% 0
		Turkeys	Retail Ground Turkey	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	1.4% 1	0.0% 0	5.0% 1	17.4% 4	0.0% 0	0.0% 0	7.7% 1
			HACCP	0.0% 0	0.0% 0	0.0% 0	1.0% 1	1.7% 2	0.0% 0	0.0% 0	0.0% 0	10.0% 2	0.0% 0	8.3% 1	0.0% 0
			Cecal											0.0% 0	0.0% 0
		Cattle	Retail Ground Beef												
			HACCP		0.0% 0	0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0		
			Cecal (Beef) Cecal (Dairy)												0.0% 0
Swine		Retail Pork Chops					0.0% 0				0.0% 0				
		Cecal (Market Swine)													
	Cecal (Sows)											0.0% 0	0.0% 0		

Table 49c. Antimicrobial Resistance among *Salmonella* Hadar Isolates, 2003-2014

Year		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014			
Number of Isolates Tested	Humans	18	10	11	22	13	19	20	17	14	18	11	8			
	Chickens	Retail Chickens	2	8	9	1	2	1	2	2	1	0	1	0		
		HACCP	51	11	17	8	2	3	6	2	0	6	1	7		
		Cecal											1	1		
	Turkeys	Retail Turkey	11	11	13	25	54	71	21	20	23	8	14	13		
		HACCP	44	31	48	98	118	40	32	30	20	31	12	34		
		Cecal											4	7		
	Cattle	Retail Ground Beef	0	0	0	0	0	0	0	0	0	0	0	0		
		HACCP	0	2	1	0	2	1	1	1	0	1	0	0		
		Cecal (Beef)											0	1		
	Swine	Retail Pork Chops	0	0	0	0	1	0	0	0	8	0	0	0		
		Cecal (Market Swine)											0	0		
		Cecal (Sows)											3	2		
	Antimicrobial Class	Antimicrobial (Resistance Breakpoint)	Isolate Source													
Folate Pathway Inhibitor	Sulfamethoxazole/ Sulfisoxazole ¹ (MIC ≥ 512 µg/ml)	Humans	16.7% 3	10.0% 1	9.1% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	5.9% 1	7.1% 1	0.0% 0	0.0% 0	0.0% 0		
		Chickens	Retail Chickens	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0	0.0% 0	
			HACCP	3.9% 2	0.0% 0	5.9% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0	0.0% 0	0.0% 0	
			Cecal											0.0% 0	0.0% 0	
		Turkeys	Retail Ground Turkey	9.1% 1	0.0% 0	7.7% 1	24.0% 6	29.6% 16	26.8% 19	9.5% 2	15.0% 3	30.4% 7	37.5% 3	0.0% 0	7.7% 1	
			HACCP	18.2% 8	29.0% 9	10.4% 5	15.3% 15	11.0% 13	17.5% 7	3.1% 1	6.7% 2	20.0% 4	3.2% 1	16.7% 2	2.9% 1	
			Cecal											0.0% 0	0.0% 0	
		Cattle	Retail Ground Beef													
			HACCP		0.0% 0	0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0			
			Cecal (Beef)												0.0% 0	
		Swine	Retail Pork Chops					0.0% 0				0.0% 0				
			Cecal (Market Swine)													
			Cecal (Sows)											0.0% 0	0.0% 0	
		Trimethoprim- Sulfamethoxazole (MIC ≥ 4 / 76 µg/ml)	Humans	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	7.1% 1	0.0% 0	0.0% 0	0.0% 0	
	Chickens		Retail Chickens	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0	0.0% 0	
			HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0	0.0% 0	0.0% 0	
			Cecal											0.0% 0	0.0% 0	
	Turkeys		Retail Ground Turkey	0.0% 0	0.0% 0	0.0% 0	0.0% 0	1.9% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
			HACCP	0.0% 0	0.0% 0	0.0% 0	1.0% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
			Cecal											0.0% 0	0.0% 0	
	Cattle		Retail Ground Beef													
			HACCP		0.0% 0	0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0		
			Cecal (Beef)												0.0% 0	
	Swine		Retail Pork Chops					0.0% 0				0.0% 0				
			Cecal (Market Swine)													
			Cecal (Sows)											0.0% 0	0.0% 0	
	Macrolides		Azithromycin (MIC ≥ 32 µg/ml)	Humans								0.0% 0	0.0% 0	0.0% 0	0.0% 0	
				Chickens	Retail Chickens								0.0% 0		0.0% 0	0.0% 0
					HACCP									0.0% 0	0.0% 0	0.0% 0
		Cecal												0.0% 0	0.0% 0	
Turkeys		Retail Ground Turkey									0.0% 0	0.0% 0	0.0% 0	0.0% 0		
		HACCP									0.0% 0	0.0% 0	0.0% 0	0.0% 0		
		Cecal											0.0% 0	0.0% 0		
Cattle		Retail Ground Beef														
		HACCP										0.0% 0				
		Cecal (Beef)												0.0% 0		
Swine		Retail Pork Chops														
		Cecal (Market Swine)														
		Cecal (Sows)												0.0% 0	0.0% 0	

¹ Sulfamethoxazole was tested from 1996-2003 and was replaced by sulfisoxazole in 2004

Table 49d. Antimicrobial Resistance among *Salmonella* Hadar Isolates, 2003-2014

Year		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014		
Number of Isolates Tested	Humans	18	10	11	22	13	19	20	17	14	18	11	8		
	Chickens	Retail Chickens	2	8	9	1	2	1	2	2	1	0	1	0	
		HACCP	51	11	17	8	2	3	6	2	0	6	1	7	
		Cecal											1	1	
	Turkeys	Retail Turkey	11	11	13	25	54	71	21	20	23	8	14	13	
		HACCP	44	31	48	98	118	40	32	30	20	31	12	34	
		Cecal											4	7	
	Cattle	Retail Ground Beef	0	0	0	0	0	0	0	0	0	0	0	0	
		HACCP	0	2	1	0	2	1	1	1	0	1	0	0	
		Cecal (Beef) Cecal (Dairy)											0	1	
	Swine	Retail Pork Chops	0	0	0	0	1	0	0	0	8	0	0	0	
		Cecal (Market Swine)											0	0	
		Cecal (Sows)											3	2	
	Antimicrobial Class	Antimicrobial (Resistance Breakpoint)	Isolate Source												
Penicillins	Ampicillin (MIC ≥ 32 µg/ml)	Humans	27.8% 5	10.0% 1	18.2% 2	22.7% 5	0.0% 0	15.8% 3	20.0% 4	29.4% 5	0.0% 0	11.1% 2	9.1% 1	12.5% 1	
		Chickens	Retail Chickens	50.0% 1	0.0% 0	33.3% 3	0.0% 0	0.0% 0	0.0% 0	50.0% 1	0.0% 0	100.0% 1		0.0% 0	
			HACCP	11.8% 6	0.0% 0	17.6% 3	12.5% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0	0.0% 0	0.0% 0
			Cecal											0.0% 0	0.0% 0
		Turkeys	Retail Ground Turkey	27.3% 3	9.1% 1	23.1% 3	12.0% 3	50.0% 27	63.4% 45	57.1% 12	15.0% 3	60.9% 14	25.0% 2	14.3% 2	38.5% 5
			HACCP	9.1% 4	9.7% 3	14.6% 7	19.4% 19	33.1% 39	42.5% 17	53.1% 17	40.0% 12	35.0% 7	32.3% 10	16.7% 2	44.1% 15
			Cecal											0.0% 0	71.4% 5
		Cattle	Retail Ground Beef												
			HACCP		0.0% 0	0.0% 0		50.0% 1	0.0% 0	0.0% 0	100.0% 1		0.0% 0		
			Cecal (Beef) Cecal (Dairy)												0.0% 0
		Swine	Retail Pork Chops					0.0% 0				100.0% 8			
			Cecal (Market Swine)												
			Cecal (Sows)											0.0% 0	0.0% 0
		Phenicol	Chloramphenicol (MIC ≥ 32 µg/ml)	Humans	5.6% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
Chickens	Retail Chickens			0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0	
	HACCP			0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0	0.0% 0	0.0% 0
	Cecal													0.0% 0	0.0% 0
Turkeys	Retail Ground Turkey			0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
	HACCP			0.0% 0	0.0% 0	0.0% 0	1.0% 1	0.0% 0	0.0% 0	0.0% 0	3.3% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0
	Cecal													0.0% 0	0.0% 0
Cattle	Retail Ground Beef														
	HACCP				0.0% 0	0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0		
	Cecal (Beef) Cecal (Dairy)														0.0% 0
Swine	Retail Pork Chops							0.0% 0				0.0% 0			
	Cecal (Market Swine)														
	Cecal (Sows)													0.0% 0	0.0% 0
Quinolones	Ciprofloxacin (MIC ≥ 1 µg/ml)			Humans	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Chickens	Retail Chickens	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0	
			HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0	0.0% 0	0.0% 0
			Cecal											0.0% 0	0.0% 0
		Turkeys	Retail Ground Turkey	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
			HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
			Cecal											0.0% 0	0.0% 0
		Cattle	Retail Ground Beef												
			HACCP		0.0% 0	0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0		
			Cecal (Beef) Cecal (Dairy)												0.0% 0
		Swine	Retail Pork Chops					0.0% 0				0.0% 0			
			Cecal (Market Swine)												
			Cecal (Sows)											0.0% 0	0.0% 0

Table 49e. Antimicrobial Resistance among *Salmonella* Hadar Isolates, 2003-2014

Year			2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
Number of Isolates Tested	Humans		18	10	11	22	13	19	20	17	14	18	11	8	
		Chickens	Retail Chickens	2	8	9	1	2	1	2	2	1	0	1	0
			HACCP	51	11	17	8	2	3	6	2	0	6	1	7
	Cecal												1	1	
	Turkeys	Retail Turkey	11	11	13	25	54	71	21	20	23	8	14	13	
		HACCP	44	31	48	98	118	40	32	30	20	31	12	34	
		Cecal											4	7	
	Cattle	Retail Ground Beef	0	0	0	0	0	0	0	0	0	0	0	0	
		HACCP	0	2	1	0	2	1	1	1	1	0	1	0	
		Cecal (Beef) Cecal (Dairy)												0 0	
	Swine	Retail Pork Chops	0	0	0	0	1	0	0	0	0	8	0	0	
		Cecal (Market Swine)												0	
		Cecal (Sows)											3	2	
	Antimicrobial Class	Antimicrobial (Resistance Breakpoint)	Isolate Source												
Quinolones	Nalidixic Acid (MIC ≥ 32 µg/ml)	Humans	11.1% 2	10.0% 1	0.0% 0	4.5% 1	7.7% 1	5.3% 1	5.0% 1	11.8% 2	14.3% 2	5.6% 1	0.0% 0	12.5% 1	
		Chickens	Retail Chickens	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0	
			HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		16.7% 1	0.0% 0	0.0% 0
			Cecal											0.0% 0	0.0% 0
		Turkeys	Retail Ground Turkey	0.0% 0	0.0% 0	0.0% 0	0.0% 0	3.7% 2	1.4% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
			HACCP	2.3% 1	3.2% 1	4.2% 2	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
			Cecal												0.0% 0
		Cattle	Retail Ground Beef												
			HACCP		0.0% 0	0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		
			Cecal (Beef) Cecal (Dairy)												0.0% 0
		Swine	Retail Pork Chops					0.0% 0				0.0% 0			
			Cecal (Market Swine)												
			Cecal (Sows)											0.0% 0	0.0% 0
		Tetracyclines	Tetracycline (MIC ≥ 16 µg/ml)	Humans	100.0% 18	90.0% 9	100.0% 11	86.4% 19	92.3% 12	84.2% 16	80.0% 16	94.1% 16	78.6% 11	88.9% 16	81.8% 9
Chickens	Retail Chickens			100.0% 2	87.5% 7	100.0% 9	100.0% 1	100.0% 2	100.0% 1	100.0% 2	100.0% 2	100.0% 1		100.0% 1	
	HACCP			94.1% 48	72.7% 8	88.2% 15	87.5% 7	100.0% 2	100.0% 3	100.0% 6	100.0% 2		66.7% 4	100.0% 1	71.4% 5
	Cecal														0.0% 0
Turkeys	Retail Ground Turkey			100.0% 11	100.0% 11	92.3% 12	96.0% 24	92.6% 50	97.2% 69	85.7% 18	100.0% 20	100.0% 23	87.5% 7	92.9% 13	100.0% 13
	HACCP			97.7% 43	83.9% 26	95.8% 46	89.8% 88	98.3% 116	90.0% 36	100.0% 32	93.3% 28	85.0% 17	96.8% 30	91.7% 11	94.1% 32
	Cecal													100.0% 4	100.0% 7
Cattle	Retail Ground Beef														
	HACCP				0.0% 0	100.0% 1		100.0% 2	100.0% 1	100.0% 1	100.0% 1		100.0% 1		100.0% 1
	Cecal (Beef) Cecal (Dairy)														
Swine	Retail Pork Chops							100.0% 1				12.5% 1			
	Cecal (Market Swine)														
	Cecal (Sows)													100.0% 3	100.0% 2

Multidrug Resistance

Table 50a. Resistance Patterns among *Salmonella* Hadar Isolates, 2003-2014¹

Year		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
Number of Isolates Tested	Humans	18	10	11	22	13	19	20	17	14	18	11	8	
	Chickens	Retail Chickens	2	8	9	1	2	1	2	2	1	0	1	0
		HACCP	51	11	17	8	2	3	6	2	0	6	1	7
		Cecal											1	1
	Turkeys	Retail Ground Turkey	11	11	13	25	54	71	21	20	23	8	14	13
		HACCP	44	31	48	98	118	40	32	30	20	31	12	34
		Cecal											4	7
	Cattle	Retail Ground Beef	0	0	0	0	0	0	0	0	0	0	0	0
		HACCP	0	2	1	0	2	1	1	1	0	1	0	0
		Cecal (Beef) Cecal (Dairy)											0	1
	Swine	Retail Pork Chops	0	0	0	0	1	0	0	0	8	0	0	0
		Cecal (Market Swine)											0	0
		Cecal (Sows)											3	2
	Resistance Pattern		Source											
1. No Resistance Detected	Humans	0.0%	10.0%	0.0%	13.6%	7.7%	15.8%	20.0%	5.9%	14.3%	5.6%	18.2%	25.0%	
	Chickens	Retail Chickens	0	1	0	3	1	3	4	1	2	1	2	2
		HACCP	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		0.0%	
		Cecal	0	0	0	0	0	0	0	0	0	0	0	0
	Turkeys	Retail Ground Turkey	3.9%	18.2%	11.8%	12.5%	0.0%	0.0%	0.0%	0.0%	0.0%	16.7%	0.0%	28.6%
		HACCP	2	2	2	1	0	0	0	0	0	1	0	2
		Cecal											0.0%	0.0%
	Turkeys	Retail Ground Turkey	0	0	7.7%	4.0%	1.9%	0.0%	0.0%	0.0%	0.0%	0.0%	7.1%	0.0%
		HACCP	0	0	1	1	1	0	0	0	0	0	1	0
		Cecal	2.3%	9.7%	4.2%	9.2%	0.8%	0.0%	0.0%	6.7%	0.0%	3.2%	8.3%	2.9%
	Cattle	Retail Ground Beef	1	3	2	9	1	0	0	2	0	1	1	1
		HACCP											0.0%	0.0%
		Cecal (Beef) Cecal (Dairy)												100.0%
	Swine	Retail Pork Chops					0.0%				0.0%			
Cecal (Market Swine)						0				0				
Cecal (Sows)												0.0%	0.0%	
2. Resistant to ≥ 3 Antimicrobial Classes	Humans	33.3%	20.0%	9.1%	18.2%	0.0%	21.1%	15.0%	35.3%	7.1%	11.1%	9.1%	25.0%	
	Chickens	Retail Chickens	6	2	1	4	0	4	3	6	1	2	1	2
		HACCP	0.0%	0.0%	22.2%	0.0%	0.0%	0.0%	50.0%	0.0%	0.0%		0.0%	
		Cecal	0	0	2	0	0	0	1	0	0	0	0	0
	Turkeys	Retail Ground Turkey	9.8%	0.0%	5.9%	12.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
		HACCP	5	0	1	1	0	0	0	0	0	0	0	0
		Cecal											0.0%	0.0%
	Turkeys	Retail Ground Turkey	36.4%	9.1%	23.1%	28.0%	50.0%	69.0%	33.3%	15.0%	52.2%	25.0%	14.3%	38.5%
		HACCP	4	1	3	7	27	49	7	3	12	2	2	5
		Cecal	20.5%	29.0%	20.8%	17.3%	23.7%	35.0%	34.4%	23.3%	25.0%	35.5%	25.0%	44.1%
	Cattle	Retail Ground Beef	9	9	10	17	28	14	11	7	5	11	3	15
		HACCP											0.0%	57.1%
		Cecal (Beef) Cecal (Dairy)												4
	Swine	Retail Ground Beef												
HACCP			0.0%	0.0%		50.0%	0.0%	0.0%	100.0%		0.0%			
Cecal (Beef) Cecal (Dairy)			0	0		1	0	0	1		0		0.0%	
Swine	Retail Pork Chops					0.0%				12.5%				
	Cecal (Market Swine)					0				1				
	Cecal (Sows)											0.0%	0.0%	
3. Resistant to ≥ 4 Antimicrobial Classes	Humans	16.7%	10.0%	9.1%	0.0%	0.0%	5.3%	0.0%	11.8%	7.1%	0.0%	0.0%	12.5%	
	Chickens	Retail Chickens	3	1	1	0	0	1	0	2	1	0	0	1
		HACCP	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		0.0%	
		Cecal	0	0	0	0	0	0	0	0	0	0	0	0
	Turkeys	Retail Ground Turkey	2.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
		HACCP	1	0	0	0	0	0	0	0	0	0	0	0
		Cecal											0.0%	0.0%
	Turkeys	Retail Ground Turkey	0.0%	0.0%	7.7%	8.0%	16.7%	19.7%	0.0%	15.0%	4.4%	25.0%	0.0%	7.7%
		HACCP	0	0	1	2	9	14	0	3	1	2	0	1
		Cecal	6.8%	3.2%	4.2%	11.2%	7.6%	7.5%	0.0%	6.7%	15.0%	0.0%	16.7%	44.1%
	Cattle	Retail Ground Beef	3	1	2	11	9	3	0	2	3	0	2	15
		HACCP											0.0%	0.0%
		Cecal (Beef) Cecal (Dairy)		0.0%	0.0%		0.0%	0.0%	0.0%	0.0%		0.0%		0
	Swine	Retail Pork Chops					0.0%				0.0%			
Cecal (Market Swine)						0				0				
Cecal (Sows)												0.0%	0.0%	

¹ Starting in 2011, testing included nine antimicrobial classes with the addition of the macrolide azithromycin. Because resistance to azithromycin is low (in this case, <1%), antimicrobial class resistance data from 2011 and beyond are comparable to the data from previous years.

Table 50b. Resistance Patterns among *Salmonella* Hadar Isolates, 2003-2014¹

Year		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
Number of Isolates Tested	Humans	18	10	11	22	13	19	20	17	14	18	11	8	
	Chickens	Retail Chickens	2	8	9	1	2	1	2	2	1	0	1	0
		HACCP	51	11	17	8	2	3	6	2	0	6	1	7
		Cecal											1	1
	Turkeys	Retail Ground Turkey	11	11	13	25	54	71	21	20	23	8	14	13
		HACCP	44	31	48	98	118	40	32	30	20	31	12	34
		Cecal											4	7
	Cattle	Retail Ground Beef	0	0	0	0	0	0	0	0	0	0	0	0
		HACCP	0	2	1	0	2	1	1	1	0	1	0	0
		Cecal (Beef)											0	1
	Swine	Retail Pork Chops	0	0	0	0	1	0	0	0	8	0	0	0
		Cecal (Market Swine)											0	0
		Cecal (Sows)											3	2
	Resistance Pattern	Source												
4. Resistant to ≥ 5 Antimicrobial Classes	Humans	11.1% 2	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
	Chickens	Retail Chickens	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
		HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
		Cecal											0.0% 0	
	Turkeys	Retail Ground Turkey	0.0% 0	0.0% 0	7.7% 1	0.0% 0	0.0% 0	1.4% 1	0.0% 0	5.0% 1	0.0% 0	0.0% 0	0.0% 0	7.7% 1
		HACCP	2.3% 1	0.0% 0	2.1% 1	1.0% 1	0.8% 1	0.0% 0	0.0% 0	3.3% 1	10.0% 2	0.0% 0	0.0% 0	0.0% 0
		Cecal											0.0% 0	0.0% 0
	Cattle	Retail Ground Beef												
		HACCP		0.0% 0	0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0		
		Cecal (Beef)												0.0% 0
	Swine	Retail Pork Chops					0.0% 0				0.0% 0			
		Cecal (Market Swine)												
		Cecal (Sows)											0.0% 0	0.0% 0
	5. At Least ACSSuT ² Resistant	Humans	5.6% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
Chickens		Retail Chickens	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
		HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
		Cecal											0.0% 0	
Turkeys		Retail Ground Turkey	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
		HACCP	0.0% 0	0.0% 0	0.0% 0	1.5% 1	0.0% 0	0.0% 0	0.0% 0	3.3% 1	0.0% 0	0.0% 0	0.0% 0	
		Cecal											0.0% 0	
Cattle		Retail Ground Beef												
		HACCP		0.0% 0	0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0		
		Cecal (Beef)											0.0% 0	
Swine		Retail Pork Chops					0.0% 0				0.0% 0			
		Cecal (Market Swine)												
		Cecal (Sows)											0.0% 0	
6. At Least ACT/S ³ Resistant		Humans	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
	Chickens	Retail Chickens	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
		HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
		Cecal											0.0% 0	
	Turkeys	Retail Ground Turkey	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
		HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
		Cecal											0.0% 0	
	Cattle	Retail Ground Beef												
		HACCP		0.0% 0	0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0		
		Cecal (Beef)											0.0% 0	
	Swine	Retail Pork Chops					0.0% 0				0.0% 0			
		Cecal (Market Swine)												
		Cecal (Sows)											0.0% 0	

¹ Starting in 2011, testing included nine antimicrobial classes with the addition of the macrolide azithromycin. Because resistance to azithromycin is low (in this case, <1%), antimicrobial class resistance data from 2011 and beyond are comparable to the data from previous years.

² ACSSuT = ampicillin, chloramphenicol, streptomycin, sulfamethoxazole/sulfisoxazole, and tetracycline

³ ACT/S = ampicillin, chloramphenicol, and trimethoprim-sulfamethoxazole

Table 50c. Resistance Patterns among *Salmonella* Hadar Isolates, 2003-2014

Year		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
Number of Isolates Tested	Humans	18	10	11	22	13	19	20	17	14	18	11	8	
	Chickens	Retail Chickens	2	8	9	1	2	1	2	2	1	0	1	0
		HACCP	51	11	17	8	2	3	6	2	0	6	1	7
		Cecal											1	1
	Turkeys	Retail Ground Turkey	11	11	13	25	54	71	21	20	23	8	14	13
		HACCP	44	31	48	98	118	40	32	30	20	31	12	34
		Cecal											4	7
	Cattle	Retail Ground Beef	0	0	0	0	0	0	0	0	0	0	0	0
		HACCP	0	2	1	0	2	1	1	1	0	1	0	0
		Cecal (Beef)											0	1
	Swine	Retail Pork Chops	0	0	0	0	1	0	0	0	8	0	0	0
		Cecal (Market Swine)											0	0
		Cecal (Sows)											3	2
Resistance Pattern	Source													
7. At Least ACSSuTAuCx ¹ Resistant	Humans	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
	Chickens	Retail Chickens	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Cecal											0.0% 0	0.0% 0
	Turkeys	Retail Ground Turkey	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		HACCP	0.0% 0	0.0% 0	0.0% 0	1.0% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Cecal											0.0% 0	0.0% 0
	Cattle	Retail Ground Beef												
		HACCP		0.0% 0	0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0		
		Cecal (Beef)												0.0% 0
	Swine	Retail Pork Chops					0.0% 0				0.0% 0			
		Cecal (Market Swine)												
		Cecal (Sows)											0.0% 0	0.0% 0
8. At Least Ceftriaxone and Nalidixic Acid Resistant	Humans	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
	Chickens	Retail Chickens	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Cecal											0.0% 0	0.0% 0
	Turkeys	Retail Ground Turkey	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		HACCP	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Cecal											0.0% 0	0.0% 0
	Cattle	Retail Ground Beef												
		HACCP		0.0% 0	0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0		
		Cecal (Beef)												0.0% 0
	Swine	Retail Pork Chops					0.0% 0				0.0% 0			
		Cecal (Market Swine)												
		Cecal (Sows)											0.0% 0	0.0% 0

¹ ACSSuTAuCx = ACSSuT, amoxicillin-clavulanic acid, and ceftriaxone

Campylobacter Data

Campylobacter jejuni and Campylobacter coli Isolates Tested

Table 51. Number of *Campylobacter jejuni* Isolates Tested, 1997-2014¹

Source		Year																	
		1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Humans		209	297	293	306	365	329	303	320	788	709	991	1033	1350	1159	1282	1190	1183	1251
Chickens	Retail Chickens						198	325	510	403	426	332	329	404	355	393	421	428	369
	HACCP					64 ²	526	374	508	567	228	166	78	117	208	344	1348	788 ³	418
	Cecal																	11	8
Turkeys	Retail Ground Turkey						2	4	7	10	12	20	10	9	5	13	3	7	0
	Cecal																	0	1
Cattle	Cecal (Beef)																	531	574
	Cecal (Dairy)																	542	395
Swine	Cecal (Market Swine)																	4	9
	Cecal (Sows)																	6	12

¹ Beginning in 2008, ground beef and pork chops were no longer tested for *Campylobacter* due to low isolation in previous years. Data for these retail meats can be found in prior reports

² These isolates were recovered from July through December, 2001, when the new ARS isolation method was used

³ Isolates were susceptibility tested by ARS from Jan-Sept 2013 and by FSIS from Oct-Dec 2013

Table 52. Number of *Campylobacter coli* Isolates Tested, 1997-2014¹

Source		Year																	
		1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Humans		6	8	20	12	17	25	22	25	98	96	104	115	141	115	149	134	142	146
Chickens	Retail Chickens						90	142	196	151	145	143	181	176	148	210	193	198	149
	HACCP					52 ²	288	247	186	380	123	76	28	81	100	233	693	393 ³	156
	Cecal																	50	62
Turkeys	Retail Ground Turkey						2	1	5	9	10	14	19	16	7	18	3	5	0
	Cecal																	18	15
Cattle	Cecal (Beef)																	131	180
	Cecal (Dairy)																	98	55
Swine	Cecal (Market Swine)																	190	174
	Cecal (Sows)																	163	148

¹ Beginning in 2008, ground beef and pork chops were no longer tested for *Campylobacter* due to low isolation in previous years. Data for these retail meats can be found in prior reports.

² These isolates were recovered from July through December, 2001, when the new ARS isolation method was used

³ Isolates were susceptibility tested by ARS from Jan-Sept 2013 and by FSIS from Oct-Dec 2013

Isolation of *Campylobacter* from Retail Meats

Table 53. Number and Percent of Retail Meat Samples Culture Positive for *Campylobacter*, 2014¹

	Retail Chickens	Retail Ground Turkey
Number of Meat Samples Tested	1570	1557
Number Positive for <i>Campylobacter</i>	518	0
Percent Positive for <i>Campylobacter</i>	33.0%	0.0%

¹ Beginning in 2008, ground beef and pork chops were no longer tested for *Campylobacter* due to low isolation in previous years. Data for these retail meats can be found in prior reports.

Figure 6. Percent of Retail Meat Samples Culture Positive for *Campylobacter*, 2014

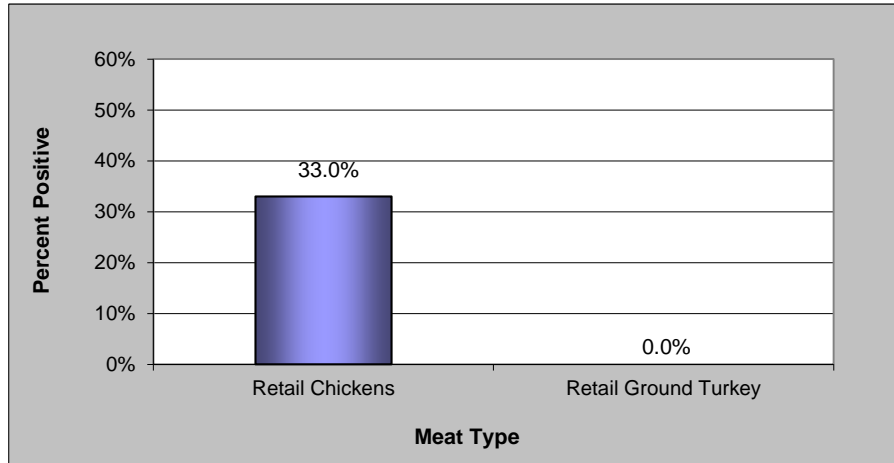
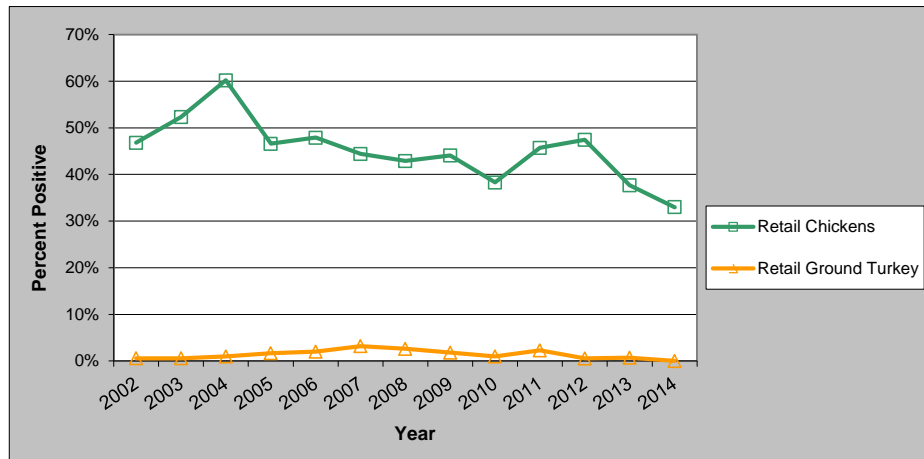


Figure 7. Percent of Retail Meat Samples Culture Positive for *Campylobacter*, 2002-2014



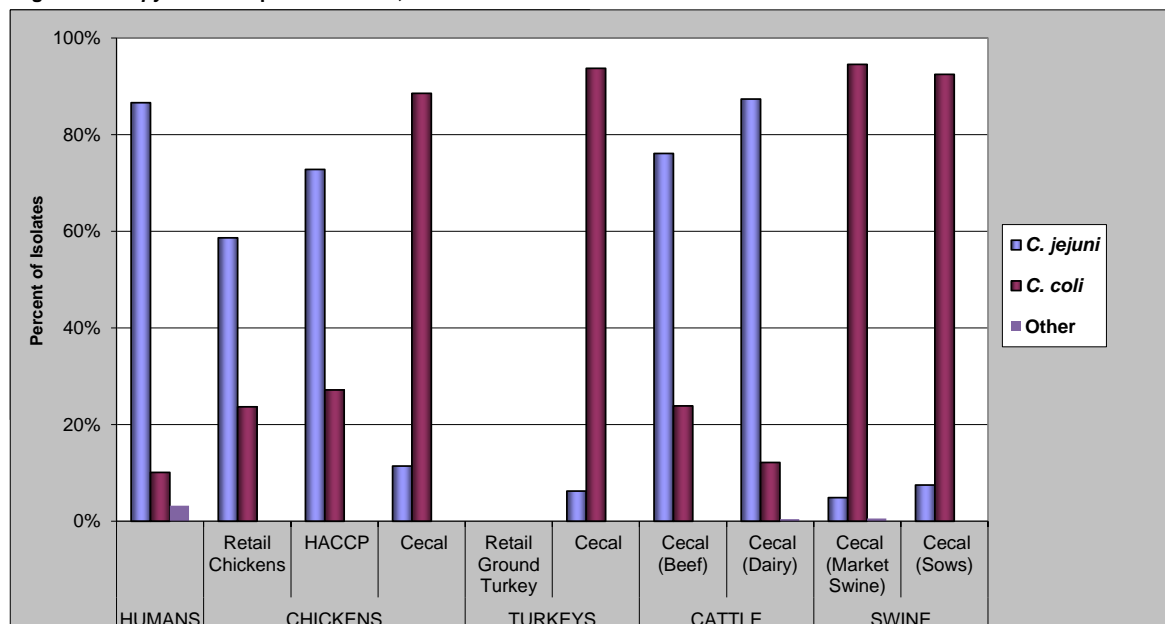
Campylobacter Species

Table 54. *Campylobacter* Species Isolated, 2014¹

<i>Campylobacter</i> Species	Humans	Chickens			Turkeys		Cattle		Swine	
	Humans (N=1444)	Retail Chickens (N=518)	HACCP (N=574)	Cecal (N=70)	Retail Ground Turkey (N=0)	Cecal (N=16)	Cecal (Beef) (N=754)	Cecal (Dairy) (N=452)	Cecal (Market Swine) (N=184)	Cecal (Sows) (N=160)
<i>C. jejuni</i>	86.6% 1251	58.7% 369	72.8% 418	11.4% 8	0.0% 0	6.3% 1	76.1% 574	87.4% 395	4.9% 9	7.5% 12
<i>C. coli</i>	10.1% 146	23.7% 149	27.2% 156	88.6% 62	0.0% 0	93.8% 15	23.9% 180	12.2% 55	94.6% 174	92.5% 148
Other	3.3% 47	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.4% 2	0.5% 1	0.0% 0

¹ Beginning in 2008, ground beef and pork chops were no longer tested for *Campylobacter* due to low isolation in previous years. Data for these retail meats can be found in prior reports.

Figure 8. *Campylobacter* Species Isolated, 2014



Antimicrobial Susceptibility among *Campylobacter jejuni*

MIC Distributions

Table 55a. Distribution of MICs and Occurrence of Resistance among *Campylobacter jejuni* Isolates, 2014

Antimicrobial Class	Antimicrobial Agent	Isolate Source (# of Isolates) ¹	%R ²	[95% CI] ³	Distribution (%) of MICs (µg/ml) ⁴													
					0.015	0.03	0.06	0.125	0.25	0.50	1	2	4	8	16	32	64	128
Aminoglycosides	Gentamicin	Humans (1251)	1.4	[0.8 - 2.2]	<div style="display: flex; justify-content: space-between;"> 0.015 0.03 0.06 0.125 0.25 0.50 1 2 4 8 16 32 64 128 256 </div>													
		Chickens	Retail Chickens (369)	0.0														[0.0 - 1.0]
		HACCP (418)	0.2	[0.0 - 1.3]														
		Cecal (8)	0.0	[0.0 - 36.9]														
		Turkeys	Retail Ground Turkey (0)	N/A														N/A
		Cecal (1)	0.0	[0.0 - 97.5]														
		Cattle	Cecal (Beef) (574)	0.0														[0.0 - 0.6]
		Cecal (Dairy) (395)	0.3	[0.0 - 1.4]														
		Swine	Cecal (Market Swine) (9)	0.0														[0.0 - 33.6]
		Cecal (Sows) (12)	0.0	[0.0 - 26.5]														
Ketolides	Telithromycin	Humans (1251)	1.8	[1.2 - 2.7]	<div style="display: flex; justify-content: space-between;"> 0.015 0.03 0.06 0.125 0.25 0.50 1 2 4 8 16 32 64 128 256 </div>													
		Chickens	Retail Chickens (369)	0.0														[0.0 - 1.0]
		HACCP (418)	0.0	[0.0 - 0.9]														
		Cecal (8)	0.0	[0.0 - 36.9]														
		Turkeys	Retail Ground Turkey (0)	N/A														N/A
		Cecal (1)	0.0	[0.0 - 97.5]														
		Cattle	Cecal (Beef) (574)	0.2														[0.0 - 1.0]
		Cecal (Dairy) (395)	0.3	[0.0 - 1.4]														
		Swine	Cecal (Market Swine) (9)	0.0														[0.0 - 33.6]
		Cecal (Sows) (12)	0.0	[0.0 - 26.5]														
Lincosamides	Clindamycin	Humans (1251)	2.6	[1.8 - 3.6]	<div style="display: flex; justify-content: space-between;"> 0.015 0.03 0.06 0.125 0.25 0.50 1 2 4 8 16 32 64 128 256 </div>													
		Chickens	Retail Chickens (369)	0.3														[0.0 - 1.5]
		HACCP (418)	0.2	[0.0 - 1.3]														
		Cecal (8)	0.0	[0.0 - 36.9]														
		Turkeys	Retail Ground Turkey (0)	N/A														N/A
		Cecal (1)	0.0	[0.0 - 97.5]														
		Cattle	Cecal (Beef) (574)	1.4														[0.6 - 2.7]
		Cecal (Dairy) (395)	1.0	[0.3 - 2.6]														
		Swine	Cecal (Market Swine) (9)	33.3														[7.5 - 70.1]
		Cecal (Sows) (12)	16.7	[2.1 - 48.4]														
Macrolides	Azithromycin	Humans (1251)	1.8	[1.2 - 2.7]	<div style="display: flex; justify-content: space-between;"> 0.015 0.03 0.06 0.125 0.25 0.50 1 2 4 8 16 32 64 128 256 </div>													
		Chickens	Retail Chickens (369)	0.3														[0.0 - 1.5]
		HACCP (418)	0.5	[0.1 - 1.7]														
		Cecal (8)	0.0	[0.0 - 36.9]														
		Turkeys	Retail Ground Turkey (0)	N/A														N/A
		Cecal (1)	0.0	[0.0 - 97.5]														
		Cattle	Cecal (Beef) (574)	0.7														[0.2 - 1.8]
		Cecal (Dairy) (395)	1.0	[0.3 - 2.6]														
		Swine	Cecal (Market Swine) (9)	22.2														[2.8 - 60.0]
		Cecal (Sows) (12)	0.0	[0.0 - 26.5]														
	Erythromycin	Humans (1251)	1.8	[1.2 - 2.7]	<div style="display: flex; justify-content: space-between;"> 0.015 0.03 0.06 0.125 0.25 0.50 1 2 4 8 16 32 64 128 256 </div>													
		Chickens	Retail Chickens (369)	0.3														[0.0 - 1.5]
		HACCP (418)	0.5	[0.1 - 1.7]														
		Cecal (8)	0.0	[0.0 - 36.9]														
		Turkeys	Retail Ground Turkey (0)	N/A														N/A
		Cecal (1)	0.0	[0.0 - 97.5]														
Erythromycin	Cattle	Cecal (Beef) (574)	0.3	[0.0 - 1.3]	<div style="display: flex; justify-content: space-between;"> 0.015 0.03 0.06 0.125 0.25 0.50 1 2 4 8 16 32 64 128 256 </div>													
		Cecal (Dairy) (395)	0.3	[0.0 - 1.4]														
		Swine	Cecal (Market Swine) (9)	22.2														[2.8 - 60.0]
		Cecal (Sows) (12)	0.0	[0.0 - 26.5]														
		Swine	Cecal (Market Swine) (9)	22.2														[2.8 - 60.0]
		Cecal (Sows) (12)	0.0	[0.0 - 26.5]														

¹ Beginning in 2008, ground beef and pork chops were no longer tested for *Campylobacter* due to low isolation in previous years. Data for these retail meats can be found in prior reports.

² Percent resistant; Discrepancies between %R and sums of distribution %s, to the right of the double vertical bars, are due to rounding

³ 95% confidence intervals for percent resistant (%R) were calculated using the Clopper-Pearson exact method

⁴ The unshaded areas indicate the range of dilutions tested for each antimicrobial. Single vertical bars indicate the breakpoints for susceptibility, while double vertical bars indicate the breakpoints for resistance. Numbers in the shaded areas indicate the percentages of isolates with MICs greater than the highest tested concentrations. Numbers listed for the lowest tested concentrations represent the percentages of isolates with MICs equal to or less than the lowest tested concentration.

Table 55b. Distribution of MICs and Occurrence of Resistance among *Campylobacter jejuni* Isolates, 2014

Antimicrobial Class	Antimicrobial Agent	Isolate Source (# of Isolates) ¹	%R ²	[95% CI] ³	Distribution (%) of MICs (µg/ml) ⁴															
					0.015	0.03	0.06	0.125	0.25	0.50	1	2	4	8	16	32	64	128	256	
Phenicol	Florfenicol	Humans (1251)	1.0	[0.5 - 1.7]						2.7	75.7	17.1	3.5	1.0						
		Chickens	Retail Chickens (369)	0.0	[0.0 - 1.0]						1.1	87.3	11.1	0.5						
			HACCP (418)	0.0	[0.0 - 0.9]	1.0	1.9	2.9	3.8	54.1	34.7	1.2	0.5							
			Cecal (8)	0.0	[0.0 - 36.9]					50.0	50.0									
			Retail Ground Turkey (0)	N/A	N/A															
		Turkeys	Cecal (1)	0.0	[0.0 - 97.5]					100.0										
		Cattle	Cecal (Beef) (574)	0.2	[0.0 - 1.0]			1.1	0.9	1.4	59.4	34.8	1.9	0.4	0.2					
			Cecal (Dairy) (395)	0.3	[0.0 - 1.4]			1.0	1.0	4.3	56.2	36.0	1.3		0.3					
		Swine	Cecal (Market Swine) (9)	0.0	[0.0 - 33.6]					11.1	44.4	44.4								
			Cecal (Sows) (12)	0.0	[0.0 - 26.5]					8.3	50.0	41.7								
Quinolones	Ciprofloxacin	Humans (1251)	26.7	[24.3 - 29.2]		0.3	19.5	44.9	7.4	1.1	0.1	0.2	0.6	10.4	9.0	3.7	1.8	0.9		
		Chickens	Retail Chickens (369)	14.9	[11.4 - 19.0]				14.4	59.6	10.8	0.3				5.7	8.7	0.5		
			HACCP (418)	28.0	[23.7 - 32.6]	0.7	6.2	44.7	18.2	1.7	0.5	0.2	0.7	2.9	17.2	6.5	0.5			
			Cecal (8)	25.0	[3.2 - 65.1]				37.5	37.5					25.0					
			Retail Ground Turkey (0)	N/A	N/A															
		Turkeys	Cecal (1)	0.0	[0.0 - 97.5]					100.0										
		Cattle	Cecal (Beef) (574)	16.2	[13.3 - 19.5]	0.2	4.7	51.4	26.0	1.4	0.2	0.4	0.4	3.7	9.8	1.6	0.5			
			Cecal (Dairy) (395)	8.4	[5.8 - 11.5]	0.3	10.4	57.5	21.5	2.0		0.3	0.8	3.3	3.3	0.8				
		Swine	Cecal (Market Swine) (9)	11.1	[0.3 - 48.2]				44.4	44.4						11.1				
			Cecal (Sows) (12)	0.0	[0.0 - 26.5]				58.3	41.7										
	Nalidixic acid	Humans (1251)	26.5	[24.1 - 29.1]										58.3	13.4	1.8	0.2	0.2	26.2	
		Chickens	Retail Chickens (369)	14.9	[11.4 - 19.0]										64.5	20.3	0.3		0.3	14.6
			HACCP (418)	27.8	[23.5 - 32.3]										60.8	10.3	1.2	2.9	15.3	9.6
			Cecal (8)	25.0	[3.2 - 65.1]										75.0				25.0	
			Retail Ground Turkey (0)	N/A	N/A															
		Turkeys	Cecal (1)	0.0	[0.0 - 97.5]										100.0					
Cattle		Cecal (Beef) (574)	16.4	[13.4 - 19.7]										65.5	17.4	0.7	1.0	3.7	11.7	
		Cecal (Dairy) (395)	8.1	[5.6 - 11.2]										76.5	13.7	1.8	0.8	2.5	4.8	
Swine	Cecal (Market Swine) (9)	11.1	[0.3 - 48.2]										66.7	22.2				11.1		
	Cecal (Sows) (12)	0.0	[0.0 - 26.5]										58.3	41.7						
Tetracyclines	Tetracycline	Humans (1251)	48.6	[45.8 - 51.4]			0.2	17.7	26.5	5.0	2.0	0.5	0.1	0.1	0.1	0.6	6.1	41.2		
		Chickens	Retail Chickens (369)	44.4	[39.3 - 49.7]				9.2	34.4	7.9	4.1	1.1				0.8	1.4	10.8	30.4
			HACCP (418)	67.7	[63.0 - 72.2]			3.3	16.5	7.2	3.6	1.7	1.2	1.0	1.9	4.1	22.5	24.9	12.2	
			Cecal (8)	50.0	[15.7 - 84.3]				25.0	12.5		12.5				12.5	12.5	25.0		
			Retail Ground Turkey (0)	#DIV/0!	[0.0 - 100.0]															
		Turkeys	Cecal (1)	100.0	[2.5 - 100.0]														100.0	
		Cattle	Cecal (Beef) (574)	76.1	[72.4 - 79.6]			3.3	13.9	4.0	2.3	0.4	0.4	0.7	0.7	5.2	11.0	28.6	29.6	
			Cecal (Dairy) (395)	61.8	[56.8 - 66.6]			5.8	22.5	7.6	2.0	0.3	0.8	1.3	1.5	3.0	9.9	25.1	20.3	
		Swine	Cecal (Market Swine) (9)	100.0	[66.4 - 100.0]												33.3	22.2	44.4	
			Cecal (Sows) (12)	50.0	[21.1 - 78.9]			8.3	25.0	8.3	8.3					8.3	8.3	25.0	8.3	

¹ Beginning in 2008, ground beef and pork chops were no longer tested for *Campylobacter* due to low isolation in previous years. Data for these retail meats can be found in prior reports.

² Percent resistant; Discrepancies between %R and sums of distribution %s, to the right of the double vertical bars, are due to rounding

³ 95% confidence intervals for percent resistant (%R) were calculated using the Clopper-Pearson exact method

⁴ The unshaded areas indicate the range of dilutions tested for each antimicrobial. Single vertical bars indicate the breakpoints for susceptibility, while double vertical bars indicate the breakpoints for resistance. Numbers in the shaded areas indicate the percentages of isolates with MICs greater than the highest tested concentrations. Numbers listed for the lowest tested concentrations represent the percentages of isolates with MICs equal to or less than the lowest tested concentration.

Resistance by Year

Table 56a. Antimicrobial Resistance among *Campylobacter jejuni* Isolates, 2003-2014

Year			2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014		
Number of Isolates Tested	Humans		303	320	788	709	991	1033	1350	1159	1282	1190	1183	1251		
	Chickens	Retail Chickens	325	510	403	426	332	329	404	355	393	421	428	369		
		HACCP	374	508	567	228	166	78	117	208	344	1348	788	418		
		Cecal											11	8		
	Turkeys	Retail Ground Turkey	4	7	10	12	20	10	9	5	13	3	7	0		
		Cecal											0	1		
	Cattle	Cecal (Beef)											531	574		
		Cecal (Dairy)											542	395		
	Swine	Cecal (Market Swine)											4	9		
		Cecal (Sows)											6	12		
Antimicrobial Class	Antimicrobial (Resistance Breakpoint) ¹	Isolate Source ²														
Aminoglycosides	Gentamicin (MIC > 2 µg/ml)	Humans		0.0% 0	2.2% 7	0.1% 1	0.0% 0	0.8% 8	1.1% 11	0.6% 8	0.6% 7	1.0% 13	1.0% 12	1.6% 19	1.4% 17	
		Chickens	Retail Chickens	0.3% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.2% 1	0.5% 2	0.0% 0
			HACCP	0.0% 0	0.2% 1	0.0% 0	0.0% 0	0.0% 0	1.3% 1	0.9% 1	0.5% 1	0.3% 1	0.4% 6	0.4% 3	0.4% 3	0.2% 1
			Cecal											0.0% 0	0.0% 0	
		Turkeys	Retail Ground Turkey	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
			Cecal												0.0% 0	
		Cattle	Cecal (Beef)												0.0% 0	0.0% 0
			Cecal (Dairy)												0.0% 0	0.3% 1
		Swine	Cecal (Market Swine)												0.0% 0	0.0% 0
			Cecal (Sows)												0.0% 0	0.0% 0
Ketolides	Telithromycin (MIC > 4 µg/ml)	Humans				0.8% 6	1.0% 7	1.3% 13	2.2% 23	1.9% 25	2.4% 28	2.6% 33	1.4% 17	2.0% 24	1.8% 23	
		Chickens	Retail Chickens		0.8% 4	0.5% 2	0.9% 4	0.6% 2	1.2% 4	0.7% 3	0.9% 3	0.5% 2	0.7% 3	0.9% 4	0.0% 0	
			HACCP			0.9% 5	0.4% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.6% 2	0.5% 7	1.9% 15	0.0% 0	
			Cecal											0.0% 0	0.0% 0	
		Turkeys	Retail Ground Turkey		0.0% 0	0.0% 0	0.0% 0	5.0% 1	10.0% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
			Cecal												0.0% 0	
		Cattle	Cecal (Beef)												0.2% 1	0.2% 1
			Cecal (Dairy)												0.7% 4	0.3% 1
		Swine	Cecal (Market Swine)												0.0% 0	0.0% 0
			Cecal (Sows)												33.3% 2	0.0% 0
Lincosamides	Clindamycin (MIC > 0.5 µg/ml)	Humans		4.3% 13	5.6% 18	3.2% 25	2.4% 17	3.4% 34	3.8% 39	2.9% 39	14.1% 163	21.4% 274	10.8% 129	3.2% 38	2.6% 32	
		Chickens	Retail Chickens		2.2% 11	1.2% 5	0.7% 3	0.6% 2	1.8% 6	1.5% 6	0.6% 2	1.0% 4	1.2% 5	1.2% 5	0.3% 1	
			HACCP	2.7% 10	1.8% 9	1.1% 6	0.4% 1	0.0% 0	1.3% 1	0.0% 0	0.0% 0	1.2% 4	1.0% 14	2.4% 19	0.2% 1	
			Cecal												0.0% 0	0.0% 0
		Turkeys	Retail Ground Turkey		14.3% 1	0.0% 0	0.0% 0	5.0% 1	10.0% 1	11.1% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
			Cecal												0.0% 0	
		Cattle	Cecal (Beef)												1.3% 7	1.4% 8
			Cecal (Dairy)												1.3% 7	1.0% 4
		Swine	Cecal (Market Swine)												0.0% 0	33.3% 3
			Cecal (Sows)												33.3% 2	16.7% 2

¹ Percent resistance for gentamicin, clindamycin, azithromycin, erythromycin, nalidixic acid, and doxycycline in this report may differ from previously published percentages because breakpoints have been revised for these antimicrobials

² Beginning in 2008, retail ground beef and retail pork chops were no longer tested for *Campylobacter* due to low isolation in previous years. Data for these retail meats can be found in prior reports.

Table 56b. Antimicrobial Resistance among *Campylobacter jejuni* Isolates, 2003-2014

Year		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014		
Number of Isolates Tested	Humans	303	320	788	709	991	1033	1350	1159	1282	1190	1183	1251		
	Chickens	Retail Chickens	325	510	403	426	332	329	404	355	393	421	428	369	
		HACCP	374	508	567	228	166	78	117	208	344	1348	788	418	
		Cecal											11	8	
	Turkeys	Retail Ground Turkey	4	7	10	12	20	10	9	5	13	3	7	0	
		Cecal											0	1	
	Cattle	Cecal (Beef)											531	574	
		Cecal (Dairy)											542	395	
	Swine	Cecal (Market Swine)											4	9	
		Cecal (Sows)											6	12	
Antimicrobial Class	Antimicrobial (Resistance Breakpoint) ¹	Isolate Source ²													
Macrolides	Azithromycin (MIC > 0.25 µg/ml)	Humans	1.3%	9.4%	2.7%	1.3%	1.8%	2.6%	1.9%	2.7%	4.9%	1.8%	2.2%	1.8%	
			4	30	21	9	18	27	26	31	63	21	26	23	
		Chickens	Retail Chickens		1.8%	5.0%	0.9%	0.6%	1.2%	1.0%	0.6%	0.5%	1.2%	1.6%	0.3%
					9	2	4	2	4	4	2	2	5	7	1
			HACCP	1.6%	1.8%	1.8%	1.3%	0.6%	1.3%	0.0%	0.0%	0.9%	1.0%	2.3%	0.5%
				6	9	10	3	1	1	0	0	3	14	18	2
		Cecal											0.0%	0.0%	
													0	0	
		Turkeys	Retail Ground Turkey		0.0%	0.0%	0.0%	5.0%	10.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
					0	0	0	1	1	0	0	0	0	0	0.0%
		Cecal											0	0	
	Cattle	Cecal (Beef)											0.0%	0.7%	
													0	4	
		Cecal (Dairy)											0.4%	1.0%	
													2	4	
	Swine	Cecal (Market Swine)											0.0%	22.2%	
													0	2	
		Cecal (Sows)											33.3%	0.0%	
													2	0	
	Erythromycin (MIC > 4 µg/ml)	Humans	0.3%	0.9%	1.5%	0.8%	1.6%	2.2%	1.5%	1.2%	1.8%	1.5%	2.2%	1.8%	
		1	3	12	6	16	23	20	14	23	18	26	23		
Chickens		Retail Chickens	0.0%	0.8%	0.5%	0.9%	0.6%	1.2%	1.0%	0.6%	0.6%	0.7%	1.6%	0.3%	
			0	4	2	4	2	4	4	2	2	3	7	1	
		HACCP	1.6%	1.6%	1.1%	0.4%	0.0%	1.3%	0.0%	0.0%	0.6%	1.1%	2.3%	0.5%	
			6	8	6	1	0	1	0	0	2	15	18	2	
Cecal												0.0%	0.0%		
												0	0		
Turkeys		Retail Ground Turkey	0.0%	0.0%	0.0%	0.0%	5.0%	10.0%	0.0%	0.0%	0.0%	0.0%	0.0%		
			0	0	0	0	1	1	0	0	0	0	0	0.0%	
	Cecal											0	0		
Cattle	Cecal (Beef)											0.0%	0.3%		
												0	2		
	Cecal (Dairy)											0.4%	0.3%		
												2	1		
Swine	Cecal (Market Swine)											0.0%	22.2%		
												0	2		
	Cecal (Sows)											33.3%	0.0%		
												2	0		
Phenicol	Florfenicol (MIC > 4) ^{3,4}	Humans			0.4%	0.0%	0.0%	0.6%	0.6%	1.5%	2.1%	1.4%	1.2%	1.0%	
					3	0	0	6	8	17	27	17	14	12	
		Chickens	Retail Chickens		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
					0	0	0	0	0	0	0	0	0	0	0
			HACCP	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
				0	0	0	0	0	0	0	0	0	0	0	
		Cecal											0.0%	0.0%	
													0	0	
		Turkeys	Retail Ground Turkey		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
					0	0	0	0	0	0	0	0	0	0	0.0%
	Cecal											0	0		
Cattle	Cecal (Beef)											0.0%	0.2%		
												0	1		
	Cecal (Dairy)											0.0%	0.3%		
												0	1		
Swine	Cecal (Market Swine)											0.0%	0.0%		
												0	0		
	Cecal (Sows)											0.0%	0.0%		
												0	0		

¹ Resistance figures for gentamicin, clindamycin, azithromycin, erythromycin, nalidixic acid, and doxycycline in this report may differ from previously published figures because breakpoints have been revised for these antimicrobials

² Beginning in 2008, ground beef and pork chops were no longer tested for *Campylobacter* due to low isolation in previous years. Data for these retail meats can be found in prior reports.

³ For Humans and Chickens at HACCP, results prior to 2005 are for Chloramphenicol

Table 56c. Antimicrobial Resistance among *Campylobacter jejuni* Isolates, 2003-2014

Year		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014			
Number of Isolates Tested	Humans	303	320	788	709	991	1033	1350	1159	1282	1190	1183	1251			
	Chickens	Retail Chickens	325	510	403	426	332	329	404	355	393	421	428	369		
		HACCP	374	508	567	228	166	78	117	208	344	1348	788	418		
		Cecal											11	8		
	Turkeys	Retail Ground Turkey	4	7	10	12	20	10	9	5	13	3	7	0		
		Cecal											0	1		
	Cattle	Cecal (Beef)											531	574		
		Cecal (Dairy)											542	395		
	Swine	Cecal (Market Swine)											4	9		
		Cecal (Sows)											6	12		
Antimicrobial Class	Antimicrobial (Resistance Breakpoint) ¹	Isolate Source ²														
Quinolones	Ciprofloxacin (MIC > 0.5 µg/ml)	Humans	17.5% 53	18.1% 58	21.6% 170	19.6% 139	26.0% 258	22.6% 233	23.1% 312	22.0% 255	24.1% 309	25.3% 301	22.2% 263	26.7% 334		
		Chickens	Retail Chickens	14.8% 48	15.1% 77	16.7% 61	17.2% 71	14.6% 57	21.3% 48	22.5% 86	22.7% 80	16.4% 89	16.4% 69	11.2% 48	14.9% 55	
			HACCP	14.7% 55	21.5% 109	15.0% 85	9.6% 22	22.3% 37	32.1% 25	19.7% 23	23.1% 48	19.5% 67	22.6% 305	24.2% 191	28.0% 117	
			Cecal											36.4% 4	25.0% 2	
		Turkeys	Retail Ground Turkey	0.0% 0	28.6% 2	10.0% 1	50.0% 6	30.0% 6	60.0% 6	44.4% 4	40.0% 2	46.2% 6	33.3% 1	14.3% 1		
			Cecal												0.0% 0	
		Cattle	Cecal (Beef)											13.8% 73	16.2% 93	
			Cecal (Dairy)											8.5% 46	8.4% 33	
			Swine	Cecal (Market Swine)											25.0% 1	11.1% 1
				Cecal (Sows)											0.0% 0	0.0% 0
	Nalidixic acid (MIC ≥ 16 µg/ml)	Humans	17.8% 54	19.1% 61	22.5% 177	19.5% 138	26.4% 262	22.8% 236	23.1% 312	22.1% 256	24.1% 309	25.5% 303	22.1% 262	26.5% 332		
		Chickens	Retail Chickens		15.3% 78	15.1% 61	16.7% 71	17.1% 57	14.6% 48	21.3% 86	22.8% 81	21.6% 85	16.4% 69	11.2% 48	14.9% 55	
			HACCP	15.5% 58	21.7% 110	16.9% 96	8.8% 20	22.3% 37	33.3% 26	19.7% 23	23.1% 48	20.3% 70	22.8% 307	24.4% 192	27.8% 116	
			Cecal											36.4% 4	25.0% 2	
		Turkeys	Retail Ground Turkey		28.6% 2	10.0% 1	50.0% 6	30.0% 6	60.0% 6	44.4% 4	40.0% 2	46.2% 6	33.3% 1	14.3% 1		
			Cecal												0.0% 0	
		Cattle	Cecal (Beef)											13.7% 73	16.4% 94	
			Cecal (Dairy)											8.5% 46	8.1% 32	
			Swine	Cecal (Market Swine)											25.0% 1	11.1% 1
				Cecal (Sows)											0.0% 0	0.0% 0
Tetracyclines	Tetracycline ³ (MIC > 1 µg/ml)	Humans	40.9% 124	47.5% 152	43.7% 344	48.7% 345	45.6% 452	45.3% 468	44.1% 595	44.2% 512	48.4% 621	47.8% 569	49.1% 581	48.6% 608		
		Chickens	Retail Chickens	50.2% 163	50.4% 257	46.9% 189	48.4% 206	48.8% 162	50.5% 166	46.7% 188	36.3% 129	50.1% 197	49.6% 209	48.4% 207	44.4% 164	
			HACCP	50.3% 188	43.5% 221	44.8% 254	58.3% 133	57.8% 96	55.1% 43	51.3% 60	49.5% 103	45.9% 158	50.7% 684	59.9% 472	67.7% 283	
			Cecal											45.5% 5	50.0% 4	
		Turkeys	Retail Ground Turkey	75.0% 3	42.9% 3	70.0% 7	75.0% 9	90.0% 18	100.0% 10	100.0% 9	80.0% 4	92.3% 12	100.0% 3	42.9% 3		
			Cecal												100.0% 1	
		Cattle	Cecal (Beef)											68.0% 361	76.1% 437	
			Cecal (Dairy)											62.0% 336	61.8% 244	
		Swine	Cecal (Market Swine)											100.0% 4	100.0% 8	
			Cecal (Sows)											66.7% 4	50.0% 6	

¹ Resistance figures for gentamicin, clindamycin, azithromycin, erythromycin, nalidixic acid, and doxycycline in this report may differ from previously published figures because breakpoints have been revised for these antimicrobials

² Beginning in 2008, ground beef and pork chops were no longer tested for *Campylobacter* due to low isolation in previous years. Data for these retail meats can be found in prior reports.

³ For Retail Chickens and Retail Ground Turkey, results for 2002 and 2003 are for Doxycycline

Antimicrobial Susceptibility among *Campylobacter coli*

MIC Distributions

Table 57a. Distribution of MICs and Occurrence of Resistance among *Campylobacter coli* Isolates, 2014

Antimicrobial Class	Antimicrobial Agent	Isolate Source (# of Isolates) ¹	%R ²	[95% CI] ³	Distribution (%) of MICs (µg/ml) ⁴															
					0.015	0.03	0.06	0.125	0.25	0.50	1	2	4	8	16	32	64	128	256	
Aminoglycosides	Gentamicin	Humans (146)	3.4	[1.1 - 7.8]						8.9	67.8	19.9						3.4		
		Chickens	Retail Chickens (149)	4.7	[1.9 - 9.4]				0.7		39.6	55.0						4.7		
			HACCP (156)	4.5	[1.8 - 9.0]				3.8	15.4	66.0	9.6	0.6					4.5		
			Cecal (62)	12.9	[5.7 - 23.9]					8.1	54.8	24.2						12.9		
		Turkeys	Retail Ground Turkey (0)	N/A	N/A															
			Cecal (15)	13.3	[1.7 - 40.5]						13.33	66.67	6.67						13.3	
		Cattle	Cecal (Beef) (180)	1.7	[0.3 - 4.8]						6.67	70	21.67						1.7	
			Cecal (Dairy) (55)	1.8	[0.0 - 9.7]						7.27	63.64	27.27						1.8	
		Swine	Cecal (Market Swine) (174)	0.6	[0.0 - 3.2]						1.15	40.23	57.47	0.6		0.6				
			Cecal (Sows) (148)	0.0	[0.0 - 2.5]						0.68	42.57	56.08	0.7						
Ketolides	Telithromycin	Humans (146)	0.0	[0.0 - 2.5]				1.4	11.6	15.1	15.1	18.5	18.5	9.6	10.3					
		Chickens	Retail Chickens (149)	11.4	[6.8 - 17.6]						15.4	8.1	26.9	32.2	6.0	2.7	8.7			
			HACCP (156)	2.6	[0.7 - 6.4]			0.6	7.1	16.0	24.4	42.3	5.8	1.3	1.3					
			Cecal (62)	9.7	[3.6 - 19.9]				6.5	24.2	4.8	30.7	17.7	6.5	6.5	3.2				
		Turkeys	Retail Ground Turkey (0)	N/A	N/A															
			Cecal (15)	6.7	[0.2 - 31.9]						20.0	13.3	40.0	13.3	6.7			6.7		
		Cattle	Cecal (Beef) (180)	2.8	[0.9 - 6.4]				0.6	1.7	3.3	14.4	71.7	5.6	0.6	2.2				
			Cecal (Dairy) (55)	7.3	[2.0 - 17.6]						1.8	1.8	18.2	67.3	3.6	1.8	5.5			
		Swine	Cecal (Market Swine) (174)	33.9	[26.9 - 41.5]			0.6	1.2	5.2	10.9	24.7	16.7	6.9	13.8	20.1				
			Cecal (Sows) (148)	17.6	[11.8 - 24.7]				1.4	4.1	14.2	37.8	20.3	4.7	7.4	10.1				
Lincosamides	Clindamycin	Humans (146)	13.7	[8.6 - 20.4]				11.0	28.8	30.8	15.8	2.7	0.7	6.2	2.7	1.4				
		Chickens	Retail Chickens (149)	11.4	[6.8 - 17.6]				16.8	54.4	16.1	1.3	1.3	4.7	4.0	1.3				
			HACCP (156)	3.8	[1.4 - 8.2]	2.6	7.7	55.1	30.1	0.6			3.2	0.6						
			Cecal (62)	11.3	[4.7 - 21.9]			6.5	45.2	30.7	4.8	1.6		4.8	6.5					
		Turkeys	Retail Ground Turkey (0)	N/A	N/A															
			Cecal (15)	6.7	[0.2 - 31.9]				26.7	26.7	33.3	6.7			6.7					
		Cattle	Cecal (Beef) (180)	10.0	[6.0 - 15.3]				1.7	5.0	29.4	43.9	10.0	2.2	2.8	0.6		4.4		
			Cecal (Dairy) (55)	9.1	[3.0 - 20.0]				3.6	3.6	34.6	43.6	5.5	1.8	7.3					
		Swine	Cecal (Market Swine) (174)	46.0	[38.4 - 53.7]				1.2	14.4	23.6	8.6	6.3	9.8	14.9	14.4	5.8	1.1		
			Cecal (Sows) (148)	21.6	[15.3 - 29.1]				1.4	18.2	33.8	21.0	4.1	4.1	6.1	9.5	2.0			
Macrolides	Azithromycin	Humans (146)	10.3	[5.9 - 16.4]		2.1	13.7	37.7	31.5	4.8							10.3			
		Chickens	Retail Chickens (149)	11.4	[6.8 - 17.6]	0.7	8.7	55.0	22.2	2.0								11.4		
			HACCP (156)	4.5	[1.8 - 9.0]	3.2	28.8	58.3	5.1				0.6					3.8		
			Cecal (62)	11.3	[4.7 - 21.9]	3.2	16.1	46.8	21.0	1.6								11.3		
		Turkeys	Retail Ground Turkey (0)	N/A	N/A															
			Cecal (15)	6.7	[0.2 - 31.9]				26.7	46.7	20.0							6.7		
		Cattle	Cecal (Beef) (180)	3.3	[1.2 - 7.1]	2.2	2.8	16.1	75.0	0.6				0.6				2.8		
			Cecal (Dairy) (55)	9.1	[3.0 - 20.0]			7.3	21.8	61.8								9.1		
		Swine	Cecal (Market Swine) (174)	40.2	[32.9 - 47.9]	1.7	9.2	31.0	15.5	2.3								40.2		
			Cecal (Sows) (148)	20.9	[14.7 - 28.4]	0.7	10.1	50.0	17.6	0.7								21.0		
	Erythromycin	Erythromycin	Humans (146)	10.3	[5.9 - 16.4]				4.1	28.8	19.9	21.9	14.4	0.7				10.3		
			Chickens	Retail Chickens (149)	11.4	[6.8 - 17.6]					18.1	26.2	31.5	10.1	2.7			1.3	10.1	
				HACCP (156)	3.8	[1.4 - 8.2]			0.6	7.1	26.9	47.4	12.8	1.3			0.6	0.6	2.6	
				Cecal (62)	11.3	[4.7 - 21.9]				6.5	25.8	33.9	14.5	4.8	3.2			3.2	8.1	
			Turkeys	Retail Ground Turkey (0)	N/A	N/A														
				Cecal (15)	6.7	[0.2 - 31.9]						33.3	20.0	40.0					6.7	
			Cattle	Cecal (Beef) (180)	3.3	[1.2 - 7.1]				2.2	2.8	3.9	61.7	25.0	1.1		0.6	0.6	2.2	
				Cecal (Dairy) (55)	9.1	[3.0 - 20.0]				1.8		1.8	5.5	67.3	14.6				9.1	
Swine	Cecal (Market Swine) (174)	40.2	[32.9 - 47.9]				1.2	1.2	9.8	21.8	23.6	1.7	0.6		0.6	4.0	35.6			
	Cecal (Sows) (148)	20.9	[14.7 - 28.4]					1.4	10.1	35.1	30.4	2.0		0.7	2.7	17.6				

¹ Beginning in 2008, ground beef and pork chops were no longer tested for *Campylobacter* due to low isolation in previous years. Data for these retail meats can be found in prior reports.

² Percent resistant; Discrepancies between %R and sums of distribution %'s, to the right of the double vertical bars, are due to rounding

³ 95% confidence intervals for percent resistant (%R) were calculated using the Clopper-Pearson exact method

⁴ The unshaded areas indicate the range of dilutions tested for each antimicrobial. Single vertical bars indicate the breakpoints for susceptibility, while double vertical bars indicate the breakpoints for resistance. Numbers in the shaded areas indicate the percentages of isolates with MICs greater than the highest tested concentrations. Numbers listed for the lowest tested concentrations represent the percentages of isolates with MICs equal to or less than the lowest tested concentration.

Table 57b. Distribution of MICs and Occurrence of Resistance among *Campylobacter coli* Isolates, 2014

Antimicrobial Class	Antimicrobial Agent	Isolate Source (# of Isolates) ¹	%R ²	[95% CI] ³	Distribution (%) of MICs (µg/ml) ⁴															
					0.015	0.03	0.06	0.125	0.25	0.50	1	2	4	8	16	32	64	128	256	
Phenicol	Florfenicol	Humans (146)	0.0	[0.0 - 2.5]						4.1	43.8	37.7	14.4							
		Chickens	Retail Chickens (149)	0.0	[0.0 - 2.4]						2.0	66.4	30.2	1.3						
			HACCP (156)	0.0	[0.0 - 2.3]															
			Cecal (62)	0.0	[0.0 - 5.8]					1.6	9.7	82.3	6.5							
			Retail Ground Turkey (0)	N/A	N/A															
		Turkeys	Cecal (15)	0.0	[0.0 - 21.8]						6.7	86.7	6.7							
			Cattle	Cecal (Beef) (180)	4.4	[1.9 - 8.6]			0.6		0.6	2.8	82.2	8.9	0.6	1.1	2.8	0.6		
		Cecal (Dairy) (55)		0.0	[0.0 - 6.5]						14.6	83.6	1.8							
		Swine	Cecal (Market Swine) (174)	0.0	[0.0 - 2.1]			0.6			2.3	35.6	58.1	3.5						
			Cecal (Sows) (148)	0.0	[0.0 - 2.5]						1.4	31.1	64.9	2.7						
Quinolones	Ciprofloxacin	Humans (146)	35.6	[27.9 - 44.0]			8.2	26.0	20.5	9.6		0.7	1.4	6.8	15.1	8.2	3.4			
		Chickens	Retail Chickens (149)	20.8	[14.6 - 28.2]			7.4	37.6	31.5	2.7				5.4	11.4	4.0			
			HACCP (156)	7.1	[3.6 - 12.3]		1.9	27.6	55.1	7.7	0.6				1.3	2.6	2.6	0.6		
			Cecal (62)	19.4	[10.4 - 31.4]			19.4	51.6	9.7					1.6	4.8	6.5	6.5		
			Retail Ground Turkey (0)	N/A	N/A															
		Turkeys	Cecal (15)	40.0	[16.3 - 67.7]			20.0	40.0						13.3	26.7				
			Cattle	Cecal (Beef) (180)	62.2	[54.7 - 69.3]		1.1	6.7	27.2	2.2	0.6				30.6	27.2	4.4		
		Cecal (Dairy) (55)		47.3	[33.7 - 61.2]			9.1	38.2	5.5					21.8	23.6	1.8			
		Swine	Cecal (Market Swine) (174)	16.1	[11.0 - 22.4]		1.7	16.7	51.2	13.2	1.2			0.6	0.6	9.8	5.2			
			Cecal (Sows) (148)	8.1	[4.3 - 13.7]		0.7	25.0	50.0	15.5	0.7				0.7	4.7	2.7			
	Nalidixic acid	Nalidixic acid	Humans (146)	35.6	[27.9 - 44.0]									21.9	35.6	6.8		2.1	33.6	
			Chickens	Retail Chickens (149)	20.8	[14.6 - 28.2]									47.7	30.9	0.7		10.1	10.7
				HACCP (156)	7.1	[3.6 - 12.3]									72.4	17.3	3.2		6.4	0.6
				Cecal (62)	21.0	[11.7 - 33.2]									48.4	30.7			1.6	16.1
				Retail Ground Turkey (0)	N/A	N/A														
			Turkeys	Cecal (15)	40.0	[16.3 - 67.7]										33.3	26.7		40.0	
				Cattle	Cecal (Beef) (180)	62.2	[54.7 - 69.3]									6.7	23.9	7.2		2.2
			Cecal (Dairy) (55)		47.3	[33.7 - 61.2]									12.7	34.6	5.5		5.5	41.8
Swine	Cecal (Market Swine) (174)	16.7	[11.5 - 23.1]									25.9	52.3	5.2		1.2	9.8			
	Cecal (Sows) (148)	8.1	[4.3 - 13.7]									34.5	54.7	2.7		0.7	5.4			
Tetracyclines	Tetracycline	Humans (146)	50.0	[41.6 - 58.4]			3.4	18.5	17.8	8.2	2.1		0.7	0.7	1.4			47.3		
		Chickens	Retail Chickens (149)	55.7	[47.3 - 63.8]			0.7	18.8	17.4	6.7	0.7						2.7	53.0	
			HACCP (156)	50.6	[42.5 - 58.7]		0.6	11.5	28.8	7.7		0.6				2.6	4.5	16.0	27.6	
			Cecal (62)	53.2	[40.1 - 66.0]			6.5	22.6	14.5	3.2						3.2	16.1	33.9	
			Retail Ground Turkey (0)	N/A	N/A															
		Turkeys	Cecal (15)	66.7	[38.4 - 88.2]			6.7	20.0	6.7									66.7	
			Cattle	Cecal (Beef) (180)	78.3	[71.6 - 84.1]		0.6	2.2	11.7	7.2					1.1	1.1		8.3	67.8
		Cecal (Dairy) (55)		76.4	[63.0 - 86.8]			1.8	1.8	12.7	7.3						1.8	3.6	7.3	63.6
		Swine	Cecal (Market Swine) (174)	82.2	[75.7 - 87.6]			5.2	4.6	1.7	2.9	3.5		4.0	6.9	9.2	11.5	19.0	31.6	
			Cecal (Sows) (148)	79.7	[72.3 - 85.9]			2.7	6.8	7.4	1.4	2.0		5.4	12.2	10.8	12.2	19.6	19.6	

¹ Beginning in 2008, ground beef and pork chops were no longer tested for *Campylobacter* due to low isolation in previous years. Data for these retail meats can be found in prior reports.

² Percent resistant; Discrepancies between %R and sums of distribution %'s, to the right of the double vertical bars, are due to rounding

³ 95% confidence intervals for percent resistant (%R) were calculated using the Clopper-Pearson exact method

⁴ The unshaded areas indicate the range of dilutions tested for each antimicrobial. Single vertical bars indicate the breakpoints for susceptibility, while double vertical bars indicate the breakpoints for resistance. Numbers in the shaded areas indicate the percentages of isolates with MICs greater than the highest tested concentrations. Numbers listed for the lowest tested concentrations represent the percentages of isolates with MICs equal to or less than the lowest tested concentration.

Resistance by Year

Table 58a. Antimicrobial Resistance among *Campylobacter coli* Isolates, 2003-2014

Year		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014		
Number of Isolates Tested	Humans	22	25	98	96	104	115	141	115	149	134	142	146		
	Chickens	Retail Chickens	142	196	151	145	143	181	176	148	210	193	198	149	
		HACCP	247	186	380	123	76	28	81	100	233	693	393	156	
		Cecal											50	62	
	Turkeys	Retail Ground Turkey	1	5	9	10	14	19	16	7	18	3	5	0	
		Cecal											18	15	
	Cattle	Cecal (Beef)											131	180	
		Cecal (Dairy)											98	55	
	Swine	Cecal (Market Swine)											190	174	
		Cecal (Sow)											163	148	
Antimicrobial Class	Antimicrobial (Resistance Breakpoint) ¹	Isolate Source ²													
Aminoglycosides	Gentamicin (MIC > 2 µg/ml)	Humans	4.5%	4.0%	3.1%	1.0%	0.0%	1.7%	3.5%	12.2%	12.1%	6.0%	2.1%	3.4%	
		Chickens	Retail Chickens	1	1	3	1	0	2	5	14	18	8	3	5
			HACCP	0.0%	0.0%	0.0%	0.0%	0.7%	1.7%	5.7%	12.8%	18.1%	4.1%	5.6%	4.7%
			Cecal	0	0	0	0	1	3	10	19	38	8	11	7
		Turkeys	Retail Ground Turkey	0.0%	0.0%	0.3%	0.0%	1.3%	3.6%	2.5%	5.0%	5.6%	3.9%	2.3%	4.5%
			Cecal	0	0	1	0	1	1	2	5	13	27	9	7
		Cattle	Retail Ground Turkey	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0
			Cecal	0	0	0	0	0	0	0	0	0	0	0	22.2%
		Swine	Cecal (Beef)											1.5%	1.7%
			Cecal (Dairy)											2	3
Cecal (Market Swine)												0.0%	1.8%		
Cecal (Sow)												0	1		
Ketolides	Telithromycin (MIC > 4 µg/ml)	Humans			8.2%	8.3%	9.6%	10.4%	7.1%	13.9%	10.7%	11.2%	21.8%	19.9%	
		Chickens	Retail Chickens		10.7%	9.9%	5.5%	7.0%	9.4%	5.1%	4.1%	5.7%	14.0%	11.1%	11.4
			HACCP		21	15	8	10	17	9	6	12	27	22	17
			Cecal			0.1%	0.1%	0.1%	0.0%	0.1%	0.0%	0.0%	7.1%	6.9%	2.6%
		Turkeys	Retail Ground Turkey			29	15	11	1	5	4	7	49	27	4
			Cecal											10.0%	9.7%
		Cattle	Retail Ground Turkey		0.0%	22.2%	0.0%	0.0%	5.3%	0.0%	14.3%	5.6%	0.0%	0.0%	0
			Cecal		0	2	0	0	1	0	1	1	0	0	16.7%
		Swine	Cecal (Beef)											3.8%	2.8%
			Cecal (Dairy)											5	5
Cecal (Market Swine)												7.1%	7.3%		
Cecal (Sow)												7	4		
Lincosamides	Clindamycin (MIC > 1 µg/ml)	Humans	18.2%	12.0%	8.2%	13.5%	9.6%	14.8%	7.8%	17.4%	16.8%	16.4%	21.1%	13.7%	
		Chickens	Retail Chickens	4	3	8	13	10	17	11	20	25	22	30	20
			HACCP	9.2%	10.6%	10.3%	0.6%	8.8%	8.0%	5.4%	5.2%	12.4%	10.1%	10.1%	11.4%
			Cecal	18	16	15	9	16	14	8	11	24	20	20	17
		Turkeys	Retail Ground Turkey	16.6%	9.7%	10.0%	12.2%	14.5%	10.7%	7.4%	5.0%	2.6%	8.5%	10.4%	3.8%
			Cecal	41	18	38	15	11	3	6	5	6	59	41	6
		Cattle	Retail Ground Turkey											14.0%	11.3%
			Cecal											7	7
		Swine	Retail Ground Turkey		0.0%	22.2%	10.0%	21.4%	10.5%	0.0%	14.3%	5.6%	0.0%	0.0%	0
			Cecal		0	2	1	3	2	0	1	1	0	0	16.7%
Cecal (Beef)												8.4%	10.0%		
Cecal (Dairy)												11	18		
Swine	Cecal (Market Swine)											4.1%	9.1%		
	Cecal (Sow)											4	5		
												37.9%	46.0%		
												72	80		
												19.6%	21.6%		
												32	32		

¹ Resistance figures for gentamicin, clindamycin, azithromycin, erythromycin, nalidixic acid, and doxycycline in this report may differ from previously published figures because breakpoints have been revised for these antimicrobials

² Beginning in 2008, ground beef and pork chops were no longer tested for *Campylobacter* due to low isolation in previous years. Data for these retail meats can be found in prior reports.

Table 58b. Antimicrobial Resistance among *Campylobacter coli* Isolates, 2003-2014

Year		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014			
Number of Isolates Tested	Humans	22	25	98	96	104	115	141	115	149	134	142	146			
	Chickens	Retail Chickens	142	196	151	145	143	181	176	148	210	193	198	149		
		HACCP	247	186	380	123	76	28	81	100	233	693	393	156		
		Cecal											50	62		
	Turkeys	Retail Ground Turkey	1	5	9	10	14	19	16	7	18	3	5	0		
		Cecal											18	15		
	Cattle	Cecal (Beef)											131	180		
		Cecal (Dairy)											98	55		
	Swine	Cecal (Market Swine)											190	174		
		Cecal (Sow)											163	148		
Antimicrobial Class	Antimicrobial (Resistance Breakpoint) ¹	Isolate Source ²														
Macrolides	Azithromycin (MIC > 0.5 µg/ml)	Humans	13.6% 3	4.0% 1	4.1% 4	9.4% 9	5.8% 6	10.4% 12	3.5% 5	7.0% 8	5.4% 8	9.0% 12	16.9% 24	10.3% 15		
		Chickens	Retail Chickens		9.7% 19	9.9% 15	6.2% 9	7.0% 10	9.9% 18	4.6% 8	4.1% 6	4.3% 9	11.9% 23	9.6% 19	11.4% 17	
			HACCP	20.2% 50	9.1% 17	8.7% 33	9.8% 12	14.5% 11	10.7% 3	6.2% 5	4.0% 4	3.9% 9	8.7% 60	10.7% 42	4.5% 7	
			Cecal											14.0% 7	11.3% 7	
		Turkeys	Retail Ground Turkey		0.0% 0	22.2% 2	0.0% 0	0.0% 0	5.3% 1	0.0% 0	14.3% 1	5.6% 1	0.0% 0	0.0% 0		
			Cecal											16.7% 3	6.7% 1	
		Cattle	Cecal (Beef)											4.6% 6	3.3% 6	
			Cecal (Dairy)											1.0% 1	9.1% 5	
		Swine	Cecal (Market Swine)											31.6% 60	40.2% 70	
			Cecal (Sow)											17.2% 28	21.0% 31	
		Erythromycin (MIC > 8 µg/ml)	Humans	9.1% 2	4.0% 1	4.1% 4	8.3% 8	5.8% 6	10.4% 12	3.5% 5	5.2% 6	2.7% 4	9.0% 12	17.6% 25	10.3% 15	
			Chickens	Retail Chickens	7.8% 11	9.2% 18	9.9% 15	5.5% 8	7.0% 10	9.9% 18	4.6% 8	4.1% 6	5.2% 11	11.4% 22	9.6% 19	11.4% 17
	HACCP			20.2% 50	9.1% 17	8.4% 32	8.9% 11	14.5% 11	10.7% 3	6.2% 5	4.0% 4	3.4% 8	8.5% 59	10.7% 42	3.8% 6	
	Cecal													14.0% 7	11.3% 7	
	Turkeys		Retail Ground Turkey	0.0% 0	0.0% 0	22.2% 2	0.0% 0	0.0% 0	5.3% 1	0.0% 0	14.3% 1	5.6% 1	0.0% 0	0.0% 0		
			Cecal											16.7% 3	6.7% 1	
	Cattle		Cecal (Beef)											4.6% 6	3.3% 6	
			Cecal (Dairy)											1.0% 1	9.1% 5	
	Swine		Cecal (Market Swine)											31.6% 60	40.2% 70	
			Cecal (Sow)											17.2% 28	21.0% 31	
	Phenicol		Florfenicol (MIC > 16 µg/ml) ^{3,4}	Humans			1.0% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.7% 1	1.5% 2	0.7% 1	0.0% 0
				Chickens	Retail Chickens		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		HACCP			0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Cecal													0.0% 0	0.0% 0
Turkeys		Retail Ground Turkey			0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		
		Cecal												0.0% 0	0.0% 0	
Cattle		Cecal (Beef)												1.5% 2	4.4% 8	
		Cecal (Dairy)												0.0% 0	0.0% 0	
Swine		Cecal (Market Swine)												0.0% 0	0.0% 0	
		Cecal (Sow)												0.0% 0	0.0% 0	

¹ Resistance figures for gentamicin, clindamycin, azithromycin, erythromycin, nalidixic acid, and doxycycline in this report may differ from previously published figures because breakpoints have been revised for these antimicrobials

² Beginning in 2008, ground beef and pork chops were no longer tested for *Campylobacter* due to low isolation in previous years. Data for these retail meats can be found in prior reports.

³ For Humans and Chickens at HACCP, results prior to 2005 are for Chloramphenicol

⁴ For florfenicol, only a susceptible breakpoint (≤ 4 µg/ml) has been established. In this report, isolates with an MIC ≥ 8 µg/ml are categorized as resistant.

Table 58c. Antimicrobial Resistance among *Campylobacter coli* Isolates, 2003-2014

Year		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014		
Number of Isolates Tested	Humans	22	25	98	96	104	115	141	115	149	134	142	146		
	Chickens	Retail Chickens	142	196	151	145	143	181	176	148	210	193	198	149	
		HACCP	247	186	380	123	76	28	81	100	233	693	393	156	
		Cecal											50	62	
	Turkeys	Retail Ground Turkey	1	5	9	10	14	19	16	7	18	3	5	0	
		Cecal											18	15	
	Cattle	Cecal (Beef)											131	180	
		Cecal (Dairy)											98	55	
	Swine	Cecal (Market Swine)											190	174	
		Cecal (Sow)											163	148	
Antimicrobial Class	Antimicrobial (Resistance Breakpoint) ¹	Isolate Source ²													
Quinolones	Ciprofloxacin (MIC > 0.5 µg/ml)	Humans	22.7% 5	32.0% 8	25.5% 25	21.9% 21	28.8% 30	29.6% 34	24.1% 34	30.4% 35	36.2% 54	33.6% 45	34.5% 49	35.6% 52	
		Chickens	Retail Chickens	13.4% 19	16.8% 33	29.8% 45	22.1% 32	25.9% 37	20.4% 37	18.2% 32	13.5% 20	18.1% 38	31.1% 60	20.2% 40	20.8% 31
			HACCP	20.2% 50	26.9% 50	22.1% 84	15.4% 19	15.8% 12	14.3% 4	22.2% 18	23.0% 23	27.9% 65	23.2% 161	21.9% 86	7.1% 11
			Cecal											24.0% 12	19.4% 12
		Turkeys	Retail Ground Turkey	100.0% 1	0.0% 0	55.6% 5	30.0% 3	50.0% 7	47.4% 9	43.8% 7	57.1% 4	50.0% 9	66.7% 2	0.0% 0	
			Cecal											66.7% 12	40.0% 6
		Cattle	Cecal (Beef)											52.7% 69	62.2% 112
			Cecal (Dairy)											30.6% 30	47.3% 26
		Swine	Cecal (Market Swine)											7.4% 14	16.1% 28
			Cecal (Sow)											3.7% 6	8.1% 12
	Nalidixic acid (MIC > 16 µg/ml)	Humans	22.7% 5	32.0% 8	26.5% 26	22.9% 22	29.8% 31	29.6% 34	24.1% 34	30.4% 35	36.2% 54	33.6% 45	35.2% 50	35.6% 52	
		Chickens	Retail Chickens		16.3% 32	29.1% 44	20.7% 30	25.9% 37	20.4% 37	18.2% 32	14.2% 21	18.1% 38	31.1% 60	20.2% 40	20.8% 31
			HACCP	21.9% 54	28.0% 52	22.4% 85	15.4% 19	15.8% 12	14.3% 4	22.2% 18	23.0% 23	27.9% 65	23.5% 163	22.1% 87	7.1% 11
			Cecal											24.0% 12	21.0% 13
		Turkeys	Retail Ground Turkey		0.0% 0	55.6% 5	30.0% 3	50.0% 7	47.4% 9	43.8% 7	57.1% 4	50.0% 9	66.7% 2	0.0% 0	
			Cecal											66.7% 12	40.0% 6
		Cattle	Cecal (Beef)											52.7% 69	62.2% 112
			Cecal (Dairy)											29.6% 29	47.2% 26
		Swine	Cecal (Market Swine)											7.4% 14	16.7% 29
			Cecal (Sow)											3.7% 6	8.1% 12
	Tetracyclines	Tetracycline ³ (MIC > 2 µg/ml)	Humans	45.5% 10	40.0% 10	31.6% 31	39.6% 38	44.2% 46	39.1% 45	45.4% 64	50.4% 58	50.3% 75	45.5% 61	51.4% 73	50.0% 73
			Chickens	Retail Chickens	53.5% 76	46.9% 92	44.4% 67	46.9% 68	39.9% 57	48.1% 87	38.6% 68	40.5% 60	51.0% 107	48.7% 94	47.0% 93
HACCP				53.0% 131	48.9% 91	42.6% 162	54.5% 67	42.1% 32	60.7% 17	45.7% 37	56.0% 56	42.1% 98	49.2% 341	58.5% 230	50.6% 79
Cecal														52.0% 26	53.2% 33
Turkeys			Retail Ground Turkey	100.0% 1	0.0% 0	88.9% 8	80.0% 8	64.3% 9	94.7% 18	75.0% 12	100.0% 7	77.8% 14	66.7% 2	40.0% 2	
			Cecal											77.8% 14	66.7% 10
Cattle			Cecal (Beef)											74.0% 97	78.3% 141
			Cecal (Dairy)											65.3% 64	76.4% 42
Swine			Cecal (Market Swine)											84.2% 160	82.2% 143
			Cecal (Sow)											76.7% 125	79.7% 118

¹ Resistance figures for gentamicin, clindamycin, azithromycin, erythromycin, nalidixic acid, and doxycycline in this report may differ from previously published figures because breakpoints have been revised for these antimicrobials

² Beginning in 2008, ground beef and pork chops were no longer tested for *Campylobacter* due to low isolation in previous years. Data for these retail meats can be found in prior reports.

³ For Retail Chickens and Turkeys, results for 2002 and 2003 are for Doxycycline

Multidrug Resistance among *Campylobacter* Species

Table 59a. Resistance Patterns among *Campylobacter* Species, 2004-2014

Year			2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014		
Number of Isolates Tested	<i>C. jejuni</i>	Humans	N/A ¹	788	709	991	1033	1350	1159	1282	1190	1183	1251		
		Chickens	Retail Chickens	510	403	426	332	329	404	355	393	421	428	369	
			HACCP	N/A ¹	567	228	166	78	117	208	344	1348	788	418	
			Cecal										11	8	
		Turkeys	Retail Ground Turkey	7	10	12	20	10	9	5	13	3	7	0	
			Cecal										0	1	
		Cattle	Cecal (Beef)											531	574
			Cecal (Dairy)											542	395
		Swine	Cecal (Market Swine)											4	9
			Cecal (Sows)											6	12
	<i>C. coli</i>	Humans	N/A ¹	98	96	104	115	141	115	149	134	142	146		
		Chickens	Retail Chickens	196	151	145	143	181	176	148	210	193	198	149	
			HACCP	N/A ¹	380	123	76	28	81	100	233	693	393	156	
			Cecal										50	62	
		Turkeys	Retail Ground Turkey	5	9	10	14	19	16	7	18	3	5	0	
			Cecal										18	15	
		Cattle	Cecal (Beef)											131	180
			Cecal (Dairy)											98	55
		Swine	Cecal (Market Swine)											190	174
			Cecal (Sows)											163	148
Resistance Pattern	Species	Isolate Source ¹													
1. No Resistance Detected	<i>C. jejuni</i>	Humans		46.3%	42.5%	44.3%	45.2%	45.9%	39.5%	33.0%	38.7%	44.5%	44.2%		
		Chickens	Retail Chickens	39.8%	365	301	439	467	620	458	423	460	527	553	
			HACCP	203	172	184	133	129	165	182	159	178	198	176	
			Cecal		45.7%	37.7%	33.7%	32.1%	40.2%	42.8%	47.4%	41.3%	35.3%	29.7%	
		Turkeys	Retail Ground Turkey	42.9%	30.0%	16.7%	10.0%	0.0%	0.0%	20.0%	0.0%	0.0%	57.1%		
			Cecal	3	3	2	2	0	0	1	0	0	4	0.0%	
		Cattle	Cecal (Beef)											30.7%	22.3%
			Cecal (Dairy)											163	128
		Swine	Cecal (Market Swine)											36.7%	35.9%
			Cecal (Sows)											199	142
	<i>C. coli</i>	Humans		50.0%	43.8%	38.5%	43.5%	44.0%	33.9%	30.9%	42.5%	31.7%	28.1%		
		Chickens	Retail Chickens	36.2%	49	42	40	50	62	39	46	57	45	41	
			HACCP	71	52	56	65	70	82	77	85	58	77	41	
			Cecal		46.1%	39.0%	43.4%	28.6%	46.9%	33.0%	42.1%	36.8%	30.3%	44.2%	
		Turkeys	Retail Ground Turkey	100.0%	11.1%	20.0%	28.6%	5.3%	18.8%	0.0%	22.2%	0.0%	60.0%		
			Cecal	5	1	2	4	1	3	0	4	0	3	16.7%	20.0%
		Cattle	Cecal (Beef)											12.2%	7.2%
			Cecal (Dairy)											16	13
		Swine	Cecal (Market Swine)											25.5%	16.4%
			Cecal (Sows)											25	9
2. Resistance to ≥ 2 Antimicrobial Classes	<i>C. jejuni</i>	Humans		16.2%	13.1%	18.8%	15.8%	15.1%	19.0%	23.6%	20.0%	17.2%	20.9%		
		Chickens	Retail Chickens	8.4%	128	93	186	163	204	220	302	238	204	262	
			HACCP	43	26	40	24	24	44	41	56	45	38	27	
			Cecal		8.8%	6.1%	14.5%	23.1%	12.0%	15.9%	15.4%	15.9%	23.0%		
		Turkeys	Retail Ground Turkey	28.6%	10.0%	41.7%	30.0%	70.0%	44.4%	40.0%	38.5%	33.3%	14.3%		
			Cecal	2	1	5	6	7	4	2	5	1	1		
		Cattle	Cecal (Beef)											14.5%	
			Cecal (Dairy)											77	
		Swine	Cecal (Market Swine)											9.6%	
			Cecal (Sows)											52	
	<i>C. coli</i>	Humans		19.4%	19.8%	22.1%	28.7%	21.3%	38.3%	43.0%	32.8%	35.9%	34.2%		
		Chickens	Retail Chickens	16.3%	19	19	23	33	30	44	64	44	51	50	
			HACCP	32	33	29	29	44	30	36	73	58	51	32	
			Cecal		22.6%	26.8%	21.1%	25.0%	19.8%	26.0%	18.9%	23.7%	25.4%	12.2%	
		Turkeys	Retail Ground Turkey	0.0%	55.6%	30.0%	42.9%	52.6%	37.5%	71.4%	55.6%	33.3%	0.0%		
			Cecal	0	5	3	6	10	6	5	10	1	0	66.7%	40.0%
		Cattle	Cecal (Beef)											12	6
			Cecal (Dairy)											58.8%	52.8%
		Swine	Cecal (Market Swine)											77	95
			Cecal (Sows)											34.7%	47.3%
												34	26		
												43.2%	48.9%		
												82	85		
												22.7%	27.7%		
												37	41		

¹ Data are reported for retail meats beginning in 2004 and for humans and chickens beginning in 2005 when the broth microdilution method was first used

Table 59b. Resistance Patterns among *Campylobacter* Species, 2004-2014

Year			2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014		
Number of Isolates Tested	C. jejuni	Humans	N/A ¹	788	709	991	1033	1350	1159	1282	1190	1183	1251		
		Chickens	Retail Chickens	510	403	426	332	329	404	355	393	421	428	369	
			HACCP	N/A ¹	567	228	166	78	117	208	344	1348	788	418	
			Cecal										11	8	
		Turkey	Retail Ground Turkey	7	10	12	20	10	9	5	13	3	7	0	
			Cecal										0	1	
		Cattle	Cecal (Beef)											531	574
			Cecal (Dairy)											542	395
	Swine	Cecal (Market Swine)											4	9	
		Cecal (Sows)											6	12	
	C. coli	Humans	N/A ¹	98	96	104	115	141	115	149	134	142	146		
		Chickens	Retail Chickens	196	151	145	143	181	176	148	210	193	198	149	
			HACCP	N/A ¹	380	123	76	28	81	100	233	693	393	156	
			Cecal										50	62	
		Turkey	Retail Ground Turkey	5	9	10	14	19	16	7	18	3	5	0	
			Cecal										18	15	
Cattle		Cecal (Beef)											131	180	
		Cecal (Dairy)											98	55	
Swine	Cecal (Market Swine)											190	174		
	Cecal (Sows)											163	148		
Resistance Pattern	Species	Isolate Source ¹													
3. Resistance to ≥ 3 Antimicrobial Classes	C. jejuni	Humans		2.4%	1.3%	1.9%	3.5%	2.7%	4.2%	7.5%	4.8%	3.1%	3.0%		
		Chickens	Retail Chickens	1.0%	0.5%	0.7%	0.6%	1.2%	1.0%	0.8%	0.5%	1.0%	1.2%	0.3%	
			HACCP	5	2	3	2	4	4	2	2	4	5	1	
			Cecal		1.4%	0.9%	0.0%	1.3%	0.0%	0.0%	1.2%	1.2%	2.0%	0.7%	
		Turkey	Retail Ground Turkey	0.0%	0.0%	0.0%	5.0%	10.0%	11.1%	0.0%	0.0%	0.0%	0.0%	0.0%	
			Cecal	0	0	0	1	1	1	0	0	0	0	0.0%	
		Cattle	Cecal (Beef)											13.0%	0.7%
			Cecal (Dairy)											69	4
	Swine	Cecal (Market Swine)											41	1.0%	
		Cecal (Sows)											25.0%	22.2%	
	C. coli	Humans		7.1%	9.4%	8.7%	8.7%	7.1%	13.9%	14.8%	12.7%	21.1%	13.7%		
		Chickens	Retail Chickens	9.2%	9.9%	6.9%	7.0%	9.9%	5.1%	4.1%	4.8%	11.4%	9.6%	11.4%	
			HACCP	18	15	10	10	18	9	6	10	22	19	17	
			Cecal		8.7%	8.9%	14.5%	7.1%	6.2%	4.0%	4.7%	9.7%	10.2%	2.6%	
		Turkey	Retail Ground Turkey	0.0%	22.2%	10.0%	21.4%	10.5%	0.0%	14.3%	5.6%	0.0%	0.0%	0.0%	
			Cecal	0	2	1	3	2	0	1	1	0	0	0	
		Cattle	Cecal (Beef)											61.1%	13.3%
			Cecal (Dairy)											11	2
	Swine	Cecal (Market Swine)											43.5%	8.9%	
		Cecal (Sows)											57	16	
	4. Resistance to ≥ 4 Antimicrobial Classes	C. jejuni	Humans		1.0%	0.7%	1.3%	1.9%	1.6%	1.9%	3.6%	1.8%	2.2%	2.0%	
			Chickens	Retail Chickens	0.8%	0.3%	0.7%	0.0%	0.0%	0.3%	0.3%	0.3%	0.0%	0.0%	0.0%
				HACCP	4	1	3	0	0	0	1	1	0	0	0
				Cecal		0.7%	0.4%	0.0%	0.0%	0.0%	0.0%	0.3%	0.7%	1.4%	0.0%
Turkey			Retail Ground Turkey	0.0%	0.0%	0.0%	5.0%	10.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
			Cecal	0	0	0	1	1	0	0	0	0	0	0	
Cattle			Cecal (Beef)											0.2%	0.3%
			Cecal (Dairy)											1	2
Swine		Cecal (Market Swine)											0.6%	0.3%	
		Cecal (Sows)											3	1	
C. coli		Humans		4.1%	6.3%	5.8%	7.0%	4.3%	7.0%	4.7%	9.0%	14.1%	6.2%		
		Chickens	Retail Chickens	3.6%	6.6%	2.8%	3.5%	2.8%	4.1%	3.8%	7.3%	4.6%	6.7%		
			HACCP	7	10	4	5	5	5	6	8	14	9	10	
			Cecal		5.8%	6.5%	5.3%	0.0%	6.2%	0.0%	2.6%	5.6%	4.1%	0.0%	
		Turkey	Retail Ground Turkey	0.0%	22.2%	0.0%	0.0%	5.3%	0.0%	14.3%	5.6%	0.0%	0.0%	0.0%	
			Cecal	0	2	0	0	1	0	1	1	0	0	0	
		Cattle	Cecal (Beef)											8.4%	5.6%
			Cecal (Dairy)											11	10
Swine		Cecal (Market Swine)											3.1%	1.8%	
		Cecal (Sows)											3	1	

¹ Data are reported for retail meats beginning in 2004 and for humans and chickens beginning in 2005 when the broth microdilution method was first used

Table 59c. Resistance Patterns among *Campylobacter* Species, 2004-2014

Year			2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
Number of Isolates Tested	<i>C. jejuni</i>	Humans	N/A ¹	788	709	991	1033	1350	1159	1282	1190	1183	1251	
		Chickens	Retail Chickens	510	403	426	332	329	404	355	393	421	428	369
			HACCP	N/A ¹	567	228	166	78	117	208	344	1348	788	418
			Cecal										11	8
		Turkey	Retail Ground Turkey	7	10	12	20	10	9	5	13	3	7	0
			Cecal										0	1
		Cattle	Cecal (Beef)										531	574
			Cecal (Dairy)										542	395
	Swine	Cecal (Market Swine)										4	9	
		Cecal (Sows)										6	12	
	<i>C. coli</i>	Humans	N/A ¹	98	96	104	115	141	115	149	134	142	146	
		Chickens	Retail Chickens	196	151	145	143	181	176	148	210	193	198	149
			HACCP	N/A ¹	380	123	76	28	81	100	233	693	393	156
			Cecal										50	62
		Turkey	Retail Ground Turkey	5	9	10	14	19	16	7	18	3	5	0
			Cecal										18	15
Cattle		Cecal (Beef)										131	180	
		Cecal (Dairy)										98	55	
Swine	Cecal (Market Swine)										190	174		
	Cecal (Sows)										163	148		
Resistance Pattern	Species	Isolate Source ¹												
5. At least Quinolone and Macrolide Resistant	<i>C. jejuni</i>	Humans		1.4%	0.7%	1.4%	1.5%	1.2%	1.3%	3.0%	1.3%	1.9%	1.4%	
		Chickens	Retail Chickens	0.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.3%	0.0%	0.0%	0.0%
			HACCP	2	0	0	0	0	0	0	1	0	0	0
			Cecal		0.7%	0.9%	0.0%	1.3%	0.0%	0.0%	0.3%	0.5%	0.1%	0.5%
		Turkey	Retail Ground Turkey	0.0%	0.0%	0.0%	5.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
			Cecal	0	0	0	1	0	0	0	0	0	0	0
		Cattle	Cecal (Beef)										0.0%	0.5%
			Cecal (Dairy)										0	3
	Swine	Cecal (Market Swine)										0.4%	0.3%	
		Cecal (Sows)										2	1	
	<i>C. coli</i>	Humans		2.0%	4.2%	1.9%	4.3%	2.8%	3.5%	3.4%	8.2%	9.2%	5.5%	
		Chickens	Retail Chickens	0.5%	1.3%	0.7%	1.4%	1.1%	0.7%	1.0%	6.2%	3.0%	2.7%	
			HACCP	1	2	1	2	2	3	1	2	12	6	4
			Cecal		1.6%	1.6%	5.3%	0.0%	4.9%	0.0%	1.3%	1.7%	2.0%	0.0%
		Turkey	Retail Ground Turkey	0.0%	22.2%	0.0%	0.0%	0.0%	0.0%	14.3%	0.0%	0.0%	0.0%	0.0%
			Cecal	0	2	0	0	0	0	1	0	0	16.7%	0.0%
Cattle		Cecal (Beef)										3	0	
		Cecal (Dairy)										0.8%	1.1%	
Swine	Cecal (Market Swine)										1	2		
	Cecal (Sows)										0.0%	1.8%		
6. At least Quinolone and Tetracycline Resistant	<i>C. jejuni</i>	Humans		14.0%	11.1%	17.4%	13.9%	13.6%	12.7%	15.7%	16.6%	16.6%	19.9%	
		Chickens	Retail Chickens	6.5%	5.5%	8.5%	6.6%	6.1%	9.9%	10.7%	13.7%	9.3%	7.2%	7.1%
			HACCP	33	23	36	22	20	40	38	54	39	31	26
			Cecal		7.8%	5.7%	13.9%	20.5%	11.1%	15.4%	14.2%	15.0%	20.3%	26.3%
		Turkey	Retail Ground Turkey	14.3%	10.0%	41.7%	30.0%	60.0%	44.4%	40.0%	38.5%	33.3%	14.3%	12.5%
			Cecal	1	1	5	6	6	4	2	5	1	1	1
		Cattle	Cecal (Beef)										27.3%	3
			Cecal (Dairy)										13.0%	15.0%
	Swine	Cecal (Market Swine)										69	86	
		Cecal (Sows)										7.2%	6.1%	
	<i>C. coli</i>	Humans		10.2%	10.4%	14.4%	17.4%	14.9%	19.1%	23.5%	24.6%	23.9%	23.3%	
		Chickens	Retail Chickens	7.1%	12.6%	10.3%	14.7%	13.3%	8.0%	8.8%	10.5%	16.1%	12.1%	9.4%
			HACCP	14	19	15	21	24	14	13	22	31	24	14
			Cecal		14.5%	10.6%	10.5%	14.3%	16.0%	16.0%	12.0%	13.4%	15.3%	3.8%
		Turkey	Retail Ground Turkey	0.0%	55.6%	30.0%	42.9%	47.4%	37.5%	57.1%	50.0%	33.3%	0.0%	0.0%
			Cecal	0	5	3	6	9	6	4	9	1	0	0
Cattle		Cecal (Beef)										14.0%	16.1%	
		Cecal (Dairy)										7	10	
Swine	Cecal (Market Swine)										61.1%	33.3%		
	Cecal (Sows)										11	5		

¹ Data are reported for retail meats beginning in 2004 and for humans and chickens beginning in 2005 when the broth microdilution method was first used

Escherichia coli Data

E. coli Isolates Tested

Table 60. Number of E. coli Isolates Tested, 2000-2014

Source		Year														
		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Chickens	Retail Chickens			282	396	400	393	418	299	306	315	357	341	386	360	317
	Cecal														48	84
Turkeys	Retail Ground Turkey			304	333	376	396	388	315	300	306	369	368	391	374	397
	Cecal														29	50
Cattle	Retail Ground Beef			295	311	338	316	295	256	250	247	269	215	271	227	205
	Cecal (Beef)														293	326
	Cecal (Dairy)														256	177
Swine	Retail Pork Chops			184	218	232	205	182	152	146	147	183	146	161	208	205
	Cecal (Market Swine)														118	146
	Cecal (Sows)														120	118

Isolation of *E. coli* from Retail Meats

Table 61. Number and Percent of Retail Meat Samples Culture Positive for *E. coli*, 2014

	Retail Chickens	Retail Ground Turkey	Retail Ground Beef	Retail Pork Chops
Number of Meat Samples Tested	480	479	480	480
Number Positive for <i>E. coli</i>	317	397	205	205
Percent Positive for <i>E. coli</i>	66.0%	82.9%	42.7%	42.7%

Figure 9. Percent of Retail Meat Samples Culture Positive for *E. coli*, 2014

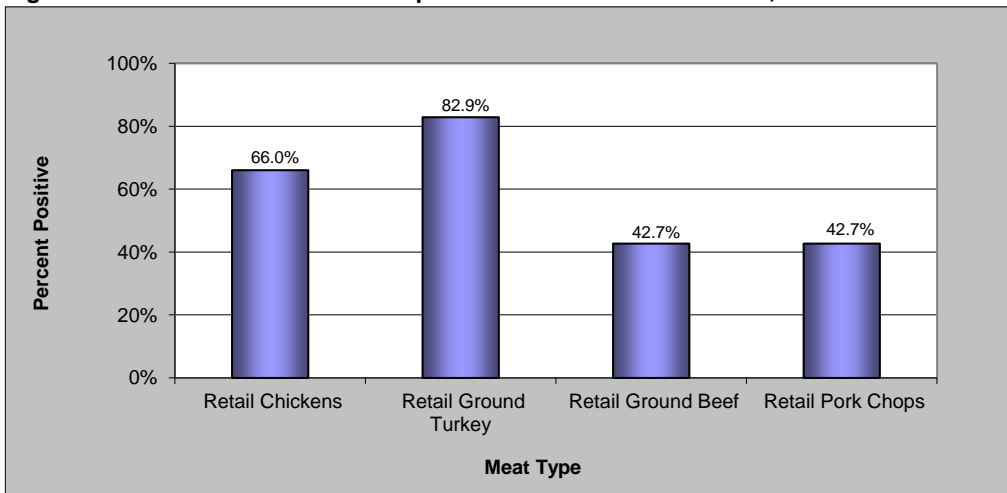
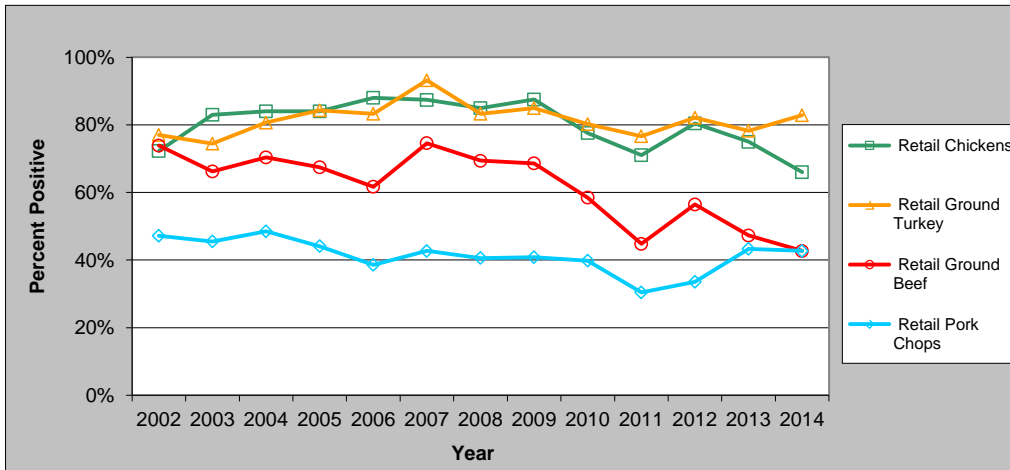


Figure 10. Percent of Retail Meat Samples Culture Positive for *E. coli*, 2002-2014



Antimicrobial Susceptibility among *E. coli*

MIC Distributions

Table 62a. Distribution of MICs and Occurrence of Resistance among *E. coli* Isolates, 2014

Antimicrobial Class	Antimicrobial Agent	Isolate Source (# of Isolates)	T _i	%I ¹	%R ²	[95% CI] ³	Distribution (%) of MICs (µg/ml) ⁴														
							0.015	0.03	0.06	0.125	0.25	0.50	1	2	4	8	16	32	64	128	256
Aminoglycosides	Gentamicin	Chickens	Retail Chickens (317)	4.1	38.5	[33.1 - 44.1]					0.3	27.4	27.1	2.5	4.1	10.1	28.4				
			Cecal (84)	6.0	46.4	[35.5 - 57.6]						19.0	25.0	2.4	1.2	6.0	14.3	32.1			
		Turkeys	Retail Ground Turkey (397)	4.3	30.2	[25.7 - 35.0]					0.3	32.2	30.2	2.0	0.8	4.3	9.1	21.2			
			Cecal (50)	4.0	32.0	[19.5 - 46.7]						20.0	40.0	4.0		4.0	10.0	22.0			
		Cattle	Retail Ground Beef (205)	0.0	0.5	[0.0 - 2.7]					0.5	42.0	54.6	2.4				0.5			
			Cecal (Beef) (326)	0.0	0.6	[0.1 - 2.2]						32.8	62.3	4.0	0.3		0.3	0.3			
			Cecal (Dairy) (177)	0.6	0.0	[0.0 - 2.1]						34.5	56.5	7.3	1.1	0.6					
		Swine	Retail Pork Chops (205)	0.0	2.0	[0.5 - 4.9]					1.0	31.7	57.1	8.3				2.0			
			Cecal (Market Swine) (146)	0.7	1.4	[0.2 - 4.9]					0.7	37.7	48.6	10.3	0.7	0.7		1.4			
	Cecal (Sows) (118)		0.0	2.5	[0.5 - 7.3]					0.8	28.8	57.6	7.6	2.5		1.7	0.8				
	Streptomycin	Chickens	Retail Chickens (317)	N/A	50.8	[45.1 - 56.4]									18.3	24.9	6.0	6.9	24.0	19.9	
			Cecal (84)	N/A	58.3	[47.1 - 69.0]										25.0	14.3	2.4	15.5	15.5	27.4
		Turkeys	Retail Ground Turkey (397)	N/A	59.4	[54.4 - 64.3]										13.1	23.9	3.5	6.8	19.4	33.2
			Cecal (50)	N/A	68.0	[53.3 - 80.5]										14.0	12.0	6.0	10.0	10.0	48.0
		Cattle	Retail Ground Beef (205)	N/A	9.3	[5.7 - 14.1]										23.9	55.1	11.7	1.0	4.9	3.4
			Cecal (Beef) (326)	N/A	12.6	[9.2 - 16.7]								0.3	44.2	38.7	4.3	3.4	4.3	4.9	
			Cecal (Dairy) (177)	N/A	12.4	[8.0 - 18.2]								0.6	50.3	31.6	5.1	1.7	6.2	4.5	
		Swine	Retail Pork Chops (205)	N/A	10.7	[6.8 - 15.8]										18.1	49.3	22.0	2.0	3.4	5.4
Cecal (Market Swine) (146)			N/A	25.3	[18.5 - 33.2]								1.4	39.7	21.9	11.6	4.1	9.6	11.6		
Cecal (Sows) (118)	N/A		21.2	[14.2 - 29.7]								0.8	34.7	33.9	9.3	4.2	9.3	7.6			
β-Lactam/β-Lactamase Inhibitor Combinations	Amoxicillin-Clavulanic Acid	Chickens	Retail Chickens (317)	1.9	7.6	[4.9 - 11.1]							1.9	27.1	46.4	15.1	1.9	2.8	4.7		
			Cecal (84)	1.2	2.4	[0.3 - 8.3]							2.4	21.4	47.6	25.0	1.2	1.2	1.2		
		Turkeys	Retail Ground Turkey (397)	18.4	6.0	[3.9 - 8.9]							1.3	9.3	28.5	36.5	18.4	2.8	3.3		
			Cecal (50)	26.0	14.0	[5.8 - 26.7]								4.0	32.0	24.0	26.0	6.0	8.0		
		Cattle	Retail Ground Beef (205)	0.5	0.5	[0.0 - 2.7]							3.9	19.5	59.0	16.6	0.5		0.5		
			Cecal (Beef) (326)	0.6	0.6	[0.1 - 2.2]							4.6	17.2	62.3	14.7	0.6	0.3	0.3		
			Cecal (Dairy) (177)	0.0	1.7	[0.4 - 4.9]							2.3	14.7	63.3	18.1		1.7			
		Swine	Retail Pork Chops (205)	0.0	2.9	[1.1 - 6.3]							0.5	22.9	55.1	18.5		1.0	2.0		
			Cecal (Market Swine) (146)	0.7	2.7	[0.8 - 6.9]							1.4	19.9	54.1	21.2	0.7	2.1	0.7		
Cecal (Sows) (118)	0.8		1.7	[0.2 - 6.0]							4.2	20.3	51.7	21.2	0.8		1.7				
Cephems	Cefoxitin	Chickens	Retail Chickens (317)	2.5	6.9	[4.4 - 10.3]						1.3	12.3	59.6	17.4	2.5	0.9	6.0			
			Cecal (84)	2.4	2.4	[0.3 - 8.3]								11.9	59.5	23.8	2.4		2.4		
		Turkeys	Retail Ground Turkey (397)	1.0	5.0	[3.1 - 7.7]							0.3	11.6	63.7	18.4	1.0	1.3	3.8		
			Cecal (50)	2.0	10.0	[3.3 - 21.8]								10.0	62.0	16.0	2.0		10.0		
		Cattle	Retail Ground Beef (205)	0.5	1.0	[0.1 - 3.5]							2.4	21.0	57.1	18.1	0.5	0.5	0.5		
			Cecal (Beef) (326)	0.9	0.6	[0.1 - 2.2]							2.8	16.0	60.4	19.3	0.9	0.3	0.3		
			Cecal (Dairy) (177)	2.3	1.1	[0.1 - 4.0]							0.6	12.4	62.7	20.9	2.3	0.6	0.6		
		Swine	Retail Pork Chops (205)	0.5	2.9	[1.1 - 6.3]								16.6	66.8	13.2	0.5		2.9		
			Cecal (Market Swine) (146)	2.1	2.7	[0.8 - 6.9]								16.4	58.2	20.5	2.1	0.7	2.1		
Cecal (Sows) (118)	4.2		1.7	[0.2 - 6.0]							0.8	16.1	59.3	17.8	4.2	0.8	0.8				

¹ Percent of isolates with intermediate susceptibility

² Percent of isolates with resistance. Discrepancies between %R and sums of distribution %s, to the right of the double vertical bars, are due to rounding

³ 95% confidence intervals for percent resistant (%R) were calculated using the Clopper-Pearson exact method

⁴ The unshaded areas indicate the range of dilutions tested for each antimicrobial. Single vertical bars indicate the breakpoints for susceptibility, while double vertical bars indicate the breakpoints for resistance. Numbers in the shaded areas indicate the percentages of isolates with MICs greater than the highest tested concentrations. Numbers listed for the lowest tested concentrations represent the percentages of isolates with MICs equal to or less than the lowest tested concentration.

Table 62b. Distribution of MICs and Occurrence of Resistance among *E. coli* Isolates, 2014

Antimicrobial Class	Antimicrobial Agent	Isolate Source (# of Isolates)	T ¹	%I ¹	%R ²	[95% CI] ³	Distribution (%) of MICs (µg/ml) ⁴											
							0.015	0.03	0.06	0.125	0.25	0.50	1	2	4	8	16	32
Cepheims	Ceftiofur	Chickens Retail Chickens (317)	0.3	6.3	[3.9 - 9.6]													
			0.0	2.4	[0.3 - 8.3]													
		Cecal (84)	0.0	2.4	[0.3 - 8.3]													
			0.0	2.4	[0.3 - 8.3]													
		Turkeys Retail Ground Turkey (397)	0.0	4.3	[2.5 - 6.8]													
			0.0	10.0	[3.3 - 21.8]													
		Cecal (50)	0.0	10.0	[3.3 - 21.8]													
			0.0	10.0	[3.3 - 21.8]													
		Cattle Retail Ground Beef (205)	0.0	0.5	[0.0 - 2.7]													
	0.0		0.9	[0.2 - 2.7]														
	0.0		1.1	[0.1 - 4.0]														
	Cecal (Beef) (326)	0.0	0.9	[0.2 - 2.7]														
		0.0	1.1	[0.1 - 4.0]														
		0.0	1.1	[0.1 - 4.0]														
	Cecal (Dairy) (177)	0.0	1.1	[0.1 - 4.0]														
		0.0	1.1	[0.1 - 4.0]														
		0.0	1.1	[0.1 - 4.0]														
	Swine Retail Pork Chops (205)	0.0	2.9	[1.1 - 6.3]														
0.0		3.4	[1.1 - 7.8]															
0.0		3.4	[1.1 - 7.8]															
0.0		1.7	[0.2 - 6.0]															
0.0		1.7	[0.2 - 6.0]															
Ceftriaxone	Chickens Retail Chickens (317)	0.0	6.6	[4.1 - 9.9]														
		0.0	2.4	[0.3 - 8.3]														
	Cecal (84)	0.0	2.4	[0.3 - 8.3]														
		0.0	2.4	[0.3 - 8.3]														
	Turkeys Retail Ground Turkey (397)	0.0	4.3	[2.5 - 6.8]														
		0.0	10.0	[3.3 - 21.8]														
	Cecal (50)	0.0	10.0	[3.3 - 21.8]														
		0.0	10.0	[3.3 - 21.8]														
	Cattle Retail Ground Beef (205)	0.0	0.5	[0.0 - 2.7]														
0.0		0.9	[0.2 - 2.7]															
0.0		1.1	[0.1 - 4.0]															
Cecal (Beef) (326)	0.0	0.9	[0.2 - 2.7]															
	0.0	1.1	[0.1 - 4.0]															
	0.0	1.1	[0.1 - 4.0]															
Cecal (Dairy) (177)	0.0	1.1	[0.1 - 4.0]															
	0.0	1.1	[0.1 - 4.0]															
	0.0	1.1	[0.1 - 4.0]															
Swine Retail Pork Chops (205)	0.0	2.9	[1.1 - 6.3]															
	0.0	3.4	[1.1 - 7.8]															
	0.0	3.4	[1.1 - 7.8]															
	0.8	1.7	[0.2 - 6.0]															
Folate Pathway Inhibitors	Sulfisoxazole	Chickens Retail Chickens (317)	N/A	44.5	[38.9 - 50.1]													
			N/A	42.9	[32.1 - 54.1]													
		Cecal (84)	N/A	42.9	[32.1 - 54.1]													
			N/A	42.9	[32.1 - 54.1]													
		Turkeys Retail Ground Turkey (397)	N/A	44.8	[39.9 - 49.9]													
			N/A	60.0	[45.2 - 73.6]													
		Cecal (50)	N/A	60.0	[45.2 - 73.6]													
			N/A	60.0	[45.2 - 73.6]													
		Cattle Retail Ground Beef (205)	N/A	7.8	[4.5 - 12.4]													
	N/A		12.0	[8.6 - 16.0]														
	N/A		10.7	[6.6 - 16.3]														
	Cecal (Beef) (326)	N/A	12.0	[8.6 - 16.0]														
		N/A	10.7	[6.6 - 16.3]														
		N/A	10.7	[6.6 - 16.3]														
	Cecal (Dairy) (177)	N/A	10.7	[6.6 - 16.3]														
		N/A	10.7	[6.6 - 16.3]														
		N/A	10.7	[6.6 - 16.3]														
	Swine Retail Pork Chops (205)	N/A	7.8	[4.5 - 12.4]														
N/A		21.2	[14.9 - 28.8]															
N/A		13.6	[8.0 - 21.1]															
Trimethoprim-Sulfamethoxazole	Chickens Retail Chickens (317)	N/A	5.0	[2.9 - 8.1]														
		N/A	10.7	[5.0 - 19.4]														
	Cecal (84)	N/A	10.7	[5.0 - 19.4]														
		N/A	10.7	[5.0 - 19.4]														
	Turkeys Retail Ground Turkey (397)	N/A	2.5	[1.2 - 4.6]														
		N/A	10.0	[3.3 - 21.8]														
	Cecal (50)	N/A	10.0	[3.3 - 21.8]														
		N/A	10.0	[3.3 - 21.8]														
	Cattle Retail Ground Beef (205)	N/A	1.0	[0.1 - 3.5]														
N/A		0.9	[0.2 - 2.7]															
N/A		0.6	[0.0 - 3.1]															
Cecal (Beef) (326)	N/A	0.9	[0.2 - 2.7]															
	N/A	0.6	[0.0 - 3.1]															
	N/A	0.6	[0.0 - 3.1]															
Cecal (Dairy) (177)	N/A	0.6	[0.0 - 3.1]															
	N/A	0.6	[0.0 - 3.1]															
	N/A	0.6	[0.0 - 3.1]															
Swine Retail Pork Chops (205)	N/A	2.4	[0.8 - 5.6]															
	N/A	5.5	[2.4 - 10.5]															
	N/A	5.9	[2.4 - 11.8]															
Cecal (Market Swine) (146)	N/A	5.5	[2.4 - 10.5]															
	N/A	5.5	[2.4 - 10.5]															
	N/A	5.9	[2.4 - 11.8]															
Cecal (Sows) (118)	N/A	5.9	[2.4 - 11.8]															
	N/A	5.9	[2.4 - 11.8]															
	N/A	5.9	[2.4 - 11.8]															

¹ Percent of isolates with intermediate susceptibility² Percent of isolates with resistance. Discrepancies between %R and sums of distribution %s, to the right of the double vertical bars, are due to rounding.³ 95% confidence intervals for percent resistant (%R) were calculated using the Clopper-Pearson exact method⁴ The unshaded areas indicate the range of dilutions tested for each antimicrobial. Single vertical bars indicate the breakpoints for susceptibility, while double vertical bars indicate the breakpoints for resistance. Numbers in the shaded areas indicate the percentages of isolates with MICs greater than the highest tested concentrations. Numbers listed for the lowest tested concentrations represent the percentages of isolates with MICs equal to or less than the lowest tested concentration.

Table 62d. Distribution of MICs and Occurrence of Resistance among *E. coli* Isolates, 2014

Antimicrobial Class	Antimicrobial Agent	Isolate Source (# of Isolates)	T _i	%I ¹	%R ²	[95% CI] ³	Distribution (%) of MICs (µg/ml) ⁴																										
							0.015	0.03	0.06	0.125	0.25	0.50	1	2	4	8	16	32	64	128	256	512	1024										
Quinolones	Nalidixic Acid	Chickens	Retail Chickens (317)	N/A	1.9	[0.7 - 4.1]							1.3	23.3	66.9	6.6						0.6	1.3										
			Cecal (84)	N/A	2.4	[0.3 - 8.3]								8.3	72.6	16.7						1.2	1.2										
		Turkeys	Retail Ground Turkey (397)	N/A	1.5	[0.6 - 3.3]						0.8	19.4	70.5	7.6	0.3																	1.5
			Cecal (50)	N/A	0.0	[0.0 - 7.1]							6.0	74.0	20.0																		
		Cattle	Retail Ground Beef (205)	N/A	0.0	[0.0 - 1.8]						2.9	15.1	68.8	13.2																		
			Cecal (Beef) (326)	N/A	0.3	[0.0 - 1.7]						0.3	6.4	69.3	23.3				0.3														0.3
			Cecal (Dairy) (177)	N/A	0.6	[0.0 - 3.1]							4.5	73.4	21.5																		0.6
		Swine	Retail Pork Chops (205)	N/A	0.5	[0.0 - 2.7]						1.0	18.5	70.7	8.8				0.5														0.5
			Cecal (Market Swine) (146)	N/A	1.4	[0.2 - 4.9]							6.8	76.0	15.1				0.7														1.4
			Cecal (Sows) (118)	N/A	0.0	[0.0 - 3.1]							7.6	73.7	17.8				0.8														
Tetracyclines	Tetracycline	Chickens	Retail Chickens (317)	0.6	44.2	[38.6 - 49.8]													55.2	0.6		0.6	2.8	40.7									
			Cecal (84)	1.2	48.8	[37.7 - 60.0]														50.0	1.2		1.2	47.6									
		Turkeys	Retail Ground Turkey (397)	0.3	74.1	[69.4 - 78.3]														25.7	0.3		0.5	3.5	70.0								
			Cecal (50)	0.0	84.0	[70.9 - 92.8]														16.0			6.0	78.0									
		Cattle	Retail Ground Beef (205)	0.5	21.5	[16.0 - 27.7]														78.1	0.5		1.5	0.5	19.5								
			Cecal (Beef) (326)	4.3	37.4	[32.2 - 42.9]														58.3	4.3		3.4	2.5	31.6								
			Cecal (Dairy) (177)	4.0	21.5	[15.7 - 28.3]														74.6	4.0		1.7		19.8								
		Swine	Retail Pork Chops (205)	0.5	45.9	[38.9 - 52.9]														53.7	0.5		1.5	2.4	42.0								
			Cecal (Market Swine) (146)	1.4	71.9	[63.9 - 79.0]														26.7	1.4		2.1		69.9								
			Cecal (Sows) (118)	1.7	71.2	[62.1 - 79.2]														27.1	1.7		0.8	3.4	66.9								

¹ Percent of isolates with intermediate susceptibility

² Percent of isolates with resistance. Discrepancies between %R and sums of distribution %'s, to the right of the double vertical bars, are due to rounding.

³ 95% confidence intervals for percent resistant (%R) were calculated using the Clopper-Pearson exact method

⁴ The unshaded areas indicate the range of dilutions tested for each antimicrobial. Single vertical bars indicate the breakpoints for susceptibility, while double vertical bars indicate the breakpoints for resistance. Numbers in the shaded areas indicate the percentages of isolates with MICs greater than the highest tested concentrations. Numbers listed for the lowest tested concentrations represent the percentages of isolates with MICs equal to or less than the lowest tested concentration.

Resistance by Year

Table 63a. Antimicrobial Resistance among *E. coli* Isolates, 2003-2014

Year		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014		
Number of Isolates Tested	Chickens	Retail Chickens	396	400	393	418	299	306	315	357	341	386	360	317	
		Cecal											48	84	
	Turkeys	Retail Ground Turkey	333	376	396	388	315	300	306	369	368	391	374	397	
		Cecal											29	50	
	Cattle	Retail Ground Beef	311	338	316	295	256	250	247	269	215	271	227	205	
		Cecal (Beef)											293	326	
		Cecal (Dairy)											256	177	
	Swine	Retail Pork Chops	218	232	205	182	152	146	147	183	146	161	208	205	
		Cecal (Market Swine)											118	146	
		Cecal (Sows)											120	118	
	Antimicrobial Class	Antimicrobial (Resistance Breakpoint)	Isolate Source												
	Gentamicin (MIC ≥ 16 µg/ml)	Chickens	Retail Chickens	29.3% 116	30.0% 120	37.7% 148	37.3% 156	34.4% 103	34.0% 104	34.3% 108	31.9% 114	38.4% 131	30.6% 118	30.3% 111	38.5% 122
Cecal													81.3% 39	46.4% 39	
Turkeys		Retail Ground Turkey	29.7% 99	29.3% 110	27.5% 109	29.6% 115	27.0% 85	37.0% 111	37.9% 116	24.9% 92	32.6% 120	40.9% 160	27.0% 101	30.2% 120	
		Cecal											55.2% 16	32.0% 16	
Cattle		Retail Ground Beef	1.0% 3	0.6% 2	0.0% 0	4.1% 12	0.0% 0	2.0% 5	0.8% 2	0.4% 1	0.5% 1	0.7% 2	0.0% 0	0.5% 1	
		Cecal (Beef)											0.7% 2	0.6% 2	
		Cecal (Dairy)											0.0% 0	0.0% 0	
Swine		Retail Pork Chops	1.4% 3	1.3% 3	0.0% 0	1.1% 2	1.3% 2	1.4% 2	4.1% 6	2.7% 5	0.7% 1	0.6% 1	1.0% 2	2.0% 4	
		Cecal (Market Swine)											1.7% 2	1.4% 2	
		Cecal (Sows)											2.5% 3	2.5% 3	
Streptomycin ¹ (MIC ≥ 64 µg/ml)		Chickens	Retail Chickens	56.1% 222	56.8% 227	50.6% 199	48.1% 201	46.8% 140	43.8% 134	38.1% 120	39.2% 140	43.4% 148	39.6% 153	38.9% 140	50.8% 161
			Cecal											4.2% 2	58.3% 49
	Turkeys	Retail Ground Turkey	54.7% 182	49.2% 185	43.4% 172	43.8% 170	44.8% 141	57.3% 172	57.5% 176	47.7% 176	60.3% 222	67.0% 262	54.0% 202	59.5% 236	
		Cecal											24.1% 7	68.0% 34	
	Cattle	Retail Ground Beef	9.0% 28	11.8% 40	5.4% 17	14.2% 42	6.3% 16	10.4% 26	8.1% 20	9.3% 25	6.5% 14	10.0% 27	8.4% 19	9.3% 19	
		Cecal (Beef)											0.7% 2	12.6% 41	
		Cecal (Dairy)											1.2% 3	12.4% 22	
	Swine	Retail Pork Chops	19.7% 43	21.1% 49	13.2% 27	13.7% 25	13.8% 21	19.9% 29	19.7% 29	19.7% 36	15.1% 22	14.9% 24	17.8% 37	10.7% 22	
		Cecal (Market Swine)											3.4% 4	25.3% 37	
		Cecal (Sows)											1.7% 2	21.2% 25	
	β-Lactam/β-Lactamase Inhibitor Combinations	Chickens	Retail Chickens	13.6% 54	10.0% 40	12.2% 48	11.5% 48	7.4% 22	11.8% 36	13.3% 42	6.7% 24	14.1% 48	7.8% 30	5.6% 20	7.6% 24
			Cecal											2.1% 1	2.4% 2
Turkeys		Retail Ground Turkey	3.0% 10	5.3% 20	3.8% 15	6.7% 26	6.3% 20	8.3% 25	9.8% 30	10.0% 37	13.0% 48	11.8% 46	8.8% 33	6.0% 24	
		Cecal											6.9% 2	14.0% 7	
Cattle		Retail Ground Beef	2.3% 7	3.9% 13	1.3% 4	2.4% 7	0.8% 2	2.4% 6	1.6% 4	1.1% 3	0.5% 1	1.5% 4	1.8% 4	0.5% 1	
		Cecal (Beef)											0.0% 0	0.6% 2	
		Cecal (Dairy)											1.6% 4	1.7% 3	
Swine		Retail Pork Chops	5.1% 11	5.6% 13	2.9% 6	2.2% 4	0.7% 1	3.4% 5	6.8% 10	2.2% 4	0.0% 0	3.1% 5	1.0% 2	2.9% 6	
		Cecal (Market Swine)											0.8% 1	2.7% 4	
		Cecal (Sows)											0.8% 1	1.7% 2	
Cephems		Chickens	Retail Chickens	9.3% 37	8.3% 33	11.2% 44	11.2% 47	7.4% 22	11.8% 36	13.3% 42	6.7% 24	13.2% 45	7.8% 30	5.0% 18	6.9% 22
			Cecal											2.1% 1	2.4% 2
	Turkeys	Retail Ground Turkey	1.2% 4	4.5% 17	3.3% 13	6.2% 24	6.3% 20	6.3% 19	7.8% 24	9.2% 34	12.5% 46	11.3% 44	7.8% 29	5.0% 20	
		Cecal											3.4% 1	10.0% 5	
	Cattle	Retail Ground Beef	0.3% 1	1.2% 4	1.0% 3	2.0% 6	0.8% 2	2.4% 6	1.6% 4	1.1% 3	0.5% 1	1.9% 5	1.3% 3	1.0% 2	
		Cecal (Beef)											0.0% 0	0.6% 2	
		Cecal (Dairy)											1.2% 3	1.1% 2	
	Swine	Retail Pork Chops	2.3% 5	2.2% 5	1.5% 3	1.6% 3	0.7% 1	3.4% 5	6.8% 10	0.5% 1	0.0% 0	1.9% 3	1.0% 2	2.9% 2	
		Cecal (Market Swine)											0.8% 1	2.7% 4	
		Cecal (Sows)											0.8% 1	1.7% 2	

¹ Streptomycin results are unavailable for one 2013 retail meat turkey isolate

Table 63b. Antimicrobial Resistance among *E. coli* Isolates, 2003-2014

Year		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014				
Number of Isolates Tested	Chickens	Retail Chickens	396	400	393	418	299	306	315	357	341	386	360	317			
		Cecal											48	84			
	Turkeys	Retail Ground Turkey	333	376	396	388	315	300	306	369	368	391	374	397			
		Cecal											29	50			
	Cattle	Retail Ground Beef	311	338	316	295	256	250	247	269	215	271	227	205			
		Cecal (Beef)											293	326			
		Cecal (Dairy)											256	177			
	Swine	Retail Pork Chops	218	232	205	182	152	146	147	183	146	161	208	205			
		Cecal (Market Swine)											118	146			
		Cecal (Sows)											120	118			
Antimicrobial Class	Antimicrobial (Resistance Breakpoint)	Isolate Source															
Cepheids	Ceftiofur (MIC ≥ 8 µg/ml)	Chickens	Retail Chickens	7.6% 30	5.8% 23	8.7% 34	8.6% 36	6.0% 18	10.8% 33	11.8% 37	5.6% 20	12.3% 42	7.5% 29	4.4% 16	6.3% 20		
			Cecal												4.2% 2	2.4% 2	
		Turkeys	Retail Ground Turkey	0.3% 1	1.1% 4	1.8% 7	3.1% 12	6.0% 19	3.7% 11	6.2% 19	7.9% 29	9.8% 36	9.2% 36	6.4% 24	4.3% 17		
			Cecal												17.2% 5	10.0% 5	
		Cattle	Retail Ground Beef	0.3% 1	0.9% 3	0.6% 2	1.0% 3	0.8% 2	1.6% 4	0.8% 2	1.1% 3	0.9% 2	0.0% 0	1.8% 4	0.5% 1		
			Cecal (Beef)											1.0% 3	0.9% 3		
			Cecal (Dairy)											0.8% 2	1.1% 2		
		Swine	Retail Pork Chops	0.9% 2	0.4% 1	0.0% 0	0.0% 0	0.7% 1	3.4% 5	6.8% 10	0.0% 0	0.0% 0	1.2% 2	1.4% 3	2.9% 6		
			Cecal (Market Swine)											4.2% 5	3.4% 5		
			Cecal (Sows)											1.7% 2	1.7% 2		
		Ceftriaxone (MIC ≥ 4 µg/ml)	Chickens	Retail Chickens	9.1% 36	6.5% 26	10.2% 40	9.1% 38	6.4% 19	11.1% 34	12.4% 39	6.4% 23	12.6% 43	7.8% 30	4.4% 16	6.6% 21	
				Cecal												4.2% 2	2.4% 2
	Turkeys		Retail Ground Turkey	0.3% 1	1.3% 5	2.3% 9	3.1% 12	6.0% 19	3.7% 11	6.9% 21	8.9% 33	10.1% 37	9.7% 38	6.7% 25	4.3% 17		
			Cecal												6.9% 2	10.0% 5	
	Cattle		Retail Ground Beef	0.3% 1	1.5% 5	1.9% 6	1.7% 5	0.8% 2	1.6% 4	0.8% 2	1.1% 3	0.5% 1	0.0% 0	2.2% 5	0.5% 1		
			Cecal (Beef)											1.0% 3	0.9% 3		
			Cecal (Dairy)											0.8% 2	1.1% 2		
	Swine		Retail Pork Chops	0.9% 2	0.4% 1	0.5% 1	0.6% 1	0.7% 1	3.4% 5	6.8% 10	0.0% 0	0.0% 0	1.2% 2	1.4% 3	2.9% 6		
			Cecal (Market Swine)											4.2% 5	3.4% 5		
			Cecal (Sows)											1.7% 2	1.7% 2		
	Folate Pathway Inhibitors		Sulfamethoxazole/Sulfisoxazole ¹ (MIC ≥ 512 µg/ml)	Chickens	Retail Chickens	38.4% 152	41.3% 165	48.1% 189	46.9% 196	42.1% 126	39.2% 120	40.6% 128	38.9% 139	44.3% 151	37.8% 146	39.2% 141	44.5% 141
					Cecal												
		Turkeys		Retail Ground Turkey	51.7% 172	48.4% 182	48.0% 190	48.5% 188	48.9% 154	51.0% 153	53.9% 165	44.7% 165	51.9% 191	56.8% 222	50.0% 187	44.8% 178	
				Cecal													55.2% 16
Cattle		Retail Ground Beef		10.3% 32	13.0% 44	7.0% 22	12.5% 37	9.4% 24	11.6% 29	7.7% 19	12.6% 34	7.9% 17	7.4% 20	7.9% 18	7.8% 16		
		Cecal (Beef)												9.2% 27	12.0% 39		
		Cecal (Dairy)												5.5% 14	10.7% 19		
Swine		Retail Pork Chops		15.1% 33	19.4% 45	14.1% 29	20.3% 37	11.8% 18	16.4% 24	14.3% 21	16.4% 30	10.3% 15	6.8% 11	10.1% 21	7.8% 16		
		Cecal (Market Swine)												19.5% 23	21.2% 31		
		Cecal (Sows)												13.3% 16	13.6% 16		
Trimethoprim-Sulfamethoxazole (MIC ≥ 4 / 76 µg/ml)		Chickens		Retail Chickens	7.1% 28	4.3% 17	7.4% 29	8.9% 37	5.0% 15	3.6% 11	2.2% 7	4.2% 15	2.3% 8	2.6% 10	3.1% 11	5.1% 16	
				Cecal												4.2% 2	10.7% 9
		Turkeys	Retail Ground Turkey	6.9% 23	3.7% 14	5.1% 20	8.0% 31	7.9% 25	5.3% 16	5.9% 18	5.1% 19	4.3% 16	6.1% 24	3.7% 14	2.5% 10		
			Cecal												10.3% 3	10.0% 5	
		Cattle	Retail Ground Beef	0.3% 1	0.6% 2	0.6% 2	1.4% 4	1.2% 3	2.0% 5	2.0% 5	0.7% 2	2.3% 5	0.4% 1	1.8% 4	1.0% 2		
			Cecal (Beef)											0.0% 0	0.9% 3		
			Cecal (Dairy)											0.0% 0	0.6% 1		
		Swine	Retail Pork Chops	2.8% 6	3.9% 9	1.5% 3	2.2% 4	1.3% 2	6.2% 9	2.7% 4	3.8% 7	3.4% 5	1.9% 3	1.4% 3	2.4% 5		
			Cecal (Market Swine)											3.4% 4	5.5% 8		
			Cecal (Sows)											1.7% 2	5.9% 7		

¹ Sulfamethoxazole was tested from 1996 through 2003 and was replaced by sulfisoxazole in 2004

Table 63c. Antimicrobial Resistance among *E. coli* Isolates, 2003-2014

Year		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014			
Number of Isolates Tested	Chickens	Retail Chickens	396	400	393	418	299	306	315	357	341	386	360	317		
		Cecal											48	84		
	Turkeys	Retail Ground Turkey	333	376	396	388	315	300	306	369	368	391	374	397		
		Cecal											29	50		
	Cattle	Retail Ground Beef	311	338	316	295	256	250	247	269	215	271	227	205		
		Cecal (Beef)											293	326		
		Cecal (Dairy)											256	177		
	Swine	Retail Pork Chops	218	232	205	182	152	146	147	183	146	161	208	205		
		Cecal (Market Swine)											118	146		
		Cecal (Sows)											120	118		
	Antimicrobial Class	Antimicrobial (Resistance Breakpoint)	Isolate Source													
	Macrolides	Azithromycin (MIC ≥32 µg/ml)	Chickens	Retail Chickens								0.0%	0.0%	0.0%	0.3%	
Cecal														4.2%	2.4%	
Turkeys			Retail Ground Turkey									0.3%	0.8%	0.0%	0.0%	
			Cecal									1	3	0	0	
Cattle			Retail Ground Beef									0.0%	0.0%	0.9%	0.0%	
			Cecal (Beef)									0	0	0	0	
			Cecal (Dairy)											0.4%	0.6%	
Swine			Retail Pork Chops									0.0%	0.0%	0.0%	0.0%	
			Cecal (Market Swine)									0	0	0	0	
			Cecal (Sows)											0.0%	0.0%	
Penicillins			Ampicillin (MIC ≥ 32 µg/ml)	Chickens	Retail Chickens	25.3%	17.0%	24.7%	20.1%	18.1%	23.5%	22.2%	16.5%	26.4%	18.5%	20.8%
					Cecal	100	68	97	84	54	72	70	59	90	61	75
	Turkeys	Retail Ground Turkey		35.7%	33.2%	38.1%	42.0%	48.3%	58.0%	56.2%	52.6%	51.6%	55.5%	54.0%	57.2%	
		Cecal		119	125	151	163	152	174	172	194	190	217	202	227	
	Cattle	Retail Ground Beef		5.1%	5.3%	3.5%	9.2%	6.6%	6.4%	4.9%	4.8%	3.7%	2.6%	4.8%	4.4%	
		Cecal (Beef)		16	18	11	27	17	16	12	13	8	7	11	9	
		Cecal (Dairy)												5.8%	5.2%	
	Swine	Retail Pork Chops		13.3%	15.1%	16.1%	15.9%	15.8%	15.1%	11.6%	19.1%	13.0%	13.0%	11.5%	11.7%	
		Cecal (Market Swine)		29	35	33	29	24	22	17	35	19	21	24	24	
		Cecal (Sows)												21.2%	17.1%	
	Phenicol	Chloramphenicol (MIC ≥ 32 µg/ml)		Chickens	Retail Chickens	0.0%	1.8%	0.5%	2.6%	2.0%	1.0%	0.6%	1.4%	1.2%	0.3%	1.7%
					Cecal	0	7	2	11	6	3	2	5	4	1	6
Turkeys			Retail Ground Turkey	3.6%	0.8%	4.0%	2.3%	2.9%	3.7%	3.3%	3.5%	4.9%	5.9%	5.3%	3.5%	
			Cecal	12	3	16	9	9	11	10	13	18	23	20	14	
Cattle			Retail Ground Beef	2.3%	3.6%	1.6%	1.4%	3.9%	0.8%	2.4%	2.6%	1.4%	1.1%	4.0%	0.5%	
			Cecal (Beef)	7	12	5	4	10	2	6	7	3	3	9	1	
			Cecal (Dairy)											3.8%	3.7%	
Swine			Retail Pork Chops	4.1%	4.3%	3.4%	6.6%	3.9%	3.4%	4.8%	1.6%	2.7%	3.7%	2.4%	1.5%	
			Cecal (Market Swine)	9	10	7	12	6	5	7	3	4	6	5	3	
			Cecal (Sows)											5.1%	4.8%	
Quinolones			Ciprofloxacin (MIC ≥ 1 µg/ml)	Chickens	Retail Chickens	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.3%	0.6%	0.0%	0.0%	
					Cecal	0	0	0	0	0	0	1	2	0	0	0.6%
	Turkeys	Retail Ground Turkey		0.3%	0.8%	0.0%	0.5%	0.3%	0.0%	0.7%	0.5%	0.0%	0.3%	0.3%	0.0%	
		Cecal		1	3	0	2	1	0	2	2	0	1	1	0	
	Cattle	Retail Ground Beef		0.0%	0.0%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
		Cecal (Beef)		0	0	1	0	0	0	0	0	0	0	0	0	
		Cecal (Dairy)												0.0%	0.6%	
	Swine	Retail Pork Chops		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.5%	
		Cecal (Market Swine)		0	0	0	0	0	0	0	0	0	0	0	1	
		Cecal (Sows)												1.7%	0.7%	

Table 63d. Antimicrobial Resistance among *E. coli* Isolates, 2003-2014

Year		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014				
Number of Isolates Tested	Chickens	Retail Chickens	396	400	393	418	299	306	315	357	341	386	360	317			
		Cecal											48	84			
	Turkeys	Retail Ground Turkey	333	376	396	388	315	300	306	369	368	391	374	397			
		Cecal											29	50			
	Cattle	Retail Ground Beef	311	338	316	295	256	250	247	269	215	271	227	205			
		Cecal (Beef)											293	326			
		Cecal (Dairy)											256	177			
	Swine	Retail Pork Chops	218	232	205	182	152	146	147	183	146	161	208	205			
		Cecal (Market Swine)											118	146			
		Cecal (Sows)											120	118			
	Antimicrobial Class	Antimicrobial (Resistance Breakpoint)	Isolate Source														
	Quinolones	Nalidixic Acid (MIC ≥ 32 µg/ml)	Chickens	Retail Chickens	4.0% 16	7.0% 28	6.6% 26	5.0% 21	3.0% 9	2.9% 9	2.9% 9	3.6% 13	2.3% 8	1.8% 7	2.5% 9	1.9% 6	
Cecal															4.2% 2	2.4% 2	
Turkeys			Retail Ground Turkey	11.7% 39	10.6% 40	10.4% 41	5.2% 20	2.2% 7	3.7% 11	2.6% 8	2.7% 10	1.6% 6	1.8% 7	1.9% 7	1.5% 6		
			Cecal												0.0% 0	0.0% 0	
Cattle			Retail Ground Beef	1.0% 3	1.5% 5	1.3% 4	0.7% 2	0.4% 1	0.4% 1	0.4% 1	0.0% 0	0.0% 0	1.5% 4	0.4% 1	0.0% 0		
			Cecal (Beef)												0.3% 1	0.3% 1	
			Cecal (Dairy)												0.4% 1	0.6% 1	
Swine			Retail Pork Chops	0.5% 1	0.0% 0	1.5% 3	0.5% 1	0.0% 0	0.0% 0	0.0% 0	0.5% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 1	0.5% 1	
			Cecal (Market Swine)												1.7% 2	1.4% 2	
			Cecal (Sows)												0.0% 0	0.0% 0	
Tetracyclines			Tetracycline (MIC ≥ 16 µg/ml)	Chickens	Retail Chickens	42.9% 170	48.0% 192	46.6% 183	50.5% 211	40.5% 121	43.8% 134	41.6% 131	38.9% 139	40.8% 139	39.4% 152	43.3% 156	44.2% 140
					Cecal												85.4% 41
	Turkeys	Retail Ground Turkey		77.8% 259	74.2% 279	78.0% 309	76.5% 297	80.0% 252	85.7% 257	82.0% 251	69.4% 256	79.9% 294	77.2% 302	74.3% 278	74.1% 294		
		Cecal													144.8% 42	84.0% 42	
	Cattle	Retail Ground Beef		25.1% 78	22.8% 77	16.5% 52	25.4% 75	21.9% 56	24.0% 60	18.6% 46	22.7% 61	17.7% 38	22.1% 60	22.5% 51	21.5% 44		
		Cecal (Beef)													41.6% 122	37.4% 122	
		Cecal (Dairy)													14.8% 38	21.5% 38	
	Swine	Retail Pork Chops		46.3% 101	56.0% 130	45.9% 94	52.7% 96	50.0% 76	54.8% 80	46.9% 69	44.3% 81	46.6% 68	39.1% 63	51.4% 107	45.9% 94		
		Cecal (Market Swine)													89.0% 105	71.9% 105	
		Cecal (Sows)													70.0% 84	71.2% 84	

Multidrug Resistance

Table 64a. Resistance Patterns among *E. coli* Isolates, 2003-2014¹

Year		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014		
Number of Isolates Tested	Chickens	Retail Chickens	396	400	393	418	299	306	315	357	341	386	360	317	
		Cecal											48	84	
	Turkeys	Retail Ground Turkey	333	376	396	388	315	300	306	369	368	391	374	397	
		Cecal											29	50	
	Cattle	Retail Ground Beef	311	338	316	295	256	250	247	269	215	271	227	205	
		Cecal (Beef)											293	326	
		Cecal (Dairy)											256	177	
	Swine	Retail Pork Chops	218	232	205	182	152	146	147	183	146	161	208	205	
		Cecal (Market Swine)											118	146	
		Cecal (Sows)											120	118	
Resistance Pattern		Source													
1. No Resistance Detected	Chickens	Retail Chickens	20.5% 81	20.8% 83	20.6% 81	23.7% 99	29.1% 87	33.3% 102	34.3% 108	33.6% 120	25.2% 86	35.8% 138	30.8% 111	35.0% 111	
		Cecal											39.6% 19	23.8% 20	
	Turkeys	Retail Ground Turkey	15.9% 53	19.1% 72	16.2% 64	16.0% 62	13.0% 41	8.3% 25	11.8% 36	17.3% 64	13.3% 49	13.3% 52	14.4% 54	16.9% 67	
		Cecal											17.2% 5	10.0% 5	
	Cattle	Retail Ground Beef	70.7% 220	73.1% 247	80.1% 253	71.5% 211	77.0% 197	73.2% 183	78.1% 193	76.6% 206	79.5% 171	75.6% 205	76.7% 174	77.1% 158	
		Cecal (Beef)											73.0% 214	60.4% 197	
		Cecal (Dairy)											82.8% 212	76.3% 135	
	Swine	Retail Pork Chops	50.0% 109	37.9% 88	50.2% 103	42.9% 78	48.0% 73	43.8% 64	51.0% 75	50.8% 93	52.1% 76	56.5% 91	46.2% 96	50.7% 104	
		Cecal (Market Swine)											33.9% 40	23.3% 34	
		Cecal (Sows)											27.5% 33	27.1% 32	
	2. Resistance to ≥ 3 Antimicrobial Classes	Chickens	Retail Chickens	38.4% 152	35.3% 141	44.8% 176	42.8% 179	33.8% 101	36.6% 112	37.5% 118	28.0% 100	37.2% 127	29.8% 115	30.8% 111	36.0% 114
			Cecal											16.7% 8	35.7% 30
Turkeys		Retail Ground Turkey	52.6% 175	51.6% 194	52.0% 206	53.9% 209	56.5% 178	63.3% 190	65.0% 199	55.0% 203	63.9% 235	67.8% 265	58.8% 220	53.7% 213	
		Cecal											62.1% 18	66.0% 33	
Cattle		Retail Ground Beef	6.4% 20	10.4% 35	5.4% 17	10.8% 32	9.0% 23	11.2% 28	6.9% 17	11.2% 30	5.6% 12	9.2% 25	7.9% 18	8.3% 17	
		Cecal (Beef)											8.2% 24	10.1% 33	
		Cecal (Dairy)											6.3% 16	11.9% 21	
Swine		Retail Pork Chops	15.1% 33	21.1% 49	15.6% 32	15.9% 29	14.5% 22	17.8% 26	14.3% 21	16.4% 30	8.9% 13	11.2% 18	13.0% 27	9.8% 20	
		Cecal (Market Swine)											21.2% 25	21.9% 32	
		Cecal (Sows)											21.7% 26	16.9% 20	
3. Resistant to ≥ 4 Antimicrobial Classes		Chickens	Retail Chickens	11.1% 44	12.5% 50	12.0% 47	14.6% 61	10.4% 31	13.7% 42	13.7% 43	10.6% 38	13.5% 46	7.5% 29	9.2% 33	10.7% 34
			Cecal											4.2% 2	7.1% 6
	Turkeys	Retail Ground Turkey	26.1% 87	24.5% 92	24.0% 95	25.3% 98	26.7% 84	32.3% 97	38.6% 118	27.4% 101	33.7% 124	37.9% 148	31.0% 116	34.0% 135	
		Cecal											37.9% 11	44.0% 22	
	Cattle	Retail Ground Beef	3.9% 12	4.7% 16	1.9% 6	5.8% 17	4.7% 12	4.0% 10	3.6% 9	3.0% 8	1.9% 4	1.1% 3	4.8% 11	2.4% 5	
		Cecal (Beef)											3.4% 10	4.6% 15	
		Cecal (Dairy)											3.1% 8	4.5% 8	
	Swine	Retail Pork Chops	6.0% 13	6.5% 15	3.4% 7	7.1% 13	2.6% 4	6.8% 10	9.5% 14	5.5% 10	2.1% 3	3.7% 6	2.9% 6	3.4% 7	
		Cecal (Market Swine)											6.8% 8	8.2% 12	
		Cecal (Sows)											9.2% 11	6.8% 8	
	4. Resistant to ≥ 5 Antimicrobial Classes	Chickens	Retail Chickens	5.6% 22	6.0% 24	5.6% 22	7.2% 30	5.7% 17	8.2% 25	6.3% 20	4.5% 16	6.5% 22	3.1% 12	2.8% 10	4.7% 15
			Cecal											2.1% 1	4.8% 4
Turkeys		Retail Ground Turkey	7.8% 26	6.9% 26	6.3% 25	5.4% 21	4.1% 13	6.3% 19	7.8% 24	6.5% 24	10.9% 40	11.8% 46	9.4% 35	5.8% 23	
		Cecal											3.4% 1	12.0% 6	
Cattle		Retail Ground Beef	1.9% 6	2.7% 9	0.9% 3	2.4% 7	0.4% 1	2.0% 5	1.2% 3	0.7% 2	0.9% 2	0.4% 1	2.2% 5	0.5% 1	
		Cecal (Beef)											0.7% 2	2.5% 8	
		Cecal (Dairy)											2.0% 5	2.3% 4	
Swine		Retail Pork Chops	2.8% 6	1.7% 4	1.5% 3	2.7% 5	0.7% 1	4.1% 6	5.4% 8	1.1% 2	0.0% 0	1.2% 2	1.0% 2	1.5% 3	
		Cecal (Market Swine)											3.4% 4	3.4% 5	
		Cecal (Sows)											2.5% 3	0.0% 0	

¹ Starting in 2011, testing included nine antimicrobial classes with the addition of the macrolide azithromycin. Because resistance to azithromycin is low (in this case, <1%), antimicrobial class resistance data from 2011 and beyond are comparable to the data from previous years.

Table 64b. Resistance Patterns among *E. coli* Isolates, 2003-2014

Year		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014				
Number of Isolates Tested	Chickens	Retail Chickens	396	400	393	418	299	306	315	357	341	386	360	317			
		Cecal											48	84			
	Turkeys	Retail Ground Turkey	333	376	396	388	315	300	306	369	368	391	374	397			
		Cecal											29	50			
	Cattle	Retail Ground Beef	311	338	316	295	256	250	247	269	215	271	227	205			
		Cecal (Beef)											293	326			
		Cecal (Dairy)											256	177			
	Swine	Retail Pork Chops	218	232	205	182	152	146	147	183	146	161	208	205			
		Cecal (Market Swine)											118	146			
		Cecal (Sows)											120	118			
Resistance Pattern		Source															
5. At Least ACSSuT ¹ Resistant		Chickens	Retail Chickens	0.0%	1.3%	0.3%	1.4%	2.0%	1.0%	0.6%	1.1%	1.2%	0.3%	0.8%			
			Cecal	0	5	1	6	6	3	2	4	4	1	3	0		
		Turkeys	Retail Ground Turkey	2.7%	0.5%	1.8%	0.8%	1.9%	2.0%	2.3%	2.2%	3.0%	5.1%	3.2%	2.0%		
			Cecal	9	2	7	3	6	6	7	8	11	20	12	8		
		Cattle	Retail Ground Beef	1.0%	1.5%	0.6%	0.3%	0.4%	0.0%	0.0%	0.4%	0.9%	0.0%	2.2%	0.5%		
			Cecal (Beef)	3	5	2	1	1	0	0	1	2	0	5	1		
			Cecal (Dairy)											0.7%	1.8%		
		Swine	Retail Pork Chops	1.4%	1.3%	1.0%	1.1%	0.7%	1.4%	2.0%	0.5%	0.0%	0.6%	0.5%	0.5%		
			Cecal (Market Swine)	3	3	2	2	1	2	3	1	0	1	1	1		
			Cecal (Sows)											0.8%	0.0%		
		6. At Least ACT/S ² Resistant		Chickens	Retail Chickens	0.0%	0.3%	0.0%	0.0%	0.3%	0.0%	0.0%	0.3%	0.0%	0.0%	0.8%	
					Cecal	0	1	0	0	1	0	0	1	0	0	3	0
				Turkeys	Retail Ground Turkey	0.9%	0.0%	0.8%	0.3%	0.3%	0.0%	0.3%	1.1%	0.0%	1.0%	0.3%	0.3%
					Cecal	3	0	3	1	1	0	1	4	0	4	1	1
				Cattle	Retail Ground Beef	0.0%	0.0%	0.3%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.9%	0.0%
Cecal (Beef)	0				0	1	1	0	0	0	0	0	0	2	0		
Cecal (Dairy)														0.0%	0.0%		
Swine	Retail Pork Chops			0.0%	0.4%	0.5%	0.0%	0.0%	0.0%	0.7%	0.0%	0.0%	0.6%	0.5%	0.5%		
	Cecal (Market Swine)			0	1	1	0	0	0	1	0	0	1	1	1		
	Cecal (Sows)													0.8%	0.8%		
7. At Least ACSSuTAuCx ³ Resistant				Chickens	Retail Chickens	0.0%	1.0%	0.3%	1.0%	0.7%	0.7%	0.6%	0.8%	1.2%	0.3%	0.0%	
					Cecal	0	4	1	4	2	2	2	3	4	1	0	0
				Turkeys	Retail Ground Turkey	0.3%	0.0%	0.3%	0.0%	1.3%	1.3%	1.0%	1.1%	2.2%	1.0%	0.3%	0.5%
					Cecal	1	0	1	0	4	4	3	4	8	4	1	2
				Cattle	Retail Ground Beef	0.0%	0.9%	0.3%	0.0%	0.0%	0.0%	0.0%	0.4%	0.0%	0.0%	1.3%	0.0%
		Cecal (Beef)	0		3	1	0	0	0	0	1	0	0	3	0		
		Cecal (Dairy)												0.0%	0.3%		
		Swine	Retail Pork Chops	0.5%	0.4%	0.0%	0.0%	0.7%	0.7%	2.0%	0.0%	0.0%	0.6%	0.0%	0.0%		
			Cecal (Market Swine)	1	1	0	0	1	1	3	0	0	1	0	0		
			Cecal (Sows)											0.0%	0.0%		
		8. At Least Ceftriaxone and Nalidixic Acid Resistant		Chickens	Retail Chickens	0.5%	1.5%	0.3%	0.2%	0.0%	1.0%	1.0%	0.3%	0.0%	0.5%	0.3%	
					Cecal	2	6	1	1	0	3	3	1	0	2	1	1
				Turkeys	Retail Ground Turkey	0.3%	0.3%	0.3%	0.0%	0.6%	0.0%	0.0%	0.0%	0.3%	0.8%	0.0%	0.3%
					Cecal	1	1	1	0	2	0	0	0	1	3	0	1
				Cattle	Retail Ground Beef	0.0%	0.3%	0.3%	0.3%	0.0%	0.0%	0.4%	0.0%	0.0%	0.0%	0.0%	0.0%
Cecal (Beef)	0				1	1	1	0	0	1	0	0	0	0	0		
Cecal (Dairy)														0.0%	0.6%		
Swine	Retail Pork Chops			0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		
	Cecal (Market Swine)			0	0	0	0	0	0	0	0	0	0	0	0		
	Cecal (Sows)													0.0%	0.7%		

¹ ACSSuT = ampicillin, chloramphenicol, streptomycin, sulfamethoxazole/sulfisoxazole, and tetracycline

² ACT/S = ampicillin, chloramphenicol, and trimethoprim-sulfamethoxazole

³ ACSSuTAuCx = ACSSuT, amoxicillin-clavulanic acid, and ceftriaxone

Table 65. Distribution of MICs and Occurrence of Resistance to Selected β -Lactam Agents among *E. coli* Isolates Resistant to Ceftiofur or Ceftriaxone, 2014

Antimicrobial Class	Antimicrobial Agent	Isolate Source (# of Isolates)	%I ¹ (or S-DD ²)	%R ³	[95% CI] ⁴	Distribution (%) of MICs (μ g/ml) ⁵												
						0.015	0.03	0.06	0.125	0.25	0.50	1	2	4	8	16	32	64
β -Lactam/ β -Lactamase Inhibitor Combinations	Piperacillin-tazobactam	Chickens Retail Chickens (21)	0.0	0.0	[0.0 - 16.1]													
		Turkeys Retail Ground Turkey (17)	0.0	0.0	[0.0 - 19.5]													
		Cattle Retail Ground Beef (1)	0.0	0.0	[0.0 - 97.5]													
		Swine Retail Pork Chops (6)	0.0	0.0	[0.0 - 45.9]													
Cepheems	Cefepime	Chickens Retail Chickens (21)	0.0	0.0	[0.0 - 16.1]													
		Turkeys Retail Ground Turkey (17)	5.9	0.0	[0.0 - 19.5]													
		Cattle Retail Ground Beef (1)	0.0	0.0	[0.0 - 97.5]													
		Swine Retail Pork Chops (6)	0.0	0.0	[0.0 - 45.9]													
	Cefotaxime	Chickens Retail Chickens (21)	0.0	100.0	[83.9 - 100.0]													
		Turkeys Retail Ground Turkey (17)	0.0	100.0	[80.5 - 100.0]													
		Cattle Retail Ground Beef (1)	0.0	100.0	[2.5 - 100.0]													
		Swine Retail Pork Chops (6)	0.0	100.0	[54.1 - 100.0]													
	Ceftazidime	Chickens Retail Chickens (21)	38.1	61.9	[38.4 - 81.9]													
		Turkeys Retail Ground Turkey (17)	47.1	41.2	[18.4 - 67.1]													
		Cattle Retail Ground Beef (1)	100.0	0.0	[0.0 - 97.5]													
		Swine Retail Pork Chops (6)	0.0	100.0	[54.1 - 100.0]													
Monobactam	Aztreonam	Chickens Retail Chickens (21)	38.1	4.8	[0.1 - 23.8]													
		Turkeys Retail Ground Turkey (17)	35.3	5.9	[0.1 - 28.7]													
		Cattle Retail Ground Beef (1)	0.0	0.0	[0.0 - 97.5]													
		Swine Retail Pork Chops (6)	50.0	0.0	[0.0 - 45.9]													
Penems	Imipenem	Chickens Retail Chickens (21)	0.0	0.0	[0.0 - 16.1]													
		Turkeys Retail Ground Turkey (17)	0.0	0.0	[0.0 - 19.5]													
		Cattle Retail Ground Beef (1)	0.0	0.0	[0.0 - 97.5]													
		Swine Retail Pork Chops (6)	0.0	0.0	[0.0 - 45.9]													

¹ Percent of isolates with intermediate susceptibility

² Percent of isolates that are susceptible-dose dependent (S-DD). Cefepime MIC's above the susceptible range but below the resistant range are designed by CLSI to be S-DD.

³ Percent of isolates with resistance. Discrepancies between %R and sums of distribution %'s, to the right of the double vertical bars, are due to rounding

⁴ 95% confidence intervals for percent resistant (%R) were calculated using the Clopper-Pearson exact method

⁵ The unshaded areas indicate the range of dilutions tested for each antimicrobial. Single vertical bars indicate the breakpoints for susceptibility, while double vertical bars indicate the breakpoints for resistance. Numbers in the shaded areas indicate the percentages of isolates with MICs greater than the highest tested concentrations. Numbers listed for the lowest tested concentrations represent the percentages of isolates with MICs equal to or less than the lowest tested concentration.

Enterococcus Data

Enterococcus Isolates Tested

Table 66. Number of *Enterococcus* Isolates Tested, 2002-2014

Source		Year												
		2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Chickens	Retail Chickens	381	466	466	457	469	339	348	349	439	433	456	439	411
	Cecal												46	100
Turkeys	Retail Ground Turkey	387	418	437	452	435	329	343	328	417	435	460	457	466
	Cecal												30	60
Cattle	Retail Ground Beef	383	432	448	447	438	334	337	327	415	423	453	454	438
	Cecal (Beef)												261	406
	Cecal (Dairy)												256	227
Swine	Retail Pork Chops	369	426	404	409	389	310	309	303	406	383	416	391	416
	Cecal (Market Swine)												107	166
	Cecal (Sows)												102	130

Isolation of *Enterococcus* from Retail Meats

Table 67. Number and Percent of Retail Meat Samples Culture Positive for *Enterococcus*, 2014

	Retail Chickens	Retail Ground Turkey	Retail Ground Beef	Retail Pork Chops
Number of Meat Samples Tested	480	479	480	480
Number Positive for <i>Enterococcus</i>	411	466	438	416
Percent Positive for <i>Enterococcus</i>	85.6%	97.3%	91.3%	86.7%

Figure 11. Percent of Retail Meat Samples Culture Positive for *Enterococcus*, 2014

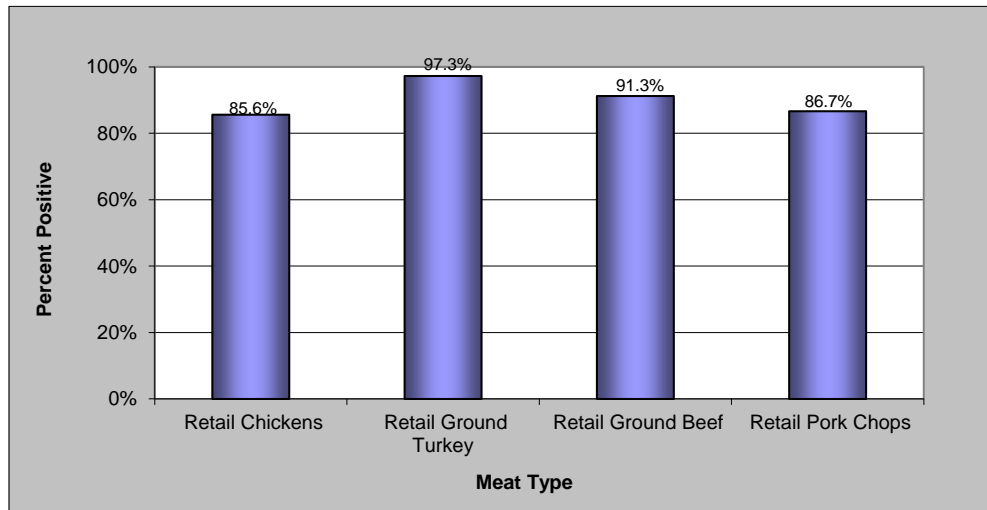
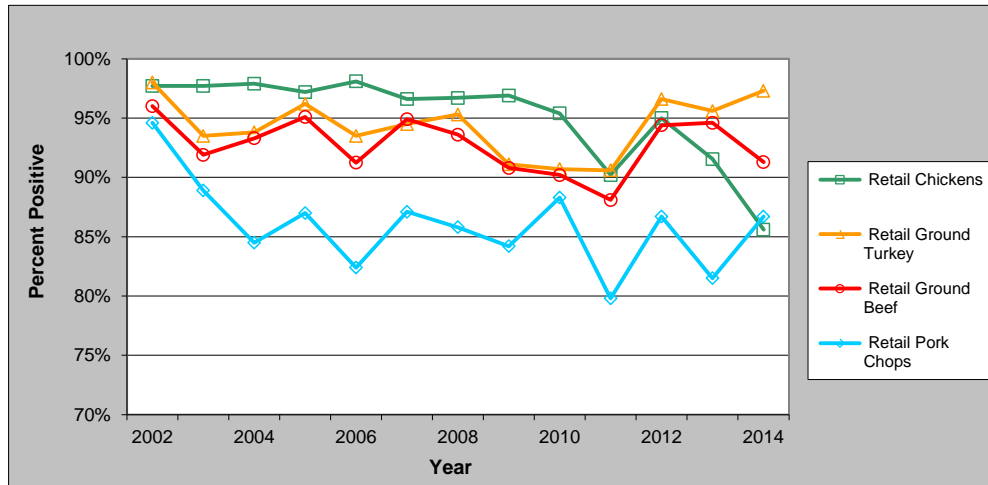


Figure 12. Percent of Retail Meat Samples Culture Positive for *Enterococcus*, 2002-2014



Enterococcus Species

Table 68. Enterococcus Species Isolated, 2014

Enterococcus Species	Chickens		Turkeys		Cattle			Swine		
	Retail Chickens (n=411)	Cecal (n=100)	Retail Ground Turkey (n=466)	Cecal (n=60)	Retail Ground Beef (n=438)	Cecal (Beef) (n=406)	Cecal (Dairy) (n=227)	Retail Pork Chops (n=416)	Cecal (Market Swine) (n=166)	Cecal (Sows) (n=130)
<i>E. faecalis</i>	50.9% 209	72.0% 72	85.8% 400	80.0% 48	71.5% 313	9.6% 39	23.8% 54	85.3% 355	48.2% 80	51.5% 67
<i>E. faecium</i>	37.2% 153	14.0% 14	12.2% 57	6.7% 4	13.7% 60	11.6% 47	12.3% 28	9.6% 40	12.7% 21	11.5% 15
<i>E. hirae</i>	8.0% 33	3.0% 3	0.4% 2	1.7% 1	9.4% 41	48.3% 196	33.0% 75	1.9% 8	30.7% 51	24.6% 32
<i>E. durans</i>	0.7% 3	8.0% 8	0.0% 0	3.3% 2	3.2% 14	9.1% 37	9.3% 21	1.4% 6	4.2% 7	4.6% 6
<i>E. gallinarum</i>	1.7% 7	1.0% 1	0.9% 4	3.3% 2	0.5% 2	3.2% 13	6.6% 15	0.0% 0	1.8% 3	3.1% 4
<i>E. avium</i>	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.6% 1	0.0% 0
<i>E. casseliflavus</i>	0.2% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	4.4% 18	4.4% 10	0.0% 0	0.6% 1	0.8% 1
<i>E. mundtii</i>	0.0% 0	0.0% 0	0.0% 0	3.3% 2	0.0% 0	6.4% 26	5.7% 13	0.0% 0	0.6% 1	0.8% 1
<i>Enterococcus spp.</i>	1.2% 5	2.0% 2	0.6% 3	0.0% 0	1.8% 8	7.1% 29	4.8% 11	1.7% 7	0.6% 1	3.1% 4

Figure 13. Enterococcus Species Isolated, 2014

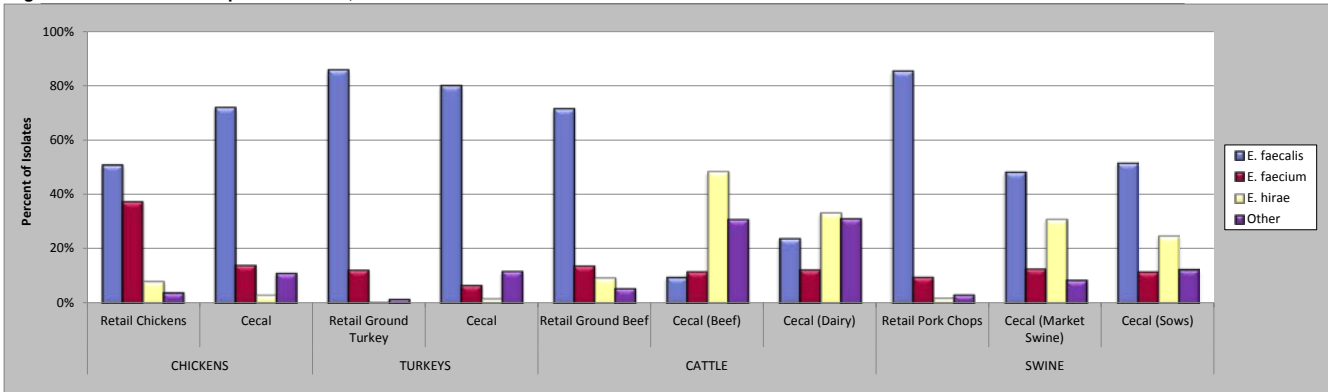


Table 69a. Distribution of MICs and Occurrence among *Enterococcus faecalis* Isolates, 2014

Antimicrobial Class	Antimicrobial Agent	Isolate Source			Distribution (%) of MICs (µg/ml) ⁴																						
		# of Isolates	% ¹	%R ²	[95% CI] ³	0.015	0.03	0.06	0.125	0.25	0.50	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048			
Aminoglycosides	Gentamicin	Chickens	Retail Chickens (209)	N/A	26.8	[20.9 - 33.3]																					
			Cecal (72)	N/A	31.9	[21.4 - 44.0]																					
		Turkeys	Retail Ground Turkey (400)	N/A	34.0	[29.4 - 38.9]																					
			Cecal (48)	N/A	41.7	[27.6 - 56.8]																					
		Cattle	Retail Ground Beef (313)	N/A	0.0	[0.0 - 1.2]																					
			Cecal (Beef) (39)	N/A	0.0	[0.0 - 9.0]																					
			Cecal (Dairy) (54)	N/A	0.0	[0.0 - 6.6]																					
		Swine	Retail (355)	N/A	2.8	[1.4 - 5.1]																					
			Cecal (Market Swine) (80)	N/A	7.5	[2.8 - 15.6]																					
	Cecal (Sows) (67)		N/A	7.5	[2.5 - 16.6]																						
	Kanamycin	Chickens	Retail Chickens (209)	N/A	29.7	[23.6 - 36.4]																					
			Cecal (72)	N/A	40.3	[28.9 - 52.5]																					
		Turkeys	Retail Ground Turkey (400)	N/A	42.0	[37.1 - 47.0]																					
			Cecal (48)	N/A	62.5	[47.4 - 76.0]																					
		Cattle	Retail Ground Beef (313)	N/A	0.0	[0.0 - 1.2]																					
			Cecal (Beef) (39)	N/A	0.0	[0.0 - 9.0]																					
			Cecal (Dairy) (54)	N/A	1.9	[0.0 - 9.9]																					
		Swine	Retail (355)	N/A	4.2	[2.4 - 6.9]																					
			Cecal (Market Swine) (80)	N/A	27.5	[18.1 - 38.6]																					
	Cecal (Sows) (67)		N/A	28.4	[18.0 - 40.7]																						
	Streptomycin	Chickens	Retail Chickens (209)	N/A	21.1	[15.7 - 27.2]																					
			Cecal (72)	N/A	18.1	[10.0 - 28.9]																					
		Turkeys	Retail Ground Turkey (400)	N/A	23.3	[19.2 - 27.7]																					
			Cecal (48)	N/A	47.9	[33.3 - 62.8]																					
		Cattle	Retail Ground Beef (313)	N/A	1.6	[0.5 - 3.7]																					
			Cecal (Beef) (39)	N/A	0.0	[0.0 - 9.0]																					
			Cecal (Dairy) (54)	N/A	5.6	[1.2 - 15.4]																					
Swine		Retail (355)	N/A	4.5	[2.6 - 7.2]																						
		Cecal (Market Swine) (80)	N/A	26.3	[17.0 - 37.3]																						
	Cecal (Sows) (67)	N/A	31.3	[20.6 - 43.8]																							
Glycopeptides	Vancomycin	Chickens	Retail Chickens (209)	0.0	0.0	[0.0 - 1.7]																					
			Cecal (72)	0.0	0.0	[0.0 - 5.0]																					
		Turkeys	Retail Ground Turkey (400)	0.0	0.0	[0.0 - 0.9]																					
			Cecal (48)	0.0	0.0	[0.0 - 7.4]																					
		Cattle	Retail Ground Beef (313)	0.0	0.0	[0.0 - 1.2]																					
			Cecal (Beef) (39)	0.0	0.0	[0.0 - 9.0]																					
			Cecal (Dairy) (54)	0.0	0.0	[0.0 - 6.6]																					
		Swine	Retail (355)	0.0	0.0	[0.0 - 1.0]																					
			Cecal (Market Swine) (80)	0.0	0.0	[0.0 - 4.5]																					
	Cecal (Sows) (67)		0.0	0.0	[0.0 - 5.4]																						
	Tigecycline	Chickens	Retail Chickens (209)	N/A	0.0	[0.0 - 1.7]	0.5			2.4				30.1													
			Cecal (72)	N/A	0.0	[0.0 - 5.0]				12.5				40.3													
		Turkeys	Retail Ground Turkey (400)	N/A	0.3	[0.0 - 1.4]								0.3													
			Cecal (48)	N/A	0.0	[0.0 - 7.4]								16.7													
		Cattle	Retail Ground Beef (313)	N/A	0.0	[0.0 - 1.2]								8.0													
			Cecal (Beef) (39)	N/A	0.0	[0.0 - 9.0]								2.6													
			Cecal (Dairy) (54)	N/A	0.0	[0.0 - 6.6]								1.9													
		Swine	Retail (355)	N/A	1.4	[0.5 - 3.3]								0.6													
Cecal (Market Swine) (80)			N/A	0.0	[0.0 - 4.5]								15.0														
Cecal (Sows) (67)	N/A		0.0	[0.0 - 5.4]								11.9															
Lincosamides	Lincomycin	Chickens	Retail Chickens (209)	0.0	100.0	[98.3 - 100.0]																					
			Cecal (72)	0.0	100.0	[95.0 - 100.0]																					
		Turkeys	Retail Ground Turkey (400)	0.0	99.0	[97.5 - 99.7]																					
			Cecal (48)	0.0	100.0	[92.6 - 100.0]																					
		Cattle	Retail Ground Beef (313)	0.0	98.1	[95.9 - 99.3]																					
			Cecal (Beef) (39)	2.6	94.9	[82.7 - 99.4]																					
			Cecal (Dairy) (54)	0.0	98.1	[90.1 - 100.0]																					
		Swine	Retail (355)	0.0	98.0	[96.0 - 99.2]																					
			Cecal (Market Swine) (80)	0.0	98.8	[93.2 - 100.0]																					
			Cecal (Sows) (67)	0.0	100.0	[94.6 - 100.0]																					

¹ Percent of isolates with intermediate susceptibility. N/A used when there is no intermediate breakpoint established.
² Percent of isolates with resistance. Discrepancies between %R and sums of distribution %'s are due to rounding. Percent (%) non-susceptible is reported rather than %R for daptomycin and tigecycline because there is no CLSI breakpoint established.
³ 95% confidence intervals for percent resistant (%R) were calculated using the Clopper-Pearson exact method.
⁴ The unshaded areas indicate the dilution range of the Sensititre plates used to test isolates. Single vertical lines indicate the breakpoints for susceptibility, while double vertical lines indicate the breakpoints for resistance. Numbers in the shaded areas indicate percentage of isolates with MIC's greater than the highest concentrations on the plate. Numbers listed for the lowest tested concentrations represent the percentage of isolates with MIC's equal to or less than the lowest tested concentration.
⁵ Data not presented as *E. faecalis* is considered intrinsically resistant to Quinupristin-Dalopristin

Table 69b. Distribution of MICs and Occurrence among *Enterococcus faecalis* Isolates, 2014

Antimicrobial Class	Antimicrobial Agent	Isolate Source (# of Isolates)	%I ¹	%R ²	[95% CI] ³	Distribution (%) of MICs (µg/ml) ⁴																																																																												
						0.015	0.03	0.06	0.125	0.25	0.50	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048																																																										
Lipopeptides	Daptomycin	Chickens	Retail Chickens (209)	N/A	0.0	[0.0 - 1.7]						1.4	52.6	40.2	5.7																																																																			
			Cecal (72)	N/A	0.0	[0.0 - 5.0]				2.8	8.3	66.7	20.8	1.4																																																																				
		Turkeys	Retail Ground Turkey (400)	N/A	0.0	[0.0 - 0.9]				1.0	52.8	42.8	3.5																																																																					
			Cecal (48)	N/A	0.0	[0.0 - 7.4]				16.7	81.3	2.1																																																																						
		Cattle	Retail Ground Beef (313)	N/A	0.0	[0.0 - 1.2]			0.3	2.6	46.3	47.6	3.2																																																																					
			Cecal (Beef) (39)	N/A	2.6	[0.1 - 13.5]					48.7	35.9	12.8																							2.6																																														
			Cecal (Dairy) (54)	N/A	1.9	[0.0 - 9.9]					50.0	42.6	5.6																							1.9																																														
		Swine	Retail (355)	N/A	0.3	[0.0 - 1.6]				2.5	51.3	40.6	5.4																							0.3																																														
			Cecal (Market Swine) (80)	N/A	1.3	[0.0 - 6.8]				1.3	63.8	30.0	3.8																							1.3																																														
			Cecal (Sows) (67)	N/A	0.0	[0.0 - 5.4]			1.5	1.5	56.7	37.3	3.0																																																																					
		Macrolides	Erythromycin	Chickens	Retail Chickens (209)	35.9	37.3	[30.7 - 44.3]				21.5	5.3																							24.9																	11.0	37.3																												
Cecal (72)	20.9				51.4	[39.3 - 63.3]				19.4	8.3	16.7	4.2											4.2	47.2																																																									
Turkeys	Retail Ground Turkey (400)			40.3	36.0	[31.3 - 40.9]				15.0	8.8	27.8	12.5											36.0																																																										
	Cecal (48)			20.9	54.2	[39.2 - 68.6]				18.8	6.3	14.6	2.1	4.2	10.4	43.8																																																																		
Cattle	Retail Ground Beef (313)			62.0	0.3	[0.0 - 1.8]				24.0	13.7	39.6	18.9	3.5	0.3																																																																			
	Cecal (Beef) (39)			35.9	7.7	[1.6 - 20.9]				46.2	10.3	28.2	7.7	2.6	5.1																																																																			
	Cecal (Dairy) (54)			48.1	1.9	[0.0 - 9.9]				25.9	24.1	40.7	7.4	1.9																																																																				
Swine	Retail (355)			69.4	7.0	[4.6 - 10.2]				11.3	12.4	38.6	25.4	5.4																			7.0																																																	
	Cecal (Market Swine) (80)			15.0	57.5	[45.9 - 68.5]				12.5	15.0	15.0	1.3	56.3																																																																				
	Cecal (Sows) (67)			16.4	64.2	[51.5 - 75.5]				11.9	7.5	14.9	1.5	1.5																			62.7																																																	
Tylosin				Chickens	Retail Chickens (209)	0.0	37.3	[30.7 - 44.3]						1.0																			12.0									49.3	0.5		37.3																																					
			Cecal (72)		0.0	52.8	[40.7 - 64.7]						1.4	30.6																			13.9									1.4			52.8																																					
			Turkeys	Retail Ground Turkey (400)	0.0	36.0	[31.3 - 40.9]																										20.0									43.5	0.5		36.0																																					
				Cecal (48)	0.0	58.3	[43.2 - 72.4]																										25.0									14.6	2.1																														58.3									
			Cattle	Retail Ground Beef (313)	0.3	0.6	[0.1 - 2.3]																										32.2									65.8	1.0	0.3	0.6																																					
				Cecal (Beef) (39)	0.0	7.7	[1.6 - 20.9]								56.4																		35.9											7.7																																						
				Cecal (Dairy) (54)	0.0	1.9	[0.0 - 9.9]								51.9																		46.3			1.9																																														
			Swine	Retail (355)	0.0	7.3	[4.8 - 10.5]							0.9	23.4																		67.6	0.9		7.3																																														
				Cecal (Market Swine) (80)	0.0	57.5	[45.9 - 68.5]								25.0																		16.3	1.3											57.5																																					
				Cecal (Sows) (67)	0.0	64.2	[51.5 - 75.5]								28.4																		7.5			64.2																																														
			Nitrofurans	Nitrofurantoin	Chickens	Retail Chickens (209)	3.4	0.0	[0.0 - 1.7]																									18.7	77.0	1.0									3.4																																					
Cecal (72)	6.9					1.4	[0.0 - 7.5]								1.4																		38.9	47.2	4.2	6.9									1.4																																					
Turkeys	Retail Ground Turkey (400)	1.5			0.3	[0.0 - 1.4]																				27.0	70.3	1.0	1.5	0.3																																																				
	Cecal (48)	0.0			2.1	[0.1 - 11.1]																				60.4	37.5			2.1																																																				
Cattle	Retail Ground Beef (313)	0.6			0.0	[0.0 - 1.2]									0.3	19.8	78.3	1.0	0.6																																																															
	Cecal (Beef) (39)	5.1			0.0	[0.0 - 9.0]										25.6	56.4	12.8	5.1																																																															
	Cecal (Dairy) (54)	5.6			0.0	[0.0 - 6.6]										22.2	68.5	3.7	5.6																																																															
Swine	Retail (355)	1.7			0.0	[0.0 - 1.0]										20.3	77.8	0.3	1.7																																																															
	Cecal (Market Swine) (80)	2.5			0.0	[0.0 - 4.5]										31.3	65.0	1.3	2.5																																																															
	Cecal (Sows) (67)	1.5			0.0	[0.0 - 5.4]										49.3	46.3	3.0	1.5																																																															
Oxazolidinones	Linezolid	Chickens			Retail Chickens (209)	0.0	0.0	[0.0 - 1.7]						34.9	65.1																																																																			
			Cecal (72)	0.0	0.0	[0.0 - 5.0]						22.2	72.2	5.6																																																																				
		Turkeys	Retail Ground Turkey (400)	0.0	0.0	[0.0 - 0.9]							0.3	43.0	56.8																																																																			
			Cecal (48)	0.0	0.0	[0.0 - 7.4]							14.6	81.3	4.2																																																																			
		Cattle	Retail Ground Beef (313)	0.0	0.0	[0.0 - 1.2]								13.7	86.3																																																																			
			Cecal (Beef) (39)	0.0	2.6	[0.1 - 13.5]								12.8	76.9																																		7.7	2.6																																
			Cecal (Dairy) (54)	0.0	0.0	[0.0 - 6.6]								3.7	77.8																																		18.5																																	
		Swine	Retail (355)	0.0	0.0	[0.0 - 1.0]																																											13.2	86.8																																
			Cecal (Market Swine) (80)	0.0	0.0	[0.0 - 4.5]																																											6.3	86.3											7.5																					
			Cecal (Sows) (67)	0.0	0.0	[0.0 - 5.4]																																											1.5	85.1											13.4																					
		Penicillins	Penicillin	Chickens	Retail Chickens (209)	N/A	0.0	[0.0 - 1.7]						0.5	18.7																																		80.4	0.5																																
Cecal (72)	N/A				0.0	[0.0 - 5.0]				2.8	1.4		25.0	70.8																																																																				
Turkeys	Retail Ground Turkey (400)			N/A	0.5	[0.1 - 1.8]								2.3									21.5	75.5	0.3											0.5																																														
	Cecal (48)			N/A	0.0	[0.0 - 7.4]																		39.6	60.4																																																									
Cattle	Retail Ground Beef (313)			N/A	0.0	[0.0 - 1.2]								0.3										25.9	73.8																																																									
	Cecal (Beef) (39)			N/A	0.0	[0.0 - 9.0]								2.6									7.7	7.7	15.4																								66.7																																	
	Cecal (Dairy) (54)			N/A	0.0	[0.0 - 6.6]								1.9										20.4	77.8																																																									
Swine	Retail (355)			N/A	0.0	[0.0 - 1.0]								0.3										27.0	72.4																								0.3																																	
	Cecal (Market Swine) (80)			N/A	0.0	[0.0 - 4.5]								1.3										1.3	18.8																								78.8																																	
	Cecal (Sows) (67)			N/A	0.0	[0.0 - 5.4]																		11.9	88.1																																																									

¹ Percent of isolates with intermediate susceptibility. N/A used when there is no intermediate breakpoint established.
² Percent of isolates with resistance. Discrepancies between %R and sums of distribution %s are due to rounding. Percent (%) non-susceptible is reported rather than %R for daptomycin and tigecycline because there is no CLSI breakpoint established.
³ 95% confidence intervals for percent resistant (%R) were calculated using the Clopper-Pearson exact method.
⁴ The unshaded areas indicate the dilution range of the Sensititre plates used to test isolates. Single vertical lines indicate the breakpoints for susceptibility, while double vertical lines indicate the breakpoints for resistance. Numbers in the shaded areas indicate percentage of isolates with MIC's greater than the highest concentrations on the plate. Numbers listed for the lowest tested concentrations represent the percentage of isolates with MIC's equal to or less than the lowest tested concentration.
⁵ Data not presented as *E. faecalis* is considered intrinsically resistant to Quinupristin-Dalfopristin

Table 69c. Distribution of MICs and Occurrence among *Enterococcus faecalis* Isolates, 2014

Antimicrobial Class	Antimicrobial Agent	Isolate Source (# of Isolates)	%I ¹	%R ²	[95% CI] ³	Distribution (%) of MICs (µg/ml) ⁴														
						0.015	0.03	0.06	0.125	0.25	0.50	1	2	4	8	16	32	64	128	256
Phenicol	Chloramphenicol	Chickens	Retail Chickens (209)	1.9	1.4	[0.3 - 4.1]														
			Cecal (72)	0.0	1.4	[0.0 - 7.5]														
		Turkeys	Retail Ground Turkey (400)	0.0	0.5	[0.1 - 1.8]														
			Cecal (48)	2.1	2.1	[0.1 - 11.1]														
		Cattle	Retail Ground Beef (313)	0.0	0.3	[0.0 - 1.8]														
			Cecal (Beef) (39)	0.0	2.6	[0.1 - 13.5]														
			Cecal (Dairy) (54)	0.0	0.0	[0.0 - 6.6]														
		Swine	Retail (355)	0.6	1.4	[0.5 - 3.3]														
			Cecal (Market Swine) (80)	0.0	8.8	[3.6 - 17.2]														
			Cecal (Sows) (67)	3.0	20.9	[11.9 - 32.6]														
Quinolones	Ciprofloxacin	Chickens	Retail Chickens (209)	51.7	1.0	[0.1 - 3.4]														
			Cecal (72)	4.2	1.4	[0.0 - 7.5]														
		Turkeys	Retail Ground Turkey (400)	40.8	0.8	[0.2 - 2.2]														
			Cecal (48)	2.1	0.0	[0.0 - 7.4]														
		Cattle	Retail Ground Beef (313)	48.9	0.0	[0.0 - 1.2]														
			Cecal (Beef) (39)	30.8	0.0	[0.0 - 9.0]														
			Cecal (Dairy) (54)	38.9	3.7	[0.5 - 12.7]														
		Swine	Retail (355)	36.6	0.0	[0.0 - 1.0]														
			Cecal (Market Swine) (80)	12.5	0.0	[0.0 - 4.5]														
			Cecal (Sows) (67)	19.4	0.0	[0.0 - 5.4]														
Streptogramins	Quinupristin-Dalfopristin ⁵	Chickens	Retail Chickens (209)	N/A	N/A	N/A														
			Cecal (72)	N/A	N/A	N/A														
		Turkeys	Retail Ground Turkey (400)	N/A	N/A	N/A														
			Cecal (48)	N/A	N/A	N/A														
		Cattle	Retail Ground Beef (313)	N/A	N/A	N/A														
			Cecal (Beef) (39)	N/A	N/A	N/A														
			Cecal (Dairy) (54)	N/A	N/A	N/A														
		Swine	Retail (355)	N/A	N/A	N/A														
			Cecal (Market Swine) (80)	N/A	N/A	N/A														
			Cecal (Sows) (67)	N/A	N/A	N/A														
Tetracyclines	Tetracycline	Chickens	Retail Chickens (209)	0.0	68.9	[62.1 - 75.1]														
			Cecal (72)	2.8	68.1	[56.0 - 78.6]														
		Turkeys	Retail Ground Turkey (400)	0.5	90.0	[86.6 - 92.8]														
			Cecal (48)	2.1	97.9	[88.9 - 99.9]														
		Cattle	Retail Ground Beef (313)	0.0	21.1	[16.7 - 26.0]														
			Cecal (Beef) (39)	2.6	20.5	[9.3 - 36.5]														
			Cecal (Dairy) (54)	1.9	22.2	[12.0 - 35.6]														
		Swine	Retail (355)	0.0	76.1	[71.3 - 80.4]														
			Cecal (Market Swine) (80)	0.0	80.0	[69.6 - 88.1]														
			Cecal (Sows) (67)	0.0	82.1	[70.8 - 90.4]														

¹ Percent of isolates with intermediate susceptibility. N/A used when there is no intermediate breakpoint established.
² Percent of isolates with resistance. Discrepancies between %R and sums of distribution %'s are due to rounding. Percent (%) non-susceptible is reported rather than %R for daptomycin and tigecycline because there is no CLSI breakpoint established.
³ 95% confidence intervals for percent resistant (%R) were calculated using the Clopper-Pearson exact method
⁴ The unshaded areas indicate the dilution range of the Sensititre plates used to test isolates. Single vertical lines indicate the breakpoints for susceptibility, while double vertical lines indicate the breakpoints for resistance. Numbers in the shaded areas indicate percentage of isolates with MIC's greater than the highest concentrations on the plate. Numbers listed for the lowest tested concentrations represent the percentage of isolates with MIC's equal to or less than the lowest tested concentration.
⁵ Data not presented as *E. faecalis* is considered intrinsically resistant to Quinupristin-Dalfopristin

Resistance by Year

Table 70a. Antimicrobial Resistance among *Enterococcus faecalis* Isolates, 2003-2014

Year		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014				
Number of Isolates Tested	Chickens	Retail Chickens	188	88	116	126	123	165	138	214	186	204	202	209			
		Cecal											35	72			
	Turkeys	Retail Ground Turkey	289	260	339	291	261	271	260	369	392	384	407	400			
		Cecal											26	48			
	Cattle	Retail Ground Beef	224	194	226	227	205	202	227	285	269	277	304	313			
		Cecal (Beef) Cecal (Dairy)											36 54	39 54			
	Swine	Retail Pork Chops	313	313	320	301	263	263	259	353	334	350	328	355			
		Cecal (Market Swine) Cecal (Sows)											55 66	80 67			
	Antimicrobial Class	Antimicrobial (Resistance Breakpoint)	Isolate Source														
	Aminoglycosides	Gentamicin (MIC >500 µg/ml)	Chickens	Retail Chickens	20.2%	19.3%	18.1%	23.0%	19.5%	19.4%	25.4%	31.8%	26.9%	29.4%	24.3%	26.8%	
				Cecal	38	17	21	29	24	32	35	68	50	60	49	56	45.7%
			Turkeys	Retail Ground Turkey	27.7%	24.6%	20.1%	22.0%	42.1%	41.3%	30.0%	37.4%	33.7%	32.6%	33.7%	34.0%	
Cecal				80	64	68	64	110	112	78	138	132	125	137	136	38.5%	41.7%
Cattle			Retail Ground Beef	1.8%	1.0%	1.8%	0.9%	0.5%	2.0%	0.9%	0.4%	0.0%	0.0%	0.7%	0.0%		
			Cecal (Beef)	4	2	4	2	1	4	2	1	0	0	2	0	2.8%	0.0%
			Cecal (Dairy)											1	0	0.0%	0.0%
Swine			Retail Pork Chops	0.3%	1.9%	1.6%	0.7%	0.8%	0.4%	1.9%	1.4%	0.9%	1.7%	0.9%	2.8%		
			Cecal (Market Swine)	1	6	5	2	2	1	5	5	3	6	3	10	9.1%	7.5%
			Cecal (Sows)											5	6	16.7%	7.5%
Kanamycin (MIC ≥ 1024 µg/ml)			Chickens	Retail Chickens	27.1%	22.7%	26.7%	30.2%	28.5%	29.7%	30.4%	36.0%	33.3%	34.8%	26.7%	29.7%	
				Cecal	51	20	31	38	35	49	42	77	62	71	54	62	48.6%
		Turkeys	Retail Ground Turkey	36.0%	29.6%	27.4%	32.0%	50.2%	55.4%	35.9%	44.7%	42.9%	38.5%	42.8%	42.0%		
			Cecal	104	77	93	93	131	150	101	165	168	148	174	168	42.3%	62.5%
		Cattle	Retail Ground Beef	3.1%	3.1%	4.0%	2.6%	2.0%	4.0%	1.8%	0.7%	1.5%	0.0%	2.3%	0.0%		
			Cecal (Beef)	7	6	9	6	4	8	4	2	4	0	2	0	5.6%	0.0%
			Cecal (Dairy)											1	1	1.9%	1.9%
		Swine	Retail Pork Chops	4.8%	2.6%	3.1%	2.3%	2.3%	3.0%	2.7%	1.7%	2.4%	2.0%	2.7%	4.2%		
			Cecal (Market Swine)	15	8	10	7	6	8	7	6	8	7	9	15	21.8%	27.5%
			Cecal (Sows)											12	22	39.4%	28.4%
		Streptomycin (MIC ≥ 1000 µg/ml)	Chickens	Retail Chickens	22.9%	18.2%	18.1%	10.3%	17.9%	10.9%	13.0%	15.4%	19.4%	17.7%	17.3%	21.1%	
				Cecal	43	16	21	13	22	18	18	33	36	36	35	44	11.4%
			Turkeys	Retail Ground Turkey	30.4%	26.9%	21.5%	20.3%	36.4%	39.1%	27.7%	27.9%	19.4%	17.7%	26.0%	23.3%	
				Cecal	88	70	73	59	95	106	72	103	108	79	106	93	30.8%
			Cattle	Retail Ground Beef	5.4%	7.7%	8.4%	5.7%	4.9%	1.5%	5.3%	1.4%	1.9%	1.8%	3.6%	1.6%	
Cecal (Beef)				12	15	19	13	10	3	12	4	5	5	11	5	5.6%	0.0%
Cecal (Dairy)														2	0	1.9%	5.6%
Swine	Retail Pork Chops		7.3%	9.3%	7.8%	7.6%	8.7%	10.3%	8.9%	6.8%	5.7%	4.0%	4.9%	4.5%			
	Cecal (Market Swine)		23	29	25	23	23	27	23	24	19	14	16	16	27.3%	26.3%	
	Cecal (Sows)												15	21	27.3%	31.3%	
Glycopeptides	Vancomycin (MIC ≥ 32 µg/ml)	Chickens	Retail Chickens	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			
			Cecal	0	0	0	0	0	0	0	0	0	0	0	0	0.0%	0.0%
		Turkeys	Retail Ground Turkey	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		
			Cecal	0	0	0	0	0	0	0	0	0	0	0	0	0.0%	0.0%
		Cattle	Retail Ground Beef	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		
			Cecal (Beef)	0	0	0	0	0	0	0	0	0	0	0	0	0.0%	0.0%
			Cecal (Dairy)											0	0	0.0%	0.0%
		Swine	Retail Pork Chops	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		
			Cecal (Market Swine)	0	0	0	0	0	0	0	0	0	0	0	0	0.0%	0.0%
			Cecal (Sows)											0	0	0.0%	0.0%

Table 70b. Antimicrobial Resistance among *Enterococcus faecalis* Isolates, 2003-2014

Year		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014		
Number of Isolates Tested	Chickens	Retail Chickens	188	88	116	126	123	165	138	214	186	204	202	209	
		Cecal											35	72	
	Turkeys	Retail Ground Turkey	289	260	339	291	261	271	260	369	392	384	407	400	
		Cecal											26	48	
	Cattle	Retail Ground Beef	224	194	226	227	205	202	227	285	269	277	304	313	
		Cecal (Beef)											36	39	
	Swine	Cecal (Dairy)											54	54	
		Retail Pork Chops	313	313	320	301	263	263	259	353	334	350	328	355	
		Cecal (Market Swine)											55	80	
		Cecal (Sows)											66	67	
	Antimicrobial Class	Antimicrobial (Resistance Breakpoint)	Isolate Source												
	Glycylcycline	Tigecycline (MIC ≥ 0.25 µg/ml) ¹	Chickens	Retail Chickens			0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Cecal						0	0	0	0	0	0	0	0	0	0.0%
Turkeys			Retail Ground Turkey			0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.3%	0.0%	0.0%	0.3%
			Cecal			0	0	0	0	0	0	1	0	0	1
Cattle			Retail Ground Beef			0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
			Cecal (Beef)			0	0	0	0	0	0	0	0	0	0
			Cecal (Dairy)											0.0%	0.0%
Swine			Retail Pork Chops			0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.3%	0.0%	0.0%	1.4%
			Cecal (Market Swine)			0	0	0	0	0	0	1	0	0	5
			Cecal (Sows)											0.0%	0.0%
														0	0
Lincosamides			Lincomycin (MIC ≥ 8 µg/ml)	Chickens	Retail Chickens	99.5%	98.9%	99.1%	100.0%	99.2%	100.0%	98.6%	99.1%	98.9%	99.0%
	Cecal	187			87	115	126	122	165	136	212	184	202	202	100.0%
	Turkeys	Retail Ground Turkey		99.0%	98.8%	97.3%	98.6%	98.9%	99.3%	97.7%	97.3%	98.5%	98.7%	99.8%	99.0%
		Cecal		286	257	330	287	258	269	254	359	386	379	406	396
	Cattle	Retail Ground Beef		96.4%	97.4%	97.8%	97.8%	97.6%	99.0%	97.8%	99.0%	97.4%	98.9%	96.7%	98.1%
		Cecal (Beef)		216	189	221	222	201	200	222	282	262	274	294	307
		Cecal (Dairy)												100.0%	94.9%
	Swine	Retail Pork Chops		98.1%	94.9%	95.3%	97.3%	97.7%	97.3%	97.3%	97.2%	97.0%	98.0%	99.4%	98.0%
		Cecal (Market Swine)		307	297	305	293	257	256	252	343	324	343	326	348
		Cecal (Sows)												100.0%	98.8%
														55	79
														100.0%	100.0%
												66	67		
Lipopeptides	Daptomycin (MIC ≥ 4 µg/ml) ¹	Chickens	Retail Chickens		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		
			Cecal		0	0	0	0	0	0	0	0	0	0	
		Turkeys	Retail Ground Turkey		0.0%	0.3%	0.0%	0.0%	0.4%	0.0%	0.0%	0.0%	0.0%	0.0%	
			Cecal		0	1	0	0	1	0	0	0	0	0	
		Cattle	Retail Ground Beef		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
			Cecal (Beef)		0	0	0	0	0	0	0	0	0	0	
			Cecal (Dairy)											0.0%	
		Swine	Retail Pork Chops		0.0%	0.0%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
			Cecal (Market Swine)		0	0	1	0	0	0	0	0	0	0	
			Cecal (Sows)											0.0%	
														0.3%	
														0	
												0			
												0			
Macrolides	Erythromycin (MIC ≥ 8 µg/ml)	Chickens	Retail Chickens	43.1%	35.2%	37.1%	34.9%	44.7%	32.7%	39.9%	32.2%	35.5%	34.3%		
			Cecal	81	31	43	44	55	54	55	69	66	70	71	
		Turkeys	Retail Ground Turkey	43.6%	33.8%	38.3%	47.1%	48.7%	51.7%	37.7%	40.4%	47.2%	37.0%	39.3%	
			Cecal	126	88	130	137	127	140	98	149	185	142	160	
		Cattle	Retail Ground Beef	4.9%	3.6%	4.4%	4.0%	2.4%	2.5%	2.6%	0.7%	3.0%	0.0%	3.0%	
			Cecal (Beef)	11	7	10	9	5	5	6	2	8	0	9	
			Cecal (Dairy)											11.1%	
		Swine	Retail Pork Chops	7.0%	9.9%	5.9%	6.6%	9.1%	8.0%	6.9%	4.5%	4.5%	5.1%	7.0%	
			Cecal (Market Swine)	22	31	19	20	24	21	18	16	15	18	23	
			Cecal (Sows)											52.7%	
														23	
														7.0%	
												25			
												46			
												64.2%			
												35			
												43			

¹ Percent non-susceptible is reported rather than percent resistance as no CLSI breakpoint has been established. NARMS breakpoint established to determine resistance.

Table 70c. Antimicrobial Resistance among *Enterococcus faecalis* Isolates, 2002-2013

Year		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014				
Number of Isolates Tested	Chickens	Retail Chickens	188	88	116	126	123	165	138	214	186	204	202	209			
		Cecal											35	72			
	Turkeys	Retail Ground Turkey	289	260	339	291	261	271	260	369	392	384	407	400			
		Cecal											26	48			
	Cattle	Retail Ground Beef	224	194	226	227	205	202	227	285	269	277	304	313			
		Cecal (Beef)											36	39			
	Swine	Retail Pork Chops	313	313	320	301	263	263	259	353	334	350	328	355			
		Cecal (Market Swine)											55	80			
			Cecal (Sows)										66	67			
	Antimicrobial Class	Antimicrobial (Resistance Breakpoint)	Isolate Source														
	Macrolides	Tylosin (MIC ≥ 32 µg/ml)	Chickens	Retail Chickens	42.6%	34.1%	37.1%	36.5%	44.7%	32.7%	39.9%	32.4%	35.5%	34.3%	35.1%	37.3%	
				Cecal	80	30	43	46	55	54	55	69	66	70	71	78	
Turkeys			Retail Ground Turkey	43.9%	34.6%	38.3%	47.1%	49.4%	51.3%	37.7%	40.4%	47.2%	37.0%	39.1%	36.0%		
			Cecal	127	90	130	137	129	139	98	149	185	142	159	144		
Cattle			Retail Ground Beef	4.9%	3.6%	5.8%	4.0%	2.4%	3.0%	2.2%	0.7%	3.0%	0.0%	3.0%	0.6%		
			Cecal (Beef)	11	7	13	9	5	6	5	2	8	0	9	2		
			Cecal (Dairy)											11.1%	7.7%		
Swine			Retail Pork Chops	7.0%	9.9%	6.3%	7.3%	9.1%	7.6%	6.6%	4.5%	4.8%	5.1%	7.0%	7.3%		
			Cecal (Market Swine)	22	31	20	22	24	20	17	16	16	18	23	26		
			Cecal (Sows)											52.7%	57.5%		
														29	46		
													53.0%	64.2%			
													35	43			
Nitrofurans			Nitrofurantoin (MIC ≥ 128 µg/ml)	Chickens	Retail Chickens	1.1%	1.1%	4.3%	0.0%	0.0%	1.2%	0.0%	0.0%	0.5%	0.0%	0.0%	
					Cecal	2	1	5	0	0	2	0	0	1	0	0	0
				Turkeys	Retail Ground Turkey	1.4%	1.2%	2.4%	0.0%	0.0%	0.0%	0.4%	0.0%	0.0%	0.0%	0.0%	0.3%
					Cecal	4	3	8	0	0	0	1	0	0	0	0	1
				Cattle	Retail Ground Beef	0.0%	0.0%	0.9%	0.0%	0.0%	0.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Cecal (Beef)	0			0	2	0	0	1	0	0	0	0	0	0		
	Cecal (Dairy)													0.0%	0.0%		
	Swine	Retail Pork Chops		0.0%	0.3%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.3%	0.0%	0.0%		
		Cecal (Market Swine)		0	1	1	0	0	0	0	0	0	1	0	0		
		Cecal (Sows)												0.0%	0.0%		
														0	0		
													0.0%	0.0%			
											0	0					
Oxazolidinones	Linezolid (MIC ≥ 8 µg/ml)	Chickens	Retail Chickens	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			
			Cecal	0	0	0	0	0	0	0	0	0	0	0	0		
		Turkeys	Retail Ground Turkey	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		
			Cecal	0	0	0	0	0	0	0	0	0	0	0	0		
		Cattle	Retail Ground Beef	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		
			Cecal (Beef)	0	0	0	0	0	0	0	0	0	0	0	0		
			Cecal (Dairy)											0.0%	2.6%		
		Swine	Retail Pork Chops	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		
			Cecal (Market Swine)	0	0	0	0	0	0	0	0	0	0	0	0		
			Cecal (Sows)											0.0%	0.0%		
														0	0		
													0.0%	0.0%			
											0	0					
Penicillins	Penicillin (MIC ≥ 16 µg/ml)	Chickens	Retail Chickens	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.5%	0.0%	0.0%	0.0%	0.0%			
			Cecal	0	0	0	0	0	0	0	1	0	0	0	0		
		Turkeys	Retail Ground Turkey	0.0%	0.0%	1.5%	0.3%	0.0%	0.0%	0.0%	0.3%	0.0%	0.3%	0.0%	0.5%		
			Cecal	0	0	5	1	0	0	0	1	0	1	0	2		
		Cattle	Retail Ground Beef	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.4%	0.0%	0.0%	0.0%	0.0%	0.0%		
			Cecal (Beef)	0	0	0	0	0	0	1	0	0	0	0	0		
			Cecal (Dairy)											0.0%	0.0%		
		Swine	Retail Pork Chops	0.0%	0.0%	1.3%	0.0%	0.0%	0.4%	0.4%	0.3%	0.0%	0.0%	0.0%	0.0%		
			Cecal (Market Swine)	0	0	4	0	0	1	1	1	0	0	0	0		
			Cecal (Sows)											0.0%	0.0%		
														0	0		
													0.0%	0.0%			
											0	0					

Table 70d. Antimicrobial Resistance among *Enterococcus faecalis* Isolates, 2003-2014

Year		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014				
Number of Isolates Tested	Chickens	Retail Chickens	188	88	116	126	123	165	138	214	186	204	202	209			
		Cecal											35	72			
	Turkeys	Retail Ground Turkey	289	260	339	291	261	271	260	369	392	384	407	400			
		Cecal											26	48			
	Cattle	Retail Ground Beef	224	194	226	227	205	202	227	285	269	277	304	313			
		Cecal (Beef)											36	39			
		Cecal (Dairy)											54	54			
	Swine	Retail Pork Chops	313	313	320	301	263	263	259	353	334	350	328	355			
		Cecal (Market Swine)											55	80			
		Cecal (Sows)											66	67			
	Antimicrobial Class	Antimicrobial (Resistance Breakpoint)	Isolate Source														
	Phenicol	Chloramphenicol (MIC ≥ 32 µg/ml)	Chickens	Retail Chickens	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.4%	0.9%	0.0%	0.0%	0.5%	1.4%	
Cecal				0	0	0	0	0	0	2	2	0	0	0	1	3	
Turkeys			Retail Ground Turkey	0.0%	0.0%	0.0%	0.0%	0.8%	0.4%	0.0%	0.3%	0.3%	0.3%	0.7%	0.5%		
			Cecal	0	0	0	0	2	1	0	1	1	1	3	2		
Cattle			Retail Ground Beef	0.0%	0.0%	0.4%	1.3%	1.0%	0.0%	0.0%	0.7%	0.7%	0.0%	0.3%	0.3%		
			Cecal (Beef)	0	0	1	3	2	0	0	2	2	0	1	1		
			Cecal (Dairy)											2.8%	2.6%		
Swine			Retail Pork Chops	1.0%	0.6%	1.3%	1.0%	0.4%	0.4%	1.2%	0.0%	0.9%	2.3%	2.1%	1.4%		
			Cecal (Market Swine)	3	2	4	3	1	1	3	0	3	8	7	5		
			Cecal (Sows)											14.6%	8.8%		
														8	7		
Quinolones			Ciprofloxacin (MIC ≥ 4 µg/ml)	Chickens	Retail Chickens	0.0%	8.0%	0.9%	0.8%	0.0%	3.0%	0.0%	0.0%	0.0%	0.5%	1.0%	
	Cecal	0			7	1	1	0	5	0	0	0	0	1	2		
	Turkeys	Retail Ground Turkey		0.0%	5.8%	2.4%	0.7%	0.0%	3.3%	0.8%	0.0%	0.3%	0.0%	0.0%	0.8%		
		Cecal		0	15	8	2	0	9	2	0	1	0	0	3		
	Cattle	Retail Ground Beef		0.4%	12.9%	0.9%	0.0%	0.0%	4.0%	1.3%	0.4%	0.0%	1.1%	0.0%	0.0%		
		Cecal (Beef)		1	25	2	0	0	8	3	1	0	3	0	0		
		Cecal (Dairy)												3.7%	3.7%		
	Swine	Retail Pork Chops		0.0%	6.1%	2.5%	0.3%	0.0%	4.6%	1.5%	0.0%	0.3%	0.3%	0.0%	0.0%		
		Cecal (Market Swine)		0	19	8	1	0	12	4	0	1	1	0	0		
		Cecal (Sows)												0.0%	0.0%		
														0	0		
	Streptogramins	Quinupristin-Dalfopristin (MIC ≥ 4 µg/ml) ¹		Chickens	Retail Chickens	-	-	-	-	-	-	-	-	-	-		
Cecal														-	-		
Turkeys			Retail Ground Turkey	-	-	-	-	-	-	-	-	-	-	-	-		
			Cecal												-		
Cattle			Retail Ground Beef	-	-	-	-	-	-	-	-	-	-	-	-		
			Cecal (Beef)												-		
			Cecal (Dairy)												-		
Swine			Retail Pork Chops	-	-	-	-	-	-	-	-	-	-	-	-		
			Cecal (Market Swine)												-		
			Cecal (Sows)												-		
Tetracyclines			Tetracycline (MIC ≥ 16 µg/ml)	Chickens	Retail Chickens	68.6%	63.6%	75.0%	70.6%	65.9%	69.1%	72.5%	72.4%	63.4%	56.9%	62.4%	68.9%
					Cecal	129	56	87	89	81	114	100	155	118	116	126	144
	Turkeys	Retail Ground Turkey		87.9%	88.1%	84.4%	85.9%	94.3%	90.0%	85.8%	87.8%	92.4%	88.8%	87.5%	90.0%		
		Cecal		254	229	286	250	246	244	223	324	362	341	356	360		
	Cattle	Retail Ground Beef		20.5%	25.3%	34.1%	22.5%	32.5%	31.7%	21.1%	16.5%	18.2%	22.0%	21.4%	21.1%		
		Cecal (Beef)		46	49	77	51	67	64	48	47	49	61	65	66		
		Cecal (Dairy)												25.0%	20.5%		
	Swine	Retail Pork Chops		78.0%	75.7%	86.3%	81.4%	90.1%	77.2%	83.8%	79.0%	79.3%	81.7%	82.3%	76.1%		
		Cecal (Market Swine)		244	237	276	245	237	203	217	279	265	286	270	270		
		Cecal (Sows)												72.7%	80.0%		
														40	64		

¹ Not presented as *E. faecalis* is considered intrinsically resistant to Quinupristin-Dalfopristin

Multidrug Resistance

Table 71a. Resistance Patterns among *Enterococcus faecalis* Isolates, 2003-2014

Year		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014		
Number of Isolates Tested	Chickens	Retail Chickens	188	88	116	126	123	165	138	214	186	204	202	209	
		Cecal											35	72	
	Turkeys	Retail Ground Turkey	289	260	339	291	261	271	260	369	392	384	407	400	
		Cecal											26	48	
	Cattle	Retail Ground Beef	224	194	226	227	206	202	227	285	269	277	304	313	
		Cecal (Beef) Cecal (Dairy)											36 54	39 54	
	Swine	Retail Pork Chops	313	313	320	301	263	263	259	353	334	350	328	355	
		Cecal (Market Swine) Cecal (Sows)											55 66	80 67	
	Resistance Pattern ¹		Source												
	1. No Resistance Detected	Chickens	Retail Chickens	0.5% 1	0.0% 0	0.9% 1	0.0% 0	0.0% 0	0.0% 0	0.7% 1	0.5% 1	0.5% 1	1.0% 2	0.0% 0	0.0% 0
Cecal													0.0% 0	0.0% 0	
Turkeys		Retail Ground Turkey	1.0% 3	0.4% 1	0.6% 2	0.3% 1	0.0% 0	0.0% 0	1.5% 4	2.2% 8	0.8% 3	0.5% 2	0.3% 1	0.5% 2	
		Cecal											0.0% 0	0.0% 0	
Cattle		Retail Ground Beef	2.7% 6	1.5% 3	1.3% 3	1.8% 4	2.0% 4	0.5% 1	1.8% 4	0.7% 2	2.2% 6	1.1% 3	3.3% 10	1.9% 6	
		Cecal (Beef)											0.0% 0	2.6% 1	
		Cecal (Dairy)											1.9% 1	0.0% 0	
Swine		Retail Pork Chops	0.0% 0	0.6% 2	1.3% 4	0.0% 0	0.4% 1	0.4% 1	0.4% 1	0.3% 1	0.6% 2	0.9% 3	0.0% 0	0.3% 1	
		Cecal (Market Swine)											0.0% 0	1.3% 1	
		Cecal (Sows)											0.0% 0	0.0% 0	
2. Resistance to ≥ 3 Antimicrobial Classes		Chickens	Retail Chickens	47.9% 90	42.1% 37	50.0% 58	43.7% 55	45.5% 56	40.6% 67	43.5% 60	39.7% 85	41.4% 77	37.3% 76	38.1% 77	45.9% 96
			Cecal											45.7% 16	52.8% 38
	Turkeys	Retail Ground Turkey	54.3% 157	52.7% 137	43.4% 147	56.7% 165	67.0% 175	69.7% 189	50.0% 130	58.5% 216	60.2% 236	53.7% 206	58.0% 236	56.0% 224	
		Cecal											57.7% 15	77.1% 37	
	Cattle	Retail Ground Beef	6.7% 15	10.8% 21	10.2% 23	7.5% 17	6.8% 14	5.5% 11	6.6% 15	2.5% 7	3.7% 10	1.8% 5	3.6% 11	2.6% 8	
		Cecal (Beef)											13.9% 5	10.3% 7	
		Cecal (Dairy)											5.6% 3	7.4% 4	
	Swine	Retail Pork Chops	9.9% 31	18.8% 59	14.4% 46	12.3% 37	16.3% 43	17.5% 46	14.7% 38	9.3% 33	8.4% 28	8.6% 30	8.2% 27	10.1% 36	
		Cecal (Market Swine)											56.4% 31	57.5% 46	
		Cecal (Sows)											59.1% 39	65.7% 44	
	3. Resistant to ≥ 4 Antimicrobial Classes	Chickens	Retail Chickens	19.1% 36	18.2% 16	20.7% 24	19.8% 25	22.8% 28	21.2% 35	21.7% 30	23.8% 51	23.1% 43	21.1% 43	19.3% 39	22.5% 47
			Cecal											28.6% 10	27.8% 20
Turkeys		Retail Ground Turkey	31.1% 90	22.3% 58	25.7% 87	22.7% 66	36.4% 95	42.8% 116	28.1% 73	29.5% 109	30.9% 121	23.7% 91	26.5% 108	26.5% 106	
		Cecal											26.9% 7	52.1% 25	
Cattle		Retail Ground Beef	3.1% 7	3.1% 6	4.4% 10	2.2% 5	1.5% 3	2.0% 4	1.3% 3	0.7% 2	1.5% 4	0.0% 0	2.6% 8	0.0% 0	
		Cecal (Beef)											5.6% 2	2.6% 1	
		Cecal (Dairy)											1.9% 1	1.9% 1	
Swine		Retail Pork Chops	5.1% 16	5.8% 18	4.4% 14	3.3% 10	2.3% 6	4.9% 13	3.9% 10	2.5% 9	3.3% 11	3.1% 11	4.3% 14	4.8% 17	
		Cecal (Market Swine)											30.9% 17	31.3% 25	
		Cecal (Sows)											43.9% 29	44.8% 30	
4. Resistant to ≥ 5 Antimicrobial Classes		Chickens	Retail Chickens	0.5% 1	1.1% 1	0.9% 1	0.0% 0	0.0% 0	1.2% 2	1.4% 2	0.9% 2	0.0% 0	0.0% 0	0.5% 1	1.0% 2
			Cecal											0.0% 0	1.4% 1
	Turkeys	Retail Ground Turkey	0.7% 2	0.0% 0	1.5% 5	0.3% 1	0.0% 0	0.7% 2	0.0% 0	0.0% 0	0.8% 3	0.0% 0	0.3% 1	0.3% 1	
		Cecal											0.0% 0	0.0% 0	
	Cattle	Retail Ground Beef	0.0% 0	0.0% 0	0.4% 1	0.4% 1	0.5% 1	0.0% 0	0.0% 0	0.0% 0	0.7% 2	0.0% 0	0.3% 1	0.0% 0	
		Cecal (Beef)											2.8% 1	2.6% 1	
		Cecal (Dairy)											0.0% 0	1.9% 1	
	Swine	Retail Pork Chops	0.6% 2	1.0% 3	1.3% 4	0.7% 2	0.4% 1	0.8% 2	0.8% 2	0.0% 0	0.6% 2	0.9% 3	1.2% 4	1.1% 4	
		Cecal (Market Swine)											12.7% 7	8.8% 7	
		Cecal (Sows)											18.2% 12	11.9% 8	

¹ Resistance patterns do not include Quinupristin-Dalfoprisin as *E. faecalis* is considered intrinsically resistant

Table 71b. Resistance Patterns among *Enterococcus faecalis* Isolates, 2003-2014

Year			2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Number of Isolates Tested	Chickens	Retail Chickens	188	88	116	126	123	165	138	214	186	204	202	209
		Cecal											35	72
	Turkeys	Retail Ground Turkey	289	260	339	291	261	271	260	369	392	384	407	400
		Cecal											26	48
	Cattle	Retail Ground Beef	224	194	226	227	206	202	227	285	269	277	304	313
		Cecal (Beef)											36	39
		Cecal (Dairy)											54	54
	Swine	Retail Pork Chops	313	313	320	301	263	263	259	353	334	350	328	355
		Cecal (Market Swine)											55	80
		Cecal (Sows)											66	67
	Resistance Pattern			Source										
	5. Resistant to ≥ 6 ¹ Antimicrobial Classes			0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
5. Resistant to ≥ 6 ¹ Antimicrobial Classes	Chickens	Retail Chickens	0	0	0	0	0	0	0	0	0	0	0	2
		Cecal											0	0
	Turkeys	Retail Ground Turkey	0	0	4	0	0	0	0	0	0	0	0	0
		Cecal											0	0
	Cattle	Retail Ground Beef	0	0	1	0	0	0	0	0	0	0	0	0
		Cecal (Beef)											0	0
		Cecal (Dairy)											0	0
	Swine	Retail Pork Chops	0	0	0	0	0	0	0	0	0	0	0	0
		Cecal (Market Swine)											0	0
		Cecal (Sows)											0	0
	6. At Least Penicillin G and High Level Gentamicin			0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	6. At Least Penicillin G and High Level Gentamicin	Chickens	Retail Chickens	0	0	0	0	0	0	0	0	0	0	0
Cecal													0	0
Turkeys		Retail Ground Turkey	0	0	0	0	0	0	0	0	0	0	0	0
		Cecal											0	0
Cattle		Retail Ground Beef	0	0	0	0	0	0	0	0	0	0	0	0
		Cecal (Beef)											0	0
		Cecal (Dairy)											0	0
Swine		Retail Pork Chops	0	0	0	0	0	0	0	0	0	0	0	0
		Cecal (Market Swine)											0	0
		Cecal (Sows)											0	0
7. At Least Penicillin G High Level Gentamicin, and Linezolid Resistant			0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
7. At Least Penicillin G High Level Gentamicin, and Linezolid Resistant		Chickens	Retail Chickens	0	0	0	0	0	0	0	0	0	0	0
	Cecal												0	0
	Turkeys	Retail Ground Turkey	0	0	0	0	0	0	0	0	0	0	0	0
		Cecal											0	0
	Cattle	Retail Ground Beef	0	0	0	0	0	0	0	0	0	0	0	0
		Cecal (Beef)											0	0
		Cecal (Dairy)											0	0
	Swine	Retail Pork Chops	0	0	0	0	0	0	0	0	0	0	0	0
		Cecal (Market Swine)											0	0
		Cecal (Sows)											0	0
	8. At Least Penicillin G, High Level Gentamicin, and Tigecycline Resistant			0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	8. At Least Penicillin G, High Level Gentamicin, and Tigecycline Resistant	Chickens	Retail Chickens	0	0	0	0	0	0	0	0	0	0	0
Cecal													0	0
Turkeys		Retail Ground Turkey	0	0	0	0	0	0	0	0	0	0	0	0
		Cecal											0	0
Cattle		Retail Ground Beef	0	0	0	0	0	0	0	0	0	0	0	0
		Cecal (Beef)											0	0
		Cecal (Dairy)											0	0
Swine		Retail Pork Chops	0	0	0	0	0	0	0	0	0	0	0	0
		Cecal (Market Swine)											0	0
		Cecal (Sows)											0	0

¹Resistance patterns do not include Quinupristin-Dalfopristin as *E. faecalis* is considered intrinsically resistant

Table 72a. Distribution of MICs and Occurrence among Enterococcus faecium Isolates, 2014

Antimicrobial Class	Antimicrobial Agent	Isolate Source (# of Isolates)	%I ¹	%R ²	[95% CI] ³	Distribution (%) of MICs (μg/ml) ⁴																			
						0.02	0.03	0.06	0.125	0.25	0.50	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048	
Aminoglycosides	Gentamicin	Chickens	Retail Chickens (153)	N/A	7.2	[3.6 - 12.5]												92.2	0.7			7.2			
			Cecal (14)	N/A	0.0	[0.0 - 23.2]													100.0						
		Turkeys	Retail Ground Turkey (57)	N/A	17.5	[8.7 - 29.9]													82.5				17.5		
			Cecal (4)	N/A	50.0	[6.8 - 93.2]													50.0			25.0	25.0		
		Cattle	Retail Ground Beef (60)	N/A	0.0	[0.0 - 6.0]													100.0						
			Cecal (Beef) (47)	N/A	0.0	[0.0 - 7.5]													100.0						
			Cecal (Dairy) (28)	N/A	0.0	[0.0 - 12.3]													100.0						
		Swine	Retail Pork Chops (40)	N/A	2.5	[0.1 - 13.2]													97.5				2.5		
			Cecal (Market Swine) (21)	N/A	0.0	[0.0 - 16.1]													100.0						
			Cecal (Sows) (15)	N/A	0.0	[0.0 - 21.8]													100.0						
		Kanamycin	Chickens	Retail Chickens (153)	N/A	12.4	[7.6 - 18.7]													58.2	19.6	9.8	3.3	9.2	
				Cecal (14)	N/A	0.0	[0.0 - 23.2]													85.7	7.1	7.1			
			Turkeys	Retail Ground Turkey (57)	N/A	22.8	[12.7 - 35.8]													43.9	24.6	8.8	1.8	21.1	
	Cecal (4)			N/A	75.0	[19.4 - 99.4]													25.0				75.0		
	Cattle		Retail Ground Beef (60)	N/A	1.7	[0.0 - 8.9]													70.0	23.3	5.0		1.7		
			Cecal (Beef) (47)	N/A	0.0	[0.0 - 7.5]													87.2	12.8					
			Cecal (Dairy) (28)	N/A	0.0	[0.0 - 12.3]													82.1	14.3	3.6				
	Swine		Retail Pork Chops (40)	N/A	2.5	[0.1 - 13.2]													77.5	17.5	2.5		2.5		
			Cecal (Market Swine) (21)	N/A	4.8	[0.1 - 23.8]													81.0	14.3			4.8		
			Cecal (Sows) (15)	N/A	13.3	[1.7 - 40.5]													73.3	13.3			13.3		
	Streptomycin		Chickens	Retail Chickens (153)	N/A	15.0	[9.8 - 21.7]															85.0	8.5	5.9	0.7
				Cecal (14)	N/A	28.6	[8.4 - 58.1]														71.4	14.3	7.1	7.1	
			Turkeys	Retail Ground Turkey (57)	N/A	33.3	[21.4 - 47.1]														66.7	14.0	12.3	7.0	
				Cecal (4)	N/A	75.0	[19.4 - 99.4]														25.0	50.0	12.3	25.0	
			Cattle	Retail Ground Beef (60)	N/A	3.3	[0.4 - 11.5]														96.7	1.7	1.7		
				Cecal (Beef) (47)	N/A	2.1	[0.1 - 11.3]														97.9	2.1			
		Cecal (Dairy) (28)		N/A	0.0	[0.0 - 12.3]														100.0					
		Swine	Retail Pork Chops (40)	N/A	0.0	[0.0 - 8.8]														100.0					
	Cecal (Market Swine) (21)		N/A	23.8	[8.2 - 47.2]														76.2	19.1	4.8				
Cecal (Sows) (15)	N/A		26.7	[7.8 - 55.1]														73.3	13.3	13.3					
Glycopeptides	Vancomycin	Chickens	Retail Chickens (153)	0.0	0.0	[0.0 - 2.4]						0.7	67.3	20.3	10.5	1.3									
			Cecal (14)	0.0	0.0	[0.0 - 23.2]								71.4	28.6										
		Turkeys	Retail Ground Turkey (57)	0.0	0.0	[0.0 - 6.3]								1.8	52.6	28.1	15.8	1.8							
			Cecal (4)	0.0	0.0	[0.0 - 60.2]								50.0	25.0	25.0									
		Cattle	Retail Ground Beef (60)	0.0	0.0	[0.0 - 6.0]								3.3	81.7	8.3	6.7								
			Cecal (Beef) (47)	0.0	0.0	[0.0 - 7.5]								2.1	72.3	8.5	17.0								
			Cecal (Dairy) (28)	0.0	0.0	[0.0 - 12.3]								67.9	21.4	10.7									
		Swine	Retail Pork Chops (40)	0.0	0.0	[0.0 - 8.8]								75.0	25.0										
	Cecal (Market Swine) (21)		0.0	0.0	[0.0 - 16.1]								57.1	19.1	23.8										
	Cecal (Sows) (15)		0.0	0.0	[0.0 - 21.8]								80.0	20.0											
	Tigecycline	Chickens	Retail Chickens (153)	N/A	0.7	[0.0 - 3.6]							0.7	5.2	46.4	47.1	0.7								
			Cecal (14)	N/A	0.0	[0.0 - 23.2]								35.7	28.6	35.7									
		Turkeys	Retail Ground Turkey (57)	N/A	1.8	[0.0 - 9.4]								1.8	45.6	50.9	1.8								
			Cecal (4)	N/A	0.0	[0.0 - 60.2]								50.0	50.0										
		Cattle	Retail Ground Beef (60)	N/A	0.0	[0.0 - 6.0]								8.3	46.7	45.0									
			Cecal (Beef) (47)	N/A	0.0	[0.0 - 7.5]								12.8	36.2	34.0	17.0								
Cecal (Dairy) (28)			N/A	0.0	[0.0 - 12.3]								7.1	53.6	21.4	17.9									
Swine		Retail Pork Chops (40)	N/A	0.0	[0.0 - 8.8]								2.5	10.0	42.5	45.0									
	Cecal (Market Swine) (21)	N/A	0.0	[0.0 - 16.1]								28.6	28.6	42.9											
	Cecal (Sows) (15)	N/A	0.0	[0.0 - 21.8]								60.0	20.0	20.0											
Lincomamides	Lincomycin	Chickens	Retail Chickens (153)	0.7	80.4	[73.2 - 86.4]												17.7	1.3	0.7	2.6	77.8			
			Cecal (14)	0.0	78.6	[49.2 - 95.3]													14.3	7.1			78.6		
		Turkeys	Retail Ground Turkey (57)	1.8	82.5	[70.1 - 91.3]														14.0	1.8	1.8	5.3	77.2	
			Cecal (4)	0.0	75.0	[19.4 - 99.4]														25.0				75.0	
		Cattle	Retail Ground Beef (60)	3.3	70.0	[56.8 - 81.2]														23.3	3.3	3.3	20.0	50.0	
			Cecal (Beef) (47)	8.5	57.4	[42.2 - 71.7]														29.8	4.3	8.5	8.5	48.9	
			Cecal (Dairy) (28)	3.6	60.7	[40.6 - 78.5]														32.1	3.6	3.6	10.7	50.0	
		Swine	Retail Pork Chops (40)	2.5	80.0	[64.4 - 90.9]														17.5		2.5	37.5	42.5	
			Cecal (Market Swine) (21)	0.0	81.0	[58.1 - 94.6]														19.1			9.5	71.4	
			Cecal (Sows) (15)	13.3	80.0	[51.9 - 95.7]														6.7		13.3	6.7	73.3	

¹ Percent of isolates with intermediate susceptibility. N/A used when there is no intermediate breakpoint established.
² Percent of isolates with resistance. Discrepancies between %R and sums of distribution %s are due to rounding. Percent (%) non-susceptible is reported rather than %R for daptomycin and tigecycline because there is no CLSI breakpoint established.
³ 95% confidence intervals for percent resistant (%R) were calculated using the Clopper-Pearson exact method
⁴ The unshaded areas indicate the dilution range of the Sensititre plates used to test isolates. Single vertical lines indicate the breakpoints for susceptibility, while double vertical lines indicate the breakpoints for resistance. Numbers in the shaded areas indicate percentage of isolates with MIC's greater than the highest concentrations on the plate. Numbers listed for the lowest tested concentrations represent the percentage of isolates with MIC's equal to or less than the lowest tested concentration.

Table 72b. Distribution of MICs and Occurrence among *Enterococcus faecium* Isolates, 2014

Antimicrobial Class	Antimicrobial Agent	Isolate Source (# of Isolates)	%A ¹	%R ²	[95% CI] ³	Distribution (%) of MICs ($\mu\text{g/ml}$) ⁴																					
						0.02	0.03	0.06	0.125	0.25	0.50	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048			
Lipopeptides	Daptomycin ⁵	Chickens	Retail Chickens (153)	N/A	N/A	N/A								3.9	11.8	77.8	6.5										
			Cecal (14)	N/A	N/A	N/A									7.1		85.7	7.1									
		Turkeys	Retail Ground Turkey (57)	N/A	N/A	N/A									8.8	19.3	52.6	19.3									
			Cecal (4)	N/A	N/A	N/A									50.0		50.0										
		Cattle	Retail Ground Beef (60)	N/A	N/A	N/A									15.0	16.7	61.7	6.7									
			Cecal (Beef) (47)	N/A	N/A	N/A						4.3			6.4	31.9	53.2	4.3									
		Cattle	Cecal (Dairy) (28)	N/A	N/A	N/A						3.6			7.1	17.9	67.9	3.6									
			Retail Pork Chops (40)	N/A	N/A	N/A									12.5	32.5	50.0	5.0									
		Swine	Cecal (Market Swine) (21)	N/A	N/A	N/A									4.8	14.3	76.2	4.8									
			Cecal (Sows) (15)	N/A	N/A	N/A									6.7	20.0	66.7	6.7									
Macrolides	Erythromycin	Chickens	Retail Chickens (153)	47.1	34.6	[27.1 - 42.7]								9.8	8.5	17.7	22.9	6.5	0.7	34.0							
			Cecal (14)	71.3	14.3	[1.8 - 42.8]									7.1	7.1	7.1	57.1	7.1		14.3						
		Turkeys	Retail Ground Turkey (57)	36.8	36.8	[24.4 - 50.7]									21.1	5.3	7.0	17.5	12.3	5.3	31.6						
			Cecal (4)	25.0	50.0	[6.8 - 93.2]										25.0			25.0		50.0						
		Cattle	Retail Ground Beef (60)	76.7	8.3	[2.8 - 18.4]									11.7	3.3	15.0	26.7	35.0	5.0	3.3						
			Cecal (Beef) (47)	70.3	6.4	[1.3 - 17.5]									21.3	2.1	21.3	29.8	19.2		6.4						
		Cattle	Cecal (Dairy) (28)	67.8	3.6	[0.1 - 18.3]									25.0	3.6	7.1	46.4	14.3	3.6							
			Retail Pork Chops (40)	87.5	7.5	[1.6 - 20.4]									5.0		17.5	22.5	47.5	7.5							
		Swine	Cecal (Market Swine) (21)	66.7	14.3	[3.0 - 36.3]									19.1		23.8	28.6	14.3	4.8	9.5						
			Cecal (Sows) (15)	60.0	13.3	[1.7 - 40.5]									26.7		6.7	40.0	13.3		13.3						
	Macrolides	Tylosin	Chickens	Retail Chickens (153)	0.7	33.3	[25.9 - 41.4]									19.6	12.4	27.5	6.5	0.7	33.3						
				Cecal (14)	0.0	7.1	[0.2 - 33.9]										14.3	21.4	57.1			7.1					
			Turkeys	Retail Ground Turkey (57)	0.0	19.3	[10.0 - 31.9]									1.8	19.3	31.6	22.8	5.3		19.3					
				Cecal (4)	0.0	75.0	[19.4 - 99.4]										25.0					75.0					
			Cattle	Retail Ground Beef (60)	0.0	0.0	[0.0 - 6.0]										16.7	31.7	31.7	20.0							
				Cecal (Beef) (47)	2.1	6.4	[1.3 - 17.5]										19.2	25.5	34.0	12.8	2.1	2.1	4.3				
			Cattle	Cecal (Dairy) (28)	0.0	0.0	[0.0 - 12.3]										3.6	10.7	28.6	46.4	10.7						
				Retail Pork Chops (40)	0.0	10.0	[2.8 - 23.7]										10.0	25.0	40.0	15.0		10.0					
			Swine	Cecal (Market Swine) (21)	4.8	9.5	[1.2 - 30.4]										38.1	14.3	28.6	4.8	4.8						
				Cecal (Sows) (15)	0.0	13.3	[1.7 - 40.5]										26.7	33.3	20.0	6.7			13.3				
Nitrofurans	Nitrofurantoin	Chickens	Retail Chickens (153)	58.8	35.9	[28.4 - 44.1]														5.2	58.8	36.0					
			Cecal (14)	78.6	21.4	[4.7 - 50.8]																78.6	21.4				
		Turkeys	Retail Ground Turkey (57)	56.1	36.8	[24.4 - 50.7]													1.8	3.5	1.8	56.1	36.8				
			Cecal (4)	25.0	50.0	[6.8 - 93.2]													25.0			25.0	50.0				
		Cattle	Retail Ground Beef (60)	65.0	25.0	[14.7 - 37.9]															10.0	65.0	25.0				
			Cecal (Beef) (47)	83.0	10.6	[3.5 - 23.1]														2.1	4.3	83.0	10.6				
		Cattle	Cecal (Dairy) (28)	60.7	28.6	[13.2 - 48.7]													3.6	7.1	60.7	28.6					
			Retail Pork Chops (40)	82.5	10.0	[2.8 - 23.7]														2.5	5.0	82.5	10.0				
		Swine	Cecal (Market Swine) (21)	52.4	38.1	[18.1 - 61.6]														4.8	4.8	52.4	38.1				
			Cecal (Sows) (15)	66.7	33.3	[11.8 - 61.6]														4.8	4.8	66.7	33.3				
Oxazolidinones	Linezolid	Chickens	Retail Chickens (153)	0.0	0.0	[0.0 - 2.4]									33.3	66.7											
			Cecal (14)	0.0	0.0	[0.0 - 23.2]										14.3	85.7										
		Turkeys	Retail Ground Turkey (57)	0.0	0.0	[0.0 - 6.3]											35.1	64.9									
			Cecal (4)	0.0	0.0	[0.0 - 60.2]										25.0	25.0	50.0									
		Cattle	Retail Ground Beef (60)	1.7	0.0	[0.0 - 6.0]											13.3	85.0	1.7								
			Cecal (Beef) (47)	0.0	0.0	[0.0 - 7.5]										2.1	25.5	72.3									
		Cattle	Cecal (Dairy) (28)	64.3	0.0	[0.0 - 12.3]											3.6	32.1	64.3								
			Retail Pork Chops (40)	0.0	0.0	[0.0 - 8.8]											27.5	72.5									
		Swine	Cecal (Market Swine) (21)	0.0	0.0	[0.0 - 16.1]											23.8	76.2									
			Cecal (Sows) (15)	0.0	0.0	[0.0 - 21.8]											20.0	80.0									
Penicillins	Penicillin	Chickens	Retail Chickens (153)	N/A	10.5	[6.1 - 16.4]									0.7	5.2	5.9	13.7	52.9	11.1	5.9	4.6					
			Cecal (14)	N/A	7.1	[0.2 - 33.9]											7.1	7.1	50.0	28.6	7.1						
		Turkeys	Retail Ground Turkey (57)	N/A	45.6	[32.4 - 59.3]									1.8	1.8	10.5	24.6	15.8	12.3	33.3						
			Cecal (4)	N/A	50.0	[6.8 - 93.2]											50.0			25.0	25.0						
		Cattle	Retail Ground Beef (60)	N/A	1.7	[0.0 - 8.9]										23.3	5.0	10.0	13.3	38.3	8.3	1.7					
			Cecal (Beef) (47)	N/A	0.0	[0.0 - 7.5]										6.4	6.4	19.2	61.7	6.4							
		Cattle	Cecal (Dairy) (28)	N/A	0.0	[0.0 - 12.3]										10.7		14.3	64.3	10.7							
			Retail Pork Chops (40)	N/A	0.0	[0.0 - 8.8]										37.5	5.0	7.5	12.5	30.0	7.5						
		Swine	Cecal (Market Swine) (21)	N/A	9.5	[1.2 - 30.4]											9.5	9.5	57.1	14.3	4.8	4.8					
			Cecal (Sows) (15)	N/A	0.0	[0.0 - 21.8]										6.7		13.3	60.0	20.0							

¹ Percent of isolates with intermediate susceptibility. N/A used when there is no intermediate breakpoint established.

² Percent of isolates with resistance. Discrepancies between %R and sums of distribution %'s are due to rounding. Percent (%) non-susceptible is reported rather than %R for daptomycin and tigecycline because there is no CLSI breakpoint established.

³ 95% confidence intervals for percent resistant (%R) were calculated using the Clopper-Pearson exact method

⁴ The unshaded areas indicate the dilution range of the Sensititre plates used to test isolates. Single vertical lines indicate the breakpoints for susceptibility, while double vertical lines indicate the breakpoints for resistance. Numbers in the shaded areas indicate percentage of isolates with MIC's greater than the highest concentrations on the plate. Numbers listed for the lowest tested concentrations represent the percentage of isolates with MIC's equal to or less than the lowest tested concentration.

⁵ There are no established CLSI breakpoints for daptomycin

Table 72c. Distribution of MICs and Occurrence among *Enterococcus faecium* Isolates, 2014

Antimicrobial Class	Antimicrobial Agent	Isolate Source			Distribution (%) of MICs (µg/ml) ⁴																					
		# of Isolates	% ¹	%R ²	95% CI ³	0.02	0.03	0.06	0.125	0.25	0.50	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048		
Phenicol	Chloramphenicol	Chickens	Retail Chickens (153)	0.0	0.7	[0.0 - 3.6]								28.1	71.2			0.7								
			Cecal (14)	0.0	0.0	[0.0 - 23.2]								57.1	42.9											
		Turkeys	Retail Ground Turkey (57)	1.8	0.0	[0.0 - 6.3]								50.9	47.4	1.8										
			Cecal (4)	0.0	0.0	[0.0 - 60.2]								50.0	50.0											
		Cattle	Retail Ground Beef (60)	0.0	1.7	[0.0 - 8.9]								31.7	66.7			1.7								
			Cecal (Beef) (47)	0.0	0.0	[0.0 - 7.5]								2.1	74.5	23.4										
			Cecal (Dairy) (28)	0.0	0.0	[0.0 - 12.3]								7.1	71.4	21.4										
		Swine	Retail Pork Chops (40)	0.0	0.0	[0.0 - 8.8]								40.0	60.0											
			Cecal (Market Swine) (21)	0.0	0.0	[0.0 - 16.1]								61.9	38.1											
			Cecal (Sows) (15)	0.0	0.0	[0.0 - 21.8]																				
Quinolones	Ciprofloxacin	Chickens	Retail Chickens (153)	36.6	45.8	[37.7 - 54.0]								0.7	2.0	15.0	36.6	37.9	7.8							
			Cecal (14)	64.3	7.1	[0.2 - 33.9]								7.1	21.4	64.3	7.1									
		Turkeys	Retail Ground Turkey (57)	40.4	40.4	[27.6 - 54.2]								1.8	17.5	40.4	31.6	8.8								
			Cecal (4)	50.0	25.0	[0.6 - 80.6]								25.0	50.0	25.0										
		Cattle	Retail Ground Beef (60)	25.0	10.0	[3.8 - 20.5]								3.3	13.3	48.3	25.0	6.7	3.3							
			Cecal (Beef) (47)	36.2	31.9	[19.1 - 47.1]								8.5	23.4	36.2	25.5	6.4								
			Cecal (Dairy) (28)	28.6	28.6	[13.2 - 48.7]								3.6	3.6	35.7	28.6	21.4	7.1							
		Swine	Retail Pork Chops (40)	27.5	5.0	[0.6 - 16.9]								7.5	12.5	47.5	27.5	5.0								
			Cecal (Market Swine) (21)	19.1	42.9	[21.8 - 66.0]								9.5	28.6	19.1	28.6	14.3								
			Cecal (Sows) (15)	6.7	53.3	[26.6 - 78.7]								6.7	33.3	6.7	26.7	26.7								
Streptogramins	Quinupristin-Dalfopristin	Chickens	Retail Chickens (153)	39.2	28.8	[21.7 - 36.6]								30.1	2.0	39.2	6.5	9.8	6.5	5.2	0.7					
			Cecal (14)	35.7	42.9	[17.7 - 71.1]								14.3	7.1	35.7	14.3	14.3	14.3							
		Turkeys	Retail Ground Turkey (57)	38.6	40.4	[27.6 - 54.2]								10.5	10.5	38.6	10.5	10.5	10.5	8.8						
			Cecal (4)	0.0	75.0	[19.4 - 99.4]								25.0			25.0	25.0	25.0							
		Cattle	Retail Ground Beef (60)	65.0	5.0	[1.0 - 13.9]								26.7	3.3	65.0	5.0									
			Cecal (Beef) (47)	51.1	4.3	[0.5 - 14.5]								31.9	12.8	51.1	4.3									
			Cecal (Dairy) (28)	53.6	3.6	[0.1 - 18.3]								35.7	7.1	53.6	3.6									
		Swine	Retail Pork Chops (40)	60.0	20.0	[9.1 - 35.6]								10.0	10.0	60.0	20.0									
			Cecal (Market Swine) (21)	52.4	23.8	[8.2 - 47.2]								19.1	4.8	52.4	19.1		4.8							
			Cecal (Sows) (15)	53.3	13.3	[1.7 - 40.5]								13.3	20.0	53.3	6.7	6.7								
Tetracyclines	Tetracycline	Chickens	Retail Chickens (153)	3.3	51.6	[43.4 - 59.8]								45.1			3.3	1.3	2.6	47.7						
			Cecal (14)	0.0	35.7	[12.8 - 64.9]								57.1		7.1		7.1	7.1	21.4						
		Turkeys	Retail Ground Turkey (57)	0.0	70.2	[56.6 - 81.6]								29.8						70.2						
			Cecal (4)	0.0	75.0	[19.4 - 99.4]								25.0						75.0						
		Cattle	Retail Ground Beef (60)	0.0	18.3	[9.5 - 30.4]								81.7						18.3						
			Cecal (Beef) (47)	0.0	31.9	[19.1 - 47.1]								61.7	4.3	2.1		4.3	2.1	25.5						
			Cecal (Dairy) (28)	0.0	7.1	[0.9 - 23.5]								92.9				3.6		3.6						
		Swine	Retail Pork Chops (40)	0.0	40.0	[24.9 - 56.7]								60.0						40.0						
			Cecal (Market Swine) (21)	4.8	57.1	[34.0 - 78.2]								33.3	4.8		4.8	4.8		52.4						
			Cecal (Sows) (15)	0.0	60.0	[32.3 - 83.7]								40.0						60.0						

¹ Percent of isolates with intermediate susceptibility. N/A used when there is no intermediate breakpoint established.

² Percent of isolates with resistance. Discrepancies between %R and sums of distribution %s are due to rounding. Percent (%) non-susceptible is reported rather than %R for daptomycin and tigecycline because there is no CLSI breakpoint established.

³ 95% confidence intervals for percent resistant (%R) were calculated using the Clopper-Pearson exact method.

⁴ The unshaded areas indicate the dilution range of the Sensititre plates used to test isolates. Single vertical lines indicate the breakpoints for susceptibility, while double vertical lines indicate the breakpoints for resistance. Numbers in the shaded areas indicate percentage of isolates with MIC's greater than the highest concentrations on the plate. Numbers listed for the lowest tested concentrations represent the percentage of isolates with MIC's equal to or less than the lowest tested concentration.

Resistance by Year

Table 73a. Antimicrobial Resistance among *Enterococcus faecium* Isolates, 2003-2014

Year		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014			
Number of Isolates Tested	Chickens	Retail Chickens	248	348	307	315	189	163	202	197	221	235	213	153		
		Cecal											6	14		
	Turkeys	Retail Ground Turkey	118	172	107	139	65	70	66	45	40	73	48	57		
		Cecal											4	4		
	Cattle	Retail Ground Beef	112	162	129	125	69	73	59	61	82	91	80	60		
		Cecal (Beef)											27	47		
	Swine	Cecal (Dairy)											34	28		
		Retail Pork Chops	97	75	75	70	33	35	26	32	37	52	50	40		
		Cecal (Market Swine)											12	21		
		Cecal (Sows)											7	15		
Antimicrobial Class	Antimicrobial (Resistance Breakpoint)	Isolate Source														
Aminoglycosides	Gentamicin (MIC >500 µg/ml)	Chickens	Retail Chickens	5.6%	4.3%	6.2%	6.0%	9.5%	11.7%	6.9%	6.1%	9.5%	6.8%	7.0%	7.2%	
			Cecal	14	15	19	19	18	19	14	12	21	16	15	11	
		Turkeys	Retail Ground Turkey	12.7%	13.4%	12.1%	15.1%	1.5%	10.0%	18.2%	6.7%	10.0%	13.7%	8.3%	17.5%	
			Cecal	15	23	13	21	1	7	12	3	4	10	4	10	
		Cattle	Retail Ground Beef	0.0%	0.0%	0.8%	0.0%	0.0%	0.0%	1.7%	0.0%	0.0%	0.0%	0.0%	0.0%	
			Cecal (Beef)	0	0	1	0	0	0	1	0	0	0	0	0	
			Cecal (Dairy)											0.0%	0.0%	
		Swine	Retail Pork Chops	0.0%	0.0%	0.0%	1.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2.5%	
			Cecal (Market Swine)	0	0	0	1	0	0	0	0	0	0	0	1	
			Cecal (Sows)											0.0%	0.0%	
		Kanamycin (MIC ≥ 1024 µg/ml)	Chickens	Retail Chickens	10.5%	9.5%	10.7%	6.3%	12.2%	11.7%	9.9%	5.6%	9.5%	8.0%	9.4%	12.4%
				Cecal	26	33	33	20	23	19	20	11	21	19	20	19
	Turkeys		Retail Ground Turkey	28.0%	35.5%	29.9%	33.8%	7.7%	12.9%	33.3%	15.6%	25.0%	26.0%	27.1%	22.8%	
			Cecal	33	61	32	47	5	9	22	7	10	19	13	13	
	Cattle		Retail Ground Beef	8.0%	8.6%	3.9%	1.6%	0.0%	5.5%	6.8%	8.2%	6.1%	5.5%	3.8%	1.7%	
			Cecal (Beef)	9	14	5	2	0	4	4	5	5	5	3	1	
			Cecal (Dairy)											0.0%	0.0%	
	Swine		Retail Pork Chops	2.1%	2.7%	8.0%	2.9%	3.0%	5.7%	0.0%	3.1%	5.4%	0.0%	4.0%	2.5%	
			Cecal (Market Swine)	2	2	6	2	1	2	0	1	2	0	2	1	
			Cecal (Sows)											0.0%	4.8%	
	Streptomycin (MIC ≥ 1000 µg/ml)		Chickens	Retail Chickens	16.9%	8.3%	14.0%	3.8%	3.7%	6.7%	30.2%	26.4%	27.2%	17.9%	17.4%	15.0%
				Cecal	42	29	43	12	7	11	61	52	60	42	37	23
		Turkeys	Retail Ground Turkey	32.2%	34.3%	34.6%	22.3%	16.9%	17.1%	51.5%	29.9%	55.0%	48.0%	37.5%	33.3%	
			Cecal	38	59	37	31	11	12	34	13	22	35	18	19	
		Cattle	Retail Ground Beef	2.7%	5.6%	1.6%	0.8%	0.0%	2.7%	8.5%	3.3%	6.1%	3.3%	2.5%	3.3%	
			Cecal (Beef)	3	9	2	1	0	2	5	2	5	3	0	2	
			Cecal (Dairy)											0.0%	2.1%	
		Swine	Retail Pork Chops	3.1%	6.7%	6.7%	2.9%	0.0%	0.0%	3.8%	3.1%	5.4%	0.0%	4.0%	0.0%	
			Cecal (Market Swine)	3	5	5	2	0	0	1	1	2	0	2	0	
			Cecal (Sows)											25.0%	23.8%	
Glycopeptides		Vancomycin (MIC ≥ 32 µg/ml)	Chickens	Retail Chickens	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
				Cecal	0	0	0	0	0	0	0	0	0	0	0	0
	Turkeys		Retail Ground Turkey	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
			Cecal	0	0	0	0	0	0	0	0	0	0	0	0	
	Cattle		Retail Ground Beef	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
			Cecal (Beef)	0	0	0	0	0	0	0	0	0	0	0	0	
			Cecal (Dairy)											0.0%	0.0%	
	Swine		Retail Pork Chops	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
			Cecal (Market Swine)	0	0	0	0	0	0	0	0	0	0	0	0	
			Cecal (Sows)											0.0%	0.0%	

Table 73b. Antimicrobial Resistance among *Enterococcus faecium* Isolates, 2003-2014

Year			2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014			
Number of Isolates Tested	Chickens	Retail Chickens	248	348	307	315	189	163	202	197	221	235	213	153			
		Cecal											6	14			
		Turkeys	Retail Ground Turkey	118	172	107	139	65	70	66	45	40	73	48	57		
			Cecal											4	4		
		Cattle	Retail Ground Beef	112	162	129	125	69	73	59	61	82	91	80	60		
			Cecal (Beef)											27	47		
	Cecal (Dairy)												34	28			
	Swine	Retail Pork Chops	97	75	75	70	33	35	26	32	37	52	50	40			
		Cecal (Market Swine)											12	21			
		Cecal (Sows)											7	15			
	Antimicrobial Class	Antimicrobial (Resistance Breakpoint)	Isolate Source														
	Glycylcycline	Tigecycline (MIC ≥ 0.25 µg/ml) ¹	Chickens	Retail Chickens			0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.7%		
Cecal						0	0	0	0	0	0	0	0	0	0.0%		
Turkeys			Retail Ground Turkey			0.0%	0.0%	0.0%	2.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.8%	
			Cecal			0	0	0	2	0	0	0	0	0	0	0.0%	
Cattle			Retail Ground Beef			0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
			Cecal (Beef)			0	0	0	0	0	0	0	0	0	0	0.0%	
			Cecal (Dairy)													0.0%	
Swine			Retail Pork Chops			0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
			Cecal (Market Swine)			0	0	0	0	0	0	0	0	0	0	0.0%	
			Cecal (Sows)													0.0%	
Lincosamides			Lincomycin (MIC ≥ 8 µg/ml)	Chickens	Retail Chickens	86.7%	83.3%	78.2%	74.9%	84.1%	81.0%	83.2%	82.2%	81.9%	78.7%	83.1%	80.4%
					Cecal	215	290	240	236	159	132	168	162	181	185	177	123
	Turkeys	Retail Ground Turkey		89.0%	88.4%	92.5%	97.8%	92.3%	91.4%	93.9%	86.7%	87.5%	83.6%	91.7%	82.5%		
		Cecal		105	152	99	136	60	64	62	39	35	61	44	47		
	Cattle	Retail Ground Beef		58.9%	67.9%	74.4%	41.6%	56.5%	75.3%	79.7%	73.8%	79.3%	72.5%	58.8%	70.0%		
		Cecal (Beef)		66	110	96	52	39	55	47	45	65	66	47	42		
		Cecal (Dairy)												81.5%	57.4%		
	Swine	Retail Pork Chops		89.7%	84.0%	88.0%	64.3%	66.7%	57.1%	84.6%	78.1%	73.0%	90.4%	84.0%	80.0%		
		Cecal (Market Swine)		87	63	66	45	22	20	22	25	27	47	42	32		
		Cecal (Sows)												83.3%	81.0%		
	Lipopeptides	Daptomycin ²		Chickens	Retail Chickens		-	-	-	-	-	-	-	-	-	-	
					Cecal											-	-
Turkeys			Retail Ground Turkey		-	-	-	-	-	-	-	-	-	-	-		
			Cecal												-		
Cattle			Retail Ground Beef		-	-	-	-	-	-	-	-	-	-	-		
			Cecal (Beef)												-		
			Cecal (Dairy)												-		
Swine			Retail Pork Chops		-	-	-	-	-	-	-	-	-	-	-		
			Cecal (Market Swine)												-		
			Cecal (Sows)												-		
Macrolides			Erythromycin (MIC ≥ 8 µg/ml)	Chickens	Retail Chickens	17.3%	12.6%	13.7%	9.5%	19.6%	22.1%	19.8%	13.7%	21.7%	21.3%	29.6%	34.6%
					Cecal	43	44	42	30	37	36	40	27	48	50	63	53
	Turkeys	Retail Ground Turkey		44.1%	43.0%	41.1%	44.6%	23.1%	37.1%	56.1%	33.3%	32.5%	27.4%	39.6%	36.8%		
		Cecal		52	74	44	62	15	26	37	15	13	20	19	21		
	Cattle	Retail Ground Beef		8.9%	9.3%	4.7%	7.2%	4.3%	13.7%	5.1%	6.6%	6.1%	3.3%	7.5%	8.3%		
		Cecal (Beef)		10	15	6	9	3	10	3	4	5	3	6	5		
		Cecal (Dairy)												3.7%	6.4%		
	Swine	Retail Pork Chops		6.2%	5.3%	9.3%	7.1%	3.0%	14.3%	3.8%	9.4%	1.8%	1.9%	4.0%	7.5%		
		Cecal (Market Swine)		6	4	7	5	1	5	1	3	4	1	2	3		
		Cecal (Sows)												16.7%	14.3%		

¹ Percent non-susceptible is reported rather than percent resistance as no CLSI breakpoint has been established. NARMS breakpoint established to determine resistance.

² Resistance data are not presented because there are no established CLSI breakpoints for daptomycin

Table 73c. Antimicrobial Resistance among *Enterococcus faecium* Isolates, 2003-2014

Year			2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014			
Number of Isolates Tested	Chickens	Retail Chickens	248	348	307	315	189	163	202	197	221	235	213	153			
		Cecal											6	14			
	Turkeys	Retail Ground Turkey	118	172	107	139	65	70	66	45	40	73	48	57			
		Cecal											4	4			
	Cattle	Retail Ground Beef	112	162	129	125	69	73	59	61	82	91	80	60			
Cecal (Beef) Cecal (Dairy)												27 34	47 28				
Swine	Retail Pork Chops	97	75	75	70	33	35	26	32	37	52	50	40				
	Cecal (Market Swine) Cecal (Sows)											12 7	21 15				
Antimicrobial Class	Antimicrobial (Resistance Breakpoint)	Isolate Source															
Macrolides	Tylosin (MIC ≥ 32 µg/ml)	Chickens	Retail Chickens	12.5% 31	10.3% 36	12.4% 38	7.9% 25	19.0% 36	20.2% 33	19.3% 39	12.2% 24	20.4% 45	20.9% 49	27.7% 59	33.3% 51		
			Cecal											16.7% 1	7.1% 1		
		Turkeys	Retail Ground Turkey	27.1% 32	35.5% 61	29.9% 32	36.0% 50	13.8% 9	12.9% 9	24.2% 16	15.6% 7	22.5% 9	17.8% 13	20.8% 10	19.3% 11		
			Cecal											0.0% 0	75.0% 3		
		Cattle	Retail Ground Beef	0.9% 1	5.6% 9	2.3% 3	4.8% 6	2.9% 2	4.1% 3	3.4% 2	3.3% 2	3.7% 3	2.2% 2	5.0% 4	0.0% 0		
			Cecal (Beef)											0.0% 0	6.4% 3		
			Cecal (Dairy)											0.0% 0	0.0% 0		
		Swine	Retail Pork Chops	2.1% 2	0.0% 0	5.3% 4	5.7% 4	3.0% 1	5.7% 2	0.0% 0	3.1% 1	5.4% 2	0.0% 0	4.0% 2	10.0% 4		
			Cecal (Market Swine)											8.3% 1	9.5% 2		
			Cecal (Sows)											14.3% 1	13.3% 2		
		Nitrofurans	Nitrofurantoin (MIC ≥ 128 µg/ml)	Chickens	Retail Chickens	64.5% 160	85.3% 297	54.7% 168	38.4% 121	32.8% 62	46.0% 75	51.5% 104	40.1% 79	41.6% 92	36.6% 86	23.0% 49	36.0% 55
					Cecal												0.0% 0
Turkeys	Retail Ground Turkey			52.5% 62	66.9% 115	43.0% 46	22.3% 31	12.3% 8	27.1% 19	40.9% 27	22.2% 10	40.0% 16	39.7% 29	29.2% 14	36.8% 21		
	Cecal														0.0% 0	50.0% 2	
Cattle	Retail Ground Beef			36.6% 41	51.9% 84	18.6% 24	12.8% 16	4.3% 3	20.5% 15	16.9% 10	6.6% 4	28.1% 23	22.0% 20	20.0% 16	25.0% 15		
	Cecal (Beef)													0.0% 0	10.6% 5		
	Cecal (Dairy)													0.0% 0	28.6% 8		
Swine	Retail Pork Chops			16.5% 16	37.3% 28	10.7% 8	4.3% 3	9.1% 3	8.6% 3	11.5% 3	6.3% 2	18.9% 7	5.8% 3	16.0% 8	10.0% 4		
	Cecal (Market Swine)													0.0% 0	38.1% 8		
	Cecal (Sows)													0.0% 0	33.3% 5		
Oxazolidinones	Linezolid (MIC ≥ 8 µg/ml)			Chickens	Retail Chickens	0.0% 0	0.0% 0	0.3% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
					Cecal												0.0% 0
		Turkeys	Retail Ground Turkey	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		
			Cecal												0.0% 0		
		Cattle	Retail Ground Beef	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		
			Cecal (Beef)												0.0% 0		
			Cecal (Dairy)												0.0% 0		
		Swine	Retail Pork Chops	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		
			Cecal (Market Swine)												0.0% 0		
			Cecal (Sows)												0.0% 0		
		Penicillins	Penicillin (MIC ≥ 16 µg/ml)	Chickens	Retail Chickens	51.2% 127	39.1% 136	31.9% 98	22.2% 70	12.2% 23	27.6% 45	23.3% 47	24.4% 48	18.6% 41	11.9% 28	9.9% 21	10.5% 16
					Cecal												0.0% 0
Turkeys	Retail Ground Turkey			65.3% 77	61.6% 106	59.8% 64	67.6% 94	60.0% 39	61.4% 43	69.7% 46	48.9% 22	75.0% 30	68.5% 50	54.2% 26	45.6% 26		
	Cecal														0.0% 0	50.0% 2	
Cattle	Retail Ground Beef			8.0% 9	3.1% 5	2.3% 3	4.8% 6	1.4% 1	9.6% 7	6.8% 4	3.3% 2	3.7% 3	3.3% 3	5.0% 4	1.7% 1		
	Cecal (Beef)														0.0% 0		
	Cecal (Dairy)														0.0% 0		
Swine	Retail Pork Chops			1.0% 1	8.0% 6	1.3% 1	1.4% 1	0.0% 0	0.0% 0	7.7% 2	6.3% 2	2.7% 1	0.0% 0	4.0% 2	0.0% 0		
	Cecal (Market Swine)														0.0% 0	9.5% 2	
	Cecal (Sows)														42.9% 3	0.0% 0	

Table 73d. Antimicrobial Resistance among *Enterococcus faecium* Isolates, 2003-2014

Year			2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
Number of Isolates Tested	Chickens	Retail Chickens	248	348	307	315	189	163	202	197	221	235	213	153	
		Cecal											6	14	
	Turkeys	Retail Ground Turkey	118	172	107	139	65	70	66	45	40	73	48	57	
		Cecal											4	4	
	Cattle	Retail Ground Beef	112	162	129	125	69	73	59	61	82	91	80	60	
		Cecal (Beef)											27	47	
		Cecal (Dairy)											34	28	
	Swine	Retail Pork Chops	97	75	75	70	33	35	26	32	37	52	50	40	
		Cecal (Market Swine)											12	21	
		Cecal (Sows)											7	15	
Antimicrobial Class	Antimicrobial (Resistance Breakpoint)	Isolate Source													
Phenicol	Chloramphenicol (MIC ≥ 32 µg/ml)	Chickens	Retail Chickens	0.0%	0.0%	0.0%	0.0%	0.0%	0.6%	0.0%	0.0%	0.0%	0.0%	0.7%	
			Cecal											0	0.0%
		Turkeys	Retail Ground Turkey	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.4%	0.0%
			Cecal											1	0.0%
		Cattle	Retail Ground Beef	0.0%	1.2%	0.0%	0.0%	0.0%	1.4%	0.0%	1.6%	0.0%	1.1%	1.3%	1.7%
			Cecal (Beef)		2	0	0	0	1	0	1	0	1	1	0.0%
			Cecal (Dairy)												0
		Swine	Retail Pork Chops	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2.7%	0.0%	0.0%	0.0%
			Cecal (Market Swine)									1	0	0	0.0%
			Cecal (Sows)												0
Quinolones	Ciprofloxacin (MIC ≥ 4 µg/ml)	Chickens	Retail Chickens	21.8%	52.3%	33.9%	37.5%	19.6%	43.6%	34.2%	32.5%	33.5%	39.6%	39.0%	
			Cecal	54	182	104	118	37	71	69	64	74	93	83	70
		Turkeys	Retail Ground Turkey	39.0%	53.5%	43.9%	37.4%	35.4%	54.3%	40.9%	42.2%	57.5%	54.8%	35.4%	40.4%
			Cecal	46	92	47	52	23	38	27	19	23	40	17	23
		Cattle	Retail Ground Beef	33.0%	27.2%	20.9%	21.6%	10.1%	26.0%	18.6%	14.8%	17.1%	12.1%	25.0%	10.0%
			Cecal (Beef)	37	44	27	27	7	19	11	9	14	11		33.3%
			Cecal (Dairy)												9
		Swine	Retail Pork Chops	6.2%	17.3%	9.3%	4.3%	9.1%	14.3%	7.7%	12.5%	10.8%	3.9%	16.0%	5.0%
			Cecal (Market Swine)	6	13	7	3	3	5	2	4	4	2	8	2
			Cecal (Sows)												25.0%
Streptogramins	Quinupristin-Dalfopristin (MIC ≥ 4 µg/ml)	Chickens	Retail Chickens	59.7%	31.6%	39.1%	36.5%	57.1%	54.6%	50.0%	28.9%	32.1%	37.5%	28.2%	
			Cecal	148	110	120	115	108	89	101	57	71	88	60	44
		Turkeys	Retail Ground Turkey	79.7%	64.5%	63.6%	75.5%	76.9%	68.6%	69.7%	57.8%	55.0%	64.4%	41.7%	40.4%
			Cecal	94	111	68	105	50	48	46	26	22	47	20	23
		Cattle	Retail Ground Beef	50.0%	6.2%	7.8%	6.4%	5.8%	16.4%	18.6%	0.0%	11.0%	26.4%	18.8%	5.0%
			Cecal (Beef)	56	10	10	8	4	12	11	0	9	24	15	3
			Cecal (Dairy)												29.6%
		Swine	Retail Pork Chops	64.9%	6.7%	13.3%	10.0%	3.0%	5.7%	19.2%	3.1%	13.5%	23.1%	8.0%	20.0%
			Cecal (Market Swine)	63	5	10	7	1	2	5	1	5	12	4	8
			Cecal (Sows)												25.0%
Tetracyclines	Tetracycline (MIC ≥ 16 µg/ml)	Chickens	Retail Chickens	51.6%	45.1%	54.4%	53.0%	66.1%	64.4%	56.9%	35.5%	43.4%	55.7%	58.7%	
			Cecal	128	157	167	167	125	105	115	70	96	131	125	79
		Turkeys	Retail Ground Turkey	91.5%	86.6%	91.6%	92.8%	96.9%	81.4%	92.4%	71.1%	82.5%	78.1%	75.0%	70.2%
			Cecal	108	149	98	129	63	57	61	32	33	57	36	40
		Cattle	Retail Ground Beef	28.6%	24.7%	28.7%	20.0%	18.8%	28.8%	39.0%	27.9%	22.0%	23.1%	20.0%	18.3%
			Cecal (Beef)	32	40	37	25	13	21	23	17	18	21	16	11
			Cecal (Dairy)												29.6%
		Swine	Retail Pork Chops	69.1%	72.0%	56.0%	54.3%	33.3%	45.7%	50.0%	50.0%	48.7%	30.8%	64.0%	40.0%
			Cecal (Market Swine)	67	54	42	38	11	16	13	16	18	16	32	16
			Cecal (Sows)												41.7%

Multidrug Resistance

Table 74a. Resistance Patterns among *Enterococcus faecium* Isolates, 2003-2014

Year		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014		
Number of Isolates Tested	Chickens	Retail Chickens	248	348	307	315	189	163	202	197	221	235	213	153	
		Cecal											6	14	
	Turkeys	Retail Ground Turkey	118	172	107	139	65	70	66	45	40	73	48	57	
		Cecal											4	4	
	Cattle	Retail Ground Beef	112	162	129	125	70	73	59	61	82	91	80	60	
Cecal (Beef) Cecal (Dairy)												27	47		
Swine	Retail Pork Chops	97	75	75	70	33	35	26	32	37	52	50	40		
	Cecal (Market Swine) Cecal (Sows)											12	21		
Resistance Pattern ¹		Source													
1. No Resistance Detected	Chickens	Retail Chickens	1.2% 3	1.1% 4	9.8% 30	10.8% 34	9.0% 17	4.9% 8	4.5% 9	6.1% 12	5.0% 11	3.4% 8	7.0% 15	6.5% 10	
		Cecal											0.0% 0	14.3% 2	
	Turkeys	Retail Ground Turkey	0.0% 0	0.6% 1	0.0% 0	0.0% 0	1.5% 1	2.9% 2	1.5% 1	6.7% 3	5.0% 2	1.4% 1	2.1% 1	0.0% 0	
		Cecal											0.0% 0	0.0% 0	
	Cattle	Retail Ground Beef	10.7% 12	9.9% 16	9.3% 12	40.0% 50	38.6% 27	8.2% 6	3.4% 2	11.5% 7	7.3% 6	11.0% 10	15.0% 12	15.0% 9	
		Cecal (Beef)											0.0% 0	21.3% 10	
		Cecal (Dairy)											2.9% 1	21.4% 6	
	Swine	Retail Pork Chops	3.1% 3	1.3% 1	6.7% 5	21.4% 15	18.2% 6	17.1% 6	11.5% 3	15.6% 5	10.8% 4	5.8% 3	6.0% 3	12.5% 5	
		Cecal (Market Swine)											8.3% 1	4.8% 1	
		Cecal (Sows)											14.3% 1	6.7% 1	
	2. Resistance to ≥ 3 Antimicrobial Classes	Chickens	Retail Chickens	79.4% 197	75.9% 264	63.2% 194	53.3% 168	66.7% 126	63.8% 104	65.8% 133	48.7% 96	54.8% 121	60.0% 141	62.9% 134	60.8% 93
			Cecal											66.7% 4	50.0% 7
		Turkeys	Retail Ground Turkey	88.1% 104	91.9% 158	86.9% 93	93.5% 130	90.8% 59	85.7% 60	92.4% 61	75.6% 34	85.0% 34	84.9% 62	79.2% 38	75.4% 43
Cecal													25.0% 1	75.0% 3	
Cattle		Retail Ground Beef	40.2% 45	27.2% 44	15.5% 20	9.6% 12	7.2% 5	27.4% 20	20.3% 12	9.8% 6	20.7% 17	22.0% 20	16.3% 13	13.3% 8	
		Cecal (Beef)											18.5% 5	19.2% 9	
		Cecal (Dairy)											14.7% 5	17.9% 5	
Swine		Retail Pork Chops	54.6% 53	41.3% 31	21.3% 16	12.9% 9	3.0% 1	17.1% 6	23.1% 6	12.5% 4	16.2% 6	7.7% 4	18.0% 9	17.5% 7	
		Cecal (Market Swine)											41.7% 5	52.4% 11	
		Cecal (Sows)											71.4% 5	53.3% 8	
3. Resistant to ≥ 4 Antimicrobial Classes		Chickens	Retail Chickens	52.8% 131	52.6% 183	43.7% 134	36.5% 115	38.6% 73	51.5% 84	56.4% 114	38.1% 75	42.1% 93	44.3% 104	36.2% 77	47.1% 72
			Cecal											50.0% 3	21.4% 3
		Turkeys	Retail Ground Turkey	72.9% 86	82.6% 142	73.8% 79	82.0% 114	75.4% 49	80.0% 56	86.4% 57	64.4% 29	75.0% 30	75.3% 55	64.6% 31	49.1% 28
	Cecal												0.0% 0	75.0% 3	
	Cattle	Retail Ground Beef	18.8% 21	9.9% 16	6.2% 8	4.8% 6	4.3% 3	15.1% 11	13.6% 8	3.3% 2	7.3% 6	7.7% 7	8.8% 7	5.0% 3	
		Cecal (Beef)											3.7% 1	6.4% 3	
		Cecal (Dairy)											2.9% 1	0.0% 0	
	Swine	Retail Pork Chops	7.2% 7	12.0% 9	9.3% 7	4.3% 3	3.0% 1	5.7% 2	3.8% 1	9.4% 3	10.8% 4	0.0% 0	10.0% 5	10.0% 4	
		Cecal (Market Swine)											25.0% 3	38.1% 8	
		Cecal (Sows)											57.1% 4	26.7% 4	
	4. Resistant to ≥ 5 Antimicrobial Classes	Chickens	Retail Chickens	35.5% 88	28.7% 100	28.3% 87	16.8% 53	16.9% 32	34.4% 56	39.1% 79	25.4% 50	23.1% 51	19.6% 46	14.6% 31	25.5% 39
			Cecal											33.3% 2	21.4% 3
		Turkeys	Retail Ground Turkey	68.6% 81	62.2% 107	57.0% 61	57.6% 80	38.5% 25	55.7% 39	65.2% 43	42.2% 19	62.5% 25	56.2% 41	43.8% 21	38.6% 22
Cecal													0.0% 0	75.0% 3	
Cattle		Retail Ground Beef	8.0% 9	5.6% 9	4.7% 6	4.0% 5	0.0% 0	8.2% 6	1.7% 1	1.6% 1	3.7% 3	3.3% 3	5.0% 4	1.7% 1	
		Cecal (Beef)											0.0% 0	0.0% 0	
		Cecal (Dairy)											0.0% 0	0.0% 0	
Swine		Retail Pork Chops	5.2% 5	4.0% 3	6.7% 5	4.3% 3	0.0% 0	2.9% 1	3.8% 1	6.3% 2	8.1% 3	0.0% 0	4.0% 2	0.0% 0	
		Cecal (Market Swine)											0.0% 0	33.3% 7	
		Cecal (Sows)											28.6% 2	13.3% 2	

¹Resistance patterns do not include daptomycin as there are no established CLSI breakpoints

Table 74b. Resistance Patterns among *Enterococcus faecium* Isolates, 2003-2014

Year			2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
Number of Isolates Tested	Chickens	Retail Chickens	248	348	307	315	189	163	202	197	221	235	213	153	
		Cecal											6	14	
	Turkeys	Retail Ground Turkey	118	172	107	139	65	70	66	45	40	73	48	57	
		Cecal											4	4	
	Cattle	Retail Ground Beef	112	162	129	125	70	73	59	61	82	91	80	60	
		Cecal (Beef)											27	47	
		Cecal (Dairy)											34	28	
	Swine	Retail Pork Chops	97	75	75	70	33	35	26	32	37	52	50	40	
		Cecal (Market Swine)											12	21	
		Cecal (Sows)											7	15	
	Resistance Pattern ¹			Source											
	4. Resistant to ≥ 6 Antimicrobial Classes	Chickens	Retail Chickens	12.9%	14.9%	15.0%	9.8%	10.6%	23.3%	14.4%	12.2%	11.8%	8.1%	7.5%	7.2%
Cecal			32	52	46	31	20	38	29	24	26	19	16	11	
Turkeys		Retail Ground Turkey	43.2%	44.8%	38.3%	30.9%	15.4%	30.0%	47.0%	24.4%	50.0%	32.9%	29.2%	26.3%	
		Cecal	51	77	41	43	10	21	31	11	20	24	14	15	
Cattle		Retail Ground Beef	4.5%	4.3%	0.0%	2.4%	0.0%	4.1%	1.7%	1.6%	2.4%	1.1%	3.8%	0.0%	
		Cecal (Beef)	5	7	0	3	0	3	1	1	2	1	3	0	
		Cecal (Dairy)											0	0	
Swine		Retail Pork Chops	1.0%	0.0%	2.7%	1.4%	0.0%	2.9%	3.9%	3.1%	2.7%	0.0%	4.0%	0.0%	
		Cecal (Market Swine)	1	0	2	1	0	1	1	1	1	0	2	0	
		Cecal (Sows)											0	6.7%	
6. At Least Penicillin G and High Level Gentamicin		Chickens	Retail Chickens	3.2%	3.5%	3.3%	3.2%	3.7%	7.4%	3.0%	2.5%	3.6%	0.9%	1.4%	1.3%
			Cecal	8	12	10	10	7	12	6	5	8	2	3	2
		Turkeys	Retail Ground Turkey	7.6%	10.5%	9.4%	7.2%	1.5%	7.1%	13.6%	2.2%	5.0%	13.7%	2.1%	12.3%
			Cecal	9	18	10	10	1	5	9	1	2	10	1	7
		Cattle	Retail Ground Beef	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.7%	0.0%	0.0%	0.0%	0.0%	0.0%
	Cecal (Beef)		0	0	0	0	0	0	1	0	0	0	0	0	
	Cecal (Dairy)												0	0	
	Swine	Retail Pork Chops	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
		Cecal (Market Swine)	0	0	0	0	0	0	0	0	0	0	0	0	
		Cecal (Sows)											0	0	
	7. At Least Penicillin G High Level Gentamicin,	Chickens	Retail Chickens	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
			Cecal	0	0	0	0	0	0	0	0	0	0	0	0
		Turkeys	Retail Ground Turkey	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
			Cecal	0	0	0	0	0	0	0	0	0	0	0	0
		Cattle	Retail Ground Beef	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Cecal (Beef)			0	0	0	0	0	0	0	0	0	0	0	0	
Cecal (Dairy)													0	0	
Swine		Retail Pork Chops	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
		Cecal (Market Swine)	0	0	0	0	0	0	0	0	0	0	0	0	
		Cecal (Sows)											0	0	
8. At Least Penicillin G, High Level Gentamicin,		Chickens	Retail Chickens	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
			Cecal	0	0	0	0	0	0	0	0	0	0	0	0
		Turkeys	Retail Ground Turkey	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
			Cecal	0	0	0	0	0	0	0	0	0	0	0	0
		Cattle	Retail Ground Beef	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Cecal (Beef)		0	0	0	0	0	0	0	0	0	0	0	0	
	Cecal (Dairy)												0	0	
	Swine	Retail Pork Chops	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
		Cecal (Market Swine)	0	0	0	0	0	0	0	0	0	0	0	0	
		Cecal (Sows)											0	0	

¹ Resistance patterns do not include daptomycin as there are no established CLSI breakpoints

Table 75a. Distribution of MICs and Occurrence among *Enterococcus hirae* Isolates, 2014

Antimicrobial Class	Antimicrobial Agent	Isolate Source			Distribution (%) of MICs (µg/ml) ⁴																																																																					
		(# of Isolates)	% ¹	%R ²	[95% CI] ³	0.02	0.03	0.06	0.125	0.25	0.50	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048																																																		
Aminoglycosides	Gentamicin	Chickens	Retail Chickens (33)	N/A	9.1	[1.9 - 24.3]																																																																				
			Cecal (3)	N/A	0.0	[0.0 - 70.8]																																																																				
																																						90.3		9.1																																		
		Turkeys	Retail Ground Turkey (2)	N/A	0.0	[0.0 - 84.2]																																																																				
			Cecal (1)	N/A	0.0	[0.0 - 97.5]																																																																				
																																																							100.0																			
		Cattle	Retail Ground Beef (41)	N/A	0.0	[0.0 - 8.6]																																																																				
			Cecal (Beef) (196)	N/A	0.5	[0.0 - 2.8]																																																																				
			Cecal (Dairy) (75)	N/A	0.0	[0.0 - 4.8]																																																																				
	Swine	Retail Pork Chops (8)	N/A	0.0	[0.0 - 36.9]																																																																					
		Cecal (Market Swine) (51)	N/A	0.0	[0.0 - 7.0]																																																																					
		Cecal (Sows) (32)	N/A	0.0	[0.0 - 10.9]																																																																					
	Kanamycin	Chickens	Retail Chickens (33)	N/A	9.1																		[1.9 - 24.3]																																																			
			Cecal (3)	N/A	33.3																		[0.8 - 90.6]																																																			
																																																																								87.9	3.0	
		Turkeys	Retail Ground Turkey (2)	N/A	0.0																		[0.0 - 84.2]																																																			
			Cecal (1)	N/A	0.0																		[0.0 - 97.5]																																																			
																																																																								100.0		
		Cattle	Retail Ground Beef (41)	N/A	0.0	[0.0 - 8.6]																																																																				
			Cecal (Beef) (196)	N/A	0.5	[0.0 - 2.8]																																																																				
			Cecal (Dairy) (75)	N/A	1.3	[0.0 - 7.2]																																																																				
	Swine	Retail Pork Chops (8)	N/A	0.0	[0.0 - 36.9]																																																																					
		Cecal (Market Swine) (51)	N/A	3.9	[0.5 - 13.5]																																																																					
		Cecal (Sows) (32)	N/A	3.1	[0.1 - 16.2]																																																																					
Streptomycin	Chickens	Retail Chickens (33)	N/A	3.0	[0.1 - 15.8]																																																																					
		Cecal (3)	N/A	0.0	[0.0 - 70.8]																																																																					
																																																								97.0		3.0																
	Turkeys	Retail Ground Turkey (2)	N/A	0.0	[0.0 - 84.2]																																																																					
		Cecal (1)	N/A	0.0	[0.0 - 97.5]																																																																					
																																																								100.0																		
	Cattle	Retail Ground Beef (41)	N/A	2.4	[0.1 - 12.9]																																																																					
		Cecal (Beef) (196)	N/A	2.6	[0.8 - 5.9]																																																																					
		Cecal (Dairy) (75)	N/A	1.3	[0.0 - 7.2]																																																																					
Swine	Retail Pork Chops (8)	N/A	0.0	[0.0 - 36.9]																																																																						
	Cecal (Market Swine) (51)	N/A	11.8	[4.4 - 23.9]																																																																						
	Cecal (Sows) (32)	N/A	12.5	[3.5 - 29.0]																																																																						
Glycopeptides	Vancomycin	Chickens	Retail Chickens (33)	0.0																			0.0	[0.0 - 10.6]																																																		
			Cecal (3)	0.0																			0.0	[0.0 - 70.8]																																																		
		Turkeys	Retail Ground Turkey (2)	0.0																		0.0	[0.0 - 84.2]																																																			
			Cecal (1)	0.0																		0.0	[0.0 - 97.5]																																																			
		Cattle	Retail Ground Beef (41)	0.0	0.0	[0.0 - 8.6]																																																																				
			Cecal (Beef) (196)	0.5	0.0	[0.0 - 1.9]																																																																				
			Cecal (Dairy) (75)	0.0	0.0	[0.0 - 4.8]																																																																				
	Swine	Retail Pork Chops (8)	0.0	0.0	[0.0 - 36.9]																																																																					
		Cecal (Market Swine) (51)	0.0	0.0	[0.0 - 7.0]																																																																					
		Cecal (Sows) (32)	0.0	0.0	[0.0 - 10.9]																																																																					
	Tigecycline	Chickens	Retail Chickens (33)	N/A	0.0																			[0.0 - 10.6]																																																		
			Cecal (3)	N/A	0.0																			[0.0 - 70.8]																																																		
		Turkeys	Retail Ground Turkey (2)	N/A	0.0																		[0.0 - 84.2]																																																			
			Cecal (1)	N/A	0.0																		[0.0 - 97.5]																																																			
Cattle		Retail Ground Beef (41)	N/A	2.4	[0.1 - 12.9]																																																																					
		Cecal (Beef) (196)	N/A	0.0	[0.0 - 1.9]																																																																					
		Cecal (Dairy) (75)	N/A	0.0	[0.0 - 4.8]																																																																					
Swine	Retail Pork Chops (8)	N/A	12.5	[0.3 - 52.7]																																																																						
	Cecal (Market Swine) (51)	N/A	0.0	[0.0 - 7.0]																																																																						
	Cecal (Sows) (32)	N/A	0.0	[0.0 - 10.9]																																																																						
Lincosamides	Lincomycin	Chickens	Retail Chickens (33)	0.0																			100.0	[89.4 - 100.0]																																																		
			Cecal (3)	0.0																			100.0	[29.2 - 100.0]																																																		
		Turkeys	Retail Ground Turkey (2)	0.0																		100.0	[15.8 - 100.0]																																																			
			Cecal (1)	0.0																		100.0	[2.5 - 100.0]																																																			
		Cattle	Retail Ground Beef (41)	0.0	95.1	[83.5 - 99.4]																																																																				
			Cecal (Beef) (196)	2.0	91.3	[86.5 - 94.9]																																																																				
			Cecal (Dairy) (75)	1.3	89.3	[80.1 - 95.3]																																																																				
		Swine	Retail Pork Chops (8)	0.0	100.0	[63.1 - 100.0]																																																																				
			Cecal (Market Swine) (51)	3.9	86.3	[73.7 - 94.3]																																																																				
			Cecal (Sows) (32)	0.0	87.5	[71.0 - 96.5]																																																																				

¹ Percent of isolates with intermediate susceptibility. N/A used when there is no intermediate breakpoint established.
² Percent of isolates with resistance. Discrepancies between %R and sums of distribution %s are due to rounding. Percent (%) non-susceptible is reported rather than %R for daptomycin and tigecycline because there is no CLSI breakpoint established.
³ 95% confidence intervals for percent resistant (%R) were calculated using the Clopper-Pearson exact method.
⁴ The unshaded areas indicate the dilution range of the Sensititre plates used to test isolates. Single vertical lines indicate the breakpoints for susceptibility, while double vertical lines indicate the breakpoints for resistance. Numbers in the shaded areas indicate percentage of isolates with MIC's greater than the highest concentrations on the plate. Numbers listed for the lowest tested concentrations represent the percentage of isolates with MIC's equal to or less than the lowest tested concentration.

Table 75b. Distribution of MICs and Occurrence among *Enterococcus hirae* Isolates, 2014

Antimicrobial Class	Antimicrobial Agent	Isolate Source (# of Isolates)			0.02	0.03	0.06	0.125	0.25	0.50	Distribution (%) of MICs ($\mu\text{g/ml}$) ⁴														
		% ¹	%R ²	[95% CI] ³							1	2	4	8	16	32	64	128	256	512	1024	2048	>2048		
Lipopeptides	Daptomycin ⁵	Chickens	Retail Chickens (33)	N/A	N/A	N/A					15.2	33.3	39.4	12.1											
			Cecal (3)	N/A	N/A	N/A							100.0												
			Turkeys	Retail Ground Turkey (2)	N/A	N/A	N/A							50.0	50.0										
		Cattle	Cecal (1)	N/A	N/A	N/A						100.0													
			Retail Ground Beef (41)	N/A	N/A	N/A					2.4	19.5	61.0	12.2	4.9										
			Cecal (Beef) (196)	N/A	N/A	N/A				1.0	10.2	27.6	48.0	12.2	0.5	0.5									
		Swine	Cecal (Dairy) (75)	N/A	N/A	N/A				1.3	10.7	40.0	34.7	12.0	1.3										
			Retail Pork Chops (8)	N/A	N/A	N/A						12.5	50.0	25.0	12.5										
			Cecal (Market Swine) (51)	N/A	N/A	N/A						5.9	31.4	51.0	11.8										
				Cecal (Sows) (32)	N/A	N/A	N/A						28.1	56.3	15.6										
Macrolides	Erythromycin	Chickens	Retail Chickens (33)	3.0	30.3	[15.6 - 48.7]				66.7		3.0		30.3											
			Cecal (3)	0.0	33.3	[0.8 - 90.6]				66.7							33.3								
			Turkeys	Retail Ground Turkey (2)	0.0	50.0	[1.3 - 98.7]				50.0					50.0									
		Cattle	Cecal (1)	0.0	0.0	[0.0 - 97.5]				100.0															
			Retail Ground Beef (41)	4.8	14.6	[5.6 - 29.2]				80.5		2.4	2.4	14.6											
			Cecal (Beef) (196)	8.6	16.3	[11.4 - 22.3]				74.5	0.5	0.5	2.0	6.1	1.5	14.8									
		Swine	Cecal (Dairy) (75)	2.6	1.3	[0.0 - 7.2]				94.7	1.3	1.3	1.3				1.3								
			Retail Pork Chops (8)	25.0	50.0	[15.7 - 84.3]				25.0					25.0	37.5	12.5								
			Cecal (Market Swine) (51)	2.0	19.2	[9.6 - 32.5]				74.5	3.9				2.0	19.6									
				Cecal (Sows) (32)	3.1	12.5	[3.5 - 29.0]				81.3	3.1			3.1			12.5							
	Tylosin		Chickens	Retail Chickens (33)	0.0	30.3	[15.6 - 48.7]				6.1	57.6	6.1									30.3			
				Cecal (3)	0.0	33.3	[0.8 - 90.6]						33.3	33.3										33.3	
				Turkeys	Retail Ground Turkey (2)	0.0	50.0	[1.3 - 98.7]							50.0									50.0	
			Cattle	Cecal (1)	0.0	0.0	[0.0 - 97.5]				100.0														
				Retail Ground Beef (41)	0.0	12.2	[4.1 - 26.2]						17.1	61.0	7.3	2.4								12.2	
				Cecal (Beef) (196)	0.5	24.0	[18.2 - 30.6]				2.0	34.7	37.2	0.5	1.0	0.5	1.5	22.5							
Swine			Cecal (Dairy) (75)	0.0	1.3	[0.0 - 7.2]				1.3	53.3	41.3	2.7										1.3		
			Retail Pork Chops (8)	0.0	12.5	[0.3 - 52.7]						12.5	12.5	37.5	25.0								12.5		
			Cecal (Market Swine) (51)	0.0	21.6	[11.3 - 35.3]						17.7	60.8											21.6	
				Cecal (Sows) (32)	0.0	15.6	[5.3 - 32.8]				3.1	18.8	50.0	12.5										15.6	
Nitrofurans	Nitrofurantoin	Chickens	Retail Chickens (33)	33.3	18.2	[7.0 - 35.5]									48.5	33.3						18.2			
			Cecal (3)	33.3	0.0	[0.0 - 70.8]									33.3	33.3							33.3		
			Turkeys	Retail Ground Turkey (2)	0.0	50.0	[1.3 - 98.7]									50.0								50.0	
		Cattle	Cecal (1)	0.0	0.0	[0.0 - 97.5]										100.0									
			Retail Ground Beef (41)	43.9	0.0	[0.0 - 8.6]											2.4	53.7					43.9		
			Cecal (Beef) (196)	27.6	1.0	[0.1 - 3.6]									0.5	0.5	12.2	58.2					27.6	1.0	
		Swine	Cecal (Dairy) (75)	34.7	4.0	[0.8 - 11.2]										1.3	8.0	52.0					34.7	4.0	
			Retail Pork Chops (8)	62.5	0.0	[0.0 - 36.9]											12.5	25.0					62.5		
			Cecal (Market Swine) (51)	37.3	5.9	[1.2 - 16.2]											2.0	7.8	47.1				37.3	5.9	
				Cecal (Sows) (32)	56.3	9.4	[2.0 - 25.0]									3.1	31.3	56.3					56.3	9.4	
Oxazolidinones	Linezolid	Chickens	Retail Chickens (33)	0.0	0.0	[0.0 - 10.6]						57.6	42.4												
			Cecal (3)	0.0	0.0	[0.0 - 70.8]						33.3	66.7												
			Turkeys	Retail Ground Turkey (2)	0.0	0.0	[0.0 - 84.2]							50.0	50.0										
		Cattle	Cecal (1)	0.0	0.0	[0.0 - 97.5]								100.0											
			Retail Ground Beef (41)	0.0	0.0	[0.0 - 8.6]									19.5	80.5									
			Cecal (Beef) (196)	0.0	0.0	[0.0 - 1.9]						11.7	64.8	23.5											
		Swine	Cecal (Dairy) (75)	0.0	0.0	[0.0 - 4.8]						1.3	60.0	38.7											
			Retail Pork Chops (8)	0.0	0.0	[0.0 - 36.9]								25.0	75.0										
			Cecal (Market Swine) (51)	0.0	0.0	[0.0 - 7.0]						3.9	45.1	51.0											
				Cecal (Sows) (32)	0.0	0.0	[0.0 - 10.9]							50.0	50.0										
Penicillins	Penicillin	Chickens	Retail Chickens (33)	N/A	3.0	[0.1 - 15.8]				9.1	9.1	48.5	24.2	6.1								3.0			
			Cecal (3)	N/A	0.0	[0.0 - 70.8]				33.3	66.7														
			Turkeys	Retail Ground Turkey (2)	N/A	0.0	[0.0 - 84.2]							50.0	50.0										
		Cattle	Cecal (1)	N/A	0.0	[0.0 - 97.5]								100.0											
			Retail Ground Beef (41)	N/A	2.4	[0.1 - 12.9]					17.1	4.9	26.8	31.7	17.1									2.4	
			Cecal (Beef) (196)	N/A	0.5	[0.0 - 2.8]					18.9	20.9	33.7	23.0	3.1									0.5	
		Swine	Cecal (Dairy) (75)	N/A	0.0	[0.0 - 4.8]					24.0	17.3	22.7	30.7	5.3										
			Retail Pork Chops (8)	N/A	0.0	[0.0 - 36.9]					62.5	12.5	25.0												
			Cecal (Market Swine) (51)	N/A	0.0	[0.0 - 7.0]					19.6	19.6	31.4	19.6	5.9	3.9									
				Cecal (Sows) (32)	N/A	0.0	[0.0 - 10.9]				31.3	25.0	6.3	15.6	12.5	9.4									

¹ Percent of isolates with intermediate susceptibility. N/A used when there is no intermediate breakpoint established.

² Percent of isolates with resistance. Discrepancies between %R and sums of distribution %s are due to rounding. Percent (%) non-susceptible is reported rather than %R for daptomycin and tigecycline because there is no CLSI breakpoint established.

³ 95% confidence intervals for percent resistant (%R) were calculated using the Clopper-Pearson exact method.

⁴ The unshaded areas indicate the dilution range of the Sensititre plates used to test isolates. Single vertical lines indicate the breakpoints for susceptibility, while double vertical lines indicate the breakpoints for resistance. Numbers in the shaded areas indicate percentage of isolates with MIC's greater than the highest concentrations on the plate. Numbers listed for the lowest tested concentrations represent the percentage of isolates with MIC's equal to or less than the lowest tested concentration.

⁵ There are no established CLSI breakpoints for daptomycin

Table 75c. Distribution of MICs and Occurrence among *Enterococcus hirae* Isolates, 2014

Antimicrobial Class	Antimicrobial Agent	Isolate Source (# of Isolates)	%I ¹	%R ²	95% CI ³	Distribution (%) of MICs (µg/ml) ⁴																										
						0.02	0.03	0.06	0.125	0.25	0.50	1	2	4	8	16	32	64	128	256	512	1024	2048	>2048								
Phenicol	Chloramphenicol	Chickens	Retail Chickens (33)	0.0	0.0	[0.0 - 10.6]											66.7	33.3														
			Cecal (3)	0.0	0.0	[0.0 - 70.8]											100.0															
		Turkeys	Retail Ground Turkey (2)	0.0	0.0	[0.0 - 84.2]											100.0															
			Cecal (1)	0.0	0.0	[0.0 - 97.5]											100.0															
		Cattle	Retail Ground Beef (41)	0.0	0.0	[0.0 - 8.6]											70.7		29.3													
			Cecal (Beef) (196)	0.5	0.0	[0.0 - 1.9]											16.8	73.0	9.7	0.5												
			Cecal (Dairy) (75)	0.0	1.3	[0.0 - 7.2]											8.0	80.0	10.7													
		Swine	Retail Pork Chops (8)	0.0	0.0	[0.0 - 36.9]											75.0		25.0													
			Cecal (Market Swine) (51)	0.0	2.0	[0.0 - 10.4]											9.8	78.4	9.8	2.0												
			Cecal (Sows) (32)	0.0	0.0	[0.0 - 10.9]											9.4	71.9	8.8													
Quinolones	Ciprofloxacin	Chickens	Retail Chickens (33)	9.1	3.0	[0.1 - 15.8]											18.2	51.5	18.2	9.1	3.0											
			Cecal (3)	0.0	0.0	[0.0 - 70.8]											33.3	66.7														
		Turkeys	Retail Ground Turkey (2)	50.0	0.0	[0.0 - 84.2]											50.0		50.0													
			Cecal (1)	0.0	0.0	[0.0 - 97.5]											100.0															
		Cattle	Retail Ground Beef (41)	2.4	0.0	[0.0 - 8.6]											46.3		51.2	2.4												
			Cecal (Beef) (196)	0.5	0.0	[0.0 - 1.9]											0.5	18.4	69.4	11.2	0.5											
			Cecal (Dairy) (75)	1.3	1.3	[0.0 - 7.2]											1.3	8.0	73.3	14.7	1.3	1.3										
		Swine	Retail Pork Chops (8)	0.0	0.0	[0.0 - 36.9]											12.5		87.5													
			Cecal (Market Swine) (51)	0.0	0.0	[0.0 - 7.0]											9.8	78.4	11.8													
			Cecal (Sows) (32)	0.0	0.0	[0.0 - 10.9]											3.1	6.3	78.1	12.5												
Streptogramins	Quinupristin-Dalfopristin	Chickens	Retail Chickens (33)	51.5	39.4	[22.9 - 57.9]											9.1	51.5	12.1	12.1	12.1	3.0										
			Cecal (3)	33.3	33.3	[0.8 - 90.6]											33.3	33.3														
		Turkeys	Retail Ground Turkey (2)	50.0	50.0	[1.3 - 98.7]											50.0		50.0													
			Cecal (1)	0.0	0.0	[0.0 - 97.5]											100.0															
		Cattle	Retail Ground Beef (41)	75.6	9.8	[2.7 - 23.1]											4.9	9.8	75.6	7.3	2.4											
			Cecal (Beef) (196)	54.1	4.1	[1.8 - 7.9]											8.7	33.2	54.1	3.6	0.5											
			Cecal (Dairy) (75)	46.7	1.3	[0.0 - 7.2]											10.7	41.3	46.7	1.3												
		Swine	Retail Pork Chops (8)	87.5	12.5	[0.3 - 52.7]											87.5		12.5													
			Cecal (Market Swine) (51)	52.9	17.6	[8.4 - 30.9]											9.8	19.6	52.9	13.7	3.9											
			Cecal (Sows) (32)	53.1	12.5	[3.5 - 29.0]											15.6	18.8	53.1	9.4	3.1											
Tetracyclines	Tetracycline	Chickens	Retail Chickens (33)	3.0	69.7	[51.3 - 84.4]											27.3	3.0		3.0	66.7											
			Cecal (3)	0.0	66.7	[9.4 - 99.2]											33.3															
		Turkeys	Retail Ground Turkey (2)	0.0	100.0	[15.8 - 100.0]											100.0		100.0													
			Cecal (1)	0.0	100.0	[2.5 - 100.0]																										
		Cattle	Retail Ground Beef (41)	0.0	46.3	[30.7 - 62.6]											53.7		4.9		4.9	36.6										
			Cecal (Beef) (196)	2.0	60.7	[53.5 - 67.6]											37.2		2.0	12.2	11.2	37.2										
			Cecal (Dairy) (75)	4.0	38.7	[27.6 - 50.6]											57.3		4.0	5.3	10.7	22.7										
		Swine	Retail Pork Chops (8)	0.0	100.0	[63.1 - 100.0]																										
			Cecal (Market Swine) (51)	0.0	76.5	[62.5 - 87.2]											23.5		2.0		7.8	66.7										
			Cecal (Sows) (32)	0.0	78.1	[60.0 - 90.7]											18.8		3.1	3.1	75.0											

¹ Percent of isolates with intermediate susceptibility. N/A used when there is no intermediate breakpoint established.

² Percent of isolates with resistance. Discrepancies between %R and sums of distribution %s are due to rounding. Percent (%) non-susceptible is reported rather than %R for daptomycin and tigecycline because there is no CLSI breakpoint established.

³ 95% confidence intervals for percent resistant (%R) were calculated using the Clopper-Pearson exact method

⁴ The unshaded areas indicate the dilution range of the Sensititre plates used to test isolates. Single vertical lines indicate the breakpoints for susceptibility, while double vertical lines indicate the breakpoints for resistance. Numbers in the shaded areas indicate percentage of isolates with MIC's greater than the highest concentrations on the plate. Numbers listed for the lowest tested concentrations represent the percentage of isolates with MIC's equal to or less than the lowest tested concentration.

Resistance by Year

Table 76a. Antimicrobial Resistance among *Enterococcus hirae* Isolates, 2003-2014

Year		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014			
Number of Isolates Tested	Chickens	Retail Chickens	28	27	30	27	22	16	8	24	18	10	15	33		
		Cecal											2	3		
	Turkeys	Retail Ground Turkey	3	0	1	3	2	0	0	2	0	3	1	2		
		Cecal											0	1		
	Cattle	Retail Ground Beef	84	88	82	77	57	49	26	41	44	57	38	41		
		Cecal (Beef)											103	196		
		Cecal (Dairy)											70	75		
	Swine	Retail Pork Chops	14	14	4	8	6	5	2	7	2	5	2	8		
		Cecal (Market Swine)											34	51		
		Cecal (Sows)											27	32		
Antimicrobial Class	Antimicrobial (Resistance Breakpoint)	Isolate Source														
Aminoglycosides	Gentamicin (MIC >500 µg/ml)	Chickens	Retail Chickens	0.0%	0.0%	10.0%	3.7%	4.5%	6.3%	12.5%	4.2%	11.1%	20.0%	26.7%	9.1%	
			Cecal	0	0	3	1	1	1	1	1	2	2	4	3	
		Turkeys	Retail Ground Turkey	0.0%		0.0%	33.3%	0.0%				0.0%		0.0%	0.0%	0.0%
			Cecal	0		0	1	0				0		0	0	0
		Cattle	Retail Ground Beef	0.0%	0.0%	1.2%	1.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
			Cecal (Beef)	0	0	1	1	0	0	0	0	0	0	0	0	0.5%
			Cecal (Dairy)											0	1	
		Swine	Retail Pork Chops	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
			Cecal (Market Swine)	0	0	0	0	0	0	0	0	0	0	0	0	0
			Cecal (Sows)											0	0	
	Kanamycin (MIC ≥ 1024 µg/ml)	Chickens	Retail Chickens	28.6%	3.7%	26.7%	3.7%	18.2%	12.5%	12.5%	4.2%	16.7%	20.0%	26.7%	9.1%	
			Cecal	8	1	8	1	4	2	1	1	3	2	4	3	
		Turkeys	Retail Ground Turkey	66.7%		0.0%	33.3%	0.0%				0.0%		0.0%	0.0%	
			Cecal	2		0	1	0				0		0	0	
		Cattle	Retail Ground Beef	3.6%	0.0%	1.2%	1.3%	0.0%	2.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
			Cecal (Beef)	3	0	1	1	0	1	0	0	0	0	0	0	
			Cecal (Dairy)											0	1	
		Swine	Retail Pork Chops	0.0%	7.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
			Cecal (Market Swine)	0	1	0	0	0	0	0	0	0	0	0	0	
			Cecal (Sows)											2.9%	3.9%	
	Streptomycin (MIC ≥ 1000 µg/ml)	Chickens	Retail Chickens	42.9%	22.2%	23.3%	18.5%	9.1%	25.0%	25.0%	8.3%	5.6%	0.0%	13.3%	3.0%	
			Cecal	12	6	7	5	2	4	2	2	1	0	2	1	
		Turkeys	Retail Ground Turkey	0.0%		0.0%	33.3%	0.0%				0.0%		0.0%	0.0%	
			Cecal	0		0	1	0				0		0	0	
		Cattle	Retail Ground Beef	3.6%	0.0%	4.9%	2.6%	1.8%	0.0%	0.0%	0.0%	0.0%	1.8%	5.3%	2.4%	
			Cecal (Beef)	3	0	4	2	1	0	0	0	0	1	2	1	
			Cecal (Dairy)											1.0%	2.6%	
		Swine	Retail Pork Chops	0.0%	0.0%	25.0%	0.0%	16.7%	0.0%	0.0%	0.0%	50.0%	0.0%	0.0%	0.0%	
			Cecal (Market Swine)	0	0	1	0	1	0	0	0	1	0	0	0	
			Cecal (Sows)											5.9%	11.8%	
Glycopeptides	Vancomycin (MIC ≥ 32 µg/ml)	Chickens	Retail Chickens	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		
			Cecal	0	0	0	0	0	0	0	0	0	0	0	0	
		Turkeys	Retail Ground Turkey	0.0%		0.0%	0.0%	0.0%				0.0%		0.0%	0.0%	
			Cecal	0		0	0	0				0		0	0	
		Cattle	Retail Ground Beef	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
			Cecal (Beef)	0	0	0	0	0	0	0	0	0	0	0	0	
			Cecal (Dairy)											0	0	
		Swine	Retail Pork Chops	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
			Cecal (Market Swine)	0	0	0	0	0	0	0	0	0	0	0	0	
			Cecal (Sows)											0	0	

Table 76b. Antimicrobial Resistance among *Enterococcus hirae* Isolates, 2003-2014

Year	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014			
Number of Isolates Tested	Chickens	Retail Chickens	28	27	30	27	22	16	8	24	18	10	15	33	
		Cecal										2	3		
	Turkeys	Retail Ground Turkey	3	0	1	3	2	0	0	2	0	3	1	2	
		Cecal										0	1		
	Cattle	Retail Ground Beef	84	88	82	77	57	49	26	41	44	57	38	41	
		Cecal (Beef)											103	196	
		Cecal (Dairy)											70	75	
	Swine	Retail Pork Chops	14	14	4	8	6	5	2	7	2	5	2	8	
		Cecal (Market Swine)											34	51	
		Cecal (Sows)											27	32	
Antimicrobial Class	Antimicrobial (Resistance Breakpoint)	Isolate Source													
Glycylcycline	Tigecycline (MIC ≥ 0.25 µg/ml) ¹	Chickens	Retail Chickens			0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
			Cecal			0	0	0	0	0	0	0	0	0	0.0%
		Turkeys	Retail Ground Turkey			0.0%	0.0%	0.0%			0.0%		0.0%	0.0%	0.0%
			Cecal			0	0	0			0		0	0	0
		Cattle	Retail Ground Beef			0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2.4%
			Cecal (Beef)			0	0	0	0	0	0	0	0	0	1
			Cecal (Dairy)											0.0%	0.0%
		Swine	Retail Pork Chops			0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	12.5%
			Cecal (Market Swine)			0	0	0	0	0	0	0	0	0	1
			Cecal (Sows)											0.0%	0.0%
Lincosamides	Lincomycin (MIC ≥ 8 µg/ml)	Chickens	Retail Chickens	100.0%	92.6%	100.0%	77.8%	95.5%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	
			Cecal	28	25	30	21	21	16	8	24	18	10	15	33
		Turkeys	Retail Ground Turkey	100.0%		100.0%	100.0%	100.0%			50.0%		66.7%	100.0%	100.0%
			Cecal	3		1	3	2			1		2	1	2
		Cattle	Retail Ground Beef	91.7%	85.2%	98.8%	81.8%	96.5%	91.8%	88.5%	95.1%	84.1%	93.0%	92.1%	95.1%
			Cecal (Beef)	77	75	81	63	55	45	23	39	37	53	35	39
			Cecal (Dairy)											93.2%	91.3%
		Swine	Retail Pork Chops	100.0%	71.4%	100.0%	87.5%	83.3%	100.0%	100.0%	100.0%	100.0%	80.0%	100.0%	100.0%
			Cecal (Market Swine)	14	10	4	7	5	5	2	7	2	4	2	8
			Cecal (Sows)											73.5%	86.3%
Lipopeptides	Daptomycin ²	Chickens	Retail Chickens		-	-	-	-	-	-	-	-	-	-	
			Cecal											-	
		Turkeys	Retail Ground Turkey			-	-	-			-		-	-	
			Cecal											-	
		Cattle	Retail Ground Beef		-	-	-	-	-	-	-	-	-	-	
			Cecal (Beef)											-	
			Cecal (Dairy)											-	
		Swine	Retail Pork Chops		-	-	-	-	-	-	-	-	-	-	
			Cecal (Market Swine)											-	
			Cecal (Sows)											-	
Macrolides	Erythromycin (MIC ≥ 8 µg/ml)	Chickens	Retail Chickens	67.9%	11.1%	63.3%	14.8%	45.5%	37.5%	25.0%	41.7%	16.7%	20.0%	26.7%	
			Cecal	19	3	19	4	10	6	2	10	3	2	4	10
		Turkeys	Retail Ground Turkey	66.7%		0.0%	66.7%	0.0%			50.0%		0.0%	0.0%	50.0%
			Cecal	2		0	2	0			1		0	0	1
		Cattle	Retail Ground Beef	15.5%	8.0%	17.1%	14.3%	17.5%	12.2%	3.8%	14.6%	13.6%	14.0%	21.1%	14.6%
			Cecal (Beef)	13	7	14	11	10	6	1	6	6	8	8	6
			Cecal (Dairy)											22.3%	16.3%
		Swine	Retail Pork Chops	7.1%	0.0%	25.0%	25.0%	33.3%	60.0%	0.0%	0.0%	50.0%	20.0%	0.0%	50.0%
			Cecal (Market Swine)	1	0	1	2	2	3	0	0	1	1	0	4
			Cecal (Sows)											11.8%	19.6%

¹ Percent non-susceptible is reported rather than percent resistance as no CLSI breakpoint has been established. NARMS breakpoint established to determine resistance

² Resistance data are not presented because there are no established CLSI breakpoints for daptomycin

Table 76c. Antimicrobial Resistance among *Enterococcus hirae* Isolates, 2003-2014

Year			2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014			
Number of Isolates Tested	Chickens	Retail Chickens	28	27	30	27	22	16	8	24	18	10	15	33			
		Cecal											2	3			
	Turkeys	Retail Ground Turkey	3	0	1	3	2	0	0	2	0	3	1	2			
		Cecal											0	1			
	Cattle	Retail Ground Beef	84	88	82	77	57	49	26	41	44	57	38	41			
		Cecal (Beef)											103	196			
		Cecal (Dairy)											70	75			
	Swine	Retail Pork Chops	14	14	4	8	6	5	2	7	2	5	2	8			
		Cecal (Market Swine)											34	51			
		Cecal (Sows)											27	32			
Antimicrobial Class	Antimicrobial (Resistance Breakpoint)	Isolate Source															
Macrolides	Tylosin (MIC ≥ 32 µg/ml)	Chickens	Retail Chickens	64.3% 18	11.1% 3	60.0% 18	18.5% 5	45.5% 10	37.5% 6	25.0% 2	41.7% 10	16.7% 3	20.0% 2	26.7% 4	30.3% 10		
			Cecal											0.0% 0	33.3% 1		
		Turkeys	Retail Ground Turkey	66.7% 2		0.0% 0	66.7% 2	0.0% 0			50.0% 1		0.0% 0	0.0% 0	50.0% 1		
			Cecal												0.0% 0		
		Cattle	Retail Ground Beef	15.5% 13	8.0% 7	17.1% 14	15.6% 12	19.3% 11	12.2% 6	3.8% 1	14.6% 6	13.6% 6	14.0% 8	21.1% 8	12.2% 5		
			Cecal (Beef)											23.3% 24	24.0% 47		
			Cecal (Dairy)											2.9% 2	1.3% 1		
		Swine	Retail Pork Chops	7.1% 1	0.0% 0	25.0% 1	25.0% 2	33.3% 2	40.0% 2	0.0% 0	0.0% 0	50.0% 1	20.0% 1	0.0% 0	12.5% 1		
			Cecal (Market Swine)											11.8% 4	21.6% 11		
			Cecal (Sows)											29.6% 8	15.6% 5		
		Nitrofurans	Nitrofurantoin (MIC ≥ 128 µg/ml)	Chickens	Retail Chickens	10.7% 3	14.8% 4	6.7% 2	7.4% 2	0.0% 0	0.0% 0	0.0% 0	4.2% 1	5.6% 1	10.0% 1	13.3% 2	18.2% 6
					Cecal											0.0% 0	0.0% 0
				Turkeys	Retail Ground Turkey	0.0% 0		0.0% 0	66.7% 2	0.0% 0			0.0% 0		0.0% 0	0.0% 0	50.0% 1
Cecal															0.0% 0		
Cattle	Retail Ground Beef			0.0% 0	6.8% 6	4.9% 4	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	2.3% 1	1.8% 1	2.6% 1	0.0% 0		
	Cecal (Beef)													0.0% 0	1.0% 2		
	Cecal (Dairy)													1.4% 1	4.0% 3		
Swine	Retail Pork Chops			7.1% 1	21.4% 3	25.0% 1	0.0% 0	0.0% 0	20.0% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		
	Cecal (Market Swine)													0.0% 0	5.9% 3		
	Cecal (Sows)													3.7% 1	9.4% 3		
Oxazolidinones	Linezolid (MIC ≥ 8 µg/ml)			Chickens	Retail Chickens	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
					Cecal											0.0% 0	0.0% 0
				Turkeys	Retail Ground Turkey	0.0% 0		0.0% 0	0.0% 0	0.0% 0			0.0% 0		0.0% 0	0.0% 0	0.0% 0
		Cecal													0.0% 0		
		Cattle	Retail Ground Beef	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		
			Cecal (Beef)											0.0% 0	0.0% 0		
			Cecal (Dairy)											0.0% 0	0.0% 0		
		Swine	Retail Pork Chops	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		
			Cecal (Market Swine)											0.0% 0	0.0% 0		
			Cecal (Sows)											0.0% 0	0.0% 0		
		Penicillins	Penicillin (MIC ≥ 16 µg/ml)	Chickens	Retail Chickens	7.1% 2	25.9% 7	0.0% 0	7.4% 2	4.5% 1	0.0% 0	0.0% 0	8.3% 2	5.6% 1	10.0% 1	13.3% 2	3.0% 1
					Cecal											0.0% 0	0.0% 0
				Turkeys	Retail Ground Turkey	0.0% 0		0.0% 0	66.7% 2	100.0% 2			0.0% 0		0.0% 0	0.0% 0	0.0% 0
Cecal															0.0% 0		
Cattle	Retail Ground Beef			0.0% 0	1.1% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	2.4% 1		
	Cecal (Beef)													0.0% 0	0.5% 1		
	Cecal (Dairy)													0.0% 0	0.0% 0		
Swine	Retail Pork Chops			0.0% 0	7.1% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		
	Cecal (Market Swine)													0.0% 0	0.0% 0		
	Cecal (Sows)													7.4% 2	0.0% 0		

Table 76d. Antimicrobial Resistance among *Enterococcus hirae* Isolates, 2003-2014

Year		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014		
Number of Isolates Tested	Chickens	Retail Chickens	28	27	30	27	22	16	8	24	18	10	15	33	
		Cecal											2	3	
	Turkeys	Retail Ground Turkey	3	0	1	3	2	0	0	2	0	3	1	0	
		Cecal											0	2	
	Cattle	Retail Ground Beef	84	88	82	77	57	49	26	41	44	57	38	41	
		Cecal (Beef)											103	196	
		Cecal (Dairy)											70	75	
	Swine	Retail Pork Chops	14	14	4	8	6	5	2	7	2	5	2	8	
		Cecal (Market Swine)											34	51	
		Cecal (Sows)											27	32	
Antimicrobial Class	Antimicrobial (Resistance Breakpoint)	Isolate Source													
Phenicolis	Chloramphenicol (MIC ≥ 32 µg/ml)	Chickens	Retail Chickens	0.0%	0.0%	3.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
			Cecal	0	0	1	0	0	0	0	0	0	0	0	0
		Turkeys	Retail Ground Turkey	0.0%		0.0%	0.0%	0.0%			0.0%		0.0%	0.0%	0.0%
			Cecal	0		0	0	0			0		0	0	0
		Cattle	Retail Ground Beef	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
			Cecal (Beef)											0.0%	0.0%
			Cecal (Dairy)											0.0%	1.3%
		Swine	Retail Pork Chops	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
			Cecal (Market Swine)											2.9%	2.0%
			Cecal (Sows)											1	1
Quinolones	Ciprofloxacin (MIC ≥ 4 µg/ml)	Chickens	Retail Chickens	0.0%	3.7%	0.0%	14.8%	4.5%	0.0%	0.0%	0.0%	0.0%	0.0%	3.0%	
			Cecal	0	1	0	4	1	0	0	0	0	0	0	1
		Turkeys	Retail Ground Turkey	0.0%		0.0%	33.3%	100.0%			0.0%		0.0%	0.0%	0.0%
			Cecal	0		0	1	2			0		0	0	0
		Cattle	Retail Ground Beef	0.0%	1.1%	0.0%	0.0%	1.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
			Cecal (Beef)		1	0	0	1	0	0	0	0	0	0	0
			Cecal (Dairy)											0.0%	1.3%
		Swine	Retail Pork Chops	0.0%	7.1%	0.0%	12.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
			Cecal (Market Swine)		1	0	1	0	0	0	0	0	0	0	0
			Cecal (Sows)											0.0%	0.0%
Streptogramins	Quinupristin-Dalfopristin (MIC ≥ 4 µg/ml)	Chickens	Retail Chickens	82.1%	7.4%	40.0%	18.5%	40.9%	18.8%	25.0%	16.7%	5.6%	20.0%	40.0%	
			Cecal	23	2	12	5	9	3	2	4	1	2	6	13
		Turkeys	Retail Ground Turkey	66.7%		0.0%	33.3%	0.0%			50.0%		0.0%	0.0%	50.0%
			Cecal	2		0	1	0			1		0	0	1
		Cattle	Retail Ground Beef	60.7%	10.2%	11.0%	5.2%	5.3%	4.1%	7.7%	7.3%	9.1%	12.3%	15.8%	9.8%
			Cecal (Beef)	51	9	9	4	3	2	2	3	4	7	6	4
			Cecal (Dairy)											14.6%	4.1%
		Swine	Retail Pork Chops	35.7%	0.0%	25.0%	0.0%	0.0%	20.0%	0.0%	0.0%	50.0%	20.0%	0.0%	12.5%
			Cecal (Market Swine)	5	0	1	0	0	1	0	0	1	1	0	1
			Cecal (Sows)											20.6%	17.7%
Tetracyclines	Tetracycline (MIC ≥ 16 µg/ml)	Chickens	Retail Chickens	64.3%	51.9%	46.7%	33.3%	81.8%	43.8%	62.5%	50.0%	72.2%	90.0%	80.0%	
			Cecal	18	14	14	9	18	7	5	12	13	9	12	23
		Turkeys	Retail Ground Turkey	0.0%		0.0%	66.7%	100.0%			50.0%		33.3%	100.0%	100.0%
			Cecal	0		0	2	2			1		1	1	2
		Cattle	Retail Ground Beef	46.4%	53.4%	65.9%	53.2%	52.6%	53.1%	50.0%	43.9%	38.6%	66.7%	68.4%	46.3%
			Cecal (Beef)	39	47	54	41	30	26	13	18	17	38	26	19
			Cecal (Dairy)											59.2%	60.7%
		Swine	Retail Pork Chops	14.3%	35.7%	50.0%	50.0%	83.3%	60.0%	100.0%	85.7%	50.0%	80.0%	100.0%	100.0%
			Cecal (Market Swine)	2	5	2	4	5	3	2	6	1	4	2	8
			Cecal (Sows)											61.8%	76.5%

Multidrug Resistance

Table 77a. Resistance Patterns among *Enterococcus hirae* Isolates, 2003-2014

Year		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
Number of Isolates Tested	Chickens	Retail Chickens	28	27	30	27	22	16	8	24	18	10	15	33
		Cecal											2	3
	Turkeys	Retail Ground Turkey	3	0	1	3	2	0	0	2	0	3	1	2
		Cecal											0	1
	Cattle	Retail Ground Beef	84	88	82	77	57	49	26	41	44	57	38	41
		Cecal (Beef)											103	196
		Cecal (Dairy)											70	75
	Swine	Retail Pork Chops	14	14	4	8	6	5	2	7	2	5	2	8
		Cecal (Market Swine)											34	51
		Cecal (Sows)											27	32
Resistance Pattern ¹	Source													
1. No Resistance Detected	Chickens	Retail Chickens	0.0% 0	3.7% 1	0.0% 0	11.1% 3	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Cecal											0.0% 0	0.0% 0
	Turkeys	Retail Ground Turkey	0.0% 0		0.0% 0	0.0% 0	0.0% 0			50.0% 1		33.3% 1	0.0% 0	0.0% 0
		Cecal												0.0% 0
	Cattle	Retail Ground Beef	3.6% 3	6.8% 6	0.0% 0	11.7% 9	0.0% 0	4.1% 2	7.7% 2	4.9% 2	11.4% 5	3.5% 2	2.6% 1	4.9% 2
		Cecal (Beef)											2.9% 3	2.6% 5
		Cecal (Dairy)											2.9% 2	6.7% 5
	Swine	Retail Pork Chops	0.0% 0	14.3% 2	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Cecal (Market Swine)											8.8% 3	7.8% 4
		Cecal (Sows)											0.0% 0	0.0% 0
2. Resistance to ≥ 3 Antimicrobial Classes	Chickens	Retail Chickens	92.9% 26	37.0% 10	50.0% 15	22.2% 6	68.2% 15	37.5% 6	37.5% 3	20.8% 5	16.7% 3	50.0% 5	53.3% 8	45.5% 15
		Cecal											50.0% 1	66.7% 2
	Turkeys	Retail Ground Turkey	66.7% 2		0.0% 0	66.7% 2	100.0% 2			50.0% 1		0.0% 0	0.0% 0	100.0% 2
		Cecal												0.0% 0
	Cattle	Retail Ground Beef	36.9% 31	15.9% 14	19.5% 16	13.0% 10	17.5% 10	12.2% 6	3.9% 1	14.6% 6	15.9% 7	14.0% 8	21.1% 8	17.1% 7
		Cecal (Beef)											21.4% 22	20.4% 40
		Cecal (Dairy)											2.9% 2	1.3% 1
	Swine	Retail Pork Chops	14.3% 2	14.3% 2	25.0% 1	12.5% 1	33.3% 2	40.0% 2	0.0% 0	0.0% 0	50.0% 1	20.0% 1	0.0% 0	50.0% 4
		Cecal (Market Swine)											17.7% 6	29.4% 15
		Cecal (Sows)											48.2% 13	31.3% 10
3. Resistant to ≥ 4 Antimicrobial Classes	Chickens	Retail Chickens	67.9% 19	14.8% 4	36.7% 11	14.8% 4	40.9% 9	6.3% 1	12.5% 1	12.5% 3	11.1% 2	30.0% 3	33.3% 5	30.3% 10
		Cecal											0.0% 0	0.0% 0
	Turkeys	Retail Ground Turkey	66.7% 2		0.0% 0	66.7% 2	100.0% 2			50.0% 1		0.0% 0	0.0% 0	50.0% 1
		Cecal												0.0% 0
	Cattle	Retail Ground Beef	14.3% 12	6.8% 6	12.2% 10	3.9% 3	5.3% 3	4.1% 2	3.9% 1	7.3% 3	2.3% 1	10.5% 6	13.2% 5	7.3% 3
		Cecal (Beef)											12.6% 13	6.1% 12
		Cecal (Dairy)											2.9% 2	1.3% 1
	Swine	Retail Pork Chops	7.1% 1	7.1% 1	25.0% 1	0.0% 0	16.7% 1	20.0% 1	0.0% 0	0.0% 0	50.0% 1	20.0% 1	0.0% 0	25.0% 2
		Cecal (Market Swine)											8.8% 3	15.7% 8
		Cecal (Sows)											29.6% 8	9.4% 3
4. Resistant to ≥ 5 Antimicrobial Classes	Chickens	Retail Chickens	32.1% 9	0.0% 0	20.0% 6	11.1% 3	0.0% 0	0.0% 0	0.0% 0	4.2% 1	11.1% 2	0.0% 0	26.7% 4	9.1% 3
		Cecal											0.0% 0	0.0% 0
	Turkeys	Retail Ground Turkey	0.0% 0		0.0% 0	66.7% 2	0.0% 0			0.0% 0		0.0% 0	0.0% 0	0.0% 0
		Cecal												0.0% 0
	Cattle	Retail Ground Beef	1.2% 1	1.1% 1	2.4% 2	1.3% 1	1.8% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	1.8% 1	5.3% 2	2.4% 1
		Cecal (Beef)											1.0% 1	0.5% 1
		Cecal (Dairy)											0.0% 0	1.3% 1
	Swine	Retail Pork Chops	0.0% 0	7.1% 1	25.0% 1	0.0% 0	0.0% 0	20.0% 1	0.0% 0	0.0% 0	50.0% 1	0.0% 0	0.0% 0	0.0% 0
		Cecal (Market Swine)											2.9% 1	9.8% 5
		Cecal (Sows)											11.1% 3	0.0% 0

¹ Resistance patterns do not include daptomycin as there are no established CLSI breakpoints

Table 77b. Resistance Patterns among *Enterococcus hirae* Isolates, 2003-2014

Year			2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Number of Isolates Tested	Chickens	Retail Chickens	28	27	30	27	22	16	8	24	18	10	15	33
		Cecal											2	3
	Turkeys	Retail Ground Turkey	3	0	1	3	2	0	0	2	0	3	1	2
		Cecal											0	1
	Cattle	Retail Ground Beef	84	88	82	77	57	49	26	41	44	57	38	41
		Cecal (Beef)											103	196
	Swine	Cecal (Dairy)											70	75
		Retail Pork Chops	14	14	4	8	6	5	2	7	2	5	2	8
		Cecal (Market Swine)											34	51
			Cecal (Sows)										27	32
Resistance Pattern ¹		Source												
4. Resistant to ≥ 6 Antimicrobial Classes	Chickens	Retail Chickens	0.0% 0	0.0% 0	10.0% 3	0.0% 0	0.0% 0	0.0% 0	0.0% 0	4.2% 1	0.0% 0	0.0% 0	6.7% 1	6.1% 2
		Cecal											0.0% 0	0.0% 0
	Turkeys	Retail Ground Turkey	0.0% 0		0.0% 0	33.3% 1	0.0% 0			0.0% 0		0.0% 0	0.0% 0	0.0% 0
		Cecal												0.0% 0
	Cattle	Retail Ground Beef	0.0% 0	0.0% 0	1.2% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	2.4% 1
		Cecal (Beef)											0.0% 0	0.0% 0
		Cecal (Dairy)											0.0% 0	1.3% 1
	Swine	Retail Pork Chops	0.0% 0	0.0% 0	25.0% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Cecal (Market Swine)											2.9% 1	2.0% 1
		Cecal (Sows)											3.7% 1	0.0% 0
6. At Least Pencillin G and High Level Gentamicin	Chickens	Retail Chickens	0.0% 0	0.0% 0	0.0% 0	0.0% 0	4.6% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	6.7% 1	0.0% 0
		Cecal											0.0% 0	0.0% 0
	Turkeys	Retail Ground Turkey	0.0% 0		0.0% 0	33.3% 1	0.0% 0			0.0% 0		0.0% 0	0.0% 0	0.0% 0
		Cecal												0.0% 0
	Cattle	Retail Ground Beef	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Cecal (Beef)											0.0% 0	0.0% 0
		Cecal (Dairy)											0.0% 0	0.0% 0
	Swine	Retail Pork Chops	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Cecal (Market Swine)											0.0% 0	0.0% 0
		Cecal (Sows)											0.0% 0	0.0% 0
7. At Least Pencillin G High Level Gentamicin,	Chickens	Retail Chickens	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Cecal											0.0% 0	0.0% 0
	Turkeys	Retail Ground Turkey	0.0% 0		0.0% 0	0.0% 0	0.0% 0			0.0% 0		0.0% 0	0.0% 0	0.0% 0
		Cecal												0.0% 0
	Cattle	Retail Ground Beef	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Cecal (Beef)											0.0% 0	0.0% 0
		Cecal (Dairy)											0.0% 0	0.0% 0
	Swine	Retail Pork Chops	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Cecal (Market Swine)											0.0% 0	0.0% 0
		Cecal (Sows)											0.0% 0	0.0% 0
8. At Least Pencillin G, High Level Gentamicin,	Chickens	Retail Chickens	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Cecal											0.0% 0	0.0% 0
	Turkeys	Retail Ground Turkey	0.0% 0		0.0% 0	0.0% 0	0.0% 0			0.0% 0		0.0% 0	0.0% 0	0.0% 0
		Cecal												0.0% 0
	Cattle	Retail Ground Beef	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Cecal (Beef)											0.0% 0	0.0% 0
		Cecal (Dairy)											0.0% 0	0.0% 0
	Swine	Retail Pork Chops	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Cecal (Market Swine)											0.0% 0	0.0% 0
		Cecal (Sows)											0.0% 0	0.0% 0

¹ Resistance patterns do not include daptomycin as there are no established CLSI breakpoints

Appendix A

Table A1. Concentration Ranges Used for Susceptibility Testing of *Salmonella* and *E. coli*, 2014

Antimicrobial Class	Antimicrobial Agent	Concentration Range (µg/ml)
Aminoglycosides	Gentamicin	0.25 - 16
	Streptomycin	2 - 64
β-Lactam/β-Lactamase Inhibitor Combinations	Amoxicillin–Clavulanic Acid	1 / 0.5 - 32 / 16
Cephems	Cefoxitin	0.5 - 32
	Ceftiofur	0.12 - 8
	Ceftriaxone	0.25 - 64
Folate Pathway Inhibitors	Sulfisoxazole	16 - 256
	Trimethoprim–Sulfamethoxazole	0.12 / 2.4 - 4 / 76
Macrolides	Azithromycin	0.12 - 16
Penicillins	Ampicillin	1 - 32
Phenicols	Chloramphenicol	2 - 32
Quinolones	Ciprofloxacin	0.015 - 4
	Nalidixic acid	0.5 - 32
Tetracyclines	Tetracycline	4 - 32

Table A2. Concentration Ranges Used for Susceptibility Testing of *Campylobacter*, 2014

Antimicrobial Class	Antimicrobial Agent	Concentration Range (µg/ml)
Aminoglycosides	Gentamicin	0.12 - 32
Ketolides	Telithromycin	0.015 - 8
Lincosamides	Clindamycin	0.03 - 16
Macrolides	Azithromycin	0.015 - 64
	Erythromycin	0.03 - 64
Phenicols	Florfenicol	0.03 - 64
Quinolones	Ciprofloxacin	0.015 - 64
	Nalidixic acid	4 - 64
Tetracyclines	Tetracycline	0.06 - 64

Table A3. Concentration Ranges Used for Antimicrobial Susceptibility Testing of *Salmonella* and *E. coli* Resistant to Ceftriaxone or Ceftiofur, 2014

Antimicrobial Class	Antimicrobial Agent	Concentration Range (µg/ml)
β-Lactam/β-Lactamase Inhibitor Combinations	Piperacillin-tazobactam	0.5 - 128
Cephems	Cefepime	0.125 - 32
	Cefotaxime	0.125 - 128
	Ceftazidime	0.125 - 128
Monobactams	Aztreonam	0.125 - 32
Penems	Imipenem	0.125 - 16

Table A4. Concentration Ranges Used for Susceptibility Testing of *Enterococcus*, 2014

Antimicrobial Class	Antimicrobial Agent	Concentration Range (µg/ml)
Aminoglycosides	Gentamicin	128 - 1024
	Kanamycin	128 - 1024
	Streptomycin	512 - 2048
Glycopeptides	Vancomycin	0.25 - 32
Glycylcyclines	Tigecycline	0.015 - 0.5
Lincosamides	Lincomycin	1 - 8
Lipopeptides	Daptomycin	0.25 - 16
Macrolides	Erythromycin	0.25 - 8
	Tylosin	0.25 - 32
Nitrofurans	Nitrofurantoin	2 - 64
Oxazolidinones	Linezolid	0.5 - 8
Penicillins	Penicillin	0.25 - 16
Phenicols	Chloramphenicol	2 - 32
Quinolones	Ciprofloxacin	0.12 - 4
Streptogramins	Quinupristin-Dalfopristin	0.5 - 32
Tetracyclines	Tetracycline	1 - 32

Appendix B

Table B1. Antimicrobial Agents and Antimicrobial Susceptibility Testing Methods for *Salmonella* and *E. coli* Isolates, 1996-2014^{1,2}

Antimicrobial Class	Method	Broth Microdilution																		
	Sensititre® Plate Name	CMV1CCDC ³ CMV3CNCD	CMV3CNCD		CMV4CNCD	CMV5CNCD	CMV6CNCD	CMV7CNCD		CMV1AGNF						CMV2AGNF			CVM3AGNF	
	Year	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Antimicrobial Class	Antimicrobial Agent																			
Aminocyclitols	Apramycin	√	√	√	√	√	√													
Aminoglycosides	Amikacin	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√				
	Gentamicin	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
	Kanamycin	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
	Streptomycin	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
β-Lactam/β-Lactamase Inhibitor Combinations	Amoxicillin-Clavulanic Acid	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Cephems	Cefoxitin					√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
	Ceftiofur	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
	Ceftriaxone	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
	Cephalothin	√	√	√	√	√	√	√	√											
Coumarins	Novobiocin	√																		
Folate Pathway Inhibitors	Sulfamethoxazole	√	√	√	√	√	√	√	√											
	Sulfisoxazole									√	√	√	√	√	√	√	√	√	√	√
	Trimethoprim-Sulfamethoxazole	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Macrolides	Azithromycin															√	√	√	√	√
Penems	Imipenem							√												
Penicillins	Ampicillin	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
	Ticarcillin	√	√	√																
Phenolics	Chloramphenicol	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
	Florfenicol				√															
Quinolones	Ciprofloxacin	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
	Nalidixic acid	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Tetracyclines	Tetracycline	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√

¹ Testing of *Salmonella* isolates from humans, food animals, and retail meats began in 1996, 1997, and 2002, respectively

² Testing of *E. coli* isolates from chickens and retail meats began in 2000 and 2002, respectively. Testing of *E. coli* O157 isolates from humans began in 1996 and a study of *E. coli* isolates from people in the community began in 2004

³ In 1996, most isolates were tested using Sensititre® plate CMV1CCDC, but a few isolates were tested using Sensititre® plate CMV3CNCD

Table B2. Antimicrobial Agents and Antimicrobial Susceptibility Testing Methods for *Campylobacter* Isolates from Humans and Chickens, 1997-2014¹

Antimicrobial Class	Method	E-Test®									Broth Microdilution Sensititre® Plate: CAMPY									
	Year	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
Antimicrobial Class	Antimicrobial Agent																			
Aminoglycosides	Gentamicin		√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	
Ketolides	Telithromycin									√	√	√	√	√	√	√	√	√	√	
Lincosamides	Clindamycin	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	
Macrolides	Azithromycin		√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	
	Erythromycin	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	
Penems	Meropenem																			
Phenicol	Chloramphenicol	√	√	√	√	√	√	√	√											
	Florfenicol									√	√	√	√	√	√	√	√	√	√	
Quinolones	Ciprofloxacin	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	
	Nalidixic acid	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	
Tetracyclines	Doxycycline																			
	Tetracycline	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	

¹ Testing of *Campylobacter* isolates from humans and chickens began in 1997 and 1998, respectively

Table B3. Antimicrobial Agents and Antimicrobial Susceptibility Testing Methods for *Campylobacter* Isolates from Retail Meats, 2002-2014

Antimicrobial Class	Method	Agar Dilution		Broth Microdilution Sensititre® Plate: CAMPY															
	Year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014					
Antimicrobial Class	Antimicrobial Agent																		
Aminoglycosides	Gentamicin		√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Ketolides	Telithromycin				√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Lincosamides	Clindamycin				√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Macrolides	Azithromycin				√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
	Erythromycin		√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Penems	Meropenem		√	√															
Phenicol	Chloramphenicol																		
	Florfenicol				√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Quinolones	Ciprofloxacin		√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
	Nalidixic acid				√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Tetracyclines	Doxycycline		√	√															
	Tetracycline				√	√	√	√	√	√	√	√	√	√	√	√	√	√	√

Table B4. Antimicrobial Agents and Antimicrobial Susceptibility Testing Methods for *Enterococcus* Isolates, 2001-2014¹

Antimicrobial Class	Method	Broth Microdilution						
		Sensititre® Plate Name	CMV4ACDC ² CMV5ACDC	CMV5ACDC	CMV1AGPF	CMV1AGPF ³ CMV2AGPF	CMV2AGPF	CMV3AGPF
		Year	2001	2002 - 2003	2004	2005	2006 - 2008	2009 - 2014
Antimicrobial Agent	Concentration Range (µg/ml)							
Aminoglycosides	Gentamicin	✓	✓	✓	✓	✓	✓	✓
	Kanamycin	✓	✓	✓	✓	✓	✓	✓
	Streptomycin	✓	✓	✓	✓	✓	✓	✓
Glycopeptides	Vancomycin	✓	✓	✓	✓	✓	✓	✓
Glycylcyclines	Tigecycline					✓	✓	✓
Ionophores	Salinomycin	✓	✓					
Lincosamides	Lincomycin	✓	✓		✓	✓	✓	✓
Lipopeptides	Daptomycin				✓	✓	✓	✓
Macrolides	Erythromycin	✓	✓		✓	✓	✓	✓
	Tylosin	✓	✓		✓	✓	✓	✓
Nitrofurans	Nitrofurantoin		✓		✓	✓	✓	✓
Oxazolidinones	Linezolid		✓		✓	✓	✓	✓
Penicillins	Penicillin	✓	✓		✓	✓	✓	✓
Phenicols	Chloramphenicol	✓	✓		✓	✓	✓	✓
Phosphoglycolipids	Flavomycin	✓	✓		✓	✓	✓ ⁴	
Polypeptides	Bacitracin	✓	✓		✓			
Quinolones	Ciprofloxacin	✓	✓		✓	✓	✓	✓
Streptogramins	Quinupristin-Dalfopristin	✓	✓		✓	✓	✓	✓
	Virginiamycin							
Tetracyclines	Tetracycline	✓	✓		✓	✓	✓	✓

¹ Testing of *Enterococcus* isolates from retail meats and chickens began in 2002 and 2003, respectively. A study of *Enterococcus* isolates from people in the community began in 2001

² In 2001, most isolates were tested using Sensititre® plate CMV5ACDC, but a few isolates were tested using Sensititre® plate CMV4ACDC

³ In 2005, isolates from chickens and most isolates from humans were tested with Sensititre® plate CMV1AGPF, while isolates from retail meats were tested with Sensititre® plate CMV2AGPF

⁴ Flavomycin was not available for all of the plates used to test isolates from 2008

Table B5. Antimicrobial Agents and Antimicrobial Susceptibility Testing Methods for *Salmonella* and *E. coli* Resistant to Ceftriaxone or Ceftiofur, 2011-2014

Antimicrobial Class	Method																Broth Microdilution			
	Sensititre® Plate Name																CMV2DW			
	Year																2011	2012	2013	2014
	Antimicrobial Agent																			
β-Lactam/β-Lactamase Inhibitor Combinations	Piperacillin-tazobactam																√	√	√	√
Cephems	Cefepime																√	√	√	√
	Cefotaxime																√	√	√	√
	Cefazidime																√	√	√	√
Monabactams	Aztreonam																√	√	√	√
Penems	Imipenem																√	√	√	√