NARMS

National Antimicrobial Resistance Monitoring System

2010

Executive Report

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CDC
CENTERS FOR DISEASE CONTROL AND PREVENTION

FDA

USDA

In Memoriam

Dr. Lucie Dutil, friend and colleague at the Canadian Integrated Program for Antimicrobial Resistance Surveillance.

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I. Introduction

A. Executive Report

This report summarizes, in an integrated format, the National Antimicrobial Resistance Monitoring System data on *Salmonella* (non-typhoidal) and *Campylobacter* recovered in 2010 from human clinical cases, retail meats, and food animals at federally inspected slaughter and processing plants. In addition, the report includes susceptibility data for *Escherichia coli* recovered from retail meats and chicken carcasses in 2010. Summary data from prior years are also included.

Suggested Citation: FDA. National Antimicrobial Resistance Monitoring System – Enteric Bacteria (NARMS): 2010 Executive Report. Rockville, MD: U.S. Department of Health and Human Services, Food and Drug Administration, 2012.

B. NARMS Program

The National Antimicrobial Resistance Monitoring System – Enteric Bacteria (NARMS) is a national public health surveillance system in the United States, which 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 among 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* and *Campylobacter*. Generic *Escherichia coli* (*E. coli*) and *Enterococcus* are also tested due to their ubiquitous presence in animals, foods, and humans and their potential to serve as reservoirs of antimicrobial resistance genes for bacterial pathogens. *Shigella*, typhoidal *Salmonella* and *Vibrio* are tested from humans only.

In addition to monitoring antimicrobial susceptibility, NARMS conducts epidemiologic and microbiologic research studies. Some studies examine risk factors and clinical outcomes of infections with specific bacterial serotypes or subsets of bacteria that exhibit particular resistance patterns. Other studies focus on understanding the genetic mechanisms of antimicrobial resistance in enteric bacteria and the mechanisms that permit the transfer of resistance between bacteria, on improving methods for isolation and typing, and on developing new methods for antimicrobial susceptibility testing. 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. PulseNet and VetNet are national molecular subtyping networks for foodborne and zoonotic disease surveillance.

The following are the primary objectives of NARMS:

- To monitor trends in antimicrobial resistance among enteric 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; and
- To provide data that 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* serotype Typhi and *Shigella* was added. By 2003, NARMS conducted nationwide surveillance for *Salmonella*, *Shigella*, and *E. coli* O157 from humans. Testing of *Campylobacter* from humans began in 5 FoodNet sites in 1997 and expanded to all 10 FoodNet sites by 2003. In 2009, NARMS began testing *Vibrio* species other than *V. cholerae* from all 50 states. Antimicrobial susceptibility testing of NARMS human isolates was performed at CDC's laboratories in the National Center for Emerging and Zoonotic Infectious Diseases 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 among FDA's Center for Veterinary Medicine (CVM), CDC, and state departments of public health.[1] Participating sites purchased chicken breasts, ground turkey, ground beef, and pork chops at retail stores and cultured them for *Salmonella* and *Campylobacter*. [2] Three or four sites also cultured retail meats for *E. coli* and *Enterococcus*.[3] 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 data for *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 and culture methodology, can be found on the FDA, CDC, and USDA websites listed below. The FDA website also includes NARMS Executive Reports.

[1] Most of the sites were participating FoodNet sites. In 2008, the Pennsylvania Department of Health joined the NARMS retail meat surveillance program, testing only *Salmonella* that year, then added *Campylobacter* in 2009.
[2] Beginning in 2008, all FoodNet sites tested for *Campylobacter* in retail poultry only.
[3] From 2002 through 2006 and in 2010, four sites cultured retail meats for *E. coli* and *Enterococcus* and from 2007-2009, 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://www.ars.usda.gov/saa/bear/narms

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

II. Summary of the NARMS 2010 Executive Report

Highlights from results of testing of *Salmonella* and *Campylobacter* strains isolated from humans, retail meats, and food animals in 2010 are described below. For more information, including a description of changes in surveillance methods over time, refer to other sections of this report and individual agency NARMS 2010 reports for human, retail meat, and food animal isolates.

Non-Typhoidal *Salmonella*

A total of 3,947 non-typhoidal *Salmonella* isolates were tested, consisting of 2,474 from humans, 400 from retail meats, and 1,073 from healthy food animals at slaughter. Among retail meats, *Salmonella* was isolated from 15% of ground turkey samples, 13% of chicken breast samples, 1.5% of pork chop samples, and 0.5% of ground beef samples. Some key findings about serotype distribution and antimicrobial resistance are described below.

Serotype Frequencies

Some of the most common serotypes among isolates from humans were also common among food isolates, particularly isolates from poultry sources.

- Among isolates from humans, Enteritidis (21%), Typhimurium (15%), and Newport (12%) remained the three most common serotypes, followed by Javiana (7.2%), I 4,[5],12:i:- (3.1%), and Heidelberg (2.5%).
- The four most common serotypes among retail chicken breast isolates were Typhimurium (46%), Enteritidis (16%), Heidelberg (12%), and Kentucky (12%); the four most common serotypes among isolates from chickens at slaughter were Kentucky (43%), Enteritidis (27%), Typhimurium (10%), and Heidelberg (4.4%).
- Hadar and Saintpaul remained among the top three serotypes recovered from retail ground turkey (10% and 24% of retail ground turkey isolates, respectively) and from turkeys at slaughter (20% and 14% of turkey isolates, respectively). Serotypes Heidelberg and IIIa 18:z4,z23:- increased in prevalence from 2009, and were two of the top four serotypes isolated from retail ground turkey (8.4% and 11% of all serotypes, respectively) and turkeys at slaughter (9.3% and 7.3%, respectively).
- Montevideo (25%) and Dublin (17%) remained the predominant serotypes among isolates from cattle at slaughter. The proportion of cattle isolates that are serotype Dublin has steadily increased since 1997. This serotype is associated with invasive salmonellosis in humans (Jones et al., 2008).

Quinolones

Resistance to nalidixic acid is correlated with decreased susceptibility to fluoroquinolones (Crump et al., 2003), a class of drugs important for treating complicated *Salmonella* infections in humans (Pegues and Miller, 2010). In the United States, fluoroquinolones are approved for the

treatment of certain respiratory infections in swine and cattle (Animal Drugs @ FDA), but these agents are not currently approved for use in poultry.

- Nalidixic acid resistance has remained <3% from all sources since 2004. In 2010, 2.0% of human *Salmonella* isolates were resistant to nalidixic acid. Enteritidis was the most common serotype (55%) among the nalidixic acid-resistant isolates from humans. Among the serotype Enteritidis isolates tested from humans, 5.2% were resistant. Enteritidis isolates were rarely resistant to the other agents tested.
- Nalidixic acid resistance was rare in retail meat and animal isolates. It was found only in seven isolates from cattle (2.8%), one isolate from turkey (0.7%), and one from retail ground turkey (0.5%) in 2010. Of the seven cattle isolates, six were serotype Dublin. Both the turkey and retail ground turkey isolates were serotype Albert.

Cephems

Ceftriaxone, an extended-spectrum cephalosporin, is important for treating complicated *Salmonella* infections in humans (Pegues and Miller, 2010). Ceftiofur, a closely related antimicrobial agent, is licensed for use in food animal production (Animal Drugs @ FDA).

- Among all isolates from humans, ceftriaxone resistance has been relatively stable since 2004 (<4%). In 2010, 2.8% of isolates were resistant. Newport (31%), Typhimurium (26%), and Heidelberg (21%) were the most common serotypes among the ceftriaxone-resistant isolates.
- Ceftriaxone resistance was found in 35% of retail chicken breast isolates in 2010, after rising from 16% in 2007 to 38% in 2009. Typhimurium (81%) was the predominant serotype among these ceftriaxone-resistant isolates. Among retail ground turkey isolates, ceftriaxone resistance rose from 5.7% in 2009 to 16% in 2010, the highest since testing began in 2002.
- Among isolates from food animals at slaughter, resistance to ceftriaxone was 22% among isolates from cattle, 15% among isolates from turkeys, and 12% among isolates from chickens. Only 2 isolates (1.8%) from swine were ceftriaxone resistant. Resistance in isolates from cattle and turkeys was the highest observed since testing began in 1997. Dublin was the predominant serotype (55%) among ceftriaxone-resistant isolates from cattle. Heidelberg (22%), Brandenburg (13%), and Schwarzengrund (13%) were the most common serotypes among ceftriaxone-resistant turkey isolates. Kentucky (55%), Typhimurium (24%) and Heidelberg (12%) were the most common serotypes among the ceftriaxone-resistant chicken isolates.
- Among serotype Newport isolates from humans, ceftriaxone resistance declined to 7.2% after peaking at 26% in 2001. A decline was also observed among cattle isolates; resistance declined to 60% (3/5) in 2010 after peaking at 82% (22/27) in 2005.
- Among serotype Typhimurium isolates from humans, ceftriaxone resistance declined from 6.5% in 2009 to 4.9% in 2010. Among retail chicken breast isolates, resistance steadily rose from 44% in 2007 to 61% in 2010.
- Human infections with serotype Heidelberg are associated with invasive disease (Jones et al., 2008). Although the percentage of serotype Heidelberg among all *Salmonella* isolated from humans and poultry has declined, ceftriaxone resistance has increased. Among human strains, ceftriaxone resistance increased from 8.0% in 2008 to 21% in 2009 and 24% in 2010.

Among retail chicken breast isolates, resistance rose from 17% in 2008 to 32% in 2009 then declined to 24% in 2010. Among isolates from chickens at slaughter, ceftriaxone resistance increased from 8.5% in 2008 to 18% in 2009 and rose to 32% in 2010. Resistance in isolates from retail ground turkey and turkeys at slaughter increased from 3.5% and 13% in 2008 to 10% and 33% in 2009, and rose to 24% and 36% in 2010, respectively.

No Resistance Detected

- In 2010, 85% of isolates from humans had no resistance to any antimicrobial agents tested, an increase from 74% in 1999.
- Among isolates from retail meats and food animals at slaughter, the percentage that had no resistance to any antimicrobial agents tested was highest in bovine sources (61% in cattle and 57% in retail ground beef) and lowest in turkeys (25% in turkeys at slaughter and 31% in retail ground turkey).

Multidrug Resistance

- Among isolates from humans, resistance to ≥3 antimicrobial classes was 9.1%, the lowest since 1996. However, among serotype Heidelberg isolates, resistance to ≥3 antimicrobial classes increased from 17% in 2007 to 28% in 2008 and 34% in 2010. Similarly, among serotype I 4,[5],12:i:- isolates, resistance to ≥3 antimicrobial classes increased from 5.5% in 2007 to 13% in 2009 and 22% in 2010. Typhimurium (44%) was the most common serotype among isolates resistant to ≥3 classes.
- Among retail chicken breast isolates, resistance to ≥3 antimicrobial classes declined to 43%, after a steady increase from 24% in 2006 to 49% in 2009. Typhimurium (81%) was the predominant serotype among isolates with resistance to ≥3 classes.
- Among retail ground turkey isolates, resistance to ≥3 antimicrobial classes was found in 34%, a decline from the peak resistance of 52% in 2008. Similarly, the percentage of Heidelberg isolates resistant to ≥3 classes declined to 65% from the peak of 83% in 2008. Heidelberg (16%), Saintpaul (16%), and I 4,[5],12:r:- (13%) were the most common serotypes among isolates resistant to ≥3 classes.
- Among isolates from turkeys at slaughter, resistance to ≥3 antimicrobial classes increased from 30% in 2008 to 37%. Hadar (16%), Heidelberg (14%), Saintpaul (11%) and Schwarzengrund (11%) were the most common serotypes among isolates resistant to ≥3 classes.
- Among isolates from cattle at slaughter, resistance to ≥3 antimicrobial classes increased from 22% in 2007 to 28%. Dublin was the predominant serotype (55%) among isolates with resistance ≥3 antimicrobial classes.

An important multidrug resistance (MDR) pattern in *Salmonella* is resistance to ampicillin, chloramphenicol, streptomycin, sulfonamides, and tetracycline (ACSSuT). This pattern is associated with invasive disease in humans (Varma et al., 2005a; Varma et al, 2005b). Another important MDR pattern linked to severe illness in humans is resistance to ACSSuT with

additional resistance to amoxicillin-clavulanic acid and ceftriaxone (ACSSuTAuCx) (Gupta, 2003).

- Among isolates from humans, resistance to at least ACSSuT declined to 4.3%, the lowest since testing began in 1996. Typhimurium (64%) and Newport (21%) were the most common serotypes among isolates with this resistance pattern. ACSSuT resistance was detected in 19% of Typhimurium and 7.2% of Newport isolates.
- Among isolates from retail poultry and poultry at slaughter, ACSSuT resistance remained low (<5%). In 2010, 7.3% of isolates from swine at slaughter were resistant to ACSSuT, a decline from the peak resistance of 13% in 2009.
- Among isolates from cattle at slaughter, resistance to at least ACSSuT was 19%. Dublin (52%) and Typhimurium (15%) were the most common serotypes among cattle isolates with this resistance pattern. ACSSuT resistance was 59% among Dublin and 47% among Typhimurium isolates.
- In 2010, 1.3% of isolates from humans were resistant to at least ACSSuTAuCx. Newport (67%) and Typhimurium (21%) were the most common serotypes among isolates with this resistance pattern. Resistance was 7.2% among Newport isolates and 1.9% among Typhimurium isolates.
- Resistance to ACSSuTAuCx among isolates from retail poultry, poultry at slaughter, and swine remained low (<4.5%), as it has been since testing began.
- ACSSuTAuCx resistance among cattle isolates from slaughter was 16%, an increase from 9.5% in 2009. Serotype Dublin accounted for 55% of isolates with this pattern. Fifty-four percent of serotype Dublin isolates from cattle were resistant to at least ACSSuTAuCx.

Campylobacter

A total of 2,136 *Campylobacter* isolates were tested, including 1,310 from humans, 518 from retail meats (505 from chicken breasts and 13 from ground turkey) and 308 from chickens at slaughter. Poultry are a major source of human *C. jejuni* infections. All sources except retail ground turkey yielded higher proportions of *C. jejuni* than *C. coli*. The distribution of these predominant species varied by source: 88% *C. jejuni* and 9% *C. coli* among isolates from humans; 70% *C. jejuni* and 29% *C. coli* among retail chicken breast isolates; 39% *C. jejuni* and 54% *C. coli* among retail ground turkey isolates; 68% *C. jejuni* and 32% *C. coli* among chicken isolates. Resistance to three important antimicrobial classes highlighted below was mostly higher among *C. coli* than among *C. jejuni* isolates from all sources. Some key antimicrobial resistance findings are described below.

Macrolides

The macrolides, erythromycin and azithromycin are important antimicrobial agents for the treatment of severe campylobacteriosis in humans (Allos and Blaser, 2010). Macrolides are also authorized for use in food-producing animals (Animal Drugs @ FDA).

- Erythromycin resistance in *C. jejuni* isolated from humans, retail chicken breasts, and chickens at slaughter has remained below 4.0% since testing began.

- Erythromycin resistance was 4.3% among *C. coli* isolates from humans; it ranged from 0% to 10% during 1999–2009 with no apparent pattern.
- Erythromycin resistance was 4.1% among *C. coli* recovered from retail chicken breasts and 4.0% among *C. coli* from chickens at slaughter, both the lowest since 2002.

Quinolones

The fluoroquinolone ciprofloxacin is an alternative therapy for treating campylobacteriosis (Allos and Blaser, 2010). FDA approvals of the two poultry fluoroquinolones, sarafloxacin and enrofloxacin, were withdrawn in April 2001 and September 2005, respectively, due to resistance concerns. See http://www.fda.gov/AnimalVeterinary/SafetyHealth/RecallsWithdrawals/ucm042004.htm

- Ciprofloxacin resistance among *C. jejuni* recovered from humans (253/1,158), retail chicken breasts (80/355) and chickens at slaughter (48/208) remained ≥20%.
- Among *C. jejuni* isolated from humans, ciprofloxacin resistance increased from 12% in 1997, peaked at 26% in 2007, and was detected in 22% in 2010. Among human *C. coli* isolates, ciprofloxacin resistance was 31% in 2010.
- Ciprofloxacin resistance in *C. jejuni* isolated from retail chicken breasts increased from 17% in 2006 to 23% in 2010 and declined in *C. coli* from 22% to 14% during that time.
- Ciprofloxacin resistance in *C. jejuni* isolated from chickens at slaughter increased from 22% in 2007 when the first full year of risked-based sampling by FSIS was implemented, peaked at 32% in 2008, and declined to 23% in 2010. Among *C. coli* isolates, ciprofloxacin resistance was 22% in 2010.

Aminoglycosides

Gentamicin is categorized as a highly important antimicrobial agent for human medical therapy according to criteria outlined in FDA's guidance on evaluating the safety of antimicrobial new animal drugs (FDA, 2003). It is used in humans for the treatment of severe infections, including *Campylobacter*, that may be transmitted from food animal sources (Allos and Blaser, 2010). Gentamicin is also used in chickens, where it can be injected in day-old chicks for the prevention of early mortality associated with bacterial infections (Animal Drugs @ FDA).

- Gentamicin resistance among *C. jejuni* isolates from humans, retail chickens and chickens at slaughter was <1%.
- Between 2007 and 2010, gentamicin resistance among *C. coli* increased from 0% to 11% among isolates from humans, 0.7% to 13% among isolates from retail chicken breasts, and 1.3% to 5.0% among isolates from chickens at slaughter.

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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 human pathogens depends on public health laboratory-based surveillance and is driven by the occurrence of laboratory-confirmed cases. NARMS testing of non-typhoidal *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 shipping to CDC for susceptibility testing. From 1996 through 2002, participating sites submitted every 10th non-typhoidal *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 5 FoodNet sites and expanded to 10 sites (Connecticut, Georgia, Maryland, Minnesota, New Mexico, Oregon, Tennessee, and selected counties in California, Colorado, and New York) by 2003. From 1997 through 2004, CDC received per week, the 1st *Campylobacter* isolate from each participating laboratory. In 2005, FoodNet sites changed from submitting the 1st isolate received each week to submitting every isolate (Georgia, Maryland, New Mexico, Oregon, and Tennessee), every other isolate (California, Colorado, Connecticut, and New York), or every 5th isolate received (Minnesota). In 2010, the scheme for testing isolates was changed to every other isolate from Georgia and Maryland and every third from New Mexico.

2. Retail Meat Component

Retail meat sampling began in January 2002 with FoodNet sites in Connecticut, Georgia, Maryland, Minnesota, and Tennessee; Oregon joined in September. FoodNet sites in California and New York joined in 2003, and FoodNet sites in Colorado and New Mexico joined in 2004.The Pennsylvania public health laboratory joined the NARMS retail meat sampling program in 2008. Each month, participating FoodNet sites purchased approximately 40 meat samples, comprising 10 samples each of chicken breasts, ground turkey, ground beef, and pork chops. After joining the retail meat program, most sites cultured all meats for *Salmonella* and *Campylobacter*. Maryland did not participate in the retail meat sampling program in 2007, and Pennsylvania did not begin testing for *Campylobacter* until 2009. Beginning in 2008, all states tested for *Campylobacter* in retail poultry only. Since 2002, 3 sites (Georgia, Oregon, and Tennessee) have continuously cultured1 meats for *E. coli* and *Enterococcus*. Maryland cultured retail meats for *E. coli* and *Enterococcus* from 2002 through 2006, and in 2010. 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 USDA's Food Safety Inspection Service (FSIS) from carcass rinsates (chicken), carcass swabs (turkey, cattle, and swine), and ground products (chicken, turkey, and beef). FSIS collected these isolates 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 2006, there were 2 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 after HACCP compliance standards were not met. All sets were included in NARMS testing, but most isolates were from “A” set samples. Beginning in June 2006, establishment testing was 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 3 FSIS laboratories (Eastern, Midwestern, and Western). 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 from July 2001 through December 2010, 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 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. In 2004, for example, 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 Inc, Cleveland, Ohio). In 2010, *Salmonella* and *E. coli* were tested using a custom panel developed for Gram-negative bacteria (Trek catalog # CMV1AGNF). The quality control organisms include *Escherichia coli* ATCC 25922, *Enterococcus faecalis* ATCC 29212, *Staphylococcus aureus* ATCC 29213, and *Pseudomonas aeruginosa* ATCC 27853, according to Clinical and Laboratory Standards Institute (CLSI) recommendations.[3,4]

Methods used to determine MICs for *Campylobacter* have also 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 the next two-fold dilution for interpretation.[5] The retail component of NARMS used the agar dilution method in 2002 and 2003. The antimicrobial agents tested using agar dilution included ciprofloxacin, doxycycline, erythromycin, gentamicin,

[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
[3] 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.
[4] CLSI. 2010. Performance Standards for Antimicrobial Susceptibility Testing; Twentieth Informational Supplement. CLSI document M100-S20. CLSI, Wayne, PA.
[5] In USDA’s NARMS annual reports, MIC values were not rounded up prior to interpretation.

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.[1] 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® semiautomated antimicrobial susceptibility system (Trek Diagnostic Systems Inc, Cleveland, 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-A2, M100-S21, and M31-A3.[2,3,4] For *Salmonella* and *E. coli*, CLSI breakpoints were available for all antimicrobial agents tested except streptomycin.[4,5] For *Campylobacter*, CLSI breakpoints were available only for ciprofloxacin, doxycycline, erythromycin, and tetracycline.[3] 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. CLSI recently updated breakpoints for ciprofloxacin for invasive *Salmonella* serotypes in its M100-S22 document published in January 2012.[5] The new breakpoints for ciprofloxacin will be applied to all *Salmonella* in all 2011 NARMS reports. The new resistant breakpoint is ≥1 µg/ml and the susceptible breakpoint is ≤0.06 µg.ml. Isolates with an MIC of 0.12-0.5 µg/ml will be considered intermediate in susceptibility. The impact that the change in the breakpoints will have on NARMS 2010 data is shown in Appendix C.

[1] 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.
[2] CLSI. 2010. Methods for Antimicrobial Dilution and Disk Susceptibility Testing of Infrequently Isolated or Fastidious Bacteria; Approved Guideline- Second Edition. CLSI document M45-A2. CLSI, Wayne, PA.
[3] CLSI. 2011. Performance Standards for Antimicrobial Susceptibility Testing; Twenty-first Informational Supplement. CLSI document M100-S21. CLSI, Wayne, PA.
[4] 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.
[5] CLSI. 2012. Performance Standards for Antimicrobial Susceptibility Testing; Twenty-second Informational Supplement. CLSI document M100-S22. CLSI, Wayne, PA.

C. Breakpoints

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

Antimicrobial Class	Antimicrobial Agent	Breakpoints (µg/ml)		
		Susceptible	Intermediate	Resistant
Aminoglycosides	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	≤ 1	2	≥ 4
Folate Pathway Inhibitors	Sulfamethoxazole/Sulfisoxazole[2]	≤ 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] Sulfamethoxazole was tested from 1996 through 2003 and was replaced by sulfisoxazole in 2004

Table 2. Interpretive Criteria 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 of the report contains data for non-typhoidal *Salmonella enterica* isolates recovered from humans, retail meats, and food animals at slaughter. The number of *Salmonella* isolates reported for humans each year is slightly lower than in reports prior to 2007 because typhoidal *Salmonella enterica* serotypes (Paratyphi A, tartrate-negative Paratyphi B, and Paratyphi C), which cause enteric fever in humans but are not associated with food animal reservoirs, have now been combined with serotype Typhi for reporting. Prior to 2007, NARMS reports combined data for all *Salmonella enterica* serotypes except for serotype Typhi. Data for typhoidal *Salmonella* can be found in the NARMS Human Isolates Final Report published by CDC.

Antimicrobial susceptibility data are first presented for all non-typhoidal *Salmonella enterica* serotypes. Data are then presented for the following top non-typhoidal *Salmonella enterica* serotypes in humans: Enteritidis, Typhimurium, Newport, I 4,[5],12:i:- and Heidelberg. During 2010, Javiana was the fourth most common non-typhoidal *Salmonella* serotype in humans. However, those data are not presented separately in this report because no *Salmonella* ser. Javiana isolates were recovered from retail meats and only one isolate was recovered from food animals. *Salmonella* serotype I 4,[5]12:i:- includes *Salmonella enterica* strains with the antigenic formulas I 4,12:i:- and I 4,5,12:i:-. Food animal data for *Salmonella enterica* serotype I 4,[5],12:i:- are not available before 2004 because NVSL, which serotyped the *Salmonella* isolates, did not report antigenic formulas for most monophasic *Salmonella enterica* serotypes at that time.

Section IV of the report contains data for *Campylobacter* recovered from humans, retail poultry, and chicken carcass rinsates. Due to low recovery of *Campylobacter* from ground beef and pork chops, states discontinued testing these meat types for *Campylobacter* in 2008. All resistance data on *Campylobacter* isolated from ground beef and pork chops can be found in reports prior to 2008. Antimicrobial susceptibility data for *C. jejuni* and *C. coli* are presented separately. Section V of the report 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 2010. Confidence intervals were calculated using the Clopper-Pearson exact method.[1] The unshaded areas in the MIC tables indicate the range of concentrations tested for each antimicrobial agent.[2] 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, from 1999 through 2010.[3] Due to space constraints, data from 1996 through 1998 are not shown in the resistance tables, but can be found in reports prior to 2008.[4,5] 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

[1] Newcombe RG. Two-sided confidence intervals for the single proportion: comparison of seven methods. Statistics in Medicine 1998; 17(8): 857-872.
[2] The concentration ranges are also listed in Appendix A.
[3] Data on *Campylobacter* recovered from chickens is presented only for the period of July 2001 through December 2010 as described in Section IIA.
[4] FDA. National Antimicrobial Resistance Monitoring System – Enteric Bacteria (NARMS): 2008 Executive Report. Rockville, MD: U.S. Department of Health and Human Services, Food and Drug Administration, 2010.
[5] Data from 1996 through 1998 are still included in the graphs and supporting tables.

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 Enteritidis, Typhimurium, Newport, I 4,[5],12;i:- and Heidelberg.

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. Resistance to ceftriaxone and nalidixic acid in *Salmonella* is highlighted in several pie charts and graphs (Figures 6-15).[1,2] Prior to 2008, NARMS reports highlighted resistance to ceftiofur (an extended-spectrum cephalosporin used in food animals), which is usually indicative of the presence of an AmpC beta-lactamase gene (*bla*CMY), to represent resistance to third-generation cephalosporins. With the revised ceftriaxone breakpoints, ceftriaxone resistance (MIC ≥ 4 µg/ml) is now nearly identical to ceftiofur resistance. Resistance to the quinolone nalidixic acid (MIC ≥ 32 µg/ml) indicates certain chromosomal point mutations that also cause decreased susceptibility to ciprofloxacin (MIC ≥ 0.125 µg/ml), which is associated with greater risk of treatment failure.[3]

The NARMS Executive Report also highlights, through a series of graphs, resistance to quinolones and macrolides, two antimicrobial classes important for treating *Campylobacter* infections in humans. Quinolones such as the fluoroquinolone, ciprofloxacin, are effective treatments for human campylobacteriosis. Fluoroquinolones were first approved for use in poultry in the United States in 1995 for control of mortality associated with *E. coli*. Because of concerns about increasing fluoroquinolone resistance among *Campylobacter* in both animal and human hosts, approvals for sarafloxacin and enrofloxacin use in poultry were withdrawn in April 2001 and September 2005, respectively. NARMS continues to monitor the susceptibility of *Campylobacter* to fluoroquinolones.

Finally, multidrug resistance data for all three genera are presented (Tables 13-25, 28, 31, 34, 37, 40, 51, and 56). Data for specific multidrug resistance phenotypes of public health importance are reported along with data on resistance to CLSI antimicrobial classes. Tables 13-17 show the number of resistant *Salmonella* isolates by antimicrobial agent and the number of antimicrobial classes in a resistance pattern for each of the top serotypes (comprising at least 2% of isolates) from each source. For *Salmonella* and *E. coli*, resistance to multiple antimicrobial classes is limited to the eight CLSI antimicrobial classes tested in all years from 1996 through 2010 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. Multidrug resistance data for *Campylobacter* are also in the 2010 report. All seven antimicrobial classes and all nine antimicrobial agents included in broth microdilution testing of *Campylobacter* isolates are represented in Table 51.

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

[1] Note that the scales vary from figure to figure, based on the maximum percent resistance.
[2] 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.
[3] Crump JA, Barrett TJ, Nelson JT, Angulo FJ. Reevaluating fluoroquinolone breakpoints for *Salmonella enterica* serotype Typhi and for Non-Typhi salmonellae. Clin Inf Dis 2003;37:75-81.

IV. Non-Typhoidal *Salmonella* Data

A. Non-Typhoidal *Salmonella* Isolates Tested

Table 3. Number of Non-Typhoidal *Salmonella* Isolates Tested, by Source and Year, 1996-2010 [1]

Source	Year														
	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Humans	1318	1297	1455	1493	1372	1410	1998	1855	1782	2034	2172	2145	2384	2193	2474
Chicken Breasts							60	83	157	153	152	99	198	272	171
Ground Turkey							74	114	142	183	159	190	246	193	202
Ground Beef							9	10	14	8	19	13	24	14	7
Pork Chops							10	5	11	9	8	18	23	8	20
Chickens		214	561	1438	1173	1307	1500	1158	1280	1989	1380	994	624	551	564
Turkeys		107	240	713	518	550	244	262	236	227	304	271	148	121	151
Cattle		24	284	1610	1388	893	1008	670	607	329	389	439	443	200	247
Swine		111	793	876	451	418	379	211	308	301	304	211	111	120	111

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

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

Table 4. Number and Percent of Retail Meat Samples Culture Positive for *Salmonella*, 2010

	Chicken Breasts	Ground Turkey	Ground Beef	Pork Chops
Number of Meat Samples Tested	1320	1320	1320	1320
Number Positive for *Salmonella*	171	202	7	20
Percent Positive for *Salmonella*	13.0%	15.3%	0.5%	1.5%

Figure 1. Percent of Retail Meat Samples Culture Positive for *Salmonella*, 2010

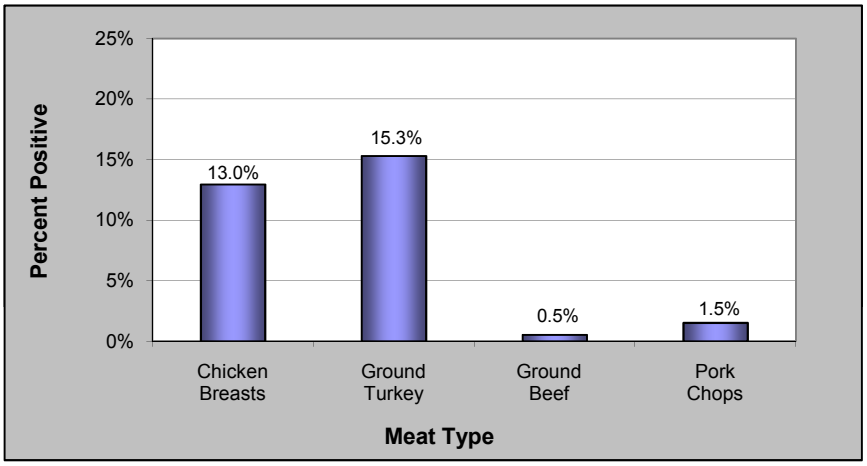
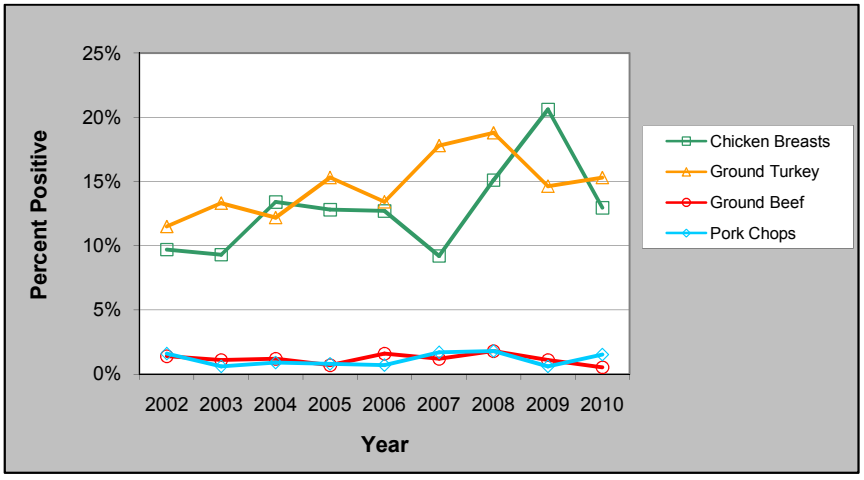


Figure 2. Percent of Retail Meat Samples Culture Positive for *Salmonella*, 2002-2010



C. Non-Typhoidal *Salmonella* Serotypes

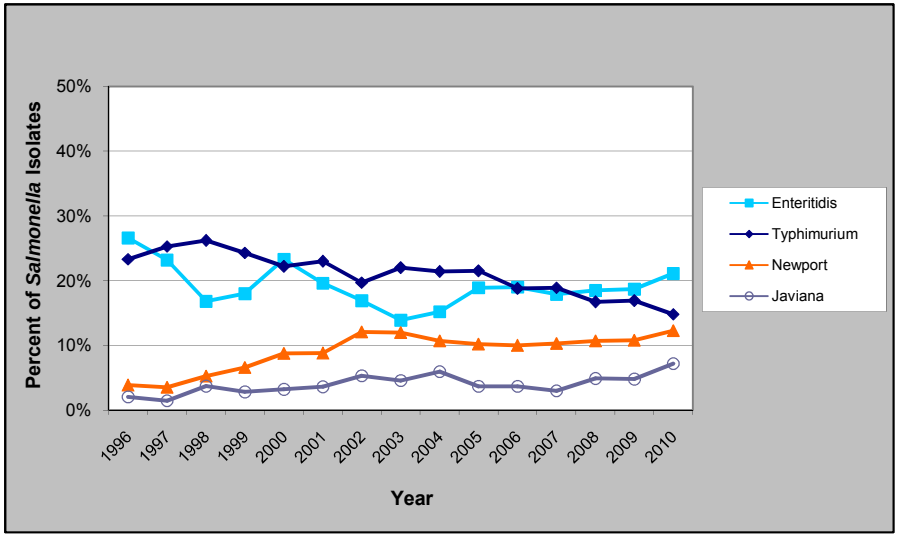
Table 5. Most Common Serotypes among Non-Typhoidal *Salmonella* Isolates from Humans, Retail Meats, and Food Animals, 2010

Humans				Retail Meats				Food Animals			
Source	**Serotype**	**n**	**%**	**Meat Type**	**Serotype**	**n**	**%**	**Animal Source**	**Serotype**	**n**	**%**
Humans (N=2474)	Enteritidis	522	21.1	**Chicken Breasts (N=171)**	Typhimurium	79	46.2	**Chickens (N=564)**	Kentucky	243	43.1
	Typhimurium	366	14.8		Enteritidis	28	16.4		Enteritidis	152	27.0
	Newport	305	12.3		Heidelberg	21	12.3		Typhimurium	54	9.6
	Javiana	178	7.2		Kentucky	21	12.3		Heidelberg	25	4.4
	I 4,[5],12:i:-	77	3.1		Senftenberg	5	2.9		I 4,[5],12:i:-	17	3.0
	Heidelberg	62	2.5		Infantis	3	1.8		Johannesburg	8	1.4
	Montevideo	60	2.4		I 4,[5],12:i:-	2	1.2		Berta	6	1.1
	Saintpaul	60	2.4		IIIa 18:z4,z23:-	2	1.2		Schwarzengrund	6	1.1
	Braenderup	57	2.3		Hadar	2	1.2		Montevideo	5	0.9
	Infantis	55	2.2		Other	8	4.7		Senftenberg	5	0.9
	Paratyphi B var. L(+) tartrate+	54	2.2						Thompson	5	0.9
	Muenchen	52	2.1						Other	38	6.7
	Agona	43	1.7								
	Oranienburg	40	1.6								
	Mbandaka	24	1.0	**Ground Turkey (N=202)**	Saintpaul	48	23.8	**Turkeys (N=151)**	Hadar	30	19.9
	Thompson	24	1.0		IIIa 18:z4,z23:-	23	11.4		Saintpaul	21	13.9
	Mississippi	23	0.9		Hadar	20	9.9		Heidelberg	14	9.3
	Anatum	20	0.8		Heidelberg	17	8.4		IIIa 18:z4,z23:-	11	7.3
	Schwarzengrund	19	0.8		Agona	16	7.9		Schwarzengrund	11	7.3
	Stanley	18	0.7		Schwarzengrund	13	6.4		Muenchen	10	6.6
	Unknown serotype	18	0.7		Albany	10	5.0		Albany	6	4.0
	Partially serotyped	12	0.5		I 4,[5],12:r:-	9	4.5		Anatum	6	4.0
	Rough/Nonmotile isolates	15	0.6		Berta	9	4.5		Senftenberg	6	4.0
	Other	370	15.0		Senftenberg	7	3.5		Agona	5	3.3
					Typhimurium	6	3.0		Newport	5	3.3
					I 4,12:d:-	3	1.5		Other	26	17.2
					Alachua	3	1.5				
					Brandenburg	3	1.5				
					Other	15	7.4				
				Ground Beef (N=7)	Newport	2	28.6	**Cattle (N=247)**	Montevideo	61	24.7
					Agona	1	14.3		Dublin	41	16.6
					Anatum	1	14.3		Typhimurium	15	6.1
					Dublin	1	14.3		Anatum	14	5.7
					Enteritidis	1	14.3		Kentucky	13	5.3
					Montevideo	1	14.3		Cerro	10	4.0
									Agona	8	3.2
									Mbandaka	8	3.2
									Meleagridis	7	2.8
									Infantis	5	2.0
									Newport	5	2.0
									Senftenberg	5	2.0
									Other	55	22.3
				Pork Chops (N=20)	Derby	6	30.0	**Swine (N=111)**	Derby	18	16.2
					Typhimurium	5	25.0		Typhimurium	13	11.7
					Saintpaul	2	10.0		Saintpaul	11	9.9
					Senftenberg	2	10.0		Infantis	9	8.1
					I 6,7:l,w:-	1	5.0		Johannesburg	8	7.2
					Alachua	1	5.0		Adelaide	7	6.3
					Anatum	1	5.0		London	6	5.4
					Infantis	1	5.0		Anatum	5	4.5
					Montevideo	1	5.0		Heidelberg	5	4.5
									Agona	4	3.6
									Other	25	22.5

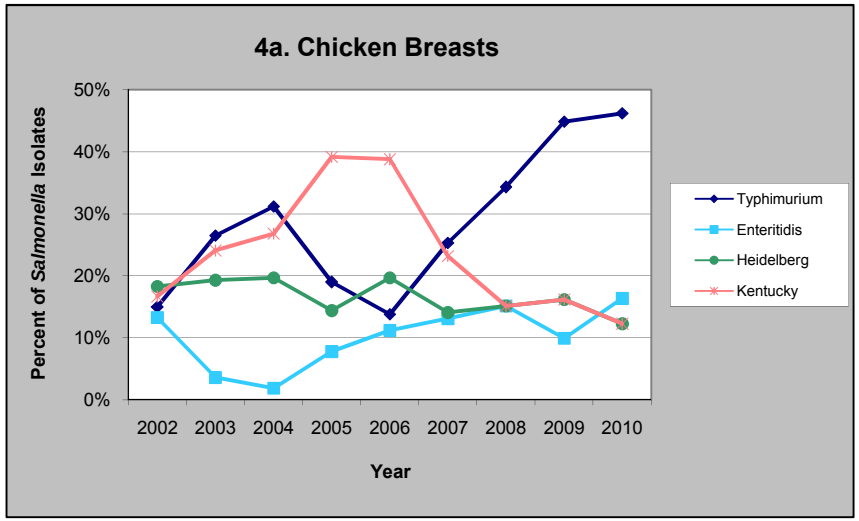
Table 6. Most Common Non-Typhoidal *Salmonella* Serotypes in Humans and their Distributions among Retail Meat and Food Animal Isolates, by Meat Type and Animal Source, 2010

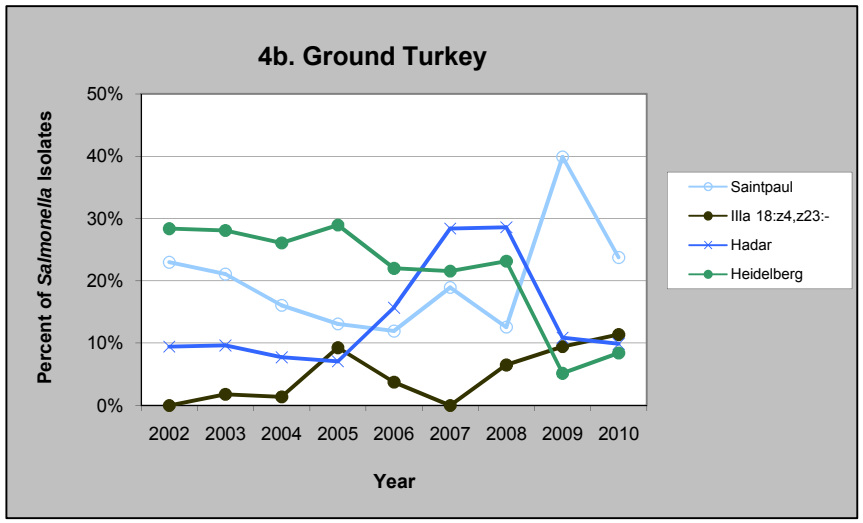
	Humans	Retail Meats				Food Animals			
	Humans (N=2474)	Chicken Breast (N=171)	Ground Turkey (N=202)	Ground Beef (N=7)	Pork Chops (N=20)	Chickens (N=564)	Turkeys (N=151)	Cattle (N=247)	Swine (N=111)
1. Enteritidis	21.1%	16.4%	0.0%	14.3%	0.0%	27.0%	0.7%	0.4%	0.0%
	522	28	0	1	0	152	1	1	0
2. Typhimurium	14.8%	46.2%	3.0%	0.0%	25.0%	9.6%	2.6%	6.1%	11.7%
	366	79	6	0	5	54	4	15	13
3. Newport	12.3%	0.0%	1.0%	28.6%	0.0%	0.2%	3.3%	2.0%	0.0%
	305	0	2	2	0	1	5	5	0
4. Javiana	7.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.4%	0.0%
	178	0	0	0	0	0	0	1	0
5. I 4,[5],12:i:-	3.1%	1.2%	0.0%	0.0%	0.0%	3.0%	0.0%	0.0%	0.9%
	77	2	0	0	0	17	0	0	1
6. Heidelberg	2.5%	12.3%	8.4%	0.0%	0.0%	4.4%	9.3%	0.8%	4.5%
	62	21	17	0	0	25	14	2	5
7. Montevideo	2.4%	0.0%	0.5%	14.3%	5.0%	0.9%	2.0%	24.7%	0.0%
	60	0	1	1	1	5	3	61	0
8. Saintpaul	2.4%	0.0%	23.8%	0.0%	10.0%	0.0%	13.9%	1.2%	9.9%
	60	0	48	0	2	0	21	3	11
9. Braenderup	2.3%	0.6%	0.0%	0.0%	0.0%	0.7%	0.0%	0.0%	0.0%
	57	1	0	0	0	4	0	0	0
10. Infantis	2.2%	1.8%	1.0%	0.0%	5.0%	0.7%	0.0%	2.0%	8.1%
	55	3	2	0	1	4	0	5	9

Figure 3. Most Common Non-Typhoidal *Salmonella* Serotypes from Humans in 2010 and their Relative Frequencies, by Year, 1996-2010



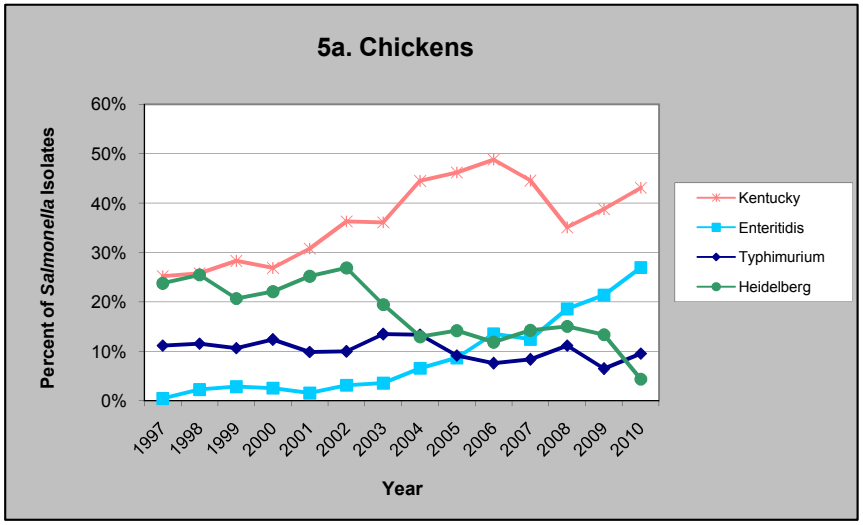
Figures 4a-b. Most Common Non-Typhoidal *Salmonella* Serotypes from Retail Poultry in 2010 and their Relative Frequencies, by Year, 2002-2010[1]

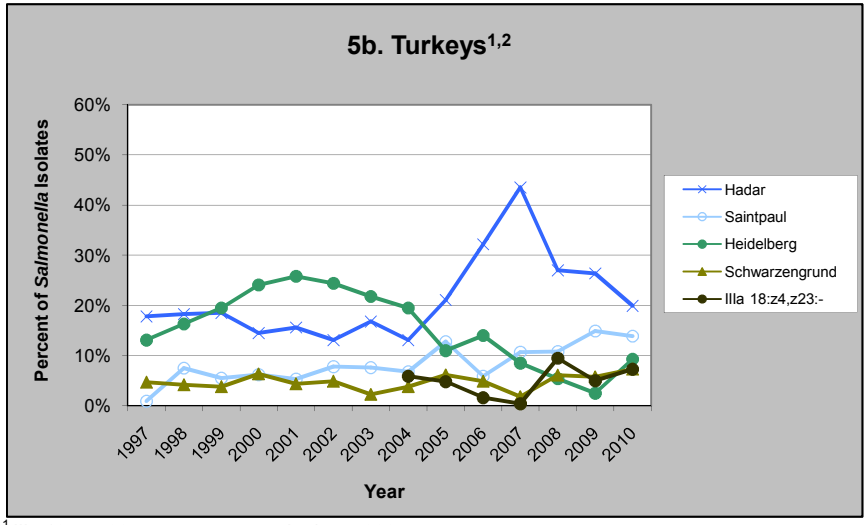




[1] Graphs are not provided for ground beef and pork chops due to the small number of *Salmonella* isolates from these sources

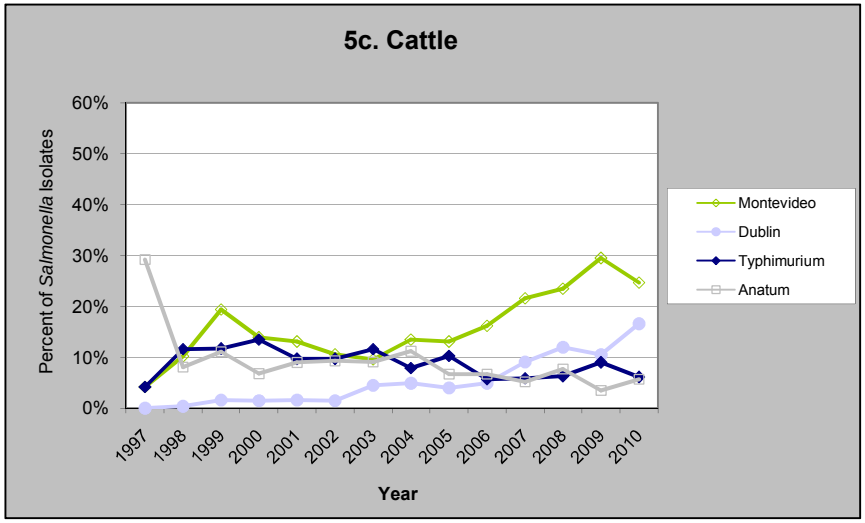
Figures 5a-d. Most Common Non-Typhoidal *Salmonella* Serotypes from Food Animals in 2010 and their Relative Frequencies, by Year, 1997-2010

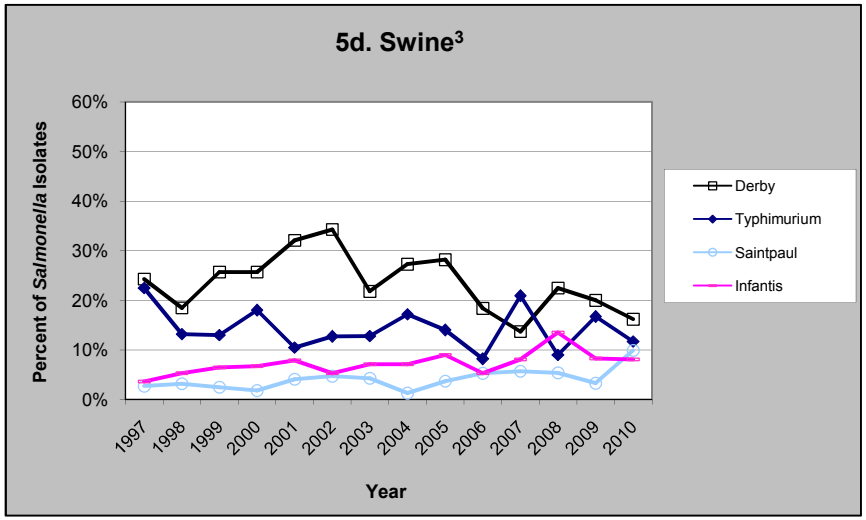




[1] IIIa 18:z4,z23:- was not reported prior to 2004

[2] There are five serotypes shown because the fourth highest frequency was shared by two serotypes. See table 5





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, 2010

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 (2474)	0.0	**0.0**	[0.0 - 0.1]						4.4	73.3	20.2	2.0	0.2							
	Chicken Breasts (171)	0.0	**0.0**	[0.0 - 2.1]						19.3	56.1	23.4	1.2								
	Ground Turkey (202)	0.0	**0.0**	[0.0 - 1.8]						4.0	55.4	35.1	5.0	0.5							
	Ground Beef (7)	0.0	**0.0**	[0.0 - 41.0]						14.3	42.9	42.9									
	Pork Chops (20)	0.0	**0.0**	[0.0 - 16.8]							40.0	55.0		5.0							
	Chickens (564)	0.0	**0.0**	[0.0 - 0.7]						13.1	74.1	12.2	0.5								
	Turkeys (151)	0.0	**0.0**	[0.0 - 2.4]						8.0	80.7	10.7	0.7								
	Cattle (247)	0.0	**0.0**	[0.0 - 1.5]						4.5	56.3	36.0	3.2								
	Swine (111)	0.0	**0.0**	[0.0 - 3.3]						3.6	72.1	21.6	1.8	0.9							
Gentamicin	Humans (2474)	0.2	**1.0**	[0.6 - 1.4]					66.9	30.3	1.4	0.2		0.2	**0.4**	**0.6**					
	Chicken Breasts (171)	0.6	**6.4**	[3.3 - 11.2]					71.3	21.6				0.6	**3.5**	**2.9**					
	Ground Turkey (202)	3.0	**16.8**	[11.9 - 22.7]					43.6	34.7	1.0	1.0		3.0	**7.9**	**8.9**					
	Ground Beef (7)	0.0	**0.0**	[0.0 - 41.0]					57.1	42.9											
	Pork Chops (20)	0.0	**10.0**	[1.2 - 31.7]					30.0	55.0	5.0					**10.0**					
	Chickens (564)	0.5	**4.6**	[3.0 - 6.7]					79.6	14.7	0.2		0.4	0.5	**3.0**	**1.6**					
	Turkeys (151)	2.6	**19.9**	[13.8 - 27.1]					59.6	17.9				2.6	**7.9**	**11.9**					
	Cattle (247)	0.4	**4.9**	[2.5 - 8.3]					50.2	39.7	4.0		0.8	0.4	**2.8**	**2.0**					
	Swine (111)	2.7	**2.7**	[0.6 - 7.7]					64.9	27.0	2.7			2.7	**2.7**						
Kanamycin	Humans (2474)	0.0	**2.3**	[1.7 - 2.9]										97.7	<0.1		**<0.1**	**2.2**			
	Chicken Breasts (171)	0.0	**8.2**	[4.5 - 13.4]										91.2	0.6			**8.2**			
	Ground Turkey (202)	0.5	**15.8**	[11.1 - 21.6]										83.7		0.5	**0.5**	**15.3**			
	Ground Beef (7)	0.0	**14.3**	[0.4 - 57.9]										85.7				**14.3**			
	Pork Chops (20)	0.0	**10.0**	[1.2 - 31.7]										90.0				**10.0**			
	Chickens (564)	0.2	**4.3**	[2.7 - 6.3]										95.6		0.2	**1.2**	**3.0**			
	Turkeys (151)	0.7	**19.2**	[13.3 - 26.4]										80.1		0.7	**2.0**	**17.2**			
	Cattle (247)	0.0	**12.6**	[8.7 - 17.3]										87.4			**0.8**	**11.7**			
	Swine (111)	0.0	**10.8**	[5.7 - 18.1]										88.3	0.9			**10.8**			
Streptomycin	Humans (2474)	N/A	**8.6**	[7.5 - 9.7]												91.4	**3.6**	**4.9**			
	Chicken Breasts (171)	N/A	**25.7**	[19.4 - 33.0]												74.3	**17.0**	**8.8**			
	Ground Turkey (202)	N/A	**31.7**	[25.3 - 38.6]												68.3	**15.8**	**15.8**			
	Ground Beef (7)	N/A	**42.9**	[9.9 - 81.6]												57.1	**14.3**	**28.6**			
	Pork Chops (20)	N/A	**45.0**	[23.1 - 68.5]												55.0	**15.0**	**30.0**			
	Chickens (564)	N/A	**36.0**	[32.0 - 40.1]												64.0	**28.5**	**7.4**			
	Turkeys (151)	N/A	**27.8**	[20.8 - 35.7]												72.2	**17.2**	**10.6**			
	Cattle (247)	N/A	**26.7**	[21.3 - 32.7]												73.3	**4.9**	**21.9**			
	Swine (111)	N/A	**31.5**	[23.0 - 41.0]												68.5	**13.5**	**18.0**			

[1] Percent of isolates with intermediate susceptibility

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

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

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

Table 7b. Distribution of MICs and Occurrence of Resistance among all Non-Typhoidal *Salmonella* Isolates from Humans, Retail Meats, and Food Animals, 2010

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 (2474)	3.3	**2.8**	[2.2 - 3.6]							89.1	1.5	0.8	2.5	3.3	**0.8**	**2.1**				
	Chicken Breasts (171)	2.9	**33.9**	[26.9 - 41.5]							60.2	0.6		2.3	2.9	**4.7**	**29.2**				
	Ground Turkey (202)	7.9	**17.3**	[12.4 - 23.3]							49.5	2.5	0.5	22.3	7.9	**4.5**	**12.9**				
	Ground Beef (7)	0.0	**28.6**	[3.7 - 71.0]							71.4						**28.6**				
	Pork Chops (20)	5.0	**0.0**	[0.0 - 16.8]							80.0	5.0	5.0	5.0	5.0						
	Chickens (564)	0.7	**11.7**	[9.2 - 14.6]							83.7	3.0	0.5	0.4	0.7	**2.1**	**9.6**				
	Turkeys (151)	11.3	**15.2**	[9.9 - 22.0]							55.0	0.7	1.3	16.6	11.3	**1.3**	**13.9**				
	Cattle (247)	2.8	**21.5**	[16.5 - 27.1]							70.0	2.8	1.6	1.2	2.8	**2.8**	**18.6**				
	Swine (111)	4.5	**3.6**	[1.0 - 9.0]							82.0	1.8	4.5	3.6	4.5	**2.7**	**0.9**				
Cephems																					
Cefoxitin	Humans (2474)	0.4	**2.5**	[2.0 - 3.2]							19.2	65.2	11.8	0.9	0.4	**1.0**	**1.5**				
	Chicken Breasts (171)	6.4	**28.1**	[21.5 - 37.4]							10.5	43.9	9.4	1.8	6.4	**14.6**	**13.5**				
	Ground Turkey (202)	0.5	**15.8**	[11.1 - 21.9]							10.4	53.5	18.8	1.0	0.5	**4.0**	**11.9**				
	Ground Beef (7)	0.0	**28.6**	[3.7 - 71.0]								14.3	57.1				**28.6**				
	Pork Chops (20)	0.0	**0.0**	[0.0 - 16.8]							5.0	40.0	55.0								
	Chickens (564)	0.4	**11.3**	[8.8 - 14.3]							7.3	66.0	14.2	0.9	0.4	**8.3**	**3.0**				
	Turkeys (151)	1.3	**15.2**	[9.9 - 22.0]							3.3	57.0	23.2		1.3	**6.6**	**8.6**				
	Cattle (247)	2.0	**20.6**	[15.8 - 26.2]							4.5	38.1	32.0	2.8	2.0	**5.3**	**15.4**				
	Swine (111)	0.0	**1.8**	[0.2 - 6.4]							3.6	43.2	46.8	4.5			**1.8**				
Ceftiofur	Humans (2474)	<0.1	**2.8**	[2.2 - 3.5]				0.2	0.4	32.7	63.1	0.8	<0.1	**<0.1**	**2.7**						
	Chicken Breasts (171)	0.0	**35.1**	[28.0 - 42.7]					0.6	23.4	40.4	0.6		**9.4**	**25.7**						
	Ground Turkey (202)	0.0	**16.3**	[11.5 - 22.2]						26.2	56.4	1.0		**1.5**	**14.9**						
	Ground Beef (7)	0.0	**28.6**	[3.7 - 71.0]							57.1	14.3			**28.6**						
	Pork Chops (20)	0.0	**0.0**	[0.0 - 16.8]						10.0	80.0	10.0									
	Chickens (564)	0.5	**12.1**	[9.5 - 15.0]				0.2	0.4	40.1	46.1	0.7	0.5	**1.8**	**10.3**						
	Turkeys (151)	0.0	**15.2**	[9.9 - 22.0]						23.8	60.9				**15.2**						
	Cattle (247)	0.4	**21.5**	[16.5 - 27.1]					1.6	28.3	47.4	0.8	0.4	**1.6**	**19.8**						
	Swine (111)	0.0	**1.8**	[0.2 - 6.4]						26.1	68.5	3.6			**1.8**						
Ceftriaxone	Humans (2474)	0.0	**2.8**	[2.2 - 3.6]					97.1	<0.1				**0.2**	**1.2**	**1.1**	**0.2**	**0.2**			
	Chicken Breasts (171)	0.0	**34.5**	[27.4 - 42.1]					64.9	0.6			**3.5**	**9.4**	**18.1**	**2.9**	**0.6**				
	Ground Turkey (202)	0.0	**16.3**	[11.5 - 22.2]					83.2	0.5			**0.5**	**1.5**	**7.9**	**6.4**					
	Ground Beef (7)	0.0	**28.6**	[3.7 - 71.0]					57.1	14.3					**14.3**	**14.3**					
	Pork Chops (20)	0.0	**0.0**	[0.0 - 16.8]					100.0												
	Chickens (564)	0.5	**11.9**	[9.3 - 14.8]					86.9	0.5	0.2	0.5	**0.2**	**1.8**	**6.9**	**1.4**	**1.4**	**0.2**			
	Turkeys (151)	0.7	**15.2**	[9.9 - 22.0]					84.1			0.7		**1.3**	**9.9**	**2.6**	**1.3**				
	Cattle (247)	0.0	**21.5**	[16.5 - 27.1]					77.7		0.8		**0.4**	**1.6**	**9.7**	**8.1**	**1.6**				
	Swine (111)	0.0	**1.8**	[0.2 - 6.4]					96.4	1.8					**0.9**		**0.9**				

[1] Percent of isolates with intermediate susceptibility

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

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

[4] The unshaded areas indicate 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, 2010

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 (2474)	N/A	**9.0**	[7.9 - 10.2]											5.0	36.1	47.6	2.1	<0.1	**9.0**	
	Chicken Breasts (171)	N/A	**46.2**	[38.6 - 54.0]											2.3	31.0	19.3	0.6	0.6	**46.2**	
	Ground Turkey (202)	N/A	**25.7**	[19.9 - 32.3]											7.4	32.7	33.7		0.5	**25.7**	
	Ground Beef (7)	N/A	**42.9**	[9.9 - 81.6]												42.9	14.3			**42.9**	
	Pork Chops (20)	N/A	**50.0**	[27.2 - 72.8]											10.0	15.0	25.0			**50.0**	
	Chickens (564)	N/A	**12.4**	[9.8 - 15.4]											8.9	30.0	46.8	1.4	0.5	**12.4**	
	Turkeys (151)	N/A	**25.2**	[18.5 - 32.9]											6.0	31.8	35.8		1.3	**25.2**	
	Cattle (247)	N/A	**26.3**	[20.9 - 32.3]											4.5	25.9	40.9	2.0	0.4	**26.3**	
	Swine (111)	N/A	**28.8**	[20.6 - 38.2]											18.9	21.6	27.0	2.7	0.9	**28.8**	
Trimethoprim-Sulfamethoxazole	Humans (2474)	N/A	**1.6**	[1.1 - 2.1]				97.0	1.3	0.1			**<0.1**	**1.5**							
	Chicken Breasts (171)	N/A	**0.0**	[0.0 - 2.1]				98.3	1.8												
	Ground Turkey (202)	N/A	**0.0**	[0.0 - 1.8]				93.6	6.4												
	Ground Beef (7)	N/A	**0.0**	[0.0 - 41.0]				100.0													
	Pork Chops (20)	N/A	**0.0**	[0.0 - 16.8]				95.0	5.0												
	Chickens (564)	N/A	**0.0**	[0.0 - 0.7]				99.6	0.4												
	Turkeys (151)	N/A	**0.0**	[0.0 - 2.4]				96.0	4.0												
	Cattle (247)	N/A	**4.5**	[2.2 - 7.8]				79.4	11.3	4.0		0.8	**0.8**	**3.6**							
	Swine (111)	N/A	**1.8**	[0.2 - 6.4]				91.0	6.3		0.9			**1.8**							
Penicillins																					
Ampicillin	Humans (2474)	<0.1	**9.1**	[8.0 - 10.3]							85.1	5.5	0.2	<0.1	<0.1	**<0.1**	**9.0**				
	Chicken Breasts (171)	0.0	**39.2**	[31.8 - 46.9]							55.0	4.1	0.6	1.2			**39.2**				
	Ground Turkey (202)	0.0	**48.0**	[41.0 - 55.1]							50.0	2.0					**48.0**				
	Ground Beef (7)	0.0	**28.6**	[3.7 - 71.0]							57.1	14.3					**28.6**				
	Pork Chops (20)	0.0	**15.0**	[3.2 - 37.9]							75.0	10.0					**15.0**				
	Chickens (564)	0.2	**13.7**	[10.9 - 16.8]							82.8	3.2		0.2	0.2		**13.7**				
	Turkeys (151)	0.0	**44.4**	[36.3 - 52.7]							54.3	1.3				**1.3**	**43.0**				
	Cattle (247)	0.4	**26.3**	[20.9 - 32.3]							70.4	2.4	0.4		0.4	**0.4**	**25.9**				
	Swine (111)	0.0	**17.1**	[10.6 - 25.4]							81.1	1.8				**0.9**	**16.2**				
Phenicols																					
Chloramphenicol	Humans (2474)	0.6	**4.9**	[4.1 - 5.9]								0.3	34.2	60.0	0.6	**<0.1**	**4.9**				
	Chicken Breasts (171)	0.0	**2.3**	[0.6 - 5.9]								2.9	66.1	28.7		**1.2**	**1.2**				
	Ground Turkey (202)	0.5	**2.5**	[0.8 - 5.7]								3.0	60.9	33.2	0.5		**2.5**				
	Ground Beef (7)	0.0	**42.9**	[9.9 - 81.6]										57.1			**42.9**				
	Pork Chops (20)	0.0	**15.0**	[3.2 - 37.9]									30.0	55.0		**10.0**	**5.0**				
	Chickens (564)	0.4	**3.0**	[1.8 - 4.8]								4.6	62.4	29.6	0.4	**0.4**	**2.7**				
	Turkeys (151)	0.7	**4.6**	[1.9 - 9.3]								2.0	51.0	41.7	0.7		**4.6**				
	Cattle (247)	0.0	**25.1**	[19.8 - 31.0]								0.4	29.1	45.3		**0.4**	**24.7**				
	Swine (111)	0.0	**8.1**	[3.8 - 14.8]									29.7	62.2			**8.1**				

[1] Percent of isolates with intermediate susceptibility

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

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

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

Table 7d. Distribution of MICs and Occurrence of Resistance among all Non-Typhoidal *Salmonella* Isolates from Humans, Retail Meats, and Food Animals, 2010

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 (2474)	0.0	**0.2**	[0.0 - 0.4]	93.5	3.6	0.2	0.9	0.9	0.7	<0.1		**<0.1**	**0.1**							
	Chicken Breasts (171)	0.0	**0.0**	[0.0 - 2.1]	94.2	5.9															
	Ground Turkey (202)	0.0	**0.0**	[0.0 - 1.8]	98.0	1.5			0.5												
	Ground Beef (7)	0.0	**0.0**	[0.0 - 41.0]	85.7	14.3															
	Pork Chops (20)	0.0	**0.0**	[0.0 - 16.8]	95.0	5.0															
	Chickens (564)	0.0	**0.0**	[0.0 - 0.7]	84.0	16.0															
	Turkeys (151)	0.0	**0.0**	[0.0 - 2.4]	96.7	1.3	1.3		0.7												
	Cattle (247)	0.0	**0.0**	[0.0 - 1.5]	87.0	10.1			2.4	0.4											
	Swine (111)	0.0	**0.0**	[0.0 - 3.3]	95.5	2.7	1.8														
Nalidixic Acid	Humans (2474)	N/A	**2.0**	[1.5 - 2.6]							0.2	33.3	63.3	0.6	0.5	**<0.1**	**1.9**				
	Chicken Breasts (171)	N/A	**0.0**	[0.0 - 2.1]							1.8	49.1	48.0	1.2							
	Ground Turkey (202)	N/A	**0.5**	[0.0 - 2.7]							1.0	63.9	34.7				**0.5**				
	Ground Beef (7)	N/A	**0.0**	[0.0 - 41.0]								28.6	71.4								
	Pork Chops (20)	N/A	**0.0**	[0.0 - 16.8]								45.0	55.0								
	Chickens (564)	N/A	**0.0**	[0.0 - 0.7]						0.2	0.2	53.4	45.7	0.5							
	Turkeys (151)	N/A	**0.7**	[0.0 - 3.6]								55.0	43.7	0.7			**0.7**				
	Cattle (247)	N/A	**2.8**	[1.1 - 5.8]								52.2	44.9				**2.8**				
	Swine (111)	N/A	**0.0**	[0.0 - 3.3]								46.8	51.4	1.8							
Tetracyclines																					
Tetracycline	Humans (2474)	0.1	**11.0**	[9.8 - 12.3]									88.8	0.1	**0.4**	**2.7**	**7.9**				
	Chicken Breasts (171)	1.8	**56.1**	[48.4 - 63.7]									42.1	1.8	**0.6**	**2.3**	**53.2**				
	Ground Turkey (202)	0.0	**54.5**	[47.3 - 61.5]									45.5		**0.5**	**5.9**	**48.0**				
	Ground Beef (7)	0.0	**42.9**	[9.9 - 81.6]									57.1				**42.9**				
	Pork Chops (20)	0.0	**45.0**	[23.1 - 68.5]									55.0			**5.0**	**40.0**				
	Chickens (564)	0.9	**41.8**	[37.7 - 46.0]									57.3	0.9	**0.7**	**1.8**	**39.4**				
	Turkeys (151)	0.0	**57.6**	[49.3 - 65.6]									42.4			**3.3**	**54.3**				
	Cattle (247)	0.8	**33.6**	[27.7 - 39.9]									65.6	0.8		**5.3**	**28.3**				
	Swine (111)	0.9	**51.4**	[41.7 - 61.0]									47.7	0.9		**6.3**	**45.0**				

[1] Percent of isolates with intermediate susceptibility

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

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

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

Table 8a. Antimicrobial Resistance among all Non-Typhoidal *Salmonella* Isolates from Humans, Retail Meats, and Food Animals, by Year, 1999-2010

Year			1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Number of Isolates Tested		Humans	1493	1372	1410	1998	1855	1782	2034	2172	2145	2384	2193	2474
		Chicken Breasts				60	83	157	153	152	99	198	272	171
		Ground Turkey				74	114	142	183	159	190	246	193	202
		Ground Beef				9	10	14	8	19	13	24	14	7
		Pork Chops				10	5	11	9	8	18	23	8	20
		Chickens	1438	1173	1307	1500	1158	1280	1989	1380	994	624	551	564
		Turkeys	713	518	550	244	262	236	227	304	271	148	121	151
		Cattle	1610	1388	893	1008	670	607	329	389	439	443	200	247
		Swine	876	451	418	379	211	308	301	304	211	111	120	111
Antimicrobial Class	**Antimicrobial (Resistance Breakpoint)**	**Isolate Source**												
Aminoglycosides	Amikacin (MIC ≥ 64 µg/ml)	Humans	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	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	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	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	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	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	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	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	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	0.5% 1	0.0% 0	0.0% 0	0.0% 0
	Gentamicin (MIC ≥ 16 µg/ml)	Humans	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	1.5% 35	1.3% 28	1.0% 24
		Chicken Breasts				10.0% 6	6.0% 5	3.8% 6	3.3% 5	9.2% 14	6.1% 6	7.1% 14	3.3% 9	6.4% 11
		Ground Turkey				14.9% 11	22.8% 26	20.4% 29	26.8% 49	28.9% 46	24.7% 47	27.6% 68	18.7% 36	16.8% 34
		Ground Beef				0.0% 0	0.0% 0	0.0% 0	25.0% 2	0.0% 0	7.7% 1	8.3% 2	14.3% 2	0.0% 0
		Pork Chops				30.0% 3	0.0% 0	0.0% 0	0.0% 0	50.0% 4	5.6% 1	13.0% 3	0.0% 0	10.0% 2
		Chickens	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	5.6% 35	5.6% 31	4.6% 26
		Turkeys	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	16.9% 25	14.9% 18	19.9% 30
		Cattle	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	1.6% 7	2.0% 4	4.9% 12
		Swine	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	2.7% 3	0.0% 0	2.7% 3
	Kanamycin (MIC ≥ 64 µg/ml)	Humans	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	2.1% 50	2.5% 54	2.3% 56
		Chicken Breasts				6.7% 4	4.8% 4	11.5% 18	4.6% 7	9.9% 15	5.1% 5	10.6% 21	15.4% 42	8.2% 14
		Ground Turkey				18.9% 14	27.2% 31	18.3% 26	20.2% 37	15.1% 24	23.7% 45	17.9% 44	6.7% 13	15.8% 32
		Ground Beef				0.0% 0	0.0% 0	0.0% 0	25.0% 2	5.3% 1	0.0% 0	8.3% 2	14.3% 2	14.3% 1
		Pork Chops				10.0% 1	0.0% 0	9.1% 1	0.0% 0	25.0% 2	5.6% 1	0.0% 0	12.5% 1	10.0% 2
		Chickens	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	3.4% 21	3.1% 17	4.3% 24
		Turkeys	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	14.2% 21	10.7% 13	19.2% 29
		Cattle	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	9.9% 44	9.0% 18	12.6% 31
		Swine	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	3.6% 4	4.2% 5	10.8% 12
	Streptomycin (MIC ≥ 64 µg/ml)	Humans	16.7% 250	16.3% 223	17.1% 241	13.2% 264	15.0% 279	12.0% 213	11.1% 225	10.7% 233	10.3% 222	10.0% 238	8.9% 196	8.6% 212
		Chicken Breasts				28.3% 17	26.5% 22	28.0% 44	30.1% 46	36.2% 55	30.3% 30	23.7% 47	23.2% 63	25.7% 44
		Ground Turkey				37.8% 28	45.6% 52	34.5% 49	44.3% 81	40.9% 65	45.8% 87	58.5% 144	28.0% 54	31.7% 64
		Ground Beef				22.2% 2	40.0% 4	14.3% 2	25.0% 2	10.5% 2	0.0% 0	20.8% 5	28.6% 4	42.9% 3
		Pork Chops				70.0% 7	40.0% 2	27.3% 3	33.3% 3	25.0% 2	16.7% 3	13.0% 3	37.5% 3	45.0% 9
		Chickens	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	25.2% 157	30.5% 168	36.0% 203
		Turkeys	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	32.4% 48	38.8% 47	27.8% 42
		Cattle	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	23.0% 102	22.0% 44	26.7% 66
		Swine	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	29.7% 33	29.2% 35	31.5% 35

Table 8b. Antimicrobial Resistance among all Non-Typhoidal *Salmonella* Isolates from Humans, Retail Meats, and Food Animals, by Year, 1999-2010

Year			1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Number of Isolates Tested		Humans	1493	1372	1410	1998	1855	1782	2034	2172	2145	2384	2193	2474
		Chicken Breasts				60	83	157	153	152	99	198	272	171
		Ground Turkey				74	114	142	183	159	190	246	193	202
		Ground Beef				9	10	14	8	19	13	24	14	7
		Pork Chops				10	5	11	9	8	18	23	8	20
		Chickens	1438	1173	1307	1500	1158	1280	1989	1380	994	624	551	564
		Turkeys	713	518	550	244	262	236	227	304	271	148	121	151
		Cattle	1610	1388	893	1008	670	607	329	389	439	443	200	247
		Swine	876	451	418	379	211	308	301	304	211	111	120	111
Antimicrobial Class	**Antimicrobial (Resistance Breakpoint)**	**Isolate Source**												
β-Lactam/β-Lactamase Inhibitor Combinations	Amoxicillin-Clavulanic Acid (MIC ≥ 32 / 16 µg/ml)	Humans	2.3% 34	3.9% 54	4.7% 66	5.3% 106	4.6% 86	3.7% 66	3.2% 65	3.7% 81	3.3% 70	3.1% 73	3.4% 75	2.8% 70
		Chicken Breasts				10.0% 6	25.3% 21	24.8% 39	21.6% 33	19.1% 29	16.2% 16	22.2% 44	37.5% 102	33.9% 58
		Ground Turkey				12.2% 9	11.4% 13	7.7% 11	8.7% 16	5.0% 8	5.3% 10	5.7% 14	5.7% 11	17.3% 35
		Ground Beef				22.2% 2	40.0% 4	14.3% 2	0.0% 0	0.0% 0	0.0% 0	8.3% 2	14.3% 2	28.6% 2
		Pork Chops				20.0% 2	20.0% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	25.0% 2	0.0% 0
		Chickens	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	8.7% 54	12.9% 71	11.7% 66
		Turkeys	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	5.4% 8	13.2% 16	15.2% 23
		Cattle	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	16.5% 73	15.0% 30	21.5% 53
		Swine	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	4.5% 5	4.2% 5	3.6% 4
Cephems	Cefoxitin (MIC ≥ 32 µg/ml)	Humans		3.2% 44	3.4% 48	4.3% 86	4.3% 79	3.4% 61	3.0% 62	3.5% 77	2.9% 63	3.0% 72	3.2% 71	2.5% 63
		Chicken Breasts				10.0% 6	25.3% 21	24.8% 39	20.9% 32	18.4% 28	15.2% 15	21.2% 42	33.1% 90	28.1% 48
		Ground Turkey				8.1% 6	2.6% 3	4.9% 7	7.1% 13	5.0% 8	5.3% 10	4.9% 12	5.7% 11	15.8% 32
		Ground Beef				22.2% 2	40.0% 4	14.3% 2	0.0% 0	0.0% 0	0.0% 0	8.3% 2	14.3% 2	28.6% 2
		Pork Chops				20.0% 2	20.0% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	25.0% 2	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	8.0% 50	11.4% 63	11.3% 64
		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	5.4% 8	12.4% 15	15.2% 23
		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	14.7% 65	13.5% 27	20.6% 51
		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	4.5% 5	4.2% 5	1.8% 2
	Ceftiofur (MIC ≥ 8 µg/ml)	Humans	2.0% 30	3.2% 44	4.1% 58	4.4% 87	4.5% 83	3.4% 60	2.9% 60	3.6% 79	3.3% 70	3.1% 73	3.4% 75	2.8% 69
		Chicken Breasts				10.0% 6	25.3% 21	24.8% 39	20.9% 32	19.1% 29	16.2% 16	22.2% 44	37.1% 101	35.1% 60
		Ground Turkey				8.1% 6	2.6% 3	4.9% 7	7.1% 13	5.0% 8	5.3% 10	4.9% 12	5.7% 11	16.3% 33
		Ground Beef				22.2% 2	40.0% 4	14.3% 2	0.0% 0	0.0% 0	0.0% 0	8.3% 2	14.3% 2	28.6% 2
		Pork Chops				20.0% 2	20.0% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	25.0% 2	0.0% 0
		Chickens	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	8.7% 54	12.7% 70	12.1% 68
		Turkeys	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	5.4% 8	12.4% 15	15.2% 23
		Cattle	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	16.3% 72	14.5% 29	21.5% 53
		Swine	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	4.5% 5	4.2% 5	1.8% 2
	Ceftriaxone (MIC ≥ 4 µg/ml)	Humans	2.0% 30	3.2% 44	3.7% 52	4.4% 87	4.4% 81	3.3% 59	2.9% 59	3.7% 80	3.3% 70	3.1% 73	3.4% 75	2.8% 70
		Chicken Breasts				10.0% 6	26.5% 22	24.8% 39	21.6% 33	19.1% 29	16.2% 16	22.2% 44	37.9% 103	34.5% 59
		Ground Turkey				8.1% 6	2.6% 3	5.6% 8	7.1% 13	5.0% 8	5.8% 11	4.9% 12	5.7% 11	16.3% 33
		Ground Beef				22.2% 2	40.0% 4	14.3% 2	0.0% 0	0.0% 0	0.0% 0	8.3% 2	14.3% 2	28.6% 2
		Pork Chops				20.0% 2	20.0% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	25.0% 2	0.0% 0
		Chickens	4.6% 66	7.4% 87	4.1% 54	9.9% 149	9.7% 112	12.3% 158	12.2% 242	12.8% 177	15.6% 155	8.7% 54	12.9% 71	11.9% 67
		Turkeys	4.2% 30	3.1% 16	4.7% 26	3.3% 8	1.1% 3	4.7% 11	3.5% 8	5.3% 16	11.1% 30	5.4% 8	12.4% 15	15.2% 23
		Cattle	3.9% 63	9.9% 137	11.3% 101	17.3% 174	21.0% 141	13.5% 82	20.7% 68	18.5% 72	15.9% 70	16.0% 71	14.5% 29	21.5% 53
		Swine	1.3% 11	1.3% 6	2.2% 9	2.9% 11	4.3% 9	1.6% 5	3.7% 11	1.6% 5	2.4% 5	4.5% 5	4.2% 5	1.8% 2

Table 8c. Antimicrobial Resistance among all Non-Typhoidal *Salmonella* Isolates from Humans, Retail Meats, and Food Animals, by Year, 1999-2010

Year			1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Number of Isolates Tested		Humans	1493	1372	1410	1998	1855	1782	2034	2172	2145	2384	2193	2474
		Chicken Breasts				60	83	157	153	152	99	198	272	171
		Ground Turkey				74	114	142	183	159	190	246	193	202
		Ground Beef				9	10	14	8	19	13	24	14	7
		Pork Chops				10	5	11	9	8	18	23	8	20
		Chickens	1438	1173	1307	1500	1158	1280	1989	1380	994	624	551	564
		Turkeys	713	518	550	244	262	236	227	304	271	148	121	151
		Cattle	1610	1388	893	1008	670	607	329	389	439	443	200	247
		Swine	876	451	418	379	211	308	301	304	211	111	120	111
Antimicrobial Class	**Antimicrobial (Resistance Breakpoint)**	**Isolate Source**												
Folate Pathway Inhibitors	Sulfamethoxazole/ Sulfisoxazole [1] (MIC ≥ 512 µg/ml)	Humans	18.0% 269	17.1% 234	17.8% 251	12.9% 258	15.1% 280	13.3% 237	12.6% 256	12.1% 263	12.3% 264	10.1% 241	9.9% 217	9.0% 223
		Chicken Breasts				16.7% 10	14.5% 12	28.7% 45	17.0% 26	23.0% 35	25.3% 25	38.9% 77	48.2% 131	46.2% 79
		Ground Turkey				20.3% 15	33.3% 38	28.2% 40	34.4% 63	32.1% 51	34.7% 66	27.6% 68	20.2% 39	25.7% 52
		Ground Beef				22.2% 2	40.0% 4	14.3% 2	25.0% 2	10.5% 2	7.7% 1	20.8% 5	35.7% 5	42.9% 3
		Pork Chops				70.0% 7	40.0% 2	18.2% 2	33.3% 3	75.0% 6	16.7% 3	30.4% 7	37.5% 3	50.0% 10
		Chickens	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	13.3% 83	10.0% 55	12.4% 70
		Turkeys	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	24.3% 36	28.9% 35	25.2% 38
		Cattle	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	24.8% 110	24.5% 49	26.3% 65
		Swine	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	31.5% 35	30.8% 37	28.8% 32
	Trimethoprim-Sulfamethoxazole (MIC ≥ 4 / 76 µg/ml)	Humans	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	1.6% 37	1.7% 38	1.6% 39
		Chicken Breasts				0.0% 0	0.0% 0	0.0% 0	0.0% 0	1.3% 2	0.0% 0	0.0% 0	0.4% 1	0.0% 0
		Ground Turkey				1.4% 1	0.0% 0	0.0% 0	0.5% 1	0.0% 0	0.5% 1	0.4% 1	1.6% 3	0.0% 0
		Ground Beef				0.0% 0	0.0% 0	7.1% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Pork Chops				20.0% 2	0.0% 0	0.0% 0	11.1% 1	50.0% 4	5.6% 1	0.0% 0	25.0% 2	0.0% 0
		Chickens	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	0.3% 2	0.2% 1	0.0% 0
		Turkeys	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	1.4% 2	1.7% 2	0.0% 0
		Cattle	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	4.5% 20	1.5% 3	4.5% 11
		Swine	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	2.7% 3	2.5% 3	1.8% 2
Penicillins	Ampicillin (MIC ≥ 32 µg/ml)	Humans	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	9.7% 232	9.8% 216	9.1% 224
		Chicken Breasts				16.7% 10	33.7% 28	30.6% 48	26.8% 41	22.4% 34	18.2% 18	28.3% 56	45.6% 124	39.2% 67
		Ground Turkey				16.2% 12	28.9% 33	20.4% 29	26.8% 49	25.8% 41	42.6% 81	51.2% 126	58.0% 112	48.0% 97
		Ground Beef				22.2% 2	40.0% 4	21.4% 3	25.0% 2	10.5% 2	0.0% 0	12.5% 3	28.6% 4	28.6% 2
		Pork Chops				40.0% 4	40.0% 2	9.1% 1	22.2% 2	25.0% 2	5.6% 1	13.0% 3	37.5% 3	15.0% 3
		Chickens	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	10.6% 66	13.8% 76	13.7% 77
		Turkeys	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	32.4% 48	38.8% 47	44.4% 67
		Cattle	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	21.7% 96	22.5% 45	26.3% 65
		Swine	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	14.4% 16	19.2% 23	17.1% 19
Phenicols	Chloramphenicol (MIC ≥ 32 µg/ml)	Humans	9.2% 137	10.1% 138	11.6% 164	8.6% 172	10.1% 187	7.6% 136	7.8% 159	6.4% 139	7.3% 156	6.1% 146	5.7% 125	4.9% 122
		Chicken Breasts				0.0% 0	2.4% 2	1.9% 3	0.7% 1	2.6% 4	1.0% 1	0.5% 1	0.0% 0	2.3% 4
		Ground Turkey				1.4% 1	0.9% 1	2.8% 4	0.5% 1	0.6% 1	1.6% 3	1.6% 4	1.6% 3	2.5% 5
		Ground Beef				22.2% 2	40.0% 4	14.3% 2	12.5% 1	5.3% 1	0.0% 0	12.5% 3	21.4% 3	42.9% 3
		Pork Chops				40.0% 4	40.0% 2	18.2% 2	22.2% 2	0.0% 0	0.0% 0	0.0% 0	12.5% 1	15.0% 3
		Chickens	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	1.8% 11	1.6% 9	3.0% 17
		Turkeys	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	2.7% 4	3.3% 4	4.6% 7
		Cattle	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	19.6% 87	21.0% 42	25.1% 62
		Swine	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	9.9% 11	15.0% 18	8.1% 9

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

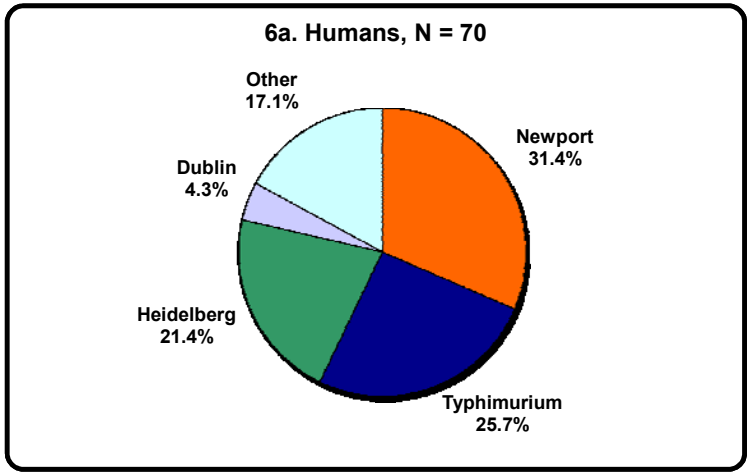
Table 8d. Antimicrobial Resistance among all Non-Typhoidal *Salmonella* Isolates from Humans, Retail Meats, and Food Animals, by Year, 1999-2010

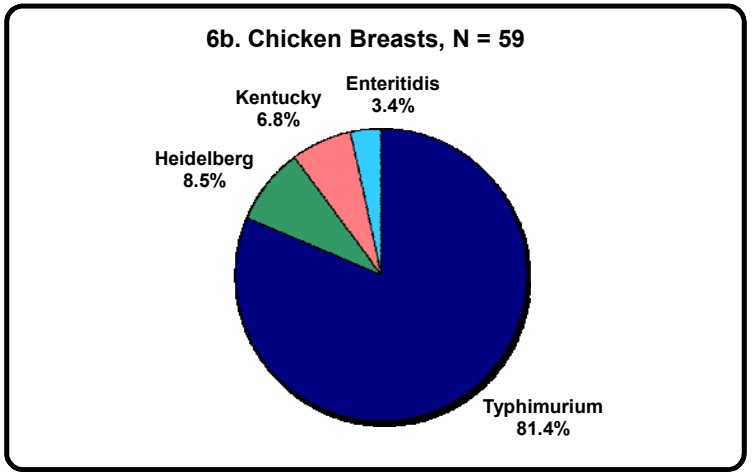
Year			1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Number of Isolates Tested		Humans	1493	1372	1410	1998	1855	1782	2034	2172	2145	2384	2193	2474
		Chicken Breasts				60	83	157	153	152	99	198	272	171
		Ground Turkey				74	114	142	183	159	190	246	193	202
		Ground Beef				9	10	14	8	19	13	24	14	7
		Pork Chops				10	5	11	9	8	18	23	8	20
		Chickens	1438	1173	1307	1500	1158	1280	1989	1380	994	624	551	564
		Turkeys	713	518	550	244	262	236	227	304	271	148	121	151
		Cattle	1610	1388	893	1008	670	607	329	389	439	443	200	247
		Swine	876	451	418	379	211	308	301	304	211	111	120	111
Antimicrobial Class	**Antimicrobial (Resistance Breakpoint)**	**Isolate Source**												
Quinolones	Ciprofloxacin (MIC ≥ 4 µg/ml)	Humans	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	0.1% 2	<0.1% 1	0.2% 4
		Chicken Breasts				0.0% 0	0.0% 0	0.0% 0	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	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	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	0.0% 0	0.0% 0	0.0% 0
		Chickens	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	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	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	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	0.0% 0
	Nalidixic Acid (MIC ≥ 32 µg/ml)	Humans	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	2.1% 49	1.8% 39	2.0% 49
		Chicken Breasts				0.0% 0	1.2% 1	0.0% 0	0.7% 1	0.7% 1	0.0% 0	0.0% 0	0.4% 1	0.0% 0
		Ground Turkey				8.1% 6	4.4% 5	0.0% 0	1.1% 2	0.0% 0	2.6% 5	0.4% 1	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	0.0% 0	14.3% 2	0.0% 0
		Pork Chops				0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Chickens	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	0.0% 0	0.0% 0	0.0% 0
		Turkeys	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	0.7% 1	0.8% 1	0.7% 1
		Cattle	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	0.7% 3	1.0% 2	2.8% 7
		Swine	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	0.0% 0	0.0% 0	0.0% 0
Tetracyclines	Tetracycline (MIC ≥ 16 µg/ml)	Humans	19.4% 289	18.7% 256	19.9% 280	14.9% 298	16.3% 303	13.6% 242	13.9% 282	13.5% 293	14.5% 310	11.5% 275	11.9% 261	11.0% 273
		Chicken Breasts				33.3% 20	27.7% 23	46.5% 73	43.8% 67	46.7% 71	41.4% 41	46.5% 92	60.3% 164	56.1% 96
		Ground Turkey				55.4% 41	39.5% 45	56.3% 80	39.9% 73	56.0% 89	67.4% 128	66.3% 163	64.8% 125	54.5% 110
		Ground Beef				22.2% 2	40.0% 4	14.3% 2	12.5% 1	21.1% 4	0.0% 0	20.8% 5	42.9% 6	42.9% 3
		Pork Chops				70.0% 7	80.0% 4	54.5% 6	55.6% 5	25.0% 2	50.0% 9	34.8% 8	37.5% 3	45.0% 9
		Chickens	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	30.4% 190	33.9% 187	41.8% 236
		Turkeys	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	64.2% 95	63.6% 77	57.6% 87
		Cattle	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	29.3% 130	29.0% 58	33.6% 83
		Swine	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	51.4% 57	53.3% 64	51.4% 57

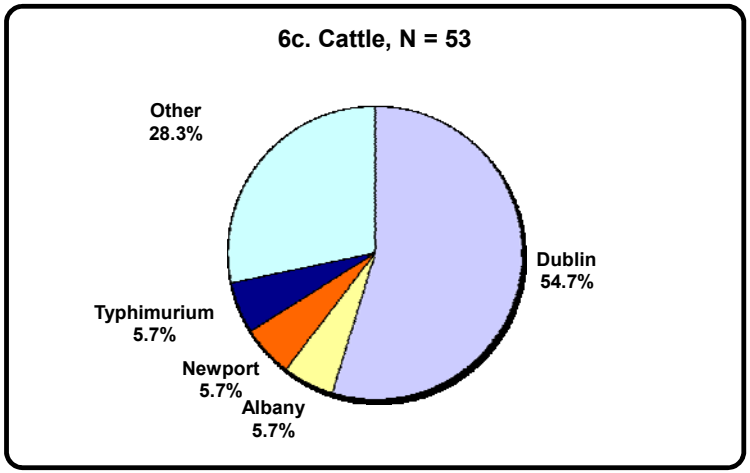
Table 9. Ceftriaxone-Resistant Non-Typhoidal *Salmonella* Isolates from Humans, Retail Meats, and Food Animals, by Source and Serotype, 2010

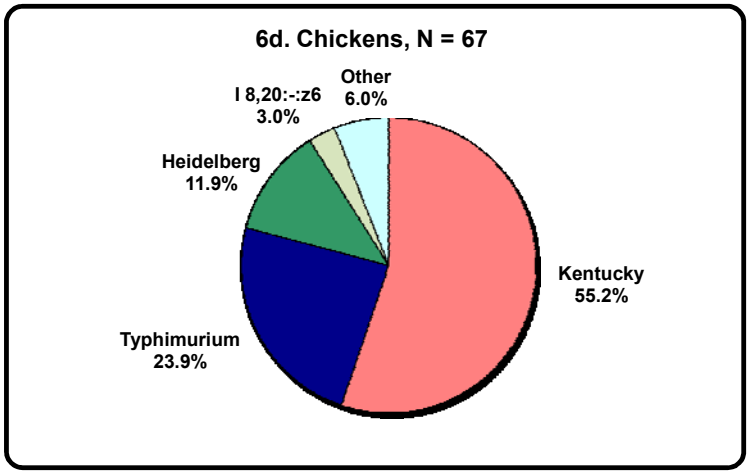
Humans				Retail Meats				Food Animals			
Source	**Serotype**	**n**	**%**	**Meat Type**	**Serotype**	**n**	**%**	**Animal Source**	**Serotype**	**n**	**%**
Humans (N=70)	Newport	22	31.4	**Chicken Breasts (N=59)**	Typhimurium	48	81.4	**Chickens (N=67)**	Kentucky	37	55.2
	Typhimurium	18	25.7		Heidelberg	5	8.5		Typhimurium	16	23.9
	Heidelberg	15	21.4		Kentucky	4	6.8		Heidelberg	8	11.9
	Dublin	3	4.3		Enteritidis	2	3.4		I 8,20:-:z6	2	3.0
	I 4,[5],12:i:-	2	2.9						Enteritidis	1	1.5
	Concord	2	2.9						Dublin	1	1.5
	Infantis	2	2.9						Infantis	1	1.5
	Albany	1	1.4						Thompson	1	1.5
	Cubana	1	1.4								
	Haifa	1	1.4								
	Javiana	1	1.4	**Ground Turkey (N=33)**	Heidelberg	4	12.1	**Turkeys (N=23)**	Heidelberg	5	21.7
	Kentucky	1	1.4		Alachua	3	9.1		Brandenburg	3	13.0
	Rough/Nonmotile isolates	1	1.4		Albany	3	9.1		Schwarzengrund	3	13.0
					Berta	3	9.1		Albany	2	8.7
					Saintpaul	3	9.1		Saintpaul	2	8.7
					Typhimurium	3	9.1		Senftenberg	2	8.7
					Agona	2	6.1		Agona	1	4.3
					Brandenburg	2	6.1		Alachua	1	4.3
					Infantis	2	6.1		Albert	1	4.3
					Schwarzengrund	2	6.1		Muenchen	1	4.3
					Senftenberg	2	6.1		Newport	1	4.3
					IIIa 18:z4,z23:-	1	3.0		Rough O:r:1,2	1	4.3
					Albert	1	3.0				
					Hadar	1	3.0				
					Muenster	1	3.0				
				Ground Beef (N=2)	Dublin	1	50.0	**Cattle (N=53)**	Dublin	29	54.7
					Newport	1	50.0		Albany	3	5.7
									Newport	3	5.7
									Typhimurium	3	5.7
									Reading	2	3.8
									Rough O:g,p:-	2	3.8
									I 3,10:-:1,7	1	1.9
									Adelaide	1	1.9
									Agona	1	1.9
									Give	1	1.9
									Heidelberg	1	1.9
									Johannesburg	1	1.9
									Lille	1	1.9
									Rough O:e:1,2	1	1.9
									Rough O:l,v:1,7	1	1.9
									Saintpaul	1	1.9
									Unknown serotype	1	1.9
				Pork Chops (N=0)				**Swine (N=2)**	Agona	1	50.0
									Anatum	1	50.0

Figures 6a-d. Ceftriaxone-Resistant Non-Typhoidal *Salmonella* Isolates, by Source and Serotype, 2010[1]









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

Figure 7. Percent of Non-Typhoidal *Salmonella* Isolates from Humans, Retail Poultry, and Poultry Resistant to Ceftriaxone, by Year, 1996-2010

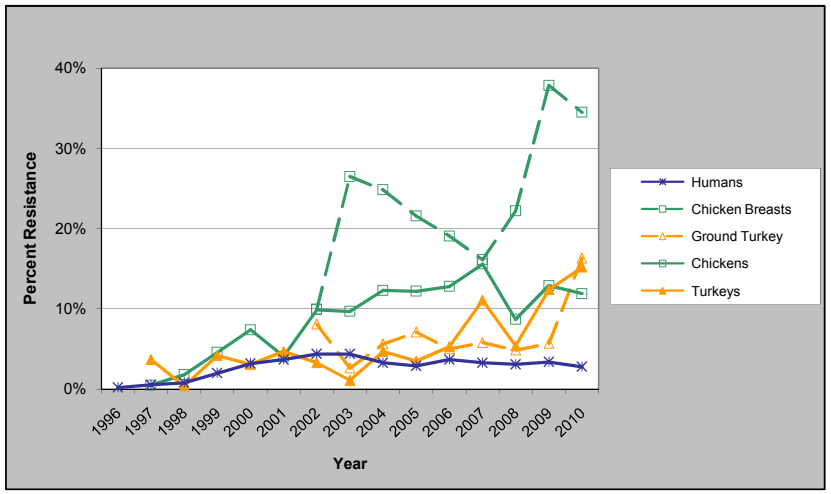
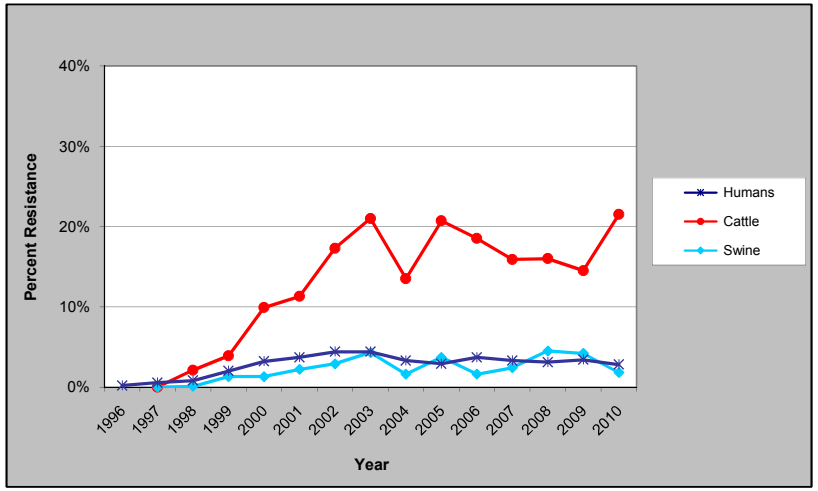


Figure 8. Percent of Non-Typhoidal *Salmonella* Isolates from Humans, Cattle, and Swine Resistant to Ceftriaxone, by Year, 1996-2010 [1]



[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, 1996-2010

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Humans	1318	1297	1455	1493	1372	1410	1998	1855	1782	2034	2172	2145	2384	2193	2474
Chicken Breasts							60	83	157	153	152	99	198	272	171
Ground Turkey							74	114	142	183	159	190	246	193	202
Ground Beef							9	10	14	8	19	13	24	14	7
Pork Chops							10	5	11	9	8	18	23	8	20
Chickens		214	561	1438	1173	1307	1500	1158	1280	1989	1380	994	624	551	564
Turkeys		107	240	713	518	550	244	262	236	227	304	271	148	121	151
Cattle		24	284	1610	1388	893	1008	670	607	329	389	439	443	200	247
Swine		111	793	876	451	418	379	211	308	301	304	211	111	120	111

Nalidixic Acid Resistance

Table 11. Naldixic Acid-Resistant Non-Typhoidal *Salmonella* Isolates from Humans, Retail Meats, and Food Animals, by Source and Serotype, 2010

Humans				Retail Meats				Food Animals			
Source	**Serotype**	**n**	**%**	**Meat Type**	**Serotype**	**n**	**%**	**Animal Source**	**Serotype**	**n**	**%**
Humans (N=49)	Enteritidis	27	55.1	**Chicken Breasts (N=0)**				**Chickens (N=0)**			
	Typhimurium	5	10.2								
	Virchow	4	8.2								
	I 4,[5],12:i:-	2	4.1								
	Hadar	2	4.1								
	Agona	1	2.0								
	Berta	1	2.0								
	Choleraesuis	1	2.0								
	Cubana	1	2.0								
	Kentucky	1	2.0								
	Newport	1	2.0								
	Rough/Nonmotile isolates	3	6.1								
				Ground Turkey (N=1)	Albert	1	100.0	**Turkeys (N=1)**	Albert	1	100.0
				Ground Beef (N=0)				**Cattle (N=7)**	Dublin	6	85.7
									Rough O:g,p:-	1	14.3
				Pork Chops (N=0)				**Swine (N=0)**			

Figure 9. Percent of Non-Typhoidal *Salmonella* Isolates from Humans, Retail Poultry, and Poultry Resistant to Nalidixic Acid, by Year, 1996-2010

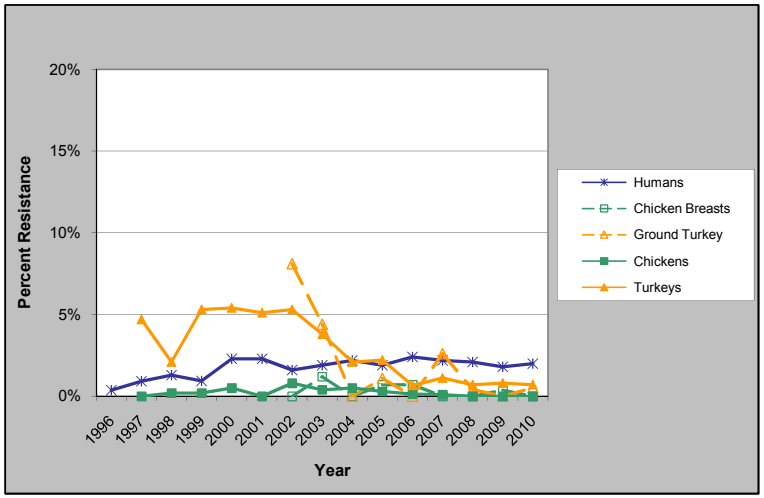
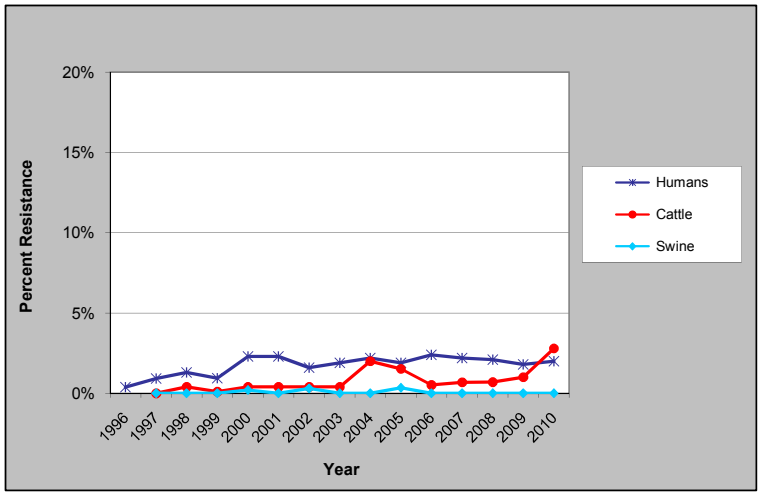


Figure 10. Percent of Non-Typhoidal *Salmonella* Isolates from Humans, Cattle, and Swine Resistant to Nalidixic Acid, by Year, 1996-2010 [1]



[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, 1996-2010

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Humans	1318	1297	1455	1493	1372	1410	1998	1855	1782	2034	2172	2145	2384	2193	2474
Chicken Breasts							60	83	157	153	152	99	198	272	171
Ground Turkey							74	114	142	183	159	190	246	193	202
Ground Beef							9	10	14	8	19	13	24	14	7
Pork Chops							10	5	11	9	8	18	23	8	20
Chickens		214	561	1438	1173	1307	1500	1158	1280	1989	1380	994	624	551	564
Turkeys		107	240	713	518	550	244	262	236	227	304	271	148	121	151
Cattle		24	284	1610	1388	893	1008	670	607	329	389	439	443	200	247
Swine		111	793	876	451	418	379	211	308	301	304	211	111	120	111

Resistance among Top *Salmonella* Serotypes

Table 13. Number of Resistant Non-Typhoidal *Salmonella* Isolates from Humans, by Serotype, 2010

				Number of Antimicrobial Classes in Resistance Pattern						Number of Resistant Isolates by Antimicrobial Agent[1] and Class														
										Aminoglycosides				β-Lactam/β-Lactamase Inhibitor Combinations	Cephems			Folate Pathway Inhibitors		Penicillins	Phenicols	Quinolones		Tetracyclines
				0	1	2-3	4-5	6-7	8															
Sources	*Salmonella* Serotype	No. of Isolates	% of Isolates	Number of Isolates						AMI	GEN	KAN	STR	AMC	FOX	TIO	AXO	FIS	COT	AMP	CHL	CIP	NAL	TET
Humans	Enteritidis	522	21.1%	481	26	13	2				1	1	3	2				10	5	12	3	1	27	11
	Typhimurium	366	14.8%	245	10	22	73	15	1		3	27	94	16	13	18	18	105	7	96	74		5	106
	Newport	305	12.3%	277	4	1	1	22			1	2	25	23	22	22	22	23	4	23	22		1	25
	Javiana	178	7.2%	175	1	2								1	1	1	1	1	1	3				
	I 4,[5],12:i:-	77	3.1%	51	9	2	15				1	1	15	3	2	2	2	15	1	17	1	1	2	22
	Heidelberg	62	2.5%	32	3	20	4	3			5	14	17	15	15	15	15	7		24	1			15
	Montevideo	60	2.4%	57	1	2					2	2	2					2						3
	Saintpaul	60	2.4%	51	5	4					1		1					1	1	4				6
	Braenderup	57	2.3%	56	1													1	1					
	Infantis	55	2.2%	49	2	3		1					1	2	2	2	2	4	1	3	2			2
	Paratyphi B var. L(+) tartrate+	54	2.2%	43	1	1	8	1					10	1				9	1	9	8			10
	Muenchen	52	2.1%	46	2	3	1						2					4		2				5
	Other	626	25.3%	532	35	39	15	5			10	9	42	7	8	9	10	41	17	31	11	2	14	68
	Total	2474	100.0%	2095	100	112	119	47	1		24	56	212	70	63	69	70	223	39	224	122	4	49	273

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

Table 14. Number of Resistant Non-Typhoidal *Salmonella* Isolate from Chicken Breasts and Chickens, by Serotype, 2010

				Number of Antimicrobial Classes in Resistance Pattern						Number of Resistant Isolates by Antimicrobial Agent[1] and Class														
										Aminoglycosides				β-Lactam/β-Lactamase Inhibitor Combinations	Cephems			Folate Pathway Inhibitors		Penicillins	Phenicols	Quinolones		Tetracyclines
				0	1	2-3	4-5	6-7	8															
Sources	*Salmonella* Serotype	No. of Isolates	% of Isolates	Number of Isolates						AMI	GEN	KAN	STR	AMC	FOX	TIO	AXO	FIS	COT	AMP	CHL	CIP	NAL	TET
Chicken Breasts	Typhimurium	79	46.2%	3	1	25	34	16			5	8	18	48	39	48	48	73		55	4			70
	Enteritidis	28	16.4%	26		1		1			1			1	1	2	2	2		1				2
	Heidelberg	21	12.3%	13	1	5	1	1			1	4	3	5	4	5	5	3		5				3
	Kentucky	21	12.3%	3	2	12	3	1			2		17	4	4	4	4	1		4				15
	Senftenberg	5	2.9%	3		1	1				2	2	2			1				2				2
	Other	17	9.9%	13		4							4											4
	Total	171	100.0%	61	4	48	39	19			11	14	44	58	48	60	59	79		67	4			96
Chickens	Kentucky	243	43.1%	47	42	120	31	3			4		165	37	36	37	37	4		37	3			169
	Enteritidis	152	27.0%	145	2	4	1				1	1	2			2	1	3		4	2			5
	Typhimurium	54	9.6%	12		25	11	6			3	9	8	16	15	16	16	40		19	2			39
	Heidelberg	25	4.4%	9	1	10		5			7	8	11	8	8	8	8	9		10	5			8
	I 4,[5],12:i:-	17	3.0%	12		4	1				4	2	2					5		1				2
	Other	73	12.9%	53	6	8	3	3			7	4	15	5	5	5	5	9		6	5			13
	Total	564	100.0%	278	51	171	47	17			26	24	203	66	64	68	67	70		77	17			236

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

Table 15. Number of Resistant Non-Typhoidal *Salmonella* Isolates from Ground Turkeys and Turkeys, by Serotype, 2010

Sources	*Salmonella* Serotype	No. of Isolates	% of Isolates	Number of Antimicrobial Classes in Resistance Pattern						Number of Resistant Isolates by Antimicrobial Agent[1] and Class														
				0	1	2-3	4-5	6-7	8	Aminoglycosides				β-Lactam/β-Lactamase Inhibitor Combinations	Cephems			Folate Pathway Inhibitors		Penicillins	Phenicols	Quinolones		Tetracyclines
				Number of Isolates						AMI	GEN	KAN	STR	AMC	FOX	TIO	AXO	FIS	COT	AMP	CHL	CIP	NAL	TET
Ground Turkeys	Saintpaul	48	23.8%	10	3	30	4	1			7	1	4	4	3	3	3	7		36				32
	IIIa 18:z4,z23:-	23	11.4%	18	1	3		1			4		5	1	1	1	1	4		1				2
	Hadar	20	9.9%		3	14	2	1			1	3	16	1		1	1	3		3				20
	Heidelberg	17	8.4%		1	11	2	3			5	13	16	4	4	4	4	6		12				14
	Agona	16	7.9%	11		3	2				2		1	2	2	2	2	3		4				5
	Schwarzengrund	13	6.4%	9	2		1	1				1		2	2	2	2	2		4				2
	Albany	10	5.0%	5		4	1					1		3	3	3	3			5				2
	I 4,[5],12:r:-	9	4.5%			5	4				3	2	5	1				7		9				9
	Berta	9	4.5%	1	2	6					2		1	3	3	3	3	3		5				2
	Senftenberg	7	3.5%	1	1	3	1	1			4	3	3	2	2	2	2	3		5				2
	Typhimurium	6	3.0%	2			3	1					2	3	3	3	3	4		4	1			4
	Other	24	11.9%	5	8	3		7	1		6	8	11	9	9	9	9	10		9	4		1	16
	Total	202	100.0%	62	21	82	20	16	1		34	32	64	35	32	33	33	52		97	5		1	110
Turkeys	Hadar	30	19.9%	2	8	18	2				3	4	15					2		12	1			28
	Saintpaul	21	13.9%	7	1	12	1				3	1	2	2	2	2	2	1		13	1			12
	Heidelberg	14	9.3%		5	4	1	4			3	9	8	5	5	5	5	4		8				14
	IIIa 18:z4,z23:-	11	7.3%	8	1	2					2		1					3						2
	Schwarzengrund	11	7.3%	4		2	5					5	3	3	3	3	3	4		5				4
	Muenchen	10	6.6%	1	1	8					1			1	1	1	1	7		2				7
	Albany	6	4.0%	4		1	1				1			2	2	2	2			2				
	Anatum	6	4.0%	1	1	4					4							3		2				2
	Senftenberg	6	4.0%			2	3	1			4	3	3	2	2	2	2	3		5	2			3
	Agona	5	3.3%	1	1	2	1				3			1	1	1	1	2		2				2
	Newport	5	3.3%	4			1					1		1	1	1	1			1				
	Other	26	17.2%	6	5	8	4	2	1		6	6	10	6	6	6	6	9		15	3		1	13
	Total	151	100.0%	38	23	63	19	7	1		30	29	42	23	23	23	23	38		67	7		1	87

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

Table 16. Number of Resistant Non-Typhoidal *Salmonella* Isolates from Ground Beef and Cattle, by Serotype, 2010

Sources	*Salmonella* Serotype	No. of Isolates	% of Isolates	Number of Antimicrobial Classes in Resistance Pattern						Number of Resistant Isolates by Antimicrobial Agent[1] and Class														
				0	1	2-3	4-5	6-7	8	Aminoglycosides				β-Lactam/β-Lactamase Inhibitor Combinations	Cephems			Folate Pathway Inhibitors		Penicillins	Phenicols	Quinolones		Tetracyclines
				Number of Isolates						AMI	GEN	KAN	STR	AMC	FOX	TIO	AXO	FIS	COT	AMP	CHL	CIP	NAL	TET
Ground Beef	Newport	2	28.6%					1	1			1	2	1	1	1	1	2		1	2			2
	Agona	1	14.3%	1																				
	Anatum	1	14.3%	1																				
	Dublin	1	14.3%						1				1	1	1	1	1	1		1	1			1
	Enteritidis	1	14.3%	1																				
	Montevideo	1	14.3%	1																				
	Total	7	100.0%	4				1	2			1	3	2	2	2	2	3		2	3			3
Cattle	Montevideo	61	24.7%	53	7	1							2											7
	Dublin	41	16.6%	2		2	9	26	2		8	23	32	29	28	29	29	37	1	32	38		6	35
	Typhimurium	15	6.1%	6		1	5	3				2	8	3	3	3	3	9	1	8	7			9
	Anatum	14	5.7%	13	1																			1
	Kentucky	13	5.3%	6	4	3							3											7
	Cerro	10	4.0%	9	1																			1
	Agona	8	3.2%	5		2		1			1	1	3	1	1	1	1	2	1	1	2			1
	Mbandaka	8	3.2%	8																				
	Meleagridis	7	2.8%	6	1																			1
	Infantis	5	2.0%	4	1																			1
	Newport	5	2.0%	2				3					3	3	3	3	3	3	1	3	3			3
	Senftenberg	5	2.0%	4		1					1									1				
	Other	55	22.3%	33	1	7	2	11	1		2	5	15	17	16	17	17	14	7	20	12		1	17
	Total	247	100.0%	151	16	17	16	44	3		12	31	66	53	51	53	53	65	11	65	62		7	83

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

Table 17. Number of Resistant Non-Typhoidal *Salmonella* Isolates Pork Chops and Swine, by Serotype, 2010

				Number of Resistant Isolates by Antimicrobial Agent[1] and Class																		
				Number of Antimicrobial Classes in Resistance Pattern						Aminoglycosides				β-Lactam/β-Lactamase Inhibitor Combinations	Cephems			Folate Pathway Inhibitors		Penicillins	Phenicols	Quinolones		Tetracyclines
	Salmonella Serotype	No. of Isolates	% of Isolates	0	1	2-3	4-5	6-7	8	AMI	GEN	KAN	STR	AMC	FOX	TIO	AXO	FIS	COT	AMP	CHL	CIP	NAL	TET
				Number of Isolates																				
Pork Chops	Derby	6	30.0%	2	1	3							3					3						4
	Typhimurium	5	25.0%		1	3	1					2	4					4		1	3			3
	Saintpaul	2	10.0%	2																				
	Senftenberg	2	10.0%		1	1					1		1					1						1
	I 6,7:l,w:-	1	5.0%	1																				
	Alachua	1	5.0%			1												1		1				1
	Anatum	1	5.0%			1					1		1					1		1				
	Infantis	1	5.0%	1																				
	Montevideo	1	5.0%	1																				
	Total	20	100.0%	7	3	9	1				2	2	9					10		3	3			9
Swine	Derby	18	16.2%	3	6	9							9					8						14
	Typhimurium	13	11.7%	3	1	2	6	1			1	2	8	1				9	1	7	6			10
	Saintpaul	11	9.9%	11																				
	Infantis	9	8.1%	6		3						3	1							3				3
	Johannesburg	8	7.2%	6	2																			2
	Adelaide	7	6.3%	5	1	1														1				2
	London	6	5.4%	3		2	1				1	1	2					3		1				3
	Anatum	5	4.5%	1	3	1								1	1	1	1			1				3
	Heidelberg	5	4.5%			5						3	4	1						1				4
	Agona	4	3.6%	2		1		1				1	2	1	1	1	1	2		1	1			2
	Other	25	22.5%	9	5	7	4				1	2	9					10	1	4	2			14
	Total	111	100.0%	49	18	31	11	2			3	12	35	4	2	2	2	32	2	19	9			57

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

Table 18a. Resistance Patterns among all Non-Typhoidal *Salmonella* Isolates from Humans, Retail Meats, and Food Animals, by Year, 1999-2010

Year		1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Number of Isolates Tested	Humans	1493	1372	1410	1998	1855	1782	2034	2172	2145	2384	2193	2474
	Chicken Breasts				60	83	157	153	152	99	198	272	171
	Ground Turkey				74	114	142	183	159	190	246	193	202
	Ground Beef				9	10	14	8	19	13	24	14	7
	Pork Chops				10	5	11	9	8	18	23	8	20
	Chickens	1438	1173	1307	1500	1158	1280	1989	1380	994	624	551	564
	Turkeys	713	518	550	244	262	236	227	304	271	148	121	151
	Cattle	1610	1388	893	1008	670	607	329	389	439	443	200	247
	Swine	876	451	418	379	211	308	301	304	211	111	120	111
Resistance Pattern	**Isolate Source**												
1. No Resistance Detected	Humans	74.1% 1107	74.5% 1022	72.5% 1022	79.1% 1580	78.0% 1447	80.0% 1425	80.9% 1646	80.5% 1748	81.1% 1739	83.9% 2000	83.2% 1824	84.7% 2095
	Chicken Breasts				51.7% 31	45.8% 38	40.1% 63	46.4% 71	38.8% 59	47.5% 47	46.0% 91	29.0% 79	35.7% 61
	Ground Turkey				37.8% 28	34.2% 39	28.9% 41	30.1% 55	17.6% 28	15.3% 29	20.7% 51	22.3% 43	30.7% 62
	Ground Beef				77.8% 7	60.0% 6	78.6% 11	75.0% 6	73.7% 14	92.3% 12	79.2% 19	57.1% 8	57.1% 4
	Pork Chops				20.0% 2	20.0% 1	45.5% 5	44.4% 4	25.0% 2	44.4% 8	65.2% 15	50.0% 4	35.0% 7
	Chickens	58.8% 846	56.9% 668	66.6% 871	62.0% 930	61.1% 708	62.7% 803	61.2% 1217	57.2% 790	53.9% 536	60.4% 377	56.1% 309	49.3% 278
	Turkeys	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	21.6% 32	19.8% 24	25.2% 38
	Cattle	74.5% 1200	70.0% 972	69.9% 624	64.3% 648	61.0% 409	65.6% 398	63.2% 208	67.6% 263	72.0% 316	68.8% 305	68.5% 137	61.1% 151
	Swine	48.9% 428	43.2% 195	43.5% 182	40.1% 152	53.6% 113	37.3% 115	44.5% 134	34.5% 105	43.1% 91	47.7% 53	44.2% 53	44.1% 49
2. Resistant to ≥ 3 Antimicrobial Classes	Humans	14.7% 220	15.6% 214	16.7% 236	12.3% 245	14.2% 263	11.4% 204	12.0% 244	11.8% 256	11.1% 239	9.5% 226	9.5% 209	9.1% 225
	Chicken Breasts				20.0% 12	30.1% 25	34.4% 54	25.5% 39	24.3% 37	25.3% 25	37.4% 74	48.5% 132	43.3% 74
	Ground Turkey				20.3% 15	28.9% 33	26.1% 37	29.0% 53	24.5% 39	42.6% 81	51.6% 127	26.4% 51	33.7% 68
	Ground Beef				22.2% 2	40.0% 4	14.3% 2	25.0% 2	10.5% 2	0.0% 0	20.8% 5	35.7% 5	42.9% 3
	Pork Chops				60.0% 6	40.0% 2	18.2% 2	22.2% 2	25.0% 2	5.6% 1	17.4% 4	50.0% 4	50.0% 10
	Chickens	12.3% 177	15.1% 177	10.2% 133	14.2% 213	13.5% 156	15.8% 202	15.1% 301	16.4% 226	17.8% 177	11.4% 71	15.6% 86	15.2% 86
	Turkeys	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	29.7% 44	33.1% 40	37.1% 56
	Cattle	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	23.5% 104	26.0% 52	28.7% 71
	Swine	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	29.7% 33	31.7% 38	27.9% 31
3. Resistant to ≥ 4 Antimicrobial Classes	Humans	11.9% 177	12.7% 174	13.5% 191	9.8% 195	11.4% 211	9.3% 165	9.1% 185	8.1% 177	8.2% 176	7.4% 177	7.3% 159	6.8% 167
	Chicken Breasts				3.3% 2	16.9% 14	24.2% 38	18.3% 28	15.1% 23	13.1% 13	22.7% 45	34.6% 94	33.9% 58
	Ground Turkey				13.5% 10	14.9% 17	12.7% 18	7.7% 14	8.2% 13	14.7% 28	15.4% 38	12.4% 24	18.3% 37
	Ground Beef				22.2% 2	40.0% 4	14.3% 2	12.5% 1	5.3% 1	0.0% 0	12.5% 3	35.7% 5	42.9% 3
	Pork Chops				40.0% 4	40.0% 2	18.2% 2	22.2% 2	25.0% 2	5.6% 1	13.0% 3	25.0% 2	5.0% 1
	Chickens	4.9% 71	6.7% 79	3.6% 47	7.7% 115	6.8% 79	9.8% 126	8.7% 174	10.3% 142	12.3% 122	7.5% 47	11.1% 61	11.3% 64
	Turkeys	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	10.1% 15	11.6% 14	17.9% 27
	Cattle	10.9% 175	17.4% 242	16.9% 151	22.1% 223	27.5% 184	18.8% 114	24.9% 82	22.1% 86	21.0% 92	21.9% 97	24.5% 49	25.5% 63
	Swine	9.8% 86	17.1% 77	9.1% 38	12.7% 48	10.9% 23	15.3% 47	13.3% 40	9.9% 30	17.5% 37	14.4% 16	15.0% 18	11.7% 13
4. Resistant to ≥ 5 Antimicrobial Classes	Humans	8.5% 127	9.5% 131	10.3% 145	8.2% 164	9.8% 182	8.0% 142	7.2% 146	6.3% 137	6.9% 149	6.6% 157	6.2% 137	5.2% 128
	Chicken Breasts				3.3% 2	12.0% 10	22.3% 35	17.6% 27	14.5% 22	12.1% 12	18.7% 37	31.6% 86	29.8% 51
	Ground Turkey				10.8% 8	4.4% 5	4.9% 7	2.7% 5	3.1% 5	3.2% 6	3.3% 8	3.6% 7	11.9% 24
	Ground Beef				22.2% 2	40.0% 4	14.3% 2	12.5% 1	5.3% 1	0.0% 0	12.5% 3	14.3% 2	28.6% 2
	Pork Chops				40.0% 4	40.0% 2	9.1% 1	22.2% 2	0.0% 0	0.0% 0	0.0% 0	25.0% 2	5.0% 1
	Chickens	3.0% 43	5.5% 64	3.1% 41	5.7% 85	4.9% 57	8.0% 103	5.9% 117	6.6% 91	7.4% 74	6.1% 38	7.8% 43	9.0% 51
	Turkeys	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	4.1% 6	9.1% 11	9.3% 14
	Cattle	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	19.0% 84	20.0% 40	23.1% 57
	Swine	7.3% 64	9.3% 42	7.2% 30	9.0% 34	9.5% 20	12.3% 38	10.3% 31	5.9% 18	11.4% 24	8.1% 9	14.2% 17	7.2% 8

Table 18b. Resistance Patterns among all Non-Typhoidal *Salmonella* Isolates from Humans, Retail Meats, and Food Animals, by Year, 1999-2010

Year		1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Number of Isolates Tested	Humans	1493	1372	1410	1998	1855	1782	2034	2172	2145	2384	2193	2474
	Chicken Breasts				60	83	157	153	152	99	198	272	171
	Ground Turkey				74	114	142	183	159	190	246	193	202
	Ground Beef				9	10	14	8	19	13	24	14	7
	Pork Chops				10	5	11	9	8	18	23	8	20
	Chickens	1438	1173	1307	1500	1158	1280	1989	1380	994	624	551	564
	Turkeys	713	518	550	244	262	236	227	304	271	148	121	151
	Cattle	1610	1388	893	1008	670	607	329	389	439	443	200	247
	Swine	876	451	418	379	211	308	301	304	211	111	120	111
Resistance Pattern	**Isolate Source**												
5. At Least ACSSuT[1] Resistant	Humans	8.4% 125	8.9% 122	10.1% 142	7.8% 156	9.3% 173	7.2% 129	6.9% 141	5.6% 121	6.3% 136	5.8% 138	5.1% 112	4.3% 107
	Chicken Breasts				0.0% 0	2.4% 2	1.9% 3	0.7% 1	2.6% 4	0.0% 0	0.5% 1	0.0% 0	1.2% 2
	Ground Turkey				1.4% 1	0.9% 1	2.8% 4	0.5% 1	0.6% 1	1.6% 3	1.6% 4	0.5% 1	2.5% 5
	Ground Beef				22.2% 2	40.0% 4	14.3% 2	12.5% 1	5.3% 1	0.0% 0	12.5% 3	14.3% 2	28.6% 2
	Pork Chops				40.0% 4	40.0% 2	9.1% 1	22.2% 2	0.0% 0	0.0% 0	0.0% 0	12.5% 1	5.0% 1
	Chickens	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	1.4% 9	1.3% 7	2.3% 13
	Turkeys	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	2.0% 3	3.3% 4	4.0% 6
	Cattle	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	18.1% 80	15.0% 30	18.6% 46
	Swine	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	8.1% 9	13.3% 16	7.2% 8
6. At Least ACT/S[2] Resistant	Humans	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	0.5% 11	0.7% 15	0.4% 11
	Chicken Breasts				0.0% 0	0.0% 0	0.0% 0	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	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	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	0.0% 0	12.5% 1	0.0% 0
	Chickens	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	0.2% 1	0.0% 0	0.0% 0
	Turkeys	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	0.7% 1	0.8% 1	0.0% 0
	Cattle	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	3.8% 17	1.5% 3	4.5% 11
	Swine	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	0.9% 1	1.7% 2	0.0% 0
7. At Least ACSSuTAuCx[3] Resistant	Humans	1.5% 23	2.6% 35	2.6% 36	3.4% 67	3.2% 60	2.4% 42	2.0% 41	2.0% 43	2.1% 46	1.8% 44	1.4% 30	1.3% 33
	Chicken Breasts				0.0% 0	0.0% 0	1.9% 3	0.0% 0	2.6% 4	0.0% 0	0.0% 0	0.0% 0	0.0% 0
	Ground Turkey				1.4% 1	0.9% 1	2.1% 3	0.5% 1	0.0% 0	1.1% 2	1.2% 3	0.5% 1	2.0% 4
	Ground Beef				22.2% 2	40.0% 4	14.3% 2	0.0% 0	0.0% 0	0.0% 0	8.3% 2	14.3% 2	28.6% 2
	Pork Chops				20.0% 2	20.0% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
	Chickens	0.3% 4	2.7% 32	1.1% 14	0.9% 13	1.0% 12	0.4% 5	0.9% 18	1.1% 15	1.4% 14	1.1% 7	1.3% 7	2.0% 11
	Turkeys	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	2.0% 3	3.3% 4	1.3% 2
	Cattle	3.7% 59	8.9% 124	11.0% 98	14.6% 147	15.1% 101	12.0% 73	17.3% 57	16.2% 63	13.9% 61	14.7% 65	9.5% 19	16.2% 40
	Swine	0.5% 4	1.3% 6	2.2% 9	1.8% 7	1.9% 4	1.0% 3	2.7% 8	0.7% 2	0.5% 1	0.9% 1	1.7% 2	0.9% 1
8. At Least Ceftriaxone and Nalidixic Acid Resistant	Humans	0.1% 1	0.1% 1	0.1% 2	0.2% 4	0.1% 1	0.1% 2	0.0% 1	0.2% 4	0.2% 5	0.0% 1	0.2% 4	0.1% 2
	Chicken Breasts				0.0% 0	0.0% 0	0.0% 0	0.7% 1	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	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	0.0% 0	14.3% 2	0.0% 0
	Pork Chops				0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
	Chickens	0.1% 1	0.1% 1	0.0% 0	0.5% 8	0.0% 0	0.2% 2	0.1% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
	Turkeys	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	0.0% 0	0.0% 0	0.7% 1
	Cattle	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	0.7% 3	0.0% 0	1.2% 3
	Swine	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	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] ACSSuTAuCx = ACSSuT, amoxicillin-clavulanic acid, and ceftriaxone

Table 19. Non-Typhoidal *Salmonella* Isolates from Humans, Retail Meats, and Food Animals that are Resistant to ≥ 3 Antimicrobial Classes, by Serotype, 2010

Humans				Retail Meats				Food Animals			
Source	**Serotype**	**n**	**%**	**Meat Type**	**Serotype**	**n**	**%**	**Animal Source**	**Serotype**	**n**	**%**
Humans (N=225)	Typhimurium	100	44.4	**Chicken Breasts (N=74)**	Typhimurium	60	81.1	**Chickens (N=86)**	Kentucky	39	45.3
	Newport	23	10.2		Heidelberg	6	8.1		Typhimurium	24	27.9
	Heidelberg	21	9.3		Kentucky	4	5.4		Heidelberg	9	10.5
	I 4,[5],12:i:-	17	7.6		Enteritidis	2	2.7		Enteritidis	4	4.7
	Enteritidis	11	4.9		Senftenberg	2	2.7		I 4,[5],12:i:-	2	2.3
	Paratyphi B var. L(+) tartrate+	9	4.0						I 8,20:-:z6	2	2.3
	Hadar	6	2.7						I 4,[5],12:-:-	1	1.2
	Dublin	4	1.8						Dublin	1	1.2
	Albany	2	0.9						Infantis	1	1.2
	Concord	2	0.9						Rough O:g,m:-	1	1.2
	Infantis	2	0.9						Schwarzengrund	1	1.2
	Kentucky	2	0.9						Thompson	1	1.2
	Montevideo	2	0.9								
	Muenchen	2	0.9								
	Stanley	2	0.9	**Ground Turkey (N=68)**	Heidelberg	11	16.2	**Turkeys (N=56)**	Hadar	9	16.1
	Anatum	1	0.4		Saintpaul	11	16.2		Heidelberg	8	14.3
	Agona	1	0.4		I 4,[5],12:r:-	9	13.2		Saintpaul	6	10.7
	Cannstatt	1	0.4		Berta	5	7.4		Schwarzengrund	6	10.7
	Choleraesuis	1	0.4		Agona	4	5.9		Senftenberg	4	7.1
	Cubana	1	0.4		Senftenberg	4	5.9		Brandenburg	3	5.4
	Denver	1	0.4		Typhimurium	4	5.9		IIIa 18:z4,z23:-	2	3.6
	Give	1	0.4		Alachua	3	4.4		Agona	2	3.6
	Haifa	1	0.4		Albany	3	4.4		Albany	2	3.6
	Irumu	1	0.4		Hadar	3	4.4		Anatum	2	3.6
	Javiana	1	0.4		IIIa 18:z4,z23:-	2	2.9		Montevideo	2	3.6
	London	1	0.4		Brandenburg	2	2.9		Muenchen	2	3.6
	Muenster	1	0.4		Infantis	2	2.9		Typhimurium	2	3.6
	Ohio	1	0.4		Schwarzengrund	2	2.9		Alachua	1	1.8
	Oranienburg	1	0.4		Albert	1	1.5		Albert	1	1.8
	Saintpaul	1	0.4		Derby	1	1.5		Berta	1	1.8
	Virchow	1	0.4		Muenster	1	1.5		Newport	1	1.8
	Other	1	0.4						Rough O:r:1,2	1	1.8
	Unknown serotype	1	0.4						Uganda	1	1.8
	Rough/Nonmotile isolates	2	0.9								
				Ground Beef (N=3)	Newport	2	66.7	**Cattle (N=71)**	Dublin	39	54.9
					Dublin	1	33.3		Typhimurium	8	11.3
									Albany	3	4.2
									Newport	3	4.2
									Reading	2	2.8
									Rough O:g,p:-	2	2.8
									I 3,10:-:1,7	1	1.4
									IIIa 18:z4,z23:-	1	1.4
									Adelaide	1	1.4
									Agona	1	1.4
									Enteritidis	1	1.4
									Give	1	1.4
									Hadar	1	1.4
									Heidelberg	1	1.4
									Johannesburg	1	1.4
									Lille	1	1.4
									Rough O:e:1,2	1	1.4
									Rough O:l,v:1,7	1	1.4
									Saintpaul	1	1.4
									Untypable	1	1.4
				Pork Chops (N=10)	Typhimurium	4	40.0	**Swine (N=31)**	Typhimurium	8	25.8
					Derby	3	30.0		Derby	7	22.6
					Alachua	1	10.0		Infantis	3	9.7
					Anatum	1	10.0		I 6,8:-:-	2	6.5
					Senftenberg	1	10.0		Agona	2	6.5
									Choleraesuis	2	6.5
									London	2	6.5
									I 4,[5],12:i:-	1	3.2
									Anatum	1	3.2
									Manhattan	1	3.2
									Ohio	1	3.2
									Reading	1	3.2

Table 20. Non-Typhoidal *Salmonella* Isolates from Humans, Retail Meats, and Food Animals that are Resistant to ≥ 4 Antimicrobial Classes, by Serotype, 2010

Humans				Retail Meats				Food Animals			
Source	**Serotype**	**n**	**%**	**Meat Type**	**Serotype**	**n**	**%**	**Animal Source**	**Serotype**	**n**	**%**
Humans (N=167)	Typhimurium	89	53.3	**Chicken Breasts (N=58)**	Typhimurium	50	86.2	**Chickens (N=64)**	Kentucky	34	53.1
	Newport	23	13.8		Kentucky	4	6.9		Typhimurium	17	26.6
	I 4,[5],12:i:-	15	9.0		Heidelberg	2	3.4		Heidelberg	5	7.8
	Paratyphi B var. L(+) tartrate+	9	5.4		Enteritidis	1	1.7		I 8,20:-:z6	2	3.1
	Heidelberg	7	4.2		Senftenberg	1	1.7		I 4,[5],12:i:-	1	1.6
	Dublin	3	1.8						Dublin	1	1.6
	Concord	2	1.2						Enteritidis	1	1.6
	Enteritidis	2	1.2						Infantis	1	1.6
	Hadar	2	1.2						Rough O:g,m:-	1	1.6
	Kentucky	2	1.2						Thompson	1	1.6
	Choleraesuis	1	0.6								
	Cubana	1	0.6								
	Denver	1	0.6	**Ground Turkey (N=37)**	Heidelberg	5	13.5	**Turkeys (N=27)**	Heidelberg	5	18.5
	Haifa	1	0.6		Saintpaul	5	13.5		Schwarzengrund	5	18.5
	Infantis	1	0.6		I 4,[5],12:r:-	4	10.8		Senftenberg	4	14.8
	London	1	0.6		Typhimurium	4	10.8		Hadar	2	7.4
	Muenchen	1	0.6		Alachua	3	8.1		Typhimurium	2	7.4
	Muenster	1	0.6		Hadar	3	8.1		Agona	1	3.7
	Oranienburg	1	0.6		Agona	2	5.4		Alachua	1	3.7
	Virchow	1	0.6		Infantis	2	5.4		Albany	1	3.7
	Unknown serotype	1	0.6		Schwarzengrund	2	5.4		Albert	1	3.7
	Rough/Nonmotile isolates	2	1.2		Senftenberg	2	5.4		Brandenburg	1	3.7
					IIIa 18:z4,z23:-	1	2.7		Montevideo	1	3.7
					Albany	1	2.7		Newport	1	3.7
					Albert	1	2.7		Rough O:r:1,2	1	3.7
					Brandenburg	1	2.7		Saintpaul	1	3.7
					Muenster	1	2.7				
				Ground Beef (N=3)	Newport	2	66.7	**Cattle (N=63)**	Dublin	37	58.7
					Dublin	1	33.3		Typhimurium	8	12.7
									Newport	3	4.8
									Reading	2	3.2
									Rough O:g,p:-	2	3.2
									I 3,10:-:1,7	1	1.6
									Adelaide	1	1.6
									Agona	1	1.6
									Enteritidis	1	1.6
									Give	1	1.6
									Heidelberg	1	1.6
									Johannesburg	1	1.6
									Lille	1	1.6
									Rough O:e:1,2	1	1.6
									Rough O:l,v:1,7	1	1.6
									Untypable	1	1.6
				Pork Chops (N=1)	Typhimurium	1	100.0	**Swine (N=13)**	Typhimurium	7	53.8
									Choleraesuis	2	15.4
									Agona	1	7.7
									London	1	7.7
									Ohio	1	7.7
									Reading	1	7.7

Table 21. Non-Typhoidal *Salmonella* Isolates from Humans, Retail Meats, and Food Animals that are Resistant to ≥ 5 Antimicrobial Classes, by Serotype, 2010

Humans				Retail Meats				Food Animals			
Source	**Serotype**	**n**	**%**	**Meat Type**	**Serotype**	**n**	**%**	**Animal Source**	**Serotype**	**n**	**%**
Humans (N=128)	Typhimurium	76	59.4	**Chicken Breasts (N=51)**	Typhimurium	47	92.2	**Chickens (N=51)**	Kentucky	24	47.1
	Newport	22	17.2		Kentucky	2	3.9		Typhimurium	16	31.4
	Paratyphi B var. L(+) tartrate+	7	5.5		Enteritidis	1	2.0		Heidelberg	5	9.8
	Heidelberg	6	4.7		Heidelberg	1	2.0		I 8,20:-:z6	2	3.9
	I 4,[5],12:i:-	3	2.3						Dublin	1	2.0
	Dublin	3	2.3						Enteritidis	1	2.0
	Concord	2	1.6						Infantis	1	2.0
	Kentucky	2	1.6						Thompson	1	2.0
	Choleraesuis	1	0.8								
	Cubana	1	0.8								
	Denver	1	0.8	**Ground Turkey (N=24)**	Heidelberg	4	16.7	**Turkeys (N=14)**	Heidelberg	5	35.7
	Haifa	1	0.8		Typhimurium	4	16.7		Typhimurium	2	14.3
	Infantis	1	0.8		Alachua	3	12.5		Agona	1	7.1
	Rough/Nonmotile isolates	1	0.8		Agona	2	8.3		Alachua	1	7.1
	Unknown serotype	1	0.8		Infantis	2	8.3		Albert	1	7.1
					Schwarzengrund	2	8.3		Hadar	1	7.1
					IIIa 18:z4,z23:-	1	4.2		Rough O:r:1,2	1	7.1
					Albert	1	4.2		Saintpaul	1	7.1
					Brandenburg	1	4.2		Senftenberg	1	7.1
					Hadar	1	4.2				
					Muenster	1	4.2				
					Saintpaul	1	4.2				
					Senftenberg	1	4.2				
				Ground Beef (N=2)	Dublin	1	50.0	**Cattle (N=57)**	Dublin	34	59.6
					Newport	1	50.0		Typhimurium	7	12.3
									Newport	3	5.3
									Reading	2	3.5
									Rough O:g,p:-	2	3.5
									I 3,10:-:1,7	1	1.8
									Adelaide	1	1.8
									Agona	1	1.8
									Give	1	1.8
									Heidelberg	1	1.8
									Johannesburg	1	1.8
									Rough O:e:1,2	1	1.8
									Rough O:l,v:1.7	1	1.8
									Untypable	1	1.8
				Pork Chops (N=1)	Typhimurium	1	100.0	**Swine (N=8)**	Typhimurium	6	75.0
									Agona	1	12.5
									Ohio	1	12.5

Table 22. Non-Typhoidal *Salmonella* Isolates from Humans, Retail Meats, and Food Animals that are at least ACSSuT [1] Resistant, by Serotype, 2010

Humans				Retail Meats				Food Animals			
Source	**Serotype**	**n**	**%**	**Meat Type**	**Serotype**	**n**	**%**	**Animal Source**	**Serotype**	**n**	**%**
Humans (N=107)	Typhimurium	68	63.6	**Chicken Breasts (N=2)**	Typhimurium	2	100.0	**Chickens (N=13)**	Heidelberg	4	30.8
	Newport	22	20.6						Kentucky	3	23.1
	Paratyphi B var. L(+) tartrate+	7	6.5						Typhimurium	2	15.4
	Dublin	3	2.8						Dublin	1	7.7
	I 4,[5],12:i:-	1	0.9						Enteritidis	1	7.7
	Choleraesuis	1	0.9						Infantis	1	7.7
	Cubana	1	0.9						Thompson	1	7.7
	Denver	1	0.9								
	Heidelberg	1	0.9								
	Infantis	1	0.9	**Ground Turkey (N=5)**	Infantis	2	40.0	**Turkeys (N=6)**	Typhimurium	2	33.3
	Unknown serotype	1	0.9		Albert	1	20.0		Albert	1	16.7
					Muenster	1	20.0		Hadar	1	16.7
					Typhimurium	1	20.0		Saintpaul	1	16.7
									Senftenberg	1	16.7
				Ground Beef (N=2)	Dublin	1	50.0	**Cattle (N=46)**	Dublin	24	52.2
					Newport	1	50.0		Typhimurium	7	15.2
									Newport	3	6.5
									Reading	2	4.3
									Rough O:g,p:-	2	4.3
									I 3,10:-:1,7	1	2.2
									Adelaide	1	2.2
									Agona	1	2.2
									Give	1	2.2
									Johannesburg	1	2.2
									Rough O:e:1,2	1	2.2
									Rough O:l,v:1,7	1	2.2
									Untypable	1	2.2
				Pork Chops (N=1)	Typhimurium	1	100.0	**Swine (N=8)**	Typhimurium	6	75.0
									Agona	1	12.5
									Ohio	1	12.5

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

Table 23. Non-Typhoidal *Salmonella* Isolates from Humans, Retail Meats, and Food Animals that are at least ACT/S [1] Resistant, by Serotype, 2010

Humans				Retail Meats				Food Animals			
Source	**Serotype**	**n**	**%**	**Meat Type**	**Serotype**	**n**	**%**	**Animal Source**	**Serotype**	**n**	**%**
Humans (N=11)	Typhimurium	4	36.4	**Chicken Breasts (N=0)**				**Chickens (N=0)**			
	Newport	4	36.4								
	Choleraesuis	1	9.1								
	Cubana	1	9.1								
	Dublin	1	9.1								
				Ground Turkey (N=0)				**Turkeys (N=0)**			
				Ground Beef (N=0)				**Cattle (N=11)**	I 3,10:-:1,7	1	9.1
									Adelaide	1	9.1
									Agona	1	9.1
									Dublin	1	9.1
									Give	1	9.1
									Johannesburg	1	9.1
									Newport	1	9.1
									Rough O:e:1,2	1	9.1
									Rough O:l,v:1,7	1	9.1
									Typhimurium	1	9.1
									Untypable	1	9.1
				Pork Chops (N=0)				**Swine (N=0)**			

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

Table 24. Non-Typhoidal *Salmonella* Isolates from Humans, Retail Meats, and Food Animals that are at least ACSSuTAuCx [1] Resistant, by Serotype, 2010

Humans				Retail Meats				Food Animals			
Source	**Serotype**	**n**	**%**	**Meat Type**	**Serotype**	**n**	**%**	**Animal Source**	**Serotype**	**n**	**%**
Humans (N=33)	Newport	22	66.7	**Chicken Breasts (N=0)**				**Chickens (N=11)**	Heidelberg	4	36.4
	Typhimurium	7	21.2						Kentucky	3	27.3
	Dublin	3	9.1						Dublin	1	9.1
	Infantis	1	3.0						Infantis	1	9.1
									Thompson	1	9.1
									Typhimurium	1	9.1
				Ground Turkey (N=4)	Infantis	2	50.0	**Turkeys (N=2)**	Albert	1	50.0
					Albert	1	25.0		Senftenberg	1	50.0
					Muenster	1	25.0				
				Ground Beef (N=2)	Dublin	1	50.0	**Cattle (N=40)**	Dublin	22	55.0
					Newport	1	50.0		Newport	3	7.5
									Reading	3	7.5
									Rough O:g,p:-	2	5.0
									Typhimurium	2	5.0
									I 3,10:-:1,7	1	2.5
									Adelaide	1	2.5
									Agona	1	2.5
									Give	1	2.5
									Johannesburg	1	2.5
									Rough O:e:1,2	1	2.5
									Rough O:l,v:1,7	1	2.5
									Untypable	1	2.5
				Pork Chops (N=0)				**Swine (N=1)**	Agona	1	100.0

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

Table 25. Non-Typhoidal *Salmonella* Isolates from Humans, Retail Meats, and Food Animals that are at least Ceftriaxone and Nalidixic Acid Resistant, by Serotype, 2010

Humans				Retail Meats				Food Animals			
Source	**Serotype**	**n**	**%**	**Meat Type**	**Serotype**	**n**	**%**	**Animal Source**	**Serotype**	**n**	**%**
Humans (N=2)	Typhimurium	1	50.0	**Chicken Breasts (N=0)**				**Chickens (N=0)**			
	Cubana	1	50.0	**Ground Turkey (N=1)**	Albert	1	100.0	**Turkeys (N=1)**	Albert	1	100.0
				Ground Beef (N=0)				**Cattle (N=3)**	Dublin	2	66.7
									Rough O:g,p:-	1	33.3
				Pork Chops (N=0)				**Swine (N=0)**			

E. Antimicrobial Susceptibility among *Salmonella* serotype Enteritidis

Table 26a. Antimicrobial Resistance among *Salmonella* Enteritidis Isolates from Humans, Retail Meats, and Food Animals, by Year, 1999-2010

Year			1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Number of Isolates Tested		Humans	269	319	277	337	257	271	384	413	385	441	410	522
		Chicken Breasts				8	3	3	12	17	13	30	27	28
		Ground Turkey				5	1	0	0	0	0	2	0	0
		Ground Beef				1	1	0	0	0	0	1	0	1
		Pork Chops				0	0	0	0	0	0	0	0	0
		Chickens	41	31	21	48	42	84	173	188	124	116	118	152
		Turkeys	1	1	0	0	0	0	0	3	0	1	0	1
		Cattle	8	4	4	6	3	2	2	2	4	5	0	1
		Swine	2	1	1	1	1	1	0	0	1	0	0	0
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	0.0% 0
		Chicken Breasts				0.0% 0	0.0% 0	0.0% 0	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		
		Ground Beef				0.0% 0	0.0% 0					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	0.0% 0
		Turkeys	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			
	Gentamicin (MIC ≥ 16 µg/ml)	Humans	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	0.2% 1	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	3.3% 1	0.0% 0	3.6% 1
		Ground Turkey				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												
		Chickens	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	0.0% 0	0.0% 0	0.7% 1
		Turkeys	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			
	Kanamycin (MIC ≥ 64 µg/ml)	Humans	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	0.0% 0	0.2% 1	0.2% 1
		Chicken Breasts				0.0% 0	0.0% 0	0.0% 0	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		
		Ground Beef				0.0% 0	0.0% 0					0.0% 0		0.0% 0
		Pork Chops												
		Chickens	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	0.0% 0	0.0% 0	0.7% 1
		Turkeys	0.0% 0	0.0% 0						0.0% 0		0.0% 0		0.0% 0
		Cattle	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	0.0% 0		100.0% 1
		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	2.2% 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	0.5% 2	1.2% 5	0.6% 3
		Chicken Breasts				0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	3.3% 1	0.0% 0	0.0% 0
		Ground Turkey				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												
		Chickens	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	0.0% 0	0.0% 0	1.3% 2
		Turkeys	0.0% 0	0.0% 0						0.0% 0		0.0% 0		0.0% 0
		Cattle	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	0.0% 0		100.0% 1
		Swine	0.0% 0	0.0% 0	100.0% 1	0.0% 0	0.0% 0	0.0% 0			0.0% 0			

Table 26b. Antimicrobial Resistance among *Salmonella* Enteritidis Isolates from Humans, Retail Meats, and Food Animals, by Year, 1999-2010

Year			1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Number of Isolates Tested		Humans	269	319	277	337	257	271	384	413	385	441	410	522
		Chicken Breasts				8	3	3	12	17	13	30	27	28
		Ground Turkey				5	1	0	0	0	0	2	0	0
		Ground Beef				1	1	0	0	0	0	1	0	1
		Pork Chops				0	0	0	0	0	0	0	0	0
		Chickens	41	31	21	48	42	84	173	188	124	116	118	152
		Turkeys	1	1	0	0	0	0	0	3	0	1	0	1
		Cattle	8	4	4	6	3	2	2	2	4	5	0	1
		Swine	2	1	1	1	1	1	0	0	1	0	0	0
Antimicrobial Class	**Antimicrobial (Resistance Breakpoint)**	**Isolate Source**												
β-Lactam/β-Lactamase Inhibitor Combinations	Amoxicillin-Clavulanic Acid (MIC ≥ 32 / 16 µg/ml)	Humans	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	0.0% 0	0.0% 0	0.4% 2
		Chicken Breasts				0.0% 0	33.3% 1	33.3% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	3.7% 1	3.6% 1
		Ground Turkey				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												
		Chickens	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	0.9% 1	0.8% 1	0.0% 0
		Turkeys	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			
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	0.0% 0	0.0% 0	0.0% 0
		Chicken Breasts				0.0% 0	33.3% 1	33.3% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	3.7% 1	3.6% 1
		Ground Turkey				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												
		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	0.9% 1	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	0.0% 0	0.0% 0	50.0% 1	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			
	Ceftiofur (MIC ≥ 8 µg/ml)	Humans	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	0.2% 1	0.0% 0	0.0% 0
		Chicken Breasts				0.0% 0	33.3% 1	33.3% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	3.7% 1	7.1% 2
		Ground Turkey				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												
		Chickens	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	0.9% 1	0.8% 1	1.3% 2
		Turkeys	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	50.0% 1	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			
	Ceftriaxone (MIC ≥ 4 µg/ml)	Humans	0.4% 1	0.0% 0	1.4% 4	0.0% 0	0.0% 0	0.0% 0	0.3% 1	0.5% 2	0.3% 1	0.2% 1	0.0% 0	0.0% 0
		Chicken Breasts				0.0% 0	33.3% 1	33.3% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	3.7% 1	7.1% 2
		Ground Turkey				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												
		Chickens	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	0.9% 1	0.8% 1	0.6% 1
		Turkeys	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	50.0% 1	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 26c. Antimicrobial Resistance among *Salmonella* Enteritidis Isolates from Humans, Retail Meats, and Food Animals, by Year, 1999-2010

Year			1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Number of Isolates Tested		Humans	269	319	277	337	257	271	384	413	385	441	410	522
		Chicken Breasts				8	3	3	12	17	13	30	27	28
		Ground Turkey				5	1	0	0	0	0	2	0	0
		Ground Beef				1	1	0	0	0	0	1	0	1
		Pork Chops				0	0	0	0	0	0	0	0	0
		Chickens	41	31	21	48	42	84	173	188	124	116	118	152
		Turkeys	1	1	0	0	0	0	0	3	0	1	0	1
		Cattle	8	4	4	6	3	2	2	2	4	5	0	1
		Swine	2	1	1	1	1	1	0	0	1	0	0	0
Antimicrobial Class	**Antimicrobial (Resistance Breakpoint)**	**Isolate Source**												
Folate Pathway Inhibitors	Sulfamethoxazole/ Sulfisoxazole [1] (MIC ≥ 512 µg/ml)	Humans	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	1.1% 5	1.7% 7	1.9% 10
		Chicken Breasts				0.0% 0	0.0% 0	33.3% 1	0.0% 0	0.0% 0	0.0% 0	3.3% 1	3.7% 1	7.1% 2
		Ground Turkey				0.0% 0	0.0% 0					50.0% 1		
		Ground Beef				0.0% 0	0.0% 0					0.0% 0		0.0% 0
		Pork Chops												
		Chickens	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	0.9% 1	0.0% 0	2.0% 3
		Turkeys	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	50.0% 1	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			
	Trimethoprim-Sulfamethoxazole (MIC ≥ 4 / 76 µg/ml)	Humans	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	0.9% 4	0.7% 3	1.0% 5
		Chicken Breasts				0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	3.7% 1	0.0% 0
		Ground Turkey				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												
		Chickens	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Turkeys	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			
Penicillins	Ampicillin (MIC ≥ 32 µg/ml)	Humans	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	3.9% 17	3.9% 16	2.3% 12
		Chicken Breasts				0.0% 0	66.7% 2	33.3% 1	0.0% 0	17.6% 3	0.0% 0	6.7% 2	18.5% 5	3.6% 1
		Ground Turkey				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												
		Chickens	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	2.6% 3	2.5% 3	2.6% 4
		Turkeys	0.0% 0	0.0% 0						0.0% 0		0.0% 0		0.0% 0
		Cattle	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	0.0% 0		100.0% 1
		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	0.4% 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	0.5% 2	0.0% 0	0.6% 3
		Chicken Breasts				0.0% 0	0.0% 0	0.0% 0	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		
		Ground Beef				0.0% 0	0.0% 0					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	0.6% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	1.3% 2
		Turkeys	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	50.0% 1	0.0% 0	0.0% 0		100.0% 1
		Swine	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0			0.0% 0			

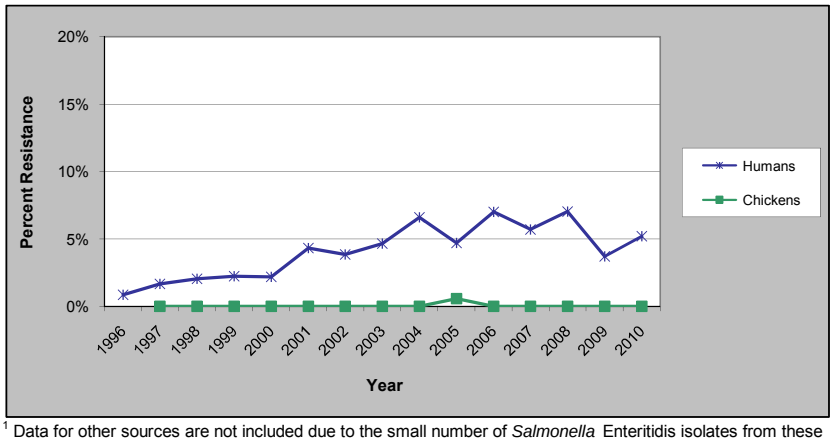
[1] Sulfamethoxazole was tested from 1996-2003 and was replaced by sulfisoxazole in 2004

Table 26d. Antimicrobial Resistance among *Salmonella* Enteritidis Isolates from Humans, Retail Meats, and Food Animals, by Year, 1999-2010

Year			1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Number of Isolates Tested		Humans	269	319	277	337	257	271	384	413	385	441	410	522
		Chicken Breasts				8	3	3	12	17	13	30	27	28
		Ground Turkey				5	1	0	0	0	0	2	0	0
		Ground Beef				1	1	0	0	0	0	1	0	1
		Pork Chops				0	0	0	0	0	0	0	0	0
		Chickens	41	31	21	48	42	84	173	188	124	116	118	152
		Turkeys	1	1	0	0	0	0	0	3	0	1	0	1
		Cattle	8	4	4	6	3	2	2	2	4	5	0	1
		Swine	2	1	1	1	1	1	0	0	1	0	0	0
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	0.2% 1
		Chicken Breasts				0.0% 0	0.0% 0	0.0% 0	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		
		Ground Beef				0.0% 0	0.0% 0					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	0.0% 0
		Turkeys	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			
	Nalidixic Acid (MIC ≥ 32 µg/ml)	Humans	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	7.0% 31	3.7% 15	5.2% 27
		Chicken Breasts				0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	3.7% 1	0.0% 0
		Ground Turkey				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												
		Chickens	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.6% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Turkeys	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			
Tetracyclines	Tetracycline (MIC ≥ 16 µg/ml)	Humans	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	1.8% 8	1.2% 5	2.1% 11
		Chicken Breasts				0.0% 0	0.0% 0	33.3% 1	0.0% 0	11.8% 2	0.0% 0	3.3% 1	3.7% 1	7.1% 2
		Ground Turkey				0.0% 0	0.0% 0					50.0% 1		
		Ground Beef				0.0% 0	0.0% 0					0.0% 0		0.0% 0
		Pork Chops												
		Chickens	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	0.9% 1	2.5% 3	3.3% 5
		Turkeys	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	50.0% 1	25.0% 1	0.0% 0		100.0% 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 11. Percent of *Salmonella* Enteritidis Isolates from Humans and Chickens Resistant to Nalidixic Acid, by Year, 1996-2010 [1]



[1] Data for other sources are not included due to the small number of *Salmonella* Enteritidis isolates from these sources. Table 26 contains resistance data for *Salmonella* Enteritidis isolates from each source, by year

Table 27. Number of *Salmonella* Enteritidis Isolates Tested from Humans, Retail Meats, and Food Animals, by Year, 1996-2010

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Humans	351	301	244	269	319	277	337	257	271	384	413	385	441	410	522
Chicken Breasts							8	3	3	12	17	13	30	27	28
Ground Turkey							5	1	0	0	0	0	2	0	0
Ground Beef							1	1	0	0	0	0	1	0	1
Pork Chops							0	0	0	0	0	0	0	0	0
Chickens		1	13	41	31	21	48	42	84	173	188	124	116	118	152
Turkeys		0	0	1	1	0	0	0	0	0	3	0	1	0	1
Cattle		1	1	8	4	4	6	3	2	2	2	4	5	0	1
Swine		0	0	2	1	1	1	1	1	0	0	1	0	0	0

Table 28a. Resistance Patterns among *Salmonella* Enteritidis Isolates from Humans, Retail Meats, and Food Animals, by Year, 1999-2010

Year		1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Number of Isolates Tested	Humans	269	319	277	337	257	271	384	413	385	441	410	522
	Chicken Breasts				8	3	3	12	17	13	30	27	28
	Ground Turkey				5	1	0	0	0	0	2	0	0
	Ground Beef				1	1	0	0	0	0	1	0	1
	Pork Chops				0	0	0	0	0	0	0	0	0
	Chickens	41	31	21	48	42	84	173	188	124	116	118	152
	Turkeys	1	1	0	0	0	0	0	3	0	1	0	1
	Cattle	8	4	4	6	3	2	2	2	4	5	0	1
	Swine	2	1	1	1	1	1	0	0	1	0	0	0
Resistance Pattern	**Isolate Source**												
1. No Resistance Detected	Humans	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	87.9% 386	92.0% 377	92.1% 481
	Chicken Breasts				100.0% 8	33.3% 1	66.7% 2	100.0% 12	82.4% 14	100.0% 13	90.0% 27	74.1% 20	92.9% 26
	Ground Turkey				100.0% 5	100.0% 1					50.0% 1		
	Ground Beef				100.0% 1	100.0% 1					100.0% 1		100.0% 1
	Pork Chops												
	Chickens	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	97.4% 113	96.6% 114	95.4% 145
	Turkeys	100.0% 1	100.0% 1						100.0% 3		100.0% 1		100.0% 1
	Cattle	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	100.0% 1		0.0% 0
	Swine	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	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	0.5% 2	1.0% 4	2.1% 11
	Chicken Breasts				0.0% 0	33.3% 1	33.3% 1	0.0% 0	0.0% 0	0.0% 0	33.3% 1	3.7% 1	7.1% 2
	Ground Turkey				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												
	Chickens	2.4% 1	3.2% 1	0.0% 0	4.2% 2	0.0% 0	2.4% 2	0.6% 1	0.0% 0	0.0% 0	0.9% 1	0.8% 1	2.6% 4
	Turkeys	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	50.0% 1	0.0% 0	0.0% 0		100.0% 1
	Swine	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	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	0.0% 0	0.5% 2	0.4% 2
	Chicken Breasts				0.0% 0	0.0% 0	33.3% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	3.7% 1	3.6% 1
	Ground Turkey				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												
	Chickens	2.4% 1	3.2% 1	0.0% 0	4.2% 2	0.0% 0	1.2% 1	0.0% 0	0.0% 0	0.0% 0	0.9% 1	0.8% 1	0.6% 1
	Turkeys	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	50.0% 1	0.0% 0	0.0% 0		100.0% 1
	Swine	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	0.4% 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	0.0% 0	0.2% 1	0.0% 0
	Chicken Breasts				0.0% 0	0.0% 0	33.3% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	3.7% 1	3.6% 1
	Ground Turkey				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												
	Chickens	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	0.9% 1	0.0% 0	0.6% 1
	Turkeys	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	50.0% 1	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 28b. Resistance Patterns among *Salmonella* Enteritidis Isolates from Humans, Retail Meats, and Food Animals, by Year, 1999-2010

Year		1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Number of Isolates Tested	Humans	269	319	277	337	257	271	384	413	385	441	410	522
	Chicken Breasts				8	3	3	12	17	13	30	27	28
	Ground Turkey				5	1	0	0	0	0	2	0	0
	Ground Beef				1	1	0	0	0	0	1	0	1
	Pork Chops				0	0	0	0	0	0	0	0	0
	Chickens	41	31	21	48	42	84	173	188	124	116	118	152
	Turkeys	1	1	0	0	0	0	0	3	0	1	0	1
	Cattle	8	4	4	6	3	2	2	2	4	5	0	1
	Swine	2	1	1	1	1	1	0	0	1	0	0	0
Resistance Pattern	**Isolate Source**												
5. At Least ACSSuT[1] Resistant	Humans	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	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	0.0% 0	0.0% 0	0.0% 0
	Ground Turkey				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												
	Chickens	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.6% 1
	Turkeys	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			
6. At Least ACT/S[2] Resistant	Humans	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	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	0.0% 0	0.0% 0	0.0% 0
	Ground Turkey				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												
	Chickens	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
	Turkeys	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			
7. At Least ACSSuTAuCx[3] Resistant	Humans	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	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	0.0% 0	0.0% 0	0.0% 0
	Ground Turkey				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												
	Chickens	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
	Turkeys	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			
8. At Least Ceftriaxone and Nalidixic Acid Resistant	Humans	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.3% 1	0.2% 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	0.0% 0	0.0% 0	0.0% 0
	Ground Turkey				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												
	Chickens	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
	Turkeys	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			

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

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

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

F. Antimicrobial Susceptibility among *Salmonella* serotype Typhimurium

Table 29a. Antimicrobial Resistance among *Salmonella* Typhimurium Isolates from Humans, Retail Meats, and Food Animals, by Year, 1999-2010

Year			1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Number of Isolates Tested		Humans	363	304	325	394	408	383	438	408	405	397	371	366
		Chicken Breasts				9	22	49	29	21	25	68	122	79
		Ground Turkey				2	2	2	1	0	1	1	1	6
		Ground Beef				2	1	0	0	1	3	2	0	0
		Pork Chops				2	1	2	2	2	3	3	1	5
		Chickens	154	145	130	150	156	171	183	105	83	70	36	54
		Turkeys	37	18	15	9	6	14	7	5	6	3	2	4
		Cattle	189	187	87	98	78	48	34	22	26	28	18	15
		Swine	114	81	44	48	27	53	42	25	44	10	20	13
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	0.0% 0
		Chicken Breasts				0.0% 0	0.0% 0	0.0% 0	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	0.0% 0	0.0% 0
		Ground Beef				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	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	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	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	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	2.3% 1	0.0% 0	0.0% 0	0.0% 0
	Gentamicin (MIC ≥ 16 µg/ml)	Humans	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	1.5% 6	1.9% 7	0.8% 3
		Chicken Breasts				0.0% 0	0.0% 0	2.0% 1	0.0% 0	0.0% 0	0.0% 0	1.5% 1	2.5% 3	6.3% 5
		Ground Turkey				0.0% 0	0.0% 0	0.0% 0	0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Ground Beef				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	50.0% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Chickens	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	5.7% 4	0.0% 0	5.6% 3
		Turkeys	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	33.3% 1	50.0% 1	0.0% 0
		Cattle	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	0.0% 0	0.0% 0	0.0% 0
		Swine	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	10.0% 1	0.0% 0	7.7% 1
	Kanamycin (MIC ≥ 64 µg/ml)	Humans	12.9% 47	13.2% 40	8.3% 27	7.6% 30	7.1% 29	5.7% 22	5.7% 25	5.1% 21	5.9% 24	2.3% 9	4.9% 18	7.4% 27
		Chicken Breasts				0.0% 0	18.2% 4	34.7% 17	24.1% 7	47.6% 10	12.0% 3	25.0% 17	27.9% 34	10.1% 8
		Ground Turkey				0.0% 0	50.0% 1	50.0% 1	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		
		Pork Chops				0.0% 0	0.0% 0	0.0% 0	0.0% 0	100.0% 2	0.0% 0	0.0% 0	0.0% 0	40.0% 2
		Chickens	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	8.6% 6	8.3% 3	16.7% 9
		Turkeys	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	0.0% 0	0.0% 0	0.0% 0
		Cattle	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	14.3% 4	33.3% 6	13.3% 2
		Swine	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	10.0% 1	0.0% 0	15.4% 2
	Streptomycin (MIC ≥ 64 µg/ml)	Humans	43.3% 157	39.5% 120	40.0% 130	32.0% 126	35.5% 145	31.9% 122	28.1% 123	29.4% 120	32.3% 131	28.5% 113	25.9% 96	25.7% 94
		Chicken Breasts				0.0% 0	18.2% 4	14.3% 7	3.4% 1	9.5% 2	28.0% 7	16.2% 11	15.6% 19	22.8% 18
		Ground Turkey				0.0% 0	50.0% 1	50.0% 1	0.0% 0		100.0% 1	0.0% 0	0.0% 0	33.3% 2
		Ground Beef				0.0% 0	0.0% 0			100.0% 1	0.0% 0	50.0% 1		
		Pork Chops				50.0% 1	100.0% 1	100.0% 2	100.0% 2	100.0% 2	0.0% 0	33.3% 1	100.0% 1	80.0% 4
		Chickens	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	5.7% 4	5.6% 2	14.8% 8
		Turkeys	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	33.3% 1	100.0% 2	50.0% 2
		Cattle	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	50.0% 14	72.2% 13	53.3% 8
		Swine	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	80.0% 8	80.0% 16	61.5% 8

Table 29b. Antimicrobial Resistance among *Salmonella* Typhimurium Isolates from Humans, Retail Meats, and Food Animals, by Year, 1999-2010

Year			1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Number of Isolates Tested		Humans	363	304	325	394	408	383	438	408	405	397	371	366
		Chicken Breasts				9	22	49	29	21	25	68	122	79
		Ground Turkey				2	2	2	1	0	1	1	1	6
		Ground Beef				2	1	0	0	1	3	2	0	0
		Pork Chops				2	1	2	2	2	3	3	1	5
		Chickens	154	145	130	150	156	171	183	105	83	70	36	54
		Turkeys	37	18	15	9	6	14	7	5	6	3	2	4
		Cattle	189	187	87	98	78	48	34	22	26	28	18	15
		Swine	114	81	44	48	27	53	42	25	44	10	20	13
Antimicrobial Class	**Antimicrobial (Resistance Breakpoint)**	**Isolate Source**												
β-Lactam/β-Lactamase Inhibitor Combinations	Amoxicillin-Clavulanic Acid (MIC ≥ 32 / 16 µg/ml)	Humans	2.8% 10	6.3% 19	6.2% 20	7.6% 30	5.6% 23	4.7% 18	3.2% 14	4.4% 18	6.7% 27	3.3% 13	6.2% 23	4.4% 16
		Chicken Breasts				33.3% 3	63.6% 14	49.0% 24	51.7% 15	57.1% 12	44.0% 11	48.5% 33	57.4% 70	60.8% 48
		Ground Turkey				0.0% 0	100.0% 2	0.0% 0	100.0% 1		0.0% 0	0.0% 0	0.0% 0	50.0% 3
		Ground Beef				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	0.0% 0	0.0% 0	0.0% 0
		Chickens	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	24.3% 17	33.3% 12	29.6% 16
		Turkeys	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	0.0% 0	50.0% 1	50.0% 2
		Cattle	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	21.4% 6	27.8% 5	20.0% 3
		Swine	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	0.0% 0	0.0% 0	7.7% 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	5.7% 23	3.3% 13	5.4% 20	3.6% 13
		Chicken Breasts				33.3% 3	63.6% 14	49.0% 24	51.7% 15	52.4% 11	40.0% 10	45.6% 31	47.5% 58	49.4% 39
		Ground Turkey				0.0% 0	100.0% 2	0.0% 0	100.0% 1		0.0% 0	0.0% 0	0.0% 0	50.0% 3
		Ground Beef				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	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	20.0% 14	27.8% 10	27.8% 15
		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	0.0% 0	50.0% 1	0.0% 0
		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	17.9% 5	22.2% 4	20.0% 3
		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	0.0% 0	0.0% 0	0.0% 0
	Ceftiofur (MIC ≥ 8 µg/ml)	Humans	1.9% 7	3.6% 11	3.1% 10	4.3% 17	4.9% 20	4.4% 17	2.5% 11	4.2% 17	6.4% 26	3.3% 13	6.5% 24	4.9% 18
		Chicken Breasts				33.3% 3	63.6% 14	49.0% 24	51.7% 15	57.1% 12	44.0% 11	48.5% 33	56.6% 69	60.8% 48
		Ground Turkey				0.0% 0	100.0% 2	0.0% 0	100.0% 1		0.0% 0	0.0% 0	0.0% 0	50.0% 3
		Ground Beef				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	0.0% 0	0.0% 0	0.0% 0
		Chickens	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	24.3% 17	33.3% 12	29.6% 16
		Turkeys	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	0.0% 0	50.0% 1	0.0% 0
		Cattle	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	21.4% 6	27.8% 5	20.0% 3
		Swine	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	0.0% 0	0.0% 0	0.0% 0
	Ceftriaxone (MIC ≥ 4 µg/ml)	Humans	1.9% 7	3.3% 10	3.1% 10	4.3% 17	4.9% 20	4.4% 17	2.5% 11	4.2% 17	6.4% 26	3.3% 13	6.5% 24	4.9% 18
		Chicken Breasts				33.3% 3	63.6% 14	49.0% 24	51.7% 15	57.1% 12	44.0% 11	48.5% 33	57.3% 70	60.8% 48
		Ground Turkey				0.0% 0	100.0% 2	0.0% 0	100.0% 1		0.0% 0	0.0% 0	0.0% 0	50.0% 3
		Ground Beef				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	0.0% 0	0.0% 0	0.0% 0
		Chickens	28.6% 44	26.2% 38	14.6% 19	26.7% 40	25.6% 40	43.3% 74	19.7% 36	30.5% 32	33.7% 28	24.3% 17	33.3% 12	29.6% 16
		Turkeys	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	0.0% 0	50.0% 1	0.0% 0
		Cattle	6.3% 12	11.8% 22	11.5% 10	15.3% 15	20.5% 16	25.0% 12	35.3% 12	27.3% 6	26.9% 7	21.4% 6	27.8% 5	20.0% 3
		Swine	0.9% 1	0.0% 0	0.0% 0	4.2% 2	0.0% 0	0.0% 0	4.8% 2	0.0% 0	2.3% 1	0.0% 0	0.0% 0	0.0% 0

Table 29c. Antimicrobial Resistance among *Salmonella* Typhimurium Isolates from Humans, Retail Meats, and Food Animals, by Year, 1999-2010

Year			1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2009
Number of Isolates Tested		Humans	363	304	325	394	408	383	438	408	405	397	371	366
		Chicken Breasts				9	22	49	29	21	25	68	122	79
		Ground Turkey				2	2	2	1	0	1	1	1	6
		Ground Beef				2	1	0	0	1	3	2	0	0
		Pork Chops				2	1	2	2	2	3	3	1	5
		Chickens	154	145	130	150	156	171	183	105	83	70	36	54
		Turkeys	37	18	15	9	6	14	7	5	6	3	2	4
		Cattle	189	187	87	98	78	48	34	22	26	28	18	15
		Swine	114	81	44	48	27	53	42	25	44	10	20	13
Antimicrobial Class	**Antimicrobial (Resistance Breakpoint)**	**Isolate Source**												
Folate Pathway Inhibitors	Sulfamethoxazole/ Sulfisoxazole [1] (MIC ≥ 512 µg/ml)	Humans	45.7% 166	45.4% 138	43.1% 140	32.2% 127	38.7% 158	36.0% 138	32.0% 140	33.3% 136	37.3% 151	30.2% 120	29.9% 111	28.7% 105
		Chicken Breasts				44.4% 4	31.8% 7	73.5% 36	69.0% 20	90.5% 19	68.0% 17	94.1% 64	96.7% 118	92.4% 73
		Ground Turkey				0.0% 0	50.0% 1	100.0% 2	0.0% 0		100.0% 1	0.0% 0	100.0% 1	66.7% 4
		Ground Beef				0.0% 0	0.0% 0			100.0% 1	0.0% 0	50.0% 1		
		Pork Chops				50.0% 1	100.0% 1	100.0% 2	100.0% 2	100.0% 2	0.0% 0	33.3% 1	100.0% 1	80.0% 4
		Chickens	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	70.0% 49	52.8% 19	74.1% 40
		Turkeys	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	66.7% 2	100.0% 2	50.0% 2
		Cattle	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	53.6% 15	83.3% 15	60.0% 9
		Swine	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	80.0% 8	90.0% 18	69.2% 9
	Trimethoprim-Sulfamethoxazole (MIC ≥ 4 / 76 µg/ml)	Humans	2.8% 10	3.6% 11	2.5% 8	2.3% 9	3.4% 14	2.6% 10	2.7% 12	2.2% 9	2.5% 10	1.8% 7	3.0% 11	1.9% 7
		Chicken Breasts				0.0% 0	0.0% 0	0.0% 0	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	0.0% 0	0.0% 0
		Ground Beef				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	50.0% 1	0.0% 0	0.0% 0	0.0% 0	100.0% 1	0.0% 0
		Chickens	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	0.0% 0	2.8% 1	0.0% 0
		Turkeys	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	0.0% 0	0.0% 0	0.0% 0
		Cattle	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	0.0% 0	5.6% 1	6.7% 1
		Swine	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	10.0% 1	5.0% 1	7.7% 1
Penicillins	Ampicillin (MIC ≥ 32 µg/ml)	Humans	41.3% 150	42.1% 128	42.5% 138	33.8% 133	36.3% 148	32.1% 123	29.0% 127	28.2% 115	31.6% 128	26.2% 104	28.0% 104	26.2% 96
		Chicken Breasts				33.3% 3	72.7% 16	53.1% 26	55.2% 16	57.1% 12	48.0% 12	60.3% 41	68.0% 83	69.6% 55
		Ground Turkey				0.0% 0	100.0% 2	50.0% 1	100.0% 1		100.0% 1	0.0% 0	0.0% 0	66.7% 4
		Ground Beef				0.0% 0	0.0% 0			100.0% 1	0.0% 0	50.0% 1		
		Pork Chops				50.0% 1	100.0% 1	50.0% 1	100.0% 2	100.0% 2	0.0% 0	0.0% 0	100.0% 1	20.0% 1
		Chickens	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	28.6% 20	33.3% 12	35.2% 19
		Turkeys	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	33.3% 1	50.0% 1	50.0% 2
		Cattle	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	50.0% 14	83.3% 15	53.3% 8
		Swine	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	70.0% 7	80.0% 16	53.8% 7
Phenicols	Chloramphenicol (MIC ≥ 32 µg/ml)	Humans	28.9% 105	30.9% 94	31.7% 103	23.4% 92	28.2% 115	24.3% 93	24.4% 107	22.1% 90	25.4% 103	23.2% 92	20.5% 76	20.2% 74
		Chicken Breasts				0.0% 0	9.1% 2	4.1% 2	3.4% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	5.1% 4
		Ground Turkey				0.0% 0	50.0% 1	50.0% 1	0.0% 0		100.0% 1	0.0% 0	0.0% 0	16.7% 1
		Ground Beef				0.0% 0	0.0% 0			100.0% 1	0.0% 0	50.0% 1		
		Pork Chops				50.0% 1	100.0% 1	100.0% 2	100.0% 2	0.0% 0	0.0% 0	0.0% 0	100.0% 1	60.0% 3
		Chickens	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	1.4% 1	0.0% 0	3.7% 2
		Turkeys	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	33.3% 1	0.0% 0	50.0% 2
		Cattle	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	35.7% 10	66.7% 12	46.7% 7
		Swine	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	50.0% 5	75.0% 15	46.2% 6

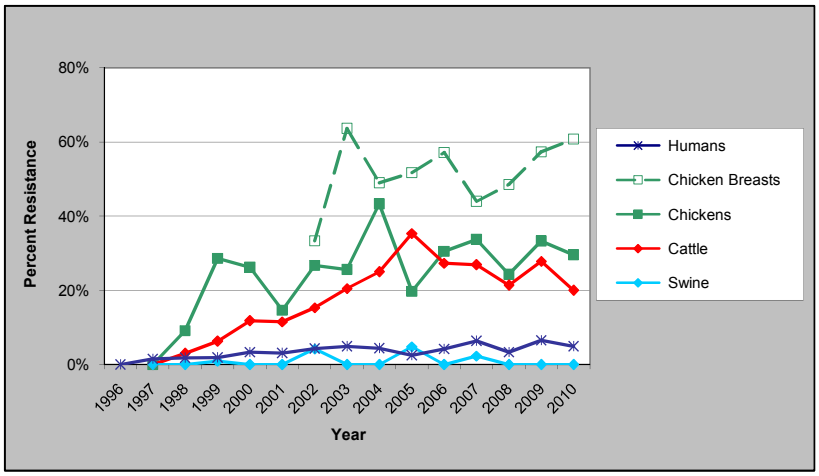
[1] Sulfamethoxazole was tested from 1996-2003 and was replaced by sulfisoxazole in 2004

Table 29d. Antimicrobial Resistance among *Salmonella* Typhimurium Isolates from Humans, Retail Meats, and Food Animals, by Year, 1999-2010

Year			1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Number of Isolates Tested		Humans	363	304	325	394	408	383	438	408	405	397	371	366
		Chicken Breasts				9	22	49	29	21	25	68	122	79
		Ground Turkey				2	2	2	1	0	1	1	1	6
		Ground Beef				2	1	0	0	1	3	2	0	0
		Pork Chops				2	1	2	2	2	3	3	1	5
		Chickens	154	145	130	150	156	171	183	105	83	70	36	54
		Turkeys	37	18	15	9	6	14	7	5	6	3	2	4
		Cattle	189	187	87	98	78	48	34	22	26	28	18	15
		Swine	114	81	44	48	27	53	42	25	44	10	20	13
Antimicrobial Class	**Antimicrobial (Resistance Breakpoint)**	**Isolate Source**												
Quinolones	Ciprofloxacin (MIC ≥ 4 µg/ml)	Humans	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	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	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	0.0% 0	0.0% 0
		Ground Beef				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	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	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	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	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	0.0% 0
	Nalidixic Acid (MIC ≥ 32 µg/ml)	Humans	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	1.3% 5	2.2% 8	1.4% 5
		Chicken Breasts				0.0% 0	0.0% 0	0.0% 0	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	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		
		Pork Chops				0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Chickens	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	0.0% 0	0.0% 0	0.0% 0
		Turkeys	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	0.0% 0	0.0% 0	0.0% 0
		Cattle	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	0.0% 0	0.0% 0	0.0% 0
		Swine	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	0.0% 0	0.0% 0	0.0% 0
Tetracyclines	Tetracycline (MIC ≥ 16 µg/ml)	Humans	41.9% 152	43.4% 132	43.4% 141	32.0% 126	38.2% 156	30.3% 116	30.4% 133	31.6% 129	36.8% 149	27.5% 109	28.8% 107	29.0% 106
		Chicken Breasts				44.4% 4	31.8% 7	71.4% 35	69.0% 20	90.5% 19	72.0% 18	92.6% 63	95.9% 117	88.6% 70
		Ground Turkey				0.0% 0	50.0% 1	100.0% 2	0.0% 0		100.0% 1	0.0% 0	100.0% 1	66.7% 4
		Ground Beef				0.0% 0	0.0% 0			100.0% 1	0.0% 0	50.0% 1		
		Pork Chops				100.0% 2	100.0% 1	100.0% 2	100.0% 2	100.0% 2	66.7% 2	33.3% 1	100.0% 1	60.0% 3
		Chickens	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	64.3% 45	55.6% 20	72.2% 39
		Turkeys	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	66.7% 2	50.0% 1	50.0% 2
		Cattle	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	50.0% 14	88.9% 16	60.0% 9
		Swine	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	100.0% 10	100.0% 20	76.9% 10

Ceftriaxone Resistance

Figure 12. Percent of *Salmonella* Typhimurium Isolates from Humans, Retail Chicken Breasts, and Food Animals Resistant to Ceftriaxone by Year, 1996-2010 [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 29 contains resistance data for *Salmonella* Typhimurium isolates from each source, by year

Table 30. Number of *Salmonella* Typhimurium Isolates Tested from Humans, Retail Meats, and Food Animals, by Year, 1996-2010

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Humans	307	328	381	363	304	325	394	408	383	438	408	405	397	371	366
Chicken Breasts							9	22	49	29	21	25	68	122	79
Ground Turkey							2	2	2	1	0	1	1	1	6
Ground Beef							2	1	0	0	1	3	2	0	0
Pork Chops							2	1	2	2	2	3	3	1	5
Chickens		24	66	154	145	130	150	156	171	183	105	83	70	36	54
Turkeys		4	6	37	18	15	9	6	14	7	5	6	3	2	4
Cattle		1	33	189	187	87	98	78	48	34	22	26	28	18	15
Swine		25	104	114	81	44	48	27	53	42	25	44	10	20	13

Table 31a. Resistance Patterns among *Salmonella* Typhimurium Isolates from Humans, Retail Meats, and Food Animals, by Year, 1999-2010

Year		1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Number of Isolates Tested	Humans	363	304	325	394	408	383	438	408	405	397	371	366
	Chicken Breasts				9	22	49	29	21	25	68	122	79
	Ground Turkey				2	2	2	1	0	1	1	1	6
	Ground Beef				2	1	0	0	1	3	2	0	0
	Pork Chops				2	1	2	2	2	3	3	1	5
	Chickens	154	145	130	150	156	171	183	105	83	70	36	54
	Turkeys	37	18	15	9	6	14	7	5	6	3	2	4
	Cattle	189	187	87	98	78	48	34	22	26	28	18	15
	Swine	114	81	44	48	27	53	42	25	44	10	20	13
Resistance Pattern	**Isolate Source**												
1. No Resistance Detected	Humans	50.4% 183	49.3% 150	49.2% 160	59.9% 236	54.7% 223	60.6% 232	65.1% 285	62.5% 255	57.5% 233	68.0% 270	63.6% 236	66.9% 245
	Chicken Breasts				22.2% 2	22.7% 5	14.3% 7	24.1% 7	0.0% 0	24.0% 6	5.9% 4	2.5% 3	3.8% 3
	Ground Turkey				100.0% 2	0.0% 0	0.0% 0	0.0% 0		0.0% 0	100.0% 1	0.0% 0	33.3% 2
	Ground Beef				100.0% 2	100.0% 1			0.0% 0	100.0% 3	50.0% 1		
	Pork Chops				0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	33.3% 1	66.7% 2	0.0% 0	0.0% 0
	Chickens	29.2% 45	31.7% 46	64.6% 84	37.3% 56	45.5% 71	40.9% 70	54.1% 99	30.5% 32	30.1% 25	27.1% 19	33.3% 12	22.2% 12
	Turkeys	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	0.0% 0	0.0% 0	50.0% 2
	Cattle	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	46.4% 13	5.5% 1	40.0% 6
	Swine	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	0.0% 0	0.0% 0	23.1% 3
2. Resistant to ≥ 3 Antimicrobial Classes	Humans	43.0% 156	43.4% 132	41.5% 135	32.5% 128	37.3% 152	31.6% 121	30.1% 132	30.4% 124	34.3% 139	27.7% 110	28.0% 104	27.3% 100
	Chicken Breasts				33.3% 3	72.7% 16	71.4% 35	58.6% 17	81.0% 17	68.0% 17	77.9% 53	75.4% 92	75.9% 60
	Ground Turkey				0.0% 0	100.0% 2	100.0% 2	100.0% 1		100.0% 1	0.0% 0	0.0% 0	66.7% 4
	Ground Beef				0.0% 0	0.0% 0			100.0% 1	0.0% 0	50.0% 1		
	Pork Chops				50.0% 1	100.0% 1	100.0% 2	100.0% 2	100.0% 2	0.0% 0	33.3% 1	100.0% 1	80.0% 4
	Chickens	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	31.4% 22	38.9% 14	44.4% 24
	Turkeys	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	33.3% 1	50.0% 1	50.0% 2
	Cattle	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	50.0% 14	83.3% 15	53.3% 8
	Swine	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	80.0% 8	85.0% 17	61.5% 8
3. Resistant to ≥ 4 Antimicrobial Classes	Humans	38.6% 140	39.8% 121	37.8% 123	28.4% 112	32.4% 132	27.7% 106	27.4% 120	27.0% 110	29.9% 121	24.7% 98	24.0% 89	24.3% 89
	Chicken Breasts				0.0% 0	36.4% 8	46.9% 23	48.3% 14	47.6% 10	40.0% 10	54.4% 37	60.7% 74	63.3% 50
	Ground Turkey				0.0% 0	50.0% 1	50.0% 1	0.0% 0		100.0% 1	0.0% 0	0.0% 0	66.7% 4
	Ground Beef				0.0% 0	0.0% 0			100.0% 1	0.0% 0	50.0% 1		
	Pork Chops				50.0% 1	100.0% 1	100.0% 2	100.0% 2	100.0% 2	0.0% 0	0.0% 0	100.0% 1	20.0% 1
	Chickens	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	25.7% 18	25.0% 9	31.5% 17
	Turkeys	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	33.3% 1	50.0% 1	50.0% 2
	Cattle	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	46.4% 13	77.8% 14	53.3% 8
	Swine	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	70.0% 7	75.0% 15	53.8% 7
4. Resistant to ≥ 5 Antimicrobial Classes	Humans	28.1% 102	29.6% 90	29.5% 96	23.1% 91	27.7% 113	24.3% 93	22.8% 100	20.8% 85	25.0% 101	23.7% 94	22.1% 82	20.8% 76
	Chicken Breasts				0.0% 0	27.3% 6	44.9% 22	48.3% 14	47.6% 10	40.0% 10	47.1% 32	56.6% 69	54.5% 47
	Ground Turkey				0.0% 0	50.0% 1	50.0% 1	0.0% 0		100.0% 1	0.0% 0	0.0% 0	66.7% 4
	Ground Beef				0.0% 0	0.0% 0			100.0% 1	0.0% 0	50.0% 1		
	Pork Chops				50.0% 1	100.0% 1	50.0% 1	100.0% 2	0.0% 0	0.0% 0	0.0% 0	100.0% 1	20.0% 1
	Chickens	15.6% 24	17.2% 25	12.3% 16	20.0% 30	17.3% 27	36.3% 62	19.7% 36	35.2% 37	30.1% 25	22.8% 16	25.9% 9	29.6% 16
	Turkeys	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	33.3% 1	50.0% 1	50.0% 2
	Cattle	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	35.7% 10	72.2% 13	46.7% 7
	Swine	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	40.0% 4	70.0% 14	46.2% 6

Table 31b. Resistance Patterns among *Salmonella* Typhimurium Isolates from Humans, Retail Meats, and Food Animals, by Year, 1999-2010

Year		1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Number of Isolates Tested	Humans	363	304	325	394	408	383	438	408	405	397	371	366
	Chicken Breasts				9	22	49	29	21	25	68	122	79
	Ground Turkey				2	2	2	1	0	1	1	1	6
	Ground Beef				2	1	0	0	1	3	2	0	0
	Pork Chops				2	1	2	2	2	3	3	1	5
	Chickens	154	145	130	150	156	171	183	105	83	70	36	54
	Turkeys	37	18	15	9	6	14	7	5	6	3	2	4
	Cattle	189	187	87	98	78	48	34	22	26	28	18	15
	Swine	114	81	44	48	27	53	42	25	44	10	20	13
Resistance Pattern	**Isolate Source**												
5. At Least ACSSuT[1] Resistant	Humans	27.8% 101	28.0% 85	29.5% 96	21.6% 85	26.5% 108	23.5% 90	22.4% 98	19.6% 80	22.7% 92	22.9% 91	19.4% 72	18.6% 68
	Chicken Breasts				0.0% 0	9.1% 2	4.1% 2	3.5% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	2.5% 2
	Ground Turkey				0.0% 0	50.0% 1	50.0% 1	0.0% 0		100.0% 1	0.0% 0	0.0% 0	16.7% 1
	Ground Beef				0.0% 0	0.0% 0			100.0% 1	0.0% 0	50.0% 1		
	Pork Chops				50.0% 1	100.0% 1	50.0% 1	100.0% 2	0.0% 0	0.0% 0	0.0% 0	100.0% 1	20.0% 1
	Chickens	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	0.0% 0	0.0% 0	13.0% 7
	Turkeys	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	33.3% 1	0.0% 0	50.0% 2
	Cattle	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	35.7% 10	66.7% 12	46.7% 7
	Swine	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	30.0% 3	70.0% 14	15.4% 2
6. At Least ACT/S[2] Resistant	Humans	2.2% 8	1.6% 5	0.9% 3	2.0% 8	3.2% 13	1.6% 6	2.1% 9	0.7% 3	2.0% 8	0.5% 2	2.2% 8	1.1% 4
	Chicken Breasts				0.0% 0	0.0% 0	0.0% 0	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	0.0% 0	0.0% 0
	Ground Beef				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	50.0% 1	0.0% 0	0.0% 0	0.0% 0	100.0% 1	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	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	0.0% 0
	Cattle	8.5% 16	0.5% 1	2.3% 2	3.1% 3	2.6% 2	4.2% 2	2.9% 1	4.5% 1	0.0% 0	0.0% 0	5.6% 1	6.7% 1
	Swine	0.0% 0	0.0% 0	0.0% 0	2.1% 1	0.0% 0	1.9% 1	7.1% 3	4.0% 1	9.1% 4	0.0% 0	0.0% 0	0.0% 0
7. At Least ACSSuTAuCx[3] Resistant	Humans	0.6% 2	1.6% 5	1.2% 4	1.8% 7	2.2% 9	2.6% 10	1.8% 8	2.9% 12	3.7% 15	2.0% 8	1.6% 6	1.9% 7
	Chicken Breasts				0.0% 0	0.0% 0	4.1% 2	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	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		
	Pork Chops				0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
	Chickens	0.0% 0	0.7% 1	0.0% 0	2.0% 3	0.6% 1	0.0% 0	1.1% 2	0.0% 0	0.0% 0	0.0% 0	0.0% 0	1.9% 1
	Turkeys	45.9% 17	33.3% 6	53.3% 8	11.1% 1	16.7% 1	14.2% 2	0.0% 0	0.0% 0	16.7% 1	0.0% 0	0.0% 0	0.0% 0
	Cattle	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	21.4% 6	16.7% 3	20.0% 3
	Swine	0.9% 1	0.0% 0	0.0% 0	4.2% 2	0.0% 0	0.0% 0	2.4% 1	0.0% 0	2.3% 1	0.0% 0	0.0% 0	0.0% 0
8. At Least Ceftriaxone and Nalidixic Acid Resistant	Humans	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	0.0% 0	0.5% 2	0.3% 1
	Chicken Breasts				0.0% 0	0.0% 0	0.0% 0	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	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		
	Pork Chops				0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
	Chickens	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	0.0% 0	0.0% 0	0.0% 0
	Turkeys	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	0.0% 0	0.0% 0	0.0% 0
	Cattle	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	0.0% 0	0.0% 0	0.0% 0
	Swine	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	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] ACSSuTAuCx = ACSSuT, amoxicillin-clavulanic acid, and ceftriaxone

G. Antimicrobial Susceptibility among *Salmonella* serotype Newport

Table 32a. Antimicrobial Resistance among *Salmonella* Newport Isolates from Humans, Retail Meats, and Food Animals, by Year, 1999-2010

Year			1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Number of Isolates Tested		Humans	99	121	124	241	223	191	207	217	221	255	236	305
		Chicken Breasts				2	0	0	0	0	0	0	1	0
		Ground Turkey				1	2	2	3	0	0	3	3	2
		Ground Beef				3	1	2	0	0	0	3	2	2
		Pork Chops				2	1	0	0	0	0	0	0	0
		Chickens	7	5	8	6	7	0	6	0	3	1	0	1
		Turkeys	4	6	16	10	19	7	5	4	15	8	3	5
		Cattle	54	109	87	113	75	44	27	30	30	31	17	5
		Swine	5	2	7	0	3	0	1	1	1	2	0	0
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	0.0% 0
		Chicken Breasts				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	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							
		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
		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	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	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	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	0.4% 1	0.4% 1	0.3% 1
		Chicken Breasts				0.0% 0							0.0% 0	
		Ground Turkey				0.0% 0	50.0% 1	0.0% 0	0.0% 0			33.3% 1	33.3% 1	50.0% 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							
		Chickens	0.0% 0	20.0% 1	0.0% 0	0.0% 0	0.0% 0		16.7% 1		0.0% 0	0.0% 0		0.0% 0
		Turkeys	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	25.0% 2	66.7% 2	0.0% 0
		Cattle	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	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		
	Kanamycin (MIC ≥ 64)	Humans	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	3.5% 9	1.3% 3	0.7% 2
		Chicken Breasts				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	0.0% 0
		Ground Beef				0.0% 0	0.0% 0	0.0% 0				33.3% 1	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		33.3% 2		0.0% 0	0.0% 0		0.0% 0
		Turkeys	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	37.5% 3	33.3% 1	20.0% 1
		Cattle	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	0.0% 0	5.9% 1	0.0% 0
		Swine	0.0% 0	0.0% 0	57.1% 4		0.0% 0		0.0% 0	0.0% 0	0.0% 0	0.0% 0		
	Streptomycin (MIC ≥ 64)	Humans	19.2% 19	24.0% 29	31.5% 39	25.3% 61	24.2% 54	15.7% 30	14.0% 29	13.8% 30	10.4% 23	13.7% 35	7.6% 18	8.2% 25
		Chicken Breasts				100.0% 2							0.0% 0	
		Ground Turkey				100.0% 1	50.0% 1	0.0% 0	0.0% 0			33.3% 1	33.3% 1	50.0% 1
		Ground Beef				66.7% 2	100.0% 1	100.0% 2				66.7% 2	0.0% 0	100.0% 2
		Pork Chops				100.0% 2	100.0% 1							
		Chickens	0.0% 0	20.0% 1	37.5% 3	0.0% 0	85.7% 6		50.0% 3		0.0% 0	100.0% 1		0.0% 0
		Turkeys	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	25.0% 2	66.7% 2	0.0% 0
		Cattle	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	74.2% 23	70.6% 12	60.0% 3
		Swine	0.0% 0	50.0% 1	85.7% 6		100.0% 3		0.0% 0	0.0% 0	0.0% 0	50.0% 1		

Table 32b. Antimicrobial Resistance among *Salmonella* Newport Isolates from Humans, Retail Meats, and Food Animals, by Year, 1999-2010

Year			1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Number of Isolates Tested		Humans	99	121	124	241	223	191	207	217	221	255	236	305
		Chicken Breasts				2	0	0	0	0	0	0	1	0
		Ground Turkey				1	2	2	3	0	0	3	3	2
		Ground Beef				3	1	2	0	0	0	3	2	2
		Pork Chops				2	1	0	0	0	0	0	0	0
		Chickens	7	5	8	6	7	0	6	0	3	1	0	1
		Turkeys	4	6	16	10	19	7	5	4	15	8	3	5
		Cattle	54	109	87	113	75	44	27	30	30	31	17	5
		Swine	5	2	7	0	3	0	1	1	1	2	0	0
Antimicrobial Class	**Antimicrobial (Resistance Breakpoint)**	**Isolate Source**												
β-Lactam/β-Lactamase Inhibitor Combinations	Amoxicillin-Clavulanic Acid (MIC ≥ 32 / 16 µg/ml)	Humans	18.2% 18	22.3% 27	26.6% 33	22.8% 55	21.5% 48	15.2% 29	12.6% 26	12.4% 27	8.1% 18	12.5% 32	6.8% 16	7.5% 23
		Chicken Breasts				0.0% 0							0.0% 0	
		Ground Turkey				100.0% 1	0.0% 0	0.0% 0	0.0% 0			0.0% 0	0.0% 0	0.0% 0
		Ground Beef				66.7% 2	100.0% 1	100.0% 2				66.7% 2	0.0% 0	50.0% 1
		Pork Chops				100.0% 2	100.0% 1							
		Chickens	0.0% 0	0.0% 0	37.5% 3	0.0% 0	85.7% 6		50.0% 3		0.0% 0	100.0% 1		0.0% 0
		Turkeys	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	25.0% 2	33.3% 1	20.0% 1
		Cattle	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	64.5% 20	58.8% 10	60.0% 3
		Swine	0.0% 0	0.0% 0	85.7% 6		100.0% 3		0.0% 0	0.0% 0	0.0% 0	50.0% 1		
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	8.1% 18	12.5% 32	5.9% 14	7.2% 22
		Chicken Breasts				0.0% 0							0.0% 0	
		Ground Turkey				100.0% 1	0.0% 0	0.0% 0	0.0% 0			0.0% 0	0.0% 0	0.0% 0
		Ground Beef				66.7% 2	100.0% 1	100.0% 2				66.7% 2	0.0% 0	50.0% 1
		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	100.0% 1		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	25.0% 2	33.3% 1	20.0% 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	64.5% 20	52.9% 6	60.0% 3
		Swine		0.0% 0	85.7% 6		100.0% 3		0.0% 0	0.0% 0	0.0% 0	50.0% 1		
	Ceftiofur (MIC ≥ 8 µg/ml)	Humans	18.2% 18	22.3% 27	27.4% 34	22.8% 55	22.0% 49	15.2% 29	12.6% 26	12.4% 27	8.1% 18	12.5% 32	6.4% 15	7.2% 22
		Chicken Breasts				0.0% 0							0.0% 0	
		Ground Turkey				100.0% 1	0.0% 0	0.0% 0	0.0% 0			0.0% 0	0.0% 0	0.0% 0
		Ground Beef				66.7% 2	100.0% 1	100.0% 2				66.7% 2	0.0% 0	50.0% 1
		Pork Chops				100.0% 2	100.0% 1							
		Chickens	0.0% 0	0.0% 0	37.5% 3	0.0% 0	85.7% 6		50.0% 3		0.0% 0	100.0% 1		0.0% 0
		Turkeys	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	25.0% 2	33.3% 1	20.0% 1
		Cattle	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	64.5% 20	58.8% 10	60.0% 3
		Swine	0.0% 0	0.0% 0	85.7% 6		100.0% 3		0.0% 0	0.0% 0	0.0% 0	50.0% 1		
	Ceftriaxone (MIC ≥ 4 µg/ml)	Humans	18.2% 18	22.3% 27	25.8% 32	22.8% 55	21.5% 48	14.7% 28	12.6% 26	12.9% 28	8.1% 18	12.5% 32	6.4% 15	7.2% 22
		Chicken Breasts				0.0% 0							0.0% 0	
		Ground Turkey				100.0% 1	0.0% 0	0.0% 0	0.0% 0			0.0% 0	0.0% 0	0.0% 0
		Ground Beef				66.7% 2	100.0% 1	100.0% 2				66.7% 2	0.0% 0	50.0% 1
		Pork Chops				100.0% 2	100.0% 1							
		Chickens	0.0% 0	0.0% 0	37.5% 3	0.0% 0	85.7% 6		50.0% 3		0.0% 0	100.0% 1		0.0% 0
		Turkeys	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	25.0% 2	33.3% 1	20.0% 1
		Cattle	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	64.5% 20	58.8% 10	60.0% 3
		Swine	0.0% 0	0.0% 0	85.7% 6		100.0% 3		0.0% 0	0.0% 0	0.0% 0	50.0% 1		

Table 32c. Antimicrobial Resistance among *Salmonella* Newport Isolates from Humans, Retail Meats, and Food Animals, by Year, 1999-2010

Year			1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Number of Isolates Tested		Humans	99	121	124	241	223	191	207	217	221	255	236	305
		Chicken Breasts				2	0	0	0	0	0	0	1	0
		Ground Turkey				1	2	2	3	0	0	3	3	2
		Ground Beef				3	1	2	0	0	0	3	2	2
		Pork Chops				2	1	0	0	0	0	0	0	0
		Chickens	7	5	8	6	7	0	6	0	3	1	0	1
		Turkeys	4	6	16	10	19	7	5	4	15	8	3	5
		Cattle	54	109	87	113	75	44	27	30	30	31	17	5
		Swine	5	2	7	0	3	0	1	1	1	2	0	0
Antimicrobial Class	**Antimicrobial (Resistance Breakpoint)**	**Isolate Source**												
Folate Pathway Inhibitors	Sulfamethoxazole/ Sulfisoxazole[1] (MIC ≥ 512 µg/ml)	Humans	22.2% 22	23.1% 28	32.3% 40	25.7% 62	24.7% 55	16.8% 32	15.5% 32	15.2% 33	10.4% 23	13.3% 34	8.1% 19	7.5% 23
		Chicken Breasts				0.0% 0							0.0% 0	
		Ground Turkey				100.0% 1	50.0% 1	0.0% 0	0.0% 0			33.3% 1	33.3% 1	50.0% 1
		Ground Beef				66.7% 2	100.0% 1	100.0% 2				66.7% 2	0.0% 0	100.0% 2
		Pork Chops				100.0% 2	100.0% 1							
		Chickens	0.0% 0	0.0% 0	37.5% 3	0.0% 0	71.4% 5		50.0% 3		0.0% 0	100.0% 1		0.0% 0
		Turkeys	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	37.5% 3	100.0% 3	0.0% 0
		Cattle	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	74.2% 23	70.6% 12	60.0% 3
		Swine	0.0% 0	50.0% 1	85.7% 6		100.0% 3		0.0% 0	0.0% 0	0.0% 0	50.0% 1		
	Trimethoprim-Sulfamethoxazole (MIC ≥ 4 / 76 µg/ml)	Humans	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	3.1% 8	0.4% 1	1.3% 4
		Chicken Breasts				0.0% 0							0.0% 0	
		Ground Turkey				100.0% 1	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	50.0% 1				0.0% 0	0.0% 0	0.0% 0
		Pork Chops				100.0% 2	0.0% 0							
		Chickens	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		16.7% 1		0.0% 0	100.0% 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	0.0% 0	0.0% 0
		Cattle	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	12.9% 4	0.0% 0	20.0% 1
		Swine	0.0% 0	0.0% 0	0.0% 0		33.3% 1		0.0% 0	0.0% 0	0.0% 0	0.0% 0		
Penicillins	Ampicillin (MIC ≥ 32 µg/ml)	Humans	18.2% 18	23.1% 28	29.8% 37	24.9% 60	22.9% 51	15.7% 30	14.0% 29	15.2% 33	10.0% 22	14.5% 37	7.6% 18	7.5% 23
		Chicken Breasts				0.0% 0							0.0% 0	
		Ground Turkey				100.0% 1	0.0% 0	0.0% 0	0.0% 0			0.0% 0	0.0% 0	0.0% 0
		Ground Beef				66.7% 2	100.0% 1	100.0% 2				66.7% 2	0.0% 0	50.0% 1
		Pork Chops				100.0% 2	100.0% 1							
		Chickens	0.0% 0	0.0% 0	37.5% 3	16.7% 1	85.7% 6		50.0% 3		0.0% 0	100.0% 1		0.0% 0
		Turkeys	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	25.0% 2	33.3% 1	20.0% 1
		Cattle	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	74.2% 23	64.7% 11	60.0% 3
		Swine	0.0% 0	0.0% 0	85.7% 6		100.0% 3		0.0% 0	0.0% 0	0.0% 0	50.0% 1		
Phenicols	Chloramphenicol (MIC ≥ 32 µg/ml)	Humans	18.2% 18	23.1% 28	28.2% 35	25.3% 61	22.4% 50	15.2% 29	13.5% 28	12.4% 27	9.5% 21	12.2% 31	6.8% 16	7.2% 22
		Chicken Breasts				0.0% 0							0.0% 0	
		Ground Turkey				100.0% 1	0.0% 0	0.0% 0	0.0% 0			0.0% 0	0.0% 0	0.0% 0
		Ground Beef				66.7% 2	100.0% 1	100.0% 2				66.7% 2	0.0% 0	100.0% 2
		Pork Chops				100.0% 2	100.0% 1							
		Chickens	0.0% 0	0.0% 0	37.5% 3	0.0% 0	85.7% 6		50.0% 3		0.0% 0	100.0% 1		0.0% 0
		Turkeys	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	12.5% 1	0.0% 0	0.0% 0
		Cattle	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	64.5% 20	52.9% 9	60.0% 3
		Swine	0.0% 0	50.0% 1	85.7% 6		100.0% 3		0.0% 0	0.0% 0	0.0% 0	50.0% 1		

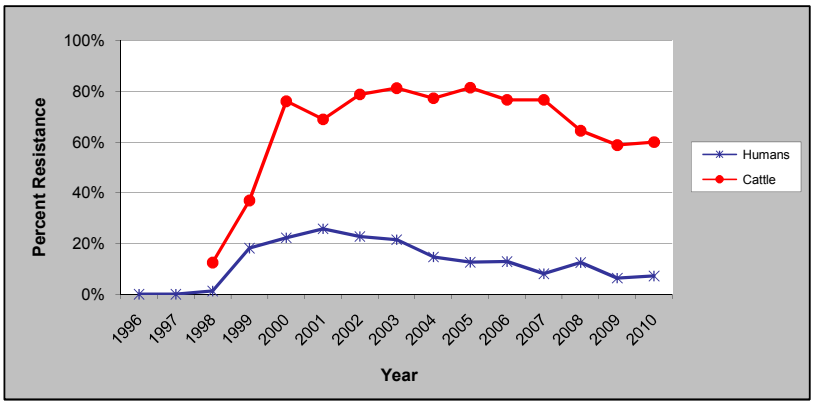
[1] Sulfamethoxazole was tested from 1996-2003 and was replaced by sulfisoxazole in 2004

Table 32d. Antimicrobial Resistance among *Salmonella* Newport Isolates from Humans, Retail Meats, and Food Animals, by Year, 1999-2010

Year			1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Number of Isolates Tested		Humans	99	121	124	241	223	191	207	217	221	255	236	305
		Chicken Breasts				2	0	0	0	0	0	0	1	0
		Ground Turkey				1	2	2	3	0	0	3	3	2
		Ground Beef				3	1	2	0	0	0	3	2	2
		Pork Chops				2	1	0	0	0	0	0	0	0
		Chickens	7	5	8	6	7	0	6	0	3	1	0	1
		Turkeys	4	6	16	10	19	7	5	4	15	8	3	5
		Cattle	54	109	87	113	75	44	27	30	30	31	17	5
		Swine	5	2	7	0	3	0	1	1	1	2	0	0
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	
		Ground Turkey				0.0% 0	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							
		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
		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	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	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	0.8% 1	0.0% 0	0.8% 2	0.4% 1	0.5% 1	0.0% 0	0.5% 1	0.0% 0	0.4% 1	0.0% 0	0.3% 1
		Chicken Breasts				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	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							
		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
		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	0.0% 0
		Cattle	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	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	19.2% 19	23.1% 28	30.6% 38	25.7% 62	24.2% 54	16.8% 32	14.5% 30	14.3% 31	10.0% 22	14.1% 36	8.1% 19	8.2% 25
		Chicken Breasts				100.0% 2							0.0% 0	
		Ground Turkey				100.0% 1	0.0% 0	0.0% 0	0.0% 0			66.7% 2	0.0% 0	0.0% 0
		Ground Beef				66.7% 2	100.0% 1	100.0% 2				66.7% 2	0.0% 0	100.0% 2
		Pork Chops				100.0% 2	100.0% 1							
		Chickens	0.0% 0	0.0% 0	37.5% 3	0.0% 0	85.7% 6		50.0% 3		0.0% 0	100.0% 1		0.0% 0
		Turkeys	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	62.5% 5	33.3% 1	0.0% 0
		Cattle	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	74.2% 23	70.6% 12	60.0% 3
		Swine	20.0% 1	50.0% 1	85.7% 6		100.0% 3		0.0% 0	0.0% 0	0.0% 0	50.0% 1		

Ceftriaxone Resistance

Figure 13. Percent of *Salmonella* Newport Isolates from Humans and Cattle Resistant to Ceftriaxone, by Year, 1996-2010 [1]



[1] Data for other sources are not included due to the small number of *Salmonella* Newport isolates. Table 32 contains resistance data for *Salmonella* Newport isolates from each source, by year

Table 33. Number of *Salmonella* Newport Isolates Tested from Humans, Retail Meats, and Food Animals, by Year, 1996-2010

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Humans	51	46	77	99	121	124	241	223	191	207	217	221	255	236	305
Chicken Breasts							2	0	0	0	0	0	0	1	0
Ground Turkey							1	2	2	3	0	0	3	3	2
Ground Beef							3	1	2	0	0	0	3	2	2
Pork Chops							2	1	0	0	0	0	0	0	0
Chickens		0	1	7	5	8	6	7	0	6	0	3	1	0	1
Turkeys		0	1	4	6	16	10	19	7	5	4	15	8	3	5
Cattle		0	8	54	109	87	113	75	44	27	30	30	31	17	5
Swine		0	1	5	2	7	0	3	0	1	1	1	2	0	0

Table 34a. Resistance Patterns among *Salmonella* Newport Isolates from Humans, Retail Meats, and Food Animals, by Year, 1999-2010

Year		1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Number of Isolates Tested	Humans	99	121	124	241	223	191	207	217	221	255	236	305
	Chicken Breasts				2	0	0	0	0	0	0	1	0
	Ground Turkey				1	2	2	3	0	0	3	3	2
	Ground Beef				3	1	2	0	0	0	3	2	2
	Pork Chops				2	1	0	0	0	0	0	0	0
	Chickens	7	5	8	6	7	0	6	0	3	1	0	1
	Turkeys	4	6	16	10	19	7	5	4	15	8	3	5
	Cattle	54	109	87	113	75	44	27	30	30	31	17	5
	Swine	5	2	7	0	3	0	1	1	1	2	0	0
Resistance Pattern	**Isolate Source**												
1. No Resistance Detected	Humans	75.8% 75	75.2% 91	65.3% 81	72.2% 174	73.5% 164	82.2% 157	84.1% 174	82.9% 180	89.1% 197	85.1% 217	89.8% 212	90.8% 277
	Chicken Breasts				0.0% 0							100.0% 1	
	Ground Turkey				0.0% 0	50.0% 1	100.0% 2	100.0% 3			0.0% 0	66.7% 2	50.0% 1
	Ground Beef				33.3% 1	0.0% 0	0.0% 0				33.3% 1	100.0% 2	0.0% 0
	Pork Chops				0.0% 0	0.0% 0							
	Chickens	100.0% 7	80.0% 4	62.5% 5	83.3% 5	14.3% 1		50.0% 3		100.0% 3	0.0% 0		100.0% 1
	Turkeys	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	12.5% 1	0.0% 0	80.0% 4
	Cattle	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	25.8% 8	29.4% 5	40.0% 2
	Swine	80.0% 4	50.0% 1	14.3% 1		0.0% 0		100.0% 1	100.0% 1	100.0% 1	50.0% 1		
2. Resistant to ≥ 3 Antimicrobial Classes	Humans	18.2% 18	23.1% 28	31.5% 39	25.3% 61	23.3% 52	16.2% 31	14.5% 30	15.2% 33	10.9% 24	13.7% 35	7.6% 18	7.5% 23
	Chicken Breasts				0.0% 0							0.0% 0	
	Ground Turkey				100.0% 1	0.0% 0	0.0% 0	0.0% 0			0.0% 0	0.0% 0	0.0% 0
	Ground Beef				66.7% 2	100.0% 1	100.0% 2				66.7% 2	0.0% 0	100.0% 2
	Pork Chops				100.0% 2	100.0% 1							
	Chickens	0.0% 0	0.0% 0	37.5% 3	0.0% 0	85.7% 6		50.0% 3		0.0% 0	100.0% 1		0.0% 0
	Turkeys	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	37.5% 3	33.3% 1	20.0% 1
	Cattle	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	74.2% 23	70.6% 12	60.0% 3
	Swine	0.0% 0	50.0% 1	85.7% 6		100.0% 3		0.0% 0	0.0% 0	0.0% 0	50.0% 1		
3. Resistant to ≥ 4 Antimicrobial Classes	Humans	18.2% 18	23.1% 28	31.5% 39	25.3% 61	22.9% 51	15.7% 30	14.0% 29	13.4% 29	9.5% 21	13.7% 35	6.8% 16	7.5% 23
	Chicken Breasts				0.0% 0							0.0% 0	
	Ground Turkey				100.0% 1	0.0% 0	0.0% 0	0.0% 0			0.0% 0	0.0% 0	0.0% 0
	Ground Beef				66.7% 2	100.0% 1	100.0% 2				66.7% 2	0.0% 0	100.0% 2
	Pork Chops				100.0% 2	100.0% 1							
	Chickens	0.0% 0	0.0% 0	37.5% 3	0.0% 0	85.7% 6		50.0% 3		0.0% 0	100.0% 1		0.0% 0
	Turkeys	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	25.0% 2	33.3% 1	20.0% 1
	Cattle	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	74.2% 23	70.6% 12	60.0% 3
	Swine	0.0% 0	50.0% 1	85.7% 6		100.0% 3		0.0% 0	0.0% 0	0.0% 0	50.0% 1		
4. Resistant to ≥ 5 Antimicrobial Classes	Humans	18.2% 18	23.1% 28	26.6% 33	23.7% 57	22.4% 50	14.7% 28	12.6% 26	12.9% 28	8.6% 19	12.9% 33	6.4% 15	7.2% 22
	Chicken Breasts				0.0% 0							0.0% 0	
	Ground Turkey				100.0% 1	0.0% 0	0.0% 0	0.0% 0			0.0% 0	0.0% 0	0.0% 0
	Ground Beef				66.7% 2	100.0% 1	100.0% 2				66.7% 2	0.0% 0	50.0% 1
	Pork Chops				100.0% 2	100.0% 1							
	Chickens	0.0% 0	0.0% 0	37.5% 3	0.0% 0	85.7% 6		50.0% 3		0.0% 0	100.0% 1		0.0% 0
	Turkeys	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	12.5% 1	33.3% 1	0.0% 0
	Cattle	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	64.5% 20	58.8% 10	60.0% 3
	Swine	0.0% 0	0.0% 0	85.7% 6		100.0% 3		0.0% 0	0.0% 0	0.0% 0	50.0% 1		

Table 34b. Resistance Patterns among *Salmonella* Newport Isolates from Humans, Retail Meats, and Food Animals, by Year, 1999-2010

Year		1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Number of Isolates Tested	Humans	99	121	124	241	223	191	207	217	221	255	236	305
	Chicken Breasts				2	0	0	0	0	0	0	1	0
	Ground Turkey				1	2	2	3	0	0	3	3	2
	Ground Beef				3	1	2	0	0	0	3	2	2
	Pork Chops				2	1	0	0	0	0	0	0	0
	Chickens	7	5	8	6	7	0	6	0	3	1	0	1
	Turkeys	4	6	16	10	19	7	5	4	15	8	3	5
	Cattle	54	109	87	113	75	44	27	30	30	31	17	5
	Swine	5	2	7	0	3	0	1	1	1	2	0	0
Resistance Pattern	**Isolate Source**												
5. At Least ACSSuT[1] Resistant	Humans	18.2% 18	23.1% 28	25.8% 32	23.7% 57	22.0% 49	14.7% 28	12.6% 26	12.0% 26	8.6% 19	11.8% 30	6.4% 15	7.2% 22
	Chicken Breasts				0.0% 0							0.0% 0	
	Ground Turkey				100.0% 1	0.0% 0	0.0% 0	0.0% 0			0.0% 0	0.0% 0	0.0% 0
	Ground Beef				66.7% 2	100.0% 1	100.0% 2				66.7% 2	0.0% 0	50.0% 1
	Pork Chops				100.0% 2	100.0% 1							
	Chickens	0.0% 0	0.0% 0	37.5% 3	0.0% 0	71.4% 5		50.0% 3		0.0% 0	100.0% 1		0.0% 0
	Turkeys	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	0.0% 0	0.0% 0	0.0% 0
	Cattle	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	64.5% 20	47.1% 8	60.0% 3
	Swine	0.0% 0	0.0% 0	85.7% 6		100.0% 3		0.0% 0	0.0% 0	0.0% 0	50.0% 1		
6. At Least ACT/S[2] Resistant	Humans	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	2.7% 7	0.4% 1	1.3% 4
	Chicken Breasts				0.0% 0							0.0% 0	
	Ground Turkey				100.0% 1	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	50.0% 1				0.0% 0	0.0% 0	0.0% 0
	Pork Chops				100.0% 2	0.0% 0							
	Chickens	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		16.7% 1		0.0% 0	100.0% 1		0.0% 0
	Turkeys	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	0.0% 0	0.0% 0	0.0% 0
	Cattle	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	12.9% 4	0.0% 0	20.0% 1
	Swine	0.0% 0	0.0% 0	0.0% 0		33.3% 1		0.0% 0	0.0% 0	0.0% 0	0.0% 0		
7. At Least ACSSuTAuCx[3] Resistant	Humans	18.2% 18	22.3% 27	25.0% 31	22.8% 55	21.1% 47	14.7% 28	12.6% 26	10.6% 23	8.1% 18	11.8% 30	6.4% 15	7.2% 22
	Chicken Breasts				0.0% 0							0.0% 0	
	Ground Turkey				100.0% 1	0.0% 0	0.0% 0	0.0% 0			0.0% 0	0.0% 0	0.0% 0
	Ground Beef				66.7% 2	100.0% 1	100.0% 2				66.7% 2	0.0% 0	50.0% 1
	Pork Chops				100.0% 2	100.0% 1							
	Chickens	0.0% 0	0.0% 0	37.5% 3	0.0% 0	71.4% 5		50.0% 3		0.0% 0	100.0% 1		0.0% 0
	Turkeys	0.0% 0	0.0% 0	12.5% 2	0.0% 0	5.2% 1	14.3% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
	Cattle	35.2% 19	69.7% 76	66.7% 58	70.8% 80	66.7% 52	72.7% 32	81.5% 22	63.3% 19	70.0% 21	64.5% 20	47.1% 8	60.0% 3
	Swine	0.0% 0	0.0% 0	85.7% 6		100.0% 3		0.0% 0	0.0% 0	0.0% 0	50.0% 1		
8. At Least Ceftriaxone and Nalidixic Acid Resistant	Humans	0.0% 0	0.0% 0	0.0% 0	0.4% 1	0.0% 0	0.5% 1	0.0% 0	0.5% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0
	Chicken Breasts				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	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							
	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
	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	0.0% 0
	Cattle	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	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] ACSSuTAuCx = ACSSuT, amoxicillin-clavulanic acid, and ceftriaxone

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

Table 35a. Antimicrobial Resistance among *Salmonella* I 4,[5],12:i:- Isolates from Humans, Retail Meats, and Food Animals, by Year, 1999-2010

Year			1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Number of Isolates Tested		Humans	8	13	14	35	37	36	33	105	73	84	72	77
		Chicken Breasts				5	2	4	9	9	2	4	8	2
		Ground Turkey				2	0	0	0	2	0	0	0	0
		Ground Beef				0	0	0	0	0	2	0	0	0
		Pork Chops				0	0	0	0	0	0	0	0	0
		Chickens	N/A	N/A	N/A	N/A	N/A	44	102	79	49	29	21	17
		Turkeys	N/A	N/A	N/A	N/A	N/A	1	2	1	1	0	0	0
		Cattle	N/A	N/A	N/A	N/A	N/A	4	2	3	6	1	1	0
		Swine	N/A	N/A	N/A	N/A	N/A	0	1	2	1	1	1	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	0.0% 0
		Chicken Breasts				0.0% 0	0.0% 0	0.0% 0	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	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	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
	Gentamicin (MIC ≥ 16 µg/ml)	Humans	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	3.6% 3	2.8% 2	1.3% 1
		Chicken Breasts				0.0% 0	0.0% 0	0.0% 0	11.1% 1	22.2% 2	50.0% 1	0.0% 0	12.5% 1	0.0% 0
		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	6.9% 2	4.8% 1	23.5% 4
		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	0.0% 0	0.0% 0	
		Swine							0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	100.0% 1
	Kanamycin (MIC ≥ 64 µg/ml)	Humans	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	1.2% 1	0.0% 0	1.3% 1
		Chicken Breasts				0.0% 0	0.0% 0	0.0% 0	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	0.0% 0	0.0% 0	11.8% 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	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
	Streptomycin (MIC ≥ 64 µg/ml)	Humans	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	10.7% 9	12.5% 9	19.5% 15
		Chicken Breasts				0.0% 0	0.0% 0	0.0% 0	11.1% 1	22.2% 2	0.0% 0	0.0% 0	12.5% 1	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	10.3% 3	9.5% 2	11.8% 2
		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	0.0% 0	0.0% 0	
		Swine							100.0% 1	0.0% 0	0.0% 0	100.0% 1	0.0% 0	100.0% 1

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

Table 35b. Antimicrobial Resistance among *Salmonella* I 4,[5],12:i:- Isolates from Humans, Retail Meats, and Food Animals, by Year, 1999-2010

Year			1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Number of Isolates Tested		Humans	8	13	14	35	37	36	33	105	73	84	72	77
		Chicken Breasts				5	2	4	9	9	2	4	8	2
		Ground Turkey				2	0	0	0	2	0	0	0	0
		Ground Beef				0	0	0	0	0	2	0	0	0
		Pork Chops				0	0	0	0	0	0	0	0	0
		Chickens	N/A	N/A	N/A	N/A	N/A	44	102	79	49	29	21	17
		Turkeys	N/A	N/A	N/A	N/A	N/A	1	2	1	1	0	0	0
		Cattle	N/A	N/A	N/A	N/A	N/A	4	2	3	6	1	1	0
		Swine	N/A	N/A	N/A	N/A	N/A	0	1	2	1	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	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	4.8% 4	4.2% 3	3.9% 3
		Chicken Breasts				0.0% 0	0.0% 0	0.0% 0	0.0% 0	11.1% 1	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	5.9% 6	16.5% 13	16.3% 8	3.4% 1	9.5% 2	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	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
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	4.8% 4	2.8% 2	2.6% 2
		Chicken Breasts				0.0% 0	0.0% 0	0.0% 0	0.0% 0	11.1% 1	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	5.9% 6	16.5% 13	16.3% 8	3.4% 1	4.8% 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	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
	Ceftiofur (MIC ≥ 8 µg/ml)	Humans	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	4.8% 4	2.8% 2	2.6% 2
		Chicken Breasts				0.0% 0	0.0% 0	0.0% 0	0.0% 0	11.1% 1	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	5.9% 6	16.5% 13	16.3% 8	3.4% 1	9.5% 2	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	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
	Ceftriaxone (MIC ≥ 4 µg/ml)	Humans	0.0% 0	0.0% 0	0.0% 0	2.9% 1	5.4% 2	2.8% 1	3.0% 1	3.8% 4	2.7% 2	4.8% 4	2.8% 2	2.6% 2
		Chicken Breasts				0.0% 0	0.0% 0	0.0% 0	0.0% 0	11.1% 1	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	5.9% 6	16.5% 13	16.3% 8	3.4% 1	9.5% 2	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	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

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

Table 35c. Antimicrobial Resistance among *Salmonella* I 4,[5],12:i:- Isolates from Humans, Retail Meats, and Food Animals, by Year, 1999-2010

Year			1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Number of Isolates Tested		Humans	8	13	14	35	37	36	33	105	73	84	72	77
		Chicken Breasts				5	2	4	9	9	2	4	8	2
		Ground Turkey				2	0	0	0	2	0	0	0	0
		Ground Beef				0	0	0	0	0	2	0	0	0
		Pork Chops				0	0	0	0	0	0	0	0	0
		Chickens	N/A	N/A	N/A	N/A	N/A	44	102	79	49	29	21	17
		Turkeys	N/A	N/A	N/A	N/A	N/A	1	2	1	1	0	0	0
		Cattle	N/A	N/A	N/A	N/A	N/A	4	2	3	6	1	1	0
		Swine	N/A	N/A	N/A	N/A	N/A	0	1	2	1	1	1	1
Antimicrobial Class	**Antimicrobial (Resistance Breakpoint)**	**Isolate Source**												
Folate Pathway Inhibitors	Sulfamethoxazole/ Sulfisoxazole [2] (MIC ≥ 512 µg/ml)	Humans	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	13.1% 11	13.9% 10	19.5% 15
		Chicken Breasts				0.0% 0	0.0% 0	0.0% 0	11.1% 1	22.2% 2	50.0% 1	0.0% 0	25.0% 2	0.0% 0
		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	6.9% 2	9.5% 2	29.4% 5
		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	0.0% 0	0.0% 0	
		Swine							100.0% 1	50.0% 1	0.0% 0	100.0% 1	0.0% 0	100.0% 1
	Trimethoprim-Sulfamethoxazole (MIC ≥ 4 / 76 µg/ml)	Humans	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	4.8% 4	1.4% 1	1.3% 1
		Chicken Breasts				0.0% 0	0.0% 0	0.0% 0	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	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	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
Penicillins	Ampicillin (MIC ≥ 32 µg/ml)	Humans	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	9.5% 8	11.1% 8	22.1% 17
		Chicken Breasts				0.0% 0	0.0% 0	0.0% 0	0.0% 0	11.1% 1	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						6.8% 3	8.8% 9	17.7% 14	20.4% 10	6.9% 2	9.5% 2	5.9% 1
		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	0.0% 0	0.0% 0	
		Swine							100.0% 1	50.0% 1	0.0% 0	100.0% 1	0.0% 0	0.0% 0
Phenicols	Chloramphenicol (MIC ≥ 32 µg/ml)	Humans	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	6.0% 5	8.3% 6	1.3% 1
		Chicken Breasts				0.0% 0	0.0% 0	0.0% 0	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	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	0.0% 0	0.0% 0	
		Swine							0.0% 0	50.0% 1	0.0% 0	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

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

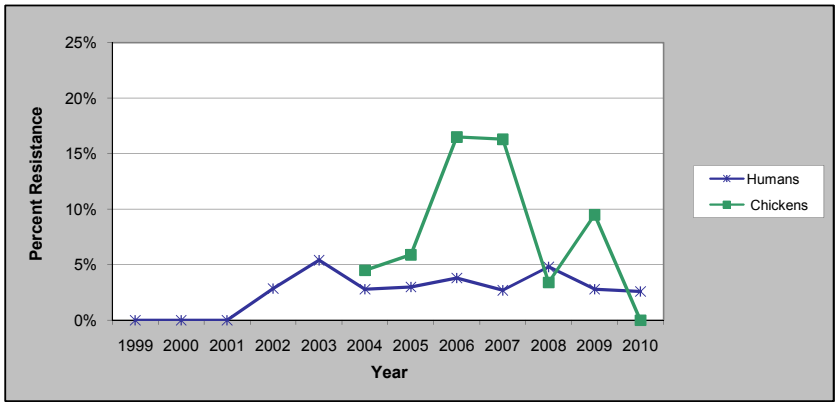
Table 35d. Antimicrobial Resistance among *Salmonella* I 4,[5],12:i:- Isolates from Humans, Retail Meats, and Food Animals, by Year, 1999-2010

Year			1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Number of Isolates Tested		Humans	8	13	14	35	37	36	33	105	73	84	72	77
		Chicken Breasts				5	2	4	9	9	2	4	8	2
		Ground Turkey				2	0	0	0	2	0	0	0	0
		Ground Beef				0	0	0	0	0	2	0	0	0
		Pork Chops				0	0	0	0	0	0	0	0	0
		Chickens	N/A	N/A	N/A	N/A	N/A	44	102	79	49	29	21	17
		Turkeys	N/A	N/A	N/A	N/A	N/A	1	2	1	1	0	0	0
		Cattle	N/A	N/A	N/A	N/A	N/A	4	2	3	6	1	1	0
		Swine	N/A	N/A	N/A	N/A	N/A	0	1	2	1	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	1.3% 1
		Chicken Breasts				0.0% 0	0.0% 0	0.0% 0	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	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	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
	Nalidixic Acid (MIC ≥ 32 µg/ml)	Humans	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	1.2% 1	0.0% 0	2.6% 2
		Chicken Breasts				0.0% 0	0.0% 0	0.0% 0	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	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	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
Tetracyclines	Tetracycline (MIC ≥ 16 µg/ml)	Humans	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	16.7% 14	16.7% 12	28.6% 22
		Chicken Breasts				0.0% 0	0.0% 0	0.0% 0	11.1% 1	11.1% 1	0.0% 0	0.0% 0	25.0% 2	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	3.4% 1	9.5% 2	11.8% 2
		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	0.0% 0	0.0% 0	
		Swine							100.0% 1	50.0% 1	0.0% 0	100.0% 1	0.0% 0	100.0% 1

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

Ceftriaxone Resistance

Figure 14. Percent of *Salmonella* I 4,[5],12:i:- Isolates from Humans and Chickens Resistant to Ceftriaxone, by Year, 1999-2010 [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 35 contains all resistance data available for *Salmonella* I 4,[5],12:i:- isolates

Table 36. Number of *Salmonella* I 4,[5],12:i:- Isolates Tested from Humans, Retail Meats, and Food Animals, by Year, 1996-2010

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Humans	3	3	0	8	13	14	35	37	36	33	105	73	84	72	77
Chicken Breasts							5	2	4	9	9	2	4	8	2
Ground Turkey							2	0	0	0	2	0	0	0	0
Ground Beef							0	0	0	0	0	2	0	0	0
Pork Chops							0	0	0	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	29	21	17
Turkeys		N/A	N/A	N/A	N/A	N/A	N/A	N/A	1	2	1	1	0	0	0
Cattle		N/A	N/A	N/A	N/A	N/A	N/A	N/A	4	2	3	6	1	1	0
Swine		N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	1	2	1	1	1	1

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

Table 37a. Resistance Patterns among *Salmonella* I 4,[5],12:i:- Isolates from Humans, Retail Meats, and Food Animals, by Year, 1999-2010

Year		1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Number of Isolates Tested	Humans	8	13	14	35	37	36	33	105	73	84	72	77
	Chicken Breasts				5	2	4	9	9	2	4	8	2
	Ground Turkey				2	0	0	0	2	0	0	0	0
	Ground Beef				0	0	0	0	0	2	0	0	0
	Pork Chops				0	0	0	0	0	0	0	0	0
	Chickens	N/A	N/A	N/A	N/A	N/A	44	102	79	49	29	21	17
	Turkeys	N/A	N/A	N/A	N/A	N/A	1	2	1	1	0	0	0
	Cattle	N/A	N/A	N/A	N/A	N/A	4	2	3	6	1	1	0
	Swine	N/A	N/A	N/A	N/A	N/A	0	1	2	1	1	1	1
Resistance Pattern	**Isolate Source**												
1. No Resistance Detected	Humans	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	76.2% 64	76.4% 55	66.2% 51
	Chicken Breasts				100.0% 5	100.0% 2	100.0% 4	88.9% 8	55.6% 5	50.0% 1	100.0% 4	75.0% 6	100.0% 2
	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	82.8% 24	76.2% 16	70.6% 12
	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	100.0% 1	100.0% 1	
	Swine							0.0% 0	50.0% 1	100.0% 1	0.0% 0	100.0% 1	0.0% 0
2. Resistant to ≥ 3 Antimicrobial Classes	Humans	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	10.7% 9	12.5% 9	22.1% 17
	Chicken Breasts				0.0% 0	0.0% 0	0.0% 0	11.1% 1	22.2% 2	0.0% 0	0.0% 0	12.5% 1	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	6.9% 2	9.5% 2	11.8% 2
	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	0.0% 0	0.0% 0	
	Swine							100.0% 1	50.0% 1	0.0% 0	100.0% 1	0.0% 0	100.0% 1
3. Resistant to ≥ 4 Antimicrobial Classes	Humans	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	7.1% 6	9.7% 7	19.5% 15
	Chicken Breasts				0.0% 0	0.0% 0	0.0% 0	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	0.0% 0	4.8% 1	5.9% 1
	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	0.0% 0	0.0% 0	
	Swine							100.0% 1	50.0% 1	0.0% 0	100.0% 1	0.0% 0	100.0% 1
4. Resistant to ≥ 5 Antimicrobial Classes	Humans	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	4.8% 4	6.9% 5	3.9% 3
	Chicken Breasts				0.0% 0	0.0% 0	0.0% 0	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	0.0% 0	4.8% 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	0.0% 0	0.0% 0	
	Swine							0.0% 0	0.0% 0	0.0% 0	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 37b. Resistance Patterns among *Salmonella* I 4,[5],12:i:- Isolates from Humans, Retail Meats, and Food Animals, by Year, 1999-2010

Year		1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Number of Isolates Tested	Humans	8	13	14	35	37	36	33	105	73	84	72	77
	Chicken Breasts				5	2	4	9	9	2	4	8	2
	Ground Turkey				2	0	0	0	2	0	0	0	0
	Ground Beef				0	0	0	0	0	2	0	0	0
	Pork Chops				0	0	0	0	0	0	0	0	0
	Chickens	N/A	N/A	N/A	N/A	N/A	44	102	79	49	29	21	17
	Turkeys	N/A	N/A	N/A	N/A	N/A	1	2	1	1	0	0	0
	Cattle	N/A	N/A	N/A	N/A	N/A	4	2	3	6	1	1	0
	Swine	N/A	N/A	N/A	N/A	N/A	0	1	2	1	1	1	1
Resistance Pattern	**Isolate Source**												
5. At Least ACSSuT[2] Resistant	Humans	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	3.6% 3	6.9% 5	1.3% 1
	Chicken Breasts				0.0% 0	0.0% 0	0.0% 0	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	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	0.0% 0	0.0% 0	
	Swine							0.0% 0	0.0% 0	0.0% 0	100.0% 1	0.0% 0	0.0% 0
6. At Least ACT/S[3] Resistant	Humans	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	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	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	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	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
7. At Least ACSSuTAuCx[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	2.4% 2	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	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	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	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
8. At Least Ceftriaxone and Nalidixic Acid Resistant	Humans	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
	Chicken Breasts				0.0% 0	0.0% 0	0.0% 0	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	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	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

[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] ACSSuTAuCx = ACSSuT, amoxicillin-clavulanic acid, and ceftriaxone

I. Antimicrobial Susceptibility among *Salmonella* serotype Heidelberg

Table 38a. Antimicrobial Resistance among *Salmonella* Heidelberg Isolates from Humans, Retail Meats, and Food Animals, by Year, 1999-2010

Year			1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Number of Isolates Tested		Humans	88	79	102	105	96	92	125	102	98	75	86	62
		Chicken Breasts				11	16	31	22	30	14	30	44	21
		Ground Turkey				21	32	37	53	35	41	57	10	17
		Ground Beef				0	0	0	0	0	0	1	0	0
		Pork Chops				3	0	3	0	4	0	0	1	0
		Chickens	297	259	329	403	226	167	283	164	142	94	74	25
		Turkeys	139	125	142	60	57	46	25	43	23	8	3	14
		Cattle	28	6	10	8	9	1	6	4	0	3	0	2
		Swine	33	22	16	11	11	4	8	13	2	1	4	5
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	0.0% 0
		Chicken Breasts				0.0% 0	0.0% 0	0.0% 0	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	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	
		Chickens	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		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	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	0.0% 0
	Gentamicin (MIC ≥ 16)	Humans	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	14.7% 11	2.3% 2	8.1% 5
		Chicken Breasts				45.5% 5	18.8% 3	9.7% 3	13.6% 3	20.0% 6	7.1% 1	26.7% 8	2.3% 1	4.8% 1
		Ground Turkey				23.8% 5	12.5% 4	35.1% 13	37.7% 20	31.4% 11	24.4% 10	57.9% 33	70.0% 7	29.4% 5
		Ground Beef										100.0% 1		
		Pork Chops				100.0% 3		0.0% 0		75.0% 3			0.0% 0	
		Chickens	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	10.6% 10	23.0% 17	28.0% 7
		Turkeys	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	50.0% 4	33.3% 1	21.4% 3
		Cattle	39.3% 11	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0		33.3% 1		50.0% 1
		Swine	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	100.0% 1	0.0% 0	0.0% 0
	Kanamycin (MIC ≥ 64)	Humans	9.1% 8	15.2% 12	19.6% 20	10.5% 11	8.3% 8	8.7% 8	12.8% 16	8.8% 9	11.2% 11	26.7% 20	20.9% 18	22.6% 14
		Chicken Breasts				36.4% 4	0.0% 0	0.0% 0	0.0% 0	0.0% 0	7.1% 1	10.0% 3	15.9% 7	19.0% 4
		Ground Turkey				38.1% 8	34.4% 11	27.0% 10	30.2% 16	34.3% 12	56.1% 23	52.6% 30	20.0% 2	76.5% 13
		Ground Beef										100.0% 1		
		Pork Chops				0.0% 0		33.3% 1		0.0% 0			100.0% 1	
		Chickens	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	8.5% 8	12.2% 9	32.0% 8
		Turkeys	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	50.0% 4	66.7% 2	64.3% 9
		Cattle	42.9% 12	16.7% 1	10.0% 1	37.5% 3	55.6% 5	100.0% 1	50.0% 3	0.0% 0		33.3% 1		50.0% 1
		Swine	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	100.0% 1	50.0% 2	60.0% 3
	Streptomycin (MIC ≥ 64)	Humans	23.9% 21	22.8% 18	25.5% 26	17.1% 18	12.5% 12	15.2% 14	13.6% 17	11.8% 12	12.2% 12	30.7% 23	23.3% 20	27.4% 17
		Chicken Breasts				63.6% 7	12.5% 2	22.6% 7	18.2% 4	23.3% 7	21.4% 3	40.0% 12	13.6% 6	14.3% 3
		Ground Turkey				57.1% 12	37.5% 12	43.2% 16	47.2% 25	45.7% 16	39.0% 16	71.9% 41	60.0% 6	94.1% 16
		Ground Beef										100.0% 1		
		Pork Chops				100.0% 3		33.3% 1		0.0% 0			100.0% 1	
		Chickens	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	16.0% 15	27.0% 20	44.0% 11
		Turkeys	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	37.5% 3	66.7% 2	57.1% 8
		Cattle	57.1% 16	16.7% 1	20.0% 2	37.5% 3	55.6% 5	100.0% 1	50.0% 3	0.0% 0		33.3% 1		50.0% 1
		Swine	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	100.0% 1	50.0% 2	80.0% 4

Table 38b. Antimicrobial Resistance among *Salmonella* Heidelberg Isolates from Humans, Retail Meats, and Food Animals, by Year, 1999-2010

Year			1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Number of Isolates Tested		Humans	88	79	102	105	96	92	125	102	98	75	86	62
		Chicken Breasts				11	16	31	22	30	14	30	44	21
		Ground Turkey				21	32	37	53	35	41	57	10	17
		Ground Beef				0	0	0	0	0	0	1	0	0
		Pork Chops				3	0	3	0	4	0	0	1	0
		Chickens	297	259	329	403	226	167	283	164	142	94	74	25
		Turkeys	139	125	142	60	57	46	25	43	23	8	3	14
		Cattle	28	6	10	8	9	1	6	4	0	3	0	2
		Swine	33	22	16	11	11	4	8	13	2	1	4	5
Antimicrobial Class	**Antimicrobial (Resistance Breakpoint)**	**Isolate Source**												
β-Lactam/β-Lactamase Inhibitor Combinations	Amoxicillin-Clavulanic Acid (MIC ≥ 32 / 16 µg/ml)	Humans	1.1% 1	3.8% 3	2.9% 3	9.5% 10	5.2% 5	9.8% 9	8.8% 11	9.8% 10	7.1% 7	8.0% 6	20.9% 18	24.2% 15
		Chicken Breasts				0.0% 0	6.3% 1	9.7% 3	13.6% 3	10.0% 3	21.4% 3	16.7% 5	31.8% 14	23.8% 5
		Ground Turkey				19.0% 4	9.4% 3	5.4% 2	9.4% 5	17.1% 6	9.8% 4	7.0% 4	10.0% 1	23.5% 4
		Ground Beef										0.0% 0		
		Pork Chops				0.0% 0		0.0% 0		0.0% 0			100.0% 1	
		Chickens	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	8.5% 8	17.6% 13	32.0% 8
		Turkeys	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	12.5% 1	33.3% 1	35.7% 5
		Cattle	42.9% 12	0.0% 0	0.0% 0	50.0% 4	55.6% 5	100.0% 1	83.3% 5	0.0% 0		33.3% 1		50.0% 1
		Swine	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	0.0% 0	0.0% 0	20.0% 1
Cephems	Cefoxitin (MIC ≥ 32 µg/ml)	Humans		2.5% 2	2.9% 3	8.6% 9	5.2% 5	7.6% 7	8.8% 11	8.8% 9	7.1% 7	8.0% 6	19.8% 17	24.2% 15
		Chicken Breasts				0.0% 0	6.3% 1	9.7% 3	9.1% 2	10.0% 3	21.4% 3	16.7% 5	31.8% 14	19.0% 4
		Ground Turkey				19.0% 4	0.0% 0	5.4% 2	9.4% 5	17.1% 6	9.8% 4	3.5% 2	10.0% 1	23.5% 4
		Ground Beef										0.0% 0		
		Pork Chops				0.0% 0		0.0% 0		0.0% 0			100.0% 1	
		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	8.5% 8	17.6% 13	32.0% 8
		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	12.5% 1	33.3% 1	35.7% 5
		Cattle		0.0% 0	0.0% 0	37.5% 3	44.4% 4	100.0% 1	66.7% 4	0.0% 0		33.3% 1		50.0% 1
		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	0.0% 0	0.0% 0	0.0% 0
	Ceftiofur (MIC ≥ 8 µg/ml)	Humans	0.0% 0	3.8% 3	2.9% 3	7.6% 8	5.2% 5	8.7% 8	8.8% 11	9.8% 10	7.1% 7	8.0% 6	20.9% 18	24.2% 15
		Chicken Breasts				0.0% 0	6.3% 1	9.7% 3	9.1% 2	10.0% 3	21.4% 3	16.7% 5	31.8% 14	23.8% 5
		Ground Turkey				19.0% 4	0.0% 0	5.4% 2	9.4% 5	17.1% 6	9.8% 4	3.5% 2	10.0% 1	23.5% 4
		Ground Beef										0.0% 0		
		Pork Chops				0.0% 0		0.0% 0		0.0% 0			100.0% 1	
		Chickens	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	8.5% 8	17.6% 13	32.8% 8
		Turkeys	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	12.5% 1	33.3% 1	35.7% 5
		Cattle	42.9% 12	0.0% 0	0.0% 0	37.5% 3	55.6% 5	100.0% 1	83.3% 5	0.0% 0		33.3% 1		50.0% 1
		Swine	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	0.0% 0	0.0% 0	0.0% 0
	Ceftriaxone (MIC ≥ 4 µg/ml)	Humans	0.0% 0	3.8% 3	2.9% 3	7.6% 8	5.2% 5	8.7% 8	8.8% 11	9.8% 10	7.1% 7	8.0% 6	20.9% 18	24.2% 15
		Chicken Breasts				0.0% 0	6.3% 1	9.7% 3	9.1% 2	10.0% 3	21.4% 3	16.7% 5	31.8% 14	23.8% 5
		Ground Turkey				19.1% 4	0.0% 0	5.4% 2	9.4% 5	17.1% 6	9.8% 4	3.5% 2	10.0% 1	23.5% 4
		Ground Beef										0.0% 0		
		Pork Chops				0.0% 0		0.0% 0		0.0% 0			100.0% 1	
		Chickens	1.3% 4	13.5% 35	5.8% 19	8.9% 36	9.3% 21	10.2% 17	21.9% 62	15.9% 26	17.6% 25	8.5% 8	17.6% 13	32.0% 8
		Turkeys	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	12.5% 1	33.3% 1	35.7% 5
		Cattle	42.9% 12	0.0% 0	0.0% 0	37.5% 3	55.6% 5	100.0% 1	83.3% 5	0.0% 0		33.3% 1		50.0% 1
		Swine	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	0.0% 0	0.0% 0	0.0% 0

Table 38c. Antimicrobial Resistance among *Salmonella* Heidelberg Isolates from Humans, Retail Meats, and Food Animals, by Year, 1999-2010

Year			1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Number of Isolates Tested		Humans	88	79	102	105	96	92	125	102	98	75	86	62
		Chicken Breasts				11	16	31	22	30	14	30	44	21
		Ground Turkey				21	32	37	53	35	41	57	10	17
		Ground Beef				0	0	0	0	0	0	1	0	0
		Pork Chops				3	0	3	0	4	0	0	1	0
		Chickens	297	259	329	403	226	167	283	164	142	94	74	25
		Turkeys	139	125	142	60	57	46	25	43	23	8	3	14
		Cattle	28	6	10	8	9	1	6	4	0	3	0	2
		Swine	33	22	16	11	11	4	8	13	2	1	4	5
Antimicrobial Class	**Antimicrobial (Resistance Breakpoint)**	**Isolate Source**												
Folate Pathway Inhibitors	Sulfamethoxazole/ Sulfisoxazole [1] (MIC ≥ 512 µg/ml)	Humans	18.2% 16	11.4% 9	8.8% 9	6.7% 7	7.3% 7	7.6% 7	8.0% 10	4.9% 5	18.4% 18	12.0% 9	7.0% 6	11.3% 7
		Chicken Breasts				45.5% 5	12.5% 2	12.9% 4	13.6% 3	26.7% 8	7.1% 1	26.7% 8	2.3% 1	14.3% 3
		Ground Turkey				28.6% 6	15.6% 5	37.8% 14	35.8% 19	37.1% 13	26.8% 11	29.8% 17	50.0% 5	35.3% 6
		Ground Beef										100.0% 1		
		Pork Chops				100.0% 3		0.0% 0		100.0% 4			100.0% 1	
		Chickens	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	12.8% 12	21.6% 16	36.0% 9
		Turkeys	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	37.5% 3	0.0% 0	28.6% 4
		Cattle	57.1% 16	0.0% 0	10.0% 1	12.5% 1	44.4% 4	100.0% 1	50.0% 3	0.0% 0		33.3% 1		50.0% 1
		Swine	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	100.0% 1	0.0% 0	0.0% 0
	Trimethoprim-Sulfamethoxazole (MIC ≥ 4 / 76 µg/ml)	Humans	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	2.7% 2	3.5% 3	0.0% 0
		Chicken Breasts				0.0% 0	0.0% 0	0.0% 0	0.0% 0	6.7% 2	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	0.0% 0	0.0% 0	0.0% 0
		Ground Beef										0.0% 0		
		Pork Chops				0.0% 0		0.0% 0		100.0% 4			100.0% 1	
		Chickens	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	0.0% 0	0.0% 0	0.0% 0
		Turkeys	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	0.0% 0	0.0% 0	0.0% 0
		Cattle	42.9% 12	0.0% 0	10.0% 1	0.0% 0	55.6% 5	100.0% 1	50.0% 3	0.0% 0		0.0% 0		0.0% 0
		Swine	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	0.0% 0	0.0% 0	0.0% 0
Penicillins	Ampicillin (MIC ≥ 32 µg/ml)	Humans	6.8% 6	10.1% 8	9.8% 10	12.4% 13	10.4% 10	25.0% 23	20.0% 25	18.6% 19	18.4% 18	28.0% 21	27.9% 24	38.7% 24
		Chicken Breasts				18.2% 2	18.8% 3	25.8% 8	27.3% 6	16.7% 5	21.4% 3	23.3% 7	31.8% 14	23.8% 5
		Ground Turkey				19.0% 4	9.4% 3	13.5% 5	18.9% 10	31.4% 11	53.7% 22	82.5% 47	80.0% 8	70.6% 12
		Ground Beef										0.0% 0		
		Pork Chops				0.0% 0		0.0% 0		0.0% 0			100.0% 1	
		Chickens	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	13.8% 13	20.3% 15	40.0% 10
		Turkeys	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	50.0% 4	66.7% 2	57.1% 8
		Cattle	50.0% 14	0.0% 0	0.0% 0	50.0% 4	55.6% 5	100.0% 1	83.3% 5	0.0% 0		66.7% 2		50.0% 1
		Swine	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	100.0% 1	0.0% 0	20.0% 1
Phenicols	Chloramphenicol (MIC ≥ 32 µg/ml)	Humans	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	1.3% 1	4.7% 4	1.6% 1
		Chicken Breasts				0.0% 0	0.0% 0	3.2% 1	0.0% 0	0.0% 0	7.1% 1	3.3% 1	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	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	
		Chickens	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	4.3% 4	5.4% 4	20.0% 5
		Turkeys	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	12.5% 1	0.0% 0	0.0% 0
		Cattle	42.9% 12	0.0% 0	10.0% 1	25.0% 2	44.4% 4	100.0% 1	50.0% 3	0.0% 0		0.0% 0		0.0% 0
		Swine	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	100.0% 1	0.0% 0	0.0% 0

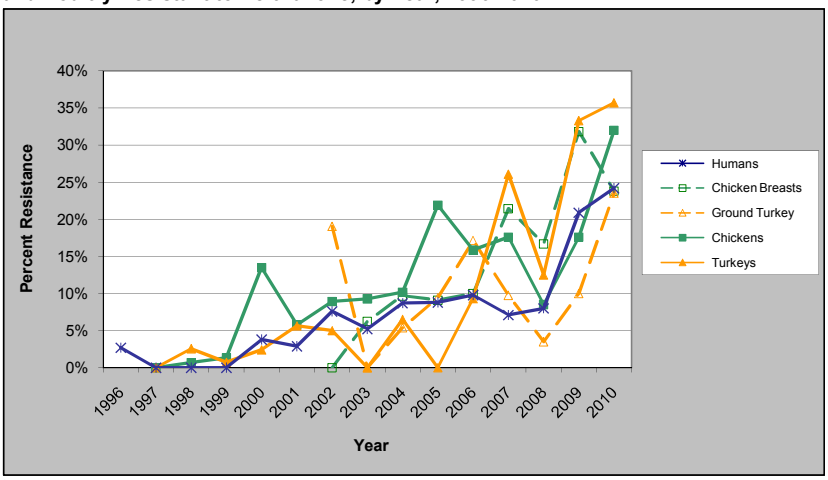
[1] Sulfamethoxazole was tested from 1996-2003 and was replaced by sulfisoxazole in 2004

Table 38d. Antimicrobial Resistance among *Salmonella* Heidelberg Isolates from Humans, Retail Meats, and Food Animals, by Year, 1999-2010

Year			1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Number of Isolates Tested		Humans	88	79	102	105	96	92	125	102	98	75	86	62
		Chicken Breasts				11	16	31	22	30	14	30	44	21
		Ground Turkey				21	32	37	53	35	41	57	10	17
		Ground Beef				0	0	0	0	0	0	1	0	0
		Pork Chops				3	0	3	0	4	0	0	1	0
		Chickens	297	259	329	403	226	167	283	164	142	94	74	25
		Turkeys	139	125	142	60	57	46	25	43	23	8	3	14
		Cattle	28	6	10	8	9	1	6	4	0	3	0	2
		Swine	33	22	16	11	11	4	8	13	2	1	4	5
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	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	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	
		Chickens	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		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	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	0.0% 0
	Nalidixic Acid (MIC ≥ 32 µg/ml)	Humans	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	0.0% 0	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	0.0% 0	0.0% 0	0.0% 0
		Ground Turkey				4.8% 1	0.0% 0	0.0% 0	1.9% 1	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	
		Chickens	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	0.0% 0	0.0% 0	0.0% 0
		Turkeys	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	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	0.0% 0
Tetracyclines	Tetracycline (MIC ≥ 16 µg/ml)	Humans	18.2% 16	21.5% 17	24.5% 25	19.0% 20	16.7% 16	19.6% 18	18.4% 23	13.7% 14	22.4% 22	36.0% 27	27.9% 24	24.2% 15
		Chicken Breasts				45.5% 5	0.0% 0	6.5% 2	4.5% 1	3.3% 1	7.1% 1	26.7% 8	15.9% 7	14.3% 3
		Ground Turkey				57.1% 12	43.8% 14	70.3% 26	56.6% 30	68.6% 24	70.7% 29	79.0% 45	60.0% 6	82.4% 14
		Ground Beef										100.0% 1		
		Pork Chops				66.7% 2		100.0% 3		0.0% 0			100.0% 1	
		Chickens	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	13.8% 13	14.9% 11	32.0% 8
		Turkeys	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	87.5% 7	66.7% 2	100.0% 14
		Cattle	60.7% 17	33.3% 2	40.0% 4	62.5% 5	55.6% 5	100.0% 1	66.7% 4	0.0% 0		33.3% 1		50.0% 1
		Swine	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	100.0% 1	100.0% 4	80.0% 4

Ceftriaxone Resistance

Figure 15. Percent of *Salmonella* Heidelberg Isolates from Humans, Retail Poultry, and Poultry Resistant to Ceftriaxone, by Year, 1996-2010[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 38 contains resistance data for *Salmonella* Heidelberg isolates from each source, by year

Table 39. Number of *Salmonella* Heidelberg Isolates Tested from Humans, Food Animals, and Retail Meats, by Year, 1996-2010

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Humans	74	75	101	88	79	102	105	96	92	125	102	98	75	86	62
Chicken Breasts							11	16	31	22	30	14	30	44	21
Ground Turkey							21	32	37	53	35	41	57	10	17
Ground Beef							0	0	0	0	0	0	1	0	0
Pork Chops							3	0	3	0	4	0	0	1	0
Chickens		51	143	297	259	329	403	226	167	283	164	142	94	74	25
Turkeys		14	39	139	125	142	60	57	46	25	43	23	8	3	14
Cattle		1	11	28	6	10	8	9	1	6	4	0	3	0	2
Swine		7	37	33	22	16	11	11	4	8	13	2	1	4	5

Table 40a. Resistance Patterns among *Salmonella* Heidelberg Isolates from Humans, Retail Meats, and Food Animals, by Year, 1999-2010

Year		1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Number of Isolates Tested	Humans	88	79	102	105	96	92	125	102	98	75	86	62
	Chicken Breasts				11	16	31	22	30	14	30	44	21
	Ground Turkey				21	32	37	53	35	41	57	10	17
	Ground Beef				0	0	0	0	0	0	1	0	0
	Pork Chops				3	0	3	0	4	0	0	1	0
	Chickens	297	259	329	403	226	167	283	164	142	94	74	25
	Turkeys	139	125	142	60	57	46	25	43	23	8	3	14
	Cattle	28	6	10	8	9	1	6	4	0	3	0	2
	Swine	33	22	16	11	11	4	8	13	2	1	4	5
Resistance Pattern	**Isolate Source**												
1. No Resistance Detected	Humans	68.2% 60	63.3% 50	64.7% 66	67.6% 71	68.8% 66	56.5% 52	62.4% 78	67.6% 69	58.2% 57	57.3% 43	60.5% 52	51.6% 32
	Chicken Breasts				27.3% 3	62.5% 10	58.1% 18	54.5% 12	50.0% 15	50.0% 7	50.0% 15	61.4% 27	61.9% 13
	Ground Turkey				33.3% 7	50.0% 16	16.2% 6	20.8% 11	8.6% 3	9.8% 4	1.8% 1	10.0% 1	0.0% 0
	Ground Beef										0.0% 0		
	Pork Chops				0.0% 0		0.0% 0		0.0% 0			0.0% 0	
	Chickens	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	70.2% 66	55.4% 41	36.0% 9
	Turkeys	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	0.0% 0	33.3% 1	0.0% 0
	Cattle	25.0% 7	66.7% 4	60.0% 6	12.5% 1	44.4% 4	0.0% 0	0.0% 0	100.0% 4		33.3% 1		50.0% 1
	Swine	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	0.0% 0	0.0% 0	0.0% 0
2. Resistant to ≥ 3 Antimicrobial Classes	Humans	10.2% 9	7.6% 6	7.8% 8	12.4% 13	10.4% 10	13.0% 12	15.2% 19	12.7% 13	17.3% 17	28.0% 21	25.6% 22	33.9% 21
	Chicken Breasts				45.5% 5	6.3% 1	12.9% 4	13.6% 3	13.3% 4	28.6% 4	33.3% 10	34.1% 15	28.6% 6
	Ground Turkey				23.8% 5	12.5% 4	27.0% 10	34.0% 18	40.0% 14	53.7% 22	82.5% 47	70.0% 7	64.7% 11
	Ground Beef										100.0% 1		
	Pork Chops				66.7% 2		0.0% 0		0.0% 0			100.0% 1	
	Chickens	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	12.8% 12	24.3% 18	36.0% 9
	Turkeys	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	50.0% 4	66.7% 2	57.1% 8
	Cattle	50.0% 14	0.0% 0	10.0% 1	37.5% 3	55.6% 5	100.0% 1	83.3% 5	0.0% 0		66.7% 2		50.0% 1
	Swine	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	100.0% 1	0.0% 0	0.0% 0
3. Resistant to ≥ 4 Antimicrobial Classes	Humans	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	13.3% 10	17.4% 15	11.3% 7
	Chicken Breasts				0.0% 0	0.0% 0	6.5% 2	0.0% 0	0.0% 0	0.0% 0	13.3% 4	9.1% 4	9.5% 2
	Ground Turkey				19.1% 4	9.4% 3	10.8% 4	7.6% 4	17.1% 6	14.6% 6	19.3% 11	30.0% 3	29.4% 5
	Ground Beef										0.0% 0		
	Pork Chops				0.0% 0		0.0% 0		0.0% 0			100.0% 1	
	Chickens	3.7% 11	13.5% 35	4.0% 13	3.7% 15	5.3% 12	7.8% 13	6.7% 19	4.3% 7	6.3% 9	4.2% 4	9.5% 7	20.0% 5
	Turkeys	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	25.0% 2	33.3% 1	35.7% 5
	Cattle	42.9% 12	0.0% 0	10.0% 1	25.0% 2	55.6% 5	100.0% 1	50.0% 3	0.0% 0		33.0% 1		50.0% 1
	Swine	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	100.0% 1	0.0% 0	0.0% 0
4. Resistant to ≥ 5 Antimicrobial Classes	Humans	0.0% 0	2.5% 2	1.0% 1	1.9% 2	0.0% 0	3.3% 3	1.6% 2	2.0% 2	4.1% 4	6.7% 5	15.1% 13	9.7% 6
	Chicken Breasts				0.0% 0	0.0% 0	3.2% 1	0.0% 0	0.0% 0	0.0% 0	6.7% 2	9.1% 4	4.8% 1
	Ground Turkey				19.1% 4	6.3% 2	5.4% 2	0.0% 0	8.6% 3	2.4% 1	1.8% 1	10.0% 1	23.5% 4
	Ground Beef										0.0% 0		
	Pork Chops				0.0% 0		0.0% 0		0.0% 0			100.0% 1	
	Chickens	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	4.2% 4	8.1% 6	20.0% 5
	Turkeys	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	25.0% 2	33.3% 1	35.7% 5
	Cattle	42.9% 12	0.0% 0	0.0% 0	25.0% 2	55.6% 5	100.0% 1	50.0% 3	0.0% 0		0.0% 0		50.0% 1
	Swine	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	100.0% 1	0.0% 0	0.0% 0

Table 40b. Resistance Patterns among *Salmonella* Heidelberg Isolates from Humans, Retail Meats, and Food Animals, by Year, 1999-2010

Year		1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Number of Isolates Tested	Humans	88	79	102	105	96	92	125	102	98	75	86	62
	Chicken Breasts				11	16	31	22	30	14	30	44	21
	Ground Turkey				21	32	37	53	35	41	57	10	17
	Ground Beef				0	0	0	0	0	0	1	0	0
	Pork Chops				3	0	3	0	4	0	0	1	0
	Chickens	297	259	329	403	226	167	283	164	142	94	74	25
	Turkeys	139	125	142	60	57	46	25	43	23	8	3	14
	Cattle	28	6	10	8	9	1	6	4	0	3	0	2
	Swine	33	22	16	11	11	4	8	13	2	1	4	5
Resistance Pattern	**Isolate Source**												
5. At Least ACSSuT[1] Resistant	Humans	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	1.3% 1	3.5% 3	1.6% 1
	Chicken Breasts				0.0% 0	0.0% 0	3.2% 1	0.0% 0	0.0% 0	0.0% 0	3.3% 1	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	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	
	Chickens	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	4.2% 4	4.1% 3	16.0% 4
	Turkeys	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	12.5% 1	0.0% 0	0.0% 0
	Cattle	42.9% 12	0.0% 0	0.0% 0	12.5% 1	33.3% 3	100.0% 1	50.0% 3	0.0% 0		0.0% 0		0.0% 0
	Swine	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	100.0% 1	0.0% 0	0.0% 0
6. At Least ACT/S[2] Resistant	Humans	0.0% 0	0.0% 0	0.0% 0	1.0% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	3.5% 3	0.0% 0
	Chicken Breasts				0.0% 0	0.0% 0	0.0% 0	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	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	
	Chickens	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
	Turkeys	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	0.0% 0	0.0% 0	0.0% 0
	Cattle	42.9% 12	0.0% 0	0.0% 0	0.0% 0	44.4% 4	100.0% 1	50.0% 3	0.0% 0		0.0% 0		0.0% 0
	Swine	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	0.0% 0	0.0% 0	0.0% 0
7. At Least ACSSuTAuCx[3] Resistant	Humans	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	0.0% 0	1.2% 1	0.0% 0
	Chicken Breasts				0.0% 0	0.0% 0	3.2% 1	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	5.4% 2	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	
	Chickens	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	2.1% 2	4.1% 3	16.0% 4
	Turkeys	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	0.0% 0	0.0% 0	0.0% 0
	Cattle	42.9% 12	0.0% 0	0.0% 0	12.5% 1	33.3% 3	100.0% 1	50.0% 3	0.0% 0		0.0% 0		0.0% 0
	Swine	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	0.0% 0	0.0% 0	0.0% 0
8. At Least Ceftriaxone and Nalidixic Acid Resistant	Humans	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
	Chicken Breasts				0.0% 0	0.0% 0	0.0% 0	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	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	
	Chickens	0.0% 0	0.0% 0	0.0% 0	1.0% 4	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
	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	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	0.0% 0

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

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

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

V. *Campylobacter* Data

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

Table 41. Number of *Campylobacter jejuni* Isolates Tested, by Source and Year, 1997-2010[1]

	Year													
Source	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
Humans	209	297	293	306	365	329	303	320	791	709	992	1043	1351	1158
Chicken Breasts						198	325	510	403	426	332	329	404	355
Ground Turkey						2	4	7	10	12	20	10	9	5
Chickens					64 [2]	526	374	508	567	228	166	78	117	208

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

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

Table 42. Number of *Campylobacter coli* Isolates Tested, by Source and Year, 1997-2010[1]

	Year													
Source	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
Humans	6	8	20	12	17	25	22	26	98	97	105	109	142	115
Chicken Breasts						90	142	196	151	145	143	181	176	148
Ground Turkey						2	1	5	9	10	14	19	16	7
Chickens					52 [2]	288	247	186	380	123	76	28	81	100

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

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

B. Isolation of *Campylobacter* from Retail Poultry

Table 43. Number and Percent of Retail Poultry Samples Culture Positive for *Campylobacter*, 2010[1]

	Chicken Breasts	Ground Turkey
Number of Meat Samples Tested	1320	1320
Number Positive for *Campylobacter*	505	13
Percent Positive for *Campylobacter*	38.3%	1.0%

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

Figure 16. Percent of Retail Poultry Samples Culture Positive for *Campylobacter*, 2010

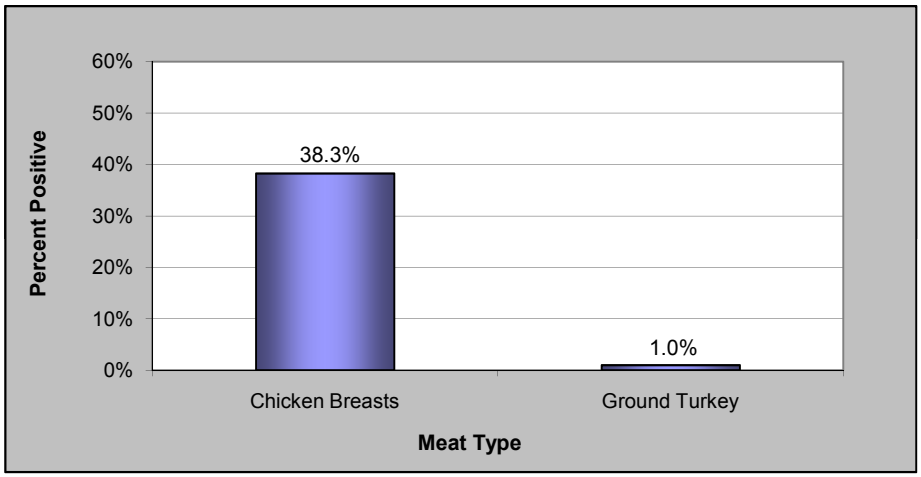
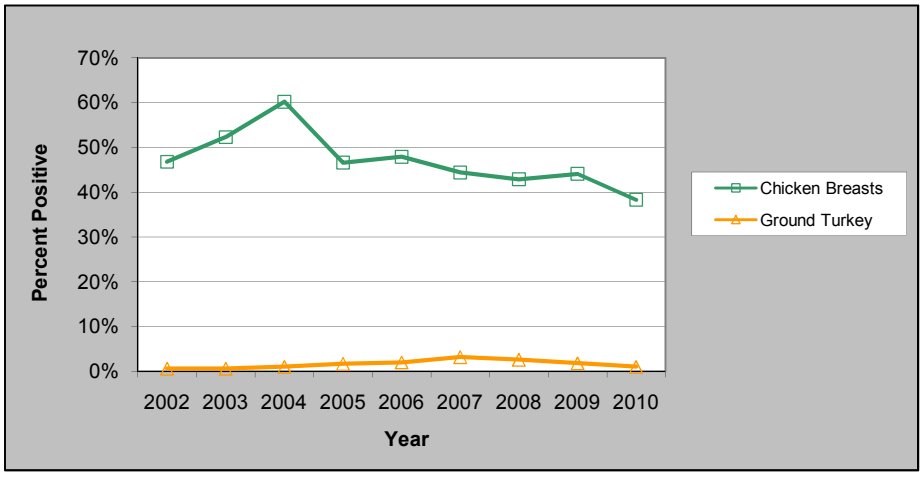


Figure 17. Percent of Retail Poultry Samples Culture Positive for *Campylobacter*, 2002-2010



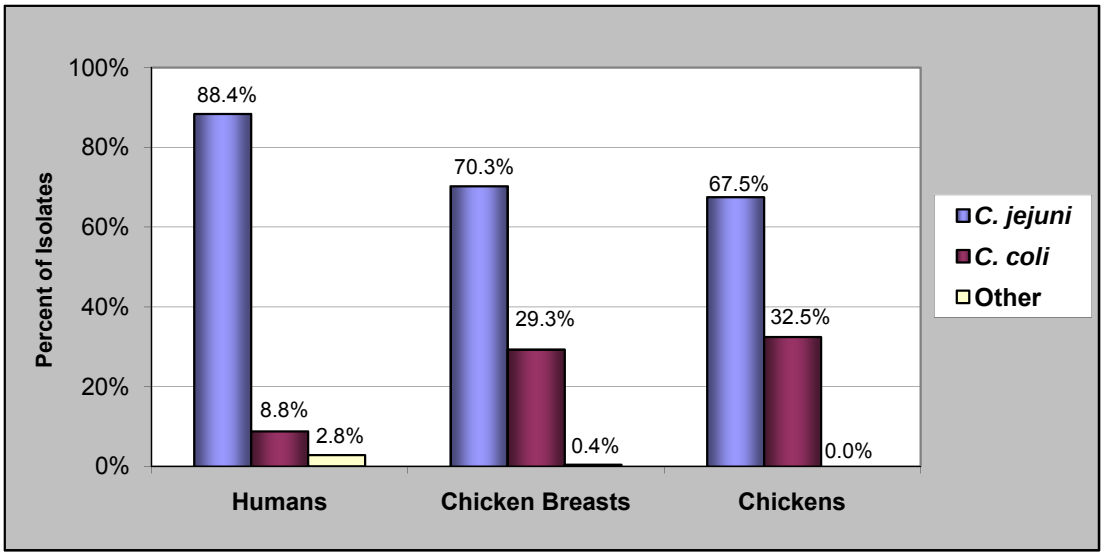
C. *Campylobacter* Species

Table 44. *Campylobacter* Species Isolated from Humans, Retail Meats, and Chickens, 2010

	Humans	Retail Meats[1]		Food Animals
***Campylobacter* Species**	**Humans (N=1310)**	**Chicken Breasts (N=505)**	**Ground Turkey (N=13)**	**Chickens (N=308)**
C. jejuni	88.4% 1158	70.3% 355	38.5% 5	67.5% 208
C. coli	8.8% 115	29.3% 148	53.8% 7	32.5% 100
Other	2.8% 37	0.4% 2	7.7% 1	0.0% 0

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

Figure 18. *Campylobacter* Species Isolated from Humans, Chicken Breasts, and Chickens, 2010



D. Antimicrobial Susceptibility among *Campylobacter jejuni*

MIC Distributions

Table 45a. Distribution of MICs and Occurrence of Resistance among *Campylobacter jejuni* Isolates from Humans, Retail Meats, and Chickens, 2010

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 (1158)	0.0	**0.7**	[0.3 - 1.4]				2.5	37.3	52.6	6.8	<0.1				**<0.1**	**0.6**		
	Chicken Breasts (355)	0.0	**0.0**	[0.0 - 1.0]					10.7	83.7	5.4	0.3							
	Ground Turkey (5)	0.0	**0.0**	[0.0 - 52.2]						100.0									
	Chickens (208)	0.0	**0.5**	[0.0 - 2.6]				3.8	31.2	60.1	4.3						**0.5**		
Ketolides																			
Telithromycin	Humans (1158)	1.2	**1.3**	[0.7 - 2.1]		<0.1		0.2	1.9	15.8	38.4	34.7	6.4	1.2	**1.3**				
	Chicken Breasts (355)	0.0	**0.8**	[0.2 - 2.4]				2.0	23.7	50.1	20.8	2.3	0.3		**0.8**				
	Ground Turkey (5)	0.0	**0.0**	[0.0 - 52.2]						80.0	20.0								
	Chickens (208)	0.0	**0.0**	[0.0 - 1.8]				1.4	12.5	46.2	35.6	4.3							
Lincosamides																			
Clindamycin	Humans (1158)	0.2	**1.3**	[0.7 - 2.1]		0.2	2.6	21.2	31.9	30.0	10.7	2.0	0.2	**<0.1**	**<0.1**	**1.1**			
	Chicken Breasts (355)	0.0	**0.6**	[0.1 - 2.0]		3.1	33.8	47.0	13.8	1.7				**0.3**	**0.3**				
	Ground Turkey (5)	0.0	**0.0**	[0.0 - 52.2]				100.0				7.7							
	Chickens (208)	0.0	**0.0**	[0.0 - 1.8]				22.6	57.7	17.8	1.9								
Macrolides																			
Azithromycin	Humans (1158)	<0.1	**1.2**	[0.7 - 2.0]		4.5	25.5	41.7	25.5	1.5	<0.1		<0.1					**1.2**	
	Chicken Breasts (355)	0.0	**0.6**	[0.1 - 2.0]	10.4	59.4	28.2	1.4										**0.6**	
	Ground Turkey (5)	0.0	**0.0**	[0.0 - 52.2]		60.0	40.0												
	Chickens (208)	0.0	**0.0**	[0.0 - 1.8]	3.4	45.7	43.8	6.7	0.5										
Erythromycin	Humans (1158)	0.0	**1.2**	[0.7 - 2.0]				0.5	8.9	27.5	40.3	19.7	1.8	<0.1				**1.2**	
	Chicken Breasts (355)	0.0	**0.6**	[0.1 - 2.0]			1.1	14.1	54.1	26.8	3.1	0.3						**0.6**	
	Ground Turkey (5)	0.0	**0.0**	[0.0 - 52.2]					80.0		20.0								
	Chickens (208)	0.0	**0.0**	[0.0 - 1.8]				6.2	34.1	46.6	12.0	1.0							
Phenicols																			
Florfenicol[6]	Humans (1158)	N/A	**1.5**	[0.9 - 2.3]		<0.1				3.1	38.0	50.9	6.5	**1.2**	**0.2**	**<0.1**			
	Chicken Breasts (355)	N/A	**0.0**	[0.0 - 1.0]				0.3		33.5	63.1	2.8	0.3						
	Ground Turkey (5)	N/A	**0.0**	[0.0 - 52.2]						40.0	60.0								
	Chickens (208)	N/A	**0.0**	[0.0 - 1.8]					0.5	35.6	62.0	1.9							

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

[2] Percent of isolates with intermediate susceptibility

[3] Percent resistant; for florfenicol, percent non-susceptible. Discrepancies between %R and sums of distribution %'s, to the right of the double vertical bars, are due to rounding

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

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

[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

Table 45b. Distribution of MICs and Occurrence of Resistance among *Campylobacter jejuni* Isolates from Humans, Retail Meats, and Chickens, 2010

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
Quinolones																			
Ciprofloxacin	Humans (1158)	0.0	**21.8**	[19.5 - 24.3]		0.3	18.0	49.7	8.8	1.4	<0.1		**0.6**	**7.9**	**7.5**	**4.1**	**1.3**	**0.4**	
	Chicken Breasts (355)	0.0	**22.5**	[18.3 - 27.2]			31.8	40.3	5.1	0.3			**0.6**	**8.7**	**9.9**	**2.8**		**0.6**	
	Ground Turkey (5)	0.0	**40.0**	[5.3 - 85.3]			20.0	40.0								**40.0**			
	Chickens (208)	0.0	**23.1**	[17.5 - 29.4]		1.9	38.5	31.7	4.8					**12.0**	**10.6**	**0.5**			
Nalidixic acid	Humans (1158)	0.0	**22.0**	[19.7 - 24.5]									56.1	19.4	2.4		**0.3**	**21.7**	
	Chicken Breasts (355)	0.0	**22.8**	[18.6 - 27.5]									60.3	16.6	0.3		**2.5**	**20.3**	
	Ground Turkey (5)	0.0	**40.0**	[5.3 - 85.3]									60.0				**20.0**	**20.0**	
	Chickens (208)	0.0	**23.1**	[17.5 - 29.4]									68.3	8.7			**6.7**	**16.3**	
Tetracyclines																			
Tetracycline	Humans (1158)	<0.1	**42.7**	[39.9 - 45.7]			0.5	8.0	27.2	14.5	5.5	1.2	0.2	<0.1	**0.2**	**0.9**	**2.7**	**38.9**	
	Chicken Breasts (355)	0.0	**36.3**	[31.3 - 41.6]			2.3	26.2	23.1	9.0	3.1				**1.1**	**3.9**	**16.3**	**14.9**	
	Ground Turkey (5)	0.0	**80.0**	[28.4 - 99.5]				20.0									**40.0**	**40.0**	
	Chickens (208)	1.4	**47.6**	[40.6 - 54.6]			1.9	24.5	13.9	4.3	5.8		0.5	1.4	**1.4**	**6.2**	**18.3**	**21.6**	

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

[2] Percent of isolates with intermediate susceptibility

[3] Percent resistant; for florfenicol, percent non-susceptible. Discrepancies between %R and sums of distribution %'s, to the right of the double vertical bars, are due to rounding

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

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

Table 46a. Antimicrobial Resistance among *Campylobacter jejuni* Isolates from Humans, Retail Meats, and Chickens, by Year, 1999-2010

Year			1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Number of Isolates Tested		Humans	293	306	365	329	303	320	791	709	992	1043	1351	1158
		Chicken Breasts				198	325	510	403	426	332	329	404	355
		Ground Turkey				2	4	7	10	12	20	10	9	5
		Chickens			64[1]	526	374	508	567	228	166	78	117	208
Antimicrobial Class	**Antimicrobial (Resistance Breakpoint)[2]**	**Isolate Source[3]**												
Aminoglycosides	Gentamicin (MIC ≥ 8 µg/ml)	Humans	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	1.2% 12	0.7% 9	0.7% 8
		Chicken Breasts				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
		Ground Turkey				0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Chickens			0.0% 0	0.0% 0	0.0% 0	0.2% 1	0.0% 0	0.0% 0	0.0% 0	1.3% 1	0.9% 1	0.5% 1
Ketolides	Telithromycin (MIC ≥ 16 µg/ml)	Humans							0.6% 5	0.8% 6	1.0% 10	2.2% 23	1.4% 19	1.3% 15
		Chicken Breasts						0.4% 2	0.5% 2	0.7% 3	0.6% 2	0.3% 1	0.2% 1	0.8% 3
		Ground Turkey						0.0% 0	0.0% 0	0.0% 0	5.0% 1	10.0% 1	0.0% 0	0.0% 0
		Chickens							0.4% 2	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
Lincosamides	Clindamycin (MIC ≥ 8 µg/ml)	Humans	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	2.1% 22	1.3% 18	1.3% 15
		Chicken Breasts						0.4% 2	0.5% 2	0.7% 3	0.6% 2	0.9% 3	0.5% 2	0.6% 2
		Ground Turkey						0.0% 0	0.0% 0	0.0% 0	5.0% 1	10.0% 1	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	0.0% 0	0.0% 0	0.0% 0
Macrolides	Azithromycin (MIC ≥ 8 µg/ml)	Humans	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	2.3% 24	1.6% 21	1.2% 14
		Chicken Breasts						0.8% 4	0.5% 2	0.9% 4	0.6% 2	1.2% 4	1.0% 4	0.6% 2
		Ground Turkey						0.0% 0	0.0% 0	0.0% 0	5.0% 1	10.0% 1	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	1.3% 1	0.0% 0	0.0% 0
	Erythromycin (MIC ≥ 32 µg/ml)	Humans	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	2.3% 24	1.6% 21	1.2% 14
		Chicken Breasts				0.0% 0	0.0% 0	0.8% 4	0.5% 2	0.9% 4	0.6% 2	1.2% 4	1.0% 4	0.6% 2
		Ground Turkey				0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	5.0% 1	10.0% 1	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	1.3% 1	0.0% 0	0.0% 0
Phenicols	Chloramphenicol (MIC ≥ 32 µg/ml)	Humans	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)[4]	Humans							0.5% 4	0.0% 0	0.0% 0	0.6% 6	0.6% 8	1.5% 17
		Chicken Breasts						0.0% 0	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	0.0% 0
		Chickens							0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	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

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

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

Table 46b. Antimicrobial Resistance among *Campylobacter jejuni* Isolates from Humans, Retail Meats, and Chickens, by Year, 1999-2010

Year			1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Number of Isolates Tested		Humans	293	306	365	329	303	320	791	709	992	1043	1351	1158
		Chicken Breasts				198	325	510	403	426	332	329	404	355
		Ground Turkey				2	4	7	10	12	20	10	9	5
		Chickens			64[1]	526	374	508	567	228	166	78	117	208
Antimicrobial Class	**Antimicrobial (Resistance Breakpoint)[2]**	**Isolate Source[3]**												
Quinolones	Ciprofloxacin (MIC ≥ 4 µg/ml)	Humans	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	22.3% 233	23.0% 311	21.8% 253
		Chicken Breasts				15.2% 30	14.5% 47	15.1% 77	15.1% 61	16.7% 71	17.2% 57	14.6% 48	21.3% 86	22.5% 80
		Ground Turkey				50.0% 1	0.0% 0	28.6% 2	10.0% 1	50.0% 6	30.0% 6	60.0% 6	44.4% 4	40.0% 2
		Chickens			20.3% 13	18.6% 98	14.7% 55	21.3% 108	15.0% 85	8.8% 20	21.7% 36	32.1% 25	19.7% 23	23.1% 48
	Nalidixic acid (MIC ≥ 64 µg/ml)	Humans	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	22.8% 238	23.2% 313	22.0% 255
		Chicken Breasts						15.1% 77	14.9% 60	16.7% 71	17.2% 57	14.6% 48	21.3% 86	22.8% 81
		Ground Turkey						28.6% 2	10.0% 1	50.0% 6	30.0% 6	60.0% 6	44.4% 4	40.0% 2
		Chickens			20.3% 13	22.1% 116	15.5% 58	21.7% 110	15.3% 87	8.8% 20	21.7% 36	33.3% 26	19.7% 23	23.1% 48
Tetracyclines	Doxycycline (MIC ≥ 8 µg/ml)	Chicken Breasts				38.4% 76	40.6% 132							
		Ground Turkey				100.0% 2	75.0% 3							
	Tetracycline (MIC ≥ 16 µg/ml)	Humans	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	44.2% 461	43.4% 587	42.7% 495
		Chicken Breasts						50.2% 256	46.4% 187	47.2% 201	48.5% 161	49.8% 164	45.8% 185	36.3% 129
		Ground Turkey						42.9% 3	70.0% 7	75.0% 9	90.0% 18	100.0% 10	100.0% 9	80.0% 4
		Chickens			35.9% 23	45.1% 237	47.6% 178	42.3% 215	44.1% 250	56.1% 128	56.6% 94	53.8% 42	49.6% 58	47.6% 99

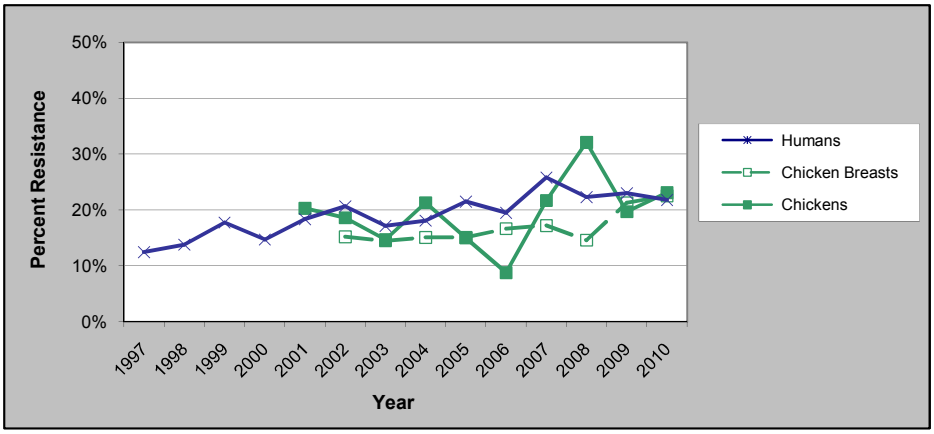
[1] These isolates were recovered from July through December, 2001, when the new ARS isolation method was used

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

Ciprofloxacin Resistance

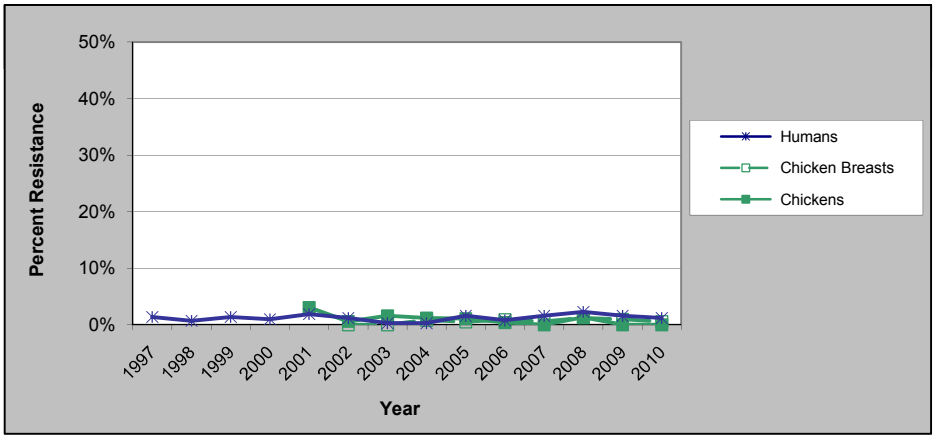
Figure 19. Percent of *Campylobacter jejuni* Isolates from Humans, Chicken Breasts, and Chickens Resistant to Ciprofloxacin, by Year, 1997-2010[1]



[1] Data for ground turkey are not included due to the small number of *C. jejuni* isolates from this source. Table 46 contains resistance data for *C. jejuni* isolates from each source, by year

Erythromycin Resistance

Figure 20. Percent of *Campylobacter jejuni* Isolates from Humans, Chicken Breasts, and Chickens Resistant to Erythromycin by Year, 1997-2010[1]



[1] Data for ground turkey are not included due to the small number of *C. jejuni* isolates from this source. Table 46 contains resistance data for *C. jejuni* isolates from each source, by year

Table 47. Number of *Campylobacter jejuni* Isolates Tested from Humans, Retail Meats[1], and Chickens by Year, 1997-2010

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Humans	209	297	293	306	365	329	303	320	791	709	992	1043	1351	1158
Chicken Breasts						198	325	510	403	426	332	329	404	355
Ground Turkey						2	4	7	10	12	20	10	9	5
Chickens					64[2]	526	374	508	567	228	166	78	117	208

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

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

E. Antimicrobial Susceptibility among *Campylobacter coli*

MIC Distributions

Table 48a. Distribution of MICs and Occurrence of Resistance among *Campylobacter coli* Isolates from Humans, Retail Meats, and Chickens, 2010

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 (115)	0.0	**11.3**	[6.2 - 18.6]					27.0	39.1	21.7	0.9					**11.3**		
	Chicken Breasts (148)	0.0	**12.8**	[7.9 - 19.3]					2.7	75.0	9.5						**12.8**		
	Ground Turkey (7)	0.0	**0.0**	[0.0 - 41.0]						100.0									
	Chickens (100)	0.0	**5.0**	[1.6 - 11.3]					8.0	77.0	10.0						**5.0**		
Ketolides																			
Telithromycin	Humans (115)	8.7	**4.3**	[1.4 - 9.9]					7.8	33.9	6.1	13.0	26.1	8.7	**4.3**				
	Chicken Breasts (148)	0.0	**4.1**	[1.5 - 8.6]				6.8	27.0	3.4	26.4	28.4	4.1		**4.1**				
	Ground Turkey (7)	14.3	**0.0**	[0.0 - 41.0]						42.9	14.3	28.6		14.3					
	Chickens (100)	0.0	**4.0**	[1.1 - 9.9]				2.0	18.0	6.0	31.0	28.0	11.0		**4.0**				
Lincosamides																			
Clindamycin	Humans (115)	4.3	**6.1**	[2.5 - 12.1]				1.7	27.0	31.3	23.5	6.1	4.3	**1.7**		**4.3**			
	Chicken Breasts (148)	3.4	**1.4**	[0.2 - 4.8]			2.0	42.6	47.3	2.7		0.7	3.4	**0.7**	**0.7**				
	Ground Turkey (7)	0.0	**0.0**	[0.0 - 41.0]				14.3	71.4			14.3							
	Chickens (100)	0.0	**4.0**	[1.1 - 9.9]			2.0	40.0	40.0	13.0		1.0		**3.0**	**1.0**				
Macrolides																			
Azithromycin	Humans (115)	0.0	**4.3**	[1.4 - 9.9]			3.5	35.7	47.0	7.8	1.7							**4.3**	
	Chicken Breasts (148)	0.0	**4.1**	[1.5 - 8.6]	1.4	17.6	60.8	15.5	0.7									**4.1**	
	Ground Turkey (7)	0.0	**14.3**	[0.4 - 57.9]		28.6	57.1											**14.3**	
	Chickens (100)	0.0	**4.0**	[1.1 - 9.9]		15.0	56.0	24.0	1.0									**4.0**	
Erythromycin	Humans (115)	0.0	**4.3**	[1.4 - 9.9]					2.6	21.7	25.2	27.0	16.5	2.6				**4.3**	
	Chicken Breasts (148)	0.0	**4.1**	[1.5 - 8.6]				8.1	26.4	27.7	31.1	2.7						**4.1**	
	Ground Turkey (7)	0.0	**14.3**	[0.4 - 57.9]					28.6	42.9	14.3							**14.3**	
	Chickens (100)	0.0	**4.0**	[1.1 - 9.9]				3.0	23.0	29.0	34.0	7.0						**4.0**	
Phenicols																			
Florfenicol[6]	Humans (115)	N/A	**0.0**	[0.0 - 3.2]						0.9	20.0	57.4	21.7						
	Chicken Breasts (148)	N/A	**0.0**	[0.0 - 2.5]						7.4	75.0	17.6							
	Ground Turkey (7)	N/A	**0.0**	[0.0 - 41.0]							85.7	14.3							
	Chickens (100)	N/A	**0.0**	[0.0 - 3.6]			1.0			10.0	75.0	14.0							

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

[2] Percent of isolates with intermediate susceptibility

[3] Percent resistant; for florfenicol, percent non-susceptible. Discrepancies between %R and sums of distribution %'s, to the right of the double vertical bars, are due to rounding

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

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

[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

Table 48b. Distribution of MICs and Occurrence of Resistance among *Campylobacter coli* Isolates from Humans, Retail Meats, and Chickens, 2010

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
Quinolones																			
Ciprofloxacin	Humans (115)	0.0	**31.3**	[23.0 - 40.6]			3.5	32.2	29.6	3.5				**7.0**	**13.0**	**11.3**			
	Chicken Breasts (148)	0.0	**13.5**	[8.5 - 20.1]			14.9	49.3	21.0	1.4				**4.7**	**6.1**	**2.7**			
	Ground Turkey (7)	0.0	**57.1**	[18.4 - 90.1]			14.3		28.6						**57.1**				
	Chickens (100)	0.0	**22.0**	[14.3 - 31.4]			18.0	40.0	19.0		1.0			**11.0**	**10.0**	**1.0**			
Nalidixic acid	Humans (115)	0.0	**31.3**	[23.0 - 40.6]									16.5	40.9	11.3			**31.3**	
	Chicken Breasts (148)	0.7	**13.5**	[8.5 - 20.1]									56.8	29.1		0.7	**8.8**	**4.7**	
	Ground Turkey (7)	0.0	**57.1**	[18.4 - 90.1]									28.6	14.3				**57.1**	
	Chickens (100)	1.0	**22.0**	[14.3 - 31.4]									60.0	17.0		1.0	**11.0**	**11.0**	
Tetracyclines																			
Tetracycline	Humans (115)	0.0	**48.7**	[39.3 - 58.2]				0.9	19.1	14.8	15.7		0.9			**0.9**	**0.9**	**47.0**	
	Chicken Breasts (148)	0.7	**39.2**	[31.3 - 47.5]				2.0	30.4	14.9	8.1	4.1	0.7	0.7			**2.7**	**36.5**	
	Ground Turkey (7)	0.0	**100.0**	[59.0 - 100.0]														**100.0**	
	Chickens (100)	0.0	**56.0**	[45.7 - 65.9]			1.0	5.0	22.0	7.0	8.0	1.0				**1.0**	**12.0**	**43.0**	

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

[2] Percent of isolates with intermediate susceptibility

[3] Percent resistant; for florfenicol, percent non-susceptible. Discrepancies between %R and sums of distribution %'s, to the right of the double vertical bars, are due to rounding

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

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

Table 49a. Antimicrobial Resistance among *Campylobacter coli* Isolates from Humans, Retail Meats, and Chickens, by Year, 1999-2010

Year			1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Number of Isolates Tested		Humans	20	12	17	25	22	26	98	97	105	109	142	115
		Chicken Breasts				90	142	196	151	145	143	181	176	148
		Ground Turkey				2	1	5	9	10	14	19	16	7
		Chickens			52[1]	288	247	186	380	123	76	28	81	100
Antimicrobial Class	**Antimicrobial (Resistance Breakpoint)[2]**	**Isolate Source[3]**												
Aminoglycosides	Gentamicin (MIC ≥ 8 µg/ml)	Humans	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	0.9% 1	2.8% 4	11.3% 13
		Chicken Breasts				0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.7% 1	1.7% 3	5.7% 10	12.8% 19
		Ground Turkey				0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Chickens			0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.3% 1	0.0% 0	1.3% 1	3.6% 1	2.5% 2	5.0% 5
Ketolides	Telithromycin (MIC ≥ 16 µg/ml)	Humans							4.1% 4	7.2% 7	5.7% 6	5.5% 6	2.1% 3	4.3% 5
		Chicken Breasts						8.2% 16	7.9% 12	4.8% 7	7.0% 10	7.7% 14	4.5% 8	4.1% 6
		Ground Turkey						0.0% 0	22.2% 2	0.0% 0	0.0% 0	5.3% 1	0.0% 0	0.0% 0
		Chickens							5.5% 21	6.5% 8	13.2% 10	3.6% 1	6.2% 5	4.0% 4
Lincosamides	Clindamycin (MIC ≥ 8 µg/ml)	Humans	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	9.1% 10	2.1% 3	6.1% 7
		Chicken Breasts						7.1% 14	8.6% 13	4.8% 7	4.9% 7	5.0% 9	3.4% 6	1.4% 2
		Ground Turkey						0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Chickens			1.9% 1	4.9% 14	4.5% 11	1.1% 2	2.4% 9	1.6% 2	9.2% 7	3.6% 1	0.0% 0	4.0% 4
Macrolides	Azithromycin (MIC ≥ 8 µg/ml)	Humans	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	10.1% 11	2.8% 4	4.3% 5
		Chicken Breasts						9.2% 18	9.9% 15	5.5% 8	6.3% 9	9.9% 18	4.5% 8	4.1% 6
		Ground Turkey						0.0% 0	22.2% 2	0.0% 0	0.0% 0	5.3% 1	0.0% 0	14.3% 1
		Chickens			11.5% 6	19.4% 56	20.2% 50	9.1% 17	8.4% 32	8.9% 11	14.5% 11	10.7% 3	6.2% 5	4.0% 4
	Erythromycin (MIC ≥ 32 µg/ml)	Humans	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	10.1% 11	2.8% 4	4.3% 5
		Chicken Breasts				7.8% 7	7.0% 10	9.2% 18	9.9% 15	5.5% 8	6.3% 9	9.9% 18	4.5% 8	4.1% 6
		Ground Turkey				0.0% 0	0.0% 0	0.0% 0	22.2% 2	0.0% 0	0.0% 0	5.3% 1	0.0% 0	14.3% 1
		Chickens			9.6% 5	18.8% 54	20.2% 50	9.1% 17	8.4% 32	8.9% 11	14.5% 11	10.7% 3	6.2% 5	4.0% 4
Phenicols	Chloramphenicol (MIC ≥ 32 µg/ml)	Humans	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)[4]	Humans							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	0.0% 0
		Ground Turkey						0.0% 0	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

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

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

Table 49b. Antimicrobial Resistance among *Campylobacter coli* Isolates from Humans, Retail Meats, and Chickens, by Year, 1999-2010

Year			1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Number of Isolates Tested		Humans	20	12	17	25	22	26	98	97	105	109	142	115
		Chicken Breasts				90	142	196	151	145	143	181	176	148
		Ground Turkey				2	1	5	9	10	14	19	16	7
		Chickens			52[1]	288	247	186	380	123	76	28	81	100
Antimicrobial Class	**Antimicrobial (Resistance Breakpoint)[2]**	**Isolate Source[3]**												
Quinolones	Ciprofloxacin (MIC ≥ 4 µg/ml)	Humans	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	30.3% 33	21.8% 31	31.3% 36
		Chicken Breasts				10.0% 9	13.4% 19	16.3% 32	29.1% 44	22.1% 32	25.9% 37	20.4% 37	18.2% 32	13.5% 20
		Ground Turkey				50.0% 1	100.0% 1	0.0% 0	55.6% 5	30.0% 3	50.0% 7	47.4% 9	43.8% 7	57.1% 4
		Chickens			19.2% 10	16.0% 46	20.2% 50	26.9% 50	22.1% 84	15.4% 19	15.8% 12	14.3% 4	22.2% 18	22.0% 22
	Nalidixic acid (MIC ≥ 64 µg/ml)	Humans	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	30.3% 33	23.2% 33	31.3% 36
		Chicken Breasts						16.3% 32	29.1% 44	20.7% 30	25.9% 37	20.4% 37	18.2% 32	13.5% 20
		Ground Turkey						0.0% 0	55.6% 5	30.0% 3	50.0% 7	47.4% 9	43.8% 7	57.1% 4
		Chickens			19.2% 10	17.7% 51	21.5% 53	27.4% 51	22.1% 84	15.4% 19	15.8% 12	14.3% 4	22.2% 18	22.0% 22
Tetracyclines	Doxycycline (MIC ≥ 8 µg/ml)	Chicken Breasts				44.4% 40	50.7% 72							
		Ground Turkey				50.0% 1	100.0% 1							
	Tetracycline (MIC ≥ 16 µg/ml)	Humans	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	39.4% 43	45.1% 64	48.7% 56
		Chicken Breasts						46.4% 91	42.4% 64	46.9% 68	39.9% 57	46.4% 84	38.1% 67	39.2% 58
		Ground Turkey						0.0% 0	88.9% 8	80.0% 8	64.3% 9	94.7% 18	75.0% 12	100.0% 7
		Chickens			57.7% 30	49.0% 141	51.0% 126	48.4% 90	42.1% 160	53.7% 66	42.1% 32	60.7% 17	44.4% 36	56.0% 56

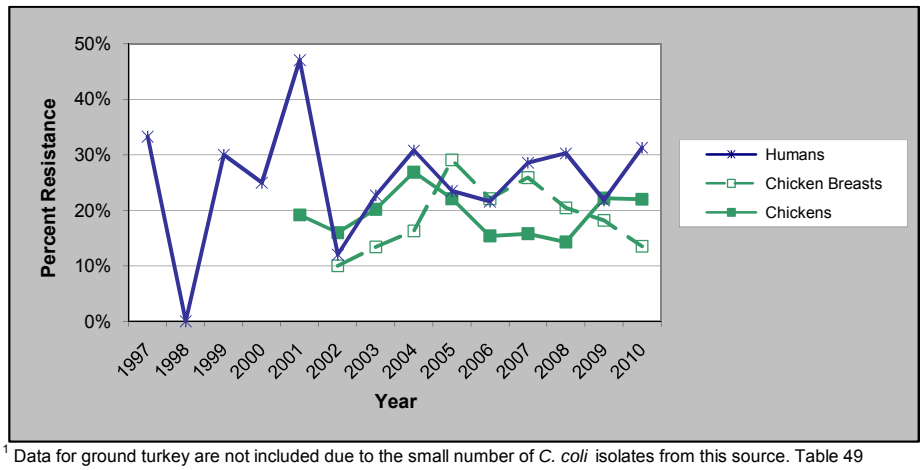
[1] These isolates were recovered from July through December, 2001, when the new ARS isolation method was used

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

Ciprofloxacin Resistance

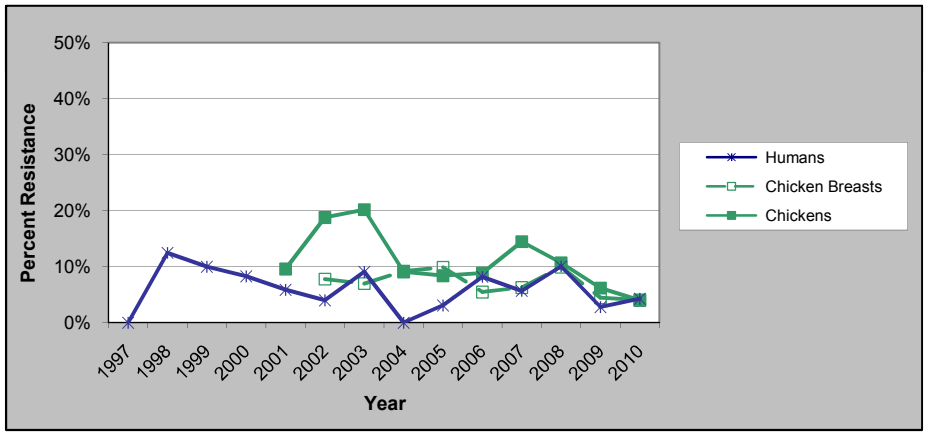
Figure 21. Percent of *Campylobacter coli* Isolates from Humans, Chicken Breasts, and Chickens Resistant to Ciprofloxacin, by Year, 1997-2010[1]



[1] Data for ground turkey are not included due to the small number of *C. coli* isolates from this source. Table 49 contains resistance data for *C . coli* isolates from each source, by year

Erythromycin Resistance

Figure 22. Percent of *Campylobacter coli* Isolates from Humans, Chicken Breasts, and Chickens Resistant to Erythromycin, by Year, 1997-2010[1]



[1] Data for ground turkey are not included due to the small number of *C. coli* isolates from this source. Table 49 contains resistance data for *C. coli* isolates from each source, by year

Table 50. Number of *Campylobacter coli* Isolates Tested from Humans, Retail Meats[1], and Chickens, by Year, 1997-2010

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Humans	6	8	20	12	17	25	22	26	98	97	105	109	142	115
Chicken Breasts						90	142	196	151	145	143	181	176	148
Ground Turkey						2	1	5	9	10	14	19	16	7
Chickens					52[2]	288	247	186	380	123	76	28	81	100

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

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

F. Multidrug Resistance among *Campylobacter* Species

Table 51a. Resistance Patterns among *Campylobacter* Species Isolate from Humans, Retail Meats and Food Animals by Year, 2002-2010[1]

Year			2004	2005	2006	2007	2008	2009	2010
Number of Isolates Tested	***C. jejuni***	Humans	N/A [2]	791	709	992	1043	1351	1158
		Chicken Breast	510	403	426	332	329	404	355
		Ground Turkey	7	10	12	20	10	9	5
		Chickens	N/A [2]	567	228	166	78	117	208
	C. coli	Humans	N/A [2]	98	97	105	109	142	115
		Chicken Breast	196	151	145	143	181	176	148
		Ground Turkey	5	9	10	14	19	16	7
		Chickens	N/A [2]	380	123	76	28	81	100
Resistance Pattern	**Species**	**Isolate Source[2]**							
1. No Resistance Detected	***C. jejuni***	Humans		48.0% 380	43.7% 310	45.5% 451	46.1% 481	46.6% 630	47.2% 547
		Chicken Breast	41.0% 209	43.4% 175	43.9% 187	40.4% 134	40.4% 133	41.8% 169	51.3% 182
		Ground Turkey	42.9% 3	30.0% 3	16.7% 2	10.0% 2	0.0% 0	0.0% 0	20.0% 1
		Chickens		46.9% 266	39.9% 91	34.3% 57	33.3% 26	41.9% 49	44.7% 93
	C. coli	Humans		51.0% 50	45.4% 44	40.0% 42	43.1% 47	43.7% 62	37.4% 43
		Chicken Breast	38.3% 75	36.4% 55	38.6% 56	45.5% 65	41.4% 75	49.4% 87	54.7% 81
		Ground Turkey	100.0% 5	11.1% 1	20.0% 2	28.6% 4	5.3% 1	18.8% 3	0.0% 0
		Chickens		47.6% 181	39.0% 48	43.4% 33	28.6% 8	49.4% 40	34.0% 34
2. Resistance to ≥ 2 Antimicrobial Classes	***C. jejuni***	Humans		14.0% 111	11.6% 82	17.4% 173	14.7% 153	14.1% 190	13.3% 154
		Chicken Breast	7.1% 36	6.0% 24	8.7% 37	7.2% 24	7.0% 23	10.4% 42	11.5% 41
		Ground Turkey	14.3% 1	10.0% 1	41.7% 5	30.0% 6	70.0% 7	44.4% 4	40.0% 2
		Chickens		8.3% 47	5.3% 12	12.7% 21	23.1% 18	12.0% 14	15.9% 33
	C. coli	Humans		14.3% 14	17.5% 17	18.1% 19	24.8% 27	15.5% 22	29.6% 34
		Chicken Breast	15.3% 30	19.9% 30	15.2% 22	19.6% 28	24.3% 44	16.5% 29	23.6% 35
		Ground Turkey	0.0% 0	55.6% 5	30.0% 3	42.9% 6	52.6% 10	37.5% 6	57.1% 4
		Chickens		21.6% 82	17.9% 22	21.1% 16	17.9% 5	19.8% 16	21.0% 21
3. Resistance to ≥ 3 Antimicrobial Classes	***C. jejuni***	Humans		1.5% 12	0.7% 5	1.3% 13	2.8% 29	1.8% 24	2.0% 23
		Chicken Breast	0.4% 2	0.5% 2	0.7% 3	0.6% 2	0.3% 1	0.2% 1	0.6% 2
		Ground Turkey	0.0% 0	0.0% 0	0.0% 0	5.0% 1	10.0% 1	0.0% 0	0.0% 0
		Chickens		0.5% 3	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
	C. coli	Humans		4.1% 4	8.2% 8	5.7% 6	6.4% 7	2.1% 3	6.1% 7
		Chicken Breast	8.2% 16	9.3% 14	5.5% 8	7.0% 10	6.1% 11	4.5% 8	4.1% 6
		Ground Turkey	0.0% 0	22.2% 2	0.0% 0	0.0% 0	5.3% 1	0.0% 0	14.3% 1
		Chickens		5.8% 22	6.5% 8	13.2% 10	7.1% 2	6.2% 5	4.0% 4

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

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

Table 51b. Resistance Patterns among *Campylobacter* Species Isolate from Humans, Retail Meats and Food Animals by Year, 2002-2010[1]

Year			2004	2005	2006	2007	2008	2009	2010
Number of Isolates Tested	***C. jejuni***	Humans	N/A [2]	791	709	992	1043	1351	1158
		Chicken Breast	510	403	426	332	329	404	355
		Ground Turkey	7	10	12	20	10	9	5
		Chickens	N/A [2]	567	228	166	78	117	208
	C. coli	Humans	N/A [2]	98	97	105	109	142	115
		Chicken Breast	196	151	145	143	181	176	148
		Ground Turkey	5	9	10	14	19	16	7
		Chickens	N/A [2]	380	123	76	28	81	100
Resistance Pattern	**Species**	**Isolate Source[2]**							
4. Resistance to ≥ 4 Antimicrobial Classes	***C. jejuni***	Humans		0.8% 6	0.7% 5	1.0% 10	1.9% 20	1.3% 17	1.0% 12
		Chicken Breast	0.4% 2	0.3% 1	0.7% 3	0.0% 0	0.0% 0	0.0% 0	0.3% 1
		Ground Turkey	0.0% 0	0.0% 0	0.0% 0	5.0% 0	10.0% 1	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
	C. coli	Humans		3.1% 3	5.2% 5	4.8% 5	4.6% 5	2.1% 3	4.3% 5
		Chicken Breast	1.5% 3	4.6% 7	2.1% 3	2.8% 4	2.2% 4	1.7% 3	2.0% 3
		Ground Turkey	0.0% 0	22.2% 2	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Chickens		1.3% 5	0.8% 1	3.9% 3	0.0% 0	4.9% 4	0.0% 0
5. At least Quinolone and Macrolide Resistant	***C. jejuni***	Humans		1.0% 8	0.6% 4	1.3% 13	1.5% 16	1.1% 15	0.9% 10
		Chicken Breast	0.0% 0	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	5.0% 1	0.0% 0	0.0% 0	0.0% 0
		Chickens		0.2% 1	0.4% 1	0.0% 0	1.3% 1	0.0% 0	0.0% 0
	C. coli	Humans		1.0% 1	3.1% 3	1.9% 2	3.7% 4	2.1% 3	1.7% 2
		Chicken Breast	0.5% 1	1.3% 2	0.0% 0	1.4% 2	1.1% 2	1.7% 3	0.7% 1
		Ground Turkey	0.0% 0	22.2% 2	0.0% 0	0.0% 0	0.0% 0	0.0% 0	14.3% 1
		Chickens		1.6% 6	1.6% 2	5.3% 4	0.0% 0	4.9% 4	0.0% 0
6. At least Quinolone and Tetracycline Resistant	***C. jejuni***	Humans		12.4% 98	10.7% 76	17.0% 169	13.6% 142	13.3% 180	12.5% 145
		Chicken Breast	6.3% 32	5.5% 22	8.0% 34	6.6% 22	6.1% 20	9.9% 40	10.7% 38
		Ground Turkey	14.3% 1	10.0% 1	41.7% 5	30.0% 6	60.0% 6	44.4% 4	40.0% 2
		Chickens		7.2% 41	4.8% 11	12.7% 21	20.5% 16	11.0% 13	15.4% 32
	C. coli	Humans		9.2% 9	10.3% 10	13.3% 14	17.3% 19	12.7% 18	17.4% 20
		Chicken Breast	7.1% 14	11.3% 17	10.3% 15	14.7% 21	13.3% 24	8.0% 14	8.1% 12
		Ground Turkey	0.0% 0	55.6% 5	30.0% 3	42.9% 6	47.4% 9	37.5% 6	57.1% 4
		Chickens		13.9% 53	9.8% 12	10.5% 8	14.3% 4	16.0% 13	16.0% 16

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

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

VI. *Escherichia coli* Data

A. *E. coli* Isolates Tested

Table 52. Number of *E. coli* Isolates Tested, by Source and Year, 2000-2010

Source	Year										
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Chicken Breasts			282	396	400	393	418	299	306	315	357
Ground Turkey			304	333	376	396	388	315	300	306	369
Ground Beef			295	311	338	316	295	256	250	247	269
Pork Chops			184	218	232	205	182	152	146	147	183
Chickens	285	1989	2100	1365	1697	2232	1357	1510	986	877	941

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

Table 53. Number and Percent of Retail Meat Samples Culture Positive for *E. coli*, 2010

	Chicken Breasts	Ground Turkey	Ground Beef	Pork Chops
Number of Meat Samples Tested	460	460	460	460
Number Positive for *E. coli*	357	369	269	183
Percent Positive for *E. coli*	77.6%	80.2%	58.5%	39.8%

Figure 23. Percent of Retail Meat Samples Culture Positive for *E. coli*, 2010

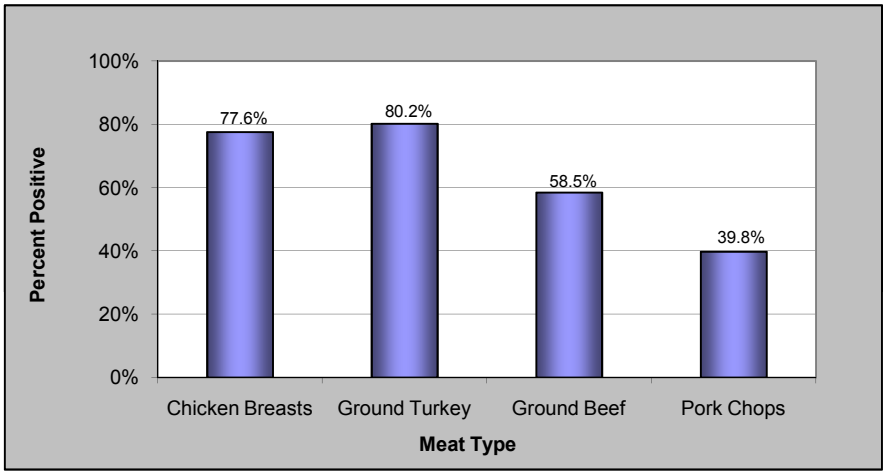
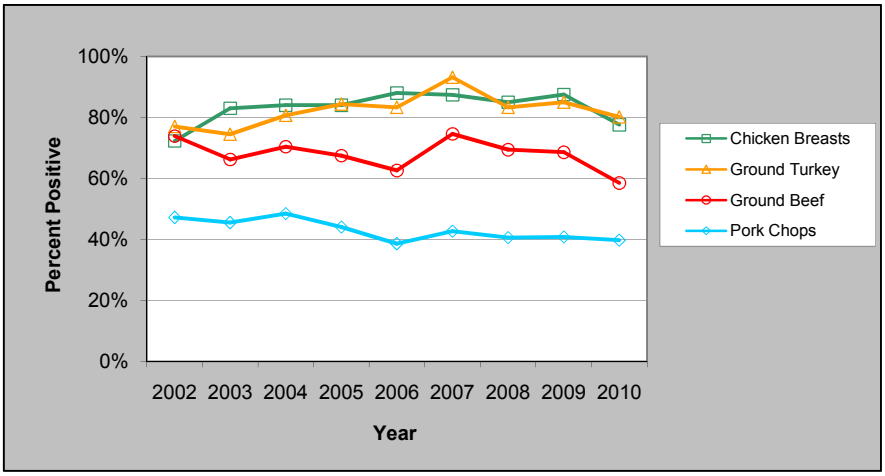


Figure 24. Percent of Retail Meat Samples Culture Positive for *E. coli*, 2002-2010



C. Antimicrobial Susceptibility among *E. coli*

MIC Distributions

Table 54a. Distribution of MICs and Occurrence of Resistance among *E. coli* Isolates from Retail Meats and Chickens, 2010

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 (357)	0.0	**0.0**	[0.0 - 1.0]							11.8	56.9	29.1	2.0	0.3						
	Ground Turkey (369)	0.0	**0.0**	[0.0 - 1.0]							10.3	66.1	22.2	1.4							
	Ground Beef (269)	0.0	**0.0**	[0.0 - 1.4]						0.4	7.8	64.3	23.4	3.7	0.4						
	Pork Chops (183)	0.0	**0.0**	[0.0 - 2.0]							7.7	48.1	41.0	3.3							
	Chickens (941)	0.0	**0.0**	[0.0 - 0.4]						0.9	26.2	60.9	11.1	1.0							
Gentamicin	Chicken Breasts (357)	3.4	**31.9**	[27.1 - 37.0]					3.4	39.8	19.6	1.7	0.3	3.4	**14.0**	**17.9**					
	Ground Turkey (369)	3.8	**24.9**	[20.6 - 29.7]					4.3	45.0	18.7	1.1	2.2	3.8	**11.7**	**13.3**					
	Ground Beef (269)	0.0	**0.4**	[0.0 - 2.1]					4.1	67.7	25.7	1.9	0.4			**0.4**					
	Pork Chops (183)	1.6	**2.7**	[0.9 - 6.3]					4.4	49.2	38.8	2.7	0.5	1.6	**1.6**	**1.1**					
	Chickens (941)	9.4	**43.0**	[39.8 - 46.3]					4.7	33.5	7.2	0.4	1.8	9.4	**24.7**	**18.4**					
Kanamycin	Chicken Breasts (357)	0.6	**6.2**	[3.9 - 9.2]										89.4	3.9	0.6	**0.3**	**5.9**			
	Ground Turkey (369)	0.0	**21.4**	[17.3 - 26.0]										77.8	0.8			**21.4**			
	Ground Beef (269)	0.0	**3.7**	[1.8 - 6.7]										95.9	0.4			**3.7**			
	Pork Chops (183)	0.0	**7.7**	[4.2 - 12.5]										92.4				**7.7**			
	Chickens (941)	0.2	**6.4**	[4.9 - 8.1]										91.0	2.4	0.2	**0.4**	**6.0**			
Streptomycin	Chicken Breasts (357)	N/A	**39.2**	[34.1 - 44.5]												60.8	**11.2**	**28.0**			
	Ground Turkey (369)	N/A	**47.7**	[42.5 - 52.9]												52.3	**22.0**	**25.7**			
	Ground Beef (269)	N/A	**9.3**	[6.1 - 13.4]												90.7	**5.2**	**4.1**			
	Pork Chops (183)	N/A	**19.7**	[14.2 - 26.2]												80.3	**8.2**	**11.5**			
	Chickens (941)	N/A	**49.1**	[45.9 - 52.3]												50.9	**21.9**	**27.2**			
β-Lactam/β-Lactamase Inhibitor Combinations																					
Amoxicillin-Clavulanic Acid	Chicken Breasts (357)	1.4	**6.7**	[4.4 - 9.8]							4.8	31.1	44.0	12.0	1.4	**5.9**	**0.8**				
	Ground Turkey (369)	9.2	**10.0**	[7.2 - 13.6]							2.4	15.4	30.6	32.2	9.2	**9.2**	**0.8**				
	Ground Beef (269)	0.0	**1.1**	[0.2 - 3.2]							5.6	29.4	58.7	5.2		**0.7**	**0.4**				
	Pork Chops (183)	1.1	**2.2**	[0.6 - 5.5]							3.3	30.6	48.1	14.8	1.1	**1.6**	**0.5**				
	Chickens (941)	1.1	**12.4**	[10.4 - 14.7]							3.9	33.7	38.0	10.8	1.1	**11.3**	**1.2**				
Cephems																					
Cefoxitin	Chicken Breasts (357)	2.5	**6.7**	[4.4 - 9.8]							1.4	21.8	54.9	12.6	2.5	**2.8**	**3.9**				
	Ground Turkey (369)	1.6	**9.2**	[6.5 - 12.6]							0.3	21.7	56.1	11.1	1.6	**4.1**	**5.1**				
	Ground Beef (269)	0.0	**1.1**	[0.2 - 3.2]							3.0	32.7	56.5	6.7		**0.7**	**0.4**				
	Pork Chops (183)	1.6	**0.5**	[0.0 - 3.0]							0.5	34.4	57.9	4.9	1.6		**0.5**				
	Chickens (941)	2.2	**12.5**	[10.5 - 14.8]						0.2	1.5	19.1	52.5	11.9	2.2	**5.4**	**7.1**				

[1] Percent of isolates with intermediate susceptibility

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

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

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

Table 54b. Distribution of MICs and Occurrence of Resistance among *E. coli* Isolates from Retail Meats and Chickens, 2010

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 (357)	1.1	**5.6**	[3.5 - 8.5]				3.4	45.4	42.0	2.5		1.1	**5.0**	**0.6**						
	Ground Turkey (369)	1.1	**7.9**	[5.3 - 11.1]				1.4	41.7	45.3	2.2	0.5	1.1	**5.4**	**2.4**						
	Ground Beef (269)	0.0	**1.1**	[0.2 - 3.2]				7.4	54.3	37.2				**1.1**							
	Pork Chops (183)	0.0	**0.0**	[0.0 - 2.0]				10.9	49.7	37.2	2.2										
	Chickens (941)	2.0	**10.0**	[8.1 - 12.1]				3.5	50.8	31.2	1.7	0.7	2.0	**8.1**	**1.9**						
Ceftriaxone	Chicken Breasts (357)	0.0	**6.4**	[4.1 - 9.5]					92.7	0.6	0.3		**0.6**	**2.8**	**3.1**						
	Ground Turkey (369)	0.3	**8.9**	[6.2 - 12.3]					90.0	0.3	0.5	0.3	**1.1**	**3.5**	**3.5**	**0.5**	**0.3**				
	Ground Beef (269)	0.0	**1.1**	[0.2 - 3.2]					98.5	0.4					**1.1**						
	Pork Chops (183)	0.0	**0.0**	[0.0 - 2.0]					98.4	1.1	0.5										
	Chickens (941)	0.1	**12.3**	[10.3 - 14.6]					86.8	0.3	0.4	0.1	**1.2**	**5.5**	**5.4**	**0.1**	**0.1**				
Folate Pathway Inhibitors																					
Sulfisoxazole	Chicken Breasts (357)	N/A	**38.9**	[33.8 - 44.2]											34.5	25.2	0.8	0.6		**38.9**	
	Ground Turkey (369)	N/A	**44.7**	[39.6 - 49.9]											30.9	21.1	3.0	0.3		**44.7**	
	Ground Beef (269)	N/A	**12.6**	[8.9 - 17.2]											56.5	30.5	0.4			**12.6**	
	Pork Chops (183)	N/A	**16.4**	[11.3 - 22.6]											53.0	29.5	1.1			**16.4**	
	Chickens (941)	N/A	**51.8**	[48.5 - 55.0]											32.9	13.8	0.5	0.7	0.2	**51.8**	
Trimethoprim-Sulfamethoxazole	Chicken Breasts (357)	N/A	**4.2**	[2.4 - 6.8]				77.6	10.4	5.6	1.1	1.1	**0.6**	**3.6**							
	Ground Turkey (369)	N/A	**5.1**	[3.1 - 7.9]				75.3	13.0	3.8	1.6	1.1	**0.5**	**4.6**							
	Ground Beef (269)	N/A	**0.7**	[0.1 - 2.7]				91.4	7.1	0.7				**0.7**							
	Pork Chops (183)	N/A	**3.8**	[1.6 - 7.7]				88.5	6.6	1.1				**3.8**							
	Chickens (941)	N/A	**6.4**	[4.9 - 8.1]				72.6	11.7	5.4	3.3	0.6	**0.1**	**6.3**							
Penicillins																					
Ampicillin	Chicken Breasts (357)	0.3	**16.5**	[12.8 - 20.8]							13.4	48.2	21.3	0.3	0.3		**16.5**				
	Ground Turkey (369)	0.3	**52.6**	[47.3 - 57.8]							6.8	30.1	9.8	0.5	0.3		**52.6**				
	Ground Beef (269)	0.0	**4.8**	[2.6 - 8.1]							13.0	52.8	28.6	0.7			**4.8**				
	Pork Chops (183)	0.5	**19.1**	[13.7 - 25.6]							9.8	49.7	19.7	1.1	0.5	**0.5**	**18.6**				
	Chickens (941)	0.0	**22.2**	[19.6 - 25.0]							15.1	49.0	13.4	0.3		**0.4**	**21.8**				
Phenicols																					
Chloramphenicol	Chicken Breasts (357)	0.6	**1.4**	[0.5 - 3.2]								5.0	56.0	37.0	0.6		**1.4**				
	Ground Turkey (369)	1.1	**3.5**	[1.9 - 5.9]								4.1	55.0	36.3	1.1	**0.3**	**3.3**				
	Ground Beef (269)	0.4	**2.6**	[1.1 - 5.3]								4.1	53.9	39.0	0.4	**0.4**	**2.2**				
	Pork Chops (183)	2.7	**1.6**	[0.3 - 4.7]								8.2	50.8	36.6	2.7	**1.1**	**0.5**				
	Chickens (941)	1.0	**0.7**	[0.3 - 1.5]								8.1	61.1	29.1	1.0		**0.7**				

[1] Percent of isolates with intermediate susceptibility

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

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

[4] The unshaded areas indicate 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 54c. Distribution of MICs and Occurrence of Resistance among *E. coli* Isolates from Retail Meats and Chickens, 2010

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 (357)	0.0	**0.3**	[0.0 - 1.6]	95.0	1.4		0.6	2.5		0.3			**0.3**							
	Ground Turkey (369)	0.0	**0.5**	[0.1 - 1.9]	94.6	2.4		0.3	2.2				**0.3**	**0.3**							
	Ground Beef (269)	0.0	**0.0**	[0.0 - 1.4]	100.0																
	Pork Chops (183)	0.0	**0.0**	[0.0 - 2.0]	96.7	2.2	0.5		0.5												
	Chickens (941)	0.0	**0.2**	[0.0 - 0.8]	93.6	2.7	0.3	1.5	1.7					**0.2**							
Nalidixic Acid	Chicken Breasts (357)	N/A	**3.6**	[2.0 - 6.1]						1.7	17.1	70.6	7.0				**3.6**				
	Ground Turkey (369)	N/A	**2.7**	[1.3 - 4.9]						0.5	17.6	71.8	7.0	0.3		**0.3**	**2.4**				
	Ground Beef (269)	N/A	**0.0**	[0.0 - 1.4]						1.1	12.3	79.6	7.1								
	Pork Chops (183)	N/A	**0.5**	[0.0 - 3.0]						3.3	18.6	67.2	9.3	1.1			**0.5**				
	Chickens (941)	N/A	**3.4**	[2.3 - 4.8]						1.4	21.4	65.7	7.7	0.4	0.1	**1.0**	**2.4**				
Tetracyclines																					
Tetracycline	Chicken Breasts (357)	1.1	**38.9**	[33.8 - 44.2]									59.9	1.1	**0.3**	**0.8**	**37.8**				
	Ground Turkey (369)	0.5	**69.4**	[64.4 - 74.0]									30.1	0.5	**0.3**	**2.4**	**66.7**				
	Ground Beef (269)	2.2	**22.7**	[17.8 - 28.2]									75.1	2.2	**1.9**	**1.5**	**19.3**				
	Pork Chops (183)	2.7	**44.3**	[36.9 - 51.8]									53.0	2.7	**1.6**	**3.3**	**39.3**				
	Chickens (941)	2.0	**42.9**	[39.7 - 46.2]									55.0	2.0	**0.7**	**7.3**	**34.9**				

[1] Percent of isolates with intermediate susceptibility

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

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

[4] The unshaded areas 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

Table 55a. Antimicrobial Resistance among *E. coli* Isolates from Retail Meats and Chickens, by Year, 2000-2010

Year			2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Number of Isolates Tested		Chicken Breasts			282	396	400	393	418	299	306	315	357
		Ground Turkey			304	333	376	396	388	315	300	306	369
		Ground Beef			295	311	338	316	295	256	250	247	269
		Pork Chops			184	218	232	205	182	152	146	147	183
		Chickens	285	1989	2100	1365	1697	2232	1357	1510	986	877	941
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	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	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	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	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
	Gentamicin (MIC ≥ 16 µg/ml)	Chicken Breasts			23.1% 65	29.3% 116	30.0% 120	37.7% 148	37.3% 156	34.4% 103	34.0% 104	34.3% 108	31.9% 114
		Ground Turkey			27.0% 82	29.7% 99	29.3% 110	27.5% 109	29.6% 115	27.0% 85	37.0% 111	37.9% 116	24.9% 92
		Ground Beef			0.3% 1	1.0% 3	0.6% 2	0.0% 0	4.1% 12	0.0% 0	2.0% 5	0.8% 2	0.4% 1
		Pork Chops			1.1% 2	1.4% 3	1.3% 3	0.0% 0	1.1% 2	1.3% 2	1.4% 2	4.1% 6	2.7% 5
		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	44.5% 439	43.3% 380	43.0% 405
	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	6.9% 21	5.4% 17	6.2% 22
		Ground Turkey			13.2% 40	16.8% 56	16.0% 60	11.4% 45	14.7% 57	15.6% 49	19.0% 57	20.6% 63	21.4% 79
		Ground Beef			2.4% 7	2.9% 9	2.4% 8	0.6% 2	4.7% 14	1.6% 4	4.0% 10	2.0% 5	3.7% 10
		Pork Chops			5.4% 10	8.7% 19	8.2% 19	7.3% 15	6.0% 11	4.6% 7	6.2% 9	6.1% 9	7.7% 14
		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	10.2% 101	7.9% 69	6.4% 60
	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	43.8% 134	38.1% 120	39.2% 140
		Ground Turkey			57.6% 175	54.7% 182	49.2% 185	43.4% 172	43.8% 170	44.8% 141	57.3% 172	57.5% 176	47.7% 176
		Ground Beef			9.5% 28	9.0% 28	11.8% 40	5.4% 17	14.2% 42	6.3% 16	10.4% 26	8.1% 20	9.3% 25
		Pork Chops			22.3% 41	19.7% 43	21.1% 49	13.2% 27	13.7% 25	13.8% 21	19.9% 29	19.7% 29	19.7% 36
		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	54.6% 538	49.8% 437	49.1% 462
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	11.8% 36	13.3% 42	6.7% 24
		Ground Turkey			5.6% 17	3.0% 10	5.3% 20	3.8% 15	6.7% 26	6.3% 20	8.3% 25	9.8% 30	10.0% 37
		Ground Beef			2.0% 6	2.3% 7	3.9% 13	1.3% 4	2.4% 7	0.8% 2	2.4% 6	1.6% 4	1.1% 3
		Pork Chops			5.4% 10	5.1% 11	5.6% 13	2.9% 6	2.2% 4	0.7% 1	3.4% 5	6.8% 10	2.2% 4
		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	13.7% 135	12.4% 109	12.4% 117
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	11.8% 36	13.3% 42	6.7% 24
		Ground Turkey			3.3% 10	1.2% 4	4.5% 17	3.3% 13	6.2% 24	6.3% 20	6.3% 19	7.8% 24	9.2% 34
		Ground Beef			1.4% 4	0.3% 1	1.2% 4	1.0% 3	2.0% 6	0.8% 2	2.4% 6	1.6% 4	1.1% 3
		Pork Chops			3.3% 6	2.3% 5	2.2% 5	1.5% 3	1.6% 3	0.7% 1	3.4% 5	6.8% 10	0.5% 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	13.8% 136	11.4% 100	12.5% 118
	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	10.8% 33	11.7% 37	5.6% 20
		Ground Turkey			1.0% 3	0.3% 1	1.1% 4	1.8% 7	3.1% 12	6.0% 19	3.7% 11	6.2% 19	7.9% 29
		Ground Beef			0.0% 0	0.3% 1	0.9% 3	0.6% 2	1.0% 3	0.8% 2	1.6% 4	0.8% 2	1.1% 3
		Pork Chops			0.5% 1	0.9% 2	0.4% 1	0.0% 0	0.0% 0	0.7% 1	3.4% 5	6.8% 10	0.0% 0
		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	10.5% 103	9.5% 83	10.0% 94
	Ceftriaxone (MIC ≥ 4 µg/ml)	Chicken Breasts			7.8% 22	9.1% 36	6.5% 26	10.2% 40	9.1% 38	6.4% 19	11.1% 34	12.4% 39	6.4% 23
		Ground Turkey			1.3% 4	0.3% 1	1.3% 5	2.3% 9	3.1% 12	6.0% 19	3.7% 11	6.9% 21	8.9% 33
		Ground Beef			0.0% 0	0.3% 1	1.5% 5	1.9% 6	1.7% 5	0.8% 2	1.6% 4	0.8% 2	1.1% 3
		Pork Chops			0.5% 1	0.9% 2	0.4% 1	0.5% 1	0.6% 1	0.7% 1	3.4% 5	6.8% 10	0.0% 0
		Chickens	6.3% 18	7.6% 152	8.6% 181	9.4% 128	7.2% 122	9.0% 200	14.7% 199	10.3% 155	13.5% 133	11.5% 101	12.3% 116

Table 55b. Antimicrobial Resistance among *E. coli* Isolates from Retail Meats and Chickens, by Year, 2000-2010

Year			2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Number of Isolates Tested		Chicken Breasts			282	396	400	393	418	299	306	315	357
		Ground Turkey			304	333	376	396	388	315	300	306	369
		Ground Beef			295	311	338	316	295	256	250	247	269
		Pork Chops			184	218	232	205	182	152	146	147	183
		Chickens	285	1989	2100	1365	1697	2232	1357	1510	986	877	941
Antimicrobial Class	**Antimicrobial (Resistance Breakpoint)**	**Isolate Source**											
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	39.2% 120	40.6% 128	38.9% 139
		Ground Turkey			48.0% 146	51.7% 172	48.4% 182	48.0% 190	48.5% 188	48.9% 154	51.0% 153	53.9% 165	44.7% 165
		Ground Beef			9.8% 29	10.3% 32	13.0% 44	7.0% 22	12.5% 37	9.4% 24	11.6% 29	7.7% 19	12.6% 34
		Pork Chops			12.5% 23	15.1% 33	19.4% 45	14.1% 29	20.3% 37	11.8% 18	16.4% 24	14.3% 21	16.4% 30
		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	52.7% 520	52.6% 461	51.8% 487
	Trimethoprim-Sulfamethoxazole (MIC ≥ 4 / 76 µg/ml)	Chicken Breasts			3.6% 10	7.1% 28	4.3% 17	7.4% 29	8.9% 37	5.0% 15	3.6% 11	2.2% 7	4.2% 15
		Ground Turkey			4.0% 12	6.9% 23	3.7% 14	5.1% 20	8.0% 31	7.9% 25	5.3% 16	5.9% 18	5.1% 19
		Ground Beef			0.7% 2	0.3% 1	0.6% 2	0.6% 2	1.4% 4	1.2% 3	2.0% 5	2.0% 5	0.7% 2
		Pork Chops			1.1% 2	2.8% 6	3.9% 9	1.5% 3	2.2% 4	1.3% 2	6.2% 9	2.7% 4	3.8% 7
		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	9.1% 90	7.0% 61	6.4% 60
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	23.5% 72	22.2% 70	16.5% 59
		Ground Turkey			31.3% 95	35.7% 119	33.2% 125	38.1% 151	42.0% 163	48.3% 152	58.0% 174	56.2% 172	52.6% 194
		Ground Beef			6.1% 18	5.1% 16	5.3% 18	3.5% 11	9.2% 27	6.6% 17	6.4% 16	4.9% 12	4.8% 13
		Pork Chops			13.6% 25	13.3% 29	15.1% 35	16.1% 33	15.9% 29	15.8% 24	15.1% 22	11.6% 17	19.1% 35
		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	23.5% 232	19.8% 174	22.2% 209
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	1.0% 3	0.6% 2	1.4% 5
		Ground Turkey			0.3% 1	3.6% 12	0.8% 3	4.0% 16	2.3% 9	2.9% 9	3.7% 11	3.3% 10	3.5% 13
		Ground Beef			1.0% 3	2.3% 7	3.6% 12	1.6% 5	1.4% 4	3.9% 10	0.8% 2	2.4% 6	2.6% 7
		Pork Chops			1.6% 3	4.1% 9	4.3% 10	3.4% 7	6.6% 12	3.9% 6	3.4% 5	4.8% 7	1.6% 3
		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	1.0% 10	1.1% 10	0.7% 7
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	0.0% 0	0.3% 1	0.3% 1
		Ground Turkey			0.0% 0	0.3% 1	0.8% 3	0.0% 0	0.5% 2	0.3% 1	0.0% 0	0.7% 2	0.5% 2
		Ground Beef			0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Pork Chops			0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
		Chickens	0.0% 0	0.2% 3	0.0% 0	0.1% 1	0.2% 3	0.4% 8	0.0% 0	0.1% 1	0.6% 6	0.5% 4	0.2% 2
	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	2.9% 9	2.9% 9	3.6% 13
		Ground Turkey			4.3% 13	11.7% 39	10.6% 40	10.4% 41	5.2% 20	2.2% 7	3.7% 11	2.6% 8	2.7% 10
		Ground Beef			0.0% 0	1.0% 3	1.5% 5	1.3% 4	0.7% 2	0.4% 1	0.4% 1	0.4% 1	0.0% 0
		Pork Chops			0.5% 1	0.5% 1	0.0% 0	1.5% 3	0.5% 1	0.0% 0	0.0% 0	0.0% 0	0.5% 1
		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	6.0% 59	3.2% 28	3.4% 32
Tetracyclines	Tetracycline (MIC ≥ 16 µg/ml)	Chicken Breasts			46.1% 130	42.9% 170	48.0% 192	46.6% 183	50.5% 211	40.5% 121	43.8% 134	41.6% 131	38.9% 139
		Ground Turkey			77.0% 234	77.8% 259	74.2% 279	78.0% 309	76.5% 297	80.0% 252	85.7% 257	82.0% 251	69.4% 256
		Ground Beef			30.9% 91	25.1% 78	22.8% 77	16.5% 52	25.4% 75	21.9% 56	24.0% 60	18.6% 62	22.7% 61
		Pork Chops			52.7% 97	46.3% 101	56.0% 130	45.9% 94	52.7% 96	50.0% 76	54.8% 80	46.9% 69	44.3% 81
		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	47.4% 467	49.1% 431	42.9% 404

[1] Sulfamethoxazole was tested from 1996 through 2003 and was replaced by sulfisoxazole in 200

Table 56a. Resistance Patterns among *E. coli* Isolates from Retail Meats and Chickens, by Year, 2000-2010

Year		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Number of Isolates Tested	Chicken Breasts			282	396	400	393	418	299	306	315	357
	Ground Turkey			304	333	376	396	388	315	300	306	369
	Ground Beef			295	311	338	316	295	256	250	247	269
	Pork Chops			184	218	232	205	182	152	146	147	183
	Chickens	285	1989	2100	1365	1697	2232	1357	1510	986	877	941
Resistance Pattern	**Isolate Source**											
1. No Resistance Detected	Chicken Breasts			27.0% 76	21.7% 86	20.8% 83	20.6% 81	23.7% 99	29.1% 87	33.3% 102	34.3% 108	33.3% 119
	Ground Turkey			17.1% 52	15.9% 53	19.1% 72	16.2% 64	16.0% 62	13.0% 41	8.3% 25	11.8% 36	17.3% 64
	Ground Beef			64.4% 190	70.7% 220	73.1% 247	80.4% 254	71.5% 211	77.0% 197	73.2% 183	78.1% 193	76.6% 206
	Pork Chops			43.5% 80	49.5% 108	37.9% 88	49.3% 101	42.9% 78	48.0% 73	43.8% 64	51.0% 75	50.8% 93
	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	20.9% 206	21.9% 192	21.5% 202
2. Resistant to ≥ 3 Antimicrobial Classes	Chicken Breasts			34.8% 98	38.9% 254	35.3% 141	45.0% 177	43.3% 181	33.8% 101	36.6% 112	37.5% 118	28.6% 102
	Ground Turkey			53.3% 162	53.5% 178	51.9% 195	52.5% 208	55.2% 214	57.5% 181	63.7% 191	66.3% 203	55.3% 204
	Ground Beef			8.1% 24	6.4% 20	10.4% 35	5.4% 17	11.5% 34	9.0% 23	11.2% 28	6.9% 17	11.5% 31
	Pork Chops			16.8% 31	16.5% 36	21.1% 49	16.1% 33	15.9% 29	15.1% 23	17.8% 26	15.0% 22	17.5% 32
	Chickens	55.1% 157	50.3% 1000	43.9% 921	39.2% 535	43.0% 729	41.5% 926	43.7% 593	36.7% 554	44.1% 435	41.4% 363	38.3% 360
3. Resistant to ≥ 4 Antimicrobial Classes	Chicken Breasts			11.3% 32	11.1% 44	12.5% 50	12.2% 48	14.6% 61	10.4% 31	13.7% 42	13.7% 43	10.6% 38
	Ground Turkey			20.1% 61	26.1% 87	24.5% 92	24.0% 95	25.8% 100	27.0% 85	32.3% 97	38.9% 119	28.2% 104
	Ground Beef			1.7% 5	3.9% 12	4.7% 16	1.9% 6	5.8% 17	4.7% 12	4.4% 11	3.6% 9	3.0% 8
	Pork Chops			4.4% 8	6.0% 13	7.8% 18	4.9% 10	7.7% 14	3.3% 5	7.5% 11	10.9% 16	6.0% 11
	Chickens	19.3% 55	16.1% 320	14.3% 300	13.8% 188	11.8% 200	14.9% 333	17.5% 137	13.6% 206	16.6% 164	14.5% 127	15.1% 142
4. Resistant to ≥ 5 Antimicrobial Classes	Chicken Breasts			4.6% 13	5.8% 23	6.0% 24	5.9% 23	7.4% 31	5.7% 17	8.2% 25	6.4% 20	4.5% 16
	Ground Turkey			3.6% 11	7.8% 26	6.9% 26	6.3% 25	5.7% 22	4.1% 13	6.3% 19	7.8% 24	6.5% 24
	Ground Beef			0.3% 1	2.6% 8	2.7% 9	1.0% 3	2.4% 7	0.4% 1	2.0% 5	1.2% 3	0.7% 2
	Pork Chops			1.6% 3	2.8% 6	2.2% 5	1.5% 3	3.3% 6	1.3% 2	4.1% 6	5.4% 8	1.1% 2
	Chickens	8.1% 23	8.1% 162	7.4% 155	7.2% 98	5.8% 98	7.6% 170	8.9% 121	7.1% 107	9.0% 89	7.5% 66	8.2% 77
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	1.0% 3	0.6% 2	1.1% 4
	Ground Turkey			0.0% 0	2.7% 9	0.5% 2	1.8% 7	0.8% 3	1.9% 6	2.0% 6	2.3% 7	2.2% 8
	Ground Beef			0.3% 1	1.0% 3	1.5% 5	0.6% 2	0.3% 1	0.4% 1	0.0% 0	0.0% 0	0.4% 1
	Pork Chops			0.5% 1	1.4% 3	1.3% 3	1.0% 2	1.1% 2	0.7% 1	1.4% 2	2.0% 3	0.5% 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	0.5% 5	0.2% 2	0.3% 3

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

Table 56b. Resistance Patterns among *E. coli* Isolates from Retail Meats and Chickens, by Year, 2000-2010

Year		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Number of Isolates Tested	Chicken Breasts			282	396	400	393	418	299	306	315	357
	Ground Turkey			304	333	376	396	388	315	300	306	369
	Ground Beef			295	311	338	316	295	256	250	247	269
	Pork Chops			184	218	232	205	182	152	146	147	183
	Chickens	285	1989	2100	1365	1697	2232	1357	1510	986	877	941
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	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	0.0% 0	0.3% 1	1.1% 4
	Ground Beef			0.0% 0	0.0% 0	0.0% 0	0.3% 1	0.3% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0
	Pork Chops			0.5% 1	0.0% 0	0.4% 1	0.5% 1	0.0% 0	0.0% 0	0.0% 0	0.7% 1	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	0.3% 3	0.2% 2	0.0% 0
7. At Least ACSSuTAuCx[2] Resistant	Chicken Breasts			0.4% 1	0.0% 0	1.0% 4	0.3% 1	1.0% 4	0.7% 2	0.7% 2	0.6% 2	0.8% 3
	Ground Turkey			0.0% 0	0.3% 1	0.0% 0	0.3% 1	0.0% 0	1.3% 4	1.3% 4	1.0% 3	1.1% 4
	Ground Beef			0.0% 0	0.0% 0	0.9% 3	0.3% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.4% 1
	Pork Chops			0.0% 0	0.5% 1	0.4% 1	0.0% 0	0.0% 0	0.7% 1	0.7% 1	2.0% 3	0.0% 0
	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	0.4% 4	0.2% 2	0.3% 3
8. At Least Ceftriaxone and Nalidixic Acid Resistant	Chicken Breasts			0.7% 2	0.5% 2	1.5% 6	0.3% 1	0.2% 1	0.0% 0	1.0% 3	1.0% 3	0.3% 1
	Ground Turkey			0.3% 1	0.3% 1	0.3% 1	0.3% 1	0.0% 0	0.6% 2	0.0% 0	0.0% 0	0.0% 0
	Ground Beef			0.0% 0	0.0% 0	0.3% 1	0.3% 1	0.3% 1	0.0% 0	0.0% 0	0.4% 1	0.0% 0
	Pork Chops			0.5% 1	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0	0.0% 0
	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	0.4% 4	0.6% 5	1.0% 9

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

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

Appendix A

Table A1. Concentration Ranges Used for Susceptibility Testing of *Salmonella* and *E. coli* , 2010

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* , 2010

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, 1996-2010[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	2008	2009	2010
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 and a study of *E. coli* isolates from people in the community began in 2004

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

Table B2. Antimicrobial Agents and Antimicrobial Susceptibility Testing Methods for *Campylobacter* Isolates from Humans and Chickens, 1997-2010[1]

	Method		E-Test®								Broth Microdilution Sensititre® Plate: CAMPY					
	Year		1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
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

Table B3. Antimicrobial Agents and Antimicrobial Susceptibility Testing Methods for *Campylobacter* Isolates from Retail Meats, 2002-2010

	Method							Agar Dilution		Broth Microdilution Sensititre® Plate: CAMPY						
	Year							2002	2003	2004	2005	2006	2007	2008	2009	2010
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

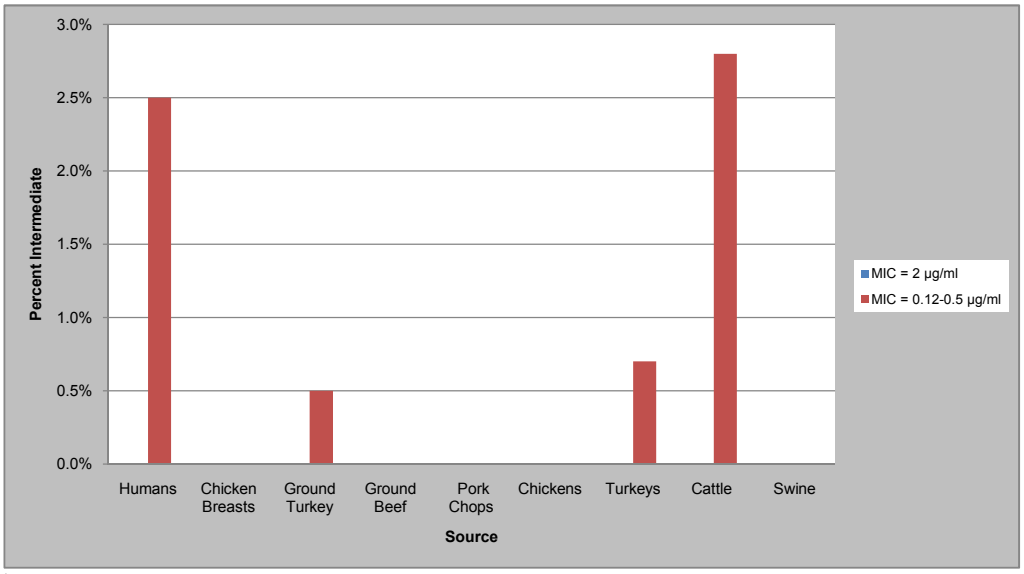
Table C. Non-Typhoidal *Salmonella* Isolates from Humans, Retail Meats, and Food Animals with Intermediate Susceptibility and Resistance to Ciprofloxacin, by Year, 1996-2010

Humans					Retail Meats					Food Animals				
Source	Current Breakpoints [1]		New Breakpoints [2]		Meat Type	Current Breakpoints [1]		New Breakpoints [2]		Meat Type	Current Breakpoints [1]		New Breakpoints [2]	
Year (N)	%I	%R	%I	%R	Year (N)	%I	%R	%I	%R	Year (N)	%I	%R	%I	%R
Humans					**Chickens Breasts**					**Chickens**				
1996 (1318)	0.0	0.0	0.4	0.0	2002 (60)	0.0	0.0	0.0	0.0	1997 (214)	0.0	0.0	0.0	0.0
1997 (1297)	0.0	0.0	1.2	0.0	2003 (83)	0.0	0.0	1.2	0.0	1998 (561)	0.0	0.0	0.0	0.2
1998 (1455)	0.0	0.1	1.3	0.1	2004 (157)	0.0	0.0	0.0	0.0	1999 (1438)	0.0	0.0	0.2	0.1
1999 (1493)	0.0	0.1	0.8	0.1	2005 (153)	0.0	0.0	0.7	0.0	2000 (1173)	0.0	0.0	0.6	0.0
2000 (1372)	0.0	0.4	1.8	0.4	2006 (152)	0.0	0.0	0.7	0.0	2001 (1307)	0.0	0.0	0.0	0.0
2001 (1410)	0.0	0.2	1.8	0.2	2007 (99)	0.0	0.0	0.0	0.0	2002 (1500)	0.0	0.0	7.0	0.1
2002 (1998)	0.0	0.1	1.6	0.1	2008 (198)	0.0	0.0	0.0	0.0	2003 (1158)	0.0	0.1	0.3	0.1
2003 (1855)	0.1	0.2	1.5	0.2	2009 (272)	0.0	0.0	0.4	0.0	2004 (1280)	0.0	0.0	0.4	0.0
2004 (1782)	0.1	0.2	2.0	0.3	2010 (171)	0.0	0.0	0.0	0.0	2005 (1989)	0.0	0.0	0.3	0.0
2005 (2034)	0.0	<0.1	1.9	0.1						2006 (1380)	0.0	0.0	0.1	0.0
2006 (2172)	0.0	0.1	2.6	0.1						2007 (994)	0.0	0.0	0.1	0.0
2007 (2145)	0.0	0.1	2.4	0.1						2008 (624)	0.0	0.0	0.0	0.0
2008 (2384)	<0.1	0.1	2.3	0.2						2009 (551)	0.0	0.0	0.0	0.0
2009 (2193)	0.1	<0.1	2.1	0.3						2010 (564)	0.0	0.0	0.0	0.0
2010 (2474)	0.0	0.2	2.5	0.2	**Ground Turkeys**					**Turkeys**				
					2002 (74)	0.0	0.0	5.4	2.7	1997 (107)	0.0	0.0	2.8	0.0
					2003 (114)	0.0	0.0	4.4	0.0	1998 (240)	0.0	0.0	1.7	0.4
					2004 (142)	0.0	0.0	0.0	0.0	1999 (713)	0.0	0.0	5.3	0.0
					2005 (183)	0.0	0.0	1.1	0.0	2000 (518)	0.0	0.0	5.0	0.4
					2006 (159)	0.0	0.0	0.6	0.0	2001 (550)	0.0	0.0	4.9	0.2
					2007 (190)	0.0	0.0	2.6	0.0	2002 (244)	0.0	0.0	4.9	0.4
					2008 (246)	0.0	0.0	0.4	0.0	2003 (262)	0.0	0.0	3.1	0.0
					2009 (193)	0.0	0.0	0.0	0.0	2004 (236)	0.0	0.0	2.1	0.0
					2010 (202)	0.0	0.0	0.5	0.0	2005 (227)	0.0	0.0	2.2	0.0
										2006 (304)	0.0	0.0	0.7	0.0
										2007 (271)	0.0	0.0	1.1	0.0
										2008 (148)	0.0	0.0	0.7	0.0
										2009 (121)	0.0	0.0	0.8	0.0
										2010 (151)	0.0	0.0	0.7	0.0
					Ground Beef					**Cattle**				
					2002 (9)	0.0	0.0	0.0	0.0	1997 (24)	0.0	0.0	0.0	0.0
					2003 (10)	0.0	0.0	0.0	0.0	1998 (284)	0.0	0.0	0.0	0.0
					2004 (14)	0.0	0.0	0.0	0.0	1999 (1610)	0.0	0.0	0.1	0.0
					2005 (8)	0.0	0.0	0.0	0.0	2000 (1388)	0.0	0.0	0.4	0.0
					2006 (19)	0.0	0.0	0.0	0.0	2001 (893)	0.0	0.0	0.3	0.0
					2007 (13)	0.0	0.0	0.0	0.0	2002 (1008)	0.0	0.0	0.3	0.0
					2008 (24)	0.0	0.0	0.0	0.0	2003 (670)	0.0	0.0	0.6	0.0
					2009 (14)	0.0	0.0	14.3	0.0	2004 (607)	0.0	0.0	1.8	0.0
					2010 (7)	0.0	0.0	0.0	0.0	2005 (329)	0.0	0.0	1.5	0.0
										2006 (389)	0.0	0.0	0.3	0.3
										2007 (439)	0.0	0.0	0.7	0.0
										2008 (443)	0.0	0.0	0.7	0.0
										2009 (200)	0.0	0.0	1.0	0.0
										2010 (247)	0.0	0.0	2.8	0.0
					Pork Chops					**Swine**				
					2002 (10)	0.0	0.0	0.0	0.0	1997 (111)	0.0	0.0	0.0	0.0
					2003 (5)	0.0	0.0	0.0	0.0	1998 (793)	0.0	0.0	0.0	0.0
					2004 (11)	0.0	0.0	0.0	0.0	1999 (876)	0.0	0.0	0.0	0.0
					2005 (9)	0.0	0.0	0.0	0.0	2000 (451)	0.0	0.0	0.0	0.0
					2006 (8)	0.0	0.0	0.0	0.0	2001 (418)	0.0	0.0	0.0	0.0
					2007 (18)	0.0	0.0	0.0	0.0	2002 (379)	0.0	0.0	0.3	0.0
					2008 (23)	0.0	0.0	0.0	0.0	2003 (211)	0.0	0.0	0.0	0.0
					2009 (8)	0.0	0.0	0.0	0.0	2004 (308)	0.0	0.0	0.0	0.0
					2010 (20)	0.0	0.0	0.0	0.0	2005 (301)	0.0	0.0	0.3	0.0
										2006 (304)	0.0	0.0	0.0	0.0
										2007 (211)	0.0	0.0	0.0	0.0
										2008 (111)	0.0	0.0	0.0	0.0
										2009 (120)	0.0	0.0	0.0	0.0
										2010 (111)	0.0	0.0	0.0	0.0

[1] The breakpoints used for ciprofloxacin in this report are: Resistant (R) MIC≥4 μg/ml, Intermediate (I) MIC=2 μg/ml

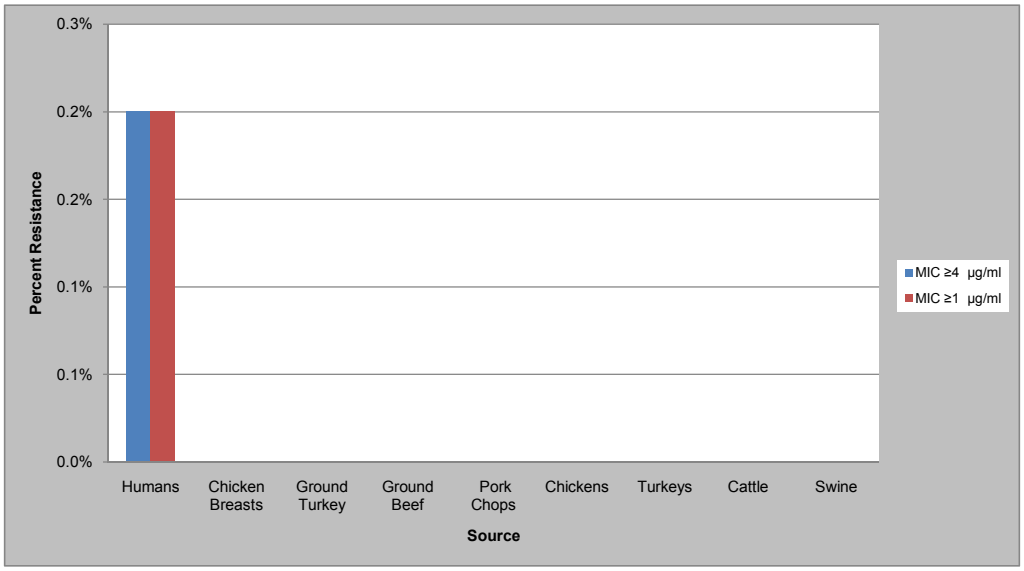
[2] The new breakpoints that will be used for ciprofloxacin in 2011 NARMS Reports are: Resistant (R) MIC≥1 μg/ml, Intermediate (I) MIC=0.12-0.5 μg/ml

Figure C1. Percentage of Non-Typhoidal *Salmonella* Isolates from Humans, Retail Meats, and Food Animals with Intermediate Susceptibility to Ciprofloxacin, 2010[1]



[1] The intermediate breakpoint used for ciprofloxacin in this report is 2 µg/ml. The new intermediate breakpoint of 0.12-0.5 µg/ml will used in NARMS 2011 Reports

Figure C2. Percentage of Non-Typhoidal *Salmonella* Isolates from Humans, Retail Meats, and Food Animals Resistant to Ciprofloxacin, 2010[1]



[1] The resistant breakpoint used for ciprofloxacin in this report is ≥4 µg/ml. The new resistant breakpoint of ≥1 µg/ml will used in NARMS 2011 Reports