NARMS

National Antimicrobial Resistance Monitoring System

2007

Executive Report

DEPARTMENT OF HEALTH & HUMAN SERVICES · USA

CDC
CENTERS FOR DISEASE CONTROL AND PREVENTION

FDA

USDA

Contents

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I. Introduction

A. Executive Report

This report summarizes, in an integrated format, National Antimicrobial Resistance Monitoring System data on *Salmonella* (non-typhoidal) and *Campylobacter* recovered in 2007 from food animals at federally inspected slaughter and processing plants, retail meats, and human clinical cases. In addition, the report includes susceptibility data for *Escherichia coli* recovered from retail meats and chicken carcasses in 2007. Summary data from prior years are also included.

Suggested Citation: FDA. National Antimicrobial Resistance Monitoring System – Enteric Bacteria (NARMS): 2007 Executive Report. Rockville, MD: U.S. Department of Health and Human Services, Food and Drug Administration, 2010.

B. NARMS Program

The National Antimicrobial Resistance Monitoring System – Enteric Bacteria (NARMS) is a national public health surveillance system in the United States that tracks changes in the susceptibility of certain enteric bacteria to antimicrobial agents of human and veterinary medical importance. The NARMS program was established in 1996 as a collaboration between three federal agencies: the U.S. Food and Drug Administration (FDA), the Centers for Disease Control and Prevention (CDC), and the U.S. Department of Agriculture (USDA).

NARMS monitors antimicrobial susceptibility among enteric bacteria from humans, retail meats, and food animals. Monitoring is conducted for several enteric pathogens, including *Salmonella*, *Campylobacter*, and *Shigella* (humans only). Generic *Escherichia coli* and *Enterococcus* are also tested in NARMS due to their ubiquitous presence in animals, foods, and humans and their potential to serve as reservoirs of antimicrobial resistance genes for bacterial pathogens.

In addition to monitoring antimicrobial susceptibility, NARMS conducts epidemiologic and microbiologic research studies. Some studies examine isolates of a particular serotype or those exhibiting a particular resistance pattern. Other studies focus on improving culture, isolation, genetic typing, or antimicrobial susceptibility testing methods. Additionally, NARMS examines *Salmonella* and *Campylobacter* strains for genetic relatedness using pulsed-field gel electrophoresis (PFGE). PFGE patterns are entered into CDC's PulseNet database or USDA's VetNet database.

The following are the primary objectives of NARMS:

- To monitor trends in antimicrobial resistance among foodborne bacteria from humans, retail meats, and animals
- To disseminate timely information on antimicrobial resistance to promote interventions that reduce resistance among foodborne bacteria
- To conduct research to better understand the emergence, persistence, and spread of antimicrobial resistance
- To assist the FDA in making decisions related to the approval of safe and effective antimicrobial drugs for animals

C. NARMS Components

The NARMS program has three components which are briefly described below.

1. Human Component

The human component of NARMS was launched in 1996 within the framework of CDC's Emerging Infections Program and the Foodborne Diseases Active Surveillance Network (FoodNet). Initially, it included non-Typhi *Salmonella* and *Escherichia coli* O157 isolates from 14 state and local health departments. Surveillance later expanded to include additional bacteria and testing sites. In 1999, testing of *Salmonella* Typhi and *Shigella* was added. By 2003, NARMS conducted nationwide surveillance for non-Typhi *Salmonella*, *Salmonella enterica* serotype Typhi, *Shigella*, and *E. coli* O157 from humans. Testing of *Campylobacter* from humans began in five FoodNet sites in 1997 and expanded to all 10 FoodNet sites by 2003. Antimicrobial susceptibility testing of NARMS human isolates was performed at CDC's laboratories in the National Center for Emerging and Zoonotic Infectious Diseases (proposed) in Atlanta, Georgia.

2. Retail Meat Component

The retail meat component of NARMS was launched in 2002, following a 15-month pilot study in Iowa. Retail meat surveillance was conducted through an ongoing collaboration between FDA's Center for Veterinary Medicine (CVM), CDC, and FoodNet laboratories. Participating FoodNet sites purchased chicken breasts, ground turkey, ground beef, and pork chops at retail stores and cultured them for *Salmonella* and *Campylobacter*. Three or four sites also cultured retail meats for *E. coli* and *Enterococcus*.[1] Isolates were sent to CVM's Office of Research in Laurel, Maryland for species and serotype confirmation, antimicrobial susceptibility testing, and genetic analysis.

3. Animal Component

The animal component of NARMS began in 1997 with monitoring of *Salmonella*, and later expanded to include *Campylobacter* (1998), *E. coli* (2000), and *Enterococcus* (2003) isolated from chicken carcasses. This report includes data for *Campylobacter* and *E. coli* from chicken carcass rinsates and *Salmonella* from carcass rinsates (chicken), carcass swabs (turkey, cattle and swine), and ground products (chicken, turkey, and beef). Isolates were recovered from samples obtained at federally inspected slaughter and processing plants. Antimicrobial susceptibility testing for the animal component of NARMS was conducted at the USDA's Agricultural Research Service (ARS) Bacterial Epidemiology and Antimicrobial Resistance Research Unit at the Russell Research Center in Athens, Georgia.

D. Links to Additional Information

Additional information about NARMS, including comprehensive annual reports for each NARMS component, can be found on the FDA, CDC, and USDA websites listed below. The FDA website also includes NARMS Executive Reports.

[1] From 2002 through 2006, four sites cultured retail meats for *E. coli* and *Enterococcus* and in 2007, three sites cultured retail meats for *E. coli* and *Enterococcus*.

FDA: http://www.fda.gov/AnimalVeterinary/SafetyHealth/AntimicrobialResistance/NationalAntimicrobialResistanceMonitoringSystem/default.htm

CDC: http://www.cdc.gov/narms

USDA: http://ars.usda.gov/Main/docs.htm?docid=6750

Information about the Foodborne Diseases Active Surveillance Network (FoodNet) can be found on the following CDC website: http://www.cdc.gov/foodnet/

II. Methods

A. Sampling Methodology

Sample collection is an integral part of public health surveillance systems. Because NARMS isolates originate from three distinct sources, sampling strategies differ among the three components of NARMS. Sampling methods for each component are described below.

1. Human Component

Sampling for the human pathogens depends on public health laboratory-based surveillance and is driven by the occurrence of laboratory-confirmed cases. NARMS testing of non-Typhi *Salmonella* began in 1996 with isolates from 14 sites, and by 2003, expanded to include state and local health departments in all 50 states. Participating public health laboratories serotyped the isolates before shipment to CDC for susceptibility testing. From 1996 through 2002, participating sites submitted every tenth non-Typhi *Salmonella* isolate they received to CDC for antimicrobial susceptibility testing. Beginning in 2003, they submitted every 20th isolate.

NARMS *Campylobacter* surveillance began in 1997 with five FoodNet sites and expanded to 10 sites (the states of Connecticut, Georgia, Maryland, Minnesota, New Mexico, Oregon, and Tennessee, and selected counties in California, Colorado, and New York) in 2003. From 1997 to 2004, one isolate per week was submitted from each site to CDC. From 2005 through 2007, FoodNet sites submitted all *Campylobacter* isolates (Georgia, Maryland, New Mexico, Oregon, Tennessee), every other isolate (California, Colorado, Connecticut, New York), or every fifth isolate (Minnesota) to NARMS.

2. Retail Meat Component

Retail meat sampling began in January 2002 with FoodNet laboratories in Connecticut, Georgia, Maryland, Minnesota, and Tennessee; Oregon joined in September. FoodNet laboratories in California and New York joined in 2003, and FoodNet laboratories in Colorado and New Mexico joined in 2004. Each month, participating FoodNet sites purchased approximately 40 meat samples, comprising 10 samples each of chicken breasts, ground turkey, ground beef, and pork chops. Before 2007, all sites cultured meats for *Salmonella* and *Campylobacter* and four sites (Georgia, Maryland, Oregon, and Tennessee) cultured meats for *E. coli* and *Enterococcus.* In 2007, all FoodNet sites except Maryland cultured retail meats for *Salmonella* and *Campylobacter* and three sites (Georgia, Oregon, and Tennessee) cultured the meats for *E. coli* and *Enterococcus*. Isolates were sent to CVM for species/serotype confirmation and antimicrobial susceptibility testing.

3. Animal Component

The animal component of NARMS began with surveillance of *Salmonella* isolates in 1997 after pilot studies were conducted in 1995 and 1996. The *Salmonella* isolates included in this report were recovered by FSIS from carcass rinsates (chicken), carcass swabs (turkey, cattle, and swine), and ground products (chicken, turkey, and beef) collected by USDA's Food Safety Inspection Service (FSIS) from federally inspected slaughter and processing plants throughout the United States as part of the Pathogen Reduction/Hazard Analysis and Critical Control Point (PR/HACCP) *Salmonella* verification testing program. ARS conducted susceptibility testing and the National Veterinary Services Laboratories (NVSL) serotyped the isolates.

Sampling methods used by FSIS for the PR/HACCP *Salmonella* verification testing program have changed since NARMS animal testing began. Before June of 2006, there were two phases of the FSIS regulatory program for *Salmonella* in raw products: non-targeted and targeted testing. Non-targeted or "A" set samples were collected at establishments randomly selected from the population of eligible establishments, with a goal of scheduling every eligible establishment at least once a year. Other sample sets (e.g., "B", "C", and "D") were collected from establishments targeted for follow-up testing following a failed set. All sets were included in NARMS testing, but most isolates were from "A" set samples. Beginning in June of 2006, establishments were scheduled using risk-based criteria designed to focus FSIS resources on establishments with the most samples positive for *Salmonella* and the greatest number of samples with serotypes most frequently associated with human salmonellosis.[1]

In 1998, *Campylobacter* isolates from chickens were submitted to ARS from the Eastern FSIS laboratory, and in 1999 and 2000, *Campylobacter* isolates were obtained from all three FSIS laboratories (Eastern, Midwestern, and Western laboratories). FSIS cultured samples for *Campylobacter* using the most probable number method described in the FSIS Microbiology Laboratory Guidebook.[2] Nalidixic acid susceptibility and cephalothin resistance were initially used as identification criteria for *Campylobacter jejuni/coli*, which likely resulted in an underreporting of quinolone-resistant *Campylobacter*. A new ARS method was adopted in July of 2001, after which *Campylobacter* were isolated by ARS from chicken carcass rinsates submitted by the Eastern FSIS laboratory. Each FSIS laboratory tested samples collected throughout the U.S.

This Executive Report contains data on *Campylobacter* recovered from chicken carcass rinsates for the period July 2001 through December 2007, when the new ARS isolation method was used. The rinsates were collected as part of the *Salmonella* PR/HACCP verification testing program described above.

USDA began testing *E. coli* for antimicrobial susceptibility in 2000. ARS isolated *E. coli* from chicken carcass rinsates submitted by the Eastern FSIS laboratory. The rinsates were collected as part of the *Salmonella* PR/HACCP verification testing program.

B. Antimicrobial Susceptibility Testing Methods

The dilution schemes and antimicrobial content of the susceptibility testing panels used by NARMS have undergone several design changes. The content of the panels has changed to accommodate new antimicrobial agents, to omit those no longer available or used, or to adjust dilution ranges for quality control and monitoring purposes. For example, in 2004, cephalothin was removed and sulfamethoxazole was replaced with sulfisoxazole on the *Salmonella*/*E. coli* panel. Appendix B shows the antimicrobial agents and antimicrobial susceptibility testing methods used since the program began.

Antimicrobial minimal inhibitory concentrations (MICs) for *Salmonella* and *E. coli* were determined according to manufacturer instructions using the Sensititre® semi-automated antimicrobial susceptibility system (Trek Diagnostic Systems, Westlake, Ohio). In 2007, *Salmonella* and *E. coli* were tested using a custom panel developed for Gram-negative bacteria (Trek catalog # CMV1AGNF). The quality control organisms included *Escherichia coli* ATCC

[1] http://www.fsis.usda.gov/Science/Serotypes_Profile_Salmonella_Isolates/index.asp
[2] http://www.fsis.usda.gov/Science/Microbiological_Lab_Guidebook/index.asp

25922, *Enterococcus faecalis* ATCC 29212, *Staphylococcus aureus* ATCC 29213, and *Pseudomonas aeruginosa* ATCC 27853, according to Clinical and Laboratory Standards Institute (CLSI) recommendations.[1,2]

Methods used to determine MICs for *Campylobacter* have changed over time. Through 2004, the human and animal components of NARMS used Etest® (AB Biodisk, Solna, Sweden). The antimicrobial agents tested using Etest® included: azithromycin, chloramphenicol, ciprofloxacin, clindamycin, erythromycin, gentamicin, nalidixic acid, and tetracycline. Based on Etest® manufacturer recommendations, MIC results that fell between the two-fold dilutions described in CLSI documents were rounded up to next two-fold dilution for interpretation.[3] The retail component of NARMS used the agar dilution method in 2002 and 2003. The antimicrobial agents tested using agar dilution included: were ciprofloxacin, doxycycline, erythromycin, gentamicin, and meropenem. Recognizing the need for a standardized semi-automated method, CVM developed a broth microdilution method which was approved and published by CLSI in 2006.[4] The retail component began using this method in 2004 and the human and food animal components adopted the method in 2005. Testing was done using the Sensititre® semi-automated antimicrobial susceptibility system (Trek Diagnostic Systems, Westlake, Ohio) and a custom panel developed for *Campylobacter* (Trek catalog # CAMPY). The antimicrobial agents included in broth microdilution testing were: azithromycin, ciprofloxacin, clindamycin, erythromycin, florfenicol, gentamicin, nalidixic acid, telithromycin, and tetracycline. *Campylobacter jejuni* ATCC 33560 was used as the quality control organism.

C. Breakpoints

The breakpoints used in this report are shown in Tables 1 and 2. CLSI-approved breakpoints were used when available and were adopted from CLSI documents M45-A, M100-S19, and M31-A3.[4,5,6] For *Salmonella* and *E. coli*, CLSI breakpoints were available for all antimicrobial agents tested except streptomycin.[5,6] For *Campylobacter*, CLSI breakpoints were available only for ciprofloxacin, doxycycline, erythromycin, and tetracycline.[4] NARMS breakpoints were used when CLSI breakpoints were not available. NARMS breakpoints were established based on the MIC distributions of NARMS isolates and the presence of known resistance genes or mutations.

For the *Enterobacteriaceae*, CLSI revised the breakpoints for several cephalosporins in its M100-S20 document published in January 2010.[7] For ceftriaxone, the breakpoint for resistance changed from ≥ 64 µg/ml to ≥ 4 µg/ml. The old ceftriaxone breakpoints are used in this report; however, the revised breakpoints will be applied in the 2008 report. The impact that the change in the resistant breakpoint will have on NARMS 2007 data is shown graphically in Appendix C.

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[1] **NCCLS**. 2002. Performance Standards for Antimicrobial Disk and Dilution Susceptibility Tests for Bacteria Isolated from Animals; Approved Standard—Second Edition. NCCLS document M31-A2. NCCLS, Wayne, PA.
[2] **CLSI**. 2007. Performance Standards for Antimicrobial Susceptibility Testing; Seventeenth Informational Supplement. CLSI document M100-S17. CLSI, Wayne, PA.
[3] In USDA's NARMS annual reports, MIC values were not rounded up prior to interpretation.
[4] **CLSI**. 2006. Methods for Antimicrobial Dilution and Disk Susceptibility Testing of Infrequently Isolated or Fastidious Bacteria; Approved Guideline. CLSI document M45-A. CLSI, Wayne, PA.
[5] **CLSI**. 2009. Performance Standards for Antimicrobial Susceptibility Testing; Nineteenth Informational Supplement. CLSI document M100-S19. CLSI, Wayne, PA.
[6] **CLSI**. 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.
[7] **CLSI**. 2010. Performance Standards for Antimicrobial Susceptibility Testing; Twentieth Informational Supplement. CLSI document M100-S20. CLSI, Wayne, PA.

Table 1. Breakpoints Used for Susceptibility Testing of *Salmonella* and *E. coli* [1,2]

Antimicrobial Class	Antimicrobial Agent	Breakpoints (µg/ml)		
		Susceptible	Intermediate	Resistant
Aminoglycosides	Amikacin	≤ 16	32	≥ 64
	Gentamicin	≤ 4	8	≥ 16
	Kanamycin	≤ 16	32	≥ 64
	Streptomycin	≤ 32	N/A	≥ 64
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 [2]	≤ 8	16 - 32	≥ 64
Folate Pathway Inhibitors	Sulfamethoxazole/Sulfisoxazole [3]	≤ 256	N/A	≥ 512
	Trimethoprim–Sulfamethoxazole	≤ 2 / 38	N/A	≥ 4 / 76
Penicillins	Ampicillin	≤ 8	16	≥ 32
Phenicols	Chloramphenicol	≤ 8	16	≥ 32
Quinolones	Ciprofloxacin	≤ 1	2	≥ 4
	Nalidixic acid	≤ 16	N/A	≥ 32
Tetracyclines	Tetracycline	≤ 4	8	≥ 16

[1] Breakpoints were adopted from CLSI (Clinical and Laboratory Standards Institute), except for streptomycin, which has no CLSI breakpoints

[2] In this NARMS report, the ceftriaxone breakpoints from the CLSI M100-S19 document were used. CLSI revised the breakpoints for ceftriaxone in its M100-S20 document published in January 2010. The new breakpoints will be used in NARMS 2008 reports. The new resistant breakpoint is ≥ 4 µg/ml. The impact that the change in the resistant breakpoint will have on NARMS 2007 data is shown graphically in Appendix C

[3] Sulfamethoxazole was tested from 1996 through 2003 and was replaced by sulfisoxazole in 2004

Table 2. Breakpoints Used for Susceptibility Testing of *Campylobacter* [1]

Antimicrobial Class	Antimicrobial Agent	Breakpoints (µg/ml)		
		Susceptible	Intermediate	Resistant
Aminoglycosides	Gentamicin	≤ 2	4	≥ 8
Ketolides	Telithromycin	≤ 4	8	≥ 16
Lincosamides	Clindamycin	≤ 2	4	≥ 8
Macrolides	Azithromycin	≤ 2	4	≥ 8
	Erythromycin	≤ 8	16	≥ 32
Phenicols	Chloramphenicol	≤ 8	16	≥ 32
	Florfenicol [2]	≤ 4	N/A	N/A
Quinolones	Ciprofloxacin	≤ 1	2	≥ 4
	Nalidixic acid	≤ 16	32	≥ 64
Tetracyclines	Doxycycline	≤ 2	4	≥ 8
	Tetracycline	≤ 4	8	≥ 16

[1] Breakpoints were adopted from CLSI (Clinical and Laboratory Standards Institute), when available

[2] 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

D. Reporting Methods

The remaining three sections of this report contain NARMS surveillance data for *Salmonella*, *Campylobacter*, and *E. coli*. Antimicrobial agents are listed in alphabetical order by CLSI-designated antimicrobial classes.

Section III contains data for non-typhoidal *Salmonella enterica* isolates recovered from food animals at slaughter, retail meats, and humans. The number of *Salmonella* isolates reported for humans each year is slightly lower than in past reports because typhoidal *Salmonella enterica* serotypes (Typhi, Paratyphi A, tartrate-negative Paratyphi B, and Paratyphi C), which cause enteric fever in humans, are excluded from the report. NARMS reports previously combined data for all *Salmonella enterica* serotypes except for serotype Typhi. *Salmonella enterica* serotype Paratyphi B var. L(+) tartrate+ (formerly serotype Java), which is not typically associated with typhoidal disease, is included in this report as a non-typhoidal *Salmonella enterica* serotype. Data for typhoidal *Salmonella* can be found in the NARMS Human Isolates Final Report, 2007 published by CDC.

Antimicrobial susceptibility data are first presented for all non-typhoidal *Salmonella enterica* serotypes. Data are then presented separately for the top five non-typhoidal *Salmonella enterica* serotypes in humans: Typhimurium, Enteritidis, Newport, Heidelberg, and I 4,[5],12;i:-. *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 NVSL, which serotyped the *Salmonella* isolates, did not report antigenic formulas for most monophasic *Salmonella enterica* serotypes at that time. Because of increased submissions of *Salmonella enterica* serotype I 4,[5],12:i:- from humans in recent years and recognition of the possibility that this serotype may have been underreported in previous years, isolates from humans reported as serogroup B and tested in NARMS during the period 1996 through 2007 were reviewed for additional information. Isolates that could be clearly identified as serogroup B, with first-phase flagellar antigen “i” and second flagellar antigen absent were re-categorized as *Salmonella* I 4,[5],12:i:- for this report.

Section IV of the report contains data for *Campylobacter* recovered from humans, retail meats, and chicken carcass rinsates. Antimicrobial susceptibility data for *C. jejuni* and *C. coli* are presented separately. Section V contains susceptibility data for *E. coli* from retail meats and chicken carcass rinsates.

Each section begins with a table that shows the number of isolates tested by source and year. This is followed by a table and two figures that show the percentages of retail meats that tested positive. Data are also provided on the distribution of *Salmonella* serotypes and *Campylobacter* species isolated from humans, retail meats, and food animals.

Data on antimicrobial susceptibility testing follows. MIC tables are presented for non-typhoidal *Salmonella*, *C. jejuni*, *C. coli*, and *E. coli*. The tables include MIC distributions, percentages of isolates displaying intermediate susceptibility and resistance, and 95% confidence intervals for the percent resistant, by source for 2007. Confidence intervals were calculated using the Clopper-Pearson exact method.[1] The unshaded areas in the MIC tables indicate the range of

[1] Newcombe RG. Two-sided confidence intervals for the single proportion: comparison of seven methods. Statistics in Medicine 1998; 17(8): 857-872.

concentrations tested for each antimicrobial agent.[1] Single vertical bars indicate breakpoints for susceptibility, while double vertical bars indicate breakpoints for resistance.

The MIC distributions are followed by tables that show the numbers and percentages of isolates that were resistant, by year, through 2007.[2] The total number of isolates tested per year for each source is listed at the top of each table. An empty cell in this area 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. Similar tables are presented for *Salmonella* serotypes Typhimurium, Enteritidis, Newport, Heidelberg, and I 4,[5],12;i:-.

Resistance to ceftiofur and nalidixic acid in *Salmonella* is highlighted in several pie charts and graphs (Figures 6-16).[3,4] Third-generation cephalosporins (such as ceftriaxone) and fluoroquinolones (such as ciprofloxacin) are antimicrobial agents commonly used for the treatment of severe *Salmonella* infections in humans. In the United States, elevated MICs (≥ 8 µg/ml) to ceftiofur are usually indicative of the presence of an AmpC beta-lactamase gene (bla_{CMY}), which also confers decreased susceptibility (MIC ≥ 2 µg/ml) to ceftriaxone. Similarly, resistance to the quinolone nalidixic acid (MIC ≥ 32 µg/ml) correlates with mutations causing decreased susceptibility to ciprofloxacin (MIC ≥ 0.125 µg/ml).

Finally, multidrug resistance data for *Salmonella* and *E. coli* are presented (Tables 13-20, 23, 26, 29, 32, 35, and 50). Data for specific multidrug resistance phenotypes of public health importance are reported along with data on resistance to 3, 4, and 5 or more CLSI antimicrobial classes. Resistance to multiple antimicrobial classes is limited to the eight CLSI antimicrobial classes tested in all years from 1996 through 2007 represented by 15 agents: amikacin, amoxicillin-clavulanic acid, ampicillin, cefoxitin, ceftiofur, ceftriaxone, chloramphenicol, ciprofloxacin, gentamicin, kanamycin, nalidixic acid, streptomycin, sulfamethoxazole/ sulfisoxazole, tetracycline, and trimethoprim-sulfamethoxazole. Amikacin was not tested for all isolates from 1996, and cefoxitin was not tested prior to 2000.

The data contained in this report differ in a few cases from those previously reported. These differences may be due to changes in breakpoints (*Campylobacter*), 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), while USDA's annual report lists these *Salmonella* variants separately.

[1] The concentration ranges are also listed in Appendix A.

[2] Data on *Campylobacter* recovered from chickens is presented only for the period of July 2001 through December 2006, as described in Section IIA.

[3] Note that the scales vary from figure to figure, based on the maximum percent resistance.

[4] Below each graph is a table that shows the number of isolates tested. Empty grey boxes indicate that surveillance was not conducted, while boxes with zeros indicate that there were no isolates available for testing.

III. Non-Typhoidal *Salmonella* Data

A. Non-Typhoidal *Salmonella* Isolates Tested

Table 3. Number of Non-Typhoidal *Salmonella* Isolates Tested, by Source and Year, 1996-2007 [1]

Source	Year											
	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Humans	1318	1297	1455	1493	1372	1410	1998	1855	1782	2034	2173	2144
Chicken Breasts							60	83	157	153	152	99
Ground Turkey							74	114	142	183	159	190
Ground Beef							9	10	14	8	19	13
Pork Chops							10	5	11	9	8	18
Chickens		214	561	1438	1173	1307	1500	1158	1280	1989	1380	994
Turkeys		107	240	713	518	550	244	262	236	227	304	271
Cattle		24	284	1610	1388	893	1008	670	607	329	389	439
Swine		111	793	876	451	418	379	211	308	301	304	211

[1] The number of *Salmonella* isolates shown for humans each year is slightly lower than in past reports because all typhoidal *Salmonella* serotypes (Typhi, Paratyphi A, tartrate-negative Paratyphi B, and Paratyphi C) were excluded. NARMS reports previously combined data for all non-Typhi *Salmonella.* Data for typhoidal *Salmonella* can be found in the NARMS Human Isolates Final Report, 2007 published by CDC

B. Isolation of Non-Typhoidal *Salmonella* from Retail Meats

Table 4. Number and Percent of Retail Meat Samples Culture Positive for *Salmonella*, 2007

	Chicken Breasts	Ground Turkey	Ground Beef	Pork Chops
Number of Meat Samples Tested	1072	1066	1071	1073
Number Positive for *Salmonella*	99	190	13	18
Percent Positive for *Salmonella*	9.2%	17.8%	1.2%	1.7%

Figure 1. Percent of Retail Meat Samples Culture Positive for *Salmonella*, 2007

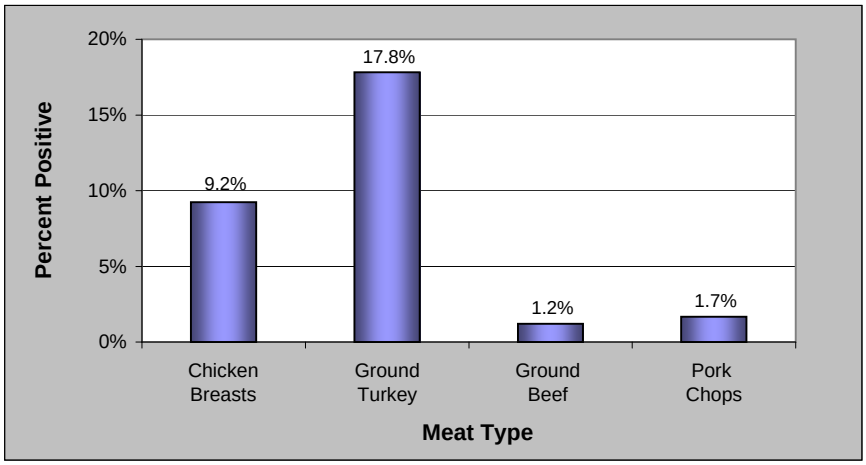
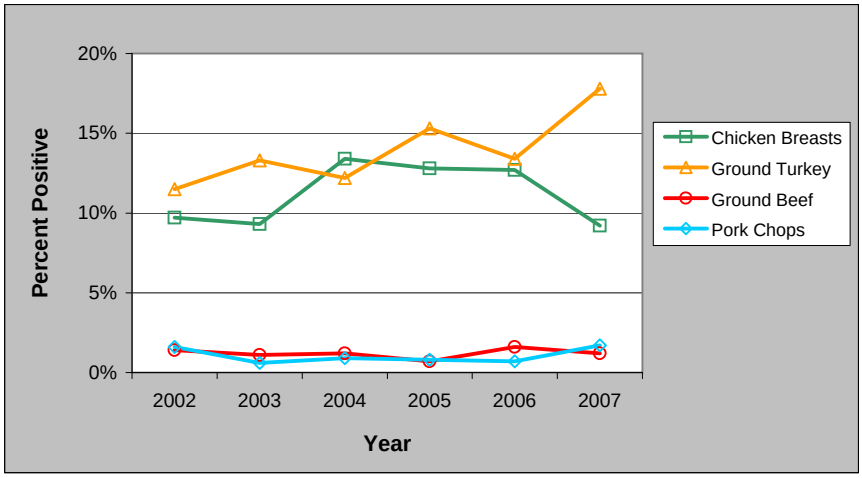


Figure 2. Percent of Retail Meat Samples Culture Positive for *Salmonella*, 2002-2007



C. Non-Typhoidal *Salmonella* Serotypes

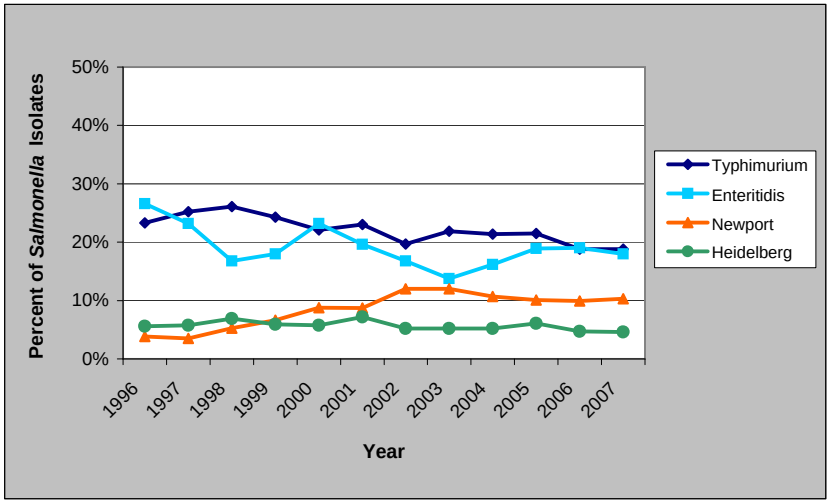
Table 5. Most Common Serotypes among Non-Typhoidal *Salmonella* Isolates from Humans, Retail Meats, and Food Animals, 2007

Humans				Retail Meats				Food Animals			
Source	**Serotype**	**n**	**%**	**Meat Type**	**Serotype**	**n**	**%**	**Animal Source**	**Serotype**	**n**	**%**
Humans (N=2144)	Typhimurium	403	18.8	**Chicken Breasts (N=99)**	Typhimurium	25	25.3	**Chickens (N=994)**	Kentucky	443	44.6
	Enteritidis	385	18.0		Kentucky	23	23.2		Heidelberg	142	14.3
	Newport	220	10.3		Heidelberg	14	14.1		Enteritidis	124	12.5
	Heidelberg	98	4.6		Enteritidis	13	13.1		Typhimurium	83	8.4
	I 4,[5],12:i:-	73	3.4		Montevideo	6	6.1		I 4,[5],12:i:-	49	4.9
	Javiana	65	3.0		I 4,[5],12:i:-	2	2.0		Montevideo	20	2.0
	Muenchen	64	3.0		Hadar	2	2.0		Infantis	16	1.6
	Montevideo	51	2.4		Mbandaka	2	2.0		Berta	13	1.3
	Tennessee	38	1.8		Oranienburg	2	2.0		Mbandaka	11	1.1
	Mississippi	37	1.7		Other	10	10.1		Schwarzengrund	11	1.1
	Oranienburg	37	1.7						Other	82	8.2
	Braenderup	36	1.7								
	Agona	32	1.5								
	Saintpaul	32	1.5	**Ground Turkey (N=190)**	Hadar	54	28.4	**Turkeys (N=271)**	Hadar	118	43.5
	Infantis	26	1.2		Heidelberg	41	21.6		Saintpaul	29	10.7
	Paratyphi B var. L(+) tartrate+	25	1.2		Saintpaul	36	18.9		Heidelberg	23	8.5
	Mbandaka	24	1.1		Reading	8	4.2		Newport	15	5.5
	Poona	22	1.0		Schwarzengrund	7	3.7		Agona	14	5.2
	Stanley	20	0.9		Senfternberg	6	3.2		Senftenberg	9	3.3
	Schwarzengrund	19	0.9		Agona	5	2.6		Reading	8	3.0
	All other serotypes	383	17.9		Minnesota	5	2.6		Typhimurium	6	2.2
	Unknown serotype	13	0.6		Albany	4	2.1		Schwarzengrund	5	1.8
	Partially serotyped	24	1.1		I 4,5,12:r:-	3	1.6		Berta	4	1.5
	Rough/nonmotile isolates	17	0.8		Muenchen	3	1.6		Muenchen	4	1.5
					Other	18	9.5		Other	36	13.3
				Ground Beef (N=13)	Montevideo	3	23.1	**Cattle (N=439)**	Montevideo	95	21.6
					Typhimurium	3	23.1		Dublin	40	9.1
					I 4,[5],12:i:-	2	15.4		Muenster	33	7.5
					Muenster	2	15.4		Newport	30	6.8
					Anatum	1	7.7		Mbandaka	27	6.2
					Cerro	1	7.7		Typhimurium	26	5.9
					Saintpaul	1	7.7		Cerro	24	5.5
									Anatum	23	5.2
									Agona	17	3.9
									Meleagridis	17	3.9
									Infantis	13	3.0
									Other	94	21.4
				Pork Chops (N=18)	Infantis	5	27.8	**Swine (N=211)**	Typhimurium	44	20.9
					Derby	4	22.2		Derby	29	13.7
					Typhimurium	3	16.7		Johannesburg	22	10.4
					Mbandaka	2	11.1		Infantis	17	8.1
					I 6,7:nonmotile	1	5.6		Anatum	14	6.6
					Hadar	1	5.6		Saintpaul	12	5.7
					Montevideo	1	5.6		Adelaide	10	4.7
					Saintpaul	1	5.6		London	10	4.7
									Hadar	9	4.3
									Agona	8	3.8
									Muenchen	4	1.9
									Other	32	15.2

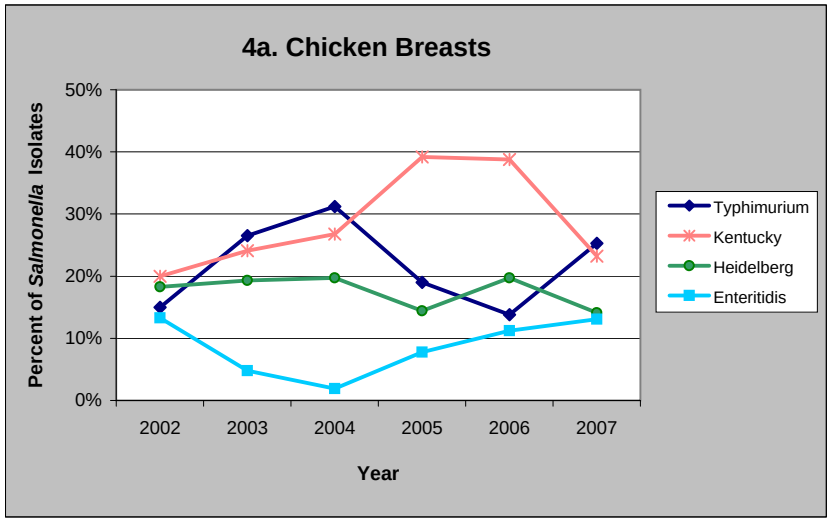
Table 6. Most Common Non-Typhoidal *Salmonella* Serotypes in Humans and their Distributions among Retail Meat and Food Animal Isolates, by Meat Type and Animal Source, 2007

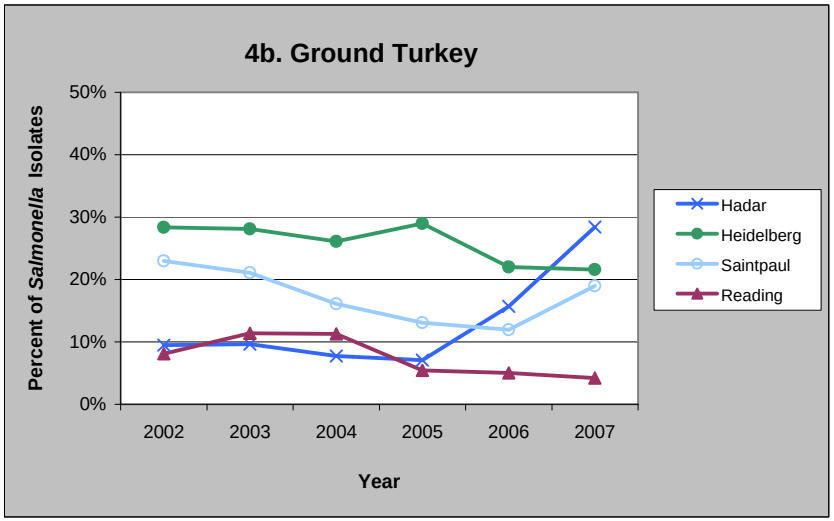
	Humans	Retail Meats				Food Animals			
	Humans (N=2144)	Chicken Breasts (N=99)	Ground Turkey (N=190)	Ground Beef (N=13)	Pork Chops (N=18)	Chickens (N=994)	Turkeys (N=271)	Cattle (N=439)	Swine (N=211)
1. Typhimurium	18.8%	25.3%	0.5%	23.1%	16.7%	8.4%	2.2%	5.9%	20.9%
	403	25	1	3	3	83	6	26	44
2. Enteritidis	18.0%	13.1%	0.0%	0.0%	0.0%	12.5%	0.0%	0.9%	0.5%
	385	13	0	0	0	124	0	4	1
3. Newport	10.3%	0.0%	0.0%	0.0%	0.0%	0.3%	5.5%	6.8%	0.5%
	220	0	0	0	0	3	15	30	1
4. Heidelberg	4.6%	14.1%	21.6%	0.0%	0.0%	14.3%	8.5%	0.0%	0.9%
	98	14	41	0	0	142	23	0	2
5. I 4,[5],12:i-	3.4%	2.0%	0.0%	15.4%	0.0%	4.9%	0.4%	1.4%	0.5%
	73	2	0	2	0	49	1	6	1
6. Javiana	3.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	65	0	0	0	0	0	0	0	0
7. Muenchen	3.0%	0.0%	1.6%	0.0%	0.0%	0.1%	1.5%	1.8%	1.9%
	64	0	3	0	0	1	4	8	4
8. Montevideo	2.4%	6.1%	1.1%	23.1%	5.6%	2.0%	1.1%	21.6%	0.9%
	51	6	2	3	1	20	3	95	2
9. Tennessee	1.8%	1.0%	0.0%	0.0%	0.0%	0.3%	0.0%	0.0%	0.0%
	38	1	0	0	0	3	0	0	0
10. Mississippi	1.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	37	0	0	0	0	0	0	0	0
11. Oranienburg	1.7%	2.0%	0.0%	0.0%	0.0%	0.8%	0.0%	0.2%	0.0%
	37	2	0	0	0	8	0	1	0

Figure 3. Most Common Non-Typhoidal *Salmonella* Serotypes from Humans in 2007 and their Relative Frequencies, by Year, 1996-2007



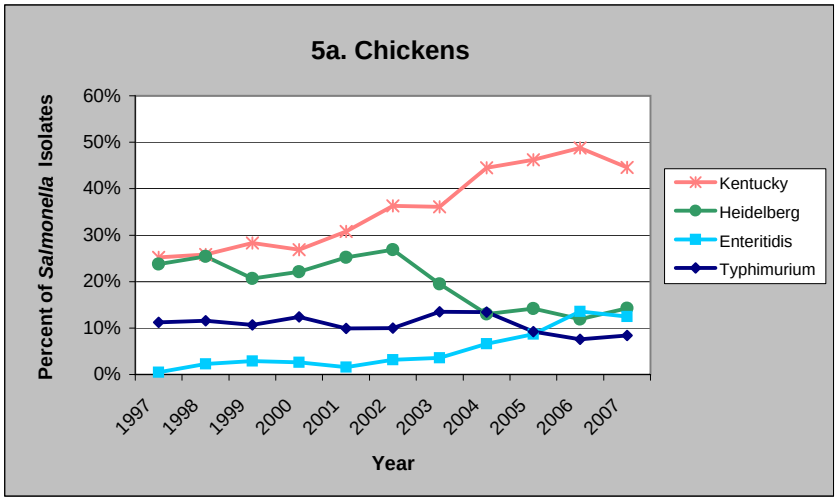
Figures 4a-b. Most Common Non-Typhoidal *Salmonella* Serotypes from Retail Poultry in 2007 and their Relative Frequencies, by Year, 2002-2007[1]

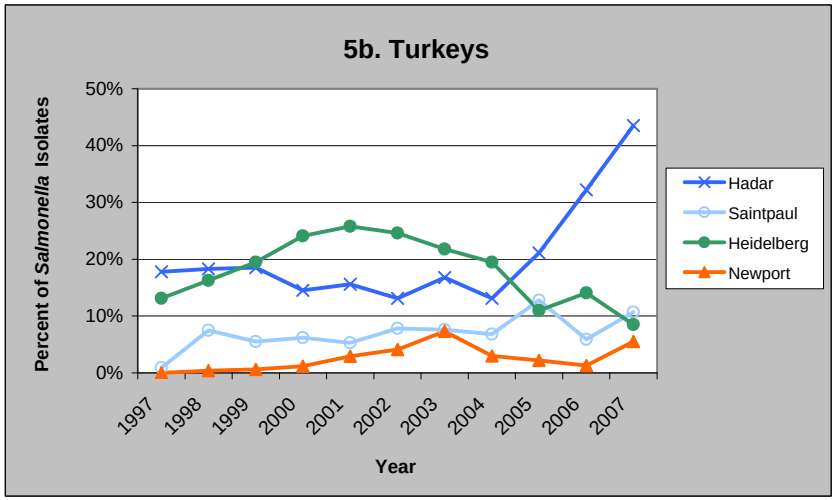


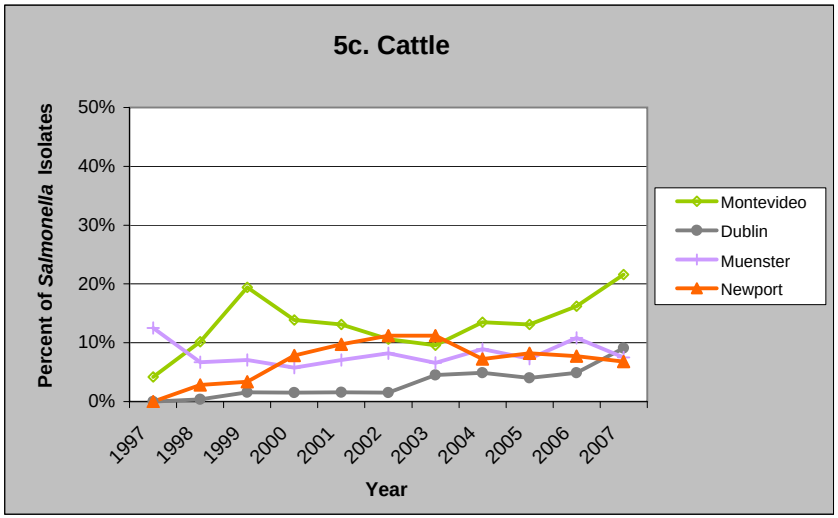


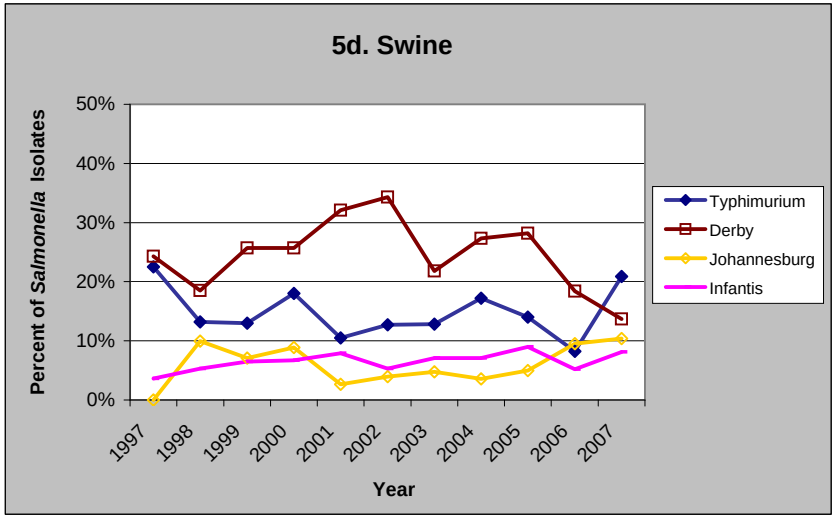
[1] Graphs are not provided for ground beef and pork chops due to the small number of *Salmonella* isolates from these sources

Figures 5a-d. Most Common Non-Typhoidal *Salmonella* Serotypes from Food Animals in 2007 and their Relative Frequencies, by Year, 1997-2007









D. Antimicrobial Susceptibility among all Non-Typhoidal *Salmonella*

MIC Distributions

Table 7a. Distribution of MICs and Occurrence of Resistance among all Non-Typhoidal *Salmonella* Isolates from Humans, Retail Meats, and Food Animals, 2007

Antimicrobial	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
Aminoglycosides																					
Amikacin	Humans (2144)	0.0	**0.0**	[0.0 - 0.2]						7.4	70.1	20.8	1.6	0.1							
	Chicken Breasts (99)	0.0	**0.0**	[0.0 - 3.7]						9.1	42.4	45.5	2.0	1.0							
	Ground Turkey (190)	0.0	**0.0**	[0.0 - 1.9]						1.1	46.8	42.6	8.9	0.5							
	Ground Beef (13)	0.0	**0.0**	[0.0 - 24.7]							46.2	46.2	7.7								
	Pork Chops (18)	0.0	**0.0**	[0.0 - 18.5]							33.3	50.0	16.7								
	Chickens (994)	0.0	**0.0**	[0.0 - 0.4]						35.5	57.5	6.4	0.5								
	Turkeys (271)	0.0	**0.0**	[0.0 - 1.4]						18.1	67.9	12.5	1.1	0.4							
	Cattle (439)	0.0	**0.0**	[0.0 - 0.8]						12.3	60.8	25.3	1.4	0.2							
	Swine (211)	0.0	**0.5**	[0.0 - 2.6]						13.3	71.6	11.8	2.8						**0.5**		
Gentamicin	Humans (2144)	0.1	**2.1**	[1.5 - 2.8]					53.5	41.4	2.8	0.1		0.1	**0.9**	**1.2**					
	Chicken Breasts (99)	1.0	**6.1**	[2.3 - 12.7]					52.5	35.4	4.0	1.0		1.0	**2.0**	**4.0**					
	Ground Turkey (190)	2.1	**24.7**	[18.8 - 31.5]					27.9	41.1	3.7	0.5		2.1	**5.8**	**18.9**					
	Ground Beef (13)	0.0	**7.7**	[0.2 - 36.0]					15.4	76.9					**7.7**						
	Pork Chops (18)	0.0	**5.6**	[0.1 - 27.3]					27.8	50.0	16.7					**5.6**					
	Chickens (994)	0.6	**4.5**	[3.3 - 6.0]					83.7	10.0	0.8		0.4	0.6	**2.9**	**1.6**					
	Turkeys (271)	4.1	**12.9**	[9.2 - 17.5]					66.4	14.8	1.1	0.4	0.4	4.1	**7.0**	**5.9**					
	Cattle (439)	0.0	**1.6**	[0.6 - 3.3]					63.8	33.3	1.4				**0.7**	**0.9**					
	Swine (211)	0.5	**0.9**	[0.1 - 3.4]					77.7	20.9				0.5	**0.5**	**0.5**					
Kanamycin	Humans (2144)	<0.1	**2.8**	[2.2 - 3.6]										96.8	0.2	<0.1	**0.2**	**2.6**			
	Chicken Breasts (99)	0.0	**5.1**	[1.7 - 11.4]										91.9	3.0			**5.1**			
	Ground Turkey (190)	1.6	**23.7**	[17.8 - 30.4]										69.5	5.3	1.6	**2.1**	**21.6**			
	Ground Beef (13)	0.0	**0.0**	[0.0 - 24.7]										100.0							
	Pork Chops (18)	0.0	**5.6**	[0.1 - 27.3]										94.4				**5.6**			
	Chickens (994)	0.0	**3.4**	[2.4 - 4.7]										96.1	0.5		**0.2**	**3.2**			
	Turkeys (271)	1.1	**16.2**	[12.1 - 21.2]										82.3	0.4	1.1	**1.1**	**15.1**			
	Cattle (439)	0.0	**7.7**	[5.4 - 10.7]										91.8	0.5		**0.5**	**7.3**			
	Swine (211)	0.0	**7.1**	[4.0 - 11.5]										92.9				**7.1**			
Streptomycin	Humans (2144)	N/A	**10.4**	[9.1 - 11.7]												89.6	**4.4**	**6.0**			
	Chicken Breasts (99)	N/A	**30.3**	[21.5 - 40.4]												69.7	**21.2**	**9.1**			
	Ground Turkey (190)	N/A	**45.8**	[38.6 - 53.2]												54.2	**27.9**	**17.9**			
	Ground Beef (13)	N/A	**0.0**	[0.0 - 24.7]												100.0					
	Pork Chops (18)	N/A	**16.7**	[3.6 - 41.4]												83.3	**11.1**	**5.6**			
	Chickens (994)	N/A	**19.3**	[16.9 - 21.9]												80.7	**16.7**	**2.6**			
	Turkeys (271)	N/A	**34.7**	[29.0 - 40.7]												65.3	**22.1**	**12.5**			
	Cattle (439)	N/A	**19.8**	[16.2 - 23.9]												80.2	**2.5**	**17.3**			
	Swine (211)	N/A	**27.0**	[21.1 - 33.5]												73.0	**18.0**	**9.0**			

[1] Percent of isolates with intermediate susceptibility

[2] Percent of isolates that were resistant

[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 7b. Distribution of MICs and Occurrence of Resistance among all Non-Typhoidal *Salmonella* Isolates from Humans, Retail Meats, and Food Animals, 2007

Antimicrobial	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	0.5	1	2	4	8	16	32	64	128	256	512	1024
β-Lactam/β-Lactamase Inhibitor Combinations																					
Amoxicillin-Clavulanic Acid	Humans (2144)	4.2	**3.3**	[2.6 - 4.1]							84.8	4.9	0.4	2.5	4.2	**0.6**	**2.7**				
	Chicken Breasts (99)	1.0	**16.2**	[9.5 - 24.9]							77.8	3.0	1.0	1.0	1.0	**1.0**	**15.2**				
	Ground Turkey (190)	22.6	**5.3**	[2.6 - 9.5]							53.2	3.7	0.5	14.7	22.6	**1.1**	**4.2**				
	Ground Beef (13)	0.0	**0.0**	[0.0 - 24.7]							92.3	7.7									
	Pork Chops (18)	5.6	**0.0**	[0.0 - 18.5]							66.7	27.8			5.6						
	Chickens (994)	0.2	**15.6**	[13.4 - 18.0]							82.2	0.7	0.2	1.1	0.2	**1.5**	**14.1**				
	Turkeys (271)	17.3	**11.1**	[7.6 - 15.4]							60.5	2.6	0.4	8.1	17.3	**2.6**	**8.5**				
	Cattle (439)	1.6	**15.5**	[12.2 - 19.2]							76.5	2.7	1.4	2.3	1.6	**3.2**	**12.3**				
	Swine (211)	11.4	**3.3**	[1.3 - 6.7]							80.6	0.9		3.8	11.4	**0.9**	**2.4**				
Cephems																					
Cefoxitin	Humans (2144)	0.7	**2.9**	[2.3 - 3.7]						0.2	8.8	70.2	15.8	1.3	0.7	**0.9**	**2.1**				
	Chicken Breasts (99)	2.0	**15.2**	[8.7 - 24.0]							3.0	55.6	22.2	2.0	2.0	**3.0**	**12.1**				
	Ground Turkey (190)	0.5	**5.3**	[2.6 - 9.5]							2.6	65.3	24.7	1.6	0.5	**0.5**	**4.7**				
	Ground Beef (13)	0.0	**0.0**	[0.0 - 24.7]								61.5	38.5								
	Pork Chops (18)	27.8	**0.0**	[0.0 - 18.5]								22.2	50.0		27.8						
	Chickens (994)	2.3	**13.0**	[11.0 - 15.2]						0.2	12.3	45.5	22.2	4.5	2.3	**9.8**	**3.2**				
	Turkeys (271)	3.0	**9.2**	[6.1 - 13.3]							7.0	49.8	25.1	5.9	3.0	**4.4**	**4.8**				
	Cattle (439)	1.4	**15.0**	[11.8 - 18.7]						0.2	6.6	34.2	33.3	9.3	1.4	**3.9**	**11.2**				
	Swine (211)	0.0	**2.8**	[1.1 - 6.1]							2.8	40.3	44.1	10.0		**1.9**	**0.9**				
Ceftiofur	Humans (2144)	0.0	**3.3**	[2.6 - 4.1]				0.3	0.8	27.5	66.7	1.4		**0.1**	**3.1**						
	Chicken Breasts (99)	0.0	**16.2**	[9.5 - 24.9]						22.2	58.6	3.0		**1.0**	**15.2**						
	Ground Turkey (190)	0.0	**5.3**	[2.6 - 9.5]						9.5	82.6	2.6			**5.3**						
	Ground Beef (13)	0.0	**0.0**	[0.0 - 24.7]						30.8	61.5	7.7									
	Pork Chops (18)	0.0	**0.0**	[0.0 - 18.5]						5.6	66.7	27.8									
	Chickens (994)	0.4	**15.4**	[13.2 - 17.8]				0.2	4.0	54.5	25.4	0.1	0.4	**2.6**	**12.8**						
	Turkeys (271)	0.0	**11.1**	[7.6 - 15.4]					0.7	43.9	43.5	0.7		**1.5**	**9.6**						
	Cattle (439)	0.9	**15.5**	[12.2 - 19.2]				0.2	1.8	39.6	41.0	0.9	0.9	**2.1**	**13.4**						
	Swine (211)	0.9	**2.8**	[1.1 - 6.1]						40.3	55.0	0.9	0.9	**0.5**	**2.4**						
Ceftriaxone	Humans (2144)	2.3	**0.4**	[0.2 - 0.8]					96.7				0.1	0.5	1.4	0.9	**0.3**	**0.1**			
	Chicken Breasts (99)	14.1	**0.0**	[0.0 - 3.7]					83.8					2.0	10.1	4.0					
	Ground Turkey (190)	3.7	**2.1**	[0.6 - 5.3]					93.7	0.5					1.1	2.6	**1.6**	**0.5**			
	Ground Beef (13)	0.0	**0.0**	[0.0 - 24.7]					100.0												
	Pork Chops (18)	0.0	**0.0**	[0.0 - 18.5]					94.4	5.6											
	Chickens (994)	9.9	**0.4**	[0.1 - 1.0]					84.2	0.2			0.5	4.7	8.0	1.9	**0.4**				
	Turkeys (271)	7.9	**0.0**	[0.0 - 1.4]					88.6	0.4				3.0	5.5	2.6					
	Cattle (439)	13.5	**0.7**	[0.1 - 2.0]					82.9	0.7	0.2	0.2	0.5	1.4	8.9	4.6	**0.7**				
	Swine (211)	1.9	**0.5**	[0.0 - 2.6]					96.7			0.9			1.9		**0.5**				

[1] Percent of isolates with intermediate susceptibility

[2] Percent of isolates that were resistant

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

[4] The unshaded areas indicate tthe 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 7c. Distribution of MICs and Occurrence of Resistance among all Non-Typhoidal *Salmonella* Isolates from Humans, Retail Meats, and Food Animals, 2007

Antimicrobial	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
Folate Pathway Inhibitors																					
Sulfisoxazole	Humans (2144)	N/A	**12.3**	[11.0 - 13.8]											19.0	53.1	15.0	0.5	0.1	**12.3**	
	Chicken Breasts (99)	N/A	**25.3**	[17.1 - 35.0]											13.1	20.2	31.3	10.1		**25.3**	
	Ground Turkey (190)	N/A	**34.7**	[28.0 - 42.0]											4.2	23.7	27.9	7.9	1.6	**34.7**	
	Ground Beef (13)	N/A	**7.7**	[0.2 - 36.0]												38.5	30.8	7.7	15.4	**7.7**	
	Pork Chops (18)	N/A	**16.7**	[3.6 - 41.4]												11.1	33.3	38.9		**16.7**	
	Chickens (994)	N/A	**10.4**	[8.5 - 12.4]											38.8	45.7	4.9	0.1	0.1	**10.4**	
	Turkeys (271)	N/A	**25.5**	[20.4 - 31.1]											17.0	46.9	9.6	0.7	0.4	**25.5**	
	Cattle (439)	N/A	**21.6**	[17.9 - 25.8]											25.1	42.6	10.5	0.2		**21.6**	
	Swine (211)	N/A	**30.8**	[24.6 - 37.5]											35.1	27.0	6.6		0.5	**30.8**	
Trimethoprim-Sulfamethoxazole	Humans (2144)	N/A	**1.5**	[1.1 - 2.2]				79.7	18.3	0.2	0.2		**0.1**	**1.5**							
	Chicken Breasts (99)	N/A	**0.0**	[0.0 - 3.7]				84.8	15.2												
	Ground Turkey (190)	N/A	**0.5**	[0.0 - 2.9]				78.4	20.5	0.5				**0.5**							
	Ground Beef (13)	N/A	**0.0**	[0.0 - 24.7]				76.9	23.1												
	Pork Chops (18)	N/A	**5.6**	[0.1 - 27.3]				88.9	5.6					**5.6**							
	Chickens (994)	N/A	**0.0**	[0.0 - 0.4]				88.0	10.0	1.8	0.2										
	Turkeys (271)	N/A	**1.1**	[0.2 - 3.2]				77.9	17.7	1.1	1.1	1.1		**1.1**							
	Cattle (439)	N/A	**3.0**	[1.6 - 5.0]				73.1	18.7	4.1	0.9	0.2	**0.7**	**2.3**							
	Swine (211)	N/A	**1.9**	[0.5 - 4.8]				69.7	23.2	3.3	1.9			**1.9**							
Penicillins																					
Ampicillin	Humans (2144)	0.0	**10.1**	[8.9 - 11.5]							81.2	8.3	0.3	0.1		**0.1**	**10.0**				
	Chicken Breasts (99)	0.0	**18.2**	[11.1 - 27.2]							68.7	12.1	1.0				**18.2**				
	Ground Turkey (190)	0.0	**42.6**	[35.5 - 50.0]							49.5	7.9					**42.6**				
	Ground Beef (13)	0.0	**0.0**	[0.0 - 24.7]							76.9	23.1									
	Pork Chops (18)	0.0	**5.6**	[0.1 - 27.3]							44.4	22.2	27.8				**5.6**				
	Chickens (994)	0.0	**17.0**	[14.7 - 19.5]							80.4	2.3	0.2	0.1		**0.1**	**16.9**				
	Turkeys (271)	0.0	**36.9**	[31.1 - 42.9]							60.9	2.2					**36.9**				
	Cattle (439)	0.0	**20.0**	[16.4 - 24.1]							77.0	2.7	0.2				**20.0**				
	Swine (211)	0.0	**18.0**	[13.1 - 23.9]							75.4	5.7	0.5	0.5		**0.5**	**17.5**				
Phenicols																					
Chloramphenicol	Humans (2144)	0.7	**7.3**	[6.2 - 8.5]								0.8	41.7	49.5	0.7	**0.4**	**6.9**				
	Chicken Breasts (99)	5.1	**1.0**	[0.0 - 5.5]									28.3	65.7	5.1	**1.0**					
	Ground Turkey (190)	1.6	**1.6**	[0.3 - 4.5]									32.1	64.7	1.6		**1.6**				
	Ground Beef (13)	0.0	**0.0**	[0.0 - 24.7]										100.0							
	Pork Chops (18)	33.3	**0.0**	[0.0 - 18.5]									5.6	61.1	33.3						
	Chickens (994)	0.4	**1.8**	[1.1 - 2.8]								5.1	58.0	34.6	0.4	**0.1**	**1.7**				
	Turkeys (271)	1.8	**5.5**	[3.1 - 9.0]								1.1	49.4	42.1	1.8		**5.5**				
	Cattle (439)	0.9	**20.0**	[16.4 - 24.1]								0.7	28.7	49.7	0.9		**20.0**				
	Swine (211)	2.4	**15.2**	[10.6 - 20.7]								1.4	20.4	60.7	2.4		**15.2**				

[1] Percent of isolates with intermediate susceptibility

[2] Percent of isolates that were resistant

[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 7d. Distribution of MICs and Occurrence of Resistance among all Non-Typhoidal *Salmonella* Isolates from Humans, Retail Meats, and Food Animals, 2007

Antimicrobial	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																					
Ciprofloxacin	Humans (2144)	0.0	**0.1**	[0.0 - 0.3]	92.9	4.4	0.2	1.3	0.8	0.3				**0.1**							
	Chicken Breasts (99)	0.0	**0.0**	[0.0 - 3.7]	85.9	14.1															
	Ground Turkey (190)	0.0	**0.0**	[0.0 - 1.9]	87.4	10.0			2.6												
	Ground Beef (13)	0.0	**0.0**	[0.0 - 24.7]	76.9	23.1															
	Pork Chops (18)	0.0	**0.0**	[0.0 - 18.5]	66.7	5.6	27.8														
	Chickens (994)	0.0	**0.0**	[0.0 - 0.4]	79.6	18.3	2.0	0.1													
	Turkeys (271)	0.0	**0.0**	[0.0 - 1.4]	74.5	21.8	2.6		0.7	0.4											
	Cattle (439)	0.0	**0.0**	[0.0 - 0.8]	79.0	18.7	1.6	0.2		0.5											
	Swine (211)	0.0	**0.0**	[0.0 - 1.7]	81.5	17.5	0.9														
Nalidixic Acid	Humans (2144)	N/A	**2.2**	[1.7 - 3.0]						0.1	0.2	34.4	61.9	0.9	0.2		**2.2**				
	Chicken Breasts (99)	N/A	**0.0**	[0.0 - 3.7]								33.3	62.6	4.0							
	Ground Turkey (190)	N/A	**2.6**	[0.9 - 6.0]							1.1	28.4	67.4	0.5			**2.6**				
	Ground Beef (13)	N/A	**0.0**	[0.0 - 24.7]								30.8	69.2								
	Pork Chops (18)	N/A	**0.0**	[0.0 - 18.5]								22.2	44.4	27.8	5.6						
	Chickens (994)	N/A	**0.1**	[0.0 - 0.6]							1.4	43.7	42.9	11.7	0.3		**0.1**				
	Turkeys (271)	N/A	**1.1**	[0.2 - 3.2]								38.7	39.5	20.3	0.4		**1.1**				
	Cattle (439)	N/A	**0.7**	[0.1 - 2.0]							0.5	43.1	44.0	11.8		**0.2**	**0.5**				
	Swine (211)	N/A	**0.0**	[0.0 - 1.7]							0.9	37.4	49.3	11.8	0.5						
Tetracyclines																					
Tetracycline	Humans (2144)	0.1	**14.5**	[13.0 - 16.0]									85.4	0.1	**0.9**	**4.2**	**9.4**				
	Chicken Breasts (99)	0.0	**41.4**	[31.6 - 51.8]									58.6				**41.4**				
	Ground Turkey (190)	0.5	**67.4**	[60.2 - 74.0]									32.1	0.5	**0.5**	**3.7**	**63.2**				
	Ground Beef (13)	0.0	**0.0**	[0.0 - 24.7]									100.0								
	Pork Chops (18)	0.0	**50.0**	[26.0 - 74.0]									50.0			**5.6**	**44.4**				
	Chickens (994)	1.4	**35.5**	[32.5 - 38.6]									63.1	1.4	**0.6**	**1.7**	**33.2**				
	Turkeys (271)	0.4	**73.8**	[68.1 - 78.9]									25.8	0.4	**0.4**	**13.3**	**60.1**				
	Cattle (439)	0.7	**27.3**	[23.2 - 31.8]									72.0	0.7	**1.1**	**3.6**	**22.6**				
	Swine (211)	0.5	**54.5**	[47.5 - 61.4]									45.0	0.5	**1.9**	**12.3**	**40.3**				

[1] Percent of isolates with intermediate susceptibility

[2] Percent of isolates that were resistant

[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 8a. Antimicrobial Resistance among all Non-Typhoidal *Salmonella* Isolates from Humans, Retail Meats, and Food Animals, by Year, 1996-2007

Year			1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Number of Isolates Tested		Humans	1318	1297	1455	1493	1372	1410	1998	1855	1782	2034	2173	2144
		Chicken Breasts							60	83	157	153	152	99
		Ground Turkey							74	114	142	183	159	190
		Ground Beef							9	10	14	8	19	13
		Pork Chops							10	5	11	9	8	18
		Chickens		214	561	1438	1173	1307	1500	1158	1280	1989	1380	994
		Turkeys		107	240	713	518	550	244	262	236	227	304	271
		Cattle		24	284	1610	1388	893	1008	670	607	329	389	439
		Swine		111	793	876	451	418	379	211	308	301	304	211
Antimicrobial Class	**Antimicrobial (Resistance Breakpoint)**	**Isolate Source**												
Aminoglycosides	Amikacin (MIC ≥ 64 µg/ml)	Humans		0.0% 0	0.0% 0	0.1% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	<0.1% 1	0.0% 0	0.0% 0
		Chicken Breasts							0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Ground Turkey							0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Ground Beef							0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Pork Chops							0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		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
		Turkeys		0.0% 0	0.0% 0	0.0% 0	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		0.0% 0	0.0% 0	0.0% 0	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		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.5% 1
	Gentamicin (MIC ≥ 16 µg/ml)	Humans	4.8% 63	2.9% 38	2.8% 41	2.1% 32	2.7% 37	1.9% 27	1.4% 27	1.4% 26	1.3% 24	2.2% 44	2.0% 44	2.1% 45
		Chicken Breasts							10.0% 6	6.0% 5	3.8% 6	3.3% 5	9.2% 14	6.1% 6
		Ground Turkey							14.9% 11	22.8% 26	20.4% 29	26.8% 49	28.9% 46	24.7% 47
		Ground Beef							0.0% 0	0.0% 0	0.0% 0	25.0% 2	0.0% 0	7.7% 1
		Pork Chops							30.0% 3	0.0% 0	0.0% 0	0.0% 0	50.0% 4	5.6% 1
		Chickens		17.8% 38	15.3% 86	10.4% 150	14.9% 175	7.9% 103	5.5% 83	6.3% 73	4.9% 63	4.3% 85	5.7% 79	4.5% 45
		Turkeys		20.6% 22	18.3% 44	17.5% 125	16.2% 84	20.9% 115	19.3% 47	21.0% 55	25.4% 60	22.9% 52	16.4% 50	12.9% 35
		Cattle		0.0% 0	1.8% 5	1.6% 25	2.1% 29	2.1% 19	2.6% 26	2.7% 18	1.8% 11	2.4% 8	3.9% 15	1.6% 7
		Swine		0.9% 1	0.8% 6	1.1% 10	1.3% 6	1.4% 6	0.8% 3	0.5% 1	1.3% 4	2.7% 8	2.0% 6	0.9% 2
	Kanamycin (MIC ≥ 64 µg/ml)	Humans	5.0% 66	5.2% 67	5.7% 83	4.4% 65	5.6% 77	4.8% 68	3.8% 76	3.5% 64	2.8% 50	3.4% 70	2.9% 63	2.8% 61
		Chicken Breasts							6.7% 4	4.8% 4	11.5% 18	4.6% 7	9.9% 15	5.1% 5
		Ground Turkey							18.9% 14	27.2% 31	18.3% 26	20.2% 37	15.1% 24	23.7% 45
		Ground Beef							0.0% 0	0.0% 0	0.0% 0	25.0% 2	5.3% 1	0.0% 0
		Pork Chops							10.0% 1	0.0% 0	9.1% 1	0.0% 0	25.0% 2	5.6% 1
		Chickens		2.3% 5	3.2% 18	1.2% 17	4.1% 48	2.4% 31	2.0% 30	2.8% 32	2.7% 34	2.5% 49	3.6% 49	3.4% 34
		Turkeys		24.3% 26	17.1% 41	21.5% 153	21.4% 111	22.9% 126	24.2% 59	16.0% 42	14.4% 34	19.8% 45	10.5% 32	16.2% 44
		Cattle		8.3% 2	9.5% 27	7.1% 115	6.6% 92	6.9% 62	10.1% 102	13.7% 92	8.9% 54	13.1% 43	9.5% 37	7.7% 34
		Swine		11.7% 13	7.2% 57	6.7% 59	9.3% 42	6.9% 29	4.2% 16	5.7% 12	3.9% 12	5.0% 15	8.6% 26	7.1% 15
	Streptomycin (MIC ≥ 64 µg/ml)	Humans	20.6% 272	21.4% 277	18.7% 272	16.7% 250	16.3% 223	17.1% 241	13.2% 264	15.0% 279	11.9% 212	11.1% 225	10.7% 233	10.4% 222
		Chicken Breasts							28.3% 17	26.5% 22	28.0% 44	30.1% 46	36.2% 55	30.3% 30
		Ground Turkey							37.8% 28	45.6% 52	34.5% 49	44.3% 81	40.9% 65	45.8% 87
		Ground Beef							22.2% 2	40.0% 4	14.3% 2	25.0% 2	10.5% 2	0.0% 0
		Pork Chops							70.0% 7	40.0% 2	27.3% 3	33.3% 3	25.0% 2	16.7% 3
		Chickens		24.3% 52	27.8% 156	27.5% 396	28.6% 335	21.0% 275	22.9% 343	19.6% 227	22.2% 284	23.3% 464	21.2% 293	19.3% 192
		Turkeys		34.6% 37	40.8% 98	43.6% 311	41.9% 217	46.7% 257	37.7% 92	29.4% 77	33.9% 80	40.1% 91	28.9% 88	34.7% 94
		Cattle		12.5% 3	16.2% 46	15.4% 248	21.3% 296	20.3% 181	25.9% 261	28.7% 192	20.9% 127	24.3% 80	23.7% 92	19.8% 87
		Swine		27.9% 31	29.4% 233	29.3% 257	39.2% 177	35.6% 149	40.1% 152	30.8% 65	36.4% 112	36.5% 110	26.3% 80	27.0% 57

Table 8b. Antimicrobial Resistance among all Non-Typhoidal *Salmonella* Isolates from Humans, Retail Meats, and Food Animals, by Year, 1996-2007

Year			1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Number of Isolates Tested		Humans	1318	1297	1455	1493	1372	1410	1998	1855	1782	2034	2173	2144
		Chicken Breasts							60	83	157	153	152	99
		Ground Turkey							74	114	142	183	159	190
		Ground Beef							9	10	14	8	19	13
		Pork Chops							10	5	11	9	8	18
		Chickens		214	561	1438	1173	1307	1500	1158	1280	1989	1380	994
		Turkeys		107	240	713	518	550	244	262	236	227	304	271
		Cattle		24	284	1610	1388	893	1008	670	607	329	389	439
		Swine		111	793	876	451	418	379	211	308	301	304	211
Antimicrobial Class	**Antimicrobial (Resistance Breakpoint)**	**Isolate Source**												
β-Lactam/β-Lactamase Inhibitor Combinations	Amoxicillin-Clavulanic Acid (MIC ≥ 32 / 16 µg/ml)	Humans	1.1% 15	1.0% 13	1.7% 25	2.3% 34	3.9% 54	4.7% 66	5.3% 106	4.6% 86	3.8% 67	3.2% 65	3.7% 81	3.3% 70
		Chicken Breasts							10.0% 6	25.3% 21	24.8% 39	21.6% 33	19.1% 29	16.2% 16
		Ground Turkey							12.2% 9	11.4% 13	7.7% 11	8.7% 16	5.0% 8	5.3% 10
		Ground Beef							22.2% 2	40.0% 4	14.3% 2	0.0% 0	0.0% 0	0.0% 0
		Pork Chops							20.0% 2	20.0% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Chickens		0.5% 1	2.0% 11	4.9% 70	7.3% 86	4.5% 59	10.2% 153	9.7% 112	12.4% 159	12.1% 241	12.9% 178	15.6% 155
		Turkeys		4.7% 5	0.4% 1	4.3% 31	3.5% 18	6.9% 38	3.7% 9	1.5% 4	4.7% 11	3.5% 8	5.6% 17	11.1% 30
		Cattle		8.3% 2	2.5% 7	3.9% 62	9.9% 138	11.8% 105	17.7% 178	21.0% 141	13.5% 82	21.0% 69	18.5% 72	15.5% 68
		Swine		0.0% 0	0.4% 3	1.0% 9	1.8% 8	2.6% 11	3.7% 14	3.8% 8	1.9% 6	4.3% 13	2.3% 7	3.3% 7
Cephems	Cefoxitin (MIC ≥ 32 µg/ml)	Humans					3.2% 44	3.4% 48	4.3% 86	4.3% 79	3.5% 62	3.0% 62	3.5% 77	2.9% 63
		Chicken Breasts							10.0% 6	25.3% 21	24.8% 39	20.9% 32	18.4% 28	15.2% 15
		Ground Turkey							8.1% 6	2.6% 3	4.9% 7	7.1% 13	5.0% 8	5.3% 10
		Ground Beef							22.2% 2	40.0% 4	14.3% 2	0.0% 0	0.0% 0	0.0% 0
		Pork Chops							20.0% 2	20.0% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Chickens					7.2% 85	4.1% 53	8.7% 130	8.2% 95	12.4% 159	12.0% 238	12.8% 176	13.0% 129
		Turkeys					3.3% 17	4.5% 25	2.5% 6	1.1% 3	5.1% 12	3.5% 8	5.3% 16	9.2% 25
		Cattle					9.1% 126	11.1% 99	15.9% 160	17.8% 119	13.2% 80	19.8% 65	17.7% 69	15.0% 66
		Swine					1.3% 6	2.2% 9	2.9% 11	4.3% 9	1.9% 6	3.7% 11	2.0% 6	2.8% 6
	Ceftiofur (MIC ≥ 8 µg/ml)	Humans	0.2% 2	0.5% 6	0.8% 12	2.0% 30	3.2% 44	4.1% 58	4.4% 87	4.5% 83	3.4% 61	2.9% 60	3.6% 79	3.3% 70
		Chicken Breasts							10.0% 6	25.3% 21	24.8% 39	20.9% 32	19.1% 29	16.2% 16
		Ground Turkey							8.1% 6	2.6% 3	4.9% 7	7.1% 13	5.0% 8	5.3% 10
		Ground Beef							22.2% 2	40.0% 4	14.3% 2	0.0% 0	0.0% 0	0.0% 0
		Pork Chops							20.0% 2	20.0% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Chickens		0.5% 1	2.0% 11	5.2% 75	7.6% 89	4.1% 54	10.2% 153	9.8% 113	12.4% 159	12.2% 242	12.8% 177	15.4% 153
		Turkeys		3.7% 4	0.4% 1	4.6% 33	3.3% 17	5.1% 28	3.3% 8	1.5% 4	4.7% 11	3.5% 8	5.3% 16	11.1% 30
		Cattle		0.0% 0	2.1% 6	4.2% 67	9.8% 136	11.4% 102	17.4% 175	21.0% 141	13.3% 81	21.6% 71	18.8% 73	15.5% 68
		Swine		0.0% 0	0.1% 1	1.9% 17	1.3% 6	2.2% 9	3.2% 12	4.3% 9	1.9% 6	3.7% 11	2.0% 6	2.8% 6
	Ceftriaxone (MIC ≥ 64 µg/ml)	Humans	0.0% 0	0.1% 1	0.0% 0	0.3% 5	0.0% 0	0.0% 0	0.2% 4	0.4% 8	0.6% 10	0.1% 3	0.2% 4	0.4% 9
		Chicken Breasts							0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.7% 1	0.0% 0
		Ground Turkey							0.0% 0	0.0% 0	0.0% 0	2.7% 5	0.6% 1	2.1% 4
		Ground Beef							0.0% 0	10.0% 1	7.1% 1	0.0% 0	0.0% 0	0.0% 0
		Pork Chops							0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Chickens		0.0% 0	0.0% 0	0.0% 0	0.1% 1	0.0% 0	0.3% 5	0.1% 1	0.5% 6	0.3% 5	0.1% 2	0.4% 4
		Turkeys		0.0% 0	0.0% 0	0.8% 6	0.4% 2	0.2% 1	0.0% 0	0.4% 1	0.4% 1	0.9% 2	0.0% 0	0.0% 0
		Cattle		0.0% 0	0.0% 0	0.1% 1	0.1% 1	0.1% 1	0.2% 2	0.1% 1	1.3% 8	2.1% 7	1.0% 4	0.7% 3
		Swine		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.5% 1

Table 8c. Antimicrobial Resistance among all Non-Typhoidal *Salmonella* Isolates from Humans, Retail Meats, and Food Animals, by Year, 1996-2007

Year			1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Number of Isolates Tested		Humans	1318	1297	1455	1493	1372	1410	1998	1855	1782	2034	2173	2144
		Chicken Breasts							60	83	157	153	152	99
		Ground Turkey							74	114	142	183	159	190
		Ground Beef							9	10	14	8	19	13
		Pork Chops							10	5	11	9	8	18
		Chickens		214	561	1438	1173	1307	1500	1158	1280	1989	1380	994
		Turkeys		107	240	713	518	550	244	262	236	227	304	271
		Cattle		24	284	1610	1388	893	1008	670	607	329	389	439
		Swine		111	793	876	451	418	379	211	308	301	304	211
Antimicrobial Class	**Antimicrobial (Resistance Breakpoint)**	**Isolate Source**												
Folate Pathway Inhibitors	Sulfamethoxazole/ Sulfisoxazole[1] (MIC ≥ 512 µg/ml)	Humans	20.4% 269	22.9% 297	19.5% 283	18.0% 269	17.1% 234	17.8% 251	12.9% 258	15.1% 280	13.2% 236	12.6% 256	12.1% 263	12.3% 264
		Chicken Breasts							16.7% 10	14.5% 12	28.7% 45	17.0% 26	23.0% 35	25.3% 25
		Ground Turkey							20.3% 15	33.3% 38	28.2% 40	34.4% 63	32.1% 51	34.7% 66
		Ground Beef							22.2% 2	40.0% 4	14.3% 2	25.0% 2	10.5% 2	7.7% 1
		Pork Chops							70.0% 7	40.0% 2	18.2% 2	33.3% 3	75.0% 6	16.7% 3
		Chickens		24.8% 53	23.7% 133	15.9% 229	18.4% 216	11.8% 154	8.9% 133	10.3% 119	11.9% 152	8.5% 169	10.7% 148	10.4% 103
		Turkeys		37.4% 40	32.1% 77	36.0% 257	25.1% 130	38.0% 209	30.3% 74	28.2% 74	36.4% 86	37.0% 84	27.3% 83	25.5% 69
		Cattle		20.8% 5	15.5% 44	15.0% 242	19.9% 276	19.7% 176	22.3% 225	25.1% 168	22.7% 138	27.4% 90	24.2% 94	21.6% 95
		Swine		34.2% 38	29.0% 230	30.7% 269	35.7% 161	34.9% 146	34.6% 131	25.1% 53	37.0% 114	32.9% 99	26.6% 81	30.8% 65
	Trimethoprim-Sulfamethoxazole (MIC ≥ 4 / 76 µg/ml)	Humans	3.8% 50	1.9% 24	2.3% 34	2.0% 30	2.0% 28	2.0% 28	1.4% 28	1.9% 36	1.7% 31	1.7% 34	1.7% 36	1.5% 33
		Chicken Breasts							0.0% 0	0.0% 0	0.0% 0	0.0% 0	1.3% 2	0.0% 0
		Ground Turkey							1.4% 1	0.0% 0	0.0% 0	0.5% 1	0.0% 0	0.5% 1
		Ground Beef							0.0% 0	0.0% 0	7.1% 1	0.0% 0	0.0% 0	0.0% 0
		Pork Chops							20.0% 2	0.0% 0	0.0% 0	11.1% 1	50.0% 4	5.6% 1
		Chickens		0.5% 1	1.2% 7	1.1% 16	0.4% 5	0.5% 6	0.8% 12	0.3% 4	0.2% 3	0.2% 4	0.1% 1	0.0% 0
		Turkeys		3.7% 4	2.5% 6	4.2% 30	1.5% 8	2.5% 14	2.5% 6	2.3% 6	0.8% 2	1.8% 4	1.0% 3	1.1% 3
		Cattle		4.2% 1	2.5% 7	2.4% 39	2.2% 30	2.6% 23	2.5% 25	3.3% 22	1.5% 9	4.9% 16	4.6% 18	3.0% 13
		Swine		1.8% 2	0.3% 2	1.1% 10	0.9% 4	0.0% 0	1.6% 6	2.4% 5	1.6% 5	2.3% 7	2.0% 6	1.9% 4
Penicillins	Ampicillin (MIC ≥ 32 µg/ml)	Humans	20.7% 273	18.3% 237	16.6% 241	15.5% 232	15.9% 218	17.5% 247	13.0% 259	13.6% 253	12.1% 216	11.4% 232	11.0% 238	10.1% 217
		Chicken Breasts							16.7% 10	33.7% 28	30.6% 48	26.8% 41	22.4% 34	18.2% 18
		Ground Turkey							16.2% 12	28.9% 33	20.4% 29	26.8% 49	25.8% 41	42.6% 81
		Ground Beef							22.2% 2	40.0% 4	21.4% 3	25.0% 2	10.5% 2	0.0% 0
		Pork Chops							40.0% 4	40.0% 2	9.1% 1	22.2% 2	25.0% 2	5.6% 1
		Chickens		11.7% 25	12.8% 72	12.4% 179	13.0% 152	9.4% 123	14.3% 215	13.7% 159	14.5% 185	14.0% 279	14.9% 205	17.0% 169
		Turkeys		12.1% 13	10.4% 25	17.7% 126	16.2% 84	19.5% 107	18.0% 44	18.7% 49	22.0% 52	22.9% 52	25.3% 77	36.9% 100
		Cattle		12.5% 3	9.2% 26	12.5% 202	18.7% 259	17.9% 160	23.9% 241	28.1% 188	19.3% 117	26.7% 88	22.4% 87	20.0% 88
		Swine		16.2% 18	12.9% 102	10.8% 95	18.8% 85	11.7% 49	13.7% 52	12.8% 27	16.2% 50	13.6% 41	11.5% 35	18.0% 38
Phenicols	Chloramphenicol (MIC ≥ 32 µg/ml)	Humans	10.5% 139	10.0% 130	10.0% 145	9.2% 137	10.1% 138	11.6% 164	8.6% 172	10.1% 187	7.6% 135	7.8% 159	6.4% 139	7.3% 156
		Chicken Breasts							0.0% 0	2.4% 2	1.9% 3	0.7% 1	2.6% 4	1.0% 1
		Ground Turkey							1.4% 1	0.9% 1	2.8% 4	0.5% 1	0.6% 1	1.6% 3
		Ground Beef							22.2% 2	40.0% 4	14.3% 2	12.5% 1	5.3% 1	0.0% 0
		Pork Chops							40.0% 4	40.0% 2	18.2% 2	22.2% 2	0.0% 0	0.0% 0
		Chickens		2.3% 5	2.9% 16	1.8% 26	4.6% 54	2.5% 33	2.4% 36	2.1% 24	1.3% 16	1.8% 36	1.7% 24	1.8% 18
		Turkeys		3.7% 4	0.8% 2	4.1% 29	4.1% 21	3.8% 21	5.3% 13	4.2% 11	4.7% 11	4.8% 11	3.9% 12	5.5% 15
		Cattle		4.2% 1	5.6% 16	8.5% 137	15.1% 209	16.5% 147	20.6% 208	25.1% 168	17.6% 107	21.9% 72	19.8% 77	20.0% 88
		Swine		11.7% 13	8.4% 67	8.0% 70	12.4% 56	7.7% 32	10.0% 38	8.5% 18	12.7% 39	10.6% 32	7.9% 24	15.2% 32

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

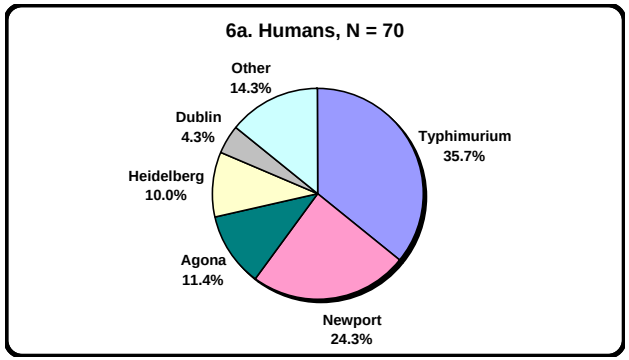
Table 8d. Antimicrobial Resistance among all Non-Typhoidal *Salmonella* Isolates from Humans, Retail Meats, and Food Animals, by Year, 1996-2007

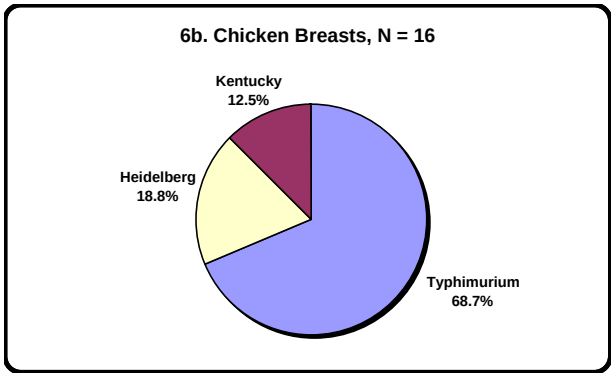
Year			1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Number of Isolates Tested		Humans	1318	1297	1455	1493	1372	1410	1998	1855	1782	2034	2173	2144
		Chicken Breasts							60	83	157	153	152	99
		Ground Turkey							74	114	142	183	159	190
		Ground Beef							9	10	14	8	19	13
		Pork Chops							10	5	11	9	8	18
		Chickens		214	561	1438	1173	1307	1500	1158	1280	1989	1380	994
		Turkeys		107	240	713	518	550	244	262	236	227	304	271
		Cattle		24	284	1610	1388	893	1008	670	607	329	389	439
		Swine		111	793	876	451	418	379	211	308	301	304	211
Antimicrobial Class	**Antimicrobial (Resistance Breakpoint)**	**Isolate Source**												
Quinolones	Ciprofloxacin (MIC ≥ 4 µg/ml)	Humans	0.0% 0	0.0% 0	0.1% 1	0.1% 1	0.4% 5	0.2% 3	<0.1% 1	0.2% 3	0.2% 4	<0.1% 1	0.1% 2	0.1% 2
		Chicken Breasts							0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Ground Turkey							0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Ground Beef							0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Pork Chops							0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Chickens		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.1% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Turkeys		0.0% 0	0.0% 0	0.0% 0	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		0.0% 0	0.0% 0	0.0% 0	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		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
	Nalidixic Acid (MIC ≥ 32 µg/ml)	Humans	0.4% 5	0.9% 12	1.3% 19	0.9% 14	2.3% 32	2.3% 32	1.6% 32	1.9% 36	2.2% 39	1.9% 38	2.4% 52	2.2% 48
		Chicken Breasts							0.0% 0	1.2% 1	0.0% 0	0.7% 1	0.7% 1	0.0% 0
		Ground Turkey							8.1% 6	4.4% 5	0.0% 0	1.1% 2	0.0% 0	2.6% 5
		Ground Beef							0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Pork Chops							0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Chickens		0.0% 0	0.2% 1	0.2% 3	0.5% 6	0.0% 0	0.8% 12	0.4% 5	0.5% 6	0.3% 6	0.1% 2	0.1% 1
		Turkeys		4.7% 5	2.1% 5	5.3% 38	5.4% 28	5.1% 28	5.3% 13	3.8% 10	2.1% 5	2.2% 5	0.7% 2	1.1% 3
		Cattle		0.0% 0	0.4% 1	0.1% 1	0.4% 6	0.4% 4	0.4% 4	0.4% 3	2.0% 12	1.5% 5	0.5% 2	0.7% 3
		Swine		0.0% 0	0.0% 0	0.0% 0	0.2% 1	0.0% 0	0.3% 1	0.0% 0	0.0% 0	0.3% 1	0.0% 0	0.0% 0
Tetracyclines	Tetracycline (MIC ≥ 16 µg/ml)	Humans	24.2% 319	21.7% 281	20.3% 295	19.4% 289	18.7% 256	19.9% 280	14.9% 298	16.3% 303	13.5% 241	13.9% 282	13.5% 293	14.5% 310
		Chicken Breasts							33.3% 20	27.7% 23	46.5% 73	43.8% 67	46.7% 71	41.4% 41
		Ground Turkey							55.4% 41	39.5% 45	56.3% 80	39.9% 73	56.0% 89	67.4% 128
		Ground Beef							22.2% 2	40.0% 4	14.3% 2	12.5% 1	21.1% 4	0.0% 0
		Pork Chops							70.0% 7	80.0% 4	54.5% 6	55.6% 5	25.0% 2	50.0% 9
		Chickens		20.6% 44	20.5% 115	25.0% 359	26.3% 308	21.9% 286	24.9% 374	26.2% 303	27.4% 351	28.3% 563	31.8% 439	35.5% 353
		Turkeys		52.3% 56	45.8% 110	52.9% 377	56.2% 291	54.9% 302	54.5% 133	58.8% 154	48.3% 114	54.6% 124	61.8% 188	73.8% 200
		Cattle		25.0% 6	24.3% 69	20.9% 336	25.8% 358	26.3% 235	32.0% 323	36.9% 247	31.8% 193	34.0% 112	30.3% 118	27.3% 120
		Swine		52.3% 58	47.5% 377	48.4% 424	54.3% 245	53.1% 222	57.8% 219	43.1% 91	58.8% 181	54.8% 165	62.8% 191	54.5% 115

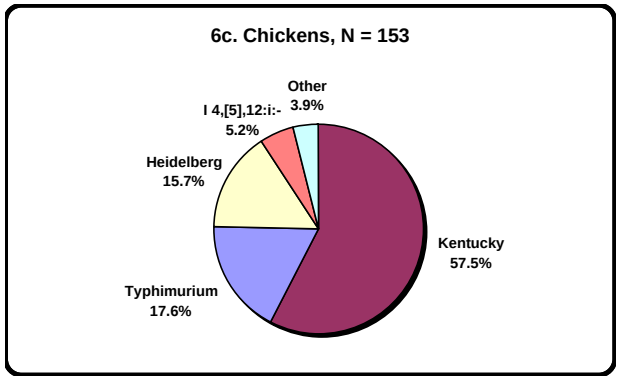
Table 9. Ceftiofur-Resistant Non-Typhoidal *Salmonella* Isolates from Humans, Retail Meats, and Food Animals, by Source and Serotype, 2007

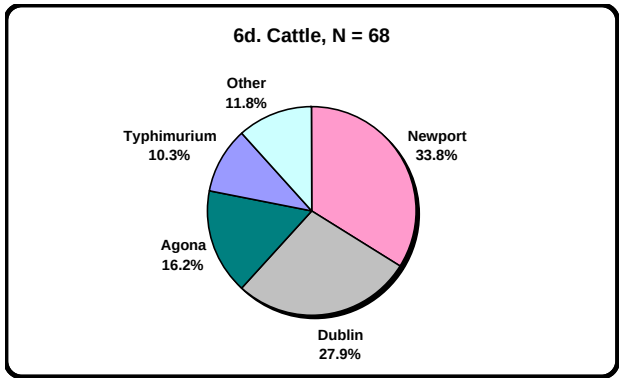
Humans				Retail Meats				Food Animals			
Source	**Serotype**	**n**	**%**	**Meat Type**	**Serotype**	**n**	**%**	**Animal Source**	**Serotype**	**n**	**%**
Humans (N=70)	Typhimurium	25	35.7	**Chicken Breasts (N=16)**	Typhimurium	11	68.8	**Chickens (N=153)**	Kentucky	88	57.5
	Newport	17	24.3		Heidelberg	3	18.8		Typhimurium	27	17.6
	Agona	8	11.4		Kentucky	2	12.5		Heidelberg	24	15.7
	Heidelberg	7	10.0						I 4,[5],12:i:-	8	5.2
	Dublin	3	4.3						I 4,[5],12:nonmotile	2	1.3
	I 4,[5],12:i:-	2	2.9						I 8,20:nonmotile	1	0.7
	Bredeney	1	1.4						Agona	1	0.7
	Concord	1	1.4						Molade	1	0.7
	Enteritidis	1	1.4						Ohio	1	0.7
	Infantis	1	1.4								
	Ohio	1	1.4								
	Saintpaul	1	1.4	**Ground Turkey (N=10)**	Heidelberg	4	40.0	**Turkeys (N=30)**	Agona	7	23.3
	Partially serotyped	2	2.9		Reading	2	20.0		Heidelberg	6	20.0
					Senftenberg	2	20.0		Saintpaul	4	13.3
					Agona	1	10.0		Hadar	2	6.7
					Saintpaul	1	10.0		London	2	6.7
									Reading	2	6.7
									Albert	1	3.3
									Berta	1	3.3
									Cubana	1	3.3
									Infantis	1	3.3
									Johannesburg	1	3.3
									Newport	1	3.3
									Typhimurium	1	3.3
				Ground Beef (N=0)				**Cattle (N=68)**	Newport	23	33.8
									Dublin	19	27.9
									Agona	11	16.2
									Typhimurium	7	10.3
									Reading	2	2.9
									I 4,[5],12:nonmotile	1	1.5
									Anatum	1	1.5
									Give	1	1.5
									Lille	1	1.5
									Mbandaka	1	1.5
									Muenster	1	1.5
				Pork Chops (N=0)				**Swine (N=6)**	Johannesburg	2	33.3
									I 4,[5],12:nonmotile	1	16.7
									Adelaide	1	16.7
									Agona	1	16.7
									Typhimurium	1	16.7

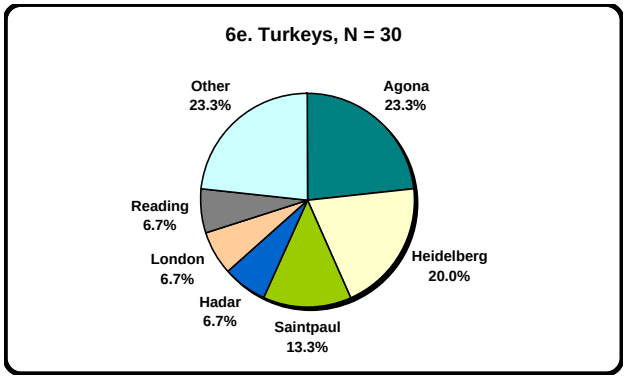
Figures 6a-e. Ceftiofur-Resistant Non-Typhoidal *Salmonella* Isolates, by Source and Serotype, 2007[1]











[1] Pie charts are not provided for other sources due to the small number of ceftiofur-resistant isolates. Table 9 shows a complete listing of ceftiofur-resistant isolates by source and serotype

Figure 7. Percent of Non-Typhoidal *Salmonella* Isolates from Humans, Retail Poultry, and Poultry Resistant to Ceftiofur, by Year, 1996-2007

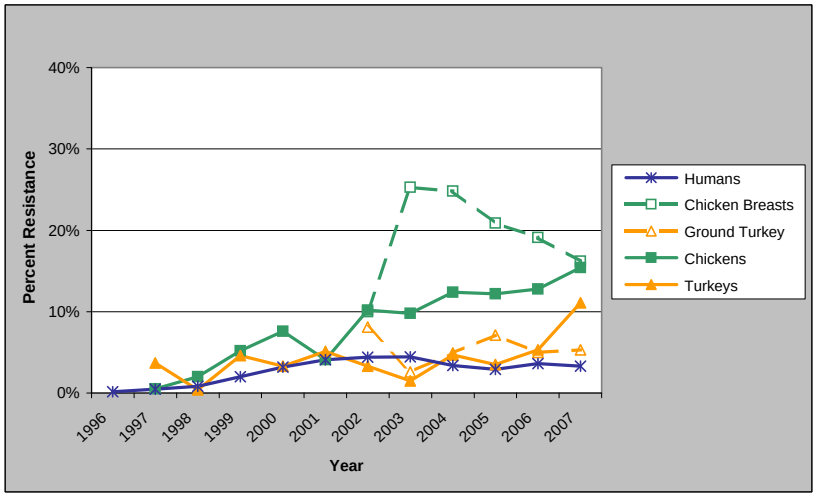
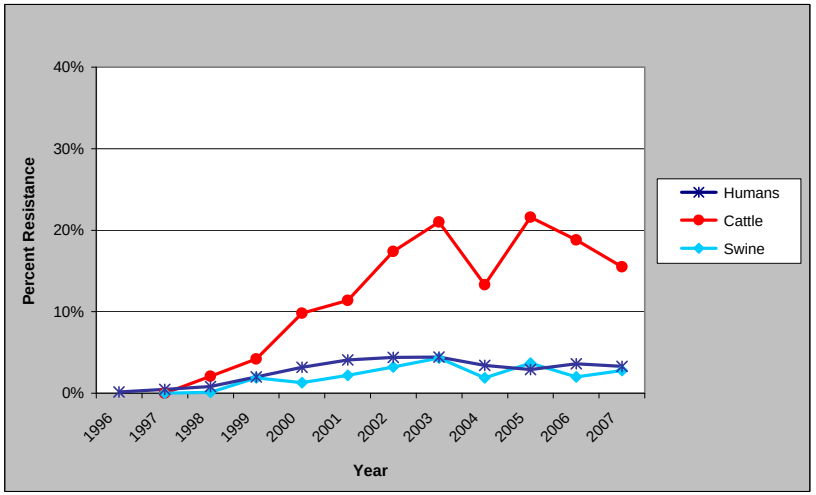


Figure 8. Percent of Non-Typhoidal *Salmonella* Isolates from Humans, Cattle, and Swine Resistant to Ceftiofur, by Year, 1996-2007[1]



[1] Data for ground beef and pork chops are not included due to the small number of *Salmonella* isolates from these sources. Table 8 contains resistance data for *Salmonella* isolates from each source, by year

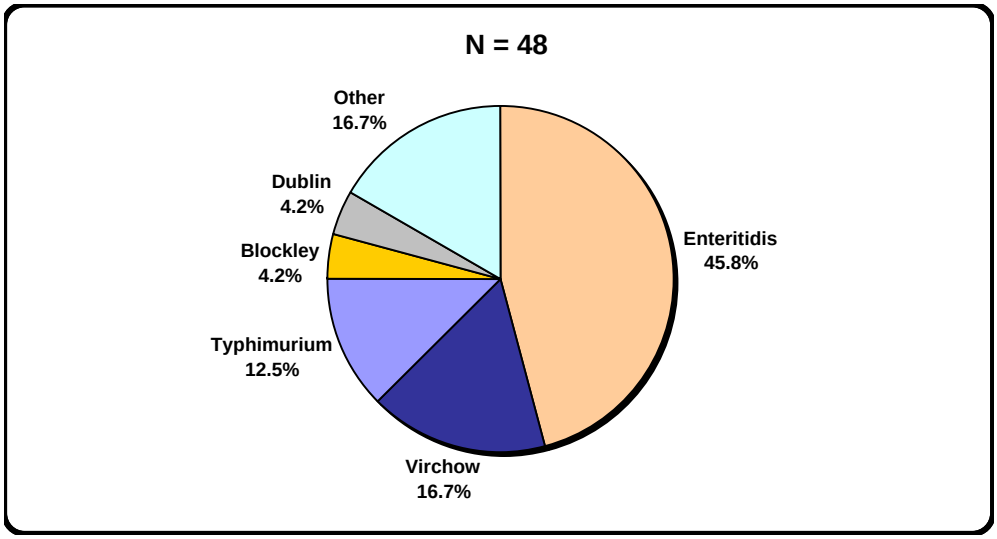
Table 10. Number of Non-Typhoidal *Salmonella* Isolates Tested from Humans, Retail Meats, and Food Animals, by Year, 1996-2007

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Humans	1318	1297	1455	1493	1372	1410	1998	1855	1782	2034	2173	2144
Chicken Breasts							60	83	157	153	152	99
Ground Turkey							74	114	142	183	159	190
Ground Beef							9	10	14	8	19	13
Pork Chops							10	5	11	9	8	18
Chickens		214	561	1438	1173	1307	1500	1158	1280	1989	1380	994
Turkeys		107	240	713	518	550	244	262	236	227	304	271
Cattle		24	284	1610	1388	893	1008	670	607	329	389	439
Swine		111	793	876	451	418	379	211	308	301	304	211

Table 11. Naldixic Acid-Resistant Non-Typhoidal *Salmonella* Isolates from Humans, Retail Meats, and Food Animals, by Source and Serotype, 2007

Humans				Retail Meats				Food Animals			
Source	**Serotype**	**n**	**%**	**Meat Type**	**Serotype**	**n**	**%**	**Animal Source**	**Serotype**	**n**	**%**
Humans (N=48)	Enteritidis	22	45.8	**Chicken Breasts (N=0)**				**Chickens (N=1)**	Kentucky	1	100.0
	Virchow	8	16.7								
	Typhimurium	6	12.5								
	Blockley	2	4.2								
	Dublin	2	4.2								
	I 4,[5],12:i:-	1	2.1								
	I 6,7:c:-	1	2.1								
	Agona	1	2.1								
	Hadar	1	2.1								
	London	1	2.1								
	Sanjuan	1	2.1								
	Senftenberg	1	2.1								
	Rough/nonmotile isolates	1	2.1								
				Ground Turkey (N=5)	Hadar	2	40.0	**Turkeys (N=3)**	Albert	1	33.3
					Ohio	2	40.0		Typhimurium	1	33.3
					Agona	1	20.0		Uganda	1	33.3
				Ground Beef (N=0)				**Cattle (N=3)**	Dublin	3	100.0
				Pork Chops (N=0)				**Swine (N=0)**			

Figure 9. Nalidixic Acid-Resistant Non-Typhoidal *Salmonella* Isolates from Humans, by Serotype, 2007[1]



[1] Pie charts are not provided for other sources due to the small number of nalidixic acid-resistant isolates. Table 11 above shows a complete listing of nalidixic acid-resistant isolates by source and serotype

Figure 10. Percent of Non-Typhoidal *Salmonella* Isolates from Humans, Retail Poultry, and Poultry Resistant to Nalidixic Acid, by Year, 1996-2007

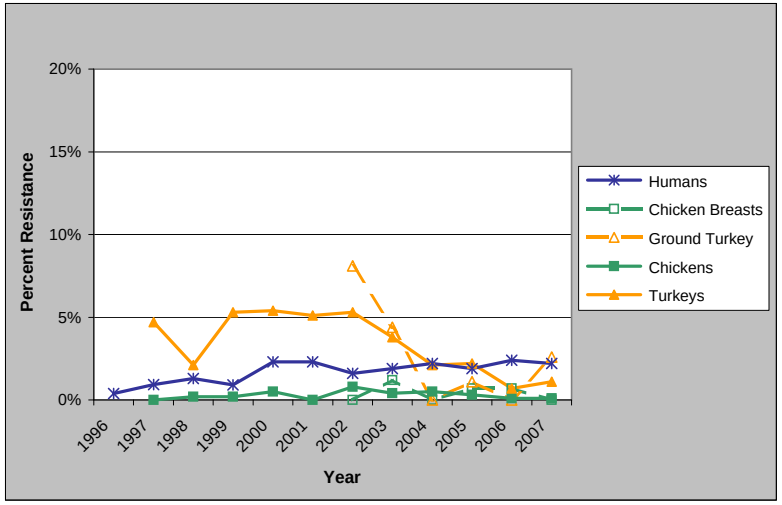
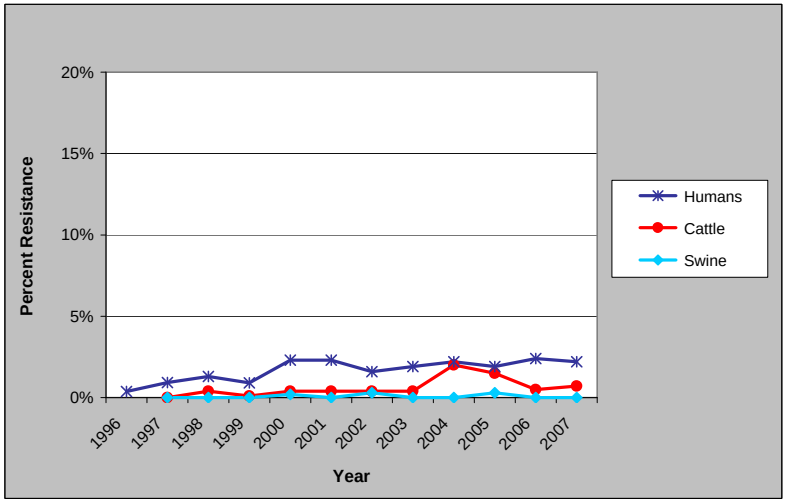


Figure 11. Percent of non-Typhoidal *Salmonella* Isolates from Humans, Cattle, and Swine Resistant to Nalidixic Acid, by Year, 1996-2007 [1]



[1] Data for ground beef and pork chops are not included due to the small number of *Salmonella* isolates from these sources. Table 8 contains resistance data for *Salmonella* isolates from each source, by year

Table 12. Number of Non-Typhoidal *Salmonella* Isolates Tested from Humans, Retail Meats, and Food Animals, by Year, 1996-2007

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Humans	1318	1297	1455	1493	1372	1410	1998	1855	1782	2034	2173	2144
Chicken Breasts							60	83	157	153	152	99
Ground Turkey							74	114	142	183	159	190
Ground Beef							9	10	14	8	19	13
Pork Chops							10	5	11	9	8	18
Chickens		214	561	1438	1173	1307	1500	1158	1280	1989	1380	994
Turkeys		107	240	713	518	550	244	262	236	227	304	271
Cattle		24	284	1610	1388	893	1008	670	607	329	389	439
Swine		111	793	876	451	418	379	211	308	301	304	211

Table 13a. Resistance Patterns among all Non-Typhoidal *Salmonella* Isolates from Humans, Retail Meats, and Food Animals, by Year, 1996-2007

Year		1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Number of Isolates Tested	Humans	1318	1297	1455	1493	1372	1410	1998	1855	1782	2034	2173	2144
	Chicken Breasts							60	83	157	153	152	99
	Ground Turkey							74	114	142	183	159	190
	Ground Beef							9	10	14	8	19	13
	Pork Chops							10	5	11	9	8	18
	Chickens		214	561	1438	1173	1307	1500	1158	1280	1989	1380	994
	Turkeys		107	240	713	518	550	244	262	236	227	304	271
	Cattle		24	284	1610	1388	893	1008	670	607	329	389	439
	Swine		111	793	876	451	418	379	211	308	301	304	211
Resistance Pattern	**Isolate Source**												
1. No Resistance Detected	Humans	66.1% 871	68.4% 887	72.9% 1060	74.1% 1107	74.5% 1022	72.5% 1022	79.1% 1580	78.0% 1447	80.0% 1425	80.9% 1646	80.5% 1749	81.1% 1738
	Chicken Breasts							51.7% 31	47.0% 39	40.1% 63	46.4% 71	38.8% 59	47.5% 47
	Ground Turkey							37.8% 28	34.2% 39	28.9% 41	30.1% 55	17.6% 28	15.3% 29
	Ground Beef							77.8% 7	60.0% 6	78.6% 11	75.0% 6	73.7% 14	92.3% 12
	Pork Chops							20.0% 2	20.0% 1	45.5% 5	44.4% 4	25.0% 2	44.4% 8
	Chickens		52.8% 113	58.6% 329	58.8% 846	57.1% 670	66.7% 872	62.0% 930	61.1% 708	62.7% 803	61.2% 1217	57.2% 790	53.9% 536
	Turkeys		32.7% 35	41.3% 99	32.5% 232	33.4% 173	31.6% 174	29.9% 73	24.0% 63	33.5% 79	27.8% 63	28.0% 85	15.5% 42
	Cattle		66.7% 16	73.6% 209	74.5% 1200	70.1% 973	70.0% 625	64.3% 648	61.0% 409	65.6% 398	63.2% 208	67.6% 263	72.0% 316
	Swine		44.1% 49	49.2% 390	48.9% 428	43.2% 195	43.5% 182	40.4% 153	53.6% 113	37.3% 115	44.5% 134	34.5% 105	43.1% 91
2. Resistant to ≥ 3 Antimicrobial Classes	Humans	17.4% 229	17.2% 223	16.3% 237	14.7% 220	15.5% 213	16.7% 236	12.3% 245	14.2% 263	11.4% 204	12.0% 244	11.8% 256	11.1% 239
	Chicken Breasts							20.0% 12	30.1% 25	34.4% 54	25.5% 39	24.3% 37	25.3% 25
	Ground Turkey							20.3% 15	29.0% 33	26.1% 37	29.0% 53	24.5% 39	42.6% 81
	Ground Beef							22.2% 2	40.0% 4	14.3% 2	25.0% 2	10.5% 2	0.0% 0
	Pork Chops							60.0% 6	40.0% 2	18.2% 2	22.2% 2	25.0% 2	5.6% 1
	Chickens		9.8% 21	13.4% 75	12.3% 177	15.0% 176	10.2% 133	14.2% 213	13.5% 156	15.8% 202	15.1% 301	16.4% 226	17.8% 177
	Turkeys		25.2% 27	23.8% 57	26.2% 187	21.6% 112	30.4% 167	24.2% 59	21.8% 57	27.1% 64	28.2% 64	27.3% 83	33.6% 91
	Cattle		12.5% 3	13.7% 39	13.3% 214	19.8% 275	18.9% 169	24.5% 247	29.6% 198	21.1% 128	27.7% 91	23.9% 93	22.1% 97
	Swine		26.1% 29	24.0% 190	26.4% 231	34.6% 156	30.6% 128	34.0% 129	23.7% 50	33.4% 103	31.9% 96	22.7% 69	28.0% 59
3. Resistant to ≥ 4 Antimicrobial Classes	Humans	12.7% 167	13.0% 169	12.8% 186	11.9% 177	12.7% 174	13.5% 191	9.8% 195	11.4% 211	9.2% 164	9.1% 185	8.1% 177	8.2% 176
	Chicken Breasts							3.3% 2	16.9% 14	24.2% 38	17.7% 27	15.1% 23	13.1% 13
	Ground Turkey							13.5% 10	14.9% 17	12.0% 17	7.7% 14	8.2% 13	14.7% 28
	Ground Beef							22.2% 2	40.0% 4	14.3% 2	12.5% 1	5.3% 1	0.0% 0
	Pork Chops							40.0% 4	40.0% 2	18.2% 2	22.2% 2	25.0% 2	5.6% 1
	Chickens		3.3% 7	3.9% 22	4.9% 71	6.7% 79	3.6% 47	7.6% 114	6.8% 79	9.8% 126	8.7% 173	10.3% 142	12.2% 121
	Turkeys		5.6% 6	6.3% 15	10.8% 77	10.0% 52	14.7% 81	11.1% 27	9.5% 25	10.2% 24	11.5% 26	12.2% 37	15.1% 41
	Cattle		8.3% 2	9.2% 26	10.9% 175	17.4% 242	16.9% 151	22.1% 223	27.3% 183	18.8% 114	24.9% 82	22.1% 86	21.0% 92
	Swine		15.3% 17	11.2% 89	9.8% 86	17.3% 78	9.1% 38	12.7% 48	10.9% 23	15.3% 47	13.3% 40	9.9% 30	17.5% 37
4. Resistant to ≥ 5 Antimicrobial Classes	Humans	9.3% 123	9.8% 127	9.8% 142	8.5% 127	9.5% 131	10.3% 145	8.2% 164	9.8% 182	7.9% 141	7.2% 146	6.3% 137	6.9% 149
	Chicken Breasts							3.3% 2	12.1% 10	22.3% 35	17.7% 27	14.5% 22	12.1% 12
	Ground Turkey							10.8% 8	4.4% 5	4.9% 7	2.7% 5	3.1% 5	3.2% 6
	Ground Beef							22.2% 2	40.0% 4	14.3% 2	12.5% 1	5.3% 1	0.0% 0
	Pork Chops							40.0% 4	40.0% 2	9.1% 1	22.2% 2	0.0% 0	0.0% 0
	Chickens		1.4% 3	2.7% 15	3.0% 43	5.5% 64	3.1% 41	5.7% 85	4.9% 57	8.0% 103	5.9% 117	6.5% 90	7.2% 72
	Turkeys		4.7% 5	0.8% 2	5.0% 36	4.8% 25	6.0% 33	6.6% 16	3.1% 8	5.5% 13	6.2% 14	5.9% 18	7.0% 19
	Cattle		8.3% 2	4.6% 13	8.0% 128	14.0% 195	15.1% 135	19.3% 195	23.6% 158	17.8% 108	23.1% 76	20.1% 78	18.9% 83
	Swine		4.5% 5	8.1% 64	7.3% 64	9.1% 41	7.2% 30	9.0% 34	9.5% 20	12.3% 38	10.3% 31	5.9% 18	11.4% 24

Table 13b. Resistance Patterns among all Non-Typhoidal *Salmonella* Isolates from Humans, Retail Meats, and Food Animals, by Year, 1996-2007

Year		1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Number of Isolates Tested	Humans	1318	1297	1455	1493	1372	1410	1998	1855	1782	2034	2173	2144
	Chicken Breasts							60	83	157	153	152	99
	Ground Turkey							74	114	142	183	159	190
	Ground Beef							9	10	14	8	19	13
	Pork Chops							10	5	11	9	8	18
	Chickens		214	561	1438	1173	1307	1500	1158	1280	1989	1380	994
	Turkeys		107	240	713	518	550	244	262	236	227	304	271
	Cattle		24	284	1610	1388	893	1008	670	607	329	389	439
	Swine		111	793	876	451	418	379	211	308	301	304	211
Resistance Pattern	**Isolate Source**												
5. At Least ACSSuT[1] Resistant	Humans	8.7% 115	9.5% 123	8.9% 130	8.4% 125	8.9% 122	10.1% 142	7.8% 156	9.3% 173	7.2% 128	6.9% 141	5.6% 121	6.3% 136
	Chicken Breasts							0.0% 0	2.4% 2	1.9% 3	0.7% 1	2.6% 4	0.0% 0
	Ground Turkey							1.4% 1	0.9% 1	2.8% 4	0.5% 1	0.6% 1	1.6% 3
	Ground Beef							22.2% 2	40.0% 4	14.3% 2	12.5% 1	5.3% 1	0.0% 0
	Pork Chops							40.0% 4	40.0% 2	9.1% 1	22.2% 2	0.0% 0	0.0% 0
	Chickens		1.4% 3	2.7% 15	1.7% 24	4.3% 50	2.4% 32	1.9% 29	1.5% 17	0.9% 12	1.6% 31	1.6% 22	1.5% 15
	Turkeys		3.7% 4	0.8% 2	3.8% 27	3.3% 17	3.6% 20	4.5% 11	2.3% 6	4.7% 11	4.0% 9	3.9% 12	4.8% 13
	Cattle		4.2% 1	4.2% 12	7.6% 123	13.1% 182	14.6% 130	17.1% 172	18.1% 121	16.3% 99	20.4% 67	18.3% 71	16.2% 71
	Swine		4.5% 5	7.8% 62	7.1% 62	8.6% 39	7.2% 30	7.7% 29	7.6% 16	12.0% 37	9.6% 29	5.3% 16	10.9% 23
6. At Least ACT/S[2] Resistant	Humans	0.7% 9	0.4% 5	0.9% 13	0.9% 14	0.9% 13	0.5% 7	1.1% 21	1.2% 23	0.6% 10	0.9% 18	0.7% 15	0.7% 16
	Chicken Breasts							0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
	Ground Turkey							1.4% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
	Ground Beef							0.0% 0	0.0% 0	7.1% 1	0.0% 0	0.0% 0	0.0% 0
	Pork Chops							20.0% 2	0.0% 0	0.0% 0	11.1% 1	0.0% 0	0.0% 0
	Chickens		0.0% 0	0.2% 1	0.1% 2	0.0% 0	0.1% 1	0.0% 0	0.0% 0	0.1% 1	0.1% 2	0.0% 0	0.0% 0
	Turkeys		0.0% 0	0.4% 1	0.4% 3	0.8% 4	0.7% 4	0.8% 2	0.0% 0	0.4% 1	0.0% 0	0.3% 1	0.0% 0
	Cattle		0.0% 0	2.1% 6	2.2% 35	1.7% 23	2.4% 21	2.4% 24	2.7% 18	1.2% 7	4.3% 14	4.1% 16	2.5% 11
	Swine		0.0% 0	0.5% 4	0.5% 4	0.0% 0	1.0% 4	0.5% 2	0.9% 2	0.6% 2	1.7% 5	0.3% 1	1.9% 4
7. At Least ACSSuTAuCf[3] Resistant	Humans	0.0% 0	0.3% 4	0.3% 5	1.5% 23	2.6% 36	2.6% 36	3.4% 67	3.2% 60	2.4% 42	2.0% 41	2.0% 43	2.1% 46
	Chicken Breasts							0.0% 0	0.0% 0	1.9% 3	0.0% 0	2.6% 4	0.0% 0
	Ground Turkey							1.4% 1	0.9% 1	2.1% 3	0.5% 1	0.0% 0	1.1% 2
	Ground Beef							22.2% 2	40.0% 4	14.3% 2	0.0% 0	0.0% 0	0.0% 0
	Pork Chops							20.0% 2	20.0% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0
	Chickens		0.0% 0	0.5% 3	0.3% 5	2.7% 32	1.1% 14	0.9% 13	1.0% 12	0.4% 5	0.9% 18	1.1% 15	1.4% 14
	Turkeys		3.7% 4	0.4% 1	3.4% 24	1.9% 10	2.9% 16	1.6% 4	0.8% 2	2.1% 5	1.8% 4	2.3% 7	4.1% 11
	Cattle		0.0% 0	2.1% 6	3.7% 59	8.9% 124	11.0% 98	14.6% 147	15.1% 101	11.9% 72	17.6% 58	16.2% 63	13.7% 60
	Swine		0.0% 0	0.1% 1	0.6% 5	1.3% 6	2.2% 9	1.8% 7	1.9% 4	1.0% 3	2.7% 8	1.0% 3	0.5% 1
8. At Least Ceftiofur and Nalidixic Acid Resistant	Humans	0.0% 0	0.2% 2	0.0% 0	0.1% 1	0.1% 1	0.1% 2	0.2% 4	0.1% 2	0.1% 2	0.1% 2	0.1% 3	0.2% 5
	Chicken Breasts							0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
	Ground Turkey							0.0% 0	0.9% 1	0.0% 0	0.0% 0	0.0% 0	0.5% 1
	Ground Beef							0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
	Pork Chops							0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
	Chickens		0.0% 0	0.0% 0	0.1% 1	0.1% 1	0.0% 0	0.6% 9	0.1% 1	0.2% 3	0.1% 1	0.0% 0	0.0% 0
	Turkeys		1.9% 2	0.0% 0	2.7% 19	1.2% 6	1.5% 8	1.2% 3	0.4% 1	0.8% 2	0.9% 2	0.3% 1	0.7% 2
	Cattle		0.0% 0	0.0% 0	0.1% 1	0.1% 1	0.3% 3	0.2% 2	0.4% 3	1.0% 6	0.9% 3	0.3% 1	0.2% 1
	Swine		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	0.0% 0	0.0% 0

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

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

[3] ACSSuTAuCf = ACSSuT, amoxicillin-clavulanic acid, and ceftiofur

Table 14. Non-Typhoidal *Salmonella* Isolates from Humans, Retail Meats, and Food Animals that are Resistant to ≥ 3 Antimicrobial Classes, by Serotype, 2007

Humans				Retail Meats				Food Animals			
Source	**Serotype**	**n**	**%**	**Meat Type**	**Serotype**	**n**	**%**	**Animal Source**	**Serotype**	**n**	**%**
Humans (N=239)	Typhimurium	138	57.7	**Chicken Breasts (N=25)**	Typhimurium	17	68.0	**Chickens (N=177)**	Kentucky	94	53.1
	Newport	23	9.6		Heidelberg	4	16.0		Typhimurium	33	18.6
	Heidelberg	17	7.1		Kentucky	3	12.0		Heidelberg	29	16.4
	Agona	8	3.3		Saintpaul	1	4.0		I 4,[5],12:i:-	10	5.6
	Derby	5	2.1						I 4,[5],12:nonmotile	2	1.1
	Stanley	5	2.1						Montevideo	2	1.1
	I 4,[5],12:i:-	4	1.7						I 8,20:nonmotile	1	0.6
	Enteritidis	4	1.7						Agona	1	0.6
	Montevideo	4	1.7						Mbandaka	1	0.6
	Dublin	3	1.3						Molade	1	0.6
	Senftenberg	3	1.3						Muenster	1	0.6
	Virchow	3	1.3						Ohio	1	0.6
	Infantis	2	0.8						Senftenberg	1	0.6
	Ohio	2	0.8								
	Paratyphi B var. L(+) tartrate+	2	0.8	**Ground Turkey (N=81)**	Hadar	27	33.3	**Turkeys (N=91)**	Hadar	28	30.8
	I 6,7:c:-	1	0.4		Heidelberg	22	27.2		Heidelberg	16	17.6
	Blockley	1	0.4		Saintpaul	13	16.0		Saintpaul	10	11.0
	Bovismorbificans	1	0.4		Minnesota	5	6.2		Agona	8	8.8
	Bredeney	1	0.4		Senftenberg	3	3.7		Senftenberg	6	6.6
	Coleypark	1	0.4		Agona	2	2.5		Typhimurium	5	5.5
	Concord	1	0.4		Ohio	2	2.5		Minnesota	3	3.3
	Javiana	1	0.4		Reading	2	2.5		London	2	2.2
	Panama	1	0.4		Anatum	1	1.2		Reading	2	2.2
	Saintpaul	1	0.4		Berta	1	1.2		Uganda	2	2.2
	Worthington	1	0.4		Bredeney	1	1.2		III 18:z4,z32:-	1	1.1
	Unknown serotype	1	0.4		Muenchen	1	1.2		Albany	1	1.1
	Partially serotyped	5	2.1		Typhimurium	1	1.2		Albert	1	1.1
									Anatum	1	1.1
									Berta	1	1.1
									Cubana	1	1.1
									Infantis	1	1.1
									Johannesburg	1	1.1
									Newport	1	1.1
				Ground Beef (N=0)				**Cattle (N=97)**	Dublin	29	29.9
									Newport	25	25.8
									Typhimurium	17	17.5
									Agona	11	11.3
									Muenster	3	3.1
									I 9,12:nonmotile	2	2.1
									Reading	2	2.1
									I 4,[5],12:nonmotile	1	1.0
									Anatum	1	1.0
									Give	1	1.0
									Hadar	1	1.0
									Lillie	1	1.0
									Mbandaka	1	1.0
									Muenchen	1	1.0
									I Rough O:g,p:-	1	1.0
				Pork Chops (N=1)	Saintpaul	1	100.0	**Swine (N=59)**	Typhimurium	32	54.2
									Derby	14	23.7
									Agona	4	6.8
									Johannesburg	3	5.1
									I 4,[5],12:nonmotile	2	3.4
									Adelaide	1	1.7
									Manhattan	1	1.7
									Uganda	1	1.7
									Untypable	1	1.7

Table 15. Non-Typhoidal *Salmonella* Isolates from Humans, Retail Meats, and Food Animals that are Resistant to ≥ 4 Antimicrobial Classes, by Serotype, 2007

Humans				Retail Meats				Food Animals			
Source	**Serotype**	**n**	**%**	**Meat Type**	**Serotype**	**n**	**%**	**Animal Source**	**Serotype**	**n**	**%**
Humans (N=176)	Typhimurium	120	68.2	**Chicken Breasts (N=13)**	Typhimurium	10	76.9	**Chickens (N=121)**	Kentucky	81	66.9
	Newport	20	11.4		Kentucky	2	15.4		Typhimurium	26	21.5
	Agona	7	4.0		Saintpaul	1	7.7		Heidelberg	8	6.6
	Heidelberg	5	2.8						I 4,[5],12:nonmotile	2	1.7
	Dublin	3	1.7						I 8,20:nonmotile	1	0.8
	Senftenberg	3	1.7						Molade	1	0.8
	I 4,[5],12:i:-	2	1.1						Muenster	1	0.8
	Ohio	2	1.1						Ohio	1	0.8
	Paratyphi B var. L(+) tartrate+	2	1.1								
	I 6,7:c:-	1	0.6								
	Bredeney	1	0.6	**Ground Turkey (N=28)**	Hadar	9	32.1	**Turkeys (N=41)**	Hadar	9	22.0
	Concord	1	0.6		Saintpaul	7	25.0		Agona	8	19.5
	Enteritidis	1	0.6		Heidelberg	6	21.4		Heidelberg	5	12.2
	Saintpaul	1	0.6		Senftenberg	3	10.7		Senftenberg	4	9.8
	Virchow	1	0.6		Agona	1	3.6		Typhimurium	4	9.8
	Worthington	1	0.6		Minnesota	1	3.6		Saintpaul	3	7.3
	Unknown serotype	1	0.6		Typhimurium	1	3.6		Reading	2	4.9
	Partially serotyped	4	2.3						III 18:z4,z32:-	1	2.4
									Albert	1	2.4
									Infantis	1	2.4
									Johannesburg	1	2.4
									Minnesota	1	2.4
									Newport	1	2.4
				Ground Beef (N=0)				**Cattle (N=92)**	Dublin	29	31.5
									Newport	25	27.2
									Typhimurium	16	17.4
									Agona	11	12.0
									I 9,12:nonmotile	2	2.2
									Muenster	2	2.2
									Reading	2	2.2
									I 4,[5],12:nonmotile	1	1.1
									Anatum	1	1.1
									Give	1	1.1
									Lille	1	1.1
									I Rough O:g p:-	1	1.1
				Pork Chops (N=1)	Saintpaul	1	100.0	**Swine (N=37)**	Typhimurium	31	83.8
									Agona	2	5.4
									Johannesburg	2	5.4
									I 4,[5],12:nonmotile	1	2.7
									Derby	1	2.7

Table 16. Non-Typhoidal *Salmonella* Isolates from Humans, Retail Meats, and Food Animals that are Resistant to ≥ 5 Antimicrobial Classes, by Serotype, 2007

Humans				Retail Meats				Food Animals			
Source	**Serotype**	**n**	**%**	**Meat Type**	**Serotype**	**n**	**%**	**Animal Source**	**Serotype**	**n**	**%**
Humans (N=149)	Typhimurium	100	67.1	**Chicken Breasts (N=12)**	Typhimurium	10	83.3	**Chickens (N=72)**	Kentucky	36	50.0
	Newport	18	12.1		Kentucky	2	16.7		Typhimurium	24	33.3
	Agona	7	4.7						Heidelberg	8	11.1
	Heidelberg	4	2.7						I 4,[5],12:nonmotile	2	2.8
	Dublin	3	2.0						Molade	1	1.4
	Senftenberg	3	2.0						Ohio	1	1.4
	Paratyphi B var. L(+) tartrate+	2	1.3								
	I 4,[5],12:i:-	1	0.7								
	I 6,7:c:-	1	0.7	**Ground Turkey (N=6)**	Senftenberg	2	33.3	**Turkeys (N=19)**	Agona	6	31.6
	Bredeney	1	0.7		Agona	1	16.7		Hadar	2	10.5
	Concord	1	0.7		Heidelberg	1	16.7		Heidelberg	2	10.5
	Enteritidis	1	0.7		Saintpaul	1	16.7		Saintpaul	2	10.5
	Ohio	1	0.7		Typhimurium	1	16.7		Typhimurium	2	10.5
	Virchow	1	0.7						III 18:z4,z32:-	1	5.3
	Worthington	1	0.7						Albert	1	5.3
	Unknown serotype	1	0.7						Infantis	1	5.3
	Partially serotyped	3	2.0						Newport	1	5.3
									Reading	1	5.3
				Ground Beef (N=0)				**Cattle (N=83)**	Dublin	24	28.9
									Newport	23	27.7
									Typhimurium	16	19.3
									Agona	11	13.3
									I 9,12:nonmotile	2	2.4
									Reading	2	2.4
									I 4,[5],12:nonmotile	1	1.2
									Anatum	1	1.2
									Give	1	1.2
									Lille	1	1.2
									Muenster	1	1.2
				Pork Chops (N=0)				**Swine (N=24)**	Typhimurium	21	87.5
									Agona	2	8.3
									Johannesburg	1	4.2

Table 17. Non-Typhoidal *Salmonella* Isolates from Humans, Retail Meats, and Food Animals that are at least ACSSuT[1] Resistant, by Serotype, 2007

Humans				Retail Meats				Food Animals			
Source	**Serotype**	**n**	**%**	**Meat Type**	**Serotype**	**n**	**%**	**Animal Source**	**Serotype**	**n**	**%**
Humans (N=136)	Typhimurium	91	66.9	**Chicken Breasts (N=0)**				**Chickens (N=15)**	Kentucky	7	46.7
	Newport	18	13.2						Heidelberg	6	40.0
	Agona	7	5.1						Ohio	1	6.7
	Dublin	3	2.2						Typhimurium	1	6.7
	Heidelberg	3	2.2								
	Paratyphi B var. L(+) tartrate+	2	1.5								
	Senftenberg	2	1.5	**Ground Turkey (N=3)**	Senftenberg	2	66.7	**Turkeys (N=13)**	Agona	6	46.2
	I 4,[5],12:i:-	1	0.7		Typhimurium	1	33.3		Typhimurium	2	15.4
	I 6,7:c:-	1	0.7						IIIa 18:z4,z32:-	1	7.7
	Bredeney	1	0.7						Albert	1	7.7
	Concord	1	0.7						Heidelberg	1	7.7
	Enteritidis	1	0.7						Reading	1	7.7
	Ohio	1	0.7						Saintpaul	1	7.7
	Worthington	1	0.7								
	Partially serotyped	3	2.2								
				Ground Beef (N=0)				**Cattle (N=71)**	Newport	21	29.6
									Dublin	20	28.2
									Typhimurium	13	18.3
									Agona	11	15.5
									I 9,12:nonmotile	2	2.8
									Reading	2	2.8
									Give	1	1.4
									Muenster	1	1.4
				Pork Chops (N=0)				**Swine (N=23)**	Typhimurium	21	91.3
									Agona	2	8.7

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

Table 18. Non-Typhoidal *Salmonella* Isolates from Humans, Retail Meats, and Food Animals that are at least ACT/S[1] Resistant, by Serotype, 2007

Humans				Retail Meats				Food Animals			
Source	Serotype	n	%	Meat Type	Serotype	n	%	Animal Source	Serotype	n	%
Humans (N=16)	Typhimurium	7	43.8	Chicken Breasts (N=0)				Chickens (N=0)			
	Agona	3	18.8								
	I 6,7:c:-	1	6.3								
	Concord	1	6.3								
	Newport	1	6.3								
	Worthington	1	6.3								
	Unknown serotype	1	6.3								
	Partially serotyped	1	6.3								
				Ground Turkey (N=0)				Turkeys (N=0)			
				Ground Beef (N=0)				Cattle (n=11)	Dublin	4	36.4
									Newport	4	36.4
									Agona	2	18.2
									I 9,12:nonmotile	1	9.1
				Pork Chops (N=0)				Swine (N=4)	Typhimurium	4	100.0

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

Table 19. Non-Typhoidal *Salmonella* Isolates from Humans, Retail Meats, and Food Animals that are at least ACSSuTAuCf[1] Resistant, by Serotype, 2007

Humans				Retail Meats				Food Animals			
Source	Serotype	n	%	Meat Type	Serotype	n	%	Animal Source	Serotype	n	%
Humans (N=46)	Newport	17	37.0	Chicken Breasts (N=0)				Chickens (N=14)	Kentucky	7	50.0
	Typhimurium	14	30.4						Heidelberg	6	42.9
	Agona	7	15.2						Ohio	1	7.1
	Dublin	3	6.5								
	Bredeney	1	2.2								
	Enteritidis	1	2.2								
	Ohio	1	2.2								
	Partially Serotyped	2	4.3								
				Ground Turkey (N=2)	Senftenberg	2	100.0	Turkeys (N=11)	Agona	6	54.5
									Albert	1	9.1
									Heidelberg	1	9.1
									Reading	1	9.1
									Saintpaul	1	9.1
									Typhimurium	1	9.1
				Ground Beef (N=0)				Cattle (N=60)	Newport	21	35.0
									Dublin	17	28.3
									Agona	11	18.3
									Typhimurium	7	11.7
									Reading	2	3.3
									Give	1	1.7
									Muenster	1	1.7
				Pork Chops (N=0)				Swine (N=1)	Typhimurium	1	100.0

[1] ACSSuTAuCf = ACSSuT, amoxicillin-clavulanic acid, and ceftiofur

Table 20. Non-Typhoidal *Salmonella* Isolates from Humans, Retail Meats, and Food Animals that are at least Ceftiofur and Nalidixic Acid Resistant, by Serotype, 2007

Humans				Retail Meats				Food Animals			
Source	**Serotype**	**n**	**%**	**Meat Type**	**Serotype**	**n**	**%**	**Animal Source**	**Serotype**	**n**	**%**
Humans (N=5)	Dublin	2	40.0	**Chicken Breasts (N=0)**				**Chickens (N=0)**			
	Agona	1	20.0								
	Enteritidis	1	20.0								
	Typhimurium	1	20.0								
				Ground Turkey (N=1)	Agona	1	100.0	**Turkeys (N=2)**	Albert	1	50.0
									Typhimurium	1	50.0
				Ground Beef (N=0)				**Cattle (N=1)**	Dublin	1	100.0
				Pork Chops (N=0)				**Swine (N=0)**			

E. Antimicrobial Susceptibility among *Salmonella* Typhimurium

Table 21a. Antimicrobial Resistance among *Salmonella* Typhimurium Isolates from Humans, Retail Meats, and Food Animals, by Year, 1996-2007

Year			1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Number of Isolates Tested		Humans	307	328	381	363	304	325	394	408	382	438	409	403
		Chicken Breasts							9	22	49	29	21	25
		Ground Turkey							2	2	2	1	0	1
		Ground Beef							2	1	0	0	1	3
		Pork Chops							2	1	2	2	2	3
		Chickens		24	66	154	145	130	150	156	171	183	105	83
		Turkeys		11	6	37	18	15	9	6	14	7	5	6
		Cattle		2	33	189	187	87	98	78	48	34	22	26
		Swine		25	105	114	81	44	48	27	53	42	25	44
Antimicrobial Class	**Antimicrobial (Resistance Breakpoint)**	**Isolate Source**												
Aminoglycosides	Amikacin (MIC ≥ 64 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
		Chicken Breasts							0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Ground Turkey							0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0
		Ground Beef							0.0% 0	0.0% 0			0.0% 0	0.0% 0
		Pork Chops							0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		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
		Turkeys		0.0% 0	0.0% 0	0.0% 0	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		0.0% 0	0.0% 0	0.0% 0	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		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	2.3% 1
	Gentamicin (MIC ≥ 16 µg/ml)	Humans	4.2% 13	4.6% 15	3.7% 14	2.2% 8	2.6% 8	1.5% 5	2.3% 9	2.0% 8	2.1% 8	1.8% 8	2.7% 11	2.5% 10
		Chicken Breasts							0.0% 0	0.0% 0	2.0% 1	0.0% 0	0.0% 0	0.0% 0
		Ground Turkey							0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0
		Ground Beef							0.0% 0	0.0% 0			0.0% 0	0.0% 0
		Pork Chops							0.0% 0	0.0% 0	0.0% 0	0.0% 0	50.0% 1	0.0% 0
		Chickens		20.8% 5	18.2% 12	16.9% 26	15.2% 22	3.1% 4	12.7% 19	5.1% 8	4.1% 7	4.4% 8	6.7% 7	3.6% 3
		Turkeys		45.5% 5	50.0% 3	29.7% 11	33.3% 6	53.3% 8	44.4% 4	83.3% 5	64.3% 9	14.3% 1	20.0% 1	16.7% 1
		Cattle		0.0% 0	3.0% 1	2.6% 5	1.6% 3	0.0% 0	2.0% 2	1.3% 1	0.0% 0	0.0% 0	0.0% 0	7.7% 2
		Swine		0.0% 0	0.0% 0	1.8% 2	0.0% 0	2.3% 1	2.1% 1	0.0% 0	3.8% 2	7.1% 3	8.0% 2	2.3% 1
	Kanamycin (MIC ≥ 64 µg/ml)	Humans	14.3% 44	15.5% 51	15.7% 60	12.9% 47	13.2% 40	8.3% 27	7.6% 30	7.1% 29	5.8% 22	5.7% 25	5.1% 21	5.7% 23
		Chicken Breasts							0.0% 0	18.2% 4	34.7% 17	24.1% 7	47.6% 10	12.0% 3
		Ground Turkey							0.0% 0	50.0% 1	50.0% 1	0.0% 0		0.0% 0
		Ground Beef							0.0% 0	0.0% 0			0.0% 0	0.0% 0
		Pork Chops							0.0% 0	0.0% 0	0.0% 0	0.0% 0	100.0% 2	0.0% 0
		Chickens		8.3% 2	4.5% 3	3.9% 6	3.4% 5	3.1% 4	5.3% 8	7.7% 12	9.9% 17	7.7% 14	18.1% 19	7.2% 6
		Turkeys		81.8% 9	66.7% 4	59.5% 22	44.4% 8	73.3% 11	55.6% 5	50.0% 3	21.4% 3	0.0% 0	0.0% 0	16.7% 1
		Cattle		0.0% 0	54.5% 18	36.5% 69	27.3% 51	24.1% 21	26.5% 26	16.7% 13	14.6% 7	38.2% 13	13.6% 3	26.9% 7
		Swine		16.0% 4	18.1% 19	21.1% 24	14.8% 12	13.6% 6	2.1% 1	0.0% 0	9.4% 5	7.1% 3	16.0% 4	9.1% 4
	Streptomycin (MIC ≥ 64 µg/ml)	Humans	51.8% 159	55.2% 181	47.8% 182	43.3% 157	39.5% 120	40.0% 130	32.0% 126	35.5% 145	31.7% 121	28.1% 123	29.3% 120	32.3% 130
		Chicken Breasts							0.0% 0	18.2% 4	14.3% 7	3.4% 1	9.5% 2	28.0% 7
		Ground Turkey							0.0% 0	50.0% 1	50.0% 1	0.0% 0		100.0% 1
		Ground Beef							0.0% 0	0.0% 0			100.0% 1	0.0% 0
		Pork Chops							50.0% 1	100.0% 1	100.0% 2	100.0% 2	100.0% 2	0.0% 0
		Chickens		41.7% 10	45.5% 30	40.9% 63	35.9% 52	16.9% 22	30.0% 45	16.7% 26	8.2% 14	13.7% 25	17.1% 18	10.8% 9
		Turkeys		81.8% 9	83.3% 5	81.1% 30	72.2% 13	93.3% 14	77.8% 7	100.0% 6	64.3% 9	57.1% 4	60.0% 3	50.0% 3
		Cattle		100.0% 2	57.6% 19	63.0% 119	63.1% 118	46.0% 40	66.3% 65	52.6% 41	56.3% 27	55.9% 19	54.5% 12	50.0% 13
		Swine		44.0% 11	82.9% 87	80.7% 92	77.8% 63	70.5% 31	77.1% 37	59.3% 16	77.4% 41	69.0% 29	72.0% 18	59.1% 26

Table 21b. Antimicrobial Resistance among *Salmonella* Typhimurium Isolates from Humans, Retail Meats, and Food Animals, by Year, 1996-2007

Year			1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Number of Isolates Tested		Humans	307	328	381	363	304	325	394	408	382	438	409	403
		Chicken Breasts							9	22	49	29	21	25
		Ground Turkey							2	2	2	1	0	1
		Ground Beef							2	1	0	0	1	3
		Pork Chops							2	1	2	2	2	3
		Chickens		24	66	154	145	130	150	156	171	183	105	83
		Turkeys		11	6	37	18	15	9	6	14	7	5	6
		Cattle		2	33	189	187	87	98	78	48	34	22	26
		Swine		25	105	114	81	44	48	27	53	42	25	44
Antimicrobial Class	**Antimicrobial (Resistance Breakpoint)**	**Isolate Source**												
β-Lactam/β-Lactamase Inhibitor Combinations	Amoxicillin-Clavulanic Acid (MIC ≥ 32 / 16 µg/ml)	Humans	2.6% 8	3.4% 11	4.5% 17	2.8% 10	6.3% 19	6.2% 20	7.6% 30	5.6% 23	4.7% 18	3.2% 14	4.4% 18	6.5% 26
		Chicken Breasts							33.3% 3	63.6% 14	49.0% 24	51.7% 15	57.1% 12	44.0% 11
		Ground Turkey							0.0% 0	100.0% 2	0.0% 0	100.0% 1		0.0% 0
		Ground Beef							0.0% 0	0.0% 0			0.0% 0	0.0% 0
		Pork Chops							0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Chickens		0.0% 0	9.1% 6	29.2% 45	25.5% 37	14.6% 19	28.7% 43	25.6% 40	43.3% 74	19.7% 36	30.5% 32	33.7% 28
		Turkeys		63.6% 7	0.0% 0	51.4% 19	38.9% 7	53.3% 8	22.2% 2	16.7% 1	14.3% 2	0.0% 0	0.0% 0	16.7% 1
		Cattle		50.0% 1	6.1% 2	6.9% 13	12.8% 24	13.8% 12	17.3% 17	20.5% 16	25.0% 12	35.3% 12	27.3% 6	26.9% 7
		Swine		0.0% 0	1.9% 2	1.8% 2	2.5% 2	4.5% 2	8.3% 4	0.0% 0	0.0% 0	9.5% 4	0.0% 0	2.3% 1
Cephems	Cefoxitin (MIC ≥ 32 µg/ml)	Humans					3.6% 11	3.1% 10	4.3% 17	4.4% 18	4.7% 18	2.5% 11	3.9% 16	5.5% 22
		Chicken Breasts							33.3% 3	63.6% 14	49.0% 24	51.7% 15	52.4% 11	40.0% 10
		Ground Turkey							0.0% 0	100.0% 2	0.0% 0	100.0% 1		0.0% 0
		Ground Beef							0.0% 0	0.0% 0			0.0% 0	0.0% 0
		Pork Chops							0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Chickens					24.8% 36	14.6% 19	26.7% 40	23.7% 37	43.3% 74	19.7% 36	29.5% 31	24.1% 20
		Turkeys					38.9% 7	53.3% 8	22.2% 2	16.7% 1	14.3% 2	0.0% 0	0.0% 0	16.7% 1
		Cattle					9.1% 17	11.5% 10	11.2% 11	16.7% 13	25.0% 12	35.3% 12	27.3% 6	26.9% 7
		Swine					1.2% 1	0.0% 0	4.2% 2	3.7% 1	0.0% 0	4.8% 2	0.0% 0	4.5% 2
	Ceftiofur (MIC ≥ 8 µg/ml)	Humans	0.0% 0	1.5% 5	1.8% 7	1.9% 7	3.6% 11	3.1% 10	4.3% 17	4.9% 20	4.5% 17	2.5% 11	4.2% 17	6.2% 25
		Chicken Breasts							33.3% 3	63.6% 14	49.0% 24	51.7% 15	57.1% 12	44.0% 11
		Ground Turkey							0.0% 0	100.0% 2	0.0% 0	100.0% 1		0.0% 0
		Ground Beef							0.0% 0	0.0% 0			0.0% 0	0.0% 0
		Pork Chops							0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Chickens		0.0% 0	9.1% 6	29.9% 46	26.2% 38	14.6% 19	28.0% 42	25.6% 40	43.3% 74	19.7% 36	30.5% 32	32.5% 27
		Turkeys		63.6% 7	0.0% 0	48.6% 18	38.9% 7	53.3% 8	22.2% 2	16.7% 1	14.3% 2	0.0% 0	0.0% 0	16.7% 1
		Cattle		0.0% 0	3.0% 1	6.9% 13	11.8% 22	11.5% 10	15.3% 15	20.5% 16	25.0% 12	35.3% 12	27.3% 6	26.9% 7
		Swine		0.0% 0	0.0% 0	1.8% 2	0.0% 0	0.0% 0	4.2% 2	0.0% 0	1.9% 1	4.8% 2	0.0% 0	2.3% 1
	Ceftriaxone (MIC ≥ 64 µg/ml)	Humans	0.0% 0	0.3% 1	0.0% 0	0.3% 1	0.0% 0	0.0% 0	0.3% 1	0.2% 1	0.8% 3	0.0% 0	0.2% 1	0.7% 3
		Chicken Breasts							0.0% 0	0.0% 0	0.0% 0	0.0% 0	4.8% 1	0.0% 0
		Ground Turkey							0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0
		Ground Beef							0.0% 0	0.0% 0			0.0% 0	0.0% 0
		Pork Chops							0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Chickens		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	1.3% 2	0.0% 0	1.8% 3	0.0% 0	0.0% 0	0.0% 0
		Turkeys		0.0% 0	0.0% 0	8.1% 3	11.1% 2	6.7% 1	0.0% 0	16.7% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Cattle		0.0% 0	0.0% 0	0.5% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	2.1% 1	0.0% 0	0.0% 0	3.8% 1
		Swine		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0

Table 21c. Antimicrobial Resistance among *Salmonella* Typhimurium Isolates from Humans, Retail Meats, and Food Animals, by Year, 1996-2007

Year			1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Number of Isolates Tested		Humans	307	328	381	363	304	325	394	408	382	438	409	403
		Chicken Breasts							9	22	49	29	21	25
		Ground Turkey							2	2	2	1	0	1
		Ground Beef							2	1	0	0	1	3
		Pork Chops							2	1	2	2	2	3
		Chickens		24	66	154	145	130	150	156	171	183	105	83
		Turkeys		11	6	37	18	15	9	6	14	7	5	6
		Cattle		2	33	189	187	87	98	78	48	34	22	26
		Swine		25	105	114	81	44	48	27	53	42	25	44
Antimicrobial Class	**Antimicrobial (Resistance Breakpoint)**	**Isolate Source**												
Folate Pathway Inhibitors	Sulfamethoxazole/ Sulfisoxazole[1] (MIC ≥ 512 µg/ml)	Humans	53.4% 164	56.7% 186	50.1% 191	45.7% 166	45.4% 138	43.1% 140	32.2% 127	38.7% 158	35.9% 137	32.0% 140	33.3% 136	37.2% 150
		Chicken Breasts							44.4% 4	31.8% 7	73.5% 36	69.0% 20	90.5% 19	68.0% 17
		Ground Turkey							0.0% 0	50.0% 1	100.0% 2	0.0% 0		100.0% 1
		Ground Beef							0.0% 0	0.0% 0			100.0% 1	0.0% 0
		Pork Chops							50.0% 1	100.0% 1	100.0% 2	100.0% 2	100.0% 2	0.0% 0
		Chickens		41.7% 10	37.9% 25	32.5% 50	34.5% 50	18.5% 24	31.3% 47	28.2% 44	47.4% 81	37.2% 68	65.7% 69	60.2% 50
		Turkeys		81.8% 9	83.3% 5	75.7% 28	66.7% 12	86.7% 13	77.8% 7	100.0% 6	78.6% 11	57.1% 4	80.0% 4	83.3% 5
		Cattle		100.0% 2	60.6% 20	64.6% 122	64.2% 120	54.0% 47	58.2% 57	44.9% 35	60.4% 29	73.5% 25	59.1% 13	65.4% 17
		Swine		80.0% 20	83.8% 88	78.9% 90	86.4% 70	75.0% 33	68.8% 33	63.0% 17	81.1% 43	69.0% 29	96.0% 24	77.3% 34
	Trimethoprim-Sulfamethoxazole (MIC ≥ 4 / 76 µg/ml)	Humans	4.6% 14	3.0% 10	4.5% 17	2.8% 10	3.6% 11	2.5% 8	2.3% 9	3.4% 14	2.6% 10	2.7% 12	2.2% 9	2.2% 9
		Chicken Breasts							0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Ground Turkey							0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0
		Ground Beef							0.0% 0	0.0% 0			0.0% 0	0.0% 0
		Pork Chops							0.0% 0	0.0% 0	0.0% 0	50.0% 1	0.0% 0	0.0% 0
		Chickens		0.0% 0	1.5% 1	1.3% 2	0.0% 0	0.8% 1	1.3% 2	0.6% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Turkeys		0.0% 0	0.0% 0	0.0% 0	11.1% 2	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Cattle		0.0% 0	6.1% 2	9.0% 17	2.1% 4	2.3% 2	4.1% 4	2.6% 2	4.2% 2	5.9% 2	4.5% 1	0.0% 0
		Swine		4.0% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	2.1% 1	3.7% 1	1.9% 1	9.5% 4	4.0% 1	9.1% 4
Penicillins	Ampicillin (MIC ≥ 32 µg/ml)	Humans	50.2% 154	50.3% 165	45.7% 174	41.3% 150	42.1% 128	42.5% 138	33.8% 133	36.3% 148	31.9% 122	29.0% 127	28.1% 115	31.5% 127
		Chicken Breasts							33.3% 3	72.7% 16	53.1% 26	55.2% 16	57.1% 12	48.0% 12
		Ground Turkey							0.0% 0	100.0% 2	50.0% 1	100.0% 1		100.0% 1
		Ground Beef							0.0% 0	0.0% 0			100.0% 1	0.0% 0
		Pork Chops							50.0% 1	100.0% 1	50.0% 1	100.0% 2	100.0% 2	0.0% 0
		Chickens		33.3% 8	30.3% 20	43.5% 67	42.1% 61	26.2% 34	45.3% 68	32.1% 50	46.8% 80	26.8% 49	42.9% 45	37.3% 31
		Turkeys		72.7% 8	50.0% 3	64.9% 24	66.7% 12	80.0% 12	55.6% 5	66.7% 4	28.6% 4	57.1% 4	80.0% 4	83.3% 5
		Cattle		100.0% 2	57.6% 19	66.1% 125	63.1% 118	57.5% 50	71.4% 70	59.0% 46	60.4% 29	73.5% 25	63.6% 14	61.5% 16
		Swine		72.0% 18	75.2% 79	64.0% 73	82.7% 67	63.6% 28	62.5% 30	51.9% 14	71.7% 38	66.7% 28	76.0% 19	70.5% 31
Phenicols	Chloramphenicol (MIC ≥ 32 µg/ml)	Humans	40.1% 123	36.0% 118	34.1% 130	28.9% 105	30.9% 94	31.7% 103	23.4% 92	28.2% 115	24.1% 92	24.4% 107	22.0% 90	25.3% 102
		Chicken Breasts							0.0% 0	9.1% 2	4.1% 2	3.4% 1	0.0% 0	0.0% 0
		Ground Turkey							0.0% 0	50.0% 1	50.0% 1	0.0% 0		100.0% 1
		Ground Beef							0.0% 0	0.0% 0			100.0% 1	0.0% 0
		Pork Chops							50.0% 1	100.0% 1	100.0% 2	100.0% 2	0.0% 0	0.0% 0
		Chickens		20.8% 5	19.7% 13	10.4% 16	14.5% 21	11.5% 15	16.0% 24	5.1% 8	1.8% 3	8.2% 15	7.6% 8	1.2% 1
		Turkeys		63.6% 7	0.0% 0	54.1% 20	55.6% 10	73.3% 11	66.7% 6	50.0% 3	28.6% 4	57.1% 4	60.0% 3	66.7% 4
		Cattle		100.0% 2	27.3% 9	37.0% 70	42.8% 80	37.9% 33	49.0% 48	42.3% 33	54.2% 26	47.1% 16	50.0% 11	65.4% 17
		Swine		52.0% 13	57.1% 60	49.1% 56	53.1% 43	47.7% 21	56.3% 27	48.1% 13	60.4% 32	54.8% 23	64.0% 16	65.9% 29

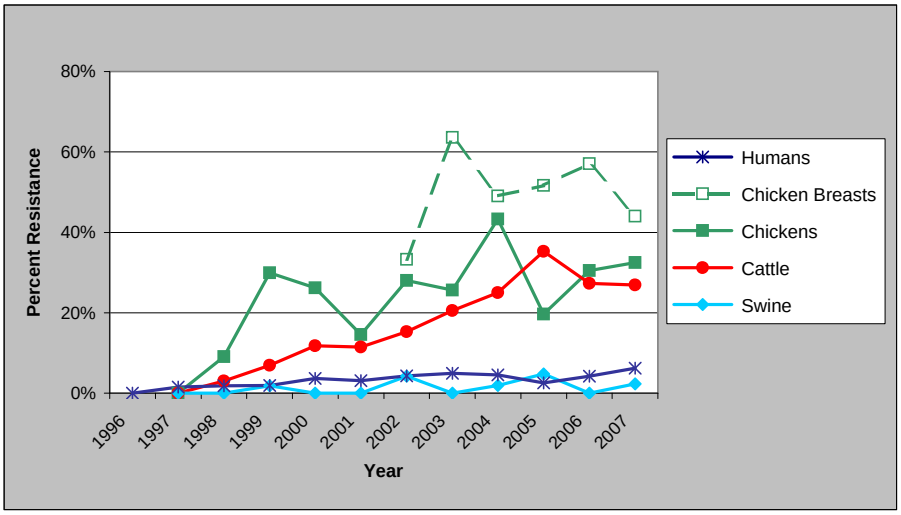
[1] Sulfamethoxazole was tested from 1996-2003 and was replaced by sulfisoxazole in 2004

Table 21d. Antimicrobial Resistance among *Salmonella* Typhimurium Isolates from Humans, Retail Meats, and Food Animals, by Year, 1996-2007

Year			1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Number of Isolates Tested		Humans	307	328	381	363	304	325	394	408	382	438	409	403
		Chicken Breasts							9	22	49	29	21	25
		Ground Turkey							2	2	2	1	0	1
		Ground Beef							2	1	0	0	1	3
		Pork Chops							2	1	2	2	2	3
		Chickens		24	66	154	145	130	150	156	171	183	105	83
		Turkeys		11	6	37	18	15	9	6	14	7	5	6
		Cattle		2	33	189	187	87	98	78	48	34	22	26
		Swine		25	105	114	81	44	48	27	53	42	25	44
Antimicrobial Class	**Antimicrobial (Resistance Breakpoint)**	**Isolate Source**												
Quinolones	Ciprofloxacin (MIC ≥ 4 µg/ml)	Humans	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	0.0% 0	0.2% 1	0.0% 0
		Chicken Breasts							0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Ground Turkey							0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0
		Ground Beef							0.0% 0	0.0% 0			0.0% 0	0.0% 0
		Pork Chops							0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		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
		Turkeys		0.0% 0	0.0% 0	0.0% 0	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		0.0% 0	0.0% 0	0.0% 0	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		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
	Nalidixic Acid (MIC ≥ 32 µg/ml)	Humans	0.3% 1	0.9% 3	0.5% 2	0.0% 0	1.3% 4	0.6% 2	1.3% 5	1.2% 5	0.5% 2	0.9% 4	0.7% 3	1.5% 6
		Chicken Breasts							0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Ground Turkey							0.0% 0	50.0% 1	0.0% 0	0.0% 0		0.0% 0
		Ground Beef							0.0% 0	0.0% 0			0.0% 0	0.0% 0
		Pork Chops							0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Chickens		0.0% 0	0.0% 0	0.6% 1	0.7% 1	0.0% 0	2.7% 4	0.0% 0	0.0% 0	1.1% 2	0.0% 0	0.0% 0
		Turkeys		45.5% 5	0.0% 0	51.4% 19	33.3% 6	60.0% 9	55.6% 5	33.3% 2	14.3% 2	0.0% 0	0.0% 0	0.0% 0
		Cattle		0.0% 0	0.0% 0	0.5% 1	0.0% 0	0.0% 0	1.0% 1	0.0% 0	6.3% 3	0.0% 0	0.0% 0	0.0% 0
		Swine		0.0% 0	0.0% 0	0.0% 0	1.2% 1	0.0% 0	2.1% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	2.3% 1
Tetracyclines	Tetracycline (MIC ≥ 16 µg/ml)	Humans	49.5% 152	52.4% 172	46.5% 177	41.9% 152	43.4% 132	43.4% 141	32.0% 126	38.2% 156	30.1% 115	30.4% 133	31.5% 129	36.7% 148
		Chicken Breasts							44.4% 4	31.8% 7	71.4% 35	69.0% 20	90.5% 19	72.0% 18
		Ground Turkey							0.0% 0	50.0% 1	100.0% 2	0.0% 0		100.0% 1
		Ground Beef							0.0% 0	0.0% 0			100.0% 1	0.0% 0
		Pork Chops							100.0% 2	100.0% 1	100.0% 2	100.0% 2	100.0% 2	66.7% 2
		Chickens		33.3% 8	31.8% 21	32.5% 50	32.4% 47	16.2% 21	28.0% 42	33.3% 52	44.4% 76	34.4% 63	61.0% 64	60.2% 50
		Turkeys		90.9% 10	83.3% 5	78.4% 29	83.3% 15	93.3% 14	77.8% 7	100.0% 6	78.6% 11	57.1% 4	100.0% 5	66.7% 4
		Cattle		100.0% 2	63.6% 21	58.7% 111	61.5% 115	44.8% 39	64.3% 63	53.8% 42	60.4% 29	67.6% 23	54.5% 12	65.4% 17
		Swine		84.0% 21	89.5% 94	84.2% 96	90.1% 73	79.5% 35	89.6% 43	74.1% 20	90.6% 48	83.3% 35	96.0% 24	88.6% 39

Ceftiofur Resistance

Figure 12. Percent of *Salmonella* Typhimurium Isolates from Humans, Retail Chicken Breasts, and Food Animals Resistant to Ceftiofur, by Year, 1996-2007 [1]



[1] Data for ground turkey, ground beef, pork chops, and turkeys are not included due to the small number of *Salmonella* Typhimurium isolates from these sources. Table 21 contains resistance data for *Salmonella* Typhimurium isolates from each source, by year

Table 22. Number of *Salmonella* Typhimurium Isolates Tested from Humans, Retail Meats, and Food Animals, by Year, 1996-2007

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Humans	307	328	381	363	304	325	394	408	382	438	409	403
Chicken Breasts							9	22	49	29	21	25
Ground Turkey							2	2	2	1	0	1
Ground Beef							2	1	0	0	1	3
Pork Chops							2	1	2	2	2	3
Chickens		24	66	154	145	130	150	156	171	183	105	83
Turkeys		11	6	37	18	15	9	6	14	7	5	6
Cattle		2	33	189	187	87	98	78	48	34	22	26
Swine		25	105	114	81	44	48	27	53	42	25	44

Table 23a. Resistance Patterns among *Salmonella* Typhimurium Isolates from Humans, Retail Meats, and Food Animals, by Year, 1996-2007

Year		1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Number of Isolates Tested	Humans	307	328	381	363	304	325	394	408	382	438	409	403
	Chicken Breasts							9	22	49	29	21	25
	Ground Turkey							2	2	2	1	0	1
	Ground Beef							2	1	0	0	1	3
	Pork Chops							2	1	2	2	2	3
	Chickens		24	66	154	145	130	150	156	171	183	105	83
	Turkeys		11	6	37	18	15	9	6	14	7	5	6
	Cattle		2	33	189	187	87	98	78	48	34	22	26
	Swine		25	105	114	81	44	48	27	53	42	25	44
Resistance Pattern	**Isolate Source**												
1. No Resistance Detected	Humans	37.8% 116	39.0% 128	46.5% 177	50.4% 183	49.3% 150	49.2% 160	59.9% 236	54.7% 223	60.7% 232	65.1% 285	62.6% 256	57.6% 232
	Chicken Breasts							22.2% 2	22.7% 5	14.3% 7	24.1% 7	0.0% 0	24.0% 6
	Ground Turkey							100.0% 2	0.0% 0	0.0% 0	0.0% 0		0.0% 0
	Ground Beef							100.0% 2	100.0% 1			0.0% 0	100.0% 3
	Pork Chops							0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	33.3% 1
	Chickens		37.5% 9	39.4% 26	29.2% 45	32.4% 47	64.6% 84	37.3% 56	45.5% 71	40.9% 70	54.1% 99	30.5% 32	30.1% 25
	Turkeys		0.0% 0	16.7% 1	10.8% 4	5.6% 1	6.7% 1	0.0% 0	0.0% 0	14.3% 2	42.9% 3	0.0% 0	16.7% 1
	Cattle		0.0% 0	36.4% 12	29.1% 55	26.7% 50	34.5% 30	19.4% 19	39.7% 31	35.4% 17	26.5% 9	31.8% 7	34.6% 9
	Swine		12.0% 3	7.6% 8	7.9% 9	2.5% 2	13.6% 6	8.3% 4	18.5% 5	3.8% 2	16.7% 7	0.0% 0	6.8% 3
2. Resistant to ≥ 3 Antimicrobial Classes	Humans	50.2% 154	51.8% 170	46.7% 178	43.0% 156	43.4% 132	41.5% 135	32.5% 128	37.3% 152	31.4% 120	30.1% 132	30.3% 124	34.2% 138
	Chicken Breasts							33.3% 3	72.7% 16	71.4% 35	58.6% 17	81.0% 17	68.0% 17
	Ground Turkey							0.0% 0	100.0% 2	100.0% 2	100.0% 1		100.0% 1
	Ground Beef							0.0% 0	0.0% 0			100.0% 1	0.0% 0
	Pork Chops							50.0% 1	100.0% 1	100.0% 2	100.0% 2	100.0% 2	0.0% 0
	Chickens		29.2% 7	31.8% 21	47.4% 73	48.3% 70	28.5% 37	46.0% 69	34.6% 54	48.5% 83	30.6% 56	55.2% 58	39.8% 33
	Turkeys		27.3% 3	83.3% 5	73.0% 27	66.7% 12	86.7% 13	77.8% 7	100.0% 6	71.4% 10	57.1% 4	80.0% 4	83.3% 5
	Cattle		50.0% 1	60.6% 20	64.0% 121	64.2% 120	50.6% 44	70.4% 69	59.0% 46	60.4% 29	73.5% 25	59.1% 13	65.4% 17
	Swine		76.0% 19	81.0% 85	78.9% 90	86.4% 70	70.5% 31	75.0% 36	55.6% 15	77.4% 41	71.4% 30	96.0% 24	72.7% 32
3. Resistant to ≥ 4 Antimicrobial Classes	Humans	45.0% 138	46.6% 153	43.3% 165	38.6% 140	39.8% 121	37.8% 123	28.4% 112	32.4% 132	27.5% 105	27.4% 120	26.9% 110	29.8% 120
	Chicken Breasts							0.0% 0	36.4% 8	46.9% 23	48.3% 14	47.6% 10	40.0% 10
	Ground Turkey							0.0% 0	50.0% 1	50.0% 1	0.0% 0		100.0% 1
	Ground Beef							0.0% 0	0.0% 0			100.0% 1	0.0% 0
	Pork Chops							50.0% 1	100.0% 1	100.0% 2	100.0% 2	100.0% 2	0.0% 0
	Chickens		25.0% 6	18.2% 12	22.7% 35	20.7% 30	13.1% 17	25.3% 38	19.9% 31	37.4% 64	21.3% 39	38.1% 40	31.3% 26
	Turkeys		27.3% 3	50.0% 3	62.2% 23	61.1% 11	86.7% 13	66.7% 6	66.7% 4	28.6% 4	57.1% 4	60.0% 3	66.7% 4
	Cattle		50.0% 1	60.6% 20	55.0% 104	55.6% 104	41.4% 36	58.2% 57	51.3% 40	60.4% 29	64.7% 22	54.5% 12	61.5% 16
	Swine		72.0% 18	71.4% 75	57.0% 65	74.1% 60	54.5% 24	60.4% 29	51.9% 14	71.7% 38	66.7% 28	72.0% 18	70.5% 31
4. Resistant to ≥ 5 Antimicrobial Classes	Humans	35.8% 110	35.7% 117	34.1% 130	28.1% 102	29.6% 90	29.5% 96	23.1% 91	27.7% 113	24.1% 92	22.8% 100	20.8% 85	24.8% 100
	Chicken Breasts							0.0% 0	27.3% 6	44.9% 22	48.3% 14	47.6% 10	40.0% 10
	Ground Turkey							0.0% 0	50.0% 1	50.0% 1	0.0% 0		100.0% 1
	Ground Beef							0.0% 0	0.0% 0			100.0% 1	0.0% 0
	Pork Chops							50.0% 1	100.0% 1	50.0% 1	100.0% 2	0.0% 0	0.0% 0
	Chickens		16.7% 4	16.7% 11	15.6% 24	17.2% 25	12.3% 16	20.0% 30	17.3% 27	36.3% 62	19.7% 36	35.2% 37	28.9% 24
	Turkeys		27.3% 3	0.0% 0	56.8% 21	55.6% 10	73.3% 11	55.6% 5	50.0% 3	28.6% 4	57.1% 4	60.0% 3	33.3% 2
	Cattle		50.0% 1	24.2% 8	34.9% 66	38.0% 71	34.5% 30	35.7% 35	33.3% 26	58.3% 28	50.0% 17	50.0% 11	61.5% 16
	Swine		32.0% 8	56.2% 59	46.5% 53	43.2% 35	45.5% 20	47.9% 23	48.1% 13	60.4% 32	54.8% 23	44.0% 11	47.7% 21

Table 23b. Resistance Patterns among *Salmonella* Typhimurium Isolates from Humans, Retail Meats, and Food Animals, by Year, 1996-2007

Year		1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Number of Isolates Tested	Humans	307	328	381	363	304	325	394	408	382	438	409	403
	Chicken Breasts							9	22	49	29	21	25
	Ground Turkey							2	2	2	1	0	1
	Ground Beef							2	1	0	0	1	3
	Pork Chops							2	1	2	2	2	3
	Chickens		24	66	154	145	130	150	156	171	183	105	83
	Turkeys		11	6	37	18	15	9	6	14	7	5	6
	Cattle		2	33	189	187	87	98	78	48	34	22	26
	Swine		25	105	114	81	44	48	27	53	42	25	44
Resistance Pattern	**Isolate Source**												
5. At Least ACSSuT[1] Resistant	Humans	33.9% 104	35.1% 115	32.5% 124	27.8% 101	28.0% 85	29.5% 96	21.6% 85	26.5% 108	23.3% 89	22.4% 98	19.6% 80	22.6% 91
	Chicken Breasts							0.0% 0	9.1% 2	4.1% 2	3.4% 1	0.0% 0	0.0% 0
	Ground Turkey							0.0% 0	50.0% 1	50.0% 1	0.0% 0		100.0% 1
	Ground Beef							0.0% 0	0.0% 0			100.0% 1	0.0% 0
	Pork Chops							50.0% 1	100.0% 1	50.0% 1	100.0% 2	0.0% 0	0.0% 0
	Chickens		12.5% 3	16.7% 11	9.7% 15	13.1% 19	11.5% 15	12.7% 19	3.2% 5	1.8% 3	7.1% 13	6.7% 7	1.2% 1
	Turkeys		27.3% 3	0.0% 0	51.4% 19	50.0% 9	66.7% 10	44.4% 4	50.0% 3	28.6% 4	57.1% 4	60.0% 3	33.3% 2
	Cattle		50.0% 1	21.2% 7	32.8% 62	37.4% 70	31.0% 27	31.6% 31	28.2% 22	54.2% 26	41.2% 14	50.0% 11	50.0% 13
	Swine		20.0% 5	54.3% 57	46.5% 53	39.5% 32	45.5% 20	47.9% 23	44.4% 12	60.4% 32	50.0% 21	44.0% 11	47.7% 21
6. At Least ACT/S[2] Resistant	Humans	2.0% 6	0.6% 2	2.6% 10	2.2% 8	1.6% 5	0.9% 3	2.0% 8	3.2% 13	1.6% 6	2.1% 9	0.7% 3	1.7% 7
	Chicken Breasts							0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
	Ground Turkey							0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0
	Ground Beef							0.0% 0	0.0% 0			0.0% 0	0.0% 0
	Pork Chops							0.0% 0	0.0% 0	0.0% 0	50.0% 1	0.0% 0	0.0% 0
	Chickens		0.0% 0	0.0% 0	0.6% 1	0.7% 1	0.0% 0	2.7% 4	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
	Turkeys		18.2% 2	0.0% 0	48.6% 18	33.3% 6	53.3% 8	22.2% 2	16.7% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0
	Cattle		0.0% 0	0.0% 0	0.5% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	4.2% 2	2.9% 1	4.5% 1	0.0% 0
	Swine		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	2.1% 1	0.0% 0	1.9% 1	7.1% 3	4.0% 1	0.0% 0
7. At Least ACSSuTAuCf[3] Resistant	Humans	0.0% 0	1.2% 4	1.0% 4	0.6% 2	2.0% 6	1.2% 4	1.8% 7	2.2% 9	2.6% 10	1.8% 8	2.9% 12	3.5% 14
	Chicken Breasts							0.0% 0	0.0% 0	4.1% 2	0.0% 0	0.0% 0	0.0% 0
	Ground Turkey							0.0% 0	50.0% 1	0.0% 0	0.0% 0		0.0% 0
	Ground Beef							0.0% 0	0.0% 0			0.0% 0	0.0% 0
	Pork Chops							0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
	Chickens		0.0% 0	0.0% 0	0.6% 1	0.7% 1	0.0% 0	2.0% 3	0.6% 1	0.0% 0	1.1% 2	0.0% 0	0.0% 0
	Turkeys		27.3% 3	0.0% 0	45.9% 17	33.3% 6	53.3% 8	11.1% 1	16.7% 1	14.3% 2	0.0% 0	0.0% 0	16.7% 1
	Cattle		0.0% 0	3.0% 1	6.3% 12	11.8% 22	10.3% 9	11.2% 11	12.8% 10	20.8% 10	26.5% 9	22.7% 5	26.9% 7
	Swine		0.0% 0	0.0% 0	1.8% 2	0.0% 0	0.0% 0	4.2% 2	0.0% 0	0.0% 0	2.4% 1	0.0% 0	2.3% 1
8. At Least Ceftiofur and Nalidixic Acid Resistant	Humans	0.0% 0	0.3% 1	0.0% 0	0.0% 0	0.3% 1	0.3% 1	0.5% 2	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.2% 1
	Chicken Breasts							0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
	Ground Turkey							0.0% 0	50.0% 1	0.0% 0	0.0% 0		0.0% 0
	Ground Beef							0.0% 0	0.0% 0			0.0% 0	0.0% 0
	Pork Chops							0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
	Chickens		0.0% 0	0.0% 0	0.6% 1	0.7% 1	0.0% 0	2.7% 4	0.0% 0	0.0% 0	0.5% 1	0.0% 0	0.0% 0
	Turkeys		18.2% 2	0.0% 0	48.6% 18	33.3% 6	53.3% 8	22.2% 2	16.7% 1	14.3% 2	0.0% 0	0.0% 0	16.7% 1
	Cattle		0.0% 0	0.0% 0	0.5% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	4.2% 2	0.0% 0	0.0% 0	0.0% 0
	Swine		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	2.1% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0

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

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

[3] ACSSuTAuCf = ACSSuT, amoxicillin-clavulanic acid, and ceftiofur

F. Antimicrobial Susceptibility among *Salmonella* Enteritidis

Table 24a. Antimicrobial Resistance among *Salmonella* Enteritidis Isolates from Humans, Retail Meats, and Food Animals, by Year, 1996-2007

Year			1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Number of Isolates Tested		Humans	351	301	244	269	319	277	337	257	271	384	413	385
		Chicken Breasts							4	3	3	12	17	13
		Ground Turkey							5	1	0	0	0	0
		Ground Beef							1	1	0	0	0	0
		Pork Chops							0	0	0	0	0	0
		Chickens		1	13	41	31	21	48	42	84	173	188	124
		Turkeys		0	0	1	1	0	0	0	0	0	3	0
		Cattle		1	1	8	4	4	6	3	2	2	2	4
		Swine		0	0	2	1	1	1	1	1	0	0	1
Antimicrobial Class	**Antimicrobial (Resistance Breakpoint)**	**Isolate Source**												
Aminoglycosides	Amikacin (MIC ≥ 64 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
		Chicken Breasts							0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Ground Turkey							0.0% 0	0.0% 0				
		Ground Beef							0.0% 0	0.0% 0				
		Pork Chops												
		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
		Turkeys				0.0% 0	0.0% 0						0.0% 0	
		Cattle		0.0% 0	0.0% 0	0.0% 0	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				0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0			0.0% 0
	Gentamicin (MIC ≥ 16 µg/ml)	Humans	4.8% 17	0.3% 1	0.4% 1	0.0% 0	0.3% 1	0.0% 0	0.3% 1	0.4% 1	0.4% 1	0.8% 3	0.2% 1	0.0% 0
		Chicken Breasts							0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Ground Turkey							0.0% 0	0.0% 0				
		Ground Beef							0.0% 0	0.0% 0				
		Pork Chops												
		Chickens		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	1.2% 1	0.0% 0	0.0% 0	0.0% 0
		Turkeys				0.0% 0	0.0% 0						0.0% 0	
		Cattle		0.0% 0	0.0% 0	0.0% 0	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				0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0			0.0% 0
	Kanamycin (MIC ≥ 64 µg/ml)	Humans	0.0% 0	0.7% 2	0.4% 1	0.4% 1	0.3% 1	0.7% 2	0.3% 1	0.0% 0	0.7% 2	0.3% 1	0.2% 1	0.5% 2
		Chicken Breasts							0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Ground Turkey							0.0% 0	0.0% 0				
		Ground Beef							0.0% 0	0.0% 0				
		Pork Chops												
		Chickens		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	2.1% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Turkeys				0.0% 0	0.0% 0						0.0% 0	
		Cattle		0.0% 0	0.0% 0	12.5% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	50.0% 1	0.0% 0
		Swine				0.0% 0	0.0% 0	100.0% 1	0.0% 0	0.0% 0	0.0% 0			0.0% 0
	Streptomycin (MIC ≥ 64 µg/ml)	Humans	2.0% 7	4.3% 13	1.6% 4	2.2% 6	0.0% 0	1.4% 4	1.5% 5	1.2% 3	2.2% 6	1.0% 4	1.2% 5	0.5% 2
		Chicken Breasts							0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Ground Turkey							0.0% 0	0.0% 0				
		Ground Beef							0.0% 0	0.0% 0				
		Pork Chops												
		Chickens		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	2.1% 1	0.0% 0	1.2% 1	0.6% 1	0.0% 0	0.8% 1
		Turkeys				0.0% 0	0.0% 0						0.0% 0	
		Cattle		0.0% 0	0.0% 0	12.5% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	50.0% 1	0.0% 0
		Swine				0.0% 0	0.0% 0	100.0% 1	0.0% 0	0.0% 0	0.0% 0			0.0% 0

Table 24b. Antimicrobial Resistance among *Salmonella* Enteritidis Isolates from Humans, Retail Meats, and Food Animals, by Year, 1996-2007

Year			1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Number of Isolates Tested		Humans	351	301	244	269	319	277	337	257	271	384	413	385
		Chicken Breasts							4	3	3	12	17	13
		Ground Turkey							5	1	0	0	0	0
		Ground Beef							1	1	0	0	0	0
		Pork Chops							0	0	0	0	0	0
		Chickens		1	13	41	31	21	48	42	84	173	188	124
		Turkeys		0	0	1	1	0	0	0	0	0	3	0
		Cattle		1	1	8	4	4	6	3	2	2	2	4
		Swine		0	0	2	1	1	1	1	1	0	0	1
Antimicrobial Class	**Antimicrobial (Resistance Breakpoint)**	**Isolate Source**												
β-Lactam/β-Lactamase Inhibitor Combinations	Amoxicillin-Clavulanic Acid (MIC ≥ 32 / 16 µg/ml)	Humans	0.6% 2	0.0% 0	0.0% 0	0.4% 1	0.0% 0	1.4% 4	0.6% 2	0.0% 0	0.0% 0	0.8% 3	0.5% 2	0.5% 2
		Chicken Breasts							0.0% 0	33.3% 1	33.3% 1	0.0% 0	0.0% 0	0.0% 0
		Ground Turkey							0.0% 0	0.0% 0				
		Ground Beef							0.0% 0	0.0% 0				
		Pork Chops												
		Chickens		0.0% 0	0.0% 0	2.4% 1	3.2% 1	0.0% 0	4.2% 2	0.0% 0	1.2% 1	0.6% 1	0.0% 0	0.0% 0
		Turkeys				0.0% 0	0.0% 0						0.0% 0	
		Cattle		0.0% 0	0.0% 0	0.0% 0	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				0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0			0.0% 0
Cephems	Cefoxitin (MIC ≥ 32 µg/ml)	Humans					0.0% 0	0.4% 1	0.0% 0	0.0% 0	0.0% 0	1.0% 4	0.5% 2	0.3% 1
		Chicken Breasts							0.0% 0	33.3% 1	33.3% 1	0.0% 0	0.0% 0	0.0% 0
		Ground Turkey							0.0% 0	0.0% 0				
		Ground Beef							0.0% 0	0.0% 0				
		Pork Chops												
		Chickens					0.0% 0	0.0% 0	2.1% 1	0.0% 0	1.2% 1	0.6% 1	0.0% 0	0.0% 0
		Turkeys					0.0% 0						0.0% 0	
		Cattle					0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	50.0% 1	0.0% 0
		Swine					0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0			0.0% 0
	Ceftiofur (MIC ≥ 8 µg/ml)	Humans	0.0% 0	0.3% 1	0.0% 0	0.4% 1	0.0% 0	2.2% 6	0.0% 0	0.0% 0	0.0% 0	0.5% 2	0.5% 2	0.3% 1
		Chicken Breasts							0.0% 0	33.3% 1	33.3% 1	0.0% 0	0.0% 0	0.0% 0
		Ground Turkey							0.0% 0	0.0% 0				
		Ground Beef							0.0% 0	0.0% 0				
		Pork Chops												
		Chickens		0.0% 0	0.0% 0	4.9% 2	3.2% 1	0.0% 0	4.2% 2	0.0% 0	1.2% 1	1.2% 2	0.0% 0	0.0% 0
		Turkeys				0.0% 0	0.0% 0						0.0% 0	
		Cattle		0.0% 0	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% 1	0.0% 0
		Swine				0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0			0.0% 0
	Ceftriaxone (MIC ≥ 64 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
		Chicken Breasts							0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Ground Turkey							0.0% 0	0.0% 0				
		Ground Beef							0.0% 0	0.0% 0				
		Pork Chops												
		Chickens		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	2.1% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Turkeys				0.0% 0	0.0% 0						0.0% 0	
		Cattle		0.0% 0	0.0% 0	0.0% 0	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				0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0			0.0% 0

Table 24c. Antimicrobial Resistance among *Salmonella* Enteritidis Isolates from Humans, Retail Meats, and Food Animals, by Year, 1996-2007

Year			1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Number of Isolates Tested		Humans	351	301	244	269	319	277	337	257	271	384	413	385
		Chicken Breasts							4	3	3	12	17	13
		Ground Turkey							5	1	0	0	0	0
		Ground Beef							1	1	0	0	0	0
		Pork Chops							0	0	0	0	0	0
		Chickens		1	13	41	31	21	48	42	84	173	188	124
		Turkeys		0	0	1	1	0	0	0	0	0	3	0
		Cattle		1	1	8	4	4	6	3	2	2	2	4
		Swine		0	0	2	1	1	1	1	1	0	0	1
Antimicrobial Class	**Antimicrobial (Resistance Breakpoint)**	**Isolate Source**												
Folate Pathway Inhibitors	Sulfamethoxazole/ Sulfisoxazole[1] (MIC ≥ 512 µg/ml)	Humans	8.5% 30	9.0% 27	2.0% 5	3.0% 8	0.9% 3	2.2% 6	1.5% 5	1.2% 3	1.8% 5	1.6% 6	1.5% 6	1.6% 6
		Chicken Breasts							0.0% 0	0.0% 0	33.3% 1	0.0% 0	0.0% 0	0.0% 0
		Ground Turkey							0.0% 0	0.0% 0				
		Ground Beef							0.0% 0	0.0% 0				
		Pork Chops												
		Chickens		0.0% 0	0.0% 0	4.9% 2	3.2% 1	0.0% 0	4.2% 2	2.4% 1	1.2% 1	0.0% 0	0.0% 0	0.8% 1
		Turkeys				0.0% 0	0.0% 0						0.0% 0	
		Cattle		0.0% 0	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% 1	0.0% 0
		Swine				0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0			0.0% 0
	Trimethoprim-Sulfamethoxazole (MIC ≥ 4 / 76 µg/ml)	Humans	6.6% 23	1.3% 4	0.8% 2	0.7% 2	0.0% 0	0.7% 2	0.6% 2	0.8% 2	0.0% 0	0.5% 2	0.5% 2	1.0% 4
		Chicken Breasts							0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Ground Turkey							0.0% 0	0.0% 0				
		Ground Beef							0.0% 0	0.0% 0				
		Pork Chops												
		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
		Turkeys				0.0% 0	0.0% 0						0.0% 0	
		Cattle		0.0% 0	0.0% 0	0.0% 0	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				0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0			0.0% 0
Penicillins	Ampicillin (MIC ≥ 32 µg/ml)	Humans	20.5% 72	11.3% 34	6.1% 15	10.8% 29	7.5% 24	8.7% 24	6.8% 23	2.3% 6	4.1% 11	2.9% 11	4.4% 18	2.1% 8
		Chicken Breasts							0.0% 0	66.7% 2	33.3% 1	0.0% 0	17.6% 3	0.0% 0
		Ground Turkey							0.0% 0	0.0% 0				
		Ground Beef							0.0% 0	0.0% 0				
		Pork Chops												
		Chickens		100.0% 1	30.8% 4	12.2% 5	9.7% 3	0.0% 0	4.2% 2	0.0% 0	1.2% 1	1.2% 2	1.6% 3	1.6% 2
		Turkeys				0.0% 0	0.0% 0						0.0% 0	
		Cattle		0.0% 0	100.0% 1	12.5% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	50.0% 1	0.0% 0
		Swine				0.0% 0	0.0% 0	100.0% 1	0.0% 0	0.0% 0	0.0% 0			0.0% 0
Phenicols	Chloramphenicol (MIC ≥ 32 µg/ml)	Humans	0.0% 0	0.7% 2	0.0% 0	0.4% 1	0.0% 0	0.0% 0	0.3% 1	0.4% 1	0.4% 1	0.5% 2	0.0% 0	0.5% 2
		Chicken Breasts							0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Ground Turkey							0.0% 0	0.0% 0				
		Ground Beef							0.0% 0	0.0% 0				
		Pork Chops												
		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	0.6% 1	0.0% 0	0.0% 0
		Turkeys				0.0% 0	0.0% 0						0.0% 0	
		Cattle		0.0% 0	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% 1	0.0% 0
		Swine				0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0			0.0% 0

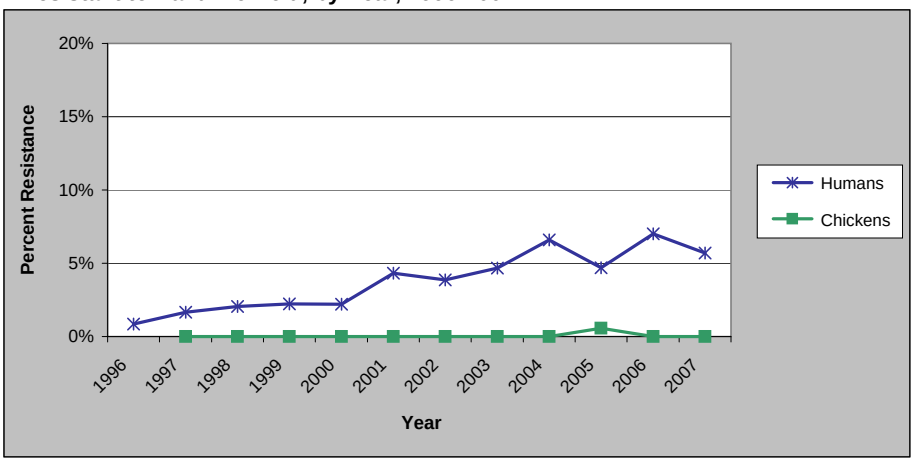
[1] Sulfamethoxazole was tested from 1996-2003 and was replaced by sulfisoxazole in 2004

Table 24d. Antimicrobial Resistance among *Salmonella* Enteritidis Isolates from Humans, Retail Meats, and Food Animals, by Year, 1996-2007

Year			1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Number of Isolates Tested		Humans	351	301	244	269	319	277	337	257	271	384	413	385
		Chicken Breasts							4	3	3	12	17	13
		Ground Turkey							5	1	0	0	0	0
		Ground Beef							1	1	0	0	0	0
		Pork Chops							0	0	0	0	0	0
		Chickens		1	13	41	31	21	48	42	84	173	188	124
		Turkeys		0	0	1	1	0	0	0	0	0	3	0
		Cattle		1	1	8	4	4	6	3	2	2	2	4
		Swine		0	0	2	1	1	1	1	1	0	0	1
Antimicrobial Class	**Antimicrobial (Resistance Breakpoint)**	**Isolate Source**												
Quinolones	Ciprofloxacin (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
		Chicken Breasts							0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Ground Turkey							0.0% 0	0.0% 0				
		Ground Beef							0.0% 0	0.0% 0				
		Pork Chops												
		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
		Turkeys				0.0% 0	0.0% 0						0.0% 0	
		Cattle		0.0% 0	0.0% 0	0.0% 0	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				0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0			0.0% 0
	Nalidixic Acid (MIC ≥ 32 µg/ml)	Humans	0.9% 3	1.7% 5	2.0% 5	2.2% 6	2.2% 7	4.3% 12	3.9% 13	4.7% 12	6.6% 18	4.7% 18	7.0% 29	5.7% 22
		Chicken Breasts							0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Ground Turkey							0.0% 0	0.0% 0				
		Ground Beef							0.0% 0	0.0% 0				
		Pork Chops												
		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	0.6% 1	0.0% 0	0.0% 0
		Turkeys				0.0% 0	0.0% 0						0.0% 0	
		Cattle		0.0% 0	0.0% 0	0.0% 0	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				0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0			0.0% 0
Tetracyclines	Tetracycline (MIC ≥ 16 µg/ml)	Humans	16.8% 59	9.6% 29	6.6% 16	8.2% 22	1.9% 6	1.8% 5	4.2% 14	1.6% 4	3.3% 9	2.3% 9	1.7% 7	3.9% 15
		Chicken Breasts							0.0% 0	0.0% 0	33.3% 1	0.0% 0	11.8% 2	0.0% 0
		Ground Turkey							0.0% 0	0.0% 0				
		Ground Beef							0.0% 0	0.0% 0				
		Pork Chops												
		Chickens		0.0% 0	0.0% 0	7.3% 3	0.0% 0	0.0% 0	2.1% 1	2.4% 1	2.4% 2	0.6% 1	1.6% 3	2.4% 3
		Turkeys				0.0% 0	0.0% 0						0.0% 0	
		Cattle		0.0% 0	100.0% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	50.0% 1	25.0% 1
		Swine				0.0% 0	0.0% 0	100.0% 1	0.0% 0	0.0% 0	0.0% 0			0.0% 0

Nalidixic Acid Resistance

Figure 13. Percent of *Salmonella* Enteritidis Isolates from Humans and Chickens Resistant to Nalidixic Acid, by Year, 1996-2007[1]



[1] Data for other sources are not included due to the small number of *Salmonella* Enteritidis isolates from these sources. Table 24 contains resistance data for *Salmonella* Enteritidis isolates from each source, by year

Table 25. Number of *Salmonella* Enteritidis Isolates Tested from Humans, Retail Meats, and Food Animals, by Year, 1996-2007

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Humans	351	301	244	269	319	277	337	257	271	384	413	385
Chicken Breasts							4	3	3	12	17	13
Ground Turkey							5	1	0	0	0	0
Ground Beef							1	1	0	0	0	0
Pork Chops							0	0	0	0	0	0
Chickens		1	13	41	31	21	48	42	84	173	188	124
Turkeys		0	0	1	1	0	0	0	0	0	3	0
Cattle		1	1	8	4	4	6	3	2	2	2	4
Swine		0	0	2	1	1	1	1	1	0	0	1

Table 26a. Resistance Patterns among *Salmonella* Enteritidis Isolates from Humans, Retail Meats, and Food Animals, by Year, 1996-2007

Year		1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Number of Isolates Tested	Humans	351	301	244	269	319	277	337	257	271	384	413	385
	Chicken Breasts							4	3	3	12	17	13
	Ground Turkey							5	1	0	0	0	0
	Ground Beef							1	1	0	0	0	0
	Pork Chops							0	0	0	0	0	0
	Chickens		1	13	41	31	21	48	42	84	173	188	124
	Turkeys		0	0	1	1	0	0	0	0	0	3	0
	Cattle		1	1	8	4	4	6	3	2	2	2	4
	Swine		0	0	2	1	1	1	1	1	0	0	1
Resistance Pattern	**Isolate Source**												
1. No Resistance Detected	Humans	73.5% 258	77.4% 233	87.7% 214	83.6% 225	89.0% 284	86.6% 240	87.5% 295	91.8% 236	87.1% 236	91.4% 351	88.6% 366	90.4% 348
	Chicken Breasts							100.0% 4	33.3% 1	66.7% 2	100.0% 12	82.4% 14	100.0% 13
	Ground Turkey							100.0% 5	100.0% 1				
	Ground Beef							100.0% 1	100.0% 1				
	Pork Chops												
	Chickens		0.0% 0	69.2% 9	82.9% 34	90.3% 28	100.0% 21	95.8% 46	97.6% 41	97.6% 82	97.1% 168	97.9% 184	96.0% 119
	Turkeys				100.0% 1	100.0% 1						100.0% 3	
	Cattle		100.0% 1	0.0% 0	87.5% 7	100.0% 4	100.0% 4	100.0% 6	100.0% 3	100.0% 2	100.0% 2	50.0% 1	75.0% 3
	Swine		0.0% 0	0.0% 0	100.0% 2	100.0% 1	0.0% 0	100.0% 1	100.0% 1	100.0% 1			100.0% 1
2. Resistant to ≥ 3 Antimicrobial Classes	Humans	6.8% 24	2.7% 8	0.4% 1	1.1% 3	0.3% 1	2.9% 8	2.1% 7	0.4% 1	1.1% 3	1.6% 6	1.7% 7	1.0% 4
	Chicken Breasts							0.0% 0	33.3% 1	33.3% 1	0.0% 0	0.0% 0	0.0% 0
	Ground Turkey							0.0% 0	0.0% 0				
	Ground Beef							0.0% 0	0.0% 0				
	Pork Chops												
	Chickens		0.0% 0	0.0% 0	2.4% 1	3.2% 1	0.0% 0	0.0% 0	0.0% 0	1.2% 1	0.6% 1	0.0% 0	0.0% 0
	Turkeys				0.0% 0	0.0% 0						0.0% 0	
	Cattle		0.0% 0	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% 1	0.0% 0
	Swine		0.0% 0	0.0% 0	0.0% 0	0.0% 0	100.0% 1	0.0% 0	0.0% 0	0.0% 0			0.0% 0
3. Resistant to ≥ 4 Antimicrobial Classes	Humans	2.3% 8	1.0% 3	0.0% 0	0.4% 1	0.0% 0	1.1% 3	0.6% 2	0.4% 1	0.7% 2	1.0% 4	0.7% 3	0.3% 1
	Chicken Breasts							0.0% 0	0.0% 0	33.3% 1	0.0% 0	0.0% 0	0.0% 0
	Ground Turkey							0.0% 0	0.0% 0				
	Ground Beef							0.0% 0	0.0% 0				
	Pork Chops												
	Chickens		0.0% 0	0.0% 0	2.4% 1	3.2% 1	0.0% 0	2.1% 1	0.0% 0	2.4% 2	0.0% 0	0.0% 0	0.0% 0
	Turkeys				0.0% 0	0.0% 0						0.0% 0	
	Cattle		0.0% 0	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% 1	0.0% 0
	Swine		0.0% 0	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. Resistant to ≥ 5 Antimicrobial Classes	Humans	0.0% 0	0.7% 2	0.0% 0	0.4% 1	0.0% 0	0.4% 1	0.0% 0	0.4% 1	0.7% 2	0.5% 2	0.2% 1	0.3% 1
	Chicken Breasts							0.0% 0	0.0% 0	33.3% 1	0.0% 0	0.0% 0	0.0% 0
	Ground Turkey							0.0% 0	0.0% 0				
	Ground Beef							0.0% 0	0.0% 0				
	Pork Chops												
	Chickens		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	4.2% 2	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
	Turkeys				0.0% 0	0.0% 0						0.0% 0	
	Cattle		0.0% 0	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% 1	0.0% 0
	Swine		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0			0.0% 0

Table 26b. Resistance Patterns among *Salmonella* Enteritidis Isolates from Humans, Retail Meats, and Food Animals, by Year, 1996-2007

Year		1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Number of Isolates Tested	Humans	351	301	244	269	319	277	337	257	271	384	413	385
	Chicken Breasts							4	3	3	12	17	13
	Ground Turkey							5	1	0	0	0	0
	Ground Beef							1	1	0	0	0	0
	Pork Chops							0	0	0	0	0	0
	Chickens		1	13	41	31	21	48	42	84	173	188	124
	Turkeys		0	0	1	1	0	0	0	0	0	3	0
	Cattle		1	1	8	4	4	6	3	2	2	2	4
	Swine		0	0	2	1	1	1	1	1	0	0	1
Resistance Pattern	**Isolate Source**												
5. At Least ACSSuT[1] Resistant	Humans	0.0% 0	0.3% 1	0.0% 0	0.4% 1	0.0% 0	0.0% 0	0.0% 0	0.4% 1	0.4% 1	0.5% 2	0.0% 0	0.3% 1
	Chicken Breasts							0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
	Ground Turkey							0.0% 0	0.0% 0				
	Ground Beef							0.0% 0	0.0% 0				
	Pork Chops												
	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
	Turkeys				0.0% 0	0.0% 0						0.0% 0	
	Cattle		0.0% 0	0.0% 0	0.0% 0	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		0.0% 0	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. At Least ACT/S[2] Resistant	Humans	0.0% 0	0.3% 1	0.0% 0	0.4% 1	0.0% 0	0.0% 0	0.0% 0	0.4% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0
	Chicken Breasts							0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
	Ground Turkey							0.0% 0	0.0% 0				
	Ground Beef							0.0% 0	0.0% 0				
	Pork Chops												
	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
	Turkeys				0.0% 0	0.0% 0						0.0% 0	
	Cattle		0.0% 0	0.0% 0	0.0% 0	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		0.0% 0	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. At Least ACSSuTAuCf[3] Resistant	Humans	0.0% 0	0.0% 0	0.0% 0	0.4% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.3% 1	0.0% 0	0.3% 1
	Chicken Breasts							0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
	Ground Turkey							0.0% 0	0.0% 0				
	Ground Beef							0.0% 0	0.0% 0				
	Pork Chops												
	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
	Turkeys				0.0% 0	0.0% 0						0.0% 0	
	Cattle		0.0% 0	0.0% 0	0.0% 0	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		0.0% 0	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. At Least Ceftiofur and Nalidixic Acid Resistant	Humans	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	0.3% 1	0.0% 0	0.3% 1
	Chicken Breasts							0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
	Ground Turkey							0.0% 0	0.0% 0				
	Ground Beef							0.0% 0	0.0% 0				
	Pork Chops												
	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
	Turkeys				0.0% 0	0.0% 0						0.0% 0	
	Cattle		0.0% 0	0.0% 0	0.0% 0	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		0.0% 0	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] ACSSuT = ampicillin, chloramphenicol, streptomycin, sulfamethoxazole/sulfisoxazole, and tetracycline

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

[3] ACSSuTAuCf = ACSSuT, amoxicillin-clavulanic acid, and ceftiofur

G. Antimicrobial Susceptibility among *Salmonella* Newport

Table 27a. Antimicrobial Resistance among *Salmonella* Newport Isolates from Humans, Retail Meats, and Food Animals, by Year, 1996-2007

Year			1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Number of Isolates Tested		Humans	51	46	77	99	121	124	241	223	191	207	217	220
		Chicken Breasts							0	0	0	0	0	0
		Ground Turkey							3	2	2	3	0	0
		Ground Beef							3	1	2	0	0	0
		Pork Chops							2	1	0	0	0	0
		Chickens		0	1	7	5	8	6	7	0	6	0	3
		Turkeys		0	1	4	6	16	10	19	7	5	4	15
		Cattle		0	8	54	109	87	113	75	44	27	30	30
		Swine		0	1	5	2	7	0	3	0	1	1	1
Antimicrobial Class	**Antimicrobial (Resistance Breakpoint)**	**Isolate Source**												
Aminoglycosides	Amikacin (MIC ≥ 64)	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
		Chicken Breasts												
		Ground Turkey							0.0% 0	0.0% 0	0.0% 0	0.0% 0		
		Ground Beef							0.0% 0	0.0% 0	0.0% 0			
		Pork Chops							0.0% 0	0.0% 0				
		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
		Turkeys			0.0% 0	0.0% 0	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			0.0% 0	0.0% 0	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			0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0		0.0% 0	0.0% 0	0.0% 0
	Gentamicin (MIC ≥ 16)	Humans	5.9% 3	4.3% 2	0.0% 0	0.0% 0	2.5% 3	3.2% 4	3.3% 8	3.1% 7	0.5% 1	1.0% 2	0.9% 2	0.9% 2
		Chicken Breasts												
		Ground Turkey							0.0% 0	50.0% 1	0.0% 0	0.0% 0		
		Ground Beef							0.0% 0	0.0% 0	0.0% 0			
		Pork Chops							0.0% 0	0.0% 0				
		Chickens			100.0% 1	0.0% 0	20.0% 1	0.0% 0	0.0% 0	0.0% 0		16.7% 1		0.0% 0
		Turkeys			0.0% 0	0.0% 0	16.7% 1	6.3% 1	0.0% 0	52.6% 10	14.3% 1	80.0% 4	50.0% 2	0.0% 0
		Cattle			0.0% 0	1.9% 1	11.0% 12	6.9% 6	7.1% 8	1.3% 1	0.0% 0	0.0% 0	3.3% 1	0.0% 0
		Swine			0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0		0.0% 0	0.0% 0	0.0% 0
	Kanamycin (MIC ≥ 64)	Humans	2.0% 1	0.0% 0	1.3% 1	1.0% 1	5.0% 6	7.3% 9	10.0% 24	4.5% 10	2.6% 5	1.9% 4	2.3% 5	0.9% 2
		Chicken Breasts												
		Ground Turkey							0.0% 0	0.0% 0	0.0% 0	0.0% 0		
		Ground Beef							0.0% 0	0.0% 0	0.0% 0			
		Pork Chops							0.0% 0	0.0% 0				
		Chickens			0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		33.3% 2		0.0% 0
		Turkeys			0.0% 0	0.0% 0	0.0% 0	0.0% 0	10.0% 1	21.1% 4	14.3% 1	80.0% 4	50.0% 2	6.7% 1
		Cattle			0.0% 0	0.0% 0	9.2% 10	6.9% 6	15.9% 18	17.3% 13	25.0% 11	14.8% 4	13.3% 4	10.0% 3
		Swine			0.0% 0	0.0% 0	0.0% 0	57.1% 4		0.0% 0		0.0% 0	0.0% 0	0.0% 0
	Streptomycin (MIC ≥ 64)	Humans	7.8% 4	4.3% 2	2.6% 2	19.2% 19	24.0% 29	31.5% 39	25.3% 61	24.2% 54	15.7% 30	14.0% 29	13.8% 30	10.0% 22
		Chicken Breasts												
		Ground Turkey							33.3% 1	50.0% 1	0.0% 0	0.0% 0		
		Ground Beef							66.7% 2	100.0% 1	100.0% 2			
		Pork Chops							100.0% 2	100.0% 1				
		Chickens			100.0% 1	0.0% 0	20.0% 1	37.5% 3	0.0% 0	85.7% 6		50.0% 3		0.0% 0
		Turkeys			0.0% 0	0.0% 0	16.7% 1	12.5% 2	0.0% 0	31.6% 6	14.3% 1	80.0% 4	0.0% 0	6.7% 1
		Cattle			12.5% 1	37.0% 20	79.8% 87	73.6% 64	80.5% 91	84.0% 63	84.1% 37	81.5% 22	83.3% 25	83.3% 25
		Swine			0.0% 0	0.0% 0	50.0% 1	85.7% 6		100.0% 3		0.0% 0	0.0% 0	0.0% 0

Table 27b. Antimicrobial Resistance among *Salmonella* Newport Isolates from Humans, Retail Meats, and Food Animals, by Year, 1996-2007

Year			1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Number of Isolates Tested		Humans	51	46	77	99	121	124	241	223	191	207	217	220
		Chicken Breasts							0	0	0	0	0	0
		Ground Turkey							3	2	2	3	0	0
		Ground Beef							3	1	2	0	0	0
		Pork Chops							2	1	0	0	0	0
		Chickens		0	1	7	5	8	6	7	0	6	0	3
		Turkeys		0	1	4	6	16	10	19	7	5	4	15
		Cattle		0	8	54	109	87	113	75	44	27	30	30
		Swine		0	1	5	2	7	0	3	0	1	1	1
Antimicrobial Class	**Antimicrobial (Resistance Breakpoint)**	**Isolate Source**												
β-Lactam/β-Lactamase Inhibitor Combinations	Amoxicillin-Clavulanic Acid (MIC ≥ 32 / 16 µg/ml)	Humans	2.0% 1	0.0% 0	2.6% 2	18.2% 18	22.3% 27	26.6% 33	22.8% 55	21.5% 48	15.2% 29	12.6% 26	12.4% 27	7.7% 17
		Chicken Breasts												
		Ground Turkey							33.3% 1	0.0% 0	0.0% 0	0.0% 0		
		Ground Beef							66.7% 2	100.0% 1	100.0% 2			
		Pork Chops							100.0% 2	100.0% 1				
		Chickens			0.0% 0	0.0% 0	0.0% 0	37.5% 3	0.0% 0	85.7% 6		50.0% 3		0.0% 0
		Turkeys			0.0% 0	0.0% 0	0.0% 0	12.5% 2	0.0% 0	10.5% 2	14.3% 1	0.0% 0	25.0% 1	6.7% 1
		Cattle			12.5% 1	37.0% 20	76.1% 83	69.0% 60	78.8% 89	81.3% 61	77.3% 34	81.5% 22	76.7% 23	76.7% 23
		Swine			0.0% 0	0.0% 0	0.0% 0	85.7% 6		100.0% 3		0.0% 0	0.0% 0	0.0% 0
Cephems	Cefoxitin (MIC ≥ 32 µg/ml)	Humans					22.3% 27	25.8% 32	22.4% 54	21.5% 48	15.2% 29	12.6% 26	12.9% 28	7.7% 17
		Chicken Breasts												
		Ground Turkey							33.3% 1	0.0% 0	0.0% 0	0.0% 0		
		Ground Beef							66.7% 2	100.0% 1	100.0% 2			
		Pork Chops							100.0% 2	100.0% 1				
		Chickens					0.0% 0	37.5% 3	0.0% 0	71.4% 5		50.0% 3		0.0% 0
		Turkeys					0.0% 0	12.5% 2	0.0% 0	10.5% 2	14.3% 1	0.0% 0	25.0% 1	6.7% 1
		Cattle					73.4% 80	66.7% 58	77.9% 88	74.7% 56	77.3% 34	81.5% 22	70.0% 21	76.7% 23
		Swine					0.0% 0	85.7% 6		100.0% 3		0.0% 0	0.0% 0	0.0% 0
	Ceftiofur (MIC ≥ 8 µg/ml)	Humans	0.0% 0	0.0% 0	1.3% 1	18.2% 18	22.3% 27	27.4% 34	22.8% 55	22.0% 49	15.2% 29	12.6% 26	12.4% 27	7.7% 17
		Chicken Breasts												
		Ground Turkey							33.3% 1	0.0% 0	0.0% 0	0.0% 0		
		Ground Beef							66.7% 2	100.0% 1	100.0% 2			
		Pork Chops							100.0% 2	100.0% 1				
		Chickens			0.0% 0	0.0% 0	0.0% 0	37.5% 3	0.0% 0	85.7% 6		50.0% 3		0.0% 0
		Turkeys			0.0% 0	0.0% 0	0.0% 0	12.5% 2	0.0% 0	10.5% 2	14.3% 1	0.0% 0	25.0% 1	6.7% 1
		Cattle			12.5% 1	37.0% 20	76.1% 83	69.0% 60	78.8% 89	81.3% 61	77.3% 34	81.5% 22	76.7% 23	76.7% 23
		Swine			0.0% 0	0.0% 0	0.0% 0	85.7% 6		100.0% 3		0.0% 0	0.0% 0	0.0% 0
	Ceftriaxone (MIC ≥ 64 µg/ml)	Humans	0.0% 0	0.0% 0	0.0% 0	3.0% 3	0.0% 0	0.0% 0	0.8% 2	1.8% 4	2.6% 5	1.4% 3	0.5% 1	0.9% 2
		Chicken Breasts												
		Ground Turkey							0.0% 0	0.0% 0	0.0% 0	0.0% 0		
		Ground Beef							0.0% 0	0.0% 0	50.0% 1			
		Pork Chops							0.0% 0	0.0% 0				
		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
		Turkeys			0.0% 0	0.0% 0	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			0.0% 0	0.0% 0	0.9% 1	1.1% 1	0.9% 1	1.3% 1	11.4% 5	14.8% 4	3.3% 1	6.7% 2
		Swine			0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0		0.0% 0	0.0% 0	0.0% 0

Table 27c. Antimicrobial Resistance among *Salmonella* Newport Isolates from Humans, Retail Meats, and Food Animals, by Year, 1996-2007

Year			1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Number of Isolates Tested		Humans	51	46	77	99	121	124	241	223	191	207	217	220
		Chicken Breasts							0	0	0	0	0	0
		Ground Turkey							3	2	2	3	0	0
		Ground Beef							3	1	2	0	0	0
		Pork Chops							2	1	0	0	0	0
		Chickens		0	1	7	5	8	6	7	0	6	0	3
		Turkeys		0	1	4	6	16	10	19	7	5	4	15
		Cattle		0	8	54	109	87	113	75	44	27	30	30
		Swine		0	1	5	2	7	0	3	0	1	1	1
Antimicrobial Class	**Antimicrobial (Resistance Breakpoint)**	**Isolate Source**												
Folate Pathway Inhibitors	Sulfamethoxazole/ Sulfisoxazole[1] (MIC ≥ 512 µg/ml)	Humans	11.8% 6	4.3% 2	3.9% 3	22.2% 22	23.1% 28	32.3% 40	25.7% 62	24.7% 55	16.8% 32	15.5% 32	15.2% 33	10.0% 22
		Chicken Breasts												
		Ground Turkey							33.3% 1	50.0% 1	0.0% 0	0.0% 0		
		Ground Beef							66.7% 2	100.0% 1	100.0% 2			
		Pork Chops							100.0% 2	100.0% 1				
		Chickens			100.0% 1	0.0% 0	0.0% 0	37.5% 3	0.0% 0	71.4% 5		50.0% 3		0.0% 0
		Turkeys			0.0% 0	0.0% 0	16.7% 1	12.5% 2	0.0% 0	52.6% 10	14.3% 1	80.0% 4	75.0% 3	0.0% 0
		Cattle			12.5% 1	35.2% 19	73.4% 80	72.4% 63	74.3% 84	73.3% 55	77.3% 34	85.2% 23	83.3% 25	83.3% 25
		Swine			0.0% 0	0.0% 0	50.0% 1	85.7% 6		100.0% 3		0.0% 0	0.0% 0	0.0% 0
	Trimethoprim-Sulfamethoxazole (MIC ≥ 4 / 76 µg/ml)	Humans	3.9% 2	4.3% 2	1.3% 1	2.0% 2	4.1% 5	1.6% 2	4.1% 10	0.9% 2	2.1% 4	1.9% 4	3.2% 7	1.8% 4
		Chicken Breasts												
		Ground Turkey							33.3% 1	0.0% 0	0.0% 0	0.0% 0		
		Ground Beef							0.0% 0	0.0% 0	50.0% 1			
		Pork Chops							100.0% 2	0.0% 0				
		Chickens			0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		16.7% 1		0.0% 0
		Turkeys			0.0% 0	0.0% 0	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			0.0% 0	1.9% 1	14.7% 16	12.6% 11	7.1% 8	0.0% 0	11.4% 5	25.9% 7	16.7% 5	13.3% 4
		Swine			0.0% 0	0.0% 0	0.0% 0	0.0% 0		33.3% 1		0.0% 0	0.0% 0	0.0% 0
Penicillins	Ampicillin (MIC ≥ 32 µg/ml)	Humans	5.9% 3	6.5% 3	2.6% 2	18.2% 18	23.1% 28	29.8% 37	24.9% 60	22.9% 51	15.7% 30	14.0% 29	15.2% 33	9.5% 21
		Chicken Breasts												
		Ground Turkey							33.3% 1	0.0% 0	0.0% 0	0.0% 0		
		Ground Beef							66.7% 2	100.0% 1	100.0% 2			
		Pork Chops							100.0% 2	100.0% 1				
		Chickens			100.0% 1	0.0% 0	0.0% 0	37.5% 3	16.7% 1	85.7% 6		50.0% 3		0.0% 0
		Turkeys			0.0% 0	0.0% 0	0.0% 0	12.5% 2	0.0% 0	15.8% 3	28.6% 2	20.0% 1	75.0% 3	6.7% 1
		Cattle			12.5% 1	37.0% 20	77.1% 84	70.1% 61	78.8% 89	82.7% 62	81.8% 36	85.2% 23	80.0% 24	76.7% 23
		Swine			0.0% 0	0.0% 0	0.0% 0	85.7% 6		100.0% 3		0.0% 0	0.0% 0	0.0% 0
Phenicols	Chloramphenicol (MIC ≥ 32 µg/ml)	Humans	5.9% 3	4.3% 2	2.6% 2	18.2% 18	23.1% 28	28.2% 35	25.3% 61	22.4% 50	15.2% 29	13.5% 28	12.4% 27	9.1% 20
		Chicken Breasts												
		Ground Turkey							33.3% 1	0.0% 0	0.0% 0	0.0% 0		
		Ground Beef							66.7% 2	100.0% 1	100.0% 2			
		Pork Chops							100.0% 2	100.0% 1				
		Chickens			0.0% 0	0.0% 0	0.0% 0	37.5% 3	0.0% 0	85.7% 6		50.0% 3		0.0% 0
		Turkeys			0.0% 0	0.0% 0	0.0% 0	12.5% 2	0.0% 0	21.1% 4	14.3% 1	0.0% 0	0.0% 0	0.0% 0
		Cattle			12.5% 1	37.0% 20	78.9% 86	73.6% 64	77.9% 88	78.7% 59	77.3% 34	81.5% 22	66.7% 20	76.7% 23
		Swine			0.0% 0	0.0% 0	50.0% 1	85.7% 6		100.0% 3		0.0% 0	0.0% 0	0.0% 0

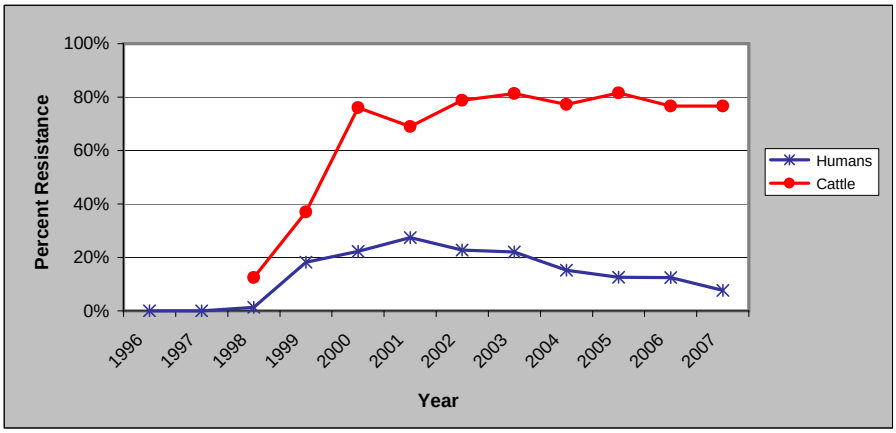
[1] Sulfamethoxazole was tested from 1996-2003 and was replaced by sulfisoxazole in 2004

Table 27d. Antimicrobial Resistance among *Salmonella* Newport Isolates from Humans, Retail Meats, and Food Animals, by Year, 1996-2007

Year			1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Number of Isolates Tested		Humans	51	46	77	99	121	124	241	223	191	207	217	220
		Chicken Breasts							0	0	0	0	0	0
		Ground Turkey							3	2	2	3	0	0
		Ground Beef							3	1	2	0	0	0
		Pork Chops							2	1	0	0	0	0
		Chickens		0	1	7	5	8	6	7	0	6	0	3
		Turkeys		0	1	4	6	16	10	19	7	5	4	15
		Cattle		0	8	54	109	87	113	75	44	27	30	30
		Swine		0	1	5	2	7	0	3	0	1	1	1
Antimicrobial Class	**Antimicrobial (Resistance Breakpoint)**	**Isolate Source**												
Quinolones	Ciprofloxacin (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
		Chicken Breasts												
		Ground Turkey							0.0% 0	0.0% 0	0.0% 0	0.0% 0		
		Ground Beef							0.0% 0	0.0% 0	0.0% 0			
		Pork Chops							0.0% 0	0.0% 0				
		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
		Turkeys			0.0% 0	0.0% 0	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			0.0% 0	0.0% 0	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			0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0		0.0% 0	0.0% 0	0.0% 0
	Nalidixic Acid (MIC ≥ 32 µg/ml)	Humans	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.8% 1	0.0% 0	0.8% 2	0.4% 1	0.5% 1	0.0% 0	0.5% 1	0.0% 0
		Chicken Breasts												
		Ground Turkey							0.0% 0	0.0% 0	0.0% 0	0.0% 0		
		Ground Beef							0.0% 0	0.0% 0	0.0% 0			
		Pork Chops							0.0% 0	0.0% 0				
		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
		Turkeys			0.0% 0	0.0% 0	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			0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	1.3% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Swine			0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0		0.0% 0	0.0% 0	0.0% 0
Tetracyclines	Tetracycline (MIC ≥ 16 µg/ml)	Humans	7.8% 4	4.3% 2	2.6% 2	19.2% 19	23.1% 28	30.6% 38	25.7% 62	24.2% 54	16.8% 32	14.5% 30	14.3% 31	9.5% 21
		Chicken Breasts												
		Ground Turkey							33.3% 1	0.0% 0	0.0% 0	0.0% 0		
		Ground Beef							66.7% 2	100.0% 1	100.0% 2			
		Pork Chops							100.0% 2	100.0% 1				
		Chickens			100.0% 1	0.0% 0	0.0% 0	37.5% 3	0.0% 0	85.7% 6		50.0% 3		0.0% 0
		Turkeys			0.0% 0	0.0% 0	0.0% 0	12.5% 2	40.0% 4	36.8% 7	28.6% 2	60.0% 3	25.0% 1	20.0% 3
		Cattle			12.5% 1	38.9% 21	80.7% 88	73.6% 64	80.5% 91	84.0% 63	84.1% 37	81.5% 22	83.3% 25	86.7% 26
		Swine			100.0% 1	20.0% 1	50.0% 1	85.7% 6		100.0% 3		0.0% 0	0.0% 0	0.0% 0

Ceftiofur Resistance

Figure 14. Percent of *Salmonella* Newport Isolates from Humans and Cattle Resistant to Ceftiofur, by Year, 1996-2007[1]



[1] Data for other sources are not included due to the small number of *Salmonella* Newport isolates. Table 27 contains resistance data for *Salmonella* Newport isolates from each source, by year

Table 28. Number of *Salmonella* Newport Isolates Tested from Humans, Retail Meats, and Food Animals, by Year, 1996-2007

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Humans	51	46	77	99	121	124	241	223	191	207	217	220
Chicken Breasts							0	0	0	0	0	0
Ground Turkey							3	2	2	3	0	0
Ground Beef							3	1	2	0	0	0
Pork Chops							2	1	0	0	0	0
Chickens		0	1	7	5	8	6	7	0	6	0	3
Turkeys		0	1	4	6	16	10	19	7	5	4	15
Cattle		0	8	54	109	87	113	75	44	27	30	30
Swine		0	1	5	2	7	0	3	0	1	1	1

Table 29a. Resistance Patterns among *Salmonella* Newport Isolates from Humans, Retail Meats, and Food Animals, by Year, 1996-2007

Year		1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Number of Isolates Tested	Humans	51	46	77	99	121	124	241	223	191	207	217	220
	Chicken Breasts							0	0	0	0	0	0
	Ground Turkey							3	2	2	3	0	0
	Ground Beef							3	1	2	0	0	0
	Pork Chops							2	1	0	0	0	0
	Chickens		0	1	7	5	8	6	7	0	6	0	3
	Turkeys		0	1	4	6	16	10	19	7	5	4	15
	Cattle		0	8	54	109	87	113	75	44	27	30	30
	Swine		0	1	5	2	7	0	3	0	1	1	1
Resistance Pattern	**Isolate Source**												
1. No Resistance Detected	Humans	86.3% 44	93.5% 43	94.8% 73	75.8% 75	75.2% 91	65.3% 81	72.2% 174	73.5% 164	82.2% 157	84.1% 174	82.9% 180	89.5% 197
	Chicken Breasts												
	Ground Turkey							66.7% 2	50.0% 1	100.0% 2	100.0% 3		
	Ground Beef							33.3% 1	0.0% 0	0.0% 0			
	Pork Chops							0.0% 0	0.0% 0				
	Chickens			0.0% 0	100.0% 7	80.0% 4	62.5% 5	83.3% 5	14.3% 1		50.0% 3		100.0% 3
	Turkeys			100.0% 1	100.0% 4	83.3% 5	87.5% 14	60.0% 6	21.1% 4	57.1% 4	20.0% 1	25.0% 1	80.0% 12
	Cattle			87.5% 7	61.1% 33	19.3% 21	25.3% 22	19.5% 22	14.7% 11	15.9% 7	14.8% 4	16.7% 5	13.3% 4
	Swine			0.0% 0	80.0% 4	50.0% 1	14.3% 1		0.0% 0		100.0% 1	100.0% 1	100.0% 1
2. Resistant to ≥ 3 Antimicrobial Classes	Humans	5.9% 3	4.3% 2	2.6% 2	18.2% 18	23.1% 28	31.5% 39	25.3% 61	23.3% 52	16.2% 31	14.5% 30	15.2% 33	10.5% 23
	Chicken Breasts												
	Ground Turkey							33.3% 1	0.0% 0	0.0% 0	0.0% 0		
	Ground Beef							66.7% 2	100.0% 1	100.0% 2			
	Pork Chops							100.0% 2	100.0% 1				
	Chickens			100.0% 1	0.0% 0	0.0% 0	37.5% 3	0.0% 0	85.7% 6		50.0% 3		0.0% 0
	Turkeys			0.0% 0	0.0% 0	0.0% 0	12.5% 2	0.0% 0	26.3% 5	14.3% 1	80.0% 4	75.0% 3	6.7% 1
	Cattle			12.5% 1	37.0% 20	79.8% 87	74.7% 65	80.5% 91	84.0% 63	84.1% 37	81.5% 22	83.3% 25	83.3% 25
	Swine			0.0% 0	0.0% 0	50.0% 1	85.7% 6		100.0% 3		0.0% 0	0.0% 0	0.0% 0
3. Resistant to ≥ 4 Antimicrobial Classes	Humans	5.9% 3	4.3% 2	2.6% 2	18.2% 18	23.1% 28	31.5% 39	25.3% 61	22.9% 51	15.7% 30	14.0% 29	13.4% 29	9.1% 20
	Chicken Breasts												
	Ground Turkey							33.3% 1	0.0% 0	0.0% 0	0.0% 0		
	Ground Beef							66.7% 2	100.0% 1	100.0% 2			
	Pork Chops							100.0% 2	100.0% 1				
	Chickens			100.0% 1	0.0% 0	0.0% 0	37.5% 3	0.0% 0	85.7% 6		50.0% 3		0.0% 0
	Turkeys			0.0% 0	0.0% 0	0.0% 0	12.5% 2	0.0% 0	21.1% 4	14.3% 1	0.0% 0	25.0% 1	6.7% 1
	Cattle			12.5% 1	37.0% 20	79.8% 87	73.6% 64	80.5% 91	84.0% 63	84.1% 37	81.5% 22	83.3% 25	83.3% 25
	Swine			0.0% 0	0.0% 0	50.0% 1	85.7% 6		100.0% 3		0.0% 0	0.0% 0	0.0% 0
4. Resistant to ≥ 5 Antimicrobial Classes	Humans	5.9% 3	4.3% 2	2.6% 2	18.2% 18	23.1% 28	26.6% 33	23.7% 57	22.4% 50	14.7% 28	12.6% 26	12.9% 28	8.2% 18
	Chicken Breasts												
	Ground Turkey							33.3% 1	0.0% 0	0.0% 0	0.0% 0		
	Ground Beef							66.7% 2	100.0% 1	100.0% 2			
	Pork Chops							100.0% 2	100.0% 1				
	Chickens			0.0% 0	0.0% 0	0.0% 0	37.5% 3	0.0% 0	85.7% 6		50.0% 3		0.0% 0
	Turkeys			0.0% 0	0.0% 0	0.0% 0	12.5% 2	0.0% 0	10.5% 2	14.3% 1	0.0% 0	25.0% 1	6.7% 1
	Cattle			12.5% 1	37.0% 20	77.1% 84	69.0% 60	78.8% 89	81.3% 61	79.5% 35	81.5% 22	76.7% 23	76.7% 23
	Swine			0.0% 0	0.0% 0	0.0% 0	85.7% 6		100.0% 3		0.0% 0	0.0% 0	0.0% 0

Table 29b. Resistance Patterns among *Salmonella* Newport Isolates from Humans, Retail Meats, and Food Animals, by Year, 1996-2007

Year		1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Number of Isolates Tested	Humans	51	46	77	99	121	124	241	223	191	207	217	220
	Chicken Breasts							0	0	0	0	0	0
	Ground Turkey							3	2	2	3	0	0
	Ground Beef							3	1	2	0	0	0
	Pork Chops							2	1	0	0	0	0
	Chickens		0	1	7	5	8	6	7	0	6	0	3
	Turkeys		0	1	4	6	16	10	19	7	5	4	15
	Cattle		0	8	54	109	87	113	75	44	27	30	30
	Swine		0	1	5	2	7	0	3	0	1	1	1
Resistance Pattern	**Isolate Source**												
5. At Least ACSSuT[1] Resistant	Humans	5.9% 3	4.3% 2	1.3% 1	18.2% 18	23.1% 28	25.8% 32	23.7% 57	22.0% 49	14.7% 28	12.6% 26	12.0% 26	8.2% 18
	Chicken Breasts												
	Ground Turkey							33.3% 1	0.0% 0	0.0% 0	0.0% 0		
	Ground Beef							66.7% 2	100.0% 1	100.0% 2			
	Pork Chops							100.0% 2	100.0% 1				
	Chickens			0.0% 0	0.0% 0	0.0% 0	37.5% 3	0.0% 0	71.4% 5		50.0% 3		0.0% 0
	Turkeys			0.0% 0	0.0% 0	0.0% 0	12.5% 2	0.0% 0	5.3% 1	14.3% 1	0.0% 0	0.0% 0	0.0% 0
	Cattle			12.5% 1	35.2% 19	70.6% 77	67.8% 59	70.8% 80	66.7% 50	75.0% 33	81.5% 22	63.3% 19	70.0% 21
	Swine			0.0% 0	0.0% 0	0.0% 0	85.7% 6		100.0% 3		0.0% 0	0.0% 0	0.0% 0
6. At Least ACT/S[2] Resistant	Humans	3.9% 2	4.3% 2	1.3% 1	2.0% 2	4.1% 5	0.8% 1	3.7% 9	0.9% 2	1.0% 2	1.9% 4	2.3% 5	0.5% 1
	Chicken Breasts												
	Ground Turkey							33.3% 1	0.0% 0	0.0% 0	0.0% 0		
	Ground Beef							0.0% 0	0.0% 0	50.0% 1			
	Pork Chops							100.0% 2	0.0% 0				
	Chickens			0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		16.7% 1		0.0% 0
	Turkeys			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	0.0% 0
	Cattle			0.0% 0	1.9% 1	13.8% 15	11.5% 10	7.1% 8	0.0% 0	2.3% 1	25.9% 7	10.0% 3	13.3% 4
	Swine			0.0% 0	0.0% 0	0.0% 0	0.0% 0		33.3% 1		0.0% 0	0.0% 0	0.0% 0
7. At Least ACSSuTAuCf[3] Resistant	Humans	0.0% 0	0.0% 0	1.3% 1	18.2% 18	22.3% 27	25.0% 31	22.8% 55	21.1% 47	14.7% 28	12.6% 26	10.6% 23	7.7% 17
	Chicken Breasts												
	Ground Turkey							33.3% 1	0.0% 0	0.0% 0	0.0% 0		
	Ground Beef							66.7% 2	100.0% 1	100.0% 2			
	Pork Chops							100.0% 2	100.0% 1				
	Chickens			0.0% 0	0.0% 0	0.0% 0	37.5% 3	0.0% 0	71.4% 5		50.0% 3		0.0% 0
	Turkeys			0.0% 0	0.0% 0	0.0% 0	12.5% 2	0.0% 0	5.3% 1	14.3% 1	0.0% 0	0.0% 0	0.0% 0
	Cattle			12.5% 1	35.2% 19	69.7% 76	66.7% 58	70.8% 80	66.7% 50	72.7% 32	81.5% 22	63.3% 19	70.0% 21
	Swine			0.0% 0	0.0% 0	0.0% 0	85.7% 6		100.0% 3		0.0% 0	0.0% 0	0.0% 0
8. At Least Ceftiofur and Nalidixic Acid Resistant	Humans	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.4% 1	0.0% 0	0.5% 1	0.0% 0	0.0% 0	0.0% 0
	Chicken Breasts												
	Ground Turkey							0.0% 0	0.0% 0	0.0% 0	0.0% 0		
	Ground Beef							0.0% 0	0.0% 0	0.0% 0			
	Pork Chops							0.0% 0	0.0% 0				
	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
	Turkeys			0.0% 0	0.0% 0	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			0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	1.3% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0
	Swine			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] ACSSuT = ampicillin, chloramphenicol, streptomycin, sulfamethoxazole/sulfisoxazole, and tetracycline

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

[3] ACSSuTAuCf = ACSSuT, amoxicillin-clavulanic acid, and ceftiofur

H. Antimicrobial Susceptibility among *Salmonella* Heidelberg

Table 30a. Antimicrobial Resistance among *Salmonella* Heidelberg Isolates from Humans, Retail Meats, and Food Animals, by Year, 1996-2007

Year			1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Number of Isolates Tested		Humans	74	75	101	88	79	102	105	96	93	125	102	98
		Chicken Breasts							11	16	31	22	30	14
		Ground Turkey							21	32	37	53	35	41
		Ground Beef							0	0	0	0	0	0
		Pork Chops							3	0	3	0	4	0
		Chickens		51	143	297	259	329	403	226	167	283	164	142
		Turkeys		14	39	139	125	142	60	57	46	25	43	23
		Cattle		1	11	28	6	10	8	9	1	6	4	0
		Swine		7	37	33	22	16	11	11	4	8	13	2
Antimicrobial Class	**Antimicrobial (Resistance Breakpoint)**	**Isolate Source**												
Aminoglycosides	Amikacin (MIC ≥ 64)	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
		Chicken Breasts							0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Ground Turkey							0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Ground Beef												
		Pork Chops							0.0% 0		0.0% 0		0.0% 0	
		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
		Turkeys		0.0% 0	0.0% 0	0.0% 0	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		0.0% 0	0.0% 0	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		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
	Gentamicin (MIC ≥ 16)	Humans	23.0% 17	17.3% 13	16.8% 17	14.8% 13	8.9% 7	7.8% 8	3.8% 4	5.2% 5	4.3% 4	6.4% 8	4.9% 5	16.3% 16
		Chicken Breasts							45.5% 5	18.8% 3	9.7% 3	13.6% 3	20.0% 6	7.1% 1
		Ground Turkey							28.6% 6	12.5% 4	35.1% 13	37.7% 20	31.4% 11	24.4% 10
		Ground Beef												
		Pork Chops							100.0% 3		0.0% 0		75.0% 3	
		Chickens		41.2% 21	26.6% 38	18.5% 55	32.0% 83	12.5% 41	8.9% 36	7.5% 17	10.2% 17	9.2% 26	9.8% 16	11.3% 16
		Turkeys		0.0% 0	17.9% 7	16.5% 23	12.0% 15	13.4% 19	18.3% 11	12.3% 7	17.4% 8	36.0% 9	32.6% 14	13.0% 3
		Cattle		0.0% 0	27.3% 3	39.3% 11	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	
		Swine		0.0% 0	0.0% 0	0.0% 0	9.1% 2	0.0% 0	9.1% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
	Kanamycin (MIC ≥ 64)	Humans	14.9% 11	8.0% 6	12.9% 13	9.1% 8	15.2% 12	19.6% 20	10.5% 11	8.3% 8	8.6% 8	12.8% 16	8.8% 9	11.2% 11
		Chicken Breasts							36.4% 4	0.0% 0	0.0% 0	0.0% 0	0.0% 0	7.1% 1
		Ground Turkey							42.9% 9	34.4% 11	27.0% 10	30.2% 16	34.3% 12	56.1% 23
		Ground Beef												
		Pork Chops							0.0% 0		33.3% 1		0.0% 0	
		Chickens		0.0% 0	0.7% 1	1.3% 4	12.0% 31	4.3% 14	3.7% 15	5.3% 12	6.0% 10	6.7% 19	7.3% 12	6.3% 9
		Turkeys		7.1% 1	5.1% 2	17.3% 24	43.2% 54	31.0% 44	30.0% 18	21.1% 12	19.6% 9	44.0% 11	27.9% 12	34.8% 8
		Cattle		0.0% 0	63.6% 7	42.9% 12	16.7% 1	10.0% 1	37.5% 3	55.6% 5	100.0% 1	50.0% 3	0.0% 0	
		Swine		85.7% 6	64.9% 24	60.6% 20	77.3% 17	75.0% 12	54.5% 6	100.0% 11	75.0% 3	75.0% 6	84.6% 11	100.0% 2
	Streptomycin (MIC ≥ 64)	Humans	40.5% 30	24.0% 18	30.7% 31	23.9% 21	22.8% 18	25.5% 26	17.1% 18	12.5% 12	15.1% 14	13.6% 17	11.8% 12	12.2% 12
		Chicken Breasts							63.6% 7	12.5% 2	22.6% 7	18.2% 4	23.3% 7	21.4% 3
		Ground Turkey							61.9% 13	37.5% 12	43.2% 16	47.2% 25	45.7% 16	39.0% 16
		Ground Beef												
		Pork Chops							100.0% 3		33.3% 1		0.0% 0	
		Chickens		35.3% 18	32.9% 47	23.9% 71	36.7% 95	20.4% 67	18.6% 75	17.7% 40	18.0% 30	15.5% 44	10.4% 17	13.4% 19
		Turkeys		14.3% 2	30.8% 12	30.2% 42	52.8% 66	40.1% 57	35.0% 21	28.1% 16	21.7% 10	44.0% 11	34.9% 15	26.1% 6
		Cattle		0.0% 0	72.7% 8	57.1% 16	16.7% 1	20.0% 2	37.5% 3	55.6% 5	100.0% 1	50.0% 3	0.0% 0	
		Swine		57.1% 4	81.1% 30	63.6% 21	86.4% 19	75.0% 12	45.5% 5	100.0% 11	75.0% 3	87.5% 7	69.2% 9	100.0% 2

Table 30b. Antimicrobial Resistance among *Salmonella* Heidelberg Isolates from Humans, Retail Meats, and Food Animals, by Year, 1996-2007

Year			1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Number of Isolates Tested		Humans	74	75	101	88	79	102	105	96	93	125	102	98
		Chicken Breasts							11	16	31	22	30	14
		Ground Turkey							21	32	37	53	35	41
		Ground Beef							0	0	0	0	0	0
		Pork Chops							3	0	3	0	4	0
		Chickens		51	143	297	259	329	403	226	167	283	164	142
		Turkeys		14	39	139	125	142	60	57	46	25	43	23
		Cattle		1	11	28	6	10	8	9	1	6	4	0
		Swine		7	37	33	22	16	11	11	4	8	13	2
Antimicrobial Class	**Antimicrobial (Resistance Breakpoint)**	**Isolate Source**												
β-Lactam/β-Lactamase Inhibitor Combinations	Amoxicillin-Clavulanic Acid (MIC ≥ 32 / 16 µg/ml)	Humans	2.7% 2	1.3% 1	1.0% 1	1.1% 1	3.8% 3	2.9% 3	9.5% 10	5.2% 5	10.8% 10	8.8% 11	9.8% 10	7.1% 7
		Chicken Breasts							0.0% 0	6.3% 1	9.7% 3	13.6% 3	10.0% 3	21.4% 3
		Ground Turkey							19.0% 4	9.4% 3	5.4% 2	9.4% 5	17.1% 6	9.8% 4
		Ground Beef												
		Pork Chops							0.0% 0		0.0% 0		0.0% 0	
		Chickens		2.0% 1	1.4% 2	1.3% 4	13.5% 35	7.0% 23	8.7% 35	9.3% 21	10.2% 17	21.9% 62	15.9% 26	17.6% 25
		Turkeys		0.0% 0	2.6% 1	0.7% 1	2.4% 3	5.6% 8	5.0% 3	0.0% 0	6.5% 3	0.0% 0	9.3% 4	26.1% 6
		Cattle		0.0% 0	27.3% 3	42.9% 12	0.0% 0	0.0% 0	50.0% 4	55.6% 5	100.0% 1	83.3% 5	0.0% 0	
		Swine		0.0% 0	0.0% 0	0.0% 0	4.5% 1	0.0% 0	9.1% 1	9.1% 1	0.0% 0	0.0% 0	7.7% 1	0.0% 0
Cephems	Cefoxitin (MIC ≥ 32 µg/ml)	Humans					2.5% 2	2.9% 3	8.6% 9	5.2% 5	8.6% 8	8.8% 11	8.8% 9	7.1% 7
		Chicken Breasts							0.0% 0	6.3% 1	9.7% 3	9.1% 2	10.0% 3	21.4% 3
		Ground Turkey							19.0% 4	0.0% 0	5.4% 2	9.4% 5	17.1% 6	9.8% 4
		Ground Beef												
		Pork Chops							0.0% 0		0.0% 0		0.0% 0	
		Chickens					13.5% 35	5.2% 17	7.4% 30	7.1% 16	10.2% 17	21.6% 61	15.2% 25	16.9% 24
		Turkeys					2.4% 3	4.9% 7	1.7% 1	0.0% 0	6.5% 3	0.0% 0	9.3% 4	17.4% 4
		Cattle					0.0% 0	0.0% 0	37.5% 3	44.4% 4	100.0% 1	66.7% 4	0.0% 0	
		Swine					4.5% 1	0.0% 0	9.1% 1	9.1% 1	0.0% 0	0.0% 0	7.7% 1	0.0% 0
	Ceftiofur (MIC ≥ 8 µg/ml)	Humans	1.4% 1	0.0% 0	0.0% 0	0.0% 0	3.8% 3	2.9% 3	7.6% 8	5.2% 5	9.7% 9	8.8% 11	9.8% 10	7.1% 7
		Chicken Breasts							0.0% 0	6.3% 1	9.7% 3	9.1% 2	10.0% 3	21.4% 3
		Ground Turkey							19.0% 4	0.0% 0	5.4% 2	9.4% 5	17.1% 6	9.8% 4
		Ground Beef												
		Pork Chops							0.0% 0		0.0% 0		0.0% 0	
		Chickens		2.1% 1	1.4% 2	1.7% 5	13.9% 36	5.8% 19	8.9% 36	9.3% 21	10.2% 17	21.9% 62	15.9% 26	16.9% 24
		Turkeys		0.0% 0	2.6% 1	0.7% 1	3.2% 4	5.6% 8	5.0% 3	0.0% 0	6.5% 3	0.0% 0	9.3% 4	26.1% 6
		Cattle		0.0% 0	27.3% 3	42.9% 12	0.0% 0	0.0% 0	37.5% 3	55.6% 5	100.0% 1	83.3% 5	0.0% 0	
		Swine		0.0% 0	0.0% 0	0.0% 0	4.5% 1	0.0% 0	9.1% 1	9.1% 1	0.0% 0	0.0% 0	7.7% 1	0.0% 0
	Ceftriaxone (MIC ≥ 64 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
		Chicken Breasts							0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Ground Turkey							0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Ground Beef												
		Pork Chops							0.0% 0		0.0% 0		0.0% 0	
		Chickens		0.0% 0	0.0% 0	0.0% 0	0.4% 1	0.0% 0	0.2% 1	0.0% 0	0.6% 1	1.4% 4	0.0% 0	1.4% 2
		Turkeys		0.0% 0	0.0% 0	0.0% 0	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		0.0% 0	0.0% 0	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		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0

Table 30c. Antimicrobial Resistance among *Salmonella* Heidelberg Isolates from Humans, Retail Meats, and Food Animals, by Year, 1996-2007

Year			1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Number of Isolates Tested		Humans	74	75	101	88	79	102	105	96	93	125	102	98
		Chicken Breasts							11	16	31	22	30	14
		Ground Turkey							21	32	37	53	35	41
		Ground Beef							0	0	0	0	0	0
		Pork Chops							3	0	3	0	4	0
		Chickens		51	143	297	259	329	403	226	167	283	164	142
		Turkeys		14	39	139	125	142	60	57	46	25	43	23
		Cattle		1	11	28	6	10	8	9	1	6	4	0
		Swine		7	37	33	22	16	11	11	4	8	13	2
Antimicrobial Class	**Antimicrobial (Resistance Breakpoint)**	**Isolate Source**												
Folate Pathway Inhibitors	Sulfamethoxazole/ Sulfisoxazole[1] (MIC ≥ 512 µg/ml)	Humans	17.6% 13	21.3% 16	21.8% 22	18.2% 16	11.4% 9	8.8% 9	6.7% 7	7.3% 7	7.5% 7	8.0% 10	4.9% 5	18.4% 18
		Chicken Breasts							45.5% 5	12.5% 2	12.9% 4	13.6% 3	26.7% 8	7.1% 1
		Ground Turkey							33.3% 7	15.6% 5	37.8% 14	35.8% 19	37.1% 13	26.8% 11
		Ground Beef												
		Pork Chops							100.0% 3		0.0% 0		100.0% 4	
		Chickens		45.1% 23	33.6% 48	26.6% 79	33.2% 86	16.4% 54	9.7% 39	11.1% 25	12.6% 21	10.6% 30	7.9% 13	13.4% 19
		Turkeys		50.0% 7	35.9% 14	33.8% 47	15.2% 19	27.5% 39	30.0% 18	19.3% 11	26.1% 12	52.0% 13	30.2% 13	34.8% 8
		Cattle		0.0% 0	36.4% 4	57.1% 16	0.0% 0	10.0% 1	12.5% 1	44.4% 4	100.0% 1	50.0% 3	0.0% 0	
		Swine		0.0% 0	21.6% 8	21.2% 7	13.6% 3	0.0% 0	0.0% 0	0.0% 0	0.0% 0	12.5% 1	0.0% 0	0.0% 0
	Trimethoprim-Sulfamethoxazole (MIC ≥ 4 / 76 µg/ml)	Humans	0.0% 0	0.0% 0	2.0% 2	1.1% 1	1.3% 1	2.0% 2	1.0% 1	2.1% 2	0.0% 0	0.8% 1	0.0% 0	0.0% 0
		Chicken Breasts							0.0% 0	0.0% 0	0.0% 0	0.0% 0	6.7% 2	0.0% 0
		Ground Turkey							0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Ground Beef												
		Pork Chops							0.0% 0		0.0% 0		100.0% 4	
		Chickens		0.0% 0	0.7% 1	0.7% 2	0.4% 1	0.3% 1	0.7% 3	0.9% 2	0.0% 0	0.4% 1	0.0% 0	0.0% 0
		Turkeys		7.1% 1	5.1% 2	4.3% 6	0.8% 1	3.5% 5	3.3% 2	3.5% 2	0.0% 0	0.0% 0	0.0% 0	4.3% 1
		Cattle		0.0% 0	27.3% 3	42.9% 12	0.0% 0	10.0% 1	0.0% 0	55.6% 5	100.0% 1	50.0% 3	0.0% 0	
		Swine		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	9.1% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
Penicillins	Ampicillin (MIC ≥ 32 µg/ml)	Humans	14.9% 11	13.3% 10	16.8% 17	6.8% 6	10.1% 8	9.8% 10	12.4% 13	10.4% 10	25.8% 24	20.0% 25	18.6% 19	18.4% 18
		Chicken Breasts							18.2% 2	18.8% 3	25.8% 8	27.3% 6	16.7% 5	21.4% 3
		Ground Turkey							19.0% 4	9.4% 3	13.5% 5	18.9% 10	31.4% 11	53.7% 22
		Ground Beef												
		Pork Chops							0.0% 0		0.0% 0		0.0% 0	
		Chickens		21.6% 11	25.2% 36	16.2% 48	24.7% 64	16.7% 55	14.9% 60	19.0% 43	16.2% 27	25.1% 71	16.5% 27	20.4% 29
		Turkeys		7.1% 1	12.8% 5	8.6% 12	4.0% 5	9.2% 13	13.3% 8	3.5% 2	17.4% 8	24.0% 6	37.2% 16	65.2% 15
		Cattle		0.0% 0	27.3% 3	50.0% 14	0.0% 0	0.0% 0	50.0% 4	55.6% 5	100.0% 1	83.3% 5	0.0% 0	
		Swine		0.0% 0	5.4% 2	0.0% 0	9.1% 2	0.0% 0	18.2% 2	9.1% 1	0.0% 0	12.5% 1	7.7% 1	0.0% 0
Phenicols	Chloramphenicol (MIC ≥ 32 µg/ml)	Humans	1.4% 1	0.0% 0	1.0% 1	1.1% 1	1.3% 1	1.0% 1	1.0% 1	0.0% 0	1.1% 1	0.8% 1	0.0% 0	3.1% 3
		Chicken Breasts							0.0% 0	0.0% 0	3.2% 1	0.0% 0	0.0% 0	7.1% 1
		Ground Turkey							0.0% 0	0.0% 0	5.4% 2	0.0% 0	0.0% 0	0.0% 0
		Ground Beef												
		Pork Chops							0.0% 0		0.0% 0		0.0% 0	
		Chickens		0.0% 0	0.7% 1	1.3% 4	11.6% 30	3.3% 11	1.7% 7	3.1% 7	4.2% 7	3.2% 9	2.4% 4	4.2% 6
		Turkeys		0.0% 0	2.6% 1	0.7% 1	1.6% 2	2.8% 4	1.7% 1	0.0% 0	0.0% 0	0.0% 0	4.7% 2	4.3% 1
		Cattle		0.0% 0	27.3% 3	42.9% 12	0.0% 0	10.0% 1	25.0% 2	44.4% 4	100.0% 1	50.0% 3	0.0% 0	
		Swine		0.0% 0	0.0% 0	3.0% 1	4.5% 1	0.0% 0	9.1% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0

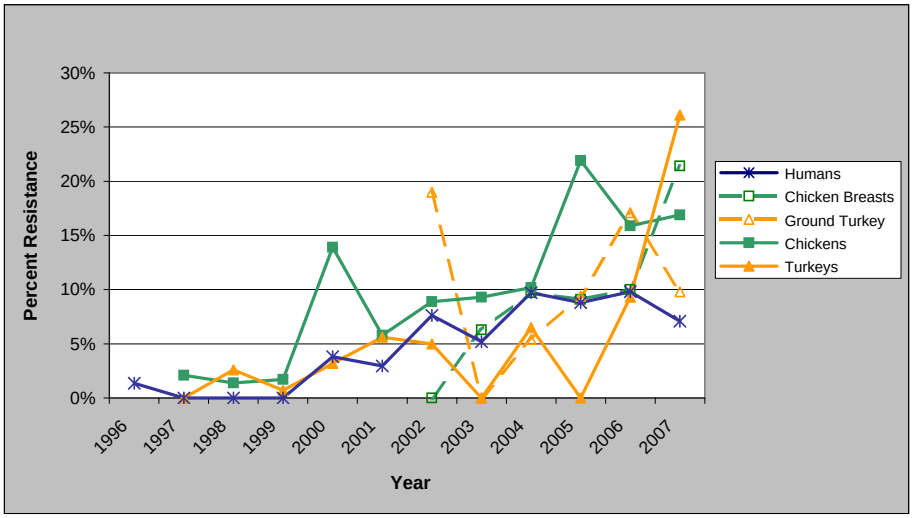
[1] Sulfamethoxazole was tested from 1996-2003 and was replaced by sulfisoxazole in 2004

Table 30d. Antimicrobial Resistance among *Salmonella* Heidelberg Isolates from Humans, Retail Meats, and Food Animals, by Year, 1996-2007

Year			1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Number of Isolates Tested		Humans	74	75	101	88	79	102	105	96	93	125	102	98
		Chicken Breasts							11	16	31	22	30	14
		Ground Turkey							21	32	37	53	35	41
		Ground Beef							0	0	0	0	0	0
		Pork Chops							3	0	3	0	4	0
		Chickens		51	143	297	259	329	403	226	167	283	164	142
		Turkeys		14	39	139	125	142	60	57	46	25	43	23
		Cattle		1	11	28	6	10	8	9	1	6	4	0
		Swine		7	37	33	22	16	11	11	4	8	13	2
Antimicrobial Class	**Antimicrobial (Resistance Breakpoint)**	**Isolate Source**												
Quinolones	Ciprofloxacin (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
		Chicken Breasts							0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Ground Turkey							0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Ground Beef												
		Pork Chops							0.0% 0		0.0% 0		0.0% 0	
		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
		Turkeys		0.0% 0	0.0% 0	0.0% 0	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		0.0% 0	0.0% 0	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		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
	Nalidixic Acid (MIC ≥ 32 µg/ml)	Humans	0.0% 0	0.0% 0	1.0% 1	1.1% 1	1.3% 1	0.0% 0	0.0% 0	1.0% 1	0.0% 0	0.8% 1	0.0% 0	0.0% 0
		Chicken Breasts							0.0% 0	0.0% 0	0.0% 0	0.0% 0	3.3% 1	0.0% 0
		Ground Turkey							4.8% 1	0.0% 0	0.0% 0	1.9% 1	0.0% 0	0.0% 0
		Ground Beef												
		Pork Chops							0.0% 0		0.0% 0		0.0% 0	
		Chickens		0.0% 0	0.0% 0	0.3% 1	0.0% 0	0.0% 0	0.7% 3	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Turkeys		0.0% 0	0.0% 0	0.7% 1	0.8% 1	0.0% 0	1.7% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Cattle		0.0% 0	0.0% 0	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		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
Tetracyclines	Tetracycline (MIC ≥ 16 µg/ml)	Humans	20.3% 15	12.0% 9	19.8% 20	18.2% 16	21.5% 17	24.5% 25	19.0% 20	16.7% 16	19.4% 18	18.4% 23	13.7% 14	22.4% 22
		Chicken Breasts							45.5% 5	0.0% 0	6.5% 2	4.5% 1	3.3% 1	7.1% 1
		Ground Turkey							57.1% 12	43.8% 14	70.3% 26	56.6% 30	68.6% 24	70.7% 29
		Ground Beef												
		Pork Chops							66.7% 2		100.0% 3		0.0% 0	
		Chickens		2.0% 1	7.7% 11	7.7% 23	20.1% 52	14.9% 49	11.7% 47	16.4% 37	15.0% 25	14.5% 41	12.2% 20	12.7% 18
		Turkeys		14.3% 2	23.1% 9	38.1% 53	64.0% 80	54.2% 77	70.0% 42	84.2% 48	73.9% 34	64.0% 16	62.8% 27	65.2% 15
		Cattle		0.0% 0	63.6% 7	60.7% 17	33.3% 2	40.0% 4	62.5% 5	55.6% 5	100.0% 1	66.7% 4	0.0% 0	
		Swine		85.7% 6	73.0% 27	72.7% 24	81.8% 18	93.8% 15	72.7% 8	100.0% 11	75.0% 3	87.5% 7	92.3% 12	100.0% 2

Ceftiofur Resistance

Figure 15. Percent of *Salmonella* Heidelberg Isolates from Humans, Retail Poultry, and Poultry Resistant to Ceftiofur, by Year, 1996-2007[1]



[1] Data for ground beef, pork chops, cattle, and swine are not included due to the small number of *Salmonella* Heidelberg isolates from these sources. Table 30 contains resistance data for *Salmonella* Heidelberg isolates from each source, by year

Table 31. Number of *Salmonella* Heidelberg Isolates Tested from Humans, Food Animals, and Retail Meats, by Year, 1996-2007

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Humans	74	75	101	88	79	102	105	96	93	125	102	98
Chicken Breasts							11	16	31	22	30	14
Ground Turkey							21	32	37	53	35	41
Ground Beef							0	0	0	0	0	0
Pork Chops							3	0	3	0	4	0
Chickens		51	143	297	259	329	403	226	167	283	164	142
Turkeys		14	39	139	125	142	60	57	46	25	43	23
Cattle		1	11	28	6	10	8	9	1	6	4	0
Swine		7	37	33	22	16	11	11	4	8	13	2

Table 32a. Resistance Patterns among *Salmonella* Heidelberg Isolates from Humans, Retail Meats, and Food Animals, by Year, 1996-2007

Year		1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Number of Isolates Tested	Humans	74	75	101	88	79	102	105	96	93	125	102	98
	Chicken Breasts							11	16	31	22	30	14
	Ground Turkey							21	32	37	53	35	41
	Ground Beef							0	0	0	0	0	0
	Pork Chops							3	0	3	0	4	0
	Chickens		51	143	297	259	329	403	226	167	283	164	142
	Turkeys		14	39	139	125	142	60	57	46	25	43	23
	Cattle		1	11	28	6	10	8	9	1	6	4	0
	Swine		7	37	33	22	16	11	11	4	8	13	2
Resistance Pattern	**Isolate Source**												
1. No Resistance Detected	Humans	54.1% 40	66.7% 50	56.4% 57	68.2% 60	63.3% 50	64.7% 66	67.6% 71	68.8% 66	55.9% 52	62.4% 78	67.6% 69	58.2% 57
	Chicken Breasts							27.3% 3	62.5% 10	58.1% 18	54.5% 12	50.0% 15	50.0% 7
	Ground Turkey							33.3% 7	50.0% 16	16.2% 6	20.8% 11	8.6% 3	9.8% 4
	Ground Beef												
	Pork Chops							0.0% 0		0.0% 0		0.0% 0	
	Chickens		35.3% 18	50.3% 72	61.6% 183	48.6% 126	63.5% 209	66.5% 268	62.8% 142	68.3% 114	59.4% 168	67.1% 110	65.5% 93
	Turkeys		50.0% 7	46.2% 18	43.2% 60	28.8% 36	31.0% 44	15.0% 9	8.8% 5	15.2% 7	16.0% 4	23.3% 10	17.4% 4
	Cattle		100.0% 1	27.3% 3	25.0% 7	66.7% 4	60.0% 6	12.5% 1	44.4% 4	0.0% 0	0.0% 0	100.0% 4	
	Swine		14.3% 1	18.9% 7	27.3% 9	13.6% 3	6.3% 1	27.3% 3	0.0% 0	0.0% 0	12.5% 1	7.7% 1	0.0% 0
2. Resistant to ≥ 3 Antimicrobial Classes	Humans	12.2% 9	12.0% 9	13.9% 14	10.2% 9	7.6% 6	7.8% 8	12.4% 13	10.4% 10	14.0% 13	15.2% 19	12.7% 13	17.3% 17
	Chicken Breasts							45.5% 5	6.3% 1	12.9% 4	13.6% 3	13.3% 4	28.6% 4
	Ground Turkey							28.6% 6	12.5% 4	27.0% 10	34.0% 18	40.0% 14	53.7% 22
	Ground Beef												
	Pork Chops							66.7% 2		0.0% 0		0.0% 0	
	Chickens		11.8% 6	15.4% 22	10.4% 31	19.3% 50	12.8% 42	10.9% 44	13.3% 30	15.6% 26	24.4% 69	17.1% 28	20.4% 29
	Turkeys		7.1% 1	10.3% 4	17.3% 24	10.4% 13	16.9% 24	21.7% 13	14.0% 8	23.9% 11	36.0% 9	44.2% 19	69.6% 16
	Cattle		100.0% 1	27.3% 3	50.0% 14	0.0% 0	10.0% 1	37.5% 3	55.6% 5	100.0% 1	83.3% 5	0.0% 0	
	Swine		0.0% 0	13.5% 5	21.2% 7	13.6% 3	0.0% 0	18.2% 2	9.1% 1	0.0% 0	25.0% 2	7.7% 1	0.0% 0
3. Resistant to ≥ 4 Antimicrobial Classes	Humans	4.1% 3	1.3% 1	3.0% 3	3.4% 3	3.8% 3	2.0% 2	1.9% 2	0.0% 0	4.3% 4	4.8% 6	2.0% 2	5.1% 5
	Chicken Breasts							0.0% 0	0.0% 0	6.5% 2	0.0% 0	0.0% 0	0.0% 0
	Ground Turkey							19.1% 4	9.4% 3	10.8% 4	7.6% 4	17.1% 6	14.6% 6
	Ground Beef												
	Pork Chops							0.0% 0		0.0% 0		0.0% 0	
	Chickens		2.0% 1	1.4% 2	3.7% 11	13.5% 35	4.0% 13	3.7% 15	5.3% 12	7.8% 13	6.7% 19	4.3% 7	5.6% 8
	Turkeys		0.0% 0	2.6% 1	2.2% 3	4.0% 5	5.6% 8	6.7% 4	1.8% 1	6.5% 3	12.0% 3	14.0% 6	21.7% 5
	Cattle		0.0% 0	27.3% 3	42.9% 12	0.0% 0	10.0% 1	25.0% 2	55.6% 5	100.0% 1	50.0% 3	0.0% 0	
	Swine		0.0% 0	5.4% 2	3.0% 1	4.5% 1	0.0% 0	9.1% 1	9.1% 1	0.0% 0	0.0% 0	7.7% 1	0.0% 0
4. Resistant to ≥ 5 Antimicrobial Classes	Humans	2.7% 2	1.3% 1	0.0% 0	0.0% 0	2.5% 2	1.0% 1	1.9% 2	0.0% 0	3.2% 3	1.6% 2	2.0% 2	4.1% 4
	Chicken Breasts							0.0% 0	0.0% 0	3.2% 1	0.0% 0	0.0% 0	0.0% 0
	Ground Turkey							19.1% 4	6.3% 2	5.4% 2	0.0% 0	8.6% 3	2.4% 1
	Ground Beef												
	Pork Chops							0.0% 0		0.0% 0		0.0% 0	
	Chickens		2.0% 1	0.7% 1	1.3% 4	12.4% 32	3.6% 12	2.7% 11	4.4% 10	3.6% 6	4.9% 14	4.3% 7	5.6% 8
	Turkeys		0.0% 0	2.6% 1	0.7% 1	3.2% 4	4.2% 6	3.3% 2	0.0% 0	2.2% 1	0.0% 0	9.3% 4	8.7% 2
	Cattle		0.0% 0	27.3% 3	42.9% 12	0.0% 0	0.0% 0	25.0% 2	55.6% 5	100.0% 1	50.0% 3	0.0% 0	
	Swine		0.0% 0	0.0% 0	0.0% 0	4.5% 1	0.0% 0	9.1% 1	9.1% 1	0.0% 0	0.0% 0	7.7% 1	0.0% 0

Table 32b. Resistance Patterns among *Salmonella* Heidelberg Isolates from Humans, Retail Meats, and Food Animals, by Year, 1996-2007

Year		1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Number of Isolates Tested	Humans	74	75	101	88	79	102	105	96	93	125	102	98
	Chicken Breasts							11	16	31	22	30	14
	Ground Turkey							21	32	37	53	35	41
	Ground Beef							0	0	0	0	0	0
	Pork Chops							3	0	3	0	4	0
	Chickens		51	143	297	259	329	403	226	167	283	164	142
	Turkeys		14	39	139	125	142	60	57	46	25	43	23
	Cattle		1	11	28	6	10	8	9	1	6	4	0
	Swine		7	37	33	22	16	11	11	4	8	13	2
Resistance Pattern	**Isolate Source**												
5. At Least ACSSuT[1] Resistant	Humans	1.4% 1	0.0% 0	0.0% 0	0.0% 0	1.3% 1	1.0% 1	1.0% 1	0.0% 0	1.1% 1	0.0% 0	0.0% 0	3.1% 3
	Chicken Breasts							0.0% 0	0.0% 0	3.2% 1	0.0% 0	0.0% 0	0.0% 0
	Ground Turkey							0.0% 0	0.0% 0	5.4% 2	0.0% 0	0.0% 0	0.0% 0
	Ground Beef												
	Pork Chops							0.0% 0		0.0% 0		0.0% 0	
	Chickens		0.0% 0	0.7% 1	1.3% 4	11.2% 29	3.0% 10	1.5% 6	2.2% 5	2.4% 4	2.8% 8	1.8% 3	4.2% 6
	Turkeys		0.0% 0	2.6% 1	0.7% 1	1.6% 2	2.8% 4	1.7% 1	0.0% 0	0.0% 0	0.0% 0	4.7% 2	4.3% 1
	Cattle		0.0% 0	27.3% 3	42.9% 12	0.0% 0	0.0% 0	12.5% 1	33.3% 3	100.0% 1	50.0% 3	0.0% 0	
	Swine		0.0% 0	0.0% 0	0.0% 0	4.5% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
6. At Least ACT/S[2] Resistant	Humans	0.0% 0	0.0% 0	0.0% 0	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
	Chicken Breasts							0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
	Ground Turkey							0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
	Ground Beef												
	Pork Chops							0.0% 0		0.0% 0		0.0% 0	
	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
	Turkeys		0.0% 0	0.0% 0	0.0% 0	0.0% 0	1.4% 2	1.7% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
	Cattle		0.0% 0	27.3% 3	42.9% 12	0.0% 0	0.0% 0	0.0% 0	44.4% 4	100.0% 1	50.0% 3	0.0% 0	
	Swine		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	9.1% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
7. At Least ACSSuTAuCf[3] Resistant	Humans	0.0% 0	0.0% 0	0.0% 0	0.0% 0	1.3% 1	1.0% 1	1.0% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
	Chicken Breasts							0.0% 0	0.0% 0	3.2% 1	0.0% 0	0.0% 0	0.0% 0
	Ground Turkey							0.0% 0	0.0% 0	5.4% 2	0.0% 0	0.0% 0	0.0% 0
	Ground Beef												
	Pork Chops							0.0% 0		0.0% 0		0.0% 0	
	Chickens		0.0% 0	0.7% 1	0.7% 2	11.2% 29	2.7% 9	1.5% 6	2.2% 5	2.4% 4	2.8% 8	1.8% 3	4.2% 6
	Turkeys		0.0% 0	2.6% 1	0.7% 1	0.8% 1	2.8% 4	1.7% 1	0.0% 0	0.0% 0	0.0% 0	4.7% 2	4.3% 1
	Cattle		0.0% 0	27.3% 3	42.9% 12	0.0% 0	0.0% 0	12.5% 1	33.3% 3	100.0% 1	50.0% 3	0.0% 0	
	Swine		0.0% 0	0.0% 0	0.0% 0	4.5% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
8. At Least Ceftiofur 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
	Chicken Breasts							0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
	Ground Turkey							0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
	Ground Beef												
	Pork Chops							0.0% 0		0.0% 0		0.0% 0	
	Chickens		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.7% 3	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
	Turkeys		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	1.7% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
	Cattle		0.0% 0	0.0% 0	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		0.0% 0	0.0% 0	0.0% 0	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] ACSSuT = ampicillin, chloramphenicol, streptomycin, sulfamethoxazole/sulfisoxazole, and tetracycline

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

[3] ACSSuTAuCf = ACSSuT, amoxicillin-clavulanic acid, and ceftiofur

I. Antimicrobial Susceptibility among *Salmonella* I 4,[5],12:i:-

Table 33a. Antimicrobial Resistance among *Salmonella* I 4,[5],12:i:- Isolates from Humans, Retail Meats, and Food Animals, by Year, 1996-2007

Year			1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Number of Isolates Tested		Humans	3	3	0	8	13	14	35	37	36	33	105	73
		Chicken Breasts							5	2	4	9	9	2
		Ground Turkey							2	0	0	0	2	0
		Ground Beef							0	0	0	0	0	2
		Pork Chops							0	0	0	0	0	0
		Chickens		N/A[1]	N/A	N/A	N/A	N/A	N/A	N/A	44	102	79	49
		Turkeys		N/A	N/A	N/A	N/A	N/A	N/A	N/A	1	2	1	1
		Cattle		N/A	N/A	N/A	N/A	N/A	N/A	N/A	4	2	3	6
		Swine		N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	1	2	1
Antimicrobial Class	**Antimicrobial (Resistance Breakpoint)**	**Isolate Source**												
Aminoglycosides	Amikacin (MIC ≥ 64 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
		Chicken Breasts							0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Ground Turkey							0.0% 0				0.0% 0	
		Ground Beef												0.0% 0
		Pork Chops												
		Chickens									0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Turkeys									0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Cattle									0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Swine										0.0% 0	0.0% 0	0.0% 0
	Gentamicin (MIC ≥ 16 µg/ml)	Humans	0.0% 0	0.0% 0		0.0% 0	0.0% 0	7.1% 1	0.0% 0	5.4% 2	5.6% 2	0.0% 0	4.8% 5	1.4% 1
		Chicken Breasts							0.0% 0	0.0% 0	0.0% 0	11.1% 1	22.2% 2	50.0% 1
		Ground Turkey							0.0% 0				50.0% 1	
		Ground Beef												50.0% 1
		Pork Chops												
		Chickens									11.4% 5	9.8% 10	11.4% 9	0.0% 0
		Turkeys									100.0% 1	0.0% 0	100.0% 1	100.0% 1
		Cattle									0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Swine										0.0% 0	0.0% 0	0.0% 0
	Kanamycin (MIC ≥ 64 µg/ml)	Humans	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	0.0% 0	1.4% 1
		Chicken Breasts							0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Ground Turkey							0.0% 0				0.0% 0	
		Ground Beef												0.0% 0
		Pork Chops												
		Chickens									4.5% 2	0.0% 0	0.0% 0	4.1% 2
		Turkeys									0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Cattle									0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Swine										0.0% 0	0.0% 0	0.0% 0
	Streptomycin (MIC ≥ 64 µg/ml)	Humans	0.0% 0	66.7% 2		0.0% 0	7.7% 1	14.3% 2	2.9% 1	8.1% 3	5.6% 2	3.0% 1	3.8% 4	8.2% 6
		Chicken Breasts							0.0% 0	0.0% 0	0.0% 0	11.1% 1	22.2% 2	0.0% 0
		Ground Turkey							0.0% 0				50.0% 1	
		Ground Beef												0.0% 0
		Pork Chops												
		Chickens									15.9% 7	9.8% 10	6.3% 5	8.2% 4
		Turkeys									100.0% 1	50.0% 1	100.0% 1	100.0% 1
		Cattle									25.0% 1	0.0% 0	0.0% 0	0.0% 0
		Swine										100.0% 1	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* I 4,[5],12:i:- Isolates from Humans, Retail Meats, and Food Animals, by Year, 1996-2007

Year			1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Number of Isolates Tested		Humans	3	3	0	8	13	14	35	37	36	33	105	73
		Chicken Breasts							5	2	4	9	9	2
		Ground Turkey							2	0	0	0	2	0
		Ground Beef							0	0	0	0	0	2
		Pork Chops							0	0	0	0	0	0
		Chickens		N/A[1]	N/A	N/A	N/A	N/A	N/A	N/A	44	102	79	49
		Turkeys		N/A	N/A	N/A	N/A	N/A	N/A	N/A	1	2	1	1
		Cattle		N/A	N/A	N/A	N/A	N/A	N/A	N/A	4	2	3	6
		Swine		N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	1	2	1
Antimicrobial Class	**Antimicrobial (Resistance Breakpoint)**	**Isolate Source**												
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	2.9% 1	5.4% 2	2.8% 1	3.0% 1	3.8% 4	1.4% 1
		Chicken Breasts							0.0% 0	0.0% 0	0.0% 0	0.0% 0	11.1% 1	0.0% 0
		Ground Turkey							0.0% 0				0.0% 0	
		Ground Beef												0.0% 0
		Pork Chops												
		Chickens									4.5% 2	5.9% 6	16.5% 13	16.3% 8
		Turkeys									0.0% 0	50.0% 1	0.0% 0	0.0% 0
		Cattle									0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Swine										0.0% 0	0.0% 0	0.0% 0
Cephems	Cefoxitin (MIC ≥ 32 µg/ml)	Humans						0.0% 0	2.9% 1	5.4% 2	2.8% 1	3.0% 1	3.8% 4	1.4% 1
		Chicken Breasts							0.0% 0	0.0% 0	0.0% 0	0.0% 0	11.1% 1	0.0% 0
		Ground Turkey							0.0% 0				0.0% 0	
		Ground Beef												0.0% 0
		Pork Chops												
		Chickens									4.5% 2	5.9% 6	16.5% 13	16.3% 8
		Turkeys									0.0% 0	50.0% 1	0.0% 0	0.0% 0
		Cattle									0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Swine										0.0% 0	0.0% 0	0.0% 0
	Ceftiofur (MIC ≥ 8 µg/ml)	Humans	0.0% 0	0.0% 0		0.0% 0	0.0% 0	7.1% 1	2.9% 1	5.4% 2	2.8% 1	3.0% 1	3.8% 4	2.7% 2
		Chicken Breasts							0.0% 0	0.0% 0	0.0% 0	0.0% 0	11.1% 1	0.0% 0
		Ground Turkey							0.0% 0				0.0% 0	
		Ground Beef												0.0% 0
		Pork Chops												
		Chickens									4.5% 2	5.9% 6	16.5% 13	16.3% 8
		Turkeys									0.0% 0	50.0% 1	0.0% 0	0.0% 0
		Cattle									0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Swine										0.0% 0	0.0% 0	0.0% 0
	Ceftriaxone (MIC ≥ 64 µg/ml)	Humans	0.0% 0	0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	2.8% 1	0.0% 0	0.0% 0	1.4% 1
		Chicken Breasts							0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Ground Turkey							0.0% 0				0.0% 0	
		Ground Beef												0.0% 0
		Pork Chops												
		Chickens									0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Turkeys									0.0% 0	50.0% 1	0.0% 0	0.0% 0
		Cattle									0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Swine										0.0% 0	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* I 4,[5],12:i:- Isolates from Humans, Retail Meats, and Food Animals, by Year, 1996-2007

Year			1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Number of Isolates Tested		Humans	3	3	0	8	13	14	35	37	36	33	105	73
		Chicken Breasts							5	2	4	9	9	2
		Ground Turkey							2	0	0	0	2	0
		Ground Beef							0	0	0	0	0	2
		Pork Chops							0	0	0	0	0	0
		Chickens		N/A[1]	N/A	N/A	N/A	N/A	N/A	N/A	44	102	79	49
		Turkeys		N/A	N/A	N/A	N/A	N/A	N/A	N/A	1	2	1	1
		Cattle		N/A	N/A	N/A	N/A	N/A	N/A	N/A	4	2	3	6
		Swine		N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	1	2	1
Antimicrobial Class	**Antimicrobial (Resistance Breakpoint)**	**Isolate Source**												
Folate Pathway Inhibitors	Sulfamethoxazole/ Sulfisoxazole[2] (MIC ≥ 512 µg/ml)	Humans	0.0% 0	100.0% 3		12.5% 1	0.0% 0	14.3% 2	2.9% 1	5.4% 2	11.1% 4	0.0% 0	8.6% 9	4.1% 3
		Chicken Breasts							0.0% 0	0.0% 0	0.0% 0	11.1% 1	22.2% 2	50.0% 1
		Ground Turkey							0.0% 0				50.0% 1	
		Ground Beef												50.0% 1
		Pork Chops												
		Chickens									13.6% 6	9.8% 10	13.9% 11	6.1% 3
		Turkeys									100.0% 1	50.0% 1	100.0% 1	100.0% 1
		Cattle									0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Swine										100.0% 1	50.0% 1	0.0% 0
	Trimethoprim-Sulfamethoxazole (MIC ≥ 4 / 76 µg/ml)	Humans	0.0% 0	0.0% 0		0.0% 0	0.0% 0	7.1% 1	2.9% 1	0.0% 0	2.8% 1	0.0% 0	0.0% 0	1.4% 1
		Chicken Breasts							0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Ground Turkey							0.0% 0				0.0% 0	
		Ground Beef												0.0% 0
		Pork Chops												
		Chickens									4.5% 2	0.0% 0	0.0% 0	0.0% 0
		Turkeys									0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Cattle									0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Swine										0.0% 0	0.0% 0	0.0% 0
Penicillins	Ampicillin (MIC ≥ 32 µg/ml)	Humans	0.0% 0	0.0% 0		0.0% 0	7.7% 1	7.1% 1	8.6% 3	8.1% 3	5.6% 2	6.1% 2	6.7% 7	5.5% 4
		Chicken Breasts							0.0% 0	0.0% 0	0.0% 0	0.0% 0	11.1% 1	0.0% 0
		Ground Turkey							0.0% 0				0.0% 0	
		Ground Beef												0.0% 0
		Pork Chops												
		Chickens									6.8% 3	8.8% 9	17.7% 14	20.4% 10
		Turkeys									0.0% 0	50.0% 1	0.0% 0	0.0% 0
		Cattle									0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Swine										100.0% 1	50.0% 1	0.0% 0
Phenicols	Chloramphenicol (MIC ≥ 32 µg/ml)	Humans	0.0% 0	0.0% 0		0.0% 0	0.0% 0	7.1% 1	2.9% 1	0.0% 0	2.8% 1	0.0% 0	1.9% 2	1.4% 1
		Chicken Breasts							0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Ground Turkey							0.0% 0				0.0% 0	
		Ground Beef												0.0% 0
		Pork Chops												
		Chickens									0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Turkeys									0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Cattle									0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Swine										0.0% 0	50.0% 1	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

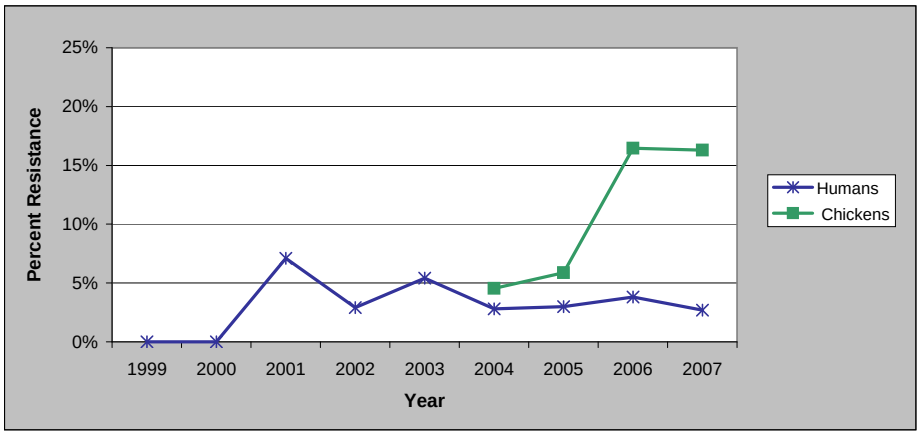
Table 33d. Antimicrobial Resistance among *Salmonella* I 4,[5],12:i:- Isolates from Humans, Retail Meats, and Food Animals, by Year, 1996-2007

Year			1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Number of Isolates Tested		Humans	3	3	0	8	13	14	35	37	36	33	105	73
		Chicken Breasts							5	2	4	9	9	2
		Ground Turkey							2	0	0	0	2	0
		Ground Beef							0	0	0	0	0	2
		Pork Chops							0	0	0	0	0	0
		Chickens		N/A[1]	N/A	N/A	N/A	N/A	N/A	N/A	44	102	79	49
		Turkeys		N/A	N/A	N/A	N/A	N/A	N/A	N/A	1	2	1	1
		Cattle		N/A	N/A	N/A	N/A	N/A	N/A	N/A	4	2	3	6
		Swine		N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	1	2	1
Antimicrobial Class	**Antimicrobial (Resistance Breakpoint)**	**Isolate Source**												
Quinolones	Ciprofloxacin (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
		Chicken Breasts							0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Ground Turkey							0.0% 0				0.0% 0	
		Ground Beef												0.0% 0
		Pork Chops												
		Chickens									0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Turkeys									0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Cattle									0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Swine										0.0% 0	0.0% 0	0.0% 0
	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	2.7% 1	2.8% 1	0.0% 0	1.0% 1	1.4% 1
		Chicken Breasts							0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Ground Turkey							0.0% 0				0.0% 0	
		Ground Beef												0.0% 0
		Pork Chops												
		Chickens									2.3% 1	0.0% 0	0.0% 0	0.0% 0
		Turkeys									0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Cattle									0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Swine										0.0% 0	0.0% 0	0.0% 0
Tetracyclines	Tetracycline (MIC ≥ 16 µg/ml)	Humans	0.0% 0	0.0% 0		0.0% 0	7.7% 1	7.1% 1	5.7% 2	0.0% 0	11.1% 4	3.0% 1	8.6% 9	9.6% 7
		Chicken Breasts							0.0% 0	0.0% 0	0.0% 0	11.1% 1	11.1% 1	0.0% 0
		Ground Turkey							0.0% 0				0.0% 0	
		Ground Beef												0.0% 0
		Pork Chops												
		Chickens									11.4% 5	4.9% 5	3.8% 3	14.3% 7
		Turkeys									0.0% 0	50.0% 1	0.0% 0	0.0% 0
		Cattle									0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Swine										100.0% 1	50.0% 1	0.0% 0

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

Ceftiofur Resistance

Figure 16. Percent of *Salmonella* I 4,[5],12:i:- Isolates from Humans and Chickens Resistant to Ceftiofur, by Year, 1999-2007[1]



[1] Data for other sources and data for humans for 1996-1998 are not included due to the small number of *Salmonella* I 4,[5],12:i:- isolates. Data for food animals are not available for this serotype prior to 2004. Table 33 contains all resistance data available for *Salmonella* I 4,[5],12:i:- isolates

Table 34. Number of *Salmonella* I 4,[5],12:i:- Isolates Tested from Humans, Retail Meats, and Food Animals, by Year, 1996-2007

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Humans	3	3	0	8	13	14	35	37	36	33	105	73
Chicken Breasts							5	2	4	9	9	2
Ground Turkey							2	0	0	0	2	0
Ground Beef							0	0	0	0	0	2
Pork Chops							0	0	0	0	0	0
Chickens		N/A[1]	N/A	N/A	N/A	N/A	N/A	N/A	44	102	79	49
Turkeys		N/A	N/A	N/A	N/A	N/A	N/A	N/A	1	2	1	1
Cattle		N/A	N/A	N/A	N/A	N/A	N/A	N/A	4	2	3	6
Swine		N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	1	2	1

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

Table 35a. Resistance Patterns among *Salmonella* I 4,[5],12:i:- Isolates from Humans, Retail Meats, and Food Animals, by Year, 1996-2007

Year		1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Number of Isolates Tested	Humans	3	3	0	8	13	14	35	37	36	33	105	73
	Chicken Breasts							5	2	4	9	9	2
	Ground Turkey							2	0	0	0	2	0
	Ground Beef							0	0	0	0	0	2
	Pork Chops							0	0	0	0	0	0
	Chickens		N/A[1]	N/A	N/A	N/A	N/A	N/A	N/A	44	102	79	49
	Turkeys		N/A	N/A	N/A	N/A	N/A	N/A	N/A	1	2	1	1
	Cattle		N/A	N/A	N/A	N/A	N/A	N/A	N/A	4	2	3	6
	Swine		N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	1	2	1
Resistance Pattern	**Isolate Source**												
1. No Resistance Detected	Humans	100.0% 3	0.0% 0		87.5% 7	92.3% 12	78.6% 11	91.4% 32	78.4% 29	80.6% 29	87.9% 29	85.7% 90	82.2% 60
	Chicken Breasts							100.0% 5	100.0% 2	100.0% 4	88.9% 8	55.6% 5	50.0% 1
	Ground Turkey							100.0% 2				50.0% 1	
	Ground Beef												50.0% 1
	Pork Chops												
	Chickens									77.3% 34	76.5% 78	68.4% 54	65.3% 32
	Turkeys									0.0% 0	50.0% 1	0.0% 0	0.0% 0
	Cattle									75.0% 3	100.0% 2	100.0% 3	100.0% 6
	Swine										0.0% 0	50.0% 1	100.0% 1
2. Resistant to ≥ 3 Antimicrobial Classes	Humans	0.0% 0	0.0% 0		0.0% 0	7.7% 1	7.1% 1	5.7% 2	5.4% 2	8.3% 3	3.0% 1	9.5% 10	5.5% 4
	Chicken Breasts							0.0% 0	0.0% 0	0.0% 0	11.1% 1	22.2% 2	0.0% 0
	Ground Turkey							0.0% 0				0.0% 0	
	Ground Beef												0.0% 0
	Pork Chops												
	Chickens									13.6% 6	9.8% 10	19.0% 15	20.4% 10
	Turkeys									0.0% 0	50.0% 1	0.0% 0	0.0% 0
	Cattle									0.0% 0	0.0% 0	0.0% 0	0.0% 0
	Swine										100.0% 1	50.0% 1	0.0% 0
3. Resistant to ≥ 4 Antimicrobial Classes	Humans	0.0% 0	0.0% 0		0.0% 0	0.0% 0	7.1% 1	2.9% 1	0.0% 0	2.8% 1	0.0% 0	3.8% 4	2.7% 2
	Chicken Breasts							0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
	Ground Turkey							0.0% 0				0.0% 0	
	Ground Beef												0.0% 0
	Pork Chops												
	Chickens									2.3% 1	0.0% 0	1.3% 1	0.0% 0
	Turkeys									0.0% 0	50.0% 1	0.0% 0	0.0% 0
	Cattle									0.0% 0	0.0% 0	0.0% 0	0.0% 0
	Swine										100.0% 1	50.0% 1	0.0% 0
4. Resistant to ≥ 5 Antimicrobial Classes	Humans	0.0% 0	0.0% 0		0.0% 0	0.0% 0	7.1% 1	2.9% 1	0.0% 0	2.8% 1	0.0% 0	2.9% 3	1.4% 1
	Chicken Breasts							0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
	Ground Turkey							0.0% 0				0.0% 0	
	Ground Beef												0.0% 0
	Pork Chops												
	Chickens									2.3% 1	0.0% 0	1.3% 1	0.0% 0
	Turkeys									0.0% 0	50.0% 1	0.0% 0	0.0% 0
	Cattle									0.0% 0	0.0% 0	0.0% 0	0.0% 0
	Swine										0.0% 0	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 35b. Resistance Patterns among *Salmonella* I 4,[5],12:i:- Isolates from Humans, Retail Meats, and Food Animals, by Year, 1996-2007

Year		1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Number of Isolates Tested	Humans	3	3	0	8	13	14	35	37	36	33	105	73
	Chicken Breasts							5	2	4	9	9	2
	Ground Turkey							2	0	0	0	2	0
	Ground Beef							0	0	0	0	0	2
	Pork Chops							0	0	0	0	0	0
	Chickens		N/A[1]	N/A	N/A	N/A	N/A	N/A	N/A	44	102	79	49
	Turkeys		N/A	N/A	N/A	N/A	N/A	N/A	N/A	1	2	1	1
	Cattle		N/A	N/A	N/A	N/A	N/A	N/A	N/A	4	2	3	6
	Swine		N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	1	2	1
Resistance Pattern	**Isolate Source**												
5. At Least ACSSuT[2] Resistant	Humans	0.0% 0	0.0% 0		0.0% 0	0.0% 0	7.1% 1	2.9% 1	0.0% 0	2.8% 1	0.0% 0	1.9% 2	1.4% 1
	Chicken Breasts							0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
	Ground Turkey							0.0% 0				0.0% 0	
	Ground Beef												0.0% 0
	Pork Chops												
	Chickens									0.0% 0	0.0% 0	0.0% 0	0.0% 0
	Turkeys									0.0% 0	0.0% 0	0.0% 0	0.0% 0
	Cattle									0.0% 0	0.0% 0	0.0% 0	0.0% 0
	Swine										0.0% 0	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	7.1% 1	2.9% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
	Chicken Breasts							0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
	Ground Turkey							0.0% 0				0.0% 0	
	Ground Beef												0.0% 0
	Pork Chops												
	Chickens									0.0% 0	0.0% 0	0.0% 0	0.0% 0
	Turkeys									0.0% 0	0.0% 0	0.0% 0	0.0% 0
	Cattle									0.0% 0	0.0% 0	0.0% 0	0.0% 0
	Swine										0.0% 0	0.0% 0	0.0% 0
7. At Least ACSSuTAuCf[4] 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
	Chicken Breasts							0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
	Ground Turkey							0.0% 0				0.0% 0	
	Ground Beef												0.0% 0
	Pork Chops												
	Chickens									0.0% 0	0.0% 0	0.0% 0	0.0% 0
	Turkeys									0.0% 0	0.0% 0	0.0% 0	0.0% 0
	Cattle									0.0% 0	0.0% 0	0.0% 0	0.0% 0
	Swine										0.0% 0	0.0% 0	0.0% 0
8. At Least Ceftiofur 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
	Chicken Breasts							0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
	Ground Turkey							0.0% 0				0.0% 0	
	Ground Beef												0.0% 0
	Pork Chops												
	Chickens									2.3% 1	0.0% 0	0.0% 0	0.0% 0
	Turkeys									0.0% 0	0.0% 0	0.0% 0	0.0% 0
	Cattle									0.0% 0	0.0% 0	0.0% 0	0.0% 0
	Swine										0.0% 0	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

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

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

[4] ACSSuTAuCf = ACSSuT, amoxicillin-clavulanic acid, and ceftiofur

IV. *Campylobacter* Data

A. *Campylobacter jejuni* and *Campylobacter coli* Isolates Tested

Table 36. Number of *Campylobacter jejuni* Isolates Tested, by Source and Year, 1997-2007

Source	Year										
	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Humans	209	297	293	306	365	329	303	320	791	709	992
Chicken Breasts						198	325	510	403	426	332
Ground Turkey						2	4	7	10	12	20
Ground Beef						0	1	0	0	0	4
Pork Chops						2	0	0	1	1	0
Chickens					64[1]	526	374	508	567	228	166

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

Table 37. Number of *Campylobacter coli* Isolates Tested, by Source and Year, 1997-2007

Source	Year										
	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Humans	6	8	20	12	17	25	22	26	98	97	105
Chicken Breasts						90	142	196	151	145	143
Ground Turkey						2	1	5	9	10	14
Ground Beef						0	0	0	0	0	1
Pork Chops						3	4	3	0	2	4
Chickens					52[1]	288	247	186	380	123	76

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

B. Isolation of *Campylobacter* from Retail Meats

Table 38. Number and Percent of Retail Meat Samples Culture Positive for *Campylobacter*, 2007

	Chicken Breasts	Ground Turkey	Ground Beef	Pork Chops
Number of Meat Samples Tested	1070	1065	1071	1072
Number Positive for *Campylobacter*	475	34	5	4
Percent Positive for *Campylobacter*	44.4%	3.2%	0.5%	0.4%

Figure 17. Percent of Retail Meat Samples Culture Positive for *Campylobacter*, 2007

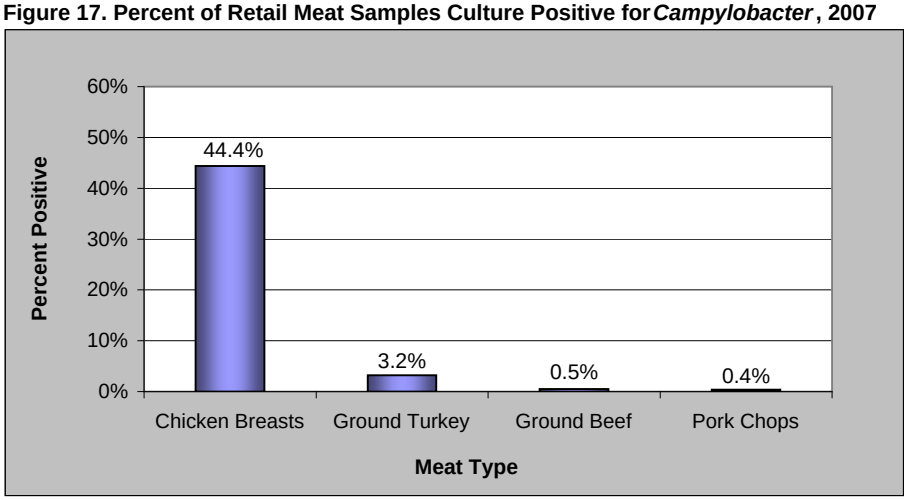
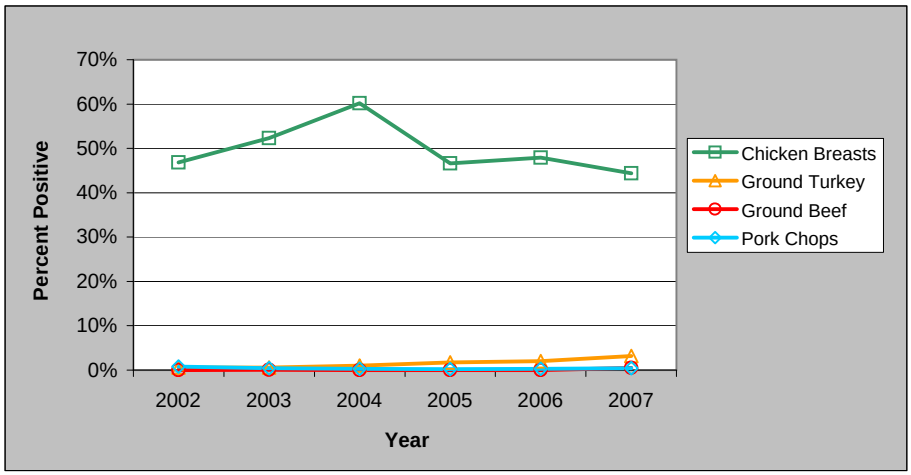


Figure 18. Percent of Retail Meat Samples Culture Positive for *Campylobacter*, 2002-2007

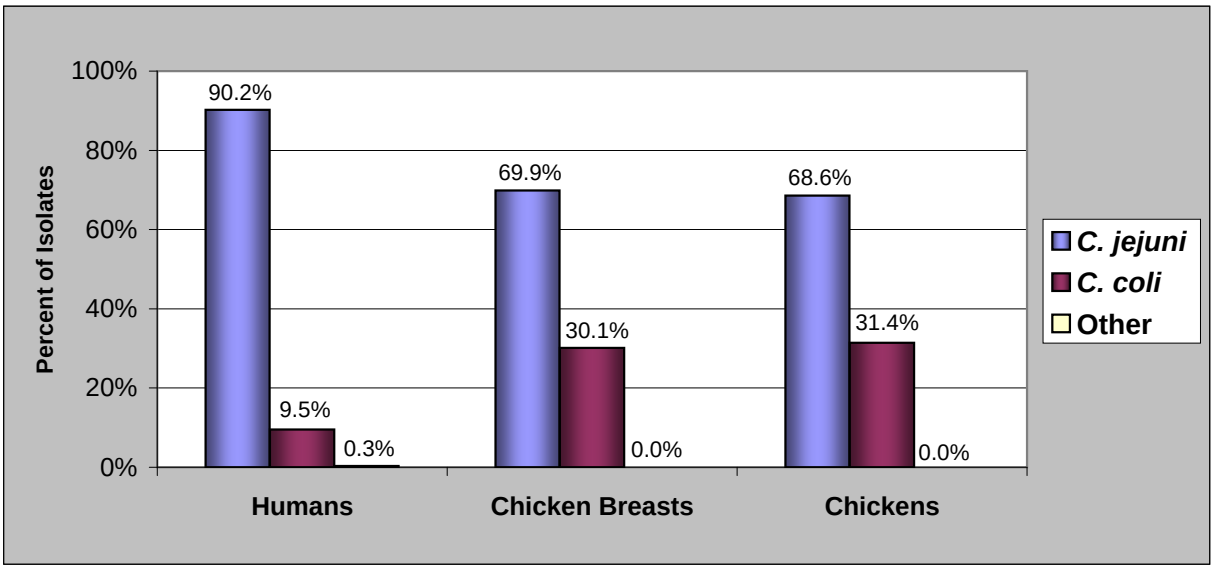


C. *Campylobacter* Species

Table 39. *Campylobacter* Species Isolated from Humans, Retail Meats, and Chickens, 2007

	Humans	Retail Meats				Food Animals
***Campylobacter* Species**	**Humans (N=1100)**	**Chicken Breasts (N=475)**	**Ground Turkey (N=34)**	**Ground Beef (N=5)**	**Pork Chops (N=4)**	**Chickens (N=242)**
C. jejuni	90.2% 992	69.9% 332	58.8% 20	80.0% 4	0.0% 0	68.6% 166
C. coli	9.5% 105	30.1% 143	41.2% 14	20.0% 1	100.0% 4	31.4% 76
Other	0.3% 3	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0

Figure 19. *Campylobacter* Species Isolated from Humans, Chicken Breasts, and Chickens, 2007



D. Antimicrobial Susceptibility among *Campylobacter jejuni*

MIC Distributions

Table 40a. Distribution of MICs and Occurrence of Resistance among *Campylobacter jejuni* Isolates from Humans, Retail Meats, and Chickens, 2007

Antimicrobial	Isolate Source (# of Isolates)[1]	%I[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	128	256
Aminoglycosides																			
Gentamicin	Humans (992)	0.1	**0.7**	[0.3 - 1.4]				2.7	35.7	55.1	5.4	0.2	0.1				**0.7**		
	Chicken Breasts (332)	0.0	**0.0**	[0.0 - 1.1]				0.6	17.2	79.8	2.4								
	Ground Turkey (20)	0.0	**0.0**	[0.0 - 16.8]				5.0	30.0	65.0									
	Ground Beef (4)	0.0	**0.0**	[0.0 - 60.2]						100.0									
	Chickens (166)	0.0	**0.0**	[0.0 - 2.2]				4.2	37.3	58.4									
Ketolides																			
Telithromycin	Humans (992)	0.3	**1.0**	[0.5 - 1.8]				0.8	14.1	37.1	32.7	12.1	1.9	0.3	**1.0**				
	Chicken Breasts (332)	0.0	**0.6**	[0.1 - 2.2]				0.6	11.4	39.8	40.1	6.6	0.9		**0.6**				
	Ground Turkey (20)	0.0	**5.0**	[0.1 - 24.9]					10.0	30.0	45.0	10.0			**5.0**				
	Ground Beef (4)	0.0	**0.0**	[0.0 - 60.2]					25.0	25.0	50.0								
	Chickens (166)	0.0	**0.0**	[0.0 - 2.2]				2.4	17.5	48.2	28.9	3.0							
Lincosamides																			
Clindamycin	Humans (992)	0.1	**1.3**	[0.7 - 2.2]		1.3	27.9	43.2	18.4	5.5	1.6	0.5	0.1	**0.3**	**0.6**	**0.4**			
	Chicken Breasts (332)	0.0	**0.6**	[0.1 - 2.2]		1.2	12.7	58.4	24.7	2.4						**0.6**			
	Ground Turkey (20)	0.0	**5.0**	[0.1 - 24.9]			20.0	60.0	15.0					**5.0**					
	Ground Beef (4)	0.0	**0.0**	[0.0 - 60.2]				75.0	25.0										
	Chickens (166)	0.0	**0.0**	[0.0 - 2.2]		1.2	40.4	49.4	8.4	0.6									
Macrolides																			
Azithromycin	Humans (992)	0.0	**1.6**	[0.9 - 2.6]	1.4	25.6	47.9	19.4	3.9	0.1	0.1							**1.6**	
	Chicken Breasts (332)	0.0	**0.6**	[0.1 - 2.2]		46.4	48.5	4.5										**0.6**	
	Ground Turkey (20)	0.0	**5.0**	[0.1 - 24.9]		35.0	50.0	10.0										**5.0**	
	Ground Beef (4)	0.0	**0.0**	[0.0 - 60.2]		50.0	50.0												
	Chickens (166)	0.0	**0.0**	[0.0 - 2.2]	11.4	51.8	33.1	3.0		0.6									
Erythromycin	Humans (992)	0.0	**1.6**	[0.9 - 2.6]			0.3	6.7	41.4	31.3	14.7	3.7	0.3				**0.1**	**1.5**	
	Chicken Breasts (332)	0.0	**0.6**	[0.1 - 2.2]			0.3	6.9	43.7	34.3	13.6	0.6						**0.6**	
	Ground Turkey (20)	0.0	**5.0**	[0.1 - 24.9]				10.0	45.0	25.0	15.0							**5.0**	
	Ground Beef (4)	0.0	**0.0**	[0.0 - 60.2]				25.0	75.0										
	Chickens (166)	0.0	**0.0**	[0.0 - 2.2]			1.2	13.9	48.8	30.7	5.4								

[1] There were no *C. jejuni* isolates from pork chops

[2] Percent of isolates with intermediate susceptibility

[3] Percent resistant; for florfenicol, percent non-susceptible

[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

Table 40b. Distribution of MICs and Occurrence of Resistance among *Campylobacter jejuni* Isolates from Humans, Retail Meats, and Chickens, 2007

Antimicrobial	Isolate Source (# of Isolates)[1]	%I[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	128	256
Phenicols																			
Florfenicol[6]	Humans (992)	N/A	**0.0**	[0.0 - 0.4]					0.3	23.3	62.8	10.8	2.8						
	Chicken Breasts (332)	N/A	**0.0**	[0.0 - 1.1]						9.3	80.7	9.9							
	Ground Turkey (20)	N/A	**0.0**	[0.0 - 16.8]						10.0	85.0	5.0							
	Ground Beef (4)	N/A	**0.0**	[0.0 - 60.2]							100.0								
	Chickens (166)	N/A	**0.0**	[0.0 - 2.2]				0.6	0.6	35.5	57.8	5.4							
Quinolones																			
Ciprofloxacin	Humans (992)	0.2	**25.8**	[23.1 - 28.6]		2.3	44.3	21.9	4.8	0.7		0.2	**1.4**	**10.5**	**7.9**	**4.4**	**1.3**	**0.3**	
	Chicken Breasts (332)	0.0	**17.2**	[13.3 - 21.7]		0.9	30.1	44.0	7.8					**6.3**	**7.5**	**3.3**			
	Ground Turkey (20)	0.0	**30.0**	[11.9 - 54.3]		5.0	40.0	5.0	10.0	10.0				**15.0**	**5.0**	**10.0**			
	Ground Beef (4)	0.0	**50.0**	[6.8 - 93.2]			25.0		25.0					**50.0**					
	Chickens (166)	0.0	**21.7**	[15.7 - 28.7]		0.6	48.8	24.1	3.6	0.6	0.6		**1.8**	**14.5**	**5.4**				
Nalidixic acid	Humans (992)	0.4	**26.1**	[23.4 - 29.0]									58.2	13.6	1.7	0.4	**1.8**	**24.3**	
	Chicken Breasts (332)	0.0	**17.2**	[13.3 - 21.7]									69.3	13.6			**0.3**	**16.9**	
	Ground Turkey (20)	0.0	**30.0**	[11.9 - 54.3]									50.0	20.0				**30.0**	
	Ground Beef (4)	0.0	**50.0**	[6.8 - 93.2]									25.0	25.0				**50.0**	
	Chickens (166)	0.6	**21.7**	[15.7 - 28.7]									68.1	9.0	0.6	0.6	**5.4**	**16.3**	
Tetracyclines																			
Tetracycline	Humans (992)	0.1	**44.8**	[41.6 - 47.9]			3.7	26.3	16.0	5.5	2.7	0.5	0.3	0.1	**0.7**	**3.1**	**12.7**	**28.2**	
	Chicken Breasts (332)	0.0	**48.5**	[43.0 - 54.0]			1.2	13.3	21.1	10.5	5.1		0.3		**2.4**	**6.3**	**14.5**	**25.3**	
	Ground Turkey (20)	0.0	**90.0**	[68.3 - 98.8]			5.0		5.0							**5.0**	**25.0**	**60.0**	
	Ground Beef (4)	0.0	**0.0**	[0.0 - 60.2]				75.0	25.0										
	Chickens (166)	0.6	**56.6**	[48.7 - 64.3]			4.2	24.7	7.8	4.2	1.2	0.6		0.6	**4.8**	**12.7**	**19.3**	**19.9**	

[1] There were no *C. jejuni* isolates from pork chops

[2] Percent of isolates with intermediate susceptibility

[3] Percent resistant; for florfenicol, percent non-susceptible

[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

[6] 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

Resistance by Year

Table 41a. Antimicrobial Resistance among *Campylobacter jejuni* Isolates from Humans, Retail Meats, and Chickens, by Year, 1997-2007

Year			1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Number of Isolates Tested		Humans	209	297	293	306	365	329	303	320	791	709	992
		Chicken Breasts						198	325	510	403	426	332
		Ground Turkey						2	4	7	10	12	20
		Ground Beef						0	1	0	0	0	4
		Pork Chops						2	0	0	1	1	0
		Chickens					64[1]	526	374	508	567	228	166
Antimicrobial Class	**Antimicrobial (Resistance Breakpoint)[2]**	**Isolate Source**											
Aminoglycosides	Gentamicin (MIC ≥ 8 µg/ml)	Humans		0.3% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.3% 1	0.5% 4	0.0% 0	0.7% 7
		Chicken Breasts						0.0% 0	0.3% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Ground Turkey						0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Ground Beef							0.0% 0				0.0% 0
		Pork Chops						0.0% 0			0.0% 0	0.0% 0	
		Chickens					0.0% 0	0.0% 0	0.0% 0	0.2% 1	0.0% 0	0.0% 0	0.0% 0
Ketolides	Telithromycin (MIC ≥ 16 µg/ml)	Humans									0.6% 5	0.8% 6	1.0% 10
		Chicken Breasts								0.4% 2	0.5% 2	0.7% 3	0.6% 2
		Ground Turkey								0.0% 0	0.0% 0	0.0% 0	5.0% 1
		Ground Beef											0.0% 0
		Pork Chops									0.0% 0	0.0% 0	
		Chickens									0.4% 2	0.0% 0	0.0% 0
Lincosamides	Clindamycin (MIC ≥ 8 µg/ml)	Humans	1.0% 2	1.0% 3	0.7% 2	0.7% 2	1.9% 7	1.8% 6	0.0% 0	2.2% 7	1.1% 9	1.0% 7	1.3% 13
		Chicken Breasts								0.4% 2	0.5% 2	0.7% 3	0.6% 2
		Ground Turkey								0.0% 0	0.0% 0	0.0% 0	5.0% 1
		Ground Beef											0.0% 0
		Pork Chops									0.0% 0	0.0% 0	
		Chickens					0.0% 0	0.4% 2	0.8% 3	0.2% 1	0.4% 2	0.0% 0	0.0% 0
Macrolides	Azithromycin (MIC ≥ 8 µg/ml)	Humans		0.3% 1	1.7% 5	1.6% 5	1.9% 7	1.8% 6	0.3% 1	0.6% 2	1.8% 14	0.8% 6	1.6% 16
		Chicken Breasts								0.8% 4	0.5% 2	0.9% 4	0.6% 2
		Ground Turkey								0.0% 0	0.0% 0	0.0% 0	5.0% 1
		Ground Beef											0.0% 0
		Pork Chops									0.0% 0	0.0% 0	
		Chickens					3.1% 2	0.6% 3	1.3% 5	1.6% 8	1.4% 8	0.4% 1	0.0% 0
	Erythromycin (MIC ≥ 32 µg/ml)	Humans	1.4% 3	0.7% 2	1.4% 4	1.0% 3	1.9% 7	1.2% 4	0.3% 1	0.3% 1	1.6% 13	0.8% 6	1.6% 16
		Chicken Breasts						0.0% 0	0.0% 0	0.8% 4	0.5% 2	0.9% 4	0.6% 2
		Ground Turkey						0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	5.0% 1
		Ground Beef							0.0% 0				0.0% 0
		Pork Chops						0.0% 0			0.0% 0	0.0% 0	
		Chickens					3.1% 2	0.6% 3	1.6% 6	1.2% 6	1.1% 6	0.4% 1	0.0% 0

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

[2] 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

Table 41b. Antimicrobial Resistance among *Campylobacter jejuni* Isolates from Humans, Retail Meats, and Chickens, by Year, 1997-2007

Year			1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Number of Isolates Tested		Humans	209	297	293	306	365	329	303	320	791	709	992
		Chicken Breasts						198	325	510	403	426	332
		Ground Turkey						2	4	7	10	12	20
		Ground Beef						0	1	0	0	0	4
		Pork Chops						2	0	0	1	1	0
		Chickens					64[1]	526	374	508	567	228	166
Antimicrobial Class	**Antimicrobial (Resistance Breakpoint)[2]**	**Isolate Source**											
Phenicols	Chloramphenicol (MIC ≥ 32 µg/ml)	Humans	3.8% 8	1.0% 3	0.7% 2	0.0% 0	0.3% 1	0.3% 1	0.0% 0	1.6% 5			
		Chickens					0.0% 0	0.0% 0	0.0% 0	0.0% 0			
	Florfenicol (MIC ≥ 8)[3]	Humans									0.5% 4	0.0% 0	0.0% 0
		Chicken Breasts								0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Ground Turkey								0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Ground Beef											0.0% 0
		Pork Chops									0.0% 0	0.0% 0	
		Chickens									0.0% 0	0.0% 0	0.0% 0
Quinolones	Ciprofloxacin (MIC ≥ 4 µg/ml)	Humans	12.4% 26	13.8% 41	17.7% 52	14.7% 45	18.4% 67	20.7% 68	17.2% 52	18.1% 58	21.5% 170	19.5% 138	25.8% 256
		Chicken Breasts						15.2% 30	14.5% 47	15.1% 77	15.1% 61	16.7% 71	17.2% 57
		Ground Turkey						50.0% 1	0.0% 0	28.6% 2	10.0% 1	50.0% 6	30.0% 6
		Ground Beef							0.0% 0				50.0% 2
		Pork Chops						0.0% 0			100.0% 1	0.0% 0	
		Chickens					20.3% 13	18.6% 98	14.7% 55	21.3% 108	15.0% 85	8.8% 20	21.7% 36
	Nalidixic acid (MIC ≥ 64 µg/ml)	Humans	13.4% 28	15.5% 46	20.1% 59	16.0% 49	18.9% 69	21.3% 70	17.8% 54	18.4% 59	21.9% 173	19.0% 135	26.1% 259
		Chicken Breasts								15.1% 77	14.9% 60	16.7% 71	17.2% 57
		Ground Turkey								28.6% 2	10.0% 1	50.0% 6	30.0% 6
		Ground Beef											50.0% 2
		Pork Chops									100.0% 1	0.0% 0	
		Chickens					20.3% 13	22.1% 116	15.5% 58	21.7% 110	15.3% 87	8.8% 20	21.7% 36
Tetracyclines	Doxycycline (MIC ≥ 8 µg/ml)	Chicken Breasts						38.4% 76	40.6% 132				
		Ground Turkey						100.0% 2	75.0% 3				
		Ground Beef							0.0% 0				
		Pork Chops						0.0% 0					
	Tetracycline (MIC ≥ 16 µg/ml)	Humans	47.8% 100	46.1% 137	45.4% 133	39.2% 120	40.3% 147	41.3% 136	38.3% 116	46.9% 150	41.8% 331	47.4% 336	44.8% 444
		Chicken Breasts								50.2% 256	46.4% 187	47.2% 201	48.5% 161
		Ground Turkey								42.9% 3	70.0% 7	75.0% 9	90.0% 18
		Ground Beef											0.0% 0
		Pork Chops									0.0% 0	0.0% 0	
		Chickens					35.9% 23	45.1% 237	47.6% 178	42.3% 215	44.1% 250	56.1% 128	56.6% 94

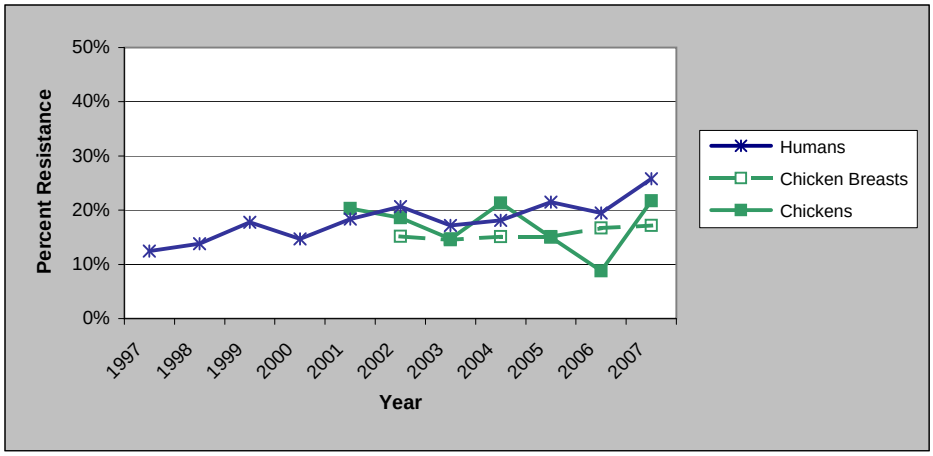
[1] These isolates were recovered from July through December, 2001, when the new ARS isolation method was used

[2] 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

[3] 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

Ciprofloxacin Resistance

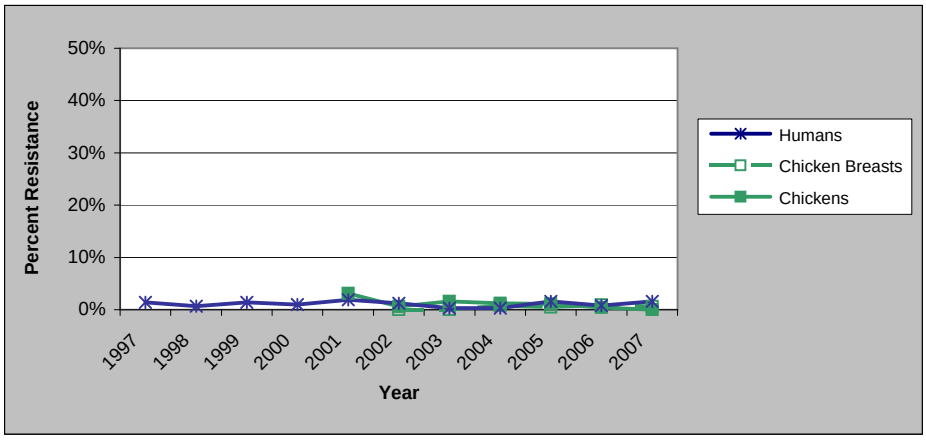
Figure 20. Percent of *Campylobacter jejuni* Isolates from Humans, Chicken Breasts, and Chickens Resistant to Ciprofloxacin, by Year, 1997-2007[1]



[1] Data for ground turkey, ground beef, and pork chops are not included due to the small number of *C. jejuni* isolates from these sources. Table 41 contains resistance data for *C. jejuni* isolates from each source, by year

Erythromycin Resistance

Figure 21. Percent of *Campylobacter jejuni* Isolates from Humans, Chicken Breasts, and Chickens Resistant to Erythromycin by Year, 1997-2007[1]



[1] Data for ground turkey, ground beef, and pork chops are not included due to the small number of *C. jejuni* isolates from these sources. Table 41 contains resistance data for *C. jejuni* isolates from each source, by year

Table 42. Number of *Campylobacter jejuni* Isolates Tested from Humans, Retail Meats, and Chickens by Year, 1997-2007

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Humans	209	297	293	306	365	329	303	320	791	709	992
Chicken Breasts						198	325	510	403	426	332
Ground Turkey						2	4	7	10	12	20
Ground Beef						0	1	0	0	0	4
Pork Chops						2	0	0	1	1	0
Chickens					64[1]	526	374	508	567	228	166

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

E. Antimicrobial Susceptibility among *Campylobacter coli*

MIC Distributions

Table 43a. Distribution of MICs and Occurrence of Resistance among *Campylobacter coli* Isolates from Humans, Retail Meats, and Chickens, 2007

Antimicrobial	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 (105)	0.0	**0.0**	[0.0 - 3.5]					14.3	61.0	23.8	1.0							
	Chicken Breasts (143)	0.0	**0.7**	[0.0 - 3.8]				0.7	2.8	88.8	7.0					**0.7**			
	Ground Turkey (14)	0.0	**0.0**	[0.0 - 23.2]					7.1	92.9									
	Ground Beef (1)	0.0	**0.0**	[0.0 - 97.5]							100.0								
	Pork Chops (4)	0.0	**0.0**	[0.0 - 60.2]						100.0									
	Chickens (76)	0.0	**1.3**	[0.0 - 7.1]				1.3	19.7	76.3	1.3						**1.3**		
Ketolides																			
Telithromycin	Humans (105)	3.8	**5.7**	[2.1 - 12.0]					14.3	18.1	21.9	21.0	15.2	3.8	**5.7**				
	Chicken Breasts (143)	0.0	**7.0**	[3.4 - 12.5]					11.2	8.4	17.5	48.3	7.7		**7.0**				
	Ground Turkey (14)	0.0	**0.0**	[0.0 - 23.2]					14.3		21.4	57.1	7.1						
	Ground Beef (1)	0.0	**0.0**	[0.0 - 97.5]								100.0							
	Pork Chops (4)	0.0	**25.0**	[0.6 - 80.6]							75.0				**25.0**				
	Chickens (76)	1.3	**13.2**	[6.5 - 22.9]				2.6	19.7	6.6	25.0	31.6		1.3	**13.2**				
Lincosamides																			
Clindamycin	Humans (105)	1.9	**5.7**	[2.1 - 12.0]		1.0	6.7	21.0	28.6	22.9	10.5	1.9	1.9		**3.8**	**1.9**			
	Chicken Breasts (143)	1.4	**4.9**	[2.0 - 9.8]			0.7	16.8	60.8	11.9	3.5		1.4	**2.1**	**2.8**				
	Ground Turkey (14)	0.0	**0.0**	[0.0 - 23.2]				21.4	42.9	14.3		21.4							
	Ground Beef (1)	0.0	**0.0**	[0.0 - 97.5]					100.0										
	Pork Chops (4)	0.0	**25.0**	[0.6 - 80.6]				25.0	50.0						**25.0**				
	Chickens (76)	3.9	**9.2**	[3.8 - 18.1]			3.9	22.4	57.9	1.3		1.3	3.9	**9.2**					
Macrolides																			
Azithromycin	Humans (105)	0.0	**5.7**	[2.1 - 12.0]		8.6	21.9	41.0	21.0	1.9								**5.7**	
	Chicken Breasts (143)	0.0	**6.3**	[2.9 - 11.6]		9.1	61.5	21.7	0.7		0.7							**6.3**	
	Ground Turkey (14)	0.0	**0.0**	[0.0 - 23.2]			57.1	21.4	21.4										
	Ground Beef (1)	0.0	**0.0**	[0.0 - 97.5]			100.0												
	Pork Chops (4)	0.0	**25.0**	[0.6 - 80.6]			75.0											**25.0**	
	Chickens (76)	0.0	**14.5**	[7.5 - 24.4]		13.2	50.0	22.4										**14.5**	
Erythromycin	Humans (105)	0.0	**5.7**	[2.1 - 12.0]				1.0	15.2	25.7	24.8	21.0	6.7					**5.7**	
	Chicken Breasts (143)	0.7	**6.3**	[2.9 - 11.6]			0.7	1.4	19.6	11.2	46.2	14.0			0.7			**6.3**	
	Ground Turkey (14)	0.0	**0.0**	[0.0 - 23.2]					14.3	35.7	42.9	7.1							
	Ground Beef (1)	0.0	**0.0**	[0.0 - 97.5]							100.0								
	Pork Chops (4)	0.0	**25.0**	[0.6 - 80.6]						50.0	25.0							**25.0**	
	Chickens (76)	0.0	**14.5**	[7.5 - 24.4]				2.6	22.4	17.1	40.8	2.6						**14.5**	

[1] Percent of isolates with intermediate susceptibility

[2] Percent resistant; for florfenicol, percent non-susceptible

[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 43b. Distribution of MICs and Occurrence of Resistance among *Campylobacter coli* Isolates from Humans, Retail Meats, and Chickens, 2007

Antimicrobial	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
Phenicols																			
Florfenicol[6]	Humans (105)	N/A	**0.0**	[0.0 - 3.5]						15.2	44.8	38.1	1.9						
	Chicken Breasts (143)	N/A	**0.0**	[0.0 - 2.5]						2.1	78.3	19.6							
	Ground Turkey (14)	N/A	**0.0**	[0.0 - 23.2]							71.4	28.6							
	Ground Beef (1)	N/A	**0.0**	[0.0 - 97.5]							100.0								
	Pork Chops (4)	N/A	**0.0**	[0.0 - 60.2]						25.0	75.0								
	Chickens (76)	N/A	**0.0**	[0.0 - 4.7]						6.6	86.8	6.6							
Quinolones																			
Ciprofloxacin	Humans (105)	0.0	**28.6**	[20.2 - 38.2]		1.9	25.7	23.8	12.4	7.6			**2.9**	**8.6**	**15.2**	**1.9**			
	Chicken Breasts (143)	0.0	**25.9**	[18.9 - 33.9]			9.8	34.3	30.1					**3.5**	**18.2**	**4.2**			
	Ground Turkey (14)	0.0	**50.0**	[23.0 - 77.0]				35.7	14.3					**7.1**	**28.6**	**14.3**			
	Ground Beef (1)	0.0	**0.0**	[0.0 - 97.5]					100.0										
	Pork Chops (4)	0.0	**0.0**	[0.0 - 60.2]			25.0	75.0											
	Chickens (76)	0.0	**15.8**	[8.4 - 26.0]			22.4	42.1	19.7				**1.3**	**7.9**	**6.6**				
Nalidixic acid	Humans (105)	0.0	**30.5**	[21.9 - 40.2]									35.2	27.6	6.7		**7.6**	**22.9**	
	Chicken Breasts (143)	0.0	**25.9**	[18.9 - 33.9]									50.3	22.4	1.4		**6.3**	**19.6**	
	Ground Turkey (14)	0.0	**50.0**	[23.0 - 77.0]									42.9	7.1			**14.3**	**35.7**	
	Ground Beef (1)	0.0	**0.0**	[0.0 - 97.5]										100.0					
	Pork Chops (4)	0.0	**0.0**	[0.0 - 60.2]									75.0	25.0					
	Chickens (76)	0.0	**15.8**	[8.4 - 26.0]									75.0	9.2			**5.3**	**10.5**	
Tetracyclines																			
Tetracycline	Humans (105)	0.0	**41.9**	[32.3 - 51.9]			1.9	5.7	26.7	10.5	9.5	2.9	1.0		**1.9**	**1.0**	**5.7**	**33.3**	
	Chicken Breasts (143)	0.0	**39.9**	[31.8 - 48.4]			0.7	0.7	32.9	18.2	6.3	1.4					**3.5**	**36.4**	
	Ground Turkey (14)	0.0	**64.3**	[35.1 - 87.2]					21.4		7.1	7.1						**64.3**	
	Ground Beef (1)	0.0	**100.0**	[2.5 - 100.0]														**100.0**	
	Pork Chops (4)	0.0	**100.0**	[39.8 - 100.0]														**100.0**	
	Chickens (76)	0.0	**42.1**	[30.9 - 54.0]				13.2	39.5	5.3						**1.3**	**6.6**	**34.2**	

[1] Percent of isolates with intermediate susceptibility

[2] Percent resistant; for florfenicol, percent non-susceptible

[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] 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

Resistance by Year

Table 44a. Antimicrobial Resistance among *Campylobacter coli* Isolates from Humans, Retail Meats, and Chickens, by Year, 1997-2007

Year			1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Number of Isolates Tested		Humans	6	8	20	12	17	25	22	26	98	97	105
		Chicken Breasts						90	142	196	151	145	143
		Ground Turkey						2	1	5	9	10	14
		Ground Beef						0	0	0	0	0	1
		Pork Chops						3	4	3	0	2	4
		Chickens					52[1]	288	247	186	380	123	76
Antimicrobial Class	**Antimicrobial (Resistance Breakpoint)[2]**	**Isolate Source**											
Aminoglycosides	Gentamicin (MIC ≥ 8 µg/ml)	Humans		0.0% 0	0.0% 0	8.3% 1	0.0% 0	0.0% 0	4.5% 1	0.0% 0	2.0% 2	1.0% 1	0.0% 0
		Chicken Breasts						0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.7% 1
		Ground Turkey						0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Ground Beef											0.0% 0
		Pork Chops						0.0% 0	0.0% 0	0.0% 0		0.0% 0	0.0% 0
		Chickens					0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.3% 1	0.0% 0	1.3% 1
Ketolides	Telithromycin (MIC ≥ 16 µg/ml)	Humans									4.1% 4	7.2% 7	5.7% 6
		Chicken Breasts								8.2% 16	7.9% 12	4.8% 7	7.0% 10
		Ground Turkey								0.0% 0	22.2% 2	0.0% 0	0.0% 0
		Ground Beef											0.0% 0
		Pork Chops								0.0% 0		50.0% 1	25.0% 1
		Chickens									5.5% 21	6.5% 8	13.2% 10
Lincosamides	Clindamycin (MIC ≥ 8 µg/ml)	Humans	16.7% 1	12.5% 1	10.0% 2	8.3% 1	5.9% 1	4.0% 1	9.1% 2	0.0% 0	4.1% 4	9.3% 9	5.7% 6
		Chicken Breasts								7.1% 14	8.6% 13	4.8% 7	4.9% 7
		Ground Turkey								0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Ground Beef											0.0% 0
		Pork Chops								33.3% 1		50.0% 1	25.0% 1
		Chickens					1.9% 1	4.9% 14	4.5% 11	1.1% 2	2.4% 9	1.6% 2	9.2% 7
Macrolides	Azithromycin (MIC ≥ 8 µg/ml)	Humans		12.5% 1	10.0% 2	8.3% 1	5.9% 1	4.0% 1	9.1% 2	0.0% 0	3.1% 3	8.2% 8	5.7% 6
		Chicken Breasts								9.2% 18	9.9% 15	5.5% 8	6.3% 9
		Ground Turkey								0.0% 0	22.2% 2	0.0% 0	0.0% 0
		Ground Beef											0.0% 0
		Pork Chops								33.3% 1		50.0% 1	25.0% 1
		Chickens					11.5% 6	19.4% 56	20.2% 50	9.1% 17	8.4% 32	8.9% 11	14.5% 11
	Erythromycin (MIC ≥ 32 µg/ml)	Humans	0.0% 0	12.5% 1	10.0% 2	8.3% 1	5.9% 1	4.0% 1	9.1% 2	0.0% 0	3.1% 3	8.2% 8	5.7% 6
		Chicken Breasts						7.8% 7	7.0% 10	9.2% 18	9.9% 15	5.5% 8	6.3% 9
		Ground Turkey						0.0% 0	0.0% 0	0.0% 0	22.2% 2	0.0% 0	0.0% 0
		Ground Beef											0.0% 0
		Pork Chops						33.3% 1	75.0% 3	33.3% 1		50.0% 1	25.0% 1
		Chickens					9.6% 5	18.8% 54	20.2% 50	9.1% 17	8.4% 32	8.9% 11	14.5% 11

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

[2] 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

Table 44b. Antimicrobial Resistance among *Campylobacter coli* Isolates from Humans, Retail Meats, and Chickens, by Year, 1997-2007

Year			1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Number of Isolates Tested		Humans	6	8	20	12	17	25	22	26	98	97	105
		Chicken Breasts						90	142	196	151	145	143
		Ground Turkey						2	1	5	9	10	14
		Ground Beef						0	0	0	0	0	1
		Pork Chops						3	4	3	0	2	4
		Chickens					52[1]	288	247	186	380	123	76
Antimicrobial Class	**Antimicrobial (Resistance Breakpoint)[2]**	**Isolate Source**											
Phenicols	Chloramphenicol (MIC ≥ 32 µg/ml)	Humans	50.0% 3	37.5% 3	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0			
		Chickens					0.0% 0	0.0% 0	0.0% 0	0.0% 0			
	Florfenicol (MIC > 4)[3]	Humans									1.0% 1	0.0% 0	0.0% 0
		Chicken Breasts								0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Ground Turkey								0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Ground Beef											0.0% 0
		Pork Chops								0.0% 0		0.0% 0	0.0% 0
		Chickens									0.0% 0	0.0% 0	0.0% 0
Quinolones	Ciprofloxacin (MIC ≥ 4 µg/ml)	Humans	33.3% 2	0.0% 0	30.0% 6	25.0% 3	47.1% 8	12.0% 3	22.7% 5	30.8% 8	23.5% 23	21.6% 21	28.6% 30
		Chicken Breasts						10.0% 9	13.4% 19	16.3% 32	29.1% 44	22.1% 32	25.9% 37
		Ground Turkey						50.0% 1	100.0% 1	0.0% 0	55.6% 5	30.0% 3	50.0% 7
		Ground Beef											0.0% 0
		Pork Chops						0.0% 0	0.0% 0	0.0% 0		0.0% 0	0.0% 0
		Chickens					19.2% 10	16.0% 46	20.2% 50	26.9% 50	22.1% 84	15.4% 19	15.8% 12
	Nalidixic acid (MIC ≥ 64 µg/ml)	Humans	50.0% 3	50.0% 4	30.0% 6	25.0% 3	47.1% 8	12.0% 3	22.7% 5	34.6% 9	26.5% 26	23.7% 23	30.5% 32
		Chicken Breasts								16.3% 32	29.1% 44	20.7% 30	25.9% 37
		Ground Turkey								0.0% 0	55.6% 5	30.0% 3	50.0% 7
		Ground Beef											0.0% 0
		Pork Chops								0.0% 0		0.0% 0	0.0% 0
		Chickens					19.2% 10	17.7% 51	21.5% 53	27.4% 51	22.1% 84	15.4% 19	15.8% 12
Tetracyclines	Doxycycline (MIC ≥ 8 µg/ml)	Chicken Breasts						44.4% 40	50.7% 72				
		Ground Turkey						50.0% 1	100.0% 1				
		Ground Beef											
		Pork Chops						33.3% 1	75.0% 3				
	Tetracycline (MIC ≥ 16 µg/ml)	Humans	66.7% 4	50.0% 4	30.0% 6	25.0% 3	58.8% 10	40.0% 10	45.5% 10	38.5% 10	30.6% 30	39.2% 38	41.9% 44
		Chicken Breasts								46.4% 91	42.4% 64	46.9% 68	39.9% 57
		Ground Turkey								0.0% 0	88.9% 8	80.0% 8	64.3% 9
		Ground Beef											100.0% 1
		Pork Chops								66.7% 2		0.0% 0	100.0% 4
		Chickens					57.7% 30	49.0% 141	51.0% 126	48.4% 90	42.1% 160	53.7% 66	42.1% 32

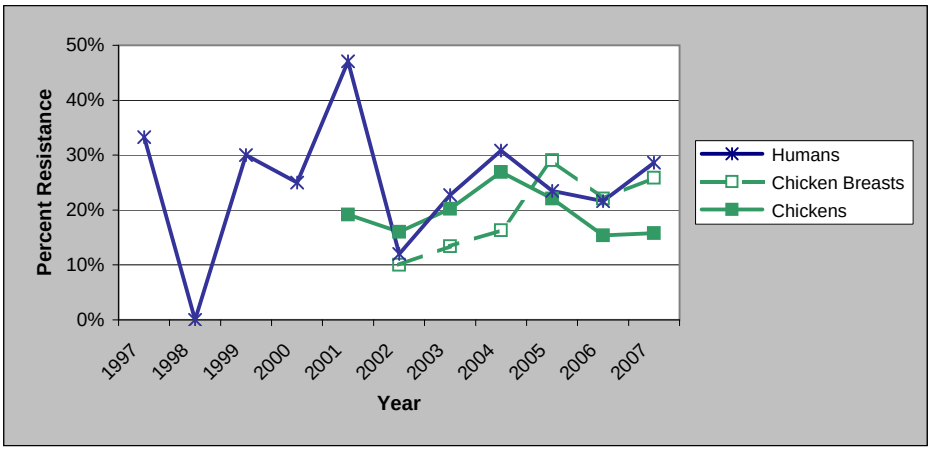
[1] These isolates were recovered from July through December, 2001, when the new ARS isolation method was used

[2] 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

[3] 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

Ciprofloxacin Resistance

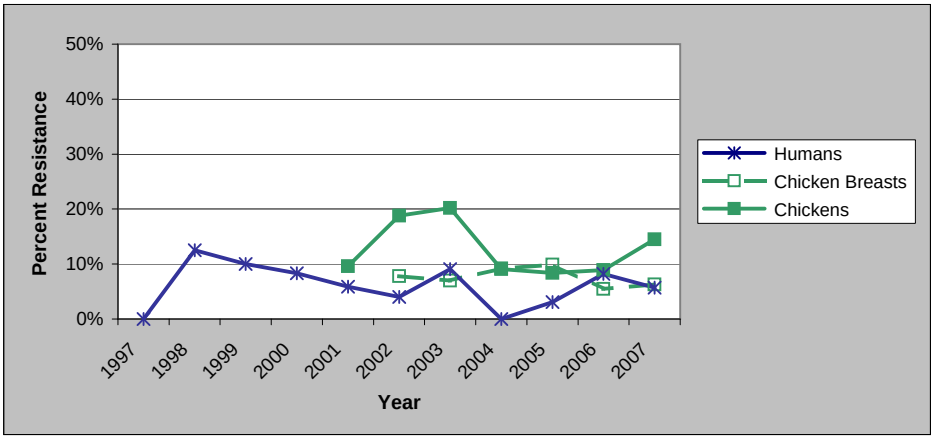
Figure 22. Percent of *Campylobacter coli* Isolates from Humans, Chicken Breasts, and Chickens Resistant to Ciprofloxacin, by Year, 1997-2007[1]



[1] Data for ground turkey, ground beef, and pork chops are not included due to the small number of *C. coli* isolates from these sources. Table 44 contains resistance data for *C. coli* isolates from each source, by year

Erythromycin Resistance

Figure 23. Percent of *Campylobacter coli* Isolates from Humans, Chicken Breasts, and Chickens Resistant to Erythromycin, by Year, 1997-2007[1]



[1] Data for ground turkey, ground beef, and pork chops are not included due to the small number of *C. coli* isolates from these sources. Table 44 contains resistance data for *C. coli* isolates from each source, by year

Table 45. Number of *Campylobacter coli* Isolates Tested from Humans, Retail Meats, and Chickens, by Year, 1997-2007

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Humans	6	8	20	12	17	25	22	26	98	97	105
Chicken Breasts						90	142	196	151	145	143
Ground Turkey						2	1	5	9	10	14
Ground Beef						0	0	0	0	0	1
Pork Chops						3	4	3	0	2	4
Chickens					52[1]	288	247	186	380	123	76

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

V. *Escherichia coli* Data

A. *Escherichia coli* Isolates Tested

Table 46. Number of *E. coli* Isolates Tested, by Source and Year, 2000-2007

Source	Year							
	2000	2001	2002	2003	2004	2005	2006	2007
Chicken Breasts			282	396	400	393	418	299
Ground Turkey			304	333	376	396	388	315
Ground Beef			295	311	338	316	295	256
Pork Chops			184	218	232	205	182	152
Chickens	285	1989	2100	1365	1697	2232	1357	1510

B. Isolation of *E. coli* from Retail Meats

Table 47. Number and Percent of Retail Meat Samples Culture Positive for *E. coli*, 2007

	Chicken Breasts	Ground Turkey	Ground Beef	Pork Chops
Number of Meat Samples Tested	342	338	343	356
Number Positive for *E. coli*	299	315	256	152
Percent Positive for *E. coli*	87.4%	93.2%	74.6%	42.7%

Figure 24. Percent of Retail Meat Samples Culture Positive for *E. coli*, 2007

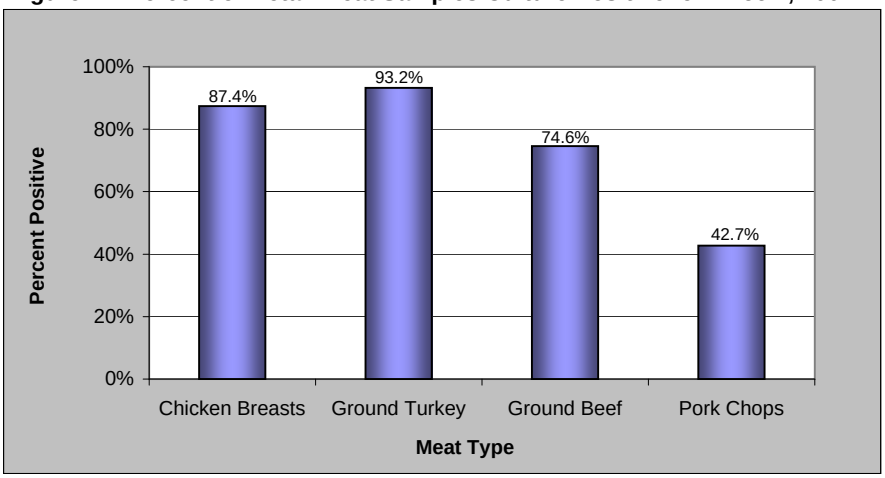
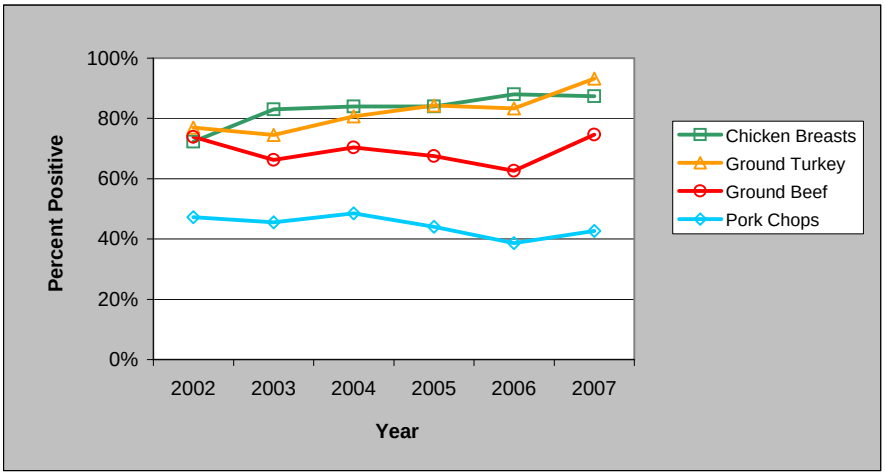


Figure 25. Percent of Retail Meat Samples Culture Positive for *E. coli*, 2002-2007



C. Antimicrobial Susceptibility among *E. coli*

MIC Distributions

Table 48a. Distribution of MICs and Occurrence of Resistance among *E. coli* Isolates from Retail Meats and Chickens, 2007

Antimicrobial	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
Aminoglycosides																					
Amikacin	Chicken Breasts (299)	0.0	**0.0**	[0.0 - 1.2]							10.0	66.6	19.7	3.3	0.3						
	Ground Turkey (315)	0.0	**0.0**	[0.0 - 1.2]						0.3	11.7	67.9	15.6	4.4							
	Ground Beef (256)	0.0	**0.0**	[0.0 - 1.4]						0.4	5.5	68.0	21.5	4.7							
	Pork Chops (152)	0.0	**0.0**	[0.0 - 2.4]							4.6	58.6	32.2	3.9	0.7						
	Chickens (1510)	0.0	**0.0**	[0.0 - 0.2]						1.7	32.3	54.8	10.1	1.1							
Gentamicin	Chicken Breasts (299)	2.0	**34.4**	[29.1 - 40.1]					2.3	43.5	14.4	2.3	1.0	2.0	**14.4**	**20.1**					
	Ground Turkey (315)	5.4	**27.0**	[22.2 - 32.2]					5.4	43.2	18.1	0.3	0.6	5.4	**15.2**	**11.7**					
	Ground Beef (256)	1.2	**0.0**	[0.0 - 1.4]					3.5	66.8	25.4	2.7	0.4	1.2							
	Pork Chops (152)	0.7	**1.3**	[0.2 - 4.7]					4.6	54.6	32.9	5.9		0.7	**0.7**	**0.7**					
	Chickens (1510)	6.7	**38.0**	[35.6 - 40.5]					9.0	37.5	5.8	1.1	1.9	6.7	**16.9**	**21.1**					
Kanamycin	Chicken Breasts (299)	0.7	**9.0**	[6.0 - 12.9]										81.9	8.4	0.7	**0.7**	**8.4**			
	Ground Turkey (315)	0.3	**15.6**	[11.7 - 20.0]										80.3	3.8	0.3		**15.6**			
	Ground Beef (256)	0.0	**1.6**	[0.4 - 4.0]										97.7	0.8			**1.6**			
	Pork Chops (152)	0.0	**4.6**	[1.9 - 9.3]										94.1	1.3		**0.7**	**3.9**			
	Chickens (1510)	1.7	**7.7**	[6.4 - 9.2]										81.9	8.7	1.7	**0.6**	**7.2**			
Streptomycin	Chicken Breasts (299)	N/A	**46.8**	[41.1 - 52.7]												53.2	**18.1**	**28.8**			
	Ground Turkey (315)	N/A	**44.8**	[39.2 - 50.4]												55.2	**23.2**	**21.6**			
	Ground Beef (256)	N/A	**6.3**	[3.6 - 10.0]												93.8	**2.0**	**4.3**			
	Pork Chops (152)	N/A	**13.8**	[8.8 - 20.3]												86.2	**7.9**	**5.9**			
	Chickens (1510)	N/A	**47.0**	[44.5 - 49.6]												53.0	**24.2**	**22.8**			
β-Lactam/β-Lactamase Inhibitor Combinations																					
Amoxicillin-Clavulanic Acid	Chicken Breasts (299)	0.3	**7.4**	[4.7 - 10.9]							1.7	31.4	47.5	11.7	0.3	**7.0**	**0.3**				
	Ground Turkey (315)	9.5	**6.3**	[3.9 - 9.6]							1.3	16.2	34.9	31.7	9.5	**4.4**	**1.9**				
	Ground Beef (256)	0.0	**0.8**	[0.1 - 2.8]							4.7	25.0	59.0	10.5		**0.8**					
	Pork Chops (152)	0.0	**0.7**	[0.0 - 3.6]							1.3	18.4	63.8	15.8		**0.7**					
	Chickens (1510)	0.5	**11.2**	[9.6 - 12.9]							6.0	38.1	35.8	8.5	0.5	**9.2**	**2.0**				
Cephems																					
Cefoxitin	Chicken Breasts (299)	1.3	**7.4**	[4.7 - 10.9]							0.3	12.7	61.2	17.1	1.3	**2.0**	**5.4**				
	Ground Turkey (315)	0.6	**6.3**	[3.9 - 9.6]							0.3	16.8	61.9	14.0	0.6	**1.6**	**4.8**				
	Ground Beef (256)	1.2	**0.8**	[0.1 - 2.8]						0.4	2.3	18.8	66.8	9.8	1.2		**0.8**				
	Pork Chops (152)	0.0	**0.7**	[0.0 - 3.6]							0.7	18.4	63.8	16.4		**0.7**					
	Chickens (1510)	1.9	**10.3**	[8.8 - 11.9]						0.1	2.4	25.1	49.6	13.4	1.9	**6.5**	**3.8**				

[1] Percent of isolates with intermediate susceptibility

[2] Percent of isolates that were resistant

[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 48b. Distribution of MICs and Occurrence of Resistance among *E. coli* Isolates from Retail Meats and Chickens, 2007

Antimicrobial	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
Cephems																					
Ceftiofur	Chicken Breasts (299)	0.3	**6.0**	[3.6 - 9.3]				0.7	37.1	54.5	0.3	1.0	0.3	**3.3**	**2.7**						
	Ground Turkey (315)	0.0	**6.0**	[3.7 - 9.3]					31.7	61.0	1.3			**2.2**	**3.8**						
	Ground Beef (256)	0.0	**0.8**	[0.1 - 2.8]				5.1	43.0	51.2				**0.4**	**0.4**						
	Pork Chops (152)	0.0	**0.7**	[0.0 - 3.6]				1.3	50.0	48.0					**0.7**						
	Chickens (1510)	2.6	**7.0**	[5.8 - 8.4]				8.5	49.1	30.0	1.7	1.0	2.6	**5.4**	**1.6**						
Ceftriaxone	Chicken Breasts (299)	2.7	**0.3**	[0.0 - 1.8]					92.6		1.0		0.3	3.0	2.3	0.3	**0.3**				
	Ground Turkey (315)	4.4	**0.3**	[0.0 - 1.8]					93.3	0.6				1.3	3.2	1.3	**0.3**				
	Ground Beef (256)	0.8	**0.0**	[0.0 - 1.4]					99.2						0.4	0.4					
	Pork Chops (152)	0.7	**0.0**	[0.0 - 2.4]					99.3						0.7						
	Chickens (1510)	2.6	**0.1**	[0.0 - 0.4]					88.1	0.5	0.7	0.3	2.1	5.6	2.5	0.1		**0.1**			
Folate Pathway Inhibitors																					
Sulfisoxazole	Chicken Breasts (299)	N/A	**42.1**	[36.5 - 48.0]											41.8	14.7	1.3				**42.1**
	Ground Turkey (315)	N/A	**48.9**	[43.2 - 54.6]											34.3	14.6	1.9		0.3		**48.9**
	Ground Beef (256)	N/A	**9.4**	[6.1 - 13.6]											75.4	15.2					**9.4**
	Pork Chops (152)	N/A	**11.8**	[7.2 - 18.1]											72.4	15.1	0.7				**11.8**
	Chickens (1510)	N/A	**53.2**	[50.7 - 55.8]											42.0	4.0	0.1	0.2	0.4		**53.2**
Trimethoprim-Sulfamethoxazole	Chicken Breasts (299)	N/A	**5.0**	[2.8 - 8.1]				51.8	28.4	9.7	4.7	0.3	**0.3**	**4.7**							
	Ground Turkey (315)	N/A	**7.9**	[5.2 - 11.5]				44.1	35.2	9.2	1.9	1.6		**7.9**							
	Ground Beef (256)	N/A	**1.2**	[0.2 - 3.4]				73.8	24.2	0.4	0.4		**0.4**	**0.8**							
	Pork Chops (152)	N/A	**1.3**	[0.2 - 4.7]				65.1	29.6	2.6	0.7	0.7		**1.3**							
	Chickens (1510)	N/A	**7.9**	[6.6 - 9.4]				63.7	17.4	5.9	4.0	1.1	**0.1**	**7.9**							
Penicillins																					
Ampicillin	Chicken Breasts (299)	0.0	**18.1**	[13.9 - 22.9]							6.4	46.8	28.4	0.3		**0.3**	**17.7**				
	Ground Turkey (315)	0.3	**48.3**	[42.6 - 53.9]							4.1	34.0	13.3		0.3	**0.3**	**47.9**				
	Ground Beef (256)	0.0	**6.6**	[3.9 - 10.4]							11.3	49.2	32.4	0.4		**0.4**	**6.3**				
	Pork Chops (152)	0.0	**15.8**	[10.4 - 22.6]							5.9	48.0	28.9	1.3			**15.8**				
	Chickens (1510)	0.1	**18.7**	[16.7 - 20.7]							20.1	43.0	17.9	0.3	0.1	**0.8**	**17.9**				
Phenicols																					
Chloramphenicol	Chicken Breasts (299)	1.3	**2.0**	[0.7 - 4.3]								1.0	35.8	59.9	1.3	**0.7**	**1.3**				
	Ground Turkey (315)	1.0	**2.9**	[1.3 - 5.4]								0.3	38.1	57.8	1.0		**2.9**				
	Ground Beef (256)	1.6	**3.9**	[1.9 - 7.1]								1.6	32.8	60.2	1.6		**3.9**				
	Pork Chops (152)	1.3	**3.9**	[1.5 - 8.4]								0.7	27.0	67.1	1.3	**0.7**	**3.3**				
	Chickens (1510)	0.6	**2.3**	[1.6 - 3.1]								14.6	61.5	21.0	0.6	**0.2**	**2.1**				

[1] Percent of isolates with intermediate susceptibility

[2] Percent of isolates that were resistant

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

[4] The unshaded areas indicate tthe 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 48c. Distribution of MICs and Occurrence of Resistance among *E. coli* Isolates from Retail Meats and Chickens, 2007

Antimicrobial	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																					
Ciprofloxacin	Chicken Breasts (299)	0.0	**0.0**	[0.0 - 1.2]	96.7	0.3		1.0	1.7	0.3											
	Ground Turkey (315)	0.0	**0.3**	[0.0 - 1.8]	96.5	1.3		1.0	1.0					**0.3**							
	Ground Beef (256)	0.0	**0.0**	[0.0 - 1.4]	99.2				0.8												
	Pork Chops (152)	0.0	**0.0**	[0.0 - 2.4]	99.3	0.7															
	Chickens (1510)	0.0	**0.1**	[0.0 - 0.4]	90.6	5.1	0.2	2.1	1.7	0.3				**0.1**							
Nalidixic Acid	Chicken Breasts (299)	N/A	**3.0**	[1.4 - 5.6]							11.0	78.6	7.4				**3.0**				
	Ground Turkey (315)	N/A	**2.2**	[0.9 - 4.5]							9.2	76.5	12.1			**0.3**	**1.9**				
	Ground Beef (256)	N/A	**0.4**	[0.0 - 2.2]						0.4	7.4	80.1	11.3	0.4			**0.4**				
	Pork Chops (152)	N/A	**0.0**	[0.0 - 2.4]						0.7	11.2	77.0	11.2								
	Chickens (1510)	N/A	**4.2**	[3.3 - 5.4]						2.5	26.0	55.4	11.5	0.3	0.1	**0.9**	**3.3**				
Tetracyclines																					
Tetracycline	Chicken Breasts (299)	2.3	**40.5**	[34.9 - 46.3]									57.2	2.3		**2.3**	**38.1**				
	Ground Turkey (315)	0.0	**80.0**	[75.2 - 84.3]									20.0			**4.1**	**75.9**				
	Ground Beef (256)	4.3	**21.9**	[17.0 - 27.4]									73.8	4.3	**1.6**	**2.3**	**18.0**				
	Pork Chops (152)	1.3	**50.0**	[41.8 - 58.2]									48.7	1.3	**1.3**	**3.3**	**45.4**				
	Chickens (1510)	1.8	**40.2**	[37.7 - 42.7]									58.0	1.8	**6.0**	**17.2**	**17.0**				

[1] Percent of isolates with intermediate susceptibility

[2] Percent of isolates that were resistant

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

[4] The unshaded areas indicatethe 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 49a. Antimicrobial Resistance among *E. coli* Isolates from Retail Meats and Chickens, by Year, 2000-2007

Year			2000	2001	2002	2003	2004	2005	2006	2007
Number of Isolates Tested		Chicken Breasts			282	396	400	393	418	299
		Ground Turkey			304	333	376	396	388	315
		Ground Beef			295	311	338	316	295	256
		Pork Chops			184	218	232	205	182	152
		Chickens	285	1989	2100	1365	1697	2232	1357	1510
Antimicrobial Class	**Antimicrobial (Resistance Breakpoint)**	**Isolate Source**								
Aminoglycosides	Amikacin (MIC ≥ 64 µg/ml)	Chicken Breasts			0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Ground Turkey			0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Ground Beef			0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Pork Chops			0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		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
	Gentamicin (MIC ≥ 16 µg/ml)	Chicken Breasts			23.0% 65	29.3% 116	30.0% 120	37.7% 148	37.3% 156	34.4% 103
		Ground Turkey			27.0% 82	29.7% 99	29.3% 110	27.5% 109	29.6% 115	27.0% 85
		Ground Beef			0.3% 1	1.0% 3	0.6% 2	0.0% 0	4.1% 12	0.0% 0
		Pork Chops			1.1% 2	1.4% 3	1.3% 3	0.0% 0	1.1% 2	1.3% 2
		Chickens	40.0% 114	33.4% 664	38.0% 799	38.8% 530	39.1% 663	36.7% 819	33.1% 449	38.0% 574
	Kanamycin (MIC ≥ 64 µg/ml)	Chicken Breasts			6.0% 17	6.8% 27	6.8% 27	7.1% 28	11.5% 48	9.0% 27
		Ground Turkey			13.2% 40	16.8% 56	16.0% 60	11.4% 45	14.7% 57	15.6% 49
		Ground Beef			2.4% 7	2.9% 9	2.4% 8	0.6% 2	4.7% 14	1.6% 4
		Pork Chops			5.4% 10	8.7% 19	8.2% 19	7.3% 15	6.0% 11	4.6% 7
		Chickens	16.1% 46	14.5% 288	11.6% 243	10.3% 140	11.5% 196	10.3% 231	9.1% 123	7.7% 117
	Streptomycin (MIC ≥ 64 µg/ml)	Chicken Breasts			49.3% 139	56.1% 222	56.8% 227	50.6% 199	48.1% 201	46.8% 140
		Ground Turkey			57.6% 175	54.7% 182	49.2% 185	43.4% 172	43.8% 170	44.8% 141
		Ground Beef			9.5% 28	9.0% 28	11.8% 40	5.4% 17	14.2% 42	6.3% 16
		Pork Chops			22.3% 41	19.7% 43	21.1% 49	13.2% 27	13.7% 25	13.8% 21
		Chickens	77.5% 221	65.8% 1308	65.1% 1368	64.2% 877	64.1% 1088	58.0% 1295	49.5% 672	47.0% 710
β-Lactam/β-Lactamase Inhibitor Combinations	Amoxicillin-Clavulanic Acid (MIC ≥ 32 / 16 µg/ml)	Chicken Breasts			12.1% 34	13.6% 54	10.0% 40	12.2% 48	11.5% 48	7.4% 22
		Ground Turkey			5.6% 17	3.0% 10	5.3% 20	3.8% 15	6.7% 26	6.3% 20
		Ground Beef			2.0% 6	2.3% 7	3.8% 13	1.3% 4	2.4% 7	0.8% 2
		Pork Chops			5.4% 10	5.0% 11	5.6% 13	2.9% 6	2.2% 4	0.7% 1
		Chickens	8.1% 23	10.0% 199	10.9% 229	11.1% 151	8.8% 149	10.6% 236	16.0% 217	11.2% 169
Cephems	Cefoxitin (MIC ≥ 32 µg/ml)	Chicken Breasts			11.0% 31	9.3% 37	8.3% 33	11.2% 44	11.2% 47	7.4% 22
		Ground Turkey			3.3% 10	1.2% 4	4.5% 17	3.3% 13	6.2% 24	6.3% 20
		Ground Beef			1.4% 4	0.3% 1	1.2% 4	0.9% 3	2.0% 6	0.8% 2
		Pork Chops			3.3% 6	2.3% 5	2.2% 5	1.5% 3	1.6% 3	0.7% 1
		Chickens	7.4% 21	8.7% 173	8.5% 178	8.3% 113	8.2% 139	9.9% 221	15.0% 204	10.3% 155

Table 49b. Antimicrobial Resistance among *E. coli* Isolates from Retail Meats and Chickens, by Year, 2000-2007

Year			2000	2001	2002	2003	2004	2005	2006	2007
Number of Isolates Tested		Chicken Breasts			282	396	400	393	418	299
		Ground Turkey			304	333	376	396	388	315
		Ground Beef			295	311	338	316	295	256
		Pork Chops			184	218	232	205	182	152
		Chickens	285	1989	2100	1365	1697	2232	1357	1510
Antimicrobial Class	**Antimicrobial (Resistance Breakpoint)**	**Isolate Source**								
Cephems	Ceftiofur (MIC ≥ 8 µg/ml)	Chicken Breasts			7.1% 20	7.6% 30	5.8% 23	8.7% 34	8.6% 36	6.0% 18
		Ground Turkey			1.0% 3	0.3% 1	1.1% 4	1.8% 7	3.1% 12	6.0% 19
		Ground Beef			0.0% 0	0.3% 1	0.9% 3	0.6% 2	1.0% 3	0.8% 2
		Pork Chops			0.5% 1	0.9% 2	0.4% 1	0.0% 0	0.0% 0	0.7% 1
		Chickens	6.3% 18	4.4% 88	5.5% 115	7.1% 97	4.9% 83	6.5% 145	10.2% 139	7.0% 106
	Ceftriaxone (MIC ≥ 64 µg/ml)	Chicken Breasts			0.0% 0	0.0% 0	0.0% 0	0.3% 1	0.7% 3	0.3% 1
		Ground Turkey			0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.3% 1	0.3% 1
		Ground Beef			0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Pork Chops			0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Chickens	0.0% 0	0.0% 0	0.0% 1	0.0% 0	0.1% 1	0.0% 1	0.1% 1	0.1% 1
Folate Pathway Inhibitors	Sulfamethoxazole/ Sulfisoxazole [1] (MIC ≥ 512 µg/ml)	Chicken Breasts			32.3% 91	38.4% 152	41.3% 165	48.1% 189	46.9% 196	42.1% 126
		Ground Turkey			48.0% 146	51.7% 172	48.4% 182	48.0% 190	48.5% 188	48.9% 154
		Ground Beef			9.8% 29	10.3% 32	13.0% 44	7.0% 22	12.5% 37	9.4% 24
		Pork Chops			12.5% 23	15.1% 33	19.4% 45	14.1% 29	20.3% 37	11.8% 18
		Chickens	57.9% 165	58.2% 1157	46.1% 969	43.9% 599	53.2% 903	51.9% 1159	48.6% 660	53.2% 804
	Trimethoprim-Sulfamethoxazole (MIC ≥ 4 / 76 µg/ml)	Chicken Breasts			3.5% 10	7.1% 28	4.3% 17	7.4% 29	8.9% 37	5.0% 15
		Ground Turkey			3.9% 12	6.9% 23	3.7% 14	5.1% 20	8.0% 31	7.9% 25
		Ground Beef			0.7% 2	0.3% 1	0.6% 2	0.6% 2	1.4% 4	1.2% 3
		Pork Chops			1.1% 2	2.8% 6	3.9% 9	1.5% 3	2.2% 4	1.3% 2
		Chickens	17.2% 49	12.6% 251	10.4% 218	10.5% 144	10.7% 181	10.4% 232	8.4% 114	7.9% 120
Penicillins	Ampicillin (MIC ≥ 32 µg/ml)	Chicken Breasts			21.6% 61	25.3% 100	17.0% 68	24.7% 97	20.1% 84	18.1% 54
		Ground Turkey			31.3% 95	35.7% 119	33.2% 125	38.1% 151	42.0% 163	48.3% 152
		Ground Beef			6.1% 18	5.1% 16	5.3% 18	3.5% 11	9.2% 27	6.6% 17
		Pork Chops			13.6% 25	13.3% 29	15.1% 35	16.1% 33	15.9% 29	15.8% 24
		Chickens	20.0% 57	19.5% 388	19.0% 399	18.6% 254	17.6% 298	22.0% 492	25.6% 347	18.7% 282
Phenicols	Chloramphenicol (MIC ≥ 32 µg/ml)	Chicken Breasts			0.7% 2	0.0% 0	1.8% 7	0.5% 2	2.6% 11	2.0% 6
		Ground Turkey			0.3% 1	3.6% 12	0.8% 3	4.0% 16	2.3% 9	2.9% 9
		Ground Beef			1.0% 3	2.3% 7	3.6% 12	1.6% 5	1.4% 4	3.9% 10
		Pork Chops			1.6% 3	4.1% 9	4.3% 10	3.4% 7	6.6% 12	3.9% 6
		Chickens	4.6% 13	2.4% 47	1.8% 38	1.3% 18	1.0% 17	1.0% 22	1.9% 26	2.3% 34

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

Table 49c. Antimicrobial Resistance among *E. coli* Isolates from Retail Meats and Chickens, by Year, 2000-2007

Year			2000	2001	2002	2003	2004	2005	2006	2007
Number of Isolates Tested		Chicken Breasts			282	396	400	393	418	299
		Ground Turkey			304	333	376	396	388	315
		Ground Beef			295	311	338	316	295	256
		Pork Chops			184	218	232	205	182	152
		Chickens	285	1989	2100	1365	1697	2232	1357	1510
Antimicrobial Class	**Antimicrobial (Resistance Breakpoint)**	**Isolate Source**								
Quinolones	Ciprofloxacin (MIC ≥ 4 µg/ml)	Chicken Breasts			0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Ground Turkey			0.0% 0	0.3% 1	0.8% 3	0.0% 0	0.5% 2	0.3% 1
		Ground Beef			0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Pork Chops			0.0% 0	0.0% 0	0.0% 0	0.5% 1	0.0% 0	0.0% 0
		Chickens	0.0% 0	0.2% 3	0.0% 1	0.1% 1	0.2% 3	0.4% 8	0.0% 0	0.1% 1
	Nalidixic Acid (MIC ≥ 32 µg/ml)	Chicken Breasts			2.8% 8	4.0% 16	7.0% 28	6.6% 26	5.0% 21	3.0% 9
		Ground Turkey			4.3% 13	11.7% 39	10.6% 40	10.4% 41	5.2% 20	2.2% 7
		Ground Beef			0.0% 0	1.0% 3	1.5% 5	1.3% 4	0.7% 2	0.4% 1
		Pork Chops			0.5% 1	0.5% 1	0.0% 0	1.5% 3	0.5% 1	0.0% 0
		Chickens	10.2% 29	8.4% 168	6.8% 142	6.2% 84	6.8% 115	7.5% 168	5.4% 73	4.2% 64
Tetracyclines	Tetracycline (MIC ≥ 16 µg/ml)	Chicken Breasts			46.1% 130	42.9% 170	48.0% 192	46.6% 183	50.7% 212	40.5% 121
		Ground Turkey			77.0% 234	77.8% 259	74.2% 279	78.0% 309	76.5% 297	80.0% 252
		Ground Beef			30.8% 91	25.1% 78	22.8% 77	16.5% 52	25.4% 75	21.9% 56
		Pork Chops			52.7% 97	46.3% 101	56.0% 130	45.9% 94	52.7% 96	50.0% 76
		Chickens	68.4% 195	61.6% 1226	58.6% 1231	52.2% 713	50.3% 853	48.9% 1092	49.0% 665	40.2% 607

Table 50a. Resistance Patterns among *E. coli* Isolates from Retail Meats and Chickens, by Year, 2000-2007

Year		2000	2001	2002	2003	2004	2005	2006	2007
Number of Isolates Tested	Chicken Breasts			282	396	400	393	418	299
	Ground Turkey			304	333	376	396	388	315
	Ground Beef			295	311	338	316	295	256
	Pork Chops			184	218	232	205	182	152
	Chickens	285	1989	2100	1365	1697	2232	1357	1510
Resistance Pattern	**Isolate Source**								
1. No Resistance Detected	Chicken Breasts			27.0% 76	20.5% 81	20.8% 83	20.6% 81	23.4% 98	29.1% 87
	Ground Turkey			16.8% 51	14.7% 49	19.1% 72	16.2% 64	16.0% 62	13.0% 41
	Ground Beef			63.1% 186	66.9% 208	73.1% 247	81.3% 257	71.5% 211	77.0% 197
	Pork Chops			41.3% 76	44.5% 97	37.9% 88	48.8% 100	42.9% 78	48.0% 73
	Chickens	10.2% 29	12.9% 257	15.9% 333	16.0% 219	17.0% 288	17.7% 395	18.6% 252	24.3% 367
2. Resistant to ≥ 3 Antimicrobial Classes	Chicken Breasts			34.8% 98	38.1% 151	35.3% 141	44.8% 176	43.3% 181	33.8% 101
	Ground Turkey			53.3% 162	53.5% 178	51.9% 195	52.6% 209	55.2% 214	57.5% 181
	Ground Beef			8.1% 24	6.4% 20	10.4% 35	5.1% 16	11.5% 34	9.0% 23
	Pork Chops			16.9% 31	16.5% 36	21.1% 49	16.1% 33	15.9% 29	15.1% 23
	Chickens	55.1% 157	50.2% 998	43.8% 919	39.0% 533	42.9% 728	41.5% 926	43.6% 591	36.4% 550
3. Resistant to ≥ 4 Antimicrobial Classes	Chicken Breasts			11.4% 32	10.6% 42	12.5% 50	12.2% 48	14.6% 61	10.4% 31
	Ground Turkey			19.7% 60	26.1% 87	24.5% 92	24.2% 96	25.8% 100	27.0% 85
	Ground Beef			1.7% 5	3.9% 12	4.7% 16	1.9% 6	5.8% 17	4.7% 12
	Pork Chops			4.4% 8	6.0% 13	7.8% 18	4.9% 10	7.7% 14	3.3% 5
	Chickens	19.3% 55	16.0% 319	14.3% 300	13.3% 182	11.8% 200	15.0% 334	17.3% 235	13.3% 201
4. Resistant to ≥ 5 Antimicrobial Classes	Chicken Breasts			4.6% 13	5.8% 23	5.5% 22	5.6% 22	7.4% 31	5.7% 17
	Ground Turkey			3.6% 11	7.8% 26	6.9% 26	6.1% 24	5.7% 22	4.1% 13
	Ground Beef			0.3% 1	2.6% 8	2.7% 9	1.0% 3	2.4% 7	0.4% 1
	Pork Chops			1.6% 3	2.8% 6	2.2% 5	1.5% 3	3.3% 6	1.3% 2
	Chickens	8.1% 23	8.2% 163	7.3% 153	7.0% 96	5.7% 96	7.6% 170	8.7% 118	6.8% 103
5. At Least ACSSuT[1] Resistant	Chicken Breasts			0.4% 1	0.0% 0	1.3% 5	0.3% 1	1.4% 6	2.0% 6
	Ground Turkey			0.0% 0	2.7% 9	0.5% 2	1.8% 7	0.8% 3	1.9% 6
	Ground Beef			0.3% 1	1.0% 3	1.5% 5	0.6% 2	0.3% 1	0.4% 1
	Pork Chops			0.5% 1	1.4% 3	1.3% 3	1.0% 2	1.1% 2	0.7% 1
	Chickens	3.5% 10	2.0% 40	1.3% 27	1.0% 14	0.8% 14	0.6% 14	1.3% 18	1.7% 26

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

Table 50b. Resistance Patterns among *E. coli* Isolates from Retail Meats and Chickens, by Year, 2000-2007

Year		2000	2001	2002	2003	2004	2005	2006	2007
Number of Isolates Tested	Chicken Breasts			282	396	400	393	418	299
	Ground Turkey			304	333	376	396	388	315
	Ground Beef			295	311	338	316	295	256
	Pork Chops			184	218	232	205	182	152
	Chickens	285	1989	2100	1365	1697	2232	1357	1510
Resistance Pattern	**Isolate Source**								
6. At Least ACT/S[1] Resistant	Chicken Breasts			0.0% 0	0.0% 0	0.3% 1	0.0% 0	0.0% 0	0.3% 1
	Ground Turkey			0.0% 0	0.9% 3	0.0% 0	0.8% 3	0.3% 1	0.3% 1
	Ground Beef			0.0% 0	0.0% 0	0.0% 0	0.3% 1	0.3% 1	0.0% 0
	Pork Chops			0.5% 1	0.0% 0	0.4% 1	0.5% 1	0.0% 0	0.0% 0
	Chickens	1.4% 4	0.6% 11	0.3% 7	0.2% 3	0.3% 5	0.3% 7	0.2% 3	0.3% 4
7. At Least ACSSuTAuCf[2] Resistant	Chicken Breasts			0.4% 1	0.0% 0	1.0% 4	0.3% 1	1.0% 4	0.7% 2
	Ground Turkey			0.0% 0	0.3% 1	0.0% 0	0.3% 1	0.0% 0	1.3% 4
	Ground Beef			0.0% 0	0.0% 0	0.9% 3	0.3% 1	0.0% 0	0.0% 0
	Pork Chops			0.0% 0	0.5% 1	0.4% 1	0.0% 0	0.0% 0	0.7% 1
	Chickens	2.8% 8	1.1% 22	0.8% 17	0.8% 11	0.6% 10	0.5% 11	1.0% 13	0.9% 14
8. At Least Ceftiofur and Nalidixic Acid Resistant	Chicken Breasts			0.4% 1	0.5% 2	0.8% 3	0.3% 1	0.2% 1	0.0% 0
	Ground Turkey			0.3% 1	0.3% 1	0.3% 1	0.0% 0	0.0% 0	0.6% 2
	Ground Beef			0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.3% 1	0.0% 0
	Pork Chops			0.5% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
	Chickens	1.4% 4	0.3% 5	0.4% 9	0.9% 12	0.4% 7	0.7% 16	0.4% 5	0.6% 9

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

[2] ACSSuTAuCf = ACSSuT, amoxicillin-clavulanic acid, and ceftiofur

Appendix A

Table A1. Concentration Ranges Used for Susceptibility Testing of *Salmonella* and *E. coli* , 2007

Antimicrobial Class	Antimicrobial Agent	Concentration Range (µg/ml)
Aminoglycosides	Amikacin	0.5 - 64
	Gentamicin	0.25 - 16
	Kanamycin	8 - 64
	Streptomycin	32 - 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
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* , 2007

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

Appendix B

Table B1. Antimicrobial Agents and Antimicrobial Susceptibility Testing Methods for *Salmonella* and *E. coli* Isolates, 1996-2007 [1,2]

	Method	Broth Microdilution												
	Sensititre® Plate Name	CMV1CCDC[3] / CMV3CNCD	CMV3CNCD		CMV4CNCD	CMV5CNCD	CMV6CNCD	CMV7CNCD		CMV1AGNF				
	Year	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	
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	√	√	√	√	√	√	√	√	√	√	√	√	
Penems	Imipenem						√							
Penicillins	Ampicillin	√	√	√	√	√	√	√	√	√	√	√	√	
	Ticarcillin	√	√	√										
Phenicols	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. A study of *E. coli* isolates from humans 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, 1997-2007 [1]

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

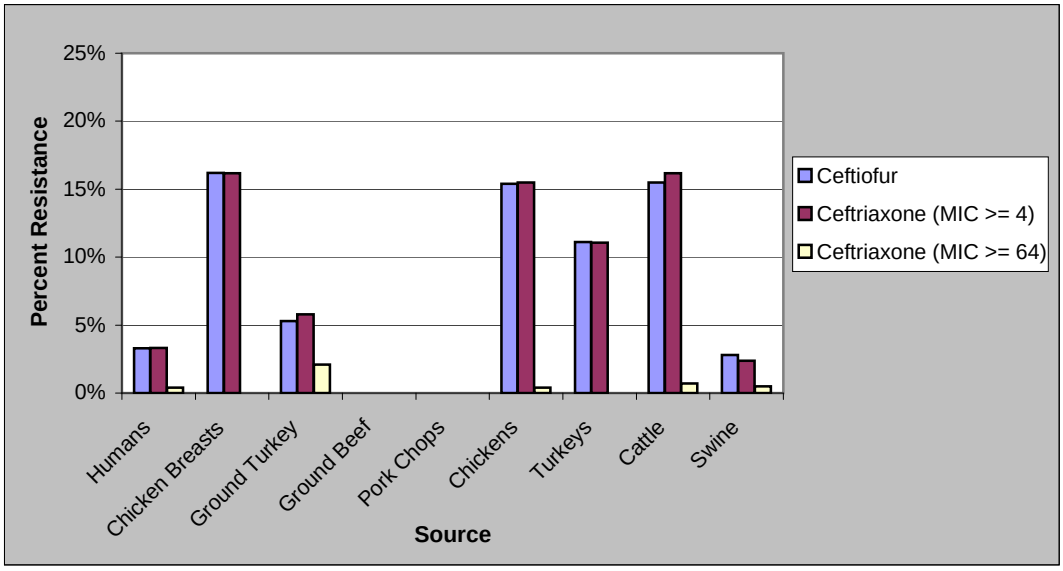
[1] Testing of *Campylobacter* isolates from humans and chickens began in 1997 and 1998, respectively. For chickens, this report contains data on isolates recovered during the period of July 2001 through December 2007, when the new isolation method was used by USDA's Agricultural Research Service

Table B3. Antimicrobial Agents and Antimicrobial Susceptibility Testing Methods for *Campylobacter* Isolates from Retail Meats, 2002-2007

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

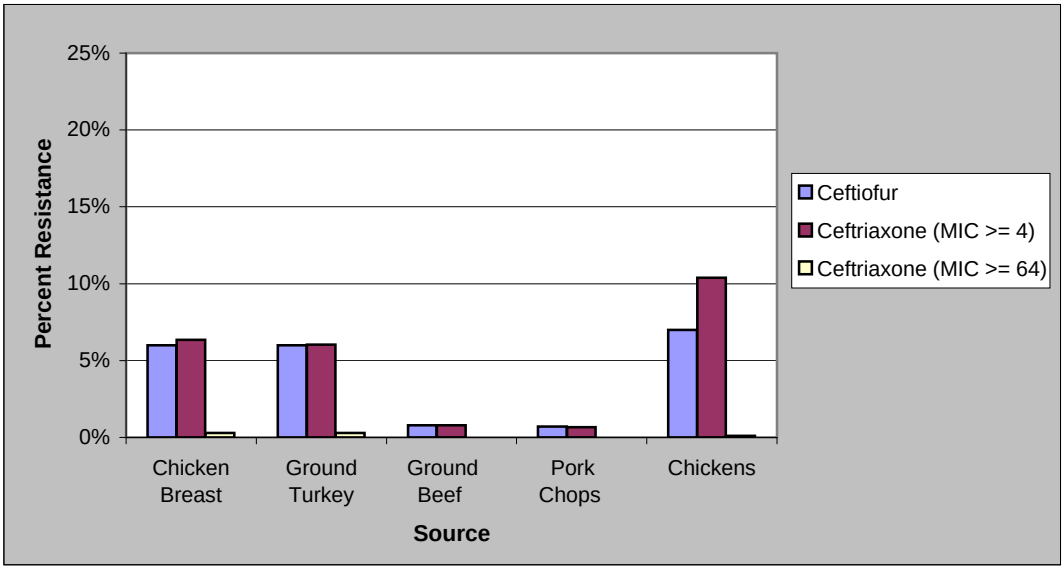
Appendix C

Figure C1. Percent of Non-Typhoidal *Salmonella* Isolates from Humans, Retail Meats, and Food Animals Resistant to Ceftiofur and Ceftriaxone, 2007 [1]



[1] The resistant breakpoint used for ceftriaxone in this report is ≥ 64 µg/ml. The new CLSI breakpoint of ≥ 4 µg/ml will be used in NARMS 2008 reports

Figure C2. Percent of *E. coli* Isolates from Retail Meats and Chickens Resistant to Ceftiofur and Ceftriaxone, 2007 [1]



[1] The resistant breakpoint used for ceftriaxone in this report is ≥ 64 µg/ml. The new CLSI breakpoint of ≥ 4 µg/ml will be used in NARMS 2008 reports