

The National Antimicrobial Resistance Monitoring System (NARMS)



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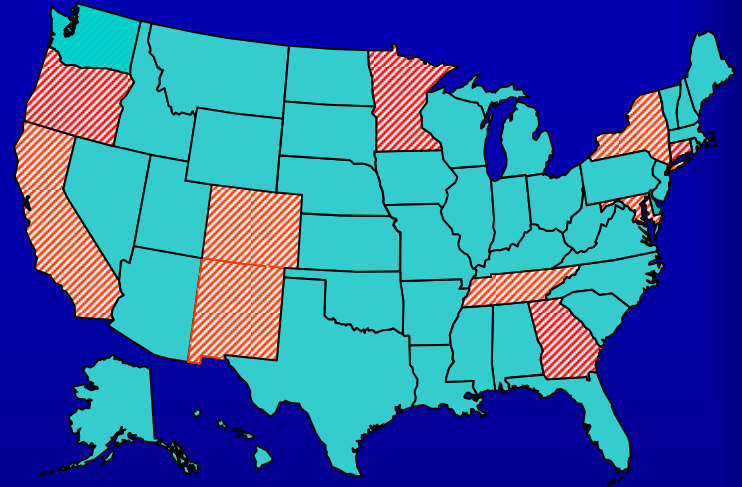
NARMS

- ❖ **The National Antimicrobial Resistance Monitoring System (NARMS) is a national collaborative network between the FDA, CDC and USDA as well as public health laboratories in all 50 states and local health departments in three major cities**
- ❖ **NARMS was developed to monitor changes in susceptibility/resistance of select zoonotic bacterial pathogens and commensal organisms recovered from animals, retail meats and humans to antimicrobial agents of human and veterinary importance**
- ❖ **NARMS monitors susceptibility/resistance phenotypes using three testing sites including:**
 - **FDA/CVM (retail meat and poultry)**
 - **CDC (humans)**
 - **USDA (animal/slaughter)**



NARMS/Retail Meats Sampling

- ❖ 10 FoodNet sites
- ❖ Similar sampling scheme
 - Random sampling of stores
 - Each site purchases 10 packages each of chicken breasts, pork chops, ground turkey, and ground beef
- ❖ All ten sites culture meat and poultry rinsates for *Salmonella* and *Campylobacter*
- ❖ In addition, four sites (GA, MD, OR and TN) culture rinsates for *E. coli* and *Enterococcus*
- ❖ Isolates are sent to FDA-OR for confirmation of identification and antimicrobial susceptibility testing



■ Retail Food Study Sites;
FoodNet laboratories



NARMS Retail meats sampled

Salmonella and Campylobacter

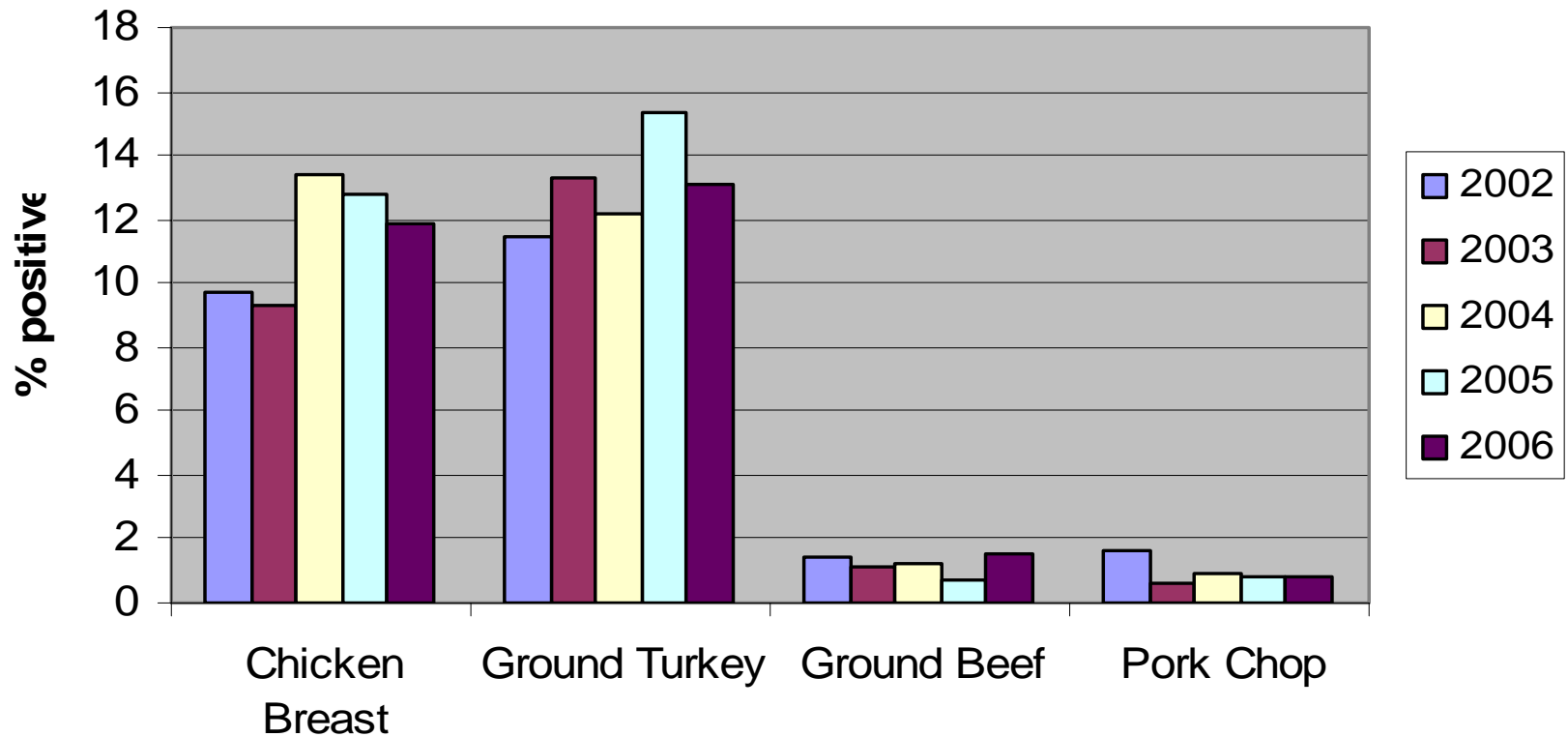
	<u>2002</u>	<u>2003</u>	<u>2004</u>	<u>2005</u>	<u>2006</u>
Chicken breast	616	897	1172	1194	1068
Ground turkey	642	857	1165	1195	1056
Ground beef	642	880	1186	1196	1070
Pork chop	613	899	1176	1196	1062
Total	2513	3533	4699	4781	4256*

*Preliminary data for 2006

2002, 6 states; 2003, 8 states; 2004, 2005 and 2006, 10 states

NARMS/Retail food preliminary data

Salmonella 2002 - 2006



2002, 6 FoodNet sites, n = 153
2003, 8 FoodNet sites, n = 212
2004, 10 FoodNet sites, n = 324
2005, 10 FoodNet sites, n = 353
2006, 10 FoodNet sites, n = 290*

Preliminary data

Total Number of *Salmonella* and Serotypes Isolated in 2004

	# Poultry Samples	# <i>Salmonella</i> Isolates	# <i>Salmonella</i> Serotypes
Human	NA	1798	>100
Chicken Breast	1,172	157 (13.4%)	15
Ground Turkey	1,165	142 (12.2%)	21

NA = not applicable

Top 5 Serotypes among Human and Retail Poultry Isolates, 2004

Rank	Human (N=1798)		Chicken Breast (N=157)		Ground Turkey (N=142)	
	Serotype	Count (%)	Serotype	Count (%)	Serotype	Count (%)
1	Typhimurium*	386 (21.5%)	Typhimurium*	49 (31.2%)	Heidelberg	37 (26.1%)
2	Enteritidis	272 (15.1%)	Kentucky	42 (26.8%)	Saintpaul	24 (16.9%)
3	Newport	189 (10.5%)	Heidelberg	31 (19.7%)	Reading	16 (11.3%)
4	Javiana	106 (5.9%)	Hadar	8 (5.1%)	Schwarzengrund	16 (11.3%)
5	Heidelberg	94 (5.2%)	Schwarzengrund	5 (3.2%)	Hadar	11 (7.7%)

*S. Typhimurium includes Typhimurium var. 5-

Other top 10 serotypes that are common among human and retail poultry isolates:

Human and Chicken Breast

S. Enteritidis

S. Montevideo

Human and Ground Turkey

S. Saintpaul

NARMS Slaughter *Salmonella* Data

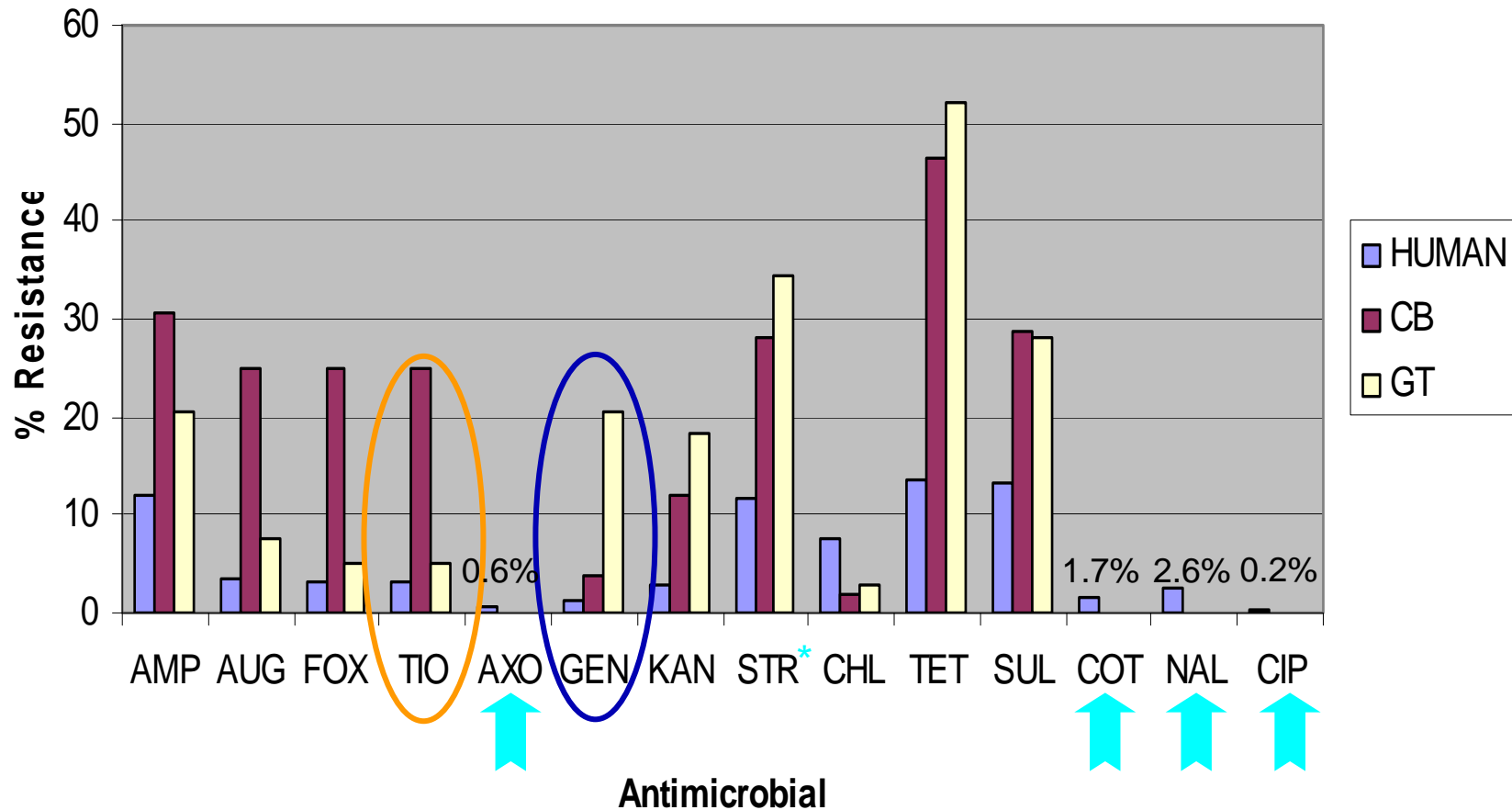
Top serotypes by Source for *Salmonella* slaughter isolates (All years)

SOURCE

Rank	Cattle n=6815		Chicken n=10,605		Swine n=3,839		Turkey n=3,147	
	Serotype	Pct	Serotype	Pct	Serotype	Pct	Serotype	Pct
1	Montevideo	13.4	Kentucky	35.5	Derby	25.8	Heidelberg	20.7
2	Anatum	8.9	Heidelberg	20.3	Typhimurium var 5 ^{-a}	11.2	Hadar	16.6
3	Newport	7.6	Typhimurium var 5 ^{-a}	6.1	Infantis	6.5	Senftenberg	8.2
4	Muenster	7.1	Typhimurium	4.9	Johannesburg	6.3	Reading	7.3
5	Typhimurium	5.6	Enteritidis	4.3	Anatum	6.1	Saintpaul	6.5
6	Typhimurium var 5 ^{-a}	5.5	Hadar	4.0	Heidelberg	3.9	Agona	5.0
7	Kentucky	5.1	Monophasic	3.1	Reading	3.9	Schwarzengrund	4.4
8	Cerro	4.0	Thompson	2.3	Saint Paul	3.0	Muenster	3.8
9	Mbandaka	3.9	Schwarzengrund	2.2	Typhimurium	2.8	Arizona	2.7
10	Agona	3.8	Montevideo	2.2	Agona	2.7	Typhimurium	2.6

^a=previously copenhagen

Antimicrobial Resistance Phenotypes among *Salmonella* Isolates: NARMS, 2004

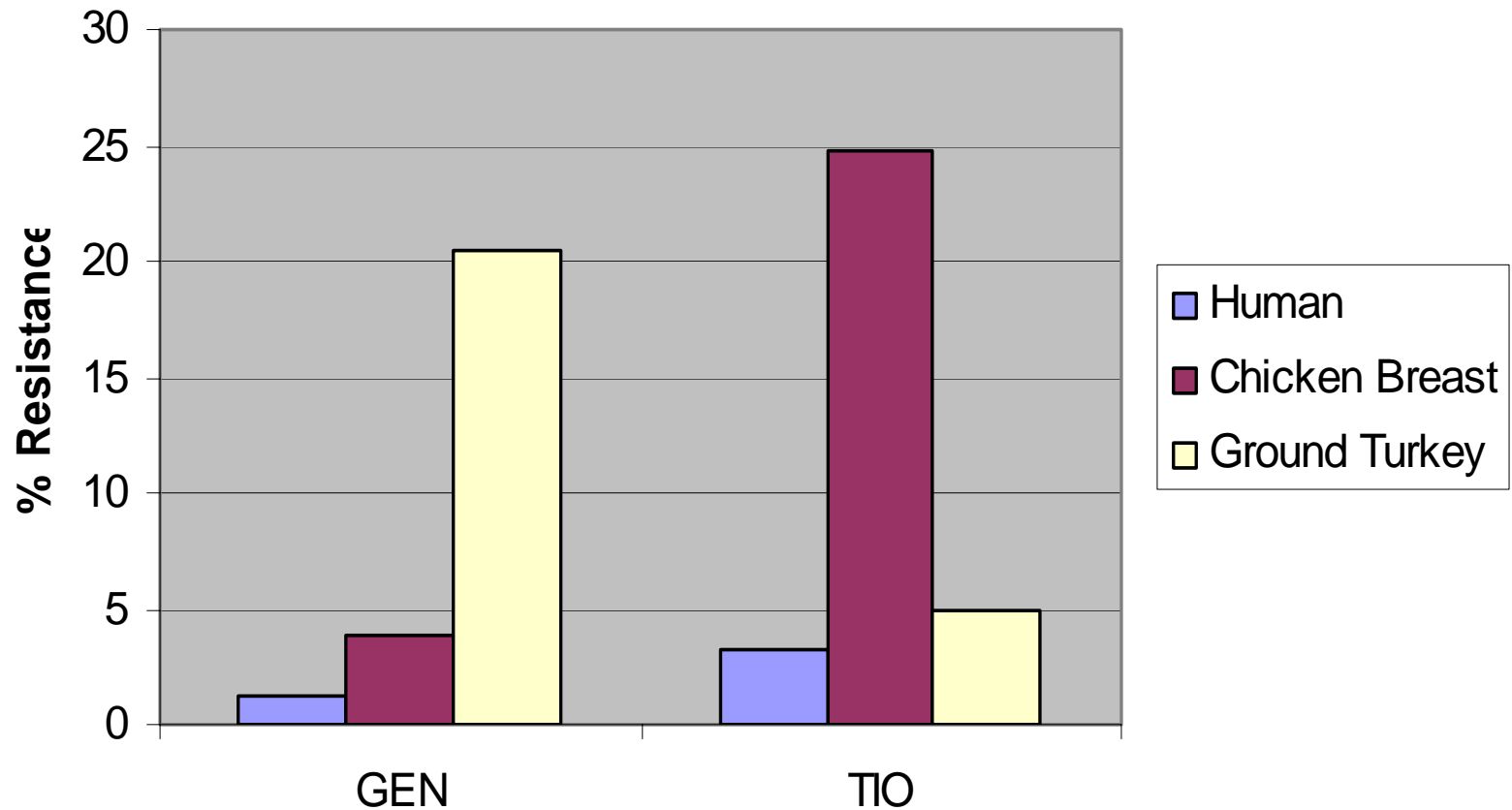


N = 2097 isolates; Human, n = 1798; Chicken breast, n = 157; Ground turkey, n = 142

*No CLSI breakpoint

All isolates were susceptible to amikacin

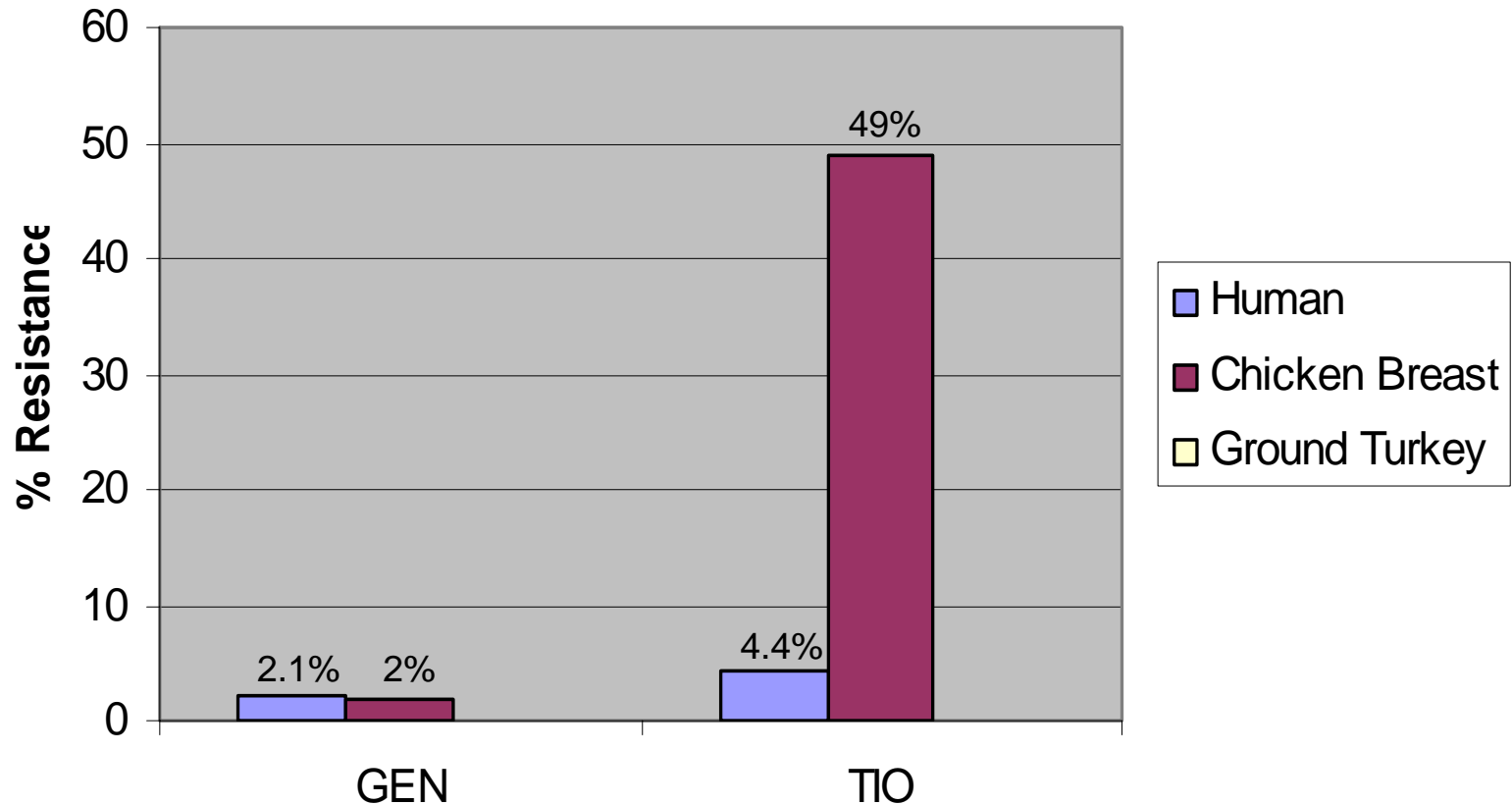
Gentamicin and Ceftiofur Resistance among *Salmonella* by Source, NARMS 2004



N = 2097 isolates; Human, n = 1798; Chicken breast, n = 157; Ground turkey, n = 142

GEN^R = 57 isolates; TIO^R = 106 isolates

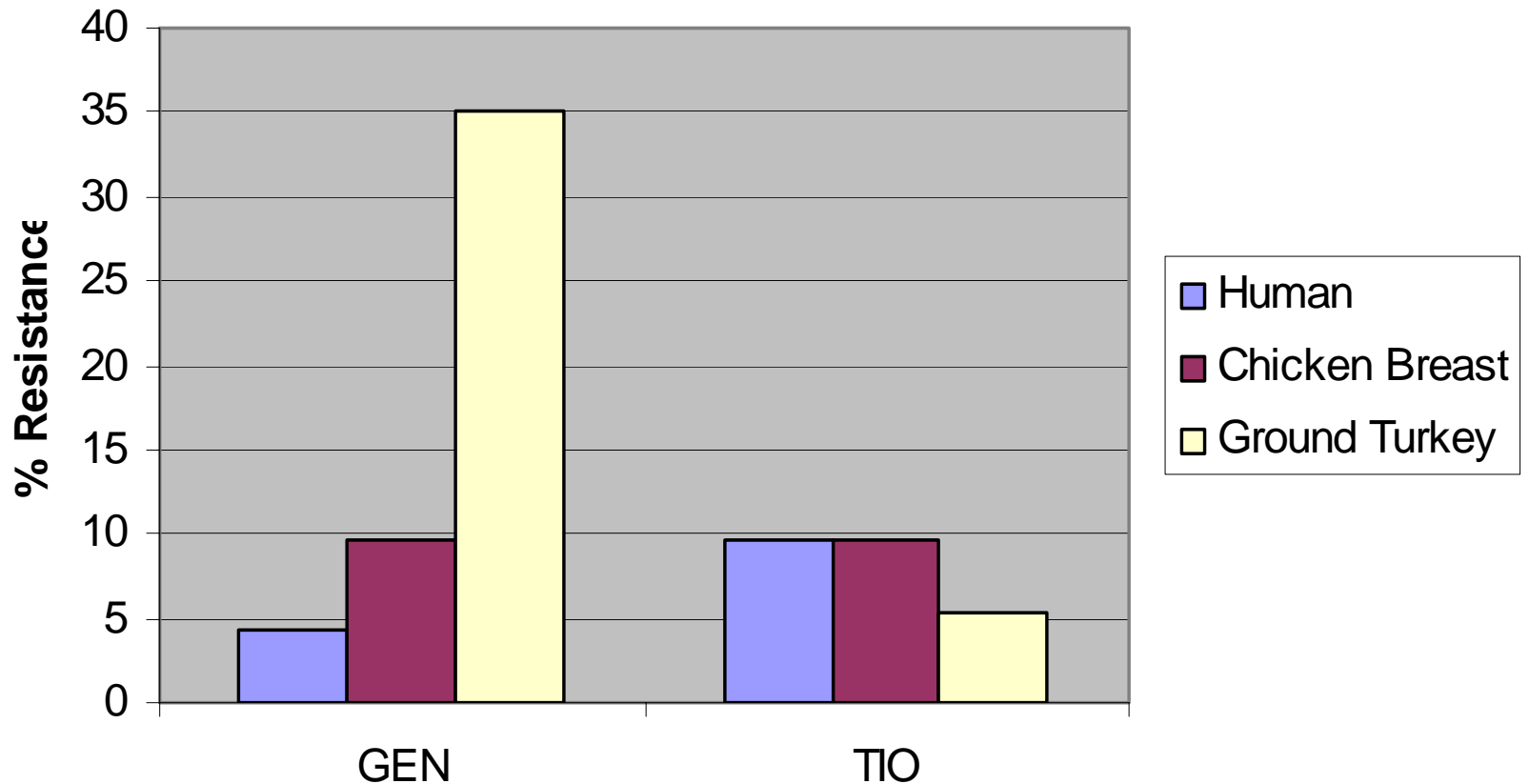
Gentamicin and Ceftiofur Resistance among *Salmonella* Typhimurium by Source, NARMS 2004



N = 437 isolates; Human, n = 386; Chicken breast, n = 49; Ground turkey, n = 2

GEN^R = 9 isolates; TIO^R = 41 isolates

Gentamicin and Ceftiofur Resistance among *Salmonella* Heidelberg by Source, NARMS 2004



N = 162 isolates; Human, n = 94; Chicken breast, n = 31; Ground turkey, n = 37

GEN^R = 20 isolates; TIO^R = 14 isolates

NARMS/PulseNet

❖ *Salmonella* and *Campylobacter* isolates undergo further molecular characterization

– PFGE analysis

- Follow CDC guidelines for PFGE analysis
- Data is shared with PulseNet
- CVM PulseNet database has more than 7,000 data entries, including
 - 4,015 *Salmonella*
 - 432 *E. coli*
 - 2,646 *Campylobacter*
 - 69 *Vibrio*
- Isolates can be used for future research projects
 - biosource tracking experiments
 - Virulence studies
 - Antimicrobial resistance studies

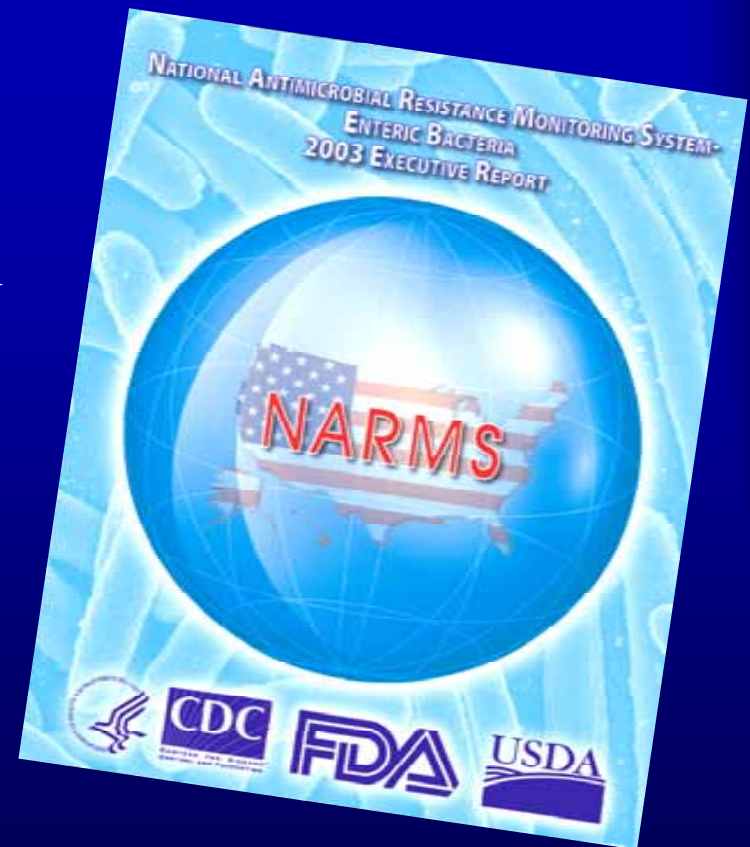


PFGE-SmaI+PFGE-KpnI
SmaI/KpnI

	PFGE-SmaI	PFGE-KpnI	CVM #	State	Source	Date Isolated	Species
			N100	CA	Chicken Breast	10/04	<i>C. jejuni</i>
			N105	CA	Chicken Breast	10/04	<i>C. jejuni</i>
			N108	CA	Chicken Breast	10/04	<i>C. jejuni</i>
			N110	CA	Chicken Breast	11/04	<i>C. jejuni</i>
			N285	CT	Chicken Breast	09/04	<i>C. jejuni</i>
			N286	CT	Chicken Breast	09/04	<i>C. jejuni</i>
			N288	CT	Chicken Breast	09/04	<i>C. jejuni</i>
			N374	MN	Chicken Breast	08/04	<i>C. jejuni</i>
			N715	OR	Chicken Breast	10/04	<i>C. jejuni</i>
			N720	OR	Chicken Breast	10/04	<i>C. jejuni</i>
			N721	OR	Chicken Breast	10/04	<i>C. jejuni</i>
			N722	OR	Chicken Breast	10/04	<i>C. jejuni</i>
			N734	OR	Chicken Breast	12/04	<i>C. jejuni</i>

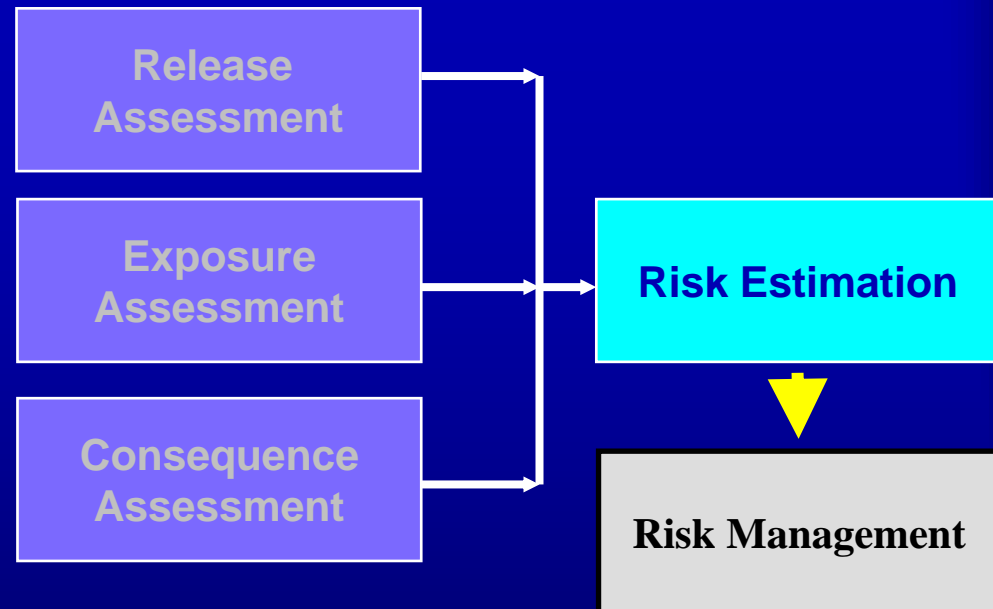
NARMS Executive Reports

- ❖ First Executive NARMS report released
 - summarizes 2003 data from FDA, USDA, CDC in single report
- ❖ Link on CVM's Web site
 - www.fda.gov/cvm
- ❖ Working on 2004 report



Evaluating the Safety of Antimicrobial New Animal Drugs with Regard to Their Microbiological Effects on Bacteria of Human Health Concern, GFI #152

- ❖ Part of human food safety evaluation on antimicrobial use impacts on resistant pathogenic, zoonotic bacteria (e.g. *Salmonella*, *E. coli*, *Campylobacter*, etc.).
 - October 23, 2003
- ❖ Human exposure through ingestion of animal-derived food
- ❖ Approach applies to therapeutic and non-therapeutic antimicrobial drugs intended for food-producing animals
- ❖ Qualitative risk assessment approach
 - Based on OIE Ad Hoc Group on Antimicrobial Resistance process



Possible risk management steps range from denying the drug approval application to approving the application under various use conditions that assure the safe use of the product

Acknowledgements

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Thank You

For the invitation to this valuable meeting

Appreciate this chance to participate



Go to the CVM Website for the most current information

www.fda.gov/cvm