2003 Retail Meat Report

National Antimicrobial Resistance Monitoring System

NARMS

ABBREVIATIONS USED IN THE REPORT, 2003

AR	Antimicrobial Resistance
BAP	Blood Agar Plate
CCA	Campy-Cefex Agar Plate
CDC	Center for Disease Control and Prevention
CVM	Center for Veterinary Medicine
EAP	Enterococcosel Agar Plate
EIP	Emerging Infections Program
EMB	Eosin Methylene Blue
FDA	Food and Drug Administration
FDA-CVM	Food and Drug Administration-Center for Veterinary Medicine
FoodNet	Foodborne Disease Active Surveillance Network
MIC	Minimum Inhibitory Concentration
NARMS	National Antimicrobial Resistance Monitoring System
CLSI/NCCLS	Clinical and Laboratory Standards Institute/National Committee for Clinical Laboratory Standards
PCR	Polymerase Chain Reaction
PFGE	Pulsed Field Gel Electrophoresis
PulseNet	The National Molecular Subtyping Network for Foodborne Disease Surveillance
QC	Quality Control
RVR10	Rappaport-Vassiliadis
USDA	United States Department of Agriculture
XLD	Xylose Lysine Deoxycholate

Antimicrobial Abbreviations:

AMC	Amoxicillin/Clavulanic Acid
AMI	Amikacin
AMP	Ampicillin
AXO	Ceftriaxone
BAC	Bacitracin
CEP	Cephalothin
CHL	Chloramphenicol
CIP	Ciprofloxacin
COT	Trimethoprim/Sulfamethoxazole
DOX	Doxycycline
ERY	Erythromycin
FLA	Flavomycin
FOX	Cefoxitin
GEN	Gentamicin
KAN	Kanamycin
LIN	Lincomycin
LZD	Linezolid
MER	Meropenem
NAL	Nalidixic Acid
NIT	Nitrofurantoin
PEN	Penicillin
QDA	Quinupristin/Dalfopristin
SAL	Salinomycin
STR	Streptomycin
SMX	Sulfamethoxazole
TET	Tetracycline
TYL	Tylosin
TIO	Ceftiofur
VAN	Vancomycin

Meat Types

CB	Chicken Breast
GB	Ground Beef
GT	Ground Turkey
PC	Pork Chop

State Abbreviations:

CA	California
CT	Connecticut
GA	Georgia
MD	Maryland
MN	Minnesota
NY	New York
OR	Oregon
TN	Tennessee

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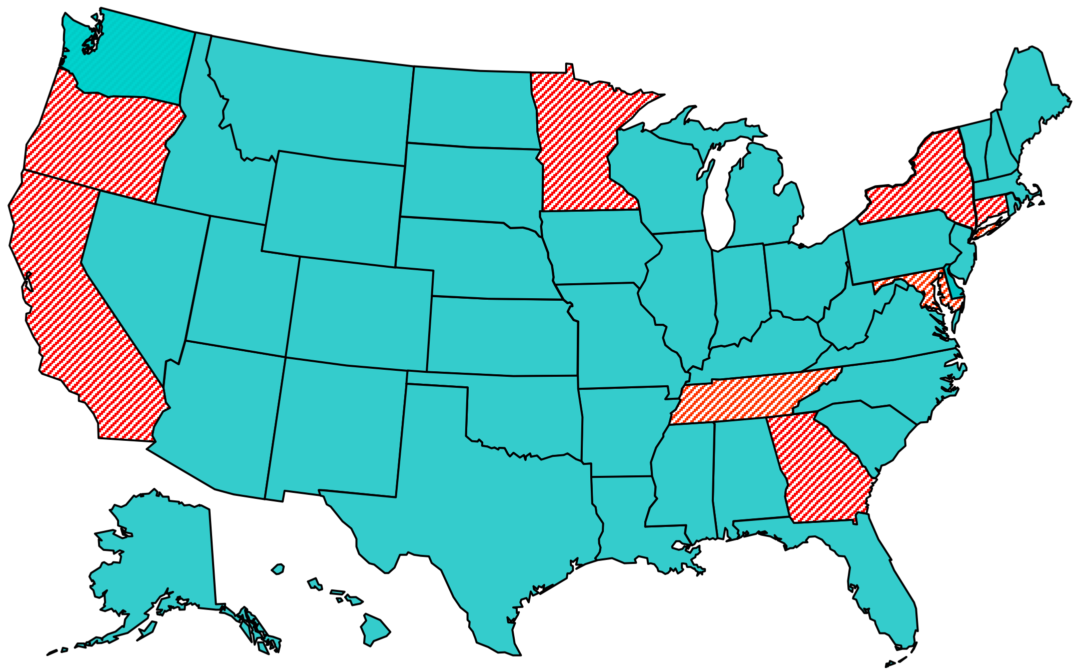
NARMS retail meat Annual Report 2003

Background:

Food destined for human consumption, including meat and poultry, are known to harbor enteric bacteria. Antimicrobial resistance (AR) among these foodborne bacteria has been documented and may be associated with the use of antimicrobial agents in food animals. These bacteria may include organisms such as *Salmonella, Campylobacter, E. coli,* and *Enterococcus*. Retail meats represent a point of exposure close to the consumer and, when combined with data from slaughter plants and on-farm studies, provides insight into the prevalence of AR in foodborne pathogens originating from food producing animals. To gain a better understanding of AR among enteric bacteria in the food supply, FoodNet and the NARMS monitor antimicrobial susceptibility/resistance phenotypes in bacteria isolated from retail meats.

The primary purpose of the NARMS retail meat surveillance program is to determine the prevalence of antimicrobial resistance among foodborne pathogens and commensal organisms, in particular, *Salmonella, Campylobacter, Enterococcus* and *E. coli,* recovered from retail foods of animal origin. The results generated by the NARMS retail meat program will establish a reference point for analyzing trends of antimicrobial resistance among these foodborne bacteria. NARMS retail meat surveillance is an ongoing collaboration between the U.S. Food and Drug Administration (Center for Veterinary Medicine), the Centers for Disease Control and Prevention, and in 2003, eight of the 11 current FoodNet laboratories: California, Connecticut, Georgia, Maryland, Minnesota, New York, Oregon, and Tennessee.



2003 Retail Food FoodNet laboratories

FoodNet is the principal foodborne disease component of CDC's (**EIP**; http://www.cdc.gov/foodnet/). It is a collaborative project of the CDC, eleven EIP sites (California, Colorado, Connecticut, Georgia, New York, Maryland, Minnesota, Oregon, Tennessee, Texas and New Mexico), the U.S. Department of Agriculture (USDA), and the Food and Drug Administration (FDA). The project consists of active surveillance for foodborne diseases and related epidemiologic studies designed to help public health officials better understand the epidemiology of foodborne diseases in the United States. The NARMS/FoodNet Retail Food Study was developed to monitor the presence of AR among *E. coli*, *Salmonella*, *Campylobacter*, and *Enterococcus* from convenience samples of fresh meat and poultry purchased monthly from grocery stores in the participating States. These isolates were then subjected to standardized antimicrobial susceptibility testing methods in order to determine the prevalence of resistance.

Retail meat sampling:

For calendar year 2003, retail meat sampling started in January among 8 participating FoodNet laboratories. Each of the FoodNet sites purchased samples monthly, attempting to go to as many different stores as possible each month. The object was to purchase as many different brands of fresh (not frozen) meat and poultry as possible. A total of 40 food samples were purchased per month including 10 samples each of chicken breast, ground turkey, ground beef, and pork chops (the exception being CT, which only collected 5 samples each for 2003). For each meat and poultry sample, the FoodNet sites recorded the store name, brand name, lot number (if available) sell-by date, purchase date and lab processing date on log sheets (A-9). Additional information with regard to whether or not the meat or poultry was ground or cut in-store was also collected, if possible. Samples were kept cold during transport from the grocery store(s) to the laboratory.

<u>*Microbiological analysis*</u>*:*

In the laboratory, samples were refrigerated at 4°C and were processed no later than 96 hours after purchase. After microbiological examination, the sites recorded on the log sheets whether or not the meat and poultry samples were presumptively positive for *Salmonella*, *Campylobacter*, *E. coli*, and *Enterococcus*. Each laboratory used essentially the same procedure for sample collection. Retail meat and poultry packages were kept intact until they were aseptically opened in the laboratory at the start of examination. For chicken and pork samples, one piece of meat was examined, whereas, 25 g of ground product was examined for ground beef and ground turkey samples. The analytical portions from each sample were placed in separate sterile plastic bags, 250 mL of buffered peptone water was added to each bag, and the bags were vigorously shaken. Fifty mL of the rinsate from each sample was transferred to separate sterile flasks (or other suitable sterile containers) for isolation and identification of *Salmonella*, *Campylobacter*, *E. coli*, or *Enterococcus* using standard microbiological procedures. Once isolated and identified, bacterial isolates were sent to FDA's CVM Office of Research for further characterization including species confirmation, antimicrobial susceptibility testing and PFGE analysis (S*almonella* and *Campylobacter* only).

All eight FoodNet sites cultured the meats and poultry rinsates for the presence of *Salmonella* and *Campylobacter*. Additionally, four of the eight FoodNet laboratories culture meat and poultry rinsates for the presence of *E. coli* and *Enterococcus*: Georgia, Maryland, Oregon, and Tennessee.

NARMS retail meat working group, 2003

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Much thanks to Deborah Brooks and Michelle Talley for providing outstanding web support to the NARMS program.

Table 1. Antimicrobial Susceptibility Test Methods and Interpretive Criteria: NARMS Retail Meat, 2003

Genus: *Campylobacter*

Susceptibility Testing Method: Agar dilution

QC Organism: *Campylobacter jejuni* ATCC 33560

Drug	Susceptible (µg/ml)	Intermediate (µg/ml)	Resistant (µg/ml)
Ciprofloxacin*	≤ 1	2	≥ 4
Doxycycline*	≤ 4	8	≥ 16
Erythromycin*	≤ 0.5	1,2,4	≥ 8
Gentamicin*	≤ 4	8	≥ 16
Meropenem*	≤ 4	8	≥ 16

Genus: *Enterococcus*

Susceptibility Testing Method: Broth microdilution Sensititre Plate: CMV5ACDC

QC Organisms: *Enterococcus faecalis* ATCC 29212 and *Enterococcus faecalis* ATCC 51299

Drug	Susceptible (µg/ml)	Intermediate (µg/ml)	Resistant (µg/ml)
Bacitracin*	≤ 32	64	≥ 128
Chloramphenicol	≤ 8	16	≥ 32
Ciprofloxacin	≤ 1	2	≥ 4
Erythromycin	≤0.5	1,2,4	≥ 8
Flavomycin*	≤ 8	16	≥ 32
Gentamicin	< 500		≥ 500
Kanamycin*	≤ 128	256	≥ 512
Lincomycin*	≤ 8	16	≥ 32
Linezolid	≤ 2	4	≥ 8
Nitrofurantoin	≤ 32	64	≥ 128
Penicillin	≤ 8		≥ 16
Salinomycin*	≤ 8	16	≥ 32
Streptomycin*	< 1000		≥1000
Quinupristin/Dalfopristin	≤ 1	2	≥ 4
Tetracycline	≤ 4	8	≥ 16
Tylosin*	≤ 8	16	≥ 32
Vancomycin	≤ 4	8,16	≥ 32

*** No CLSI/NCCLS interpretative criteria for this bacterium / antimicrobial combination currently available.**

Genus: *Escherichia coli* and *Salmonella*

Susceptibility Testing Method: Broth microdilution Sensititre Plate: CMV7CNCD

QC Organisms: *Escherichia coli* ATCC 25922, *Staphylococcus aureus* ATCC 29213, *Pseudomonas aeruginosa* ATCC 27853, and *Enterococcus faecalis* ATCC 29212

Drug	**Susceptible** (µg/ml)	**Intermediate** (µg/ml)	**Resistant** (µg/ml)
Amikacin	≤ 16	32	≥ 64
Amoxicillin/Clavulanic acid	≤ 8/4	16/8	≥ 32/16
Ampicillin	≤ 8	16	≥ 32
Cefoxitin	≤ 8	16	≥ 32
Ceftiofur	≤ 2	4	≥ 8
Ceftriaxone	≤ 8	16,32	≥ 64
Cephalothin	≤ 8	16	≥ 32
Chloramphenicol	≤ 8	16	≥ 32
Ciprofloxacin	≤ 1	2	≥ 4
Gentamicin	≤ 4	8	≥ 16
Kanamycin	≤ 16	32	≥ 64
Nalidixic acid	≤ 16		≥ 32
Streptomycin*	≤ 32		≥ 64
Sulfamethoxazole	≤ 256		≥ 512
Tetracycline	≤ 4	8	≥ 16
Trimethoprim/sulfamethoxazole	≤ 2/38		≥ 4/76

*** No CLSI/NCCLS interpretative criteria for this bacterium / antimicrobial combination currently available.**

Table 2. Number of Retail Meat Samples Tested by Site and Meat Type, 2003

Site	Chicken Breast	Ground Turkey	Ground Beef	Pork Chop	Total
CA	120	120	120	120	480
CT*	60	60	60	60	240
GA	120	120	120	120	480
MD	120	120	120	120	480
MN	120	110	110	120	460
NY	120	120	120	120	480
OR	120	120	120	120	480
TN	117	87	110	119	433
Total	897	857	880	899	3533

* CT only collected 5 samples for each meat type in 2003.

Table 3. Percent Positive Samples by Bacterium and Meat Type, 2003

	Chicken Breast		Ground Turkey		Ground Beef		Pork Chop	
Bacterium	**N**	**(%)**	**N**	**(%)**	**N**	**(%)**	**N**	**(%)**
Campylobacter	469	(52.3)	5	(0.6)	1	(0.1)	4	(0.4)
Salmonella	83	(9.3)	114	(13.3)	10	(1.1)	5	(0.6)
Enterococcus	466	(97.7)	418	(93.5)	432	(91.9)	426	(88.9)
Escherichia coli	396	(83.0)	333	(74.5)	311	(66.2)	218	(45.5)

3533 = Total number of retail meats tested for *Salmonella* and *Campylobacter*
897 = Total Chicken Breast tested
857 =Total Ground Turkey tested
880 = Total Ground Beef tested
899 = Total Pork Chop tested

1873 = Total number of retail meats tested for *Enterococcus* and *Escherichia coli*
477 = Total Chicken Breast tested
447 =Total Ground Turkey tested
470 = Total Ground Beef tested
479 = Total Pork Chop tested

Table 4. Number of Isolates by Site, Bacterium, and Meat Type, 2003

	Chicken Breast	Ground Turkey	Ground Beef	Pork Chops
Site: CA				
Campylobacter	64	0	0	2
Salmonella	4	6	1	1
Site: CT				
Campylobacter	50	0	0	0
Salmonella	9	8	0	0
Site: GA				
Campylobacter	76	2	0	0
Salmonella	8	27	2	0
Enterococcus	119	120	119	116
Escherichia coli	120	117	90	68
Site: MD				
Campylobacter	38	0	1	0
Salmonella	18	25	3	1
Enterococcus	113	103	92	90
Escherichia coli	113	103	87	71
Site: MN				
Campylobacter	62	3	0	1
Salmonella	13	11	1	0
Site: NY				
Campylobacter	75	0	0	0
Salmonella	11	20	0	2
Site: OR				
Campylobacter	45	0	0	1
Salmonella	17	5	2	1
Enterococcus	119	108	112	103
Escherichia coli	78	49	57	28
Site: TN				
Campylobacter	59	0	0	0
Salmonella	3	12	1	0
Enterococcus	115	87	109	117
Escherichia coli	85	64	77	51

Figure 1a. Percent Positive Samples for *Campylobacter* & *Salmonella* by Meat Type and Site, 2003

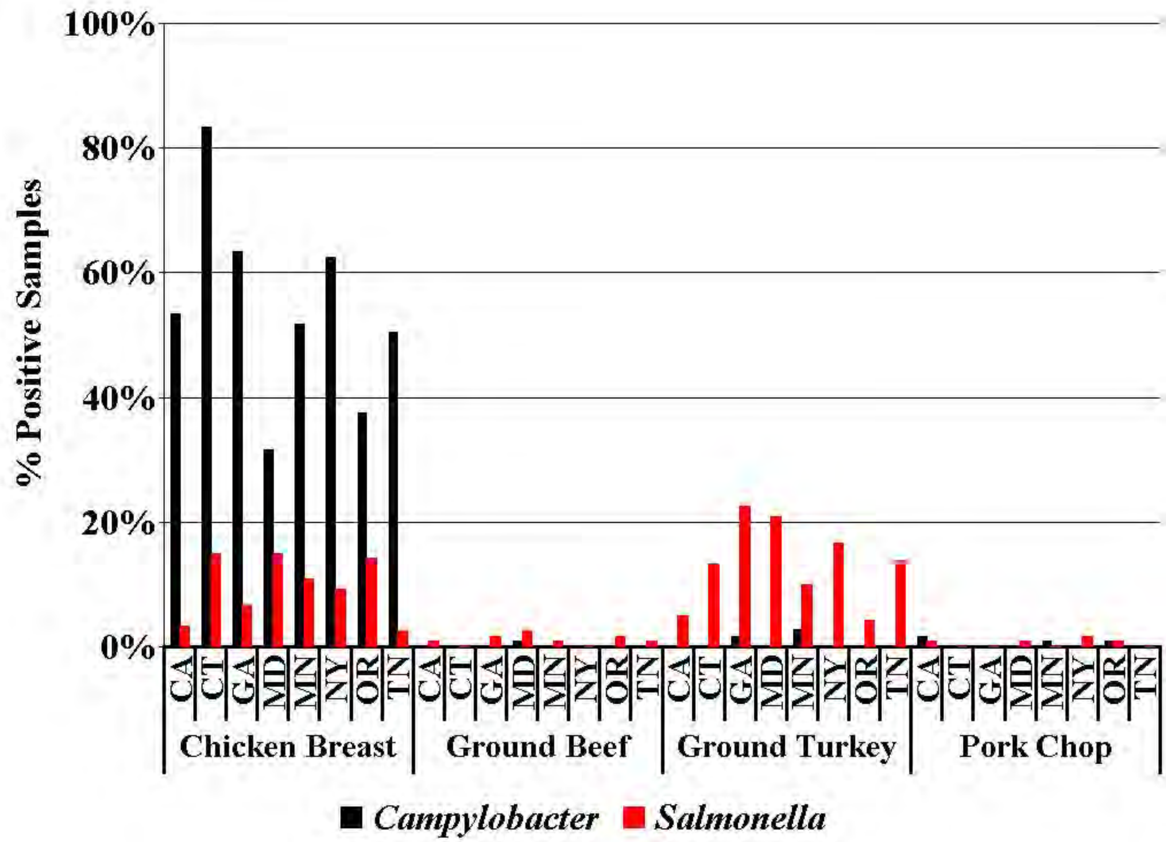


Figure 1b. Percent Positive Samples for *Enterococcus* & *E. coli* by Meat Type and Site, 2003

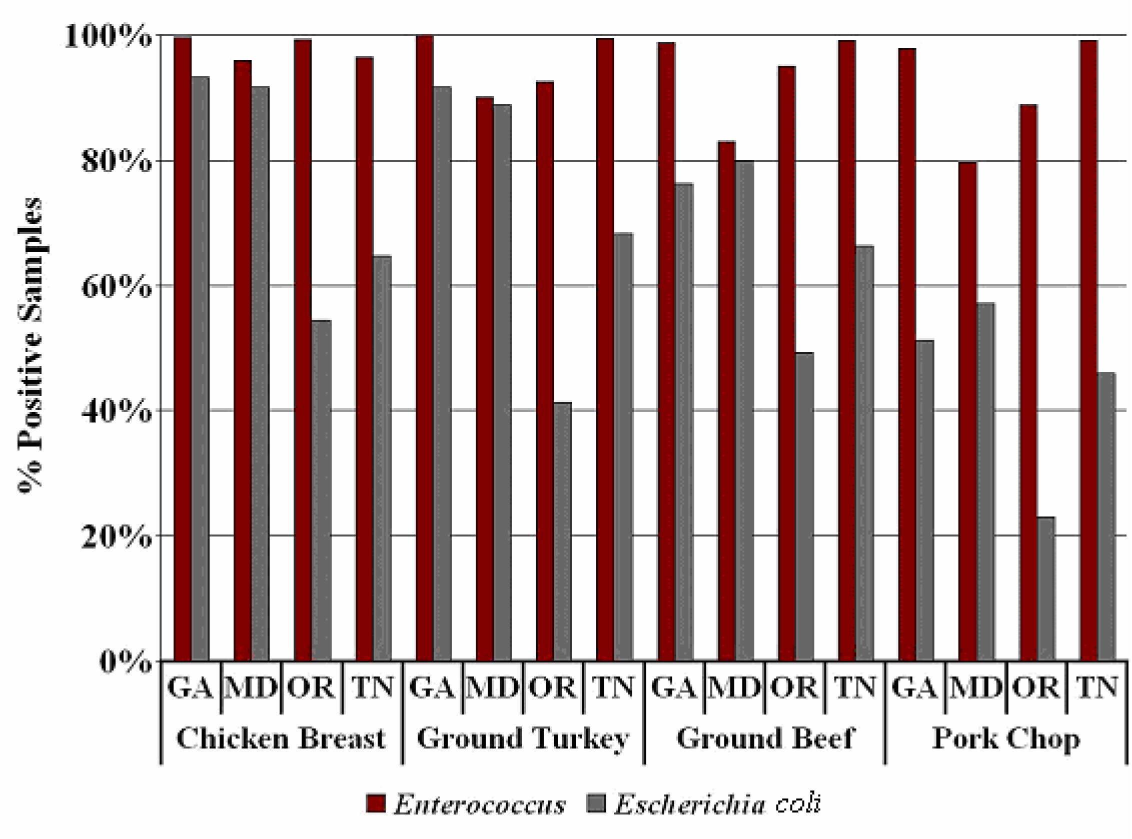


Figure 2a. Percent Positive Samples for *Campylobacter* & *Salmonella* by Meat Type for All Sites, 2003

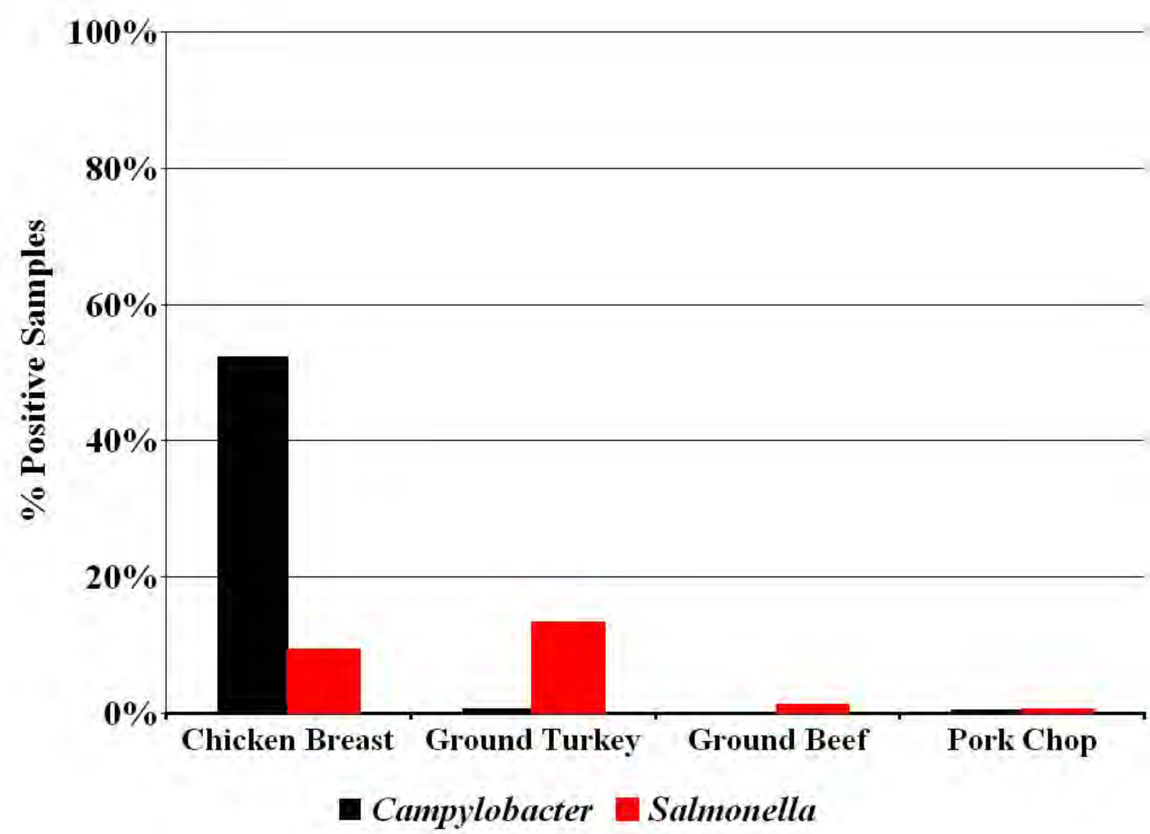


Figure 2b. Percent Positive Samples for *Enterococcus* & *E. coli* by Meat Type for All Sites, 2003

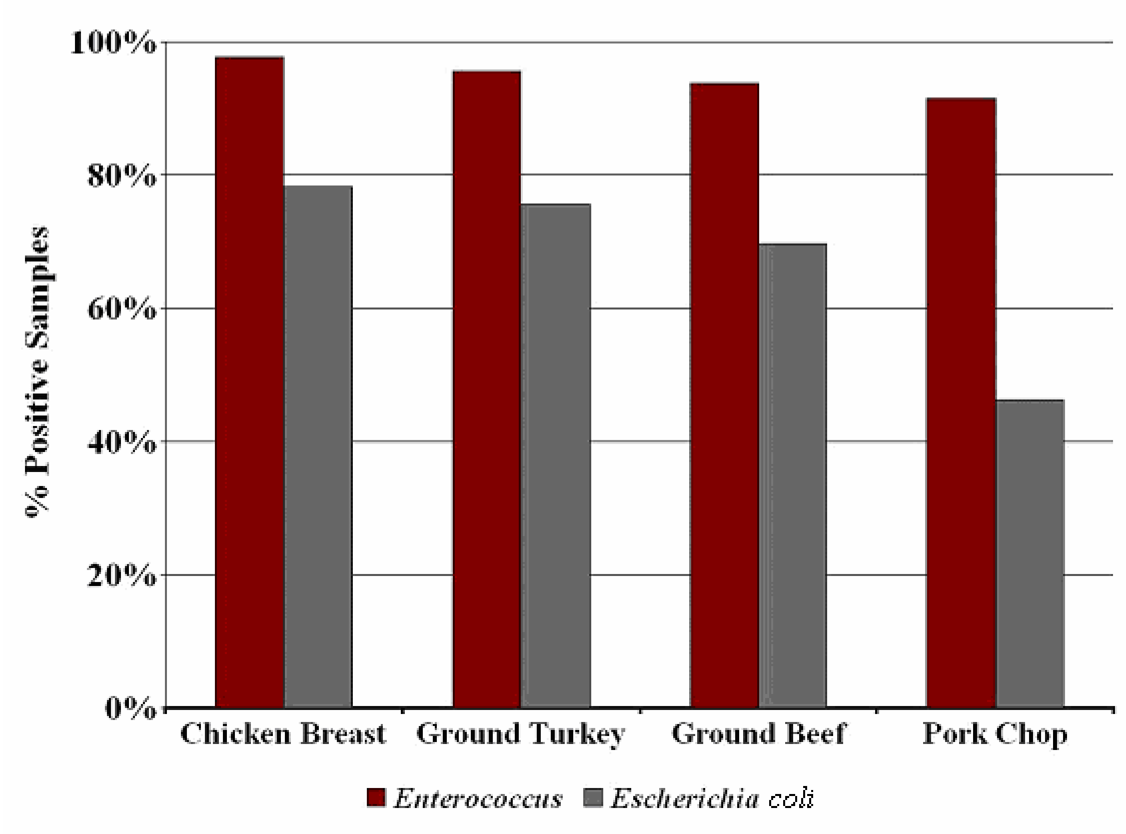


Figure 3a. Percent Positive Samples for *Campylobacter* & *Salmonella* and *Enterococcus* & *E. coli* by Month and Meat Type for All Sites, 2003

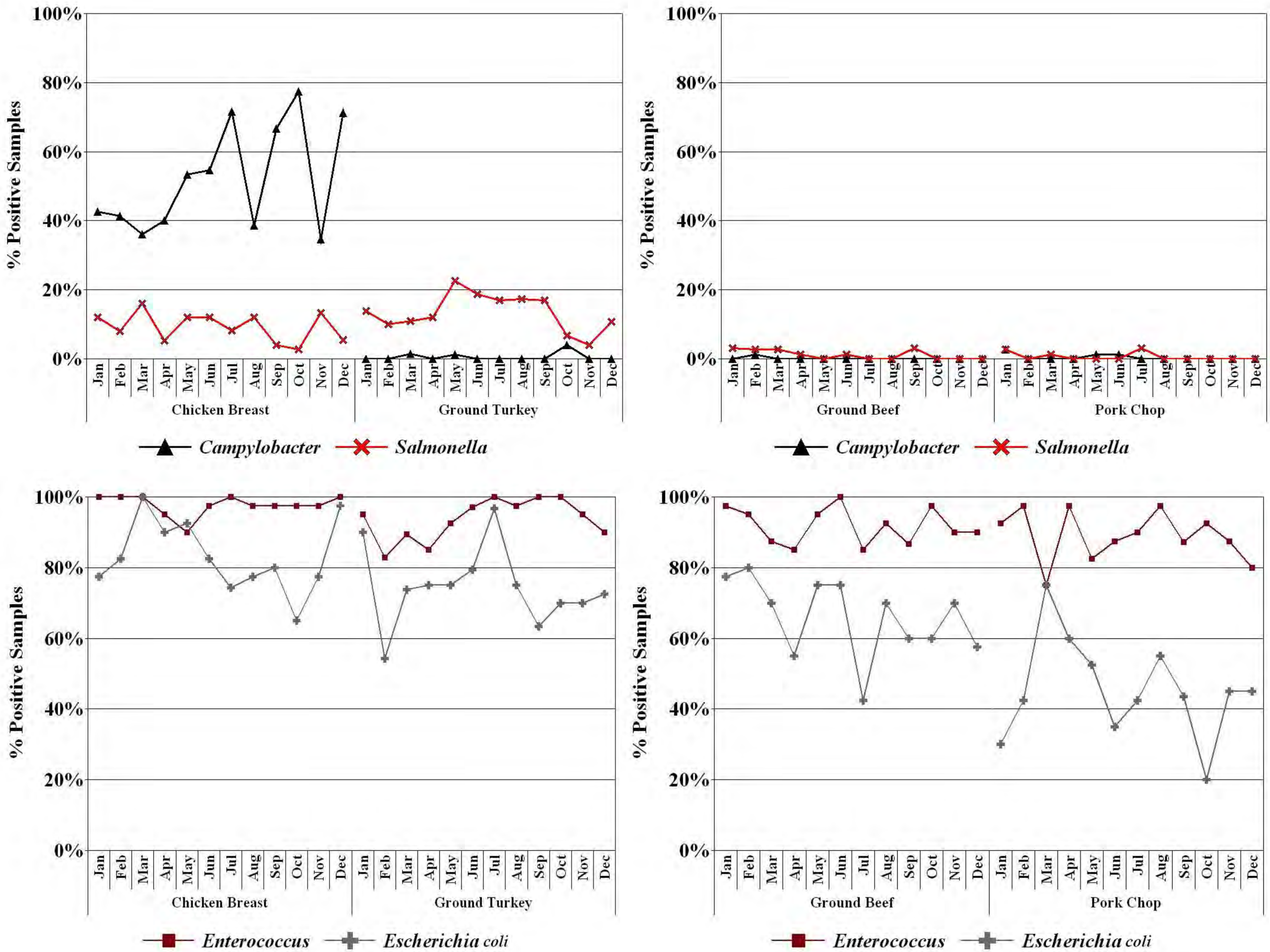


Figure 3b. Percent Positive Samples for *Campylobacter* & *Salmonella* by Month and Meat Type in California, 2003

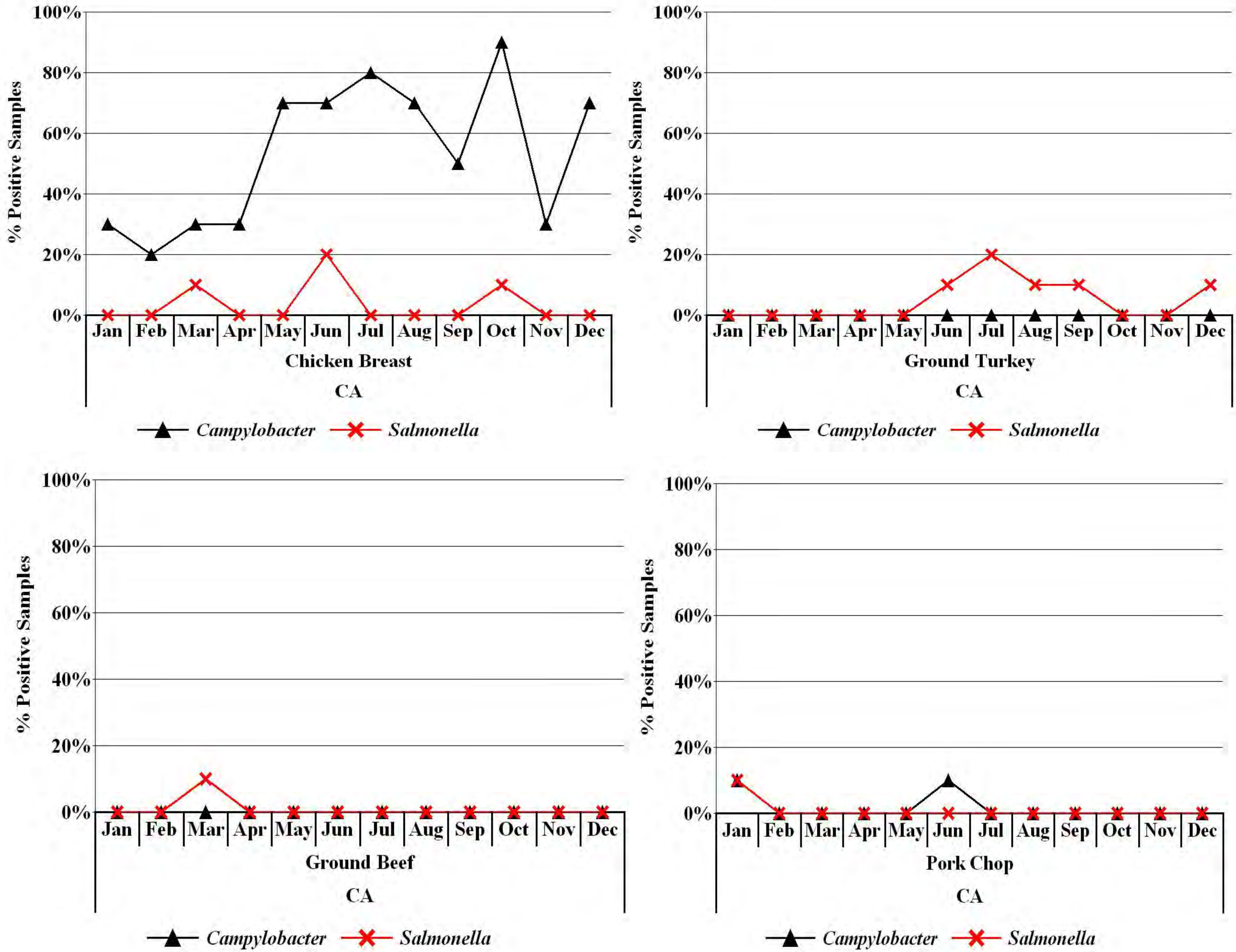


Figure 3c. Percent Positive Samples for *Campylobacter* & *Salmonella* by Month and Meat Type in Connecticut, 2003

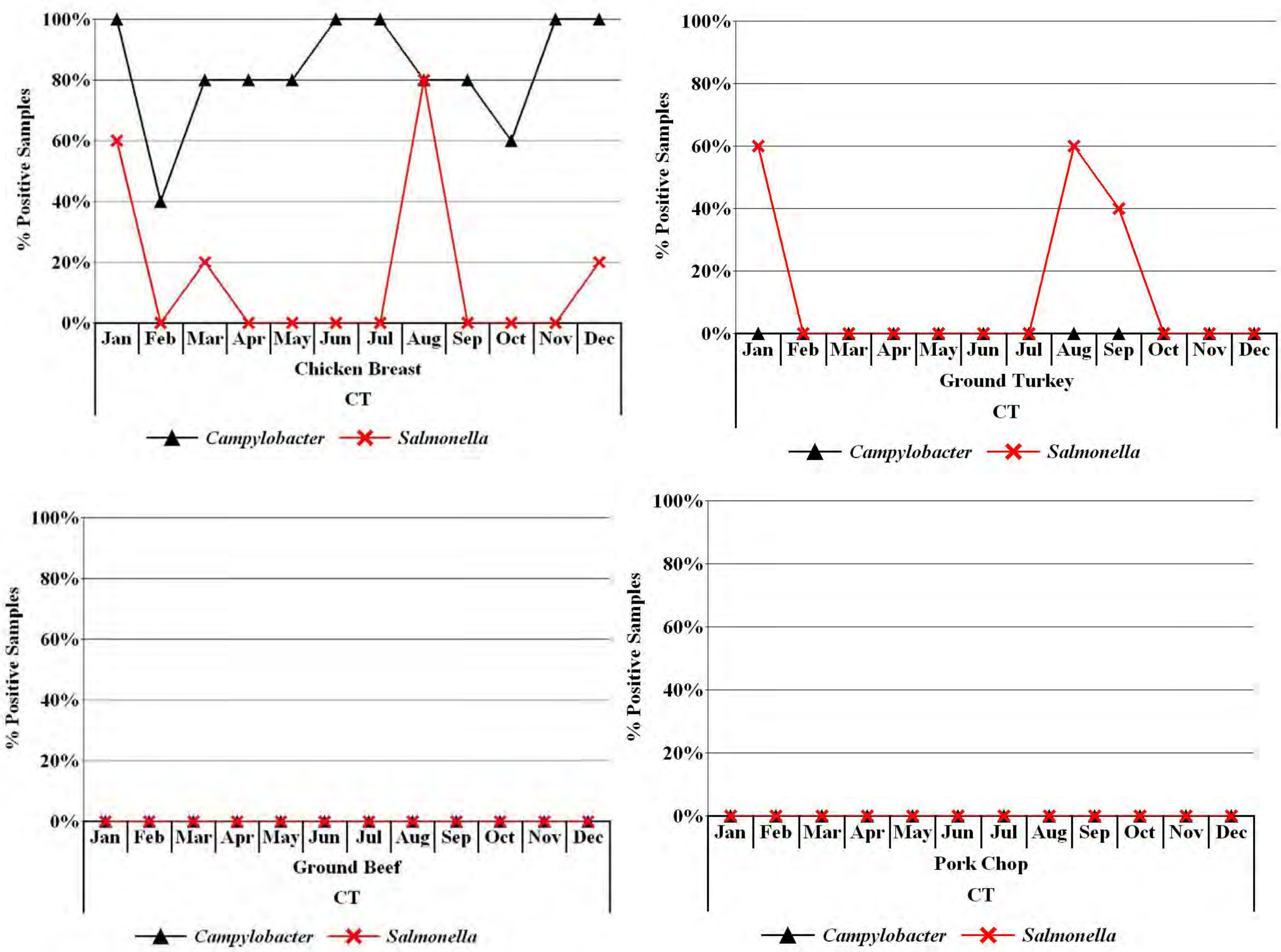


Figure 3d. Percent Positive Samples for *Campylobacter* & *Salmonella* by Month and Meat Type in Georgia, 2003

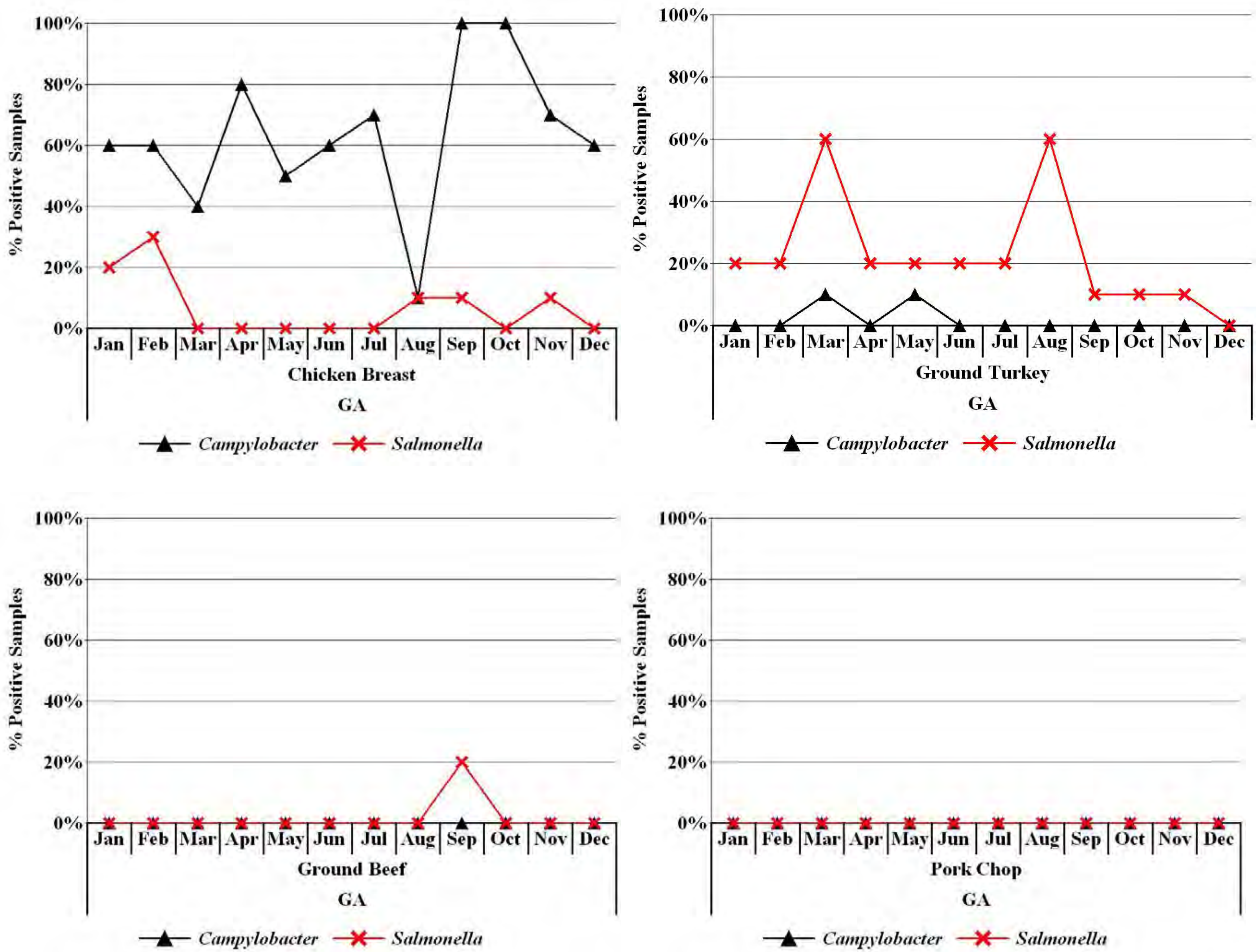


Figure 3e. Percent Positive Samples for *Enterococcus* & *E. coli* by Month and Meat Type in Georgia, 2003

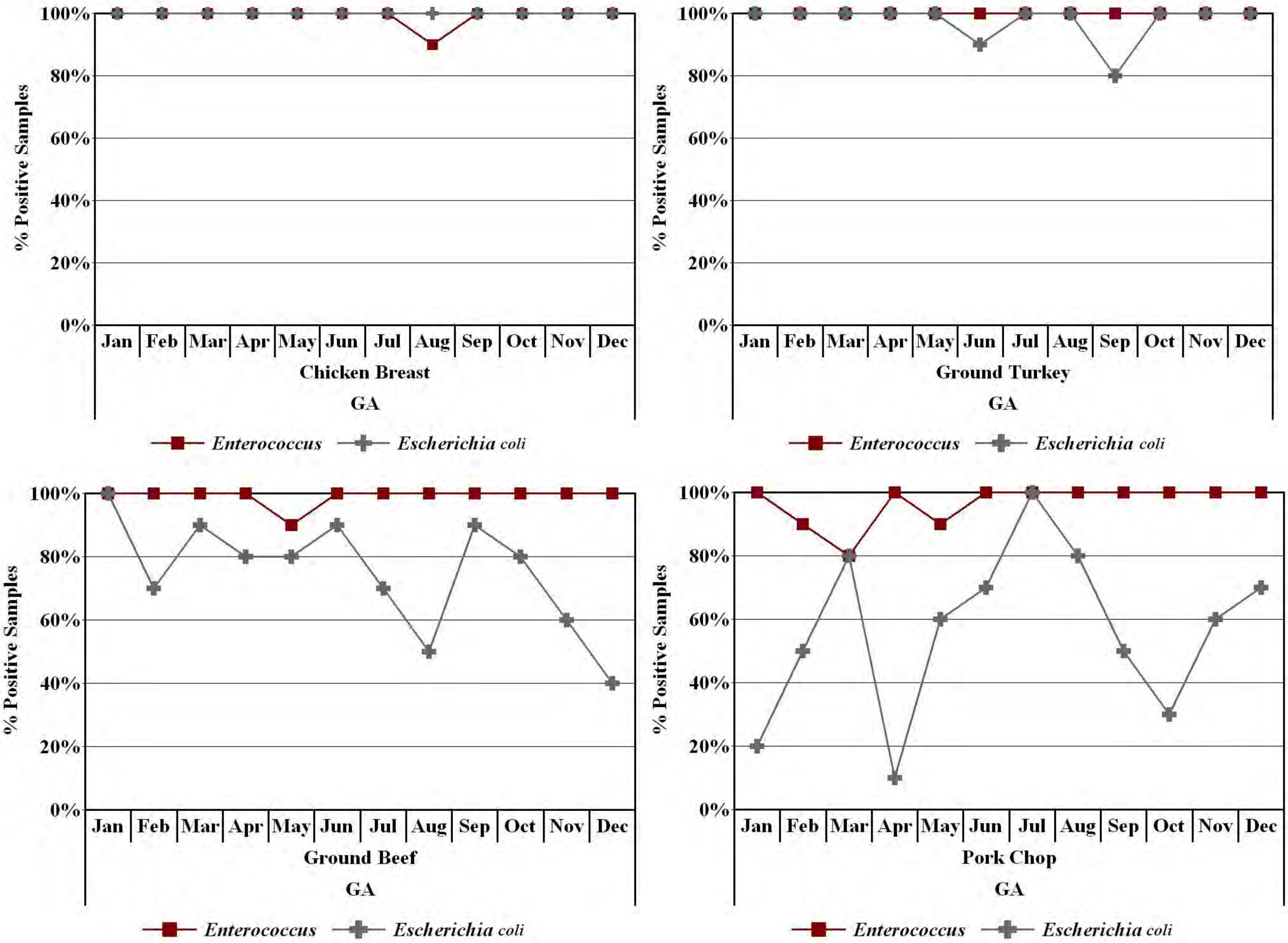


Figure 3f. Percent Positive Samples for *Campylobacter* & *Salmonella* by Month and Meat Type in Maryland, 2003

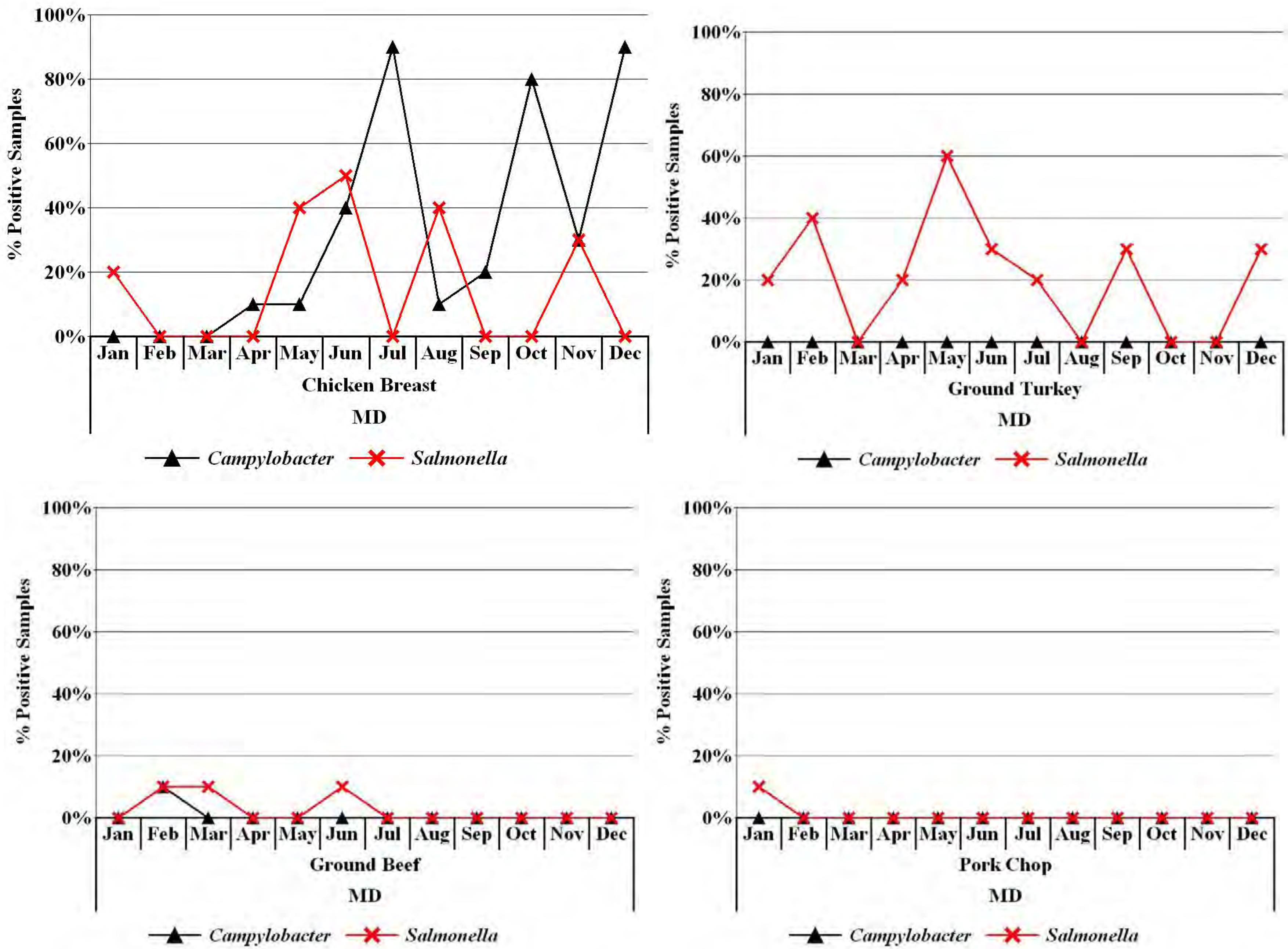
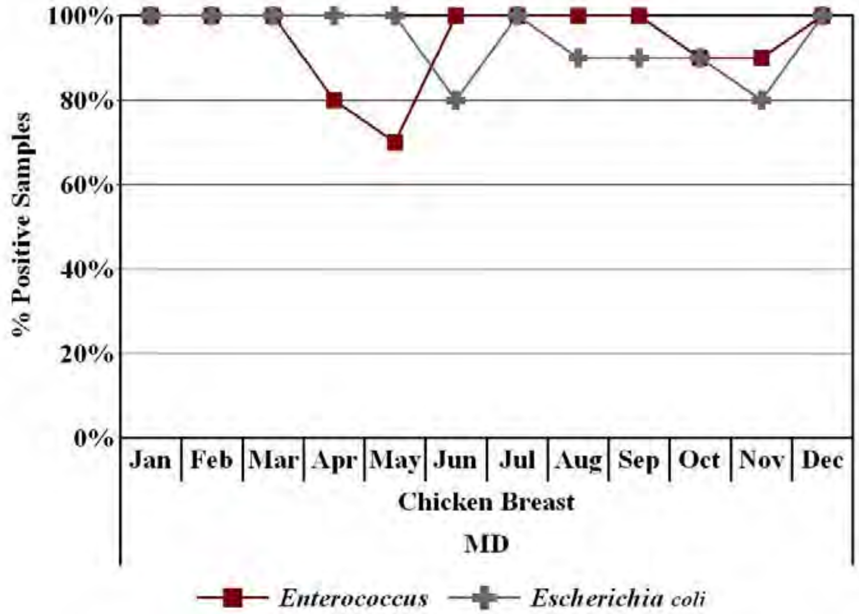
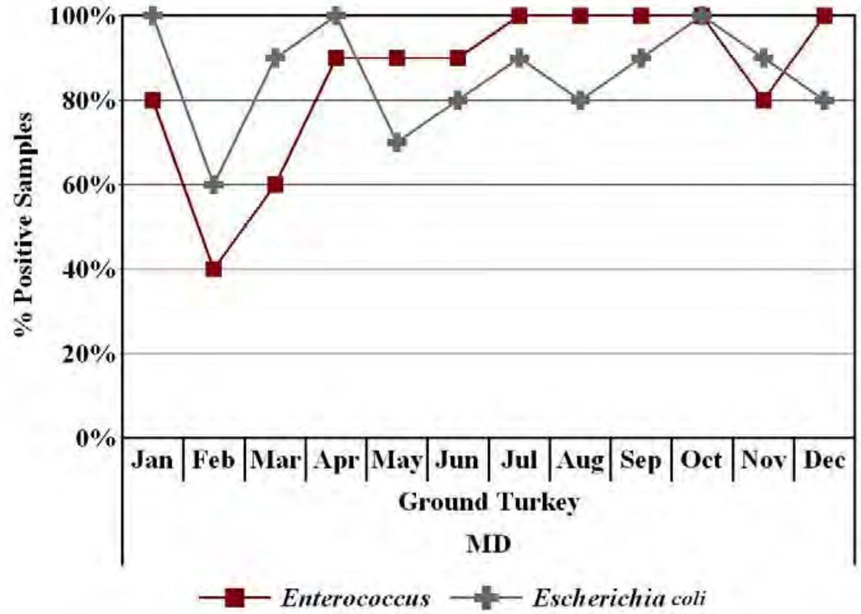
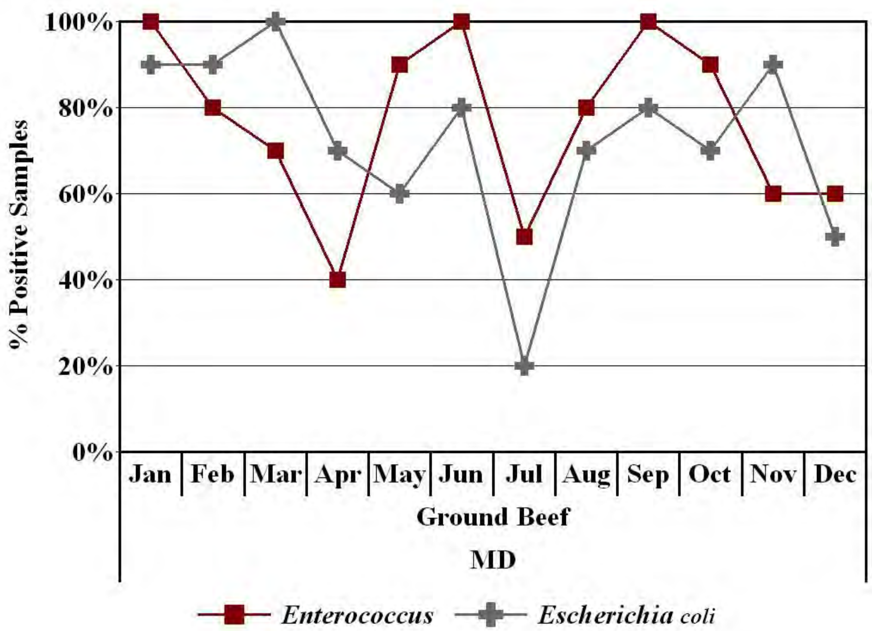


Figure 3g. Percent Positive Samples for *Enterococcus* & *E. coli* by Month and Meat Type in Maryland, 2003







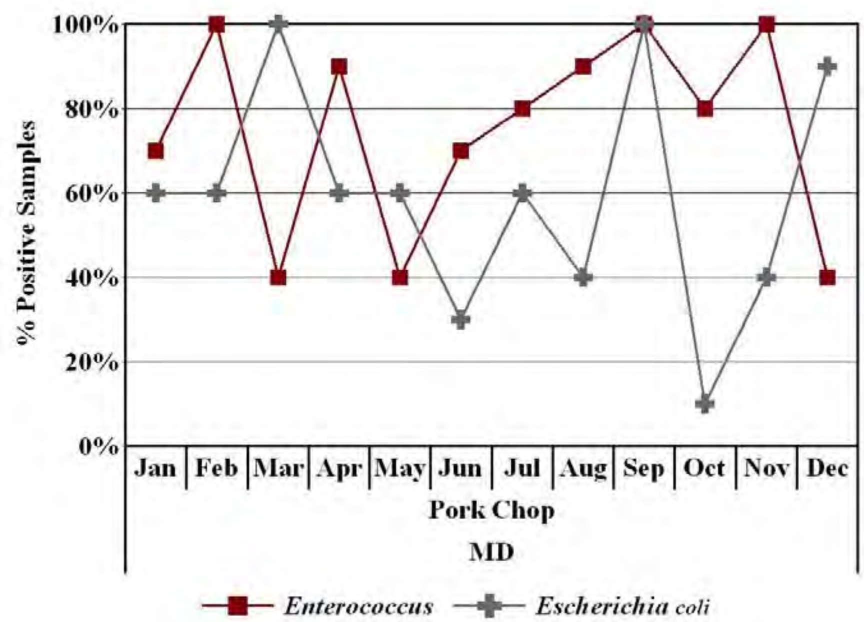


Figure 3h. Percent Positive Samples for *Campylobacter* & *Salmonella* by Month and Meat Type in Minnesota, 2003

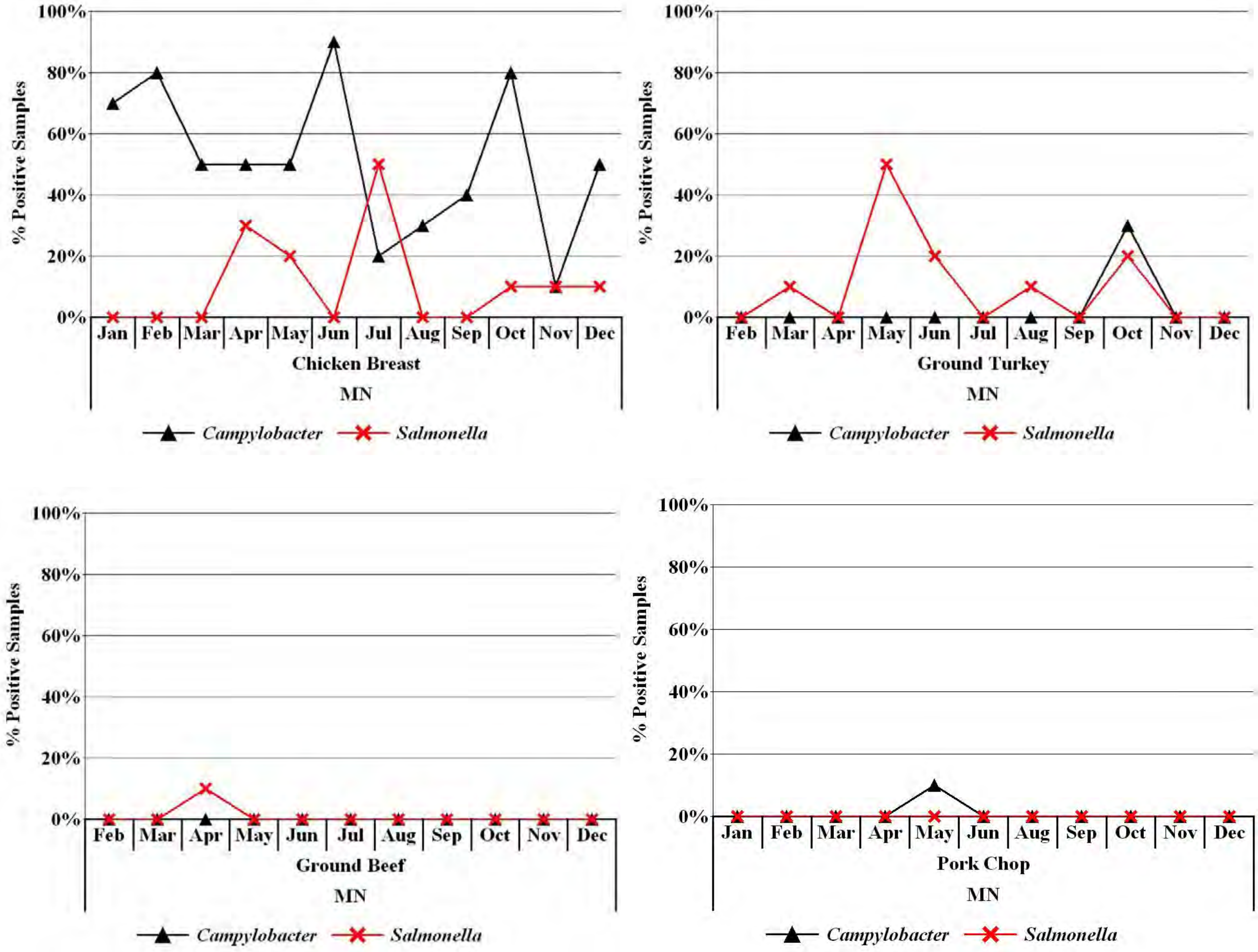


Figure 3i. Percent Positive Samples for *Campylobacter* & *Salmonella* by Month and Meat Type in New York, 2003

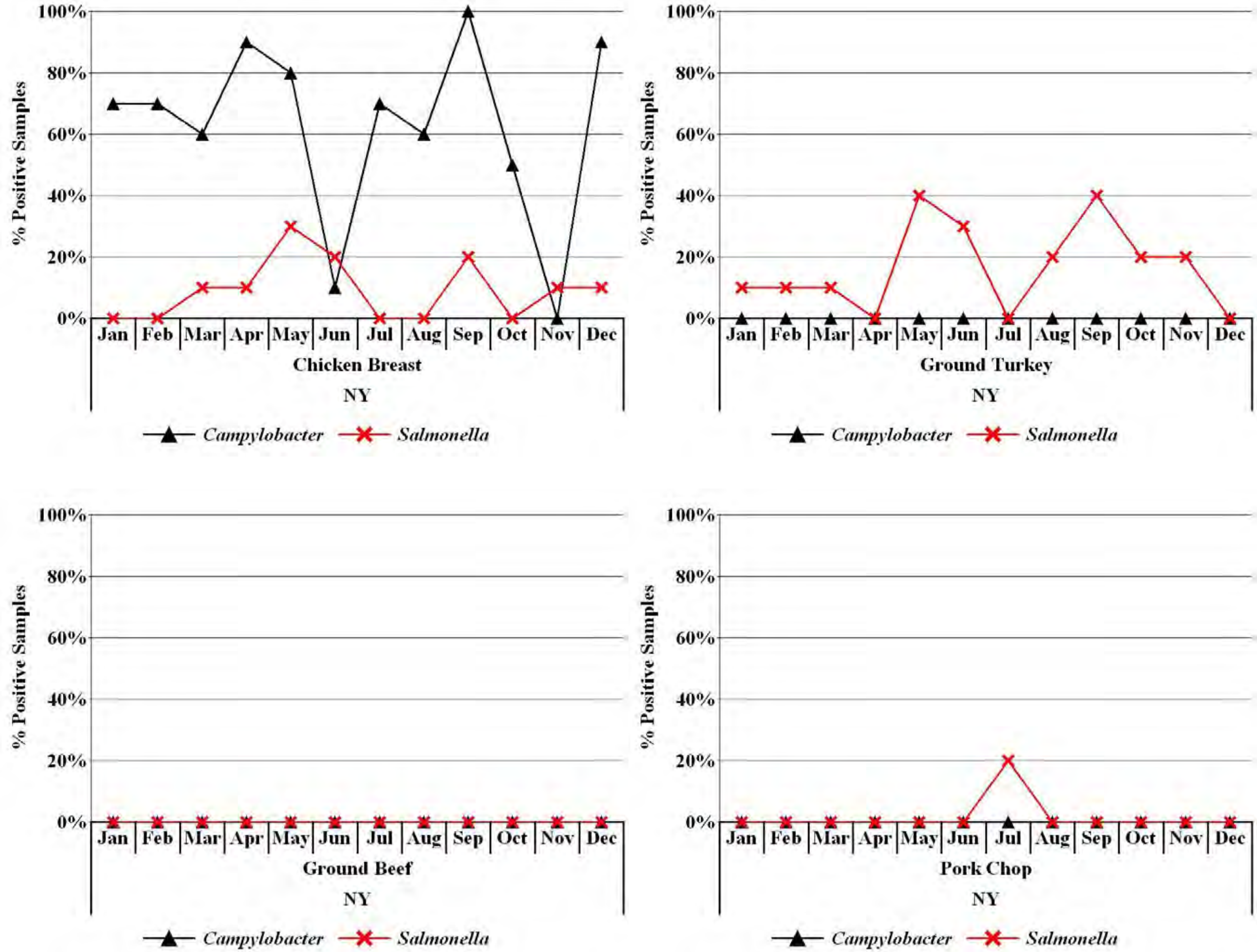


Figure 3j. Percent Positive Samples for *Campylobacter* & *Salmonella* by Month and Meat Type in Oregon, 2003

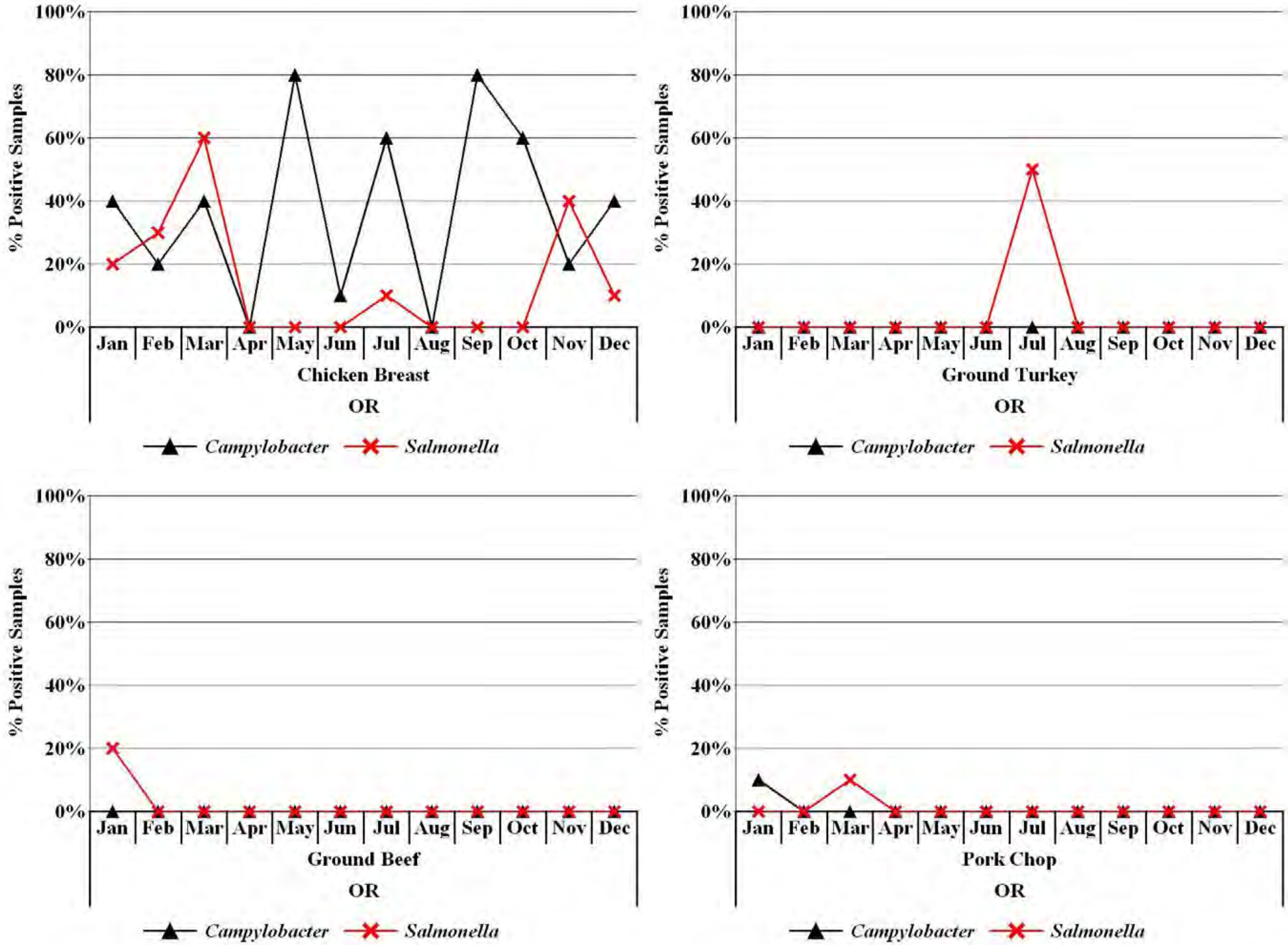


Figure 3k. Percent Positive Samples for *Enterococcus* & *E. coli* by Month and Meat Type in Oregon, 2003

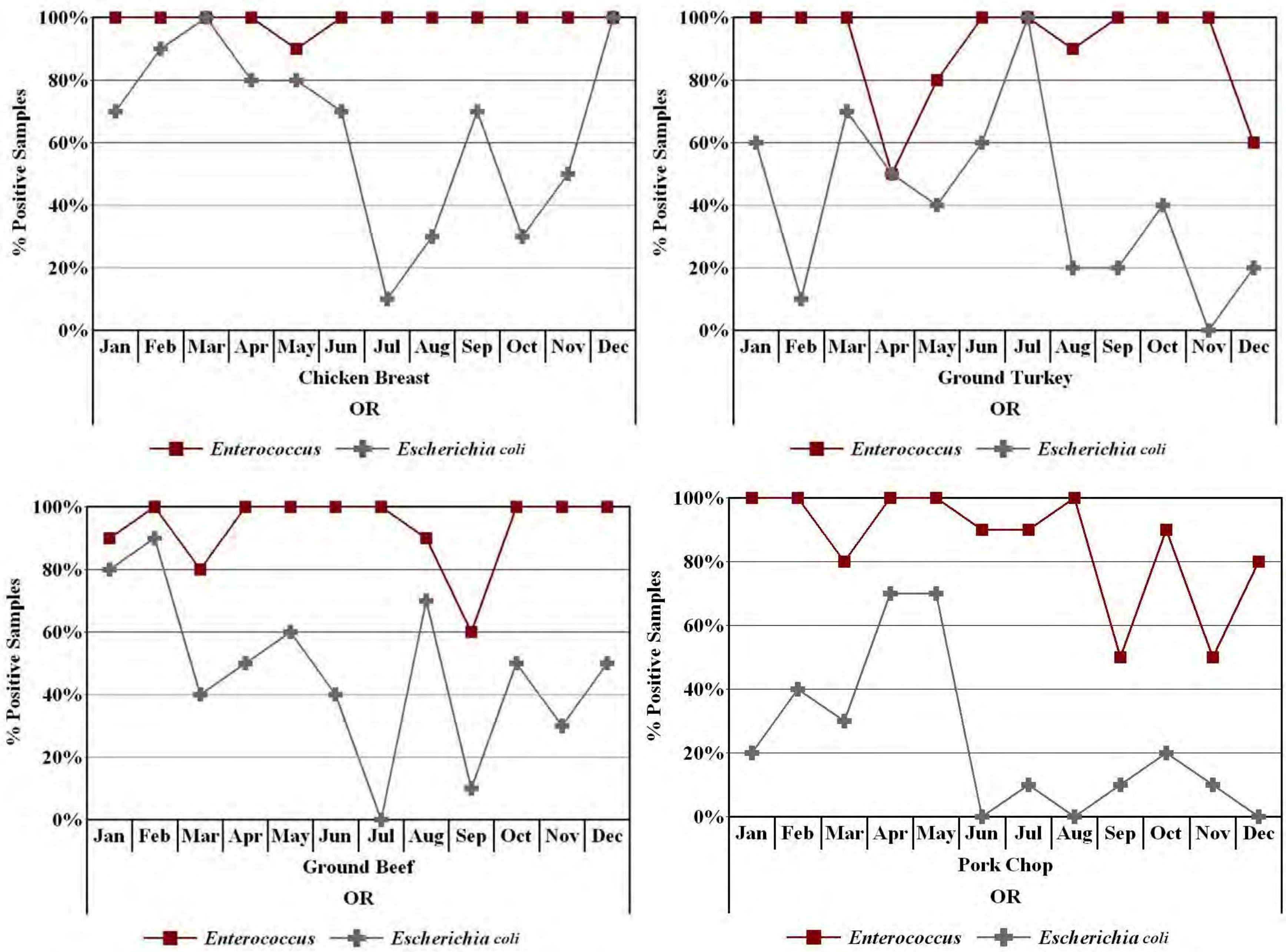


Figure 3l. Percent Positive Samples for *Campylobacter* & *Salmonella* by Month and Meat Type in Tennessee, 2003

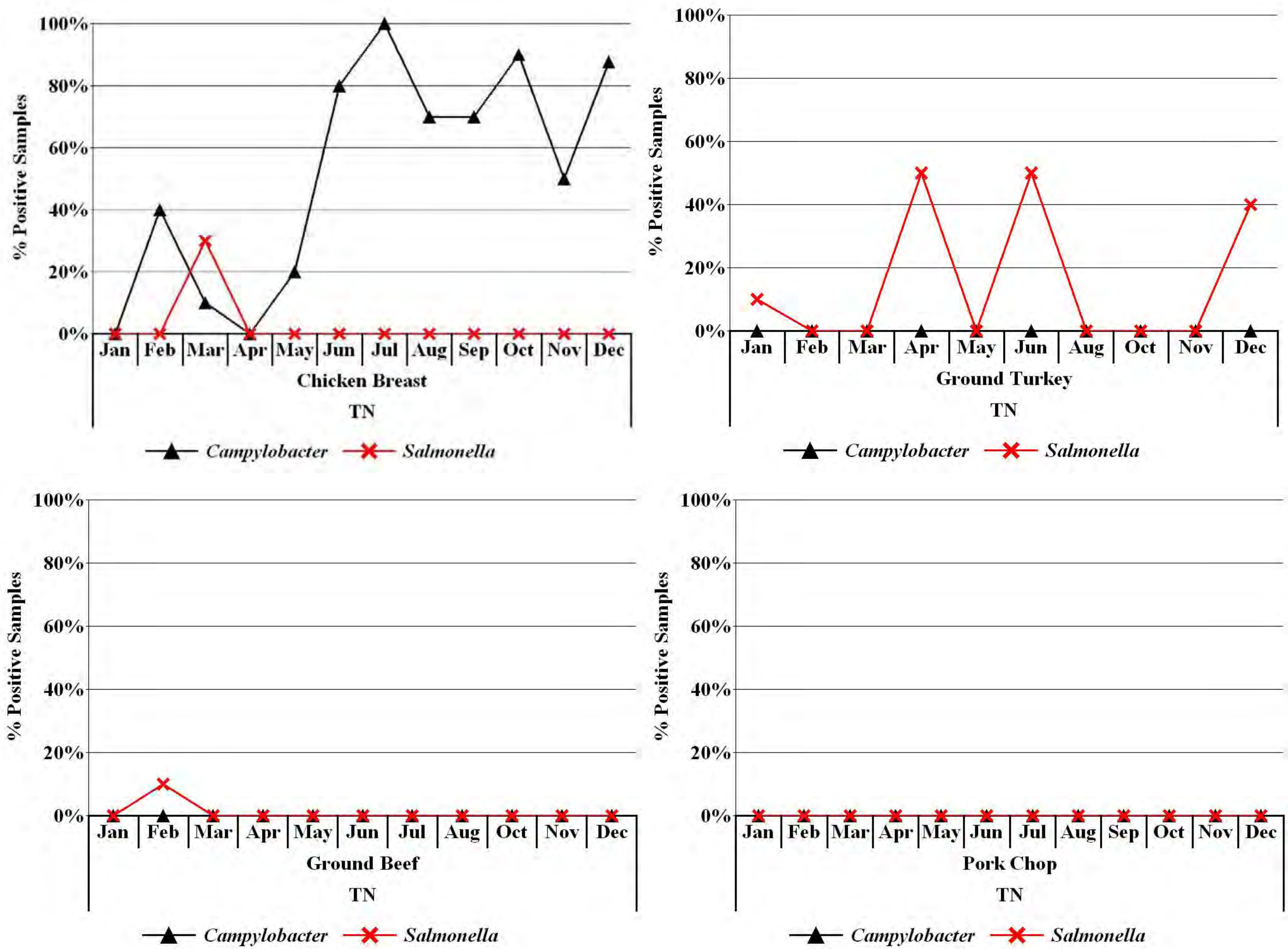


Figure 3m. Percent Positive Samples for *Enterococcus* & *E. coli* by Month and Meat Type in Tennessee, 2003

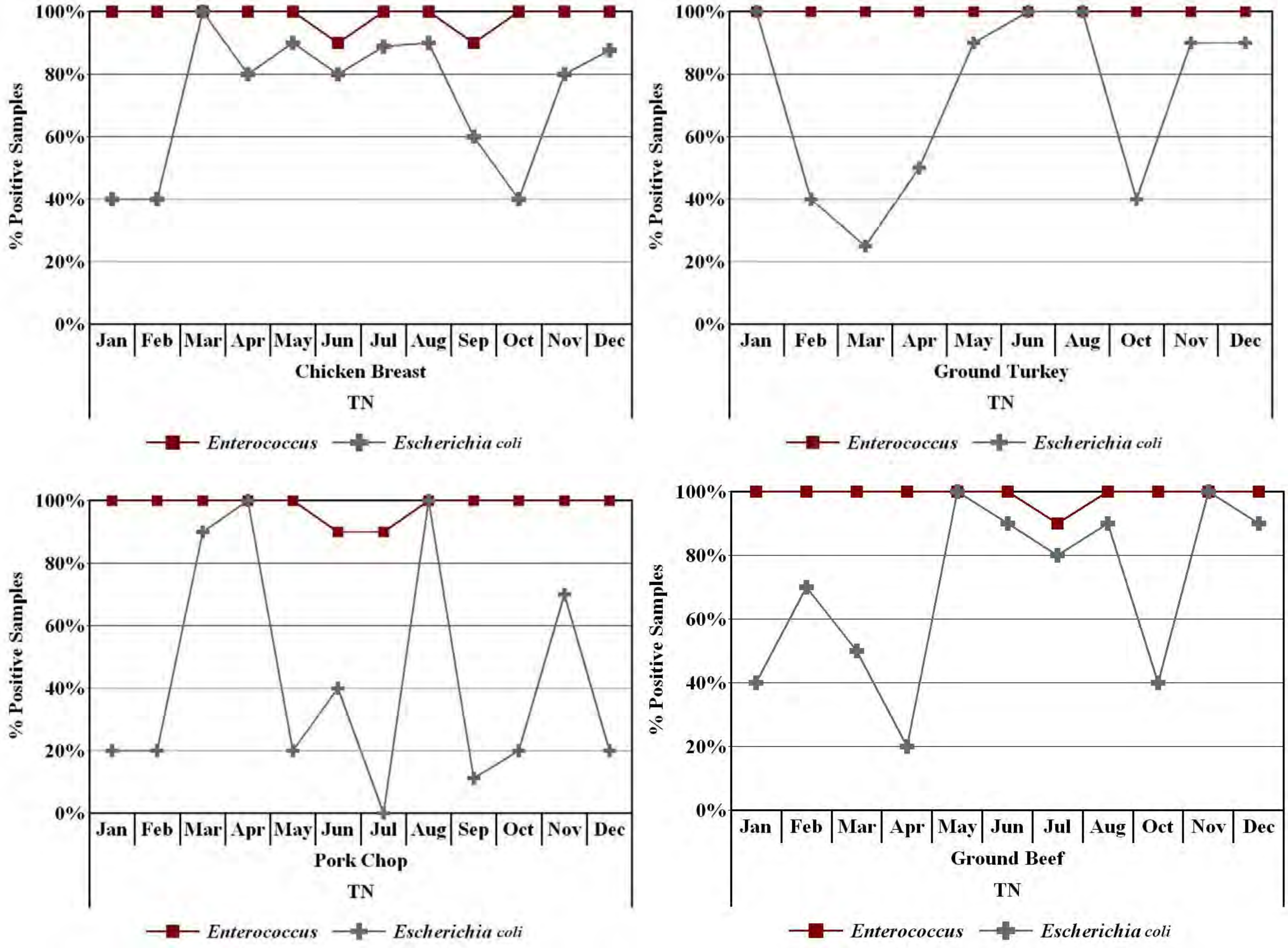


Table 5. Overall *Salmonella* Serotypes Identified, 2003

	Serotype	*n*
1.	Heidelberg	48
2.	Saintpaul	26
3.	Typhimurium*	26
4.	Kentucky	24
5.	Hadar	13
6.	Reading	13
7.	Mbandaka	7
8.	Agona	6
9.	Enteritidis	6
10.	Montevideo	5
11.	Senftenberg	5
12.	Haardt	4
13.	Newport	4
14.	Brandenburg	3
15.	Dublin	3
16.	Schwarzengrund	3
17.	Bredeney	2
18.	I 4, 5, 12, : i : -	2
19.	IIIa:18:z4, z32:	2
20.	IIIa:18:z4, z23 :-	2
21.	Johannesburg	2
22.	Anatum	1
23.	Chester	1
24.	I 4,12 : r : -	1
25.	Infantis	1
26.	Muenchen	1
27.	Sandiego	1
	Total	**212**

* Includes Typhimurium var. Copenhagen.

Table 6. *Salmonella* by Serotype and Meat Type, 2003

Serotype	*Chicken Breast*		*Ground Turkey*		*Ground Beef*		*Pork Chop*	
	n	**%***	**n**	**%**	**n**	**%**	**n**	**%**
Heidelberg (n=48)	16	33.3%	32	66.7%	0	-†	0	-
Saintpaul (n=26)	2	7.7%	24	92.3%	0	-	0	-
Typhimurium‡ (n=26)	22	84.6%	2	7.7%	1	3.8%	1	3.8%
Kentucky (n=24)	20	83.3%	4	16.7%	0	-	0	-
Hadar (n=13)	2	15.4%	11	84.6%	0	-	0	-
Reading (n=13)	0	-	13	100.0%	0	-	0	-
Mbandaka (n=7)	7	100.0%	0	-	0	-	0	-
Agona (n=6)	0	-	6	100.0%	0	-	0	-
Enteritidis (n=6)	4	66.7%	1	16.7%	1	16.7%	0	-
Montevideo (n=5)	1	20.0%	2	40.0%	2	40.0%	0	-
Senftenberg (n=5)	0	-	5	100.0%	0	-	0	-
Haardt (n=4)	4	100.0%	0	-	0	-	0	-
Newport (n=4)	0	-	2	50.0%	1	25.0%	1	25.0%
Brandenburg (n=3)	2	66.7%	0	-	0	-	1	33.3%
Dublin (n=3)	0	-	0	-	3	100.0%	0	-
Schwarzengrund (n=3)	1	33.3%	2	66.7%	0	-	0	-
Bredeney (n=2)	0	-	2	100.0%	0	-	0	-
I 4, 5, 12, : i : - (n=2)	2	100.0%	0	-	0	-	0	-
IIIa:18:z4, z32: (n=2)	0	-	2	100.0%	0	-	0	-
IIIa:18:z4, z23 :- (n=2)	0	-	2	100.0%	0	-	0	-
Johannesburg (n=2)	0	-	0	-	0	-	2	100.0%
Anatum (n=1)	0	-	1	100.0%	0	-	0	-
Chester (n=1)	0	-	1	100.0%	0	-	0	-
I 4,12 : r : - (n=1)	0	-	1	100.0%	0	-	0	-
Infantis (n=1)	0	-	0	-	1	100.0%	0	-
Muenchen (n=1)	0	-	0	-	1	100.0%	0	-
Sandiego (n=1)	0	-	1	100.0%	0	-	0	-
Total (N=212)	**83**	**39.2%**	**114**	**53.8%**	**10**	**4.7%**	**5**	**2.4%**

* Where % = (# isolates per serotype per meat) / (total # isolates per serotype).
† Dashes indicate no isolates from that serotype were isolated from that meat type.
‡ Includes Typhimurium var. Copenhagen.

Table 7. *Salmonella* Serotype by Site and Meat Type, 2003.

Site	*Serotype*	*Chicken Breast*		*Ground Turkey*		*Ground Beef*		*Pork Chop*	
		n	**%***	**n**	**%**	**n**	**%**	**n**	**%**
CA	Hadar (n=2)	0	-†	2	100.0%	0	-	0	-
	Heidelberg (n=2)	2	100.0%	0	-	0	-	0	-
	Kentucky (n=2)	2	100.0%	0	-	0	-	0	-
	Newport (n=2)	0	-	1	50.0%	1	50.0%	0	-
	Reading (n=2)	0	-	2	100.0%	0	-	0	-
	Brandenburg (n=1)	0	-	0	-	0	-	1	100.0%
	Typhimurium‡ (n=1)	0	-	1	100.0%	0	-	0	-
	Total (n=12)	**4**	**33.3%**	**6**	**50.0%**	**1**	**8.3%**	**1**	**8.3%**
CT	Typhimurium (n=6)	6	100.0%	0	-	0	-	0	-
	Heidelberg (n=4)	0	-	4	100.0%	0	-	0	-
	Kentucky (n=3)	3	100.0%	0	-	0	-	0	-
	Saintpaul (n=3)	0	-	3	100.0%	0	-	0	-
	Agona (n=1)	0	-	1	100.0%	0	-	0	-
	Total (n=17)	**9**	**52.9%**	**8**	**47.1%**	**0**	**0.0%**	**0**	**0.0%**
GA	Heidelberg (n=14)	1	7.1%	13	92.9%	0	-	0	-
	Saintpaul (n=5)	0	-	5	100.0%	0	-	0	-
	Brandenburg (n=2)	2	100.0%	0	-	0	-	0	-
	Bredeney (n=2)	0	-	2	100.0%	0	-	0	-
	Kentucky (n=2)	1	50.0%	1	50.0%	0	-	0	-
	Mbandaka (n=2)	2	100.0%	0	-	0	-	0	-
	Montevideo (n=2)	0	-	0	-	2	100.0%	0	-
	Schwarzengrund (n=2)	1	50.0%	1	50.0%	0	-	0	-
	Chester (n=1)	0	-	1	100.0%	0	-	0	-
	I 4,12 : r : - (n=1)	0	-	1	100.0%	0	-	0	-
	IIIa:18:z4, z32: (n=1)	0	-	1	100.0%	0	-	0	-
	Reading (n=1)	0	-	1	100.0%	0	-	0	-
	Senftenberg (n=1)	0	-	1	100.0%	0	-	0	-
	Typhimurium (n=1)	1	100.0%	0	-	0	-	0	-
	Total (n=37)	**8**	**21.6%**	**27**	**73.0%**	**2**	**5.4%**	**0**	**0.0%**
MD	Typhimurium (n=15)	13	86.7%	0	-	1	6.7%	1	6.7%
	Saintpaul (n=12)	2	16.7%	10	83.3%	0	-	0	-
	Enteritidis (n=5)	3	60.0%	1	20.0%	1	20.0%	0	-
	Hadar (n=3)	0	-	3	100.0%	0	-	0	-
	Heidelberg (n=3)	0	-	3	100.0%	0	-	0	-
	Agona (n=2)	0	-	2	100.0%	0	-	0	-
	Senftenberg (n=2)	0	-	2	100.0%	0	-	0	-
	Anatum (n=1)	0	-	1	100.0%	0	-	0	-
	Infantis (n=1)	0	-	0	-	1	100.0%	0	-
	Newport (n=1)	0	-	1	100.0%	0	-	0	-
	Sandiego (n=1)	0	-	1	100.0%	0	-	0	-
	Schwarzengrund (n=1)	0	-	1	100.0%	0	-	0	-
	Total (n=47)	**18**	**38.3%**	**25**	**53.2%**	**3**	**6.4%**	**1**	**2.1%**

* Where % = (# isolates per serotype per meat type per site)/(total # isolates per serotype per site).

† Dashes indicate no isolates from that serotype were isolated from that meat type.

‡ Includes Typhimurium var. Copenhagen.

Table 7(cont'd). *Salmonella* Serotype by Site and Meat Type, 2003.

Site	Serotype	Chicken Breast		Ground Turkey		Ground Beef		Pork Chop	
		n	%	n	%	n	%	n	%
MN	Kentucky (n=8)	6	75.0%	2	25.0%	0	-	0	-
	Reading (n=7)	0	-	7	100.0%	0	-	0	-
	Mbandaka (n=5)	5	100.0%	0	-	0	-	0	-
	Heidelberg (n=3)	1	33.3%	2	66.7%	0	-	0	-
	Dublin (n=1)	0	-	0	-	1	100.0%	0	-
	Enteritidis (n=1)	1	100.0%	0	-	0	-	0	-
	Total (n=25)	**13**	**52.0%**	**11**	**44.0%**	**1**	**4.0%**	**0**	**0.0%**
NY	Kentucky (n=6)	6	100.0%	0	-	0	-	0	-
	Saintpaul (n=5)	0	-	5	100.0%	0	-	0	-
	Heidelberg (n=4)	1	25.0%	3	75.0%	0	-	0	-
	Agona (n=3)	0	-	3	100.0%	0	-	0	-
	Typhimurium (n=3)	2	66.7%	1	33.3%	0	-	0	-
	I 4, 5, 12, : i : - (n=2)	2	100.0%	0	-	0	-	0	-
	IIIa:18:z4, z23 :- (n=2)	0	-	2	100.0%	0	-	0	-
	Johannesburg (n=2)	0	-	0	-	0	-	2	100.0%
	Montevideo (n=2)	0	-	2	100.0%	0	-	0	-
	Senftenberg (n=2)	0	-	2	100.0%	0	-	0	-
	IIIa:18:z4, z32: (n=1)	0	-	1	100.0%	0	-	0	-
	Reading (n=1)	0	-	1	100.0%	0	-	0	-
	Total (n=33)	**11**	**33.3%**	**20**	**60.6%**	**0**	**0.0%**	**2**	**6.1%**
OR	Heidelberg (n=11)	9	81.8%	2	18.2%	0	-	0	-
	Hadar (n=5)	2	40.0%	3	60.0%	0	-	0	-
	Haardt (n=4)	4	100.0%	0	-	0	-	0	-
	Dublin (n=2)	0	-	0	-	2	100.0%	0	-
	Kentucky (n=1)	1	100.0%	0	-	0	-	0	-
	Montevideo (n=1)	1	100.0%	0	-	0	-	0	-
	Newport (n=1)	0	-	0	-	0	-	1	100.0%
	Total (n=25)	**17**	**68.0%**	**5**	**20.0%**	**2**	**8.0%**	**1**	**4.0%**
TN	Heidelberg (n=7)	2	28.6%	5	71.4%	0	-	0	-
	Hadar (n=3)	0	-	3	100.0%	0	-	0	-
	Kentucky (n=2)	1	50.0%	1	50.0%	0	-	0	-
	Reading (n=2)	0	-	2	100.0%	0	-	0	-
	Muenchen (n=1)	0	-	0	-	1	100.0%	0	-
	Saintpaul (n=1)	0	-	1	100.0%	0	-	0	-
	Total (n=16)	**3**	**18.8%**	**12**	**75.0%**	**1**	**6.3%**	**0**	**0.0%**
Grand Total (N=212)		**83**	**39.2%**	**114**	**53.8%**	**10**	**4.7%**	**5**	**2.4%**

Table 8. *Salmonella* Isolates by Month for All Sites, 2003

Month	***n***	**%***
January	22	10.4%
February	15	7.1%
March	23	10.8%
April	14	6.6%
May	26	12.3%
June	23	10.8%
July	19	9.0%
August	22	10.4%
September	16	7.5%
October	7	3.3%
November	13	6.1%
December	12	5.7%
Total (N)	**212**	**100.0%**

* Where % = (n / N).

Table 9. Antimicrobial Resistance (%R) among *Salmonella* Isolates (N=212), 2003.

Antimicrobial Agent	*n*	*%R*[*]
Streptomycin	80	37.7%
Tetracycline	76	35.8%
Ampicillin	67	31.6%
Cephalothin	63	29.7%
Sulfamethoxazole	56	26.4%
Amoxicillin/Clavulanic Acid	39	18.4%
Kanamycin	35	16.5%
Gentamicin	31	14.6%
Cefoxitin	29	13.7%
Ceftiofur	29	13.7%
Chloramphenicol	9	4.2%
Nalidixic Acid	6	2.8%
Ceftriaxone	1	0.5%
Amikacin	0	0.0%
Ciprofloxacin	0	0.0%
Trimethoprim/Sulfamethoxazole	0	0.0%

[*] Where % R = (n / N).

Figure 4. Antimicrobial Resistance among *Salmonella* Isolates (N=212), 2003

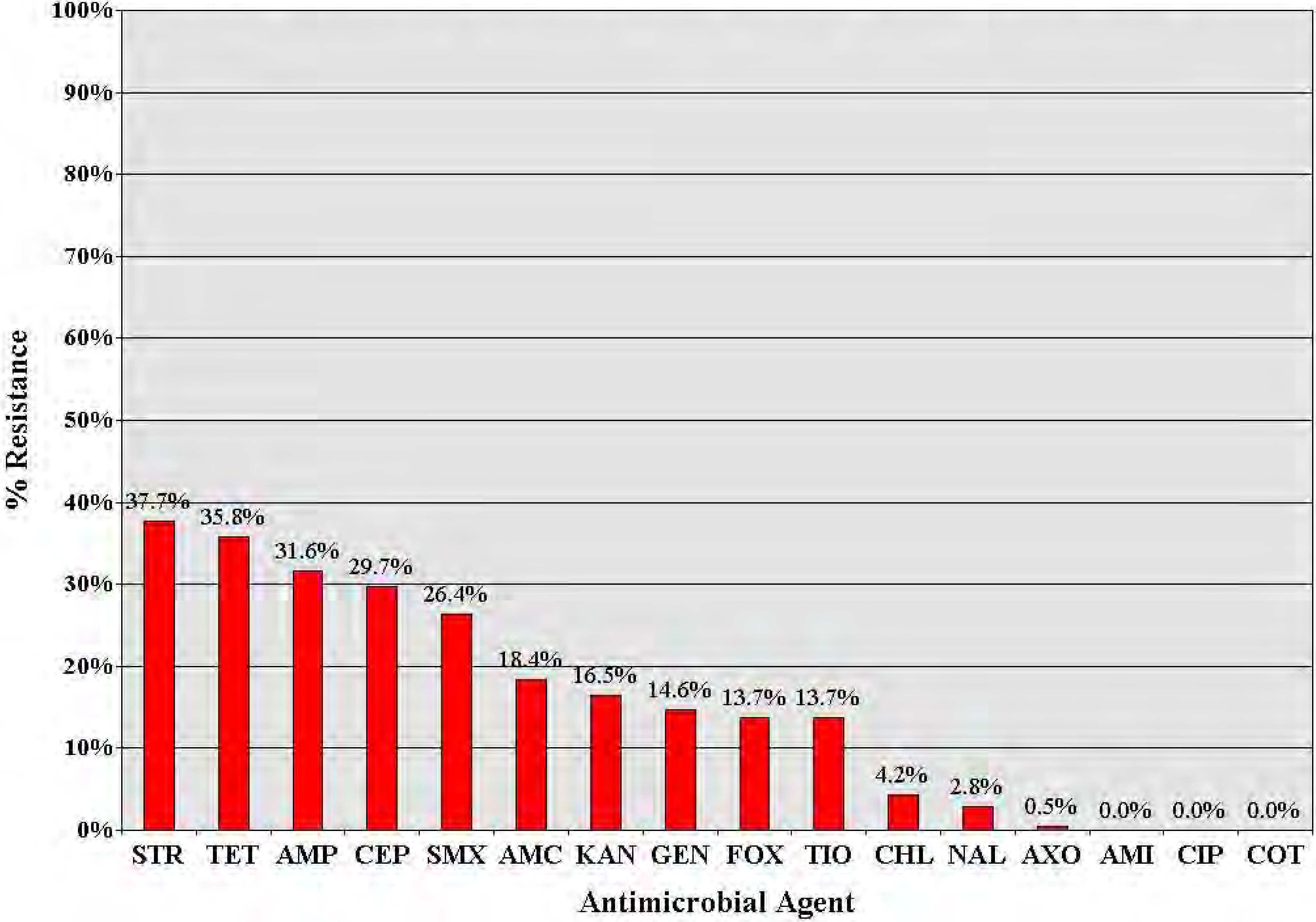


Figure 5. MIC Distribution among all Antimicrobial Agents

Salmonella from All Meats (N=212)		Distribution (%) of MICs (in µg/ml)																
Antimicrobial Agent	**%R**[†]	**0.015**	**0.03**	**0.06**	**0.125**	**0.25**	**0.5**	**1**	**2**	**4**	**8**	**16**	**32**	**64**	**128**	**256**	**512**	**>512**
Ampicillin	**31.6%**							38.2	28.8	0.9	0.5			**31.6**				
Amoxicillin/Clavulanic Acid	**18.4%**							60.4	7.5	0.5	1.9	11.3	**4.7**	**13.7**				
Cefoxitin	**13.7%**							0.9	55.7	23.6	5.2	0.9	**13.7**					
Ceftiofur	**13.7%**						45.3	39.2	1.9			**13.7**						
Ceftriaxone	**0.5%**					85.8				0.5	0.9	8.0	4.2	**0.5**				
Cephalothin	**29.7%**								11.3	46.7	10.4	1.9	**2.4**	**27.4**				
Nalidixic Acid	**2.8%**							0.5	1.4	82.5	11.8	0.9		**2.8**				
Ciprofloxacin	**0.0%**	83.5	12.3	1.4		2.4	0.5											
Sulfamethoxazole	**26.4%**											24.1	33.5	13.7	2.4		**0.5**	**25.9**
Trimethoprim/Sulfamethoxazole	**0.0%**				88.7	10.8	0.5											
Amikacin	**0.0%**						3.3	51.9	42.0	2.8								
Gentamicin	**14.6%**					29.2	44.3	6.1	1.9		3.8	9.0	**5.7**					
Kanamycin	**16.5%**										81.1		2.4	**7.5**	**9.0**			
Streptomycin*	**37.7%**												62.3	**17.0**	**20.8**			
Chloramphenicol	**4.2%**									20.3	74.1	1.4		**4.2**				
Tetracycline	**35.8%**									62.7	1.4		**0.5**	**35.4**				

Vertical bars show the CLSI/NCCLS Susceptible/Resistant breakpoints for each drug where appropriate.

*Currently no CLSI/NCCLS breakpoints have been established for this organism/antimicrobial combination.

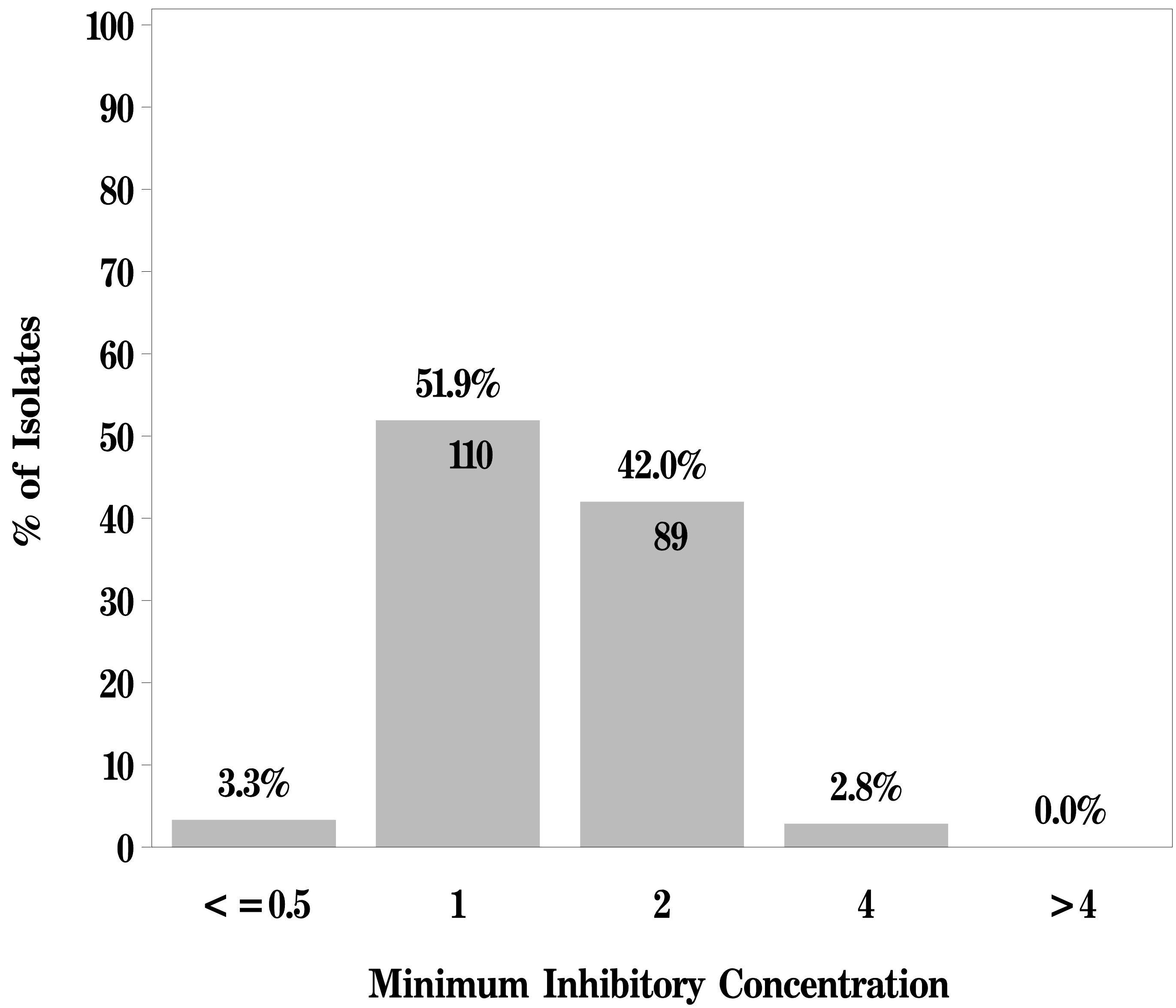
[†]Discrepancies between %R and sums of distribution %s are due to rounding.

Unshaded areas indicate the dilution ranges of the Sensititre plate used to test the 2003 isolates.

NARMS

Figure 5a: Minimum Inhibitory Concentration of Amikacin for *Salmonella* (N=212 Isolates)

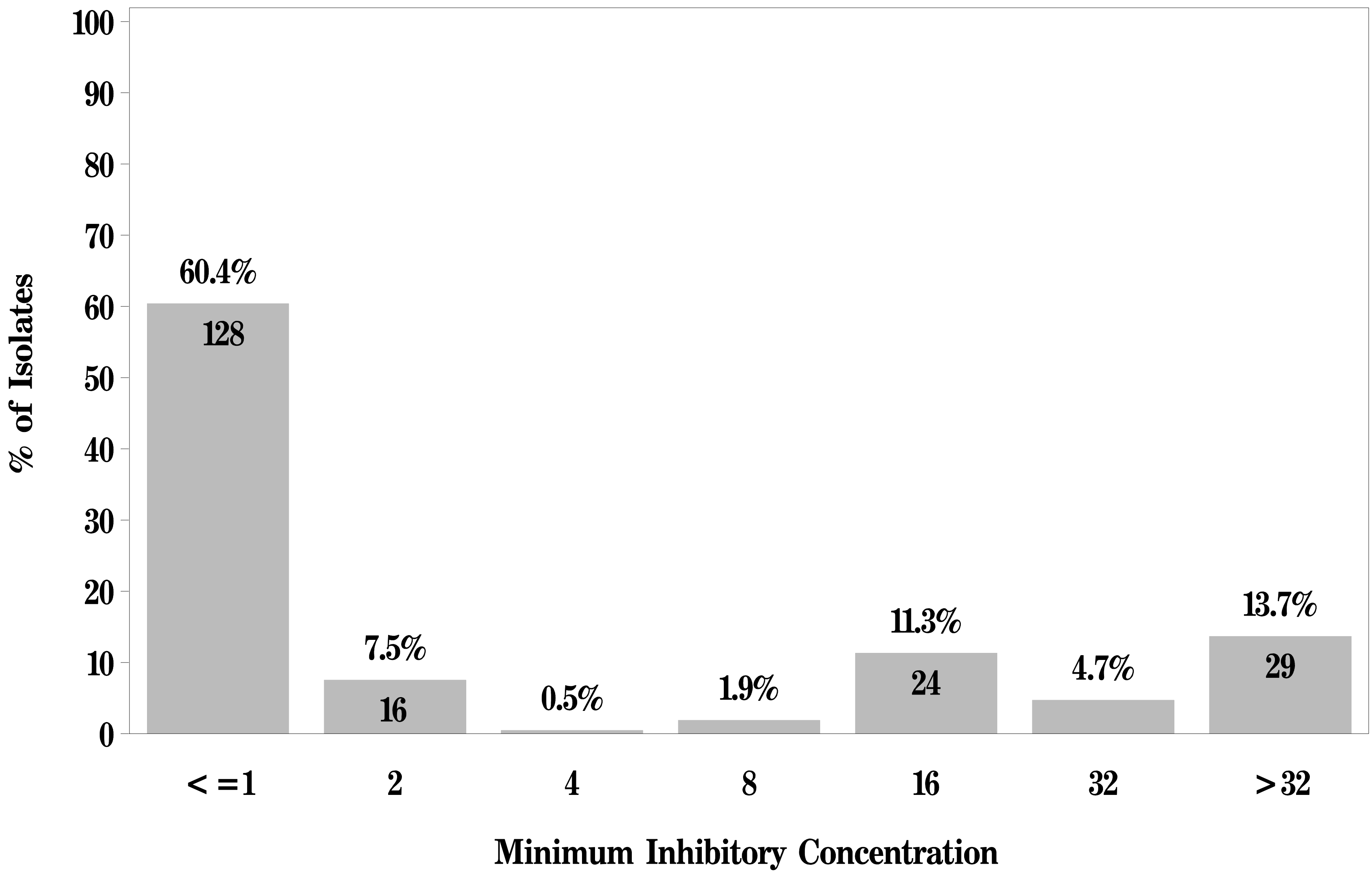
Breakpoints: Susceptible <=16 μg/mL Resistant >=64 μg/mL



NARMS

Figure 5b: Minimum Inhibitory Concentration of Amoxicillin/Clavulanic acid for *Salmonella* (N=212 Isolates)

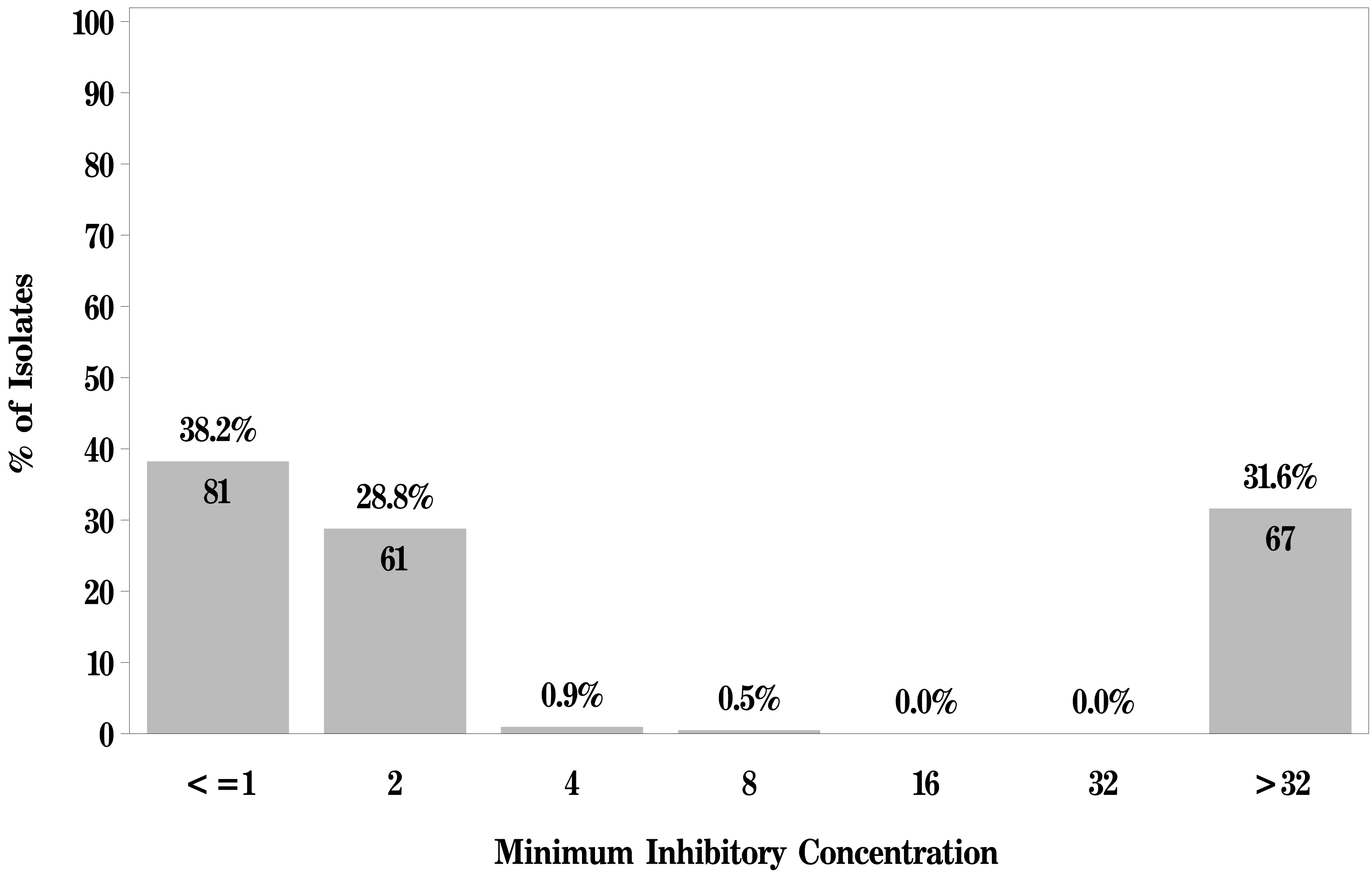
Breakpoints: Susceptible <=8 μg/mL Resistant >=32 μg/mL



NARMS

Figure 5c: Minimum Inhibitory Concentration of Ampicillin for *Salmonella* (N=212 Isolates)

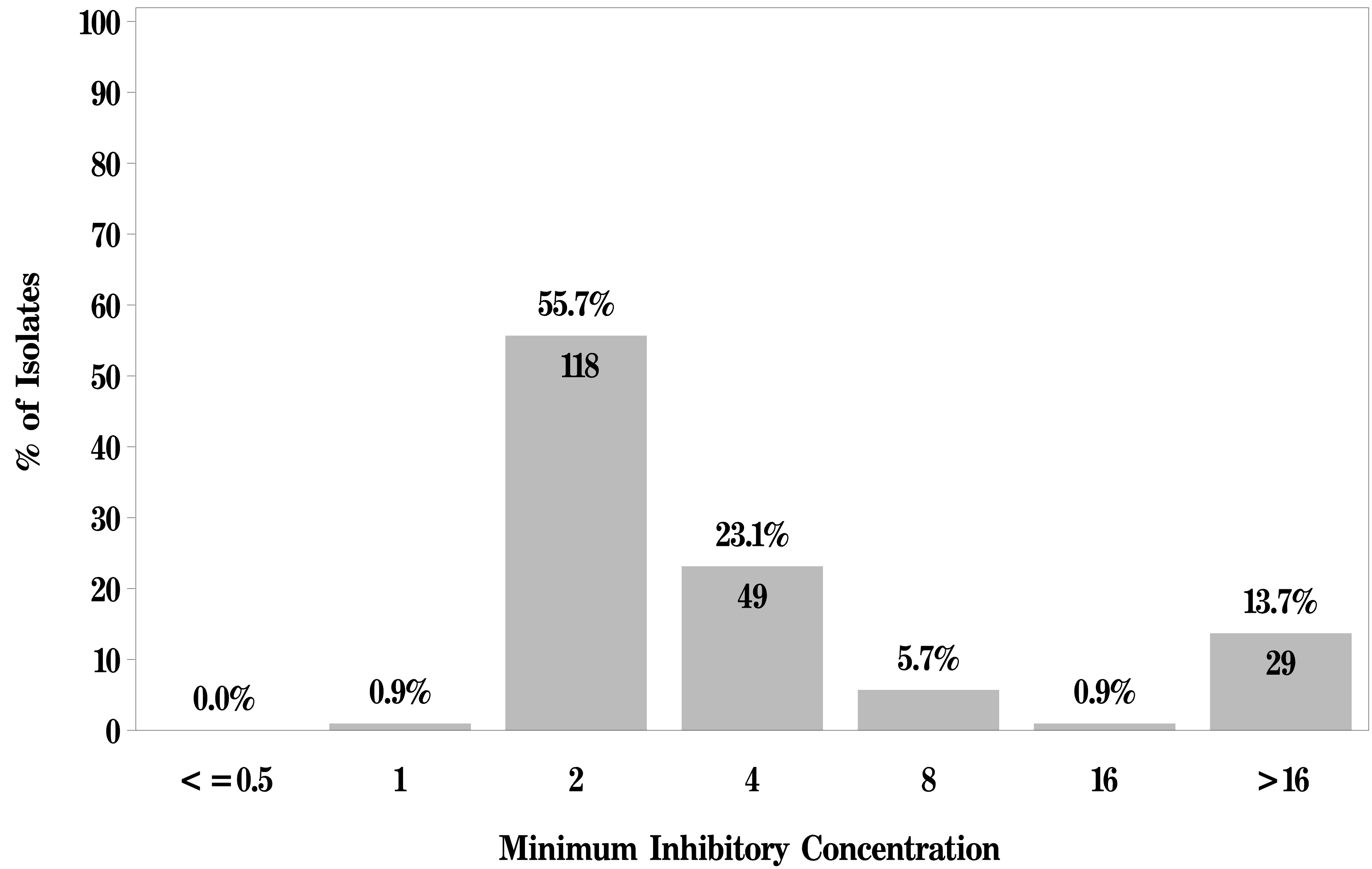
Breakpoints: Susceptible <=8 μg/mL Resistant >=32 μg/mL



NARMS

Figure 5d: Minimum Inhibitory Concentration of Cefoxitin for *Salmonella* (N=212 Isolates)

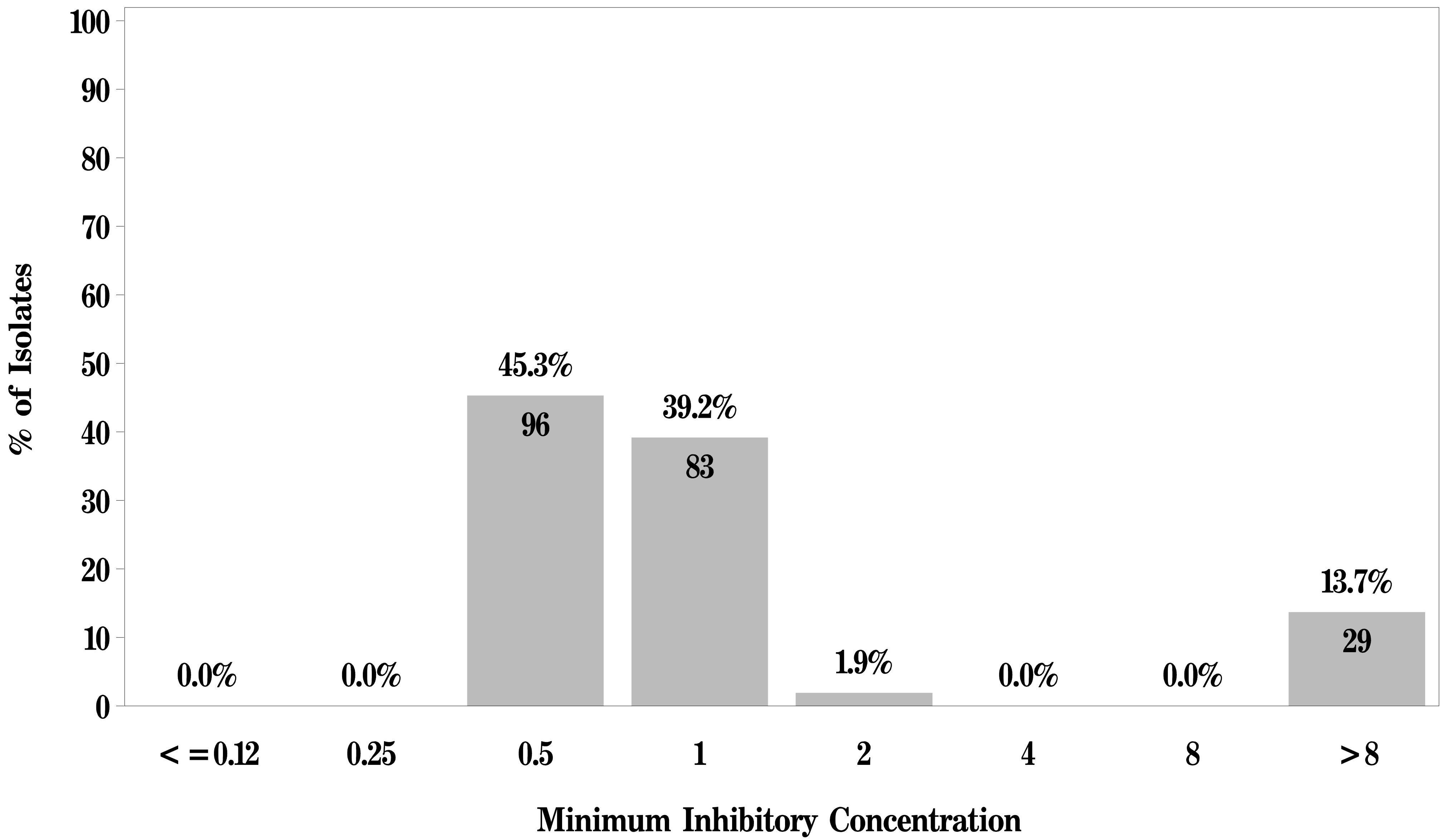
Breakpoints: Susceptible<=8 μg/mL Resistant>=32 μg/mL



NARMS

Figure 5e: Minimum Inhibitory Concentration of Ceftiofur for *Salmonella* (N=212 Isolates)

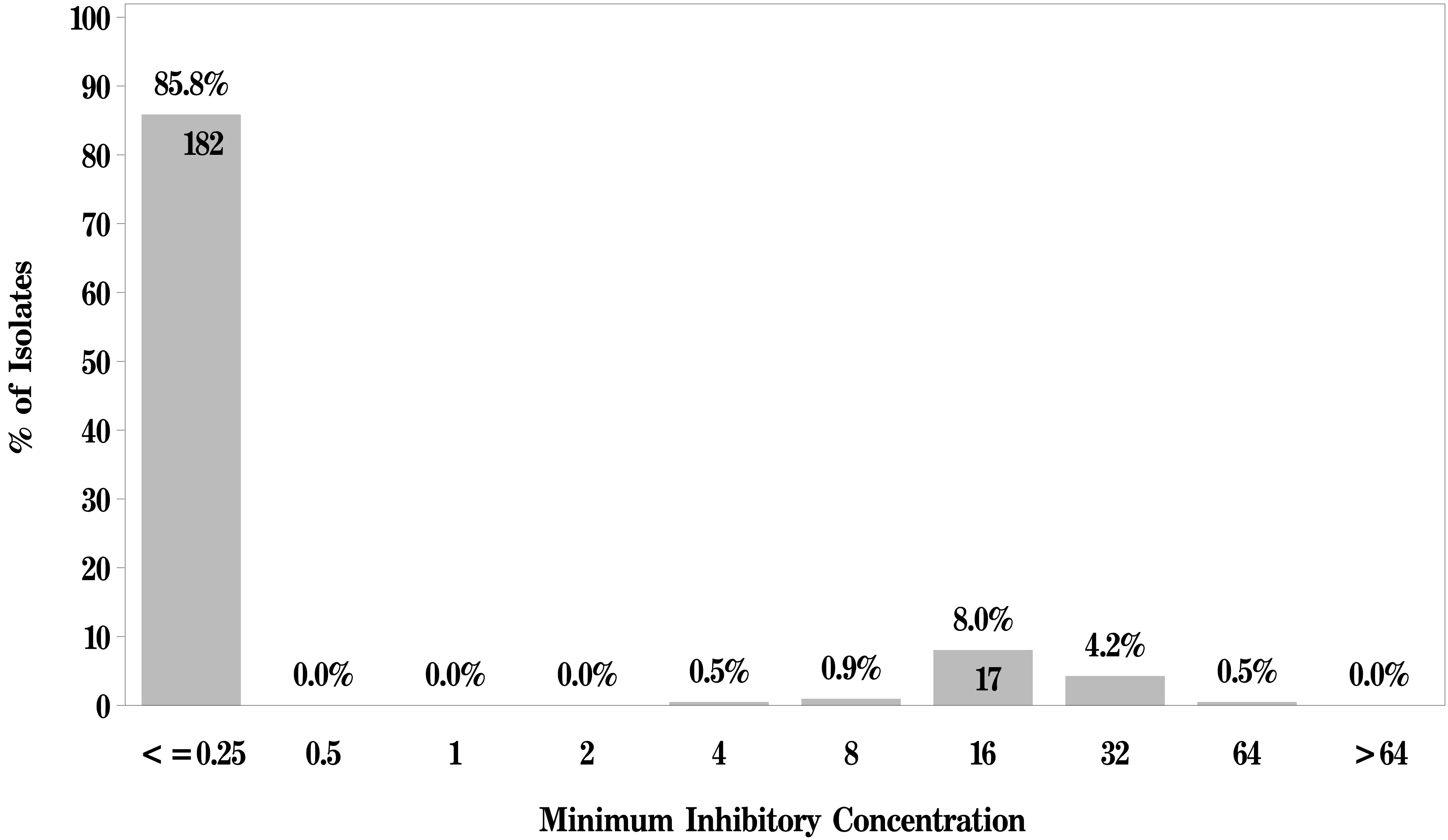
Breakpoints: Susceptible <=2 µg/mL Resistant >=8 µg/mL



NARMS

Figure 5f: Minimum Inhibitory Concentration of Ceftriaxone for *Salmonella* (N=212 Isolates)

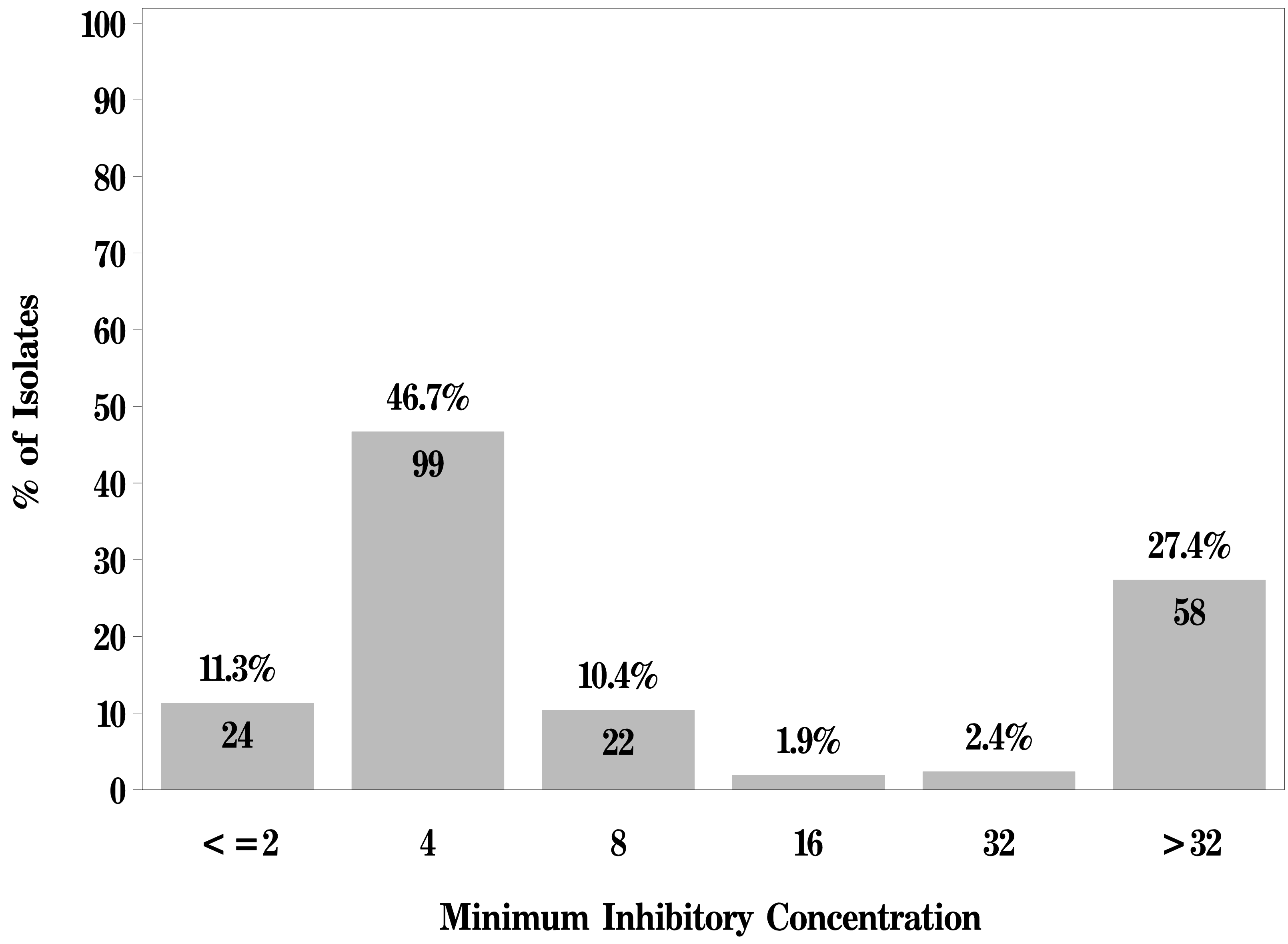
Breakpoints: Susceptible<=8 µg/mL Resistant>=64 µg/mL



NARMS

Figure 5g: Minimum Inhibitory Concentration of Cephalothin for *Salmonella* (N=212 Isolates)

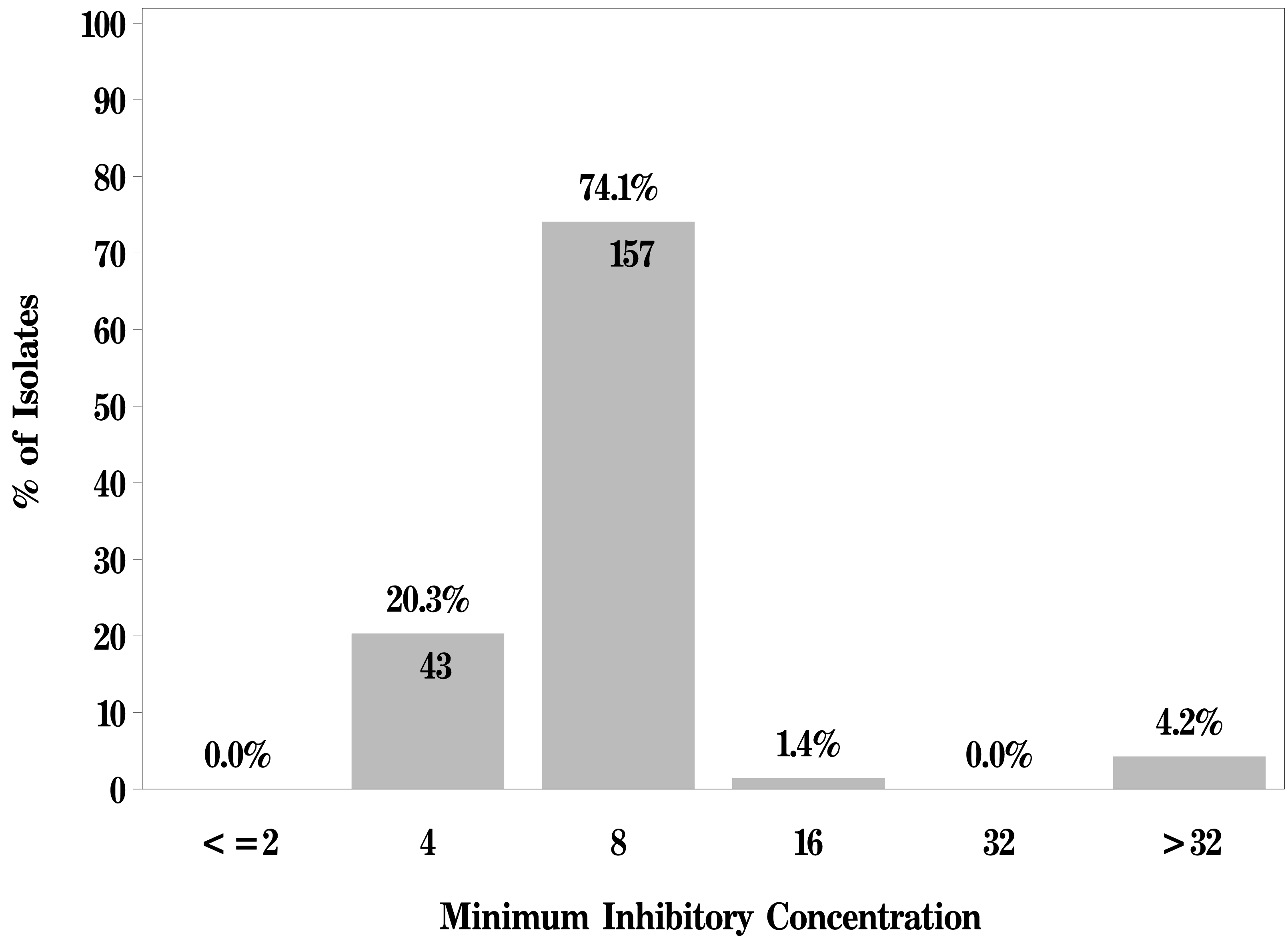
Breakpoints: Susceptible<=8 μg/mL Resistant>=32 μg/mL



NARMS

Figure 5h: Minimum Inhibitory Concentration of Chloramphenicol for *Salmonella* (N=212 Isolates)

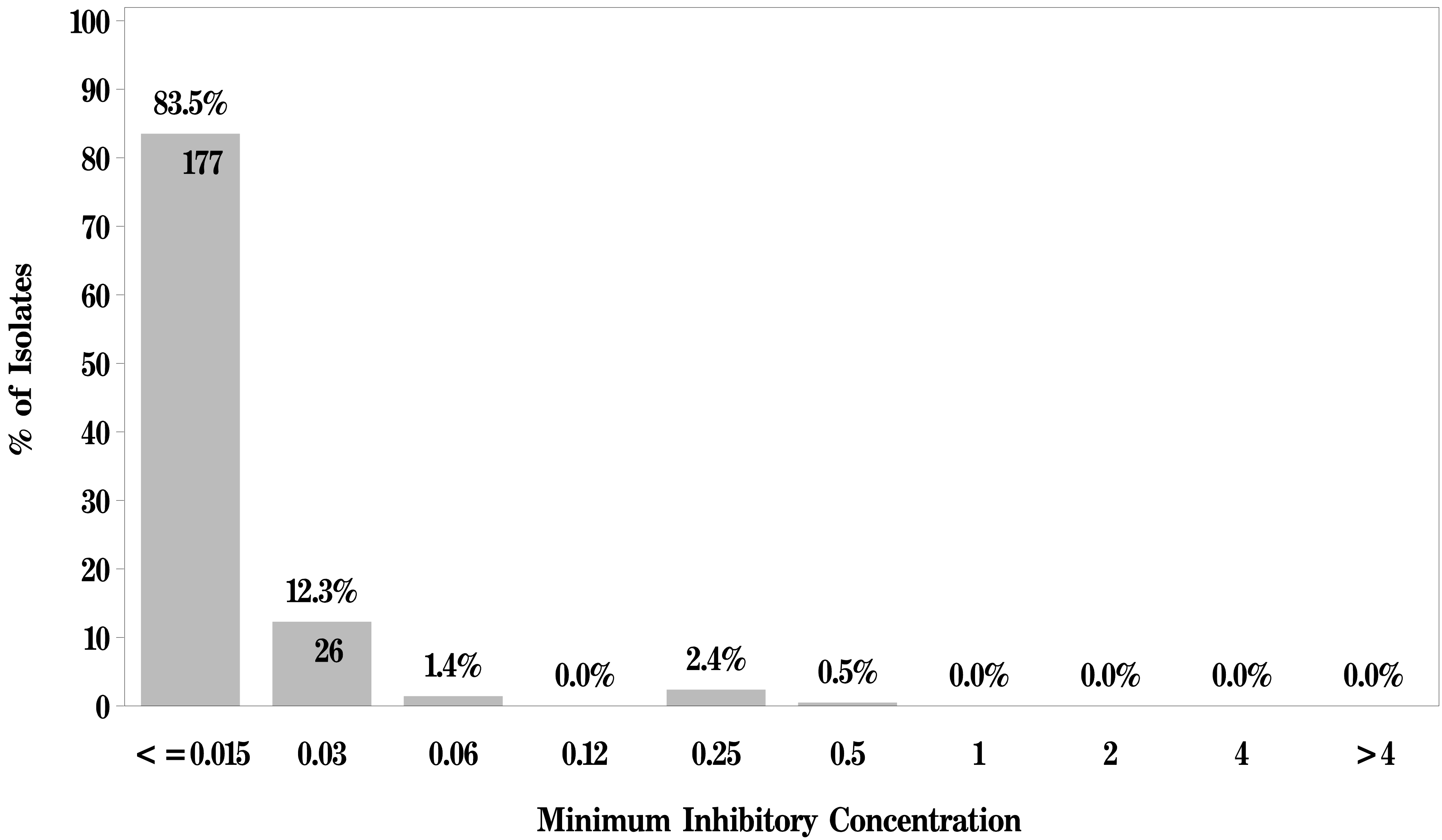
Breakpoints: Susceptible <=8 µg/mL Resistant >=32 µg/mL



NARMS

Figure 5i: Minimum Inhibitory Concentration of Ciprofloxacin for *Salmonella* (N=212 Isolates)

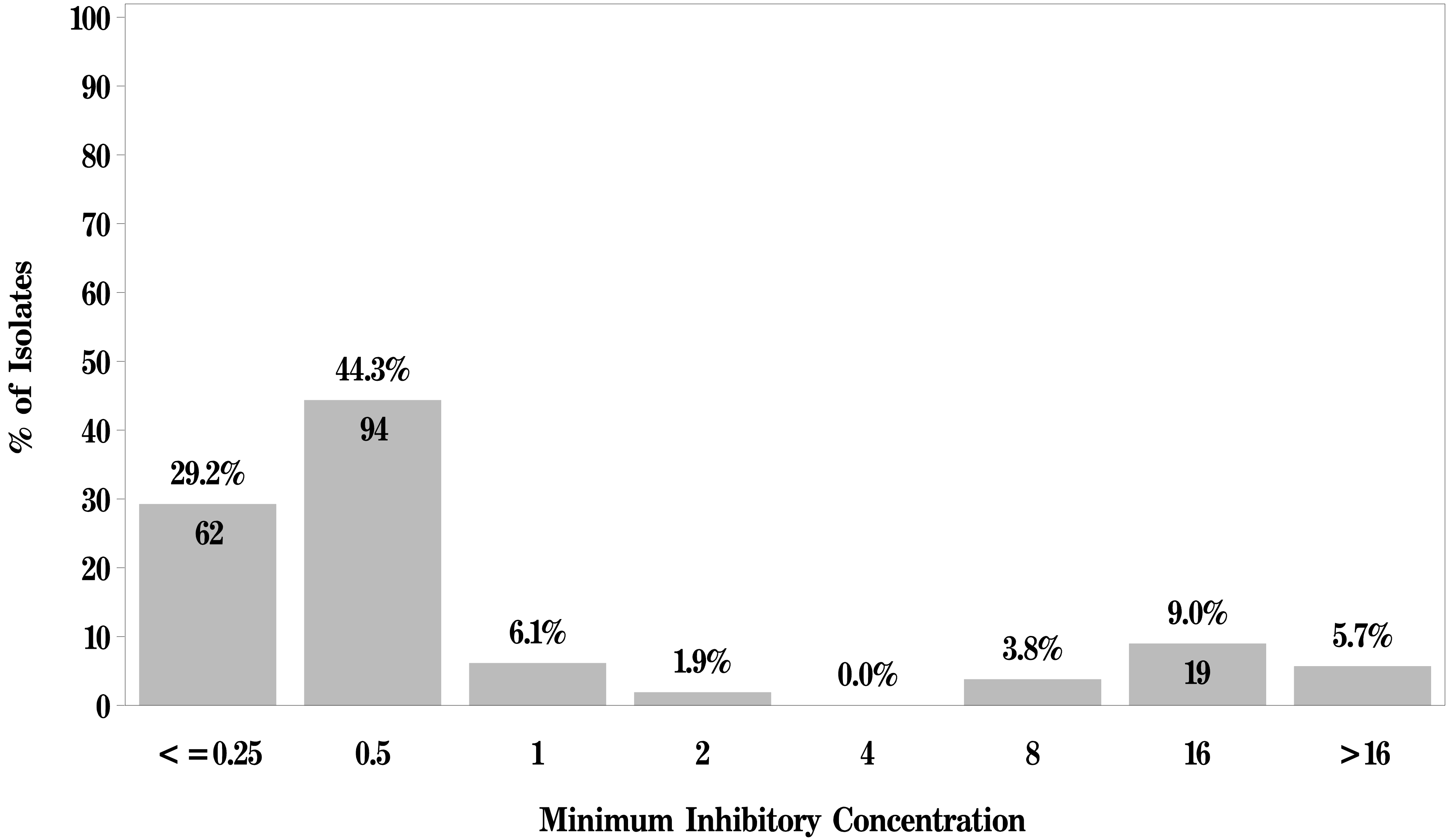
Breakpoints: Susceptible <=1 µg/mL Resistant >=4 µg/mL



NARMS

Figure 5j: Minimum Inhibitory Concentration of Gentamicin for *Salmonella* (N=212 Isolates)

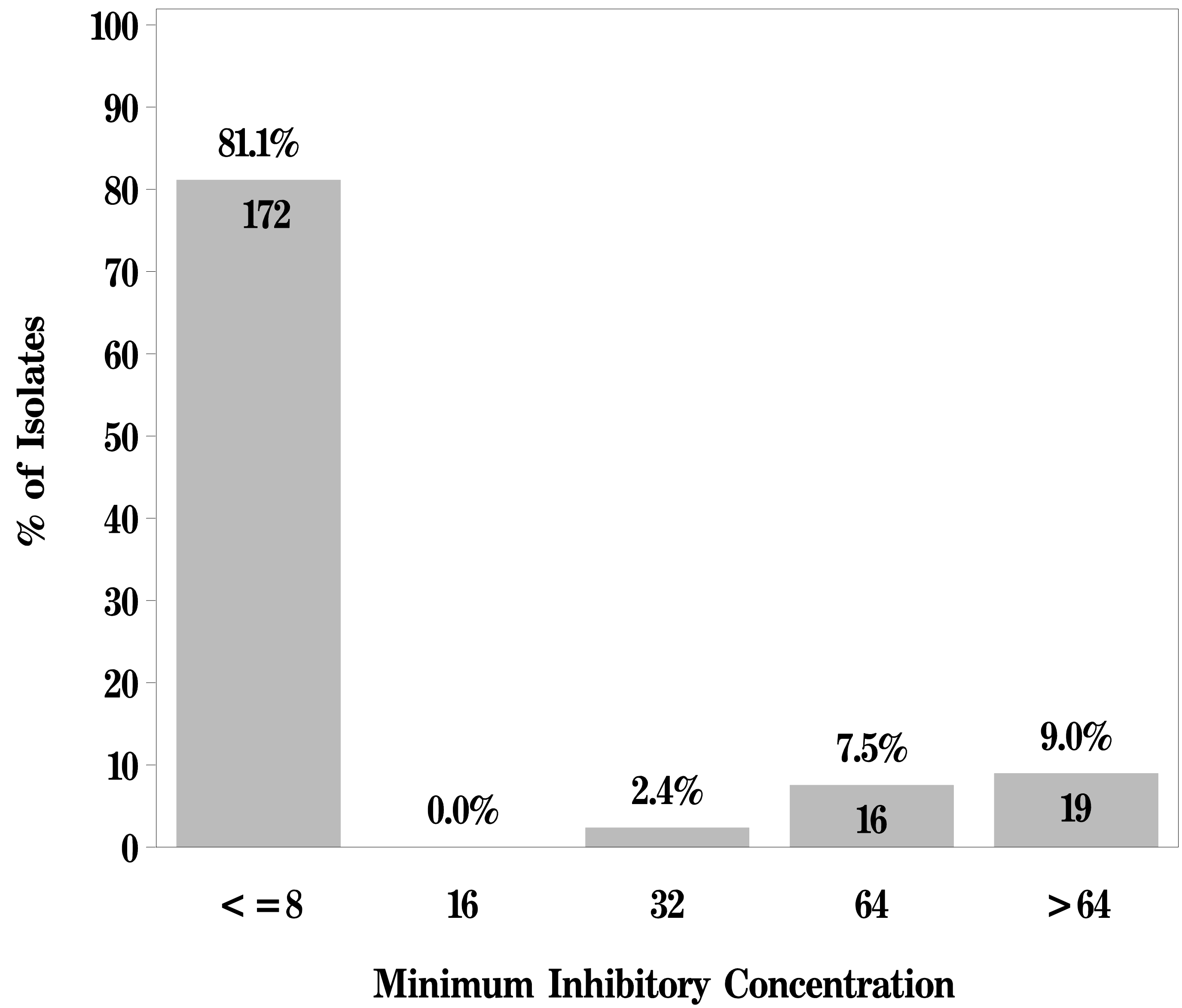
Breakpoints: Susceptible <=4 μg/mL Resistant >=16 μg/mL



NARMS

Figure 5k: Minimum Inhibitory Concentration of Kanamycin for *Salmonella* (N=212 Isolates)

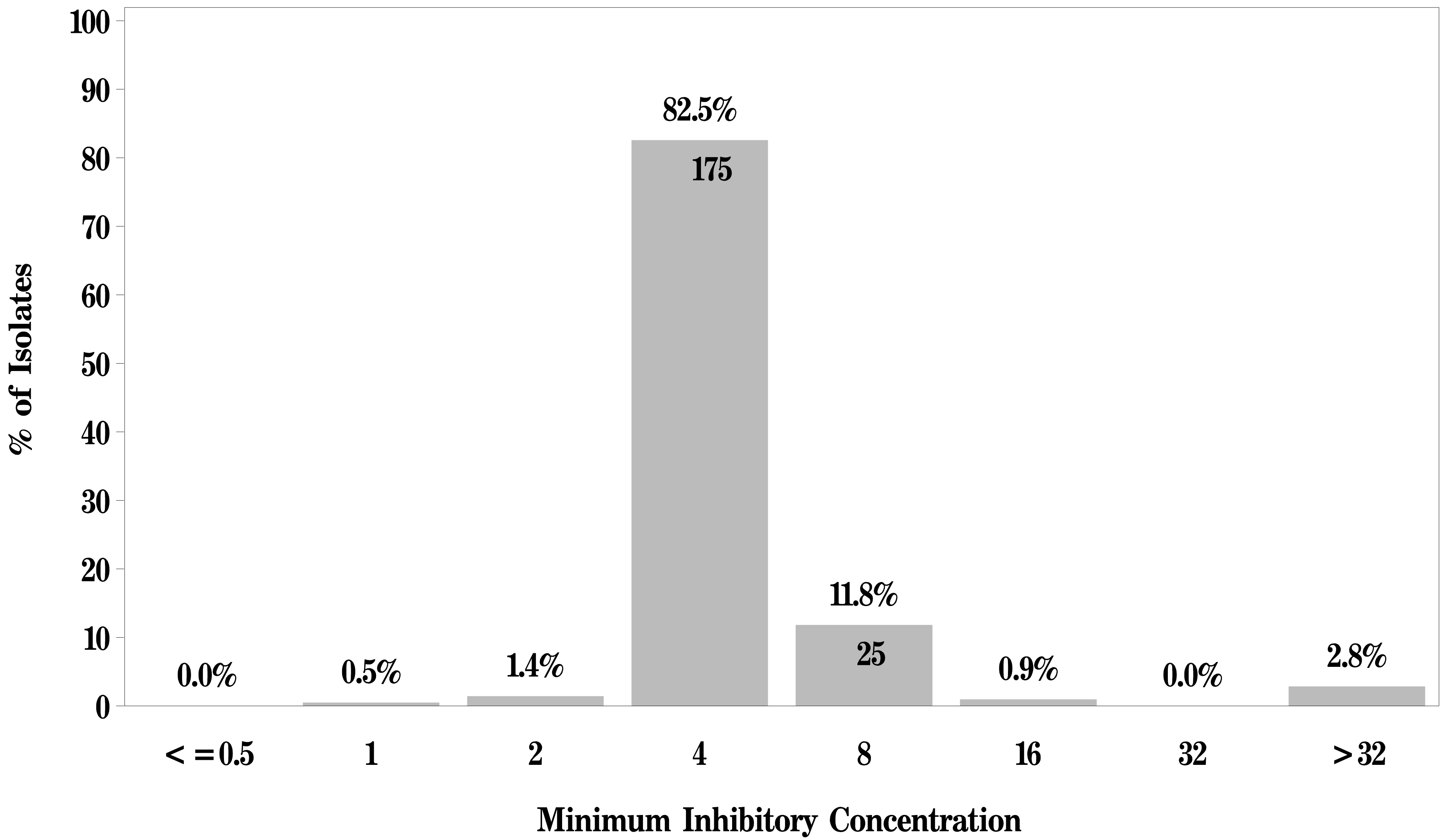
Breakpoints: Susceptible <=16 µg/mL Resistant >=64 µg/mL



NARMS

Figure 5l: Minimum Inhibitory Concentration of Nalidixic acid for *Salmonella* (N=212 Isolates)

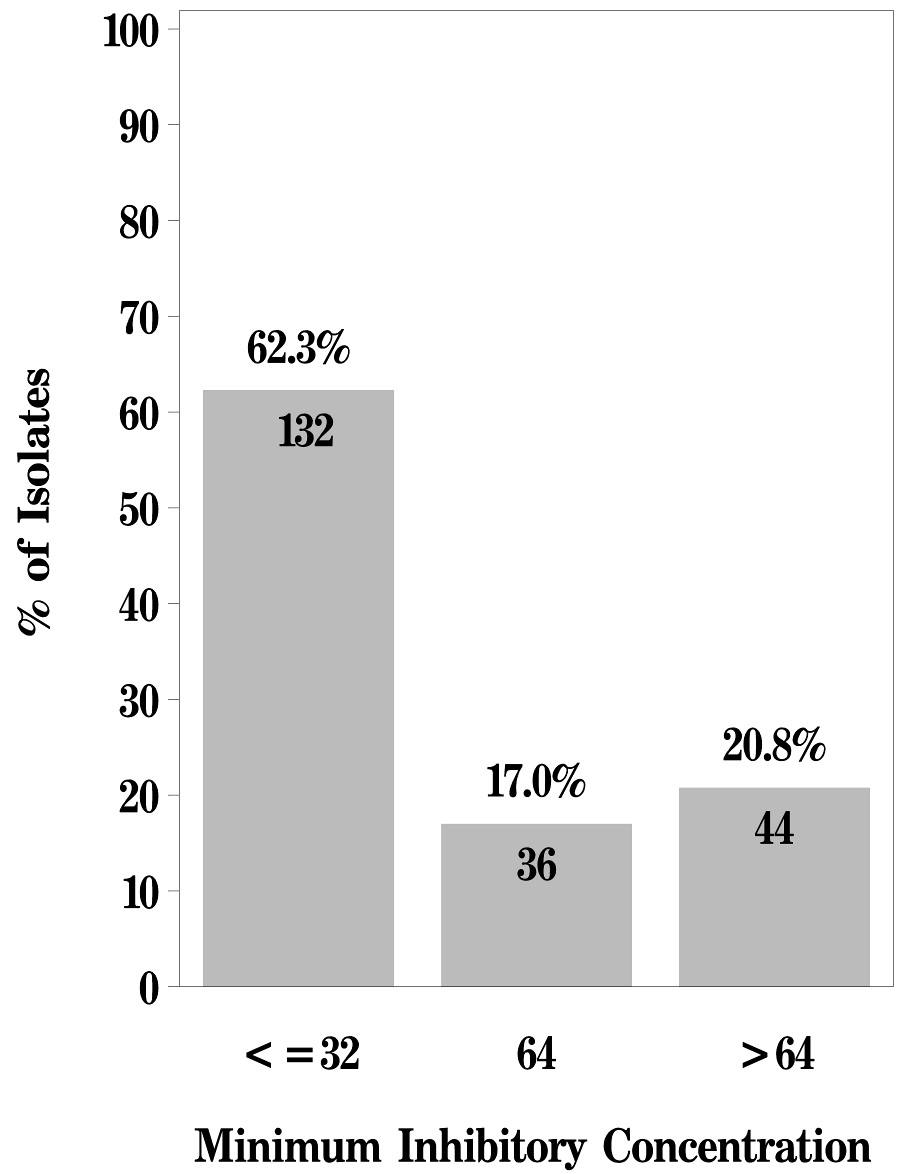
Breakpoints: Susceptible<=16 μg/mL Resistant>=32 μg/mL



NARMS

Figure 5m: Minimum Inhibitory Concentration of Streptomycin for *Salmonella* (N=212 Isolates)

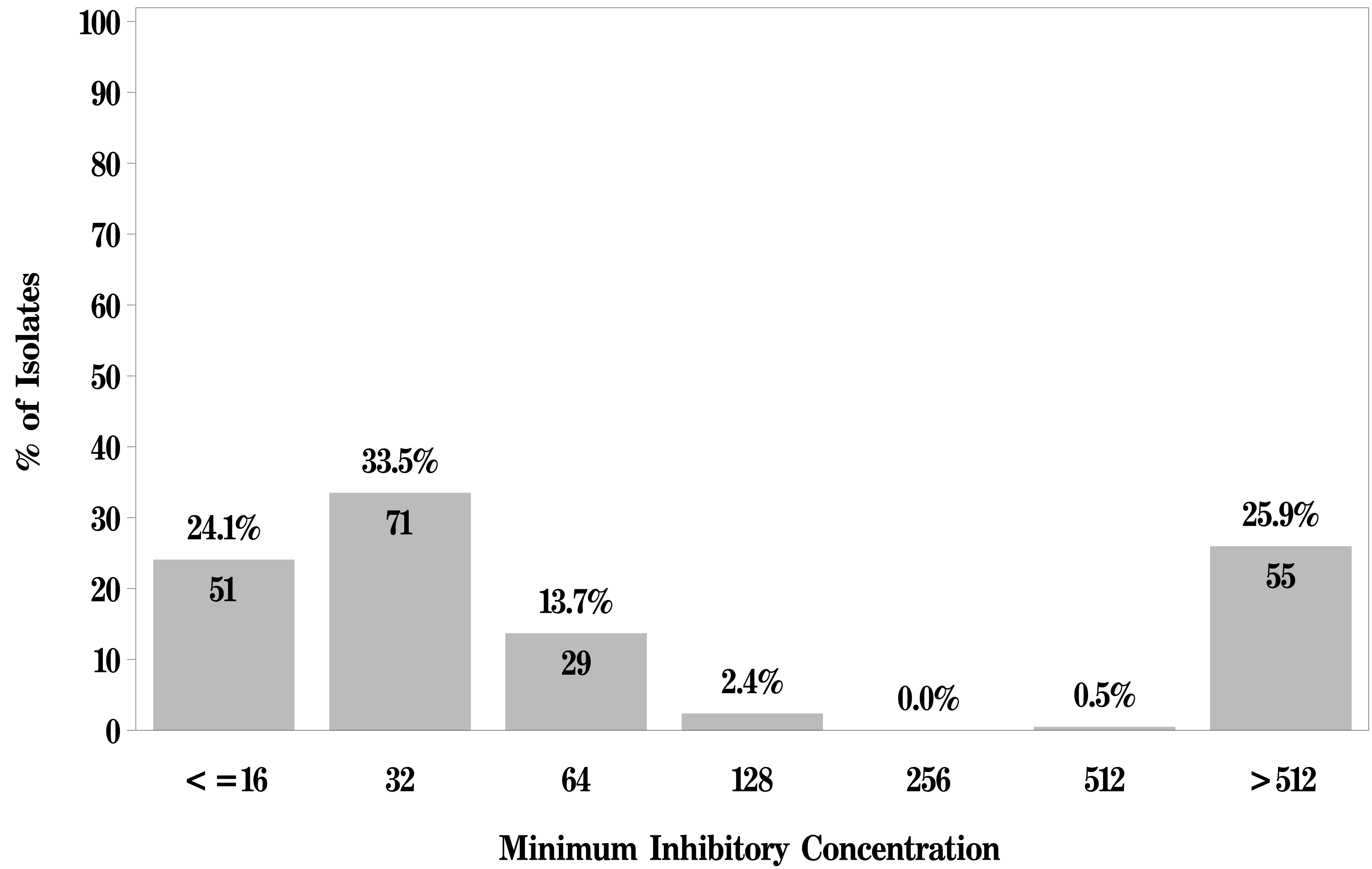
Breakpoints: Susceptible <=32 µg/mL Resistant >=64 µg/mL



NARMS

Figure 5n: Minimum Inhibitory Concentration of Sulfamethoxazole for *Salmonella* (N=212 Isolates)

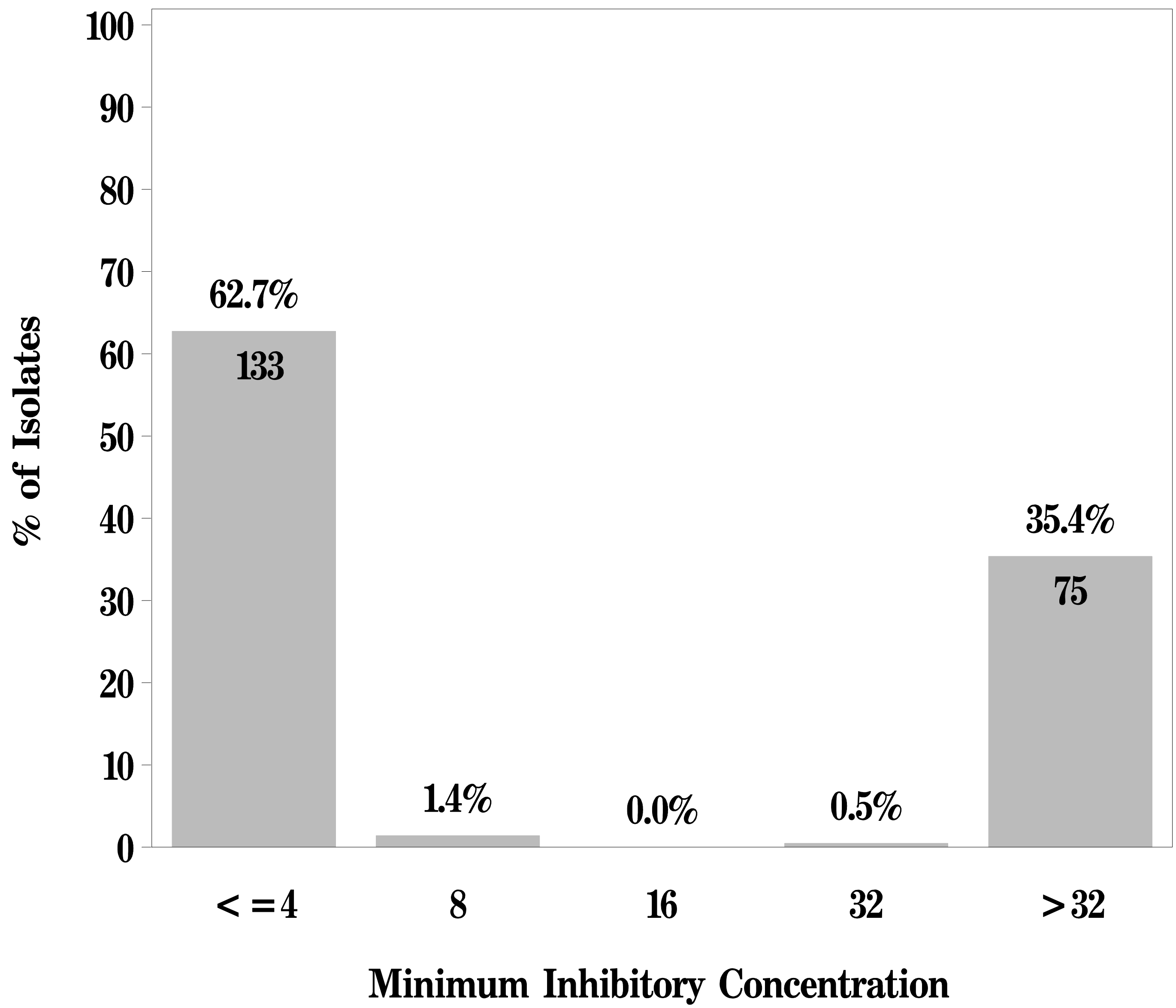
Breakpoints: Susceptible<=256 μg/mL Resistant>=512 μg/mL



NARMS

Figure 5o: Minimum Inhibitory Concentration of Tetracycline for *Salmonella* (N=212 Isolates)

Breakpoints: Susceptible <=4 µg/mL Resistant >=16 µg/mL



NARMS

Figure 5p: Minimum Inhibitory Concentration of Trimethoprim/sulfamethoxazole for *Salmonella* (N=212 Isolates)

Breakpoints: Susceptible <=2 μg/mL Resistant >=4 μg/mL

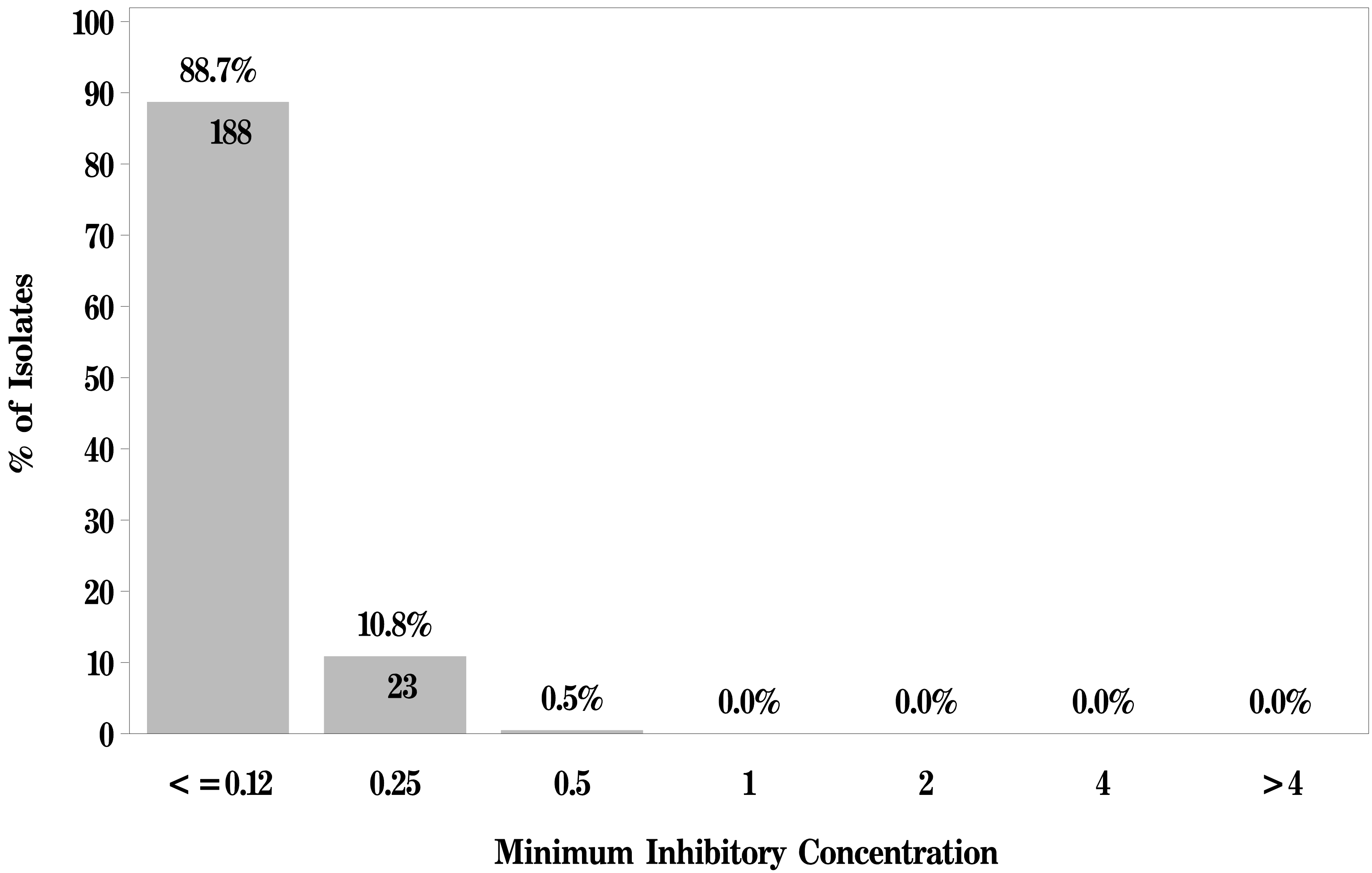


Table 10. Antimicrobial Resistance[*] among *Salmonella* Isolates by Meat Type, 2003

Antimicrobial Agent	***Chicken Breast (n=83)***	***Ground Turkey (n=114)***	***Ground Beef (n=10)***	***Pork Chop (n=5)***
Streptomycin	26.5%	45.6%	40.0%	40.0%
Tetracycline	27.7%	39.5%	40.0%	80.0%
Ampicillin	33.7%	28.9%	40.0%	40.0%
Cephalothin	28.9%	28.9%	40.0%	40.0%
Sulfamethoxazole	14.5%	33.3%	40.0%	40.0%
Amoxicillin/Clavulanic Acid	25.3%	11.4%	40.0%	20.0%
Kanamycin	4.8%	27.2%	-[†]	-
Gentamicin	6.0%	22.8%	-	-
Cefoxitin	25.3%	2.6%	40.0%	20.0%
Ceftiofur	25.3%	2.6%	40.0%	20.0%
Chloramphenicol	2.4%	0.9%	40.0%	40.0%
Nalidixic Acid	1.2%	4.4%	-	-
Ceftriaxone	-	-	10.0%	-
Amikacin	-	-	-	-
Ciprofloxacin	-	-	-	-
Trimethoprim/Sulfamethoxazole	-	-	-	-

[*] Where % Resistance = (# isolates per meat type resistant to antimicrobial) / (total # isolates per meat type).
[†] Dashes indicate 0.0% resistance to antimicrobial.

Figure 6a. MIC Distribution among *Salmonella* from Chicken Breast

Salmonella from Chicken Breast (N=83)		Distribution (%) of MICs (in µg/ml)																
Antimicrobial Agent	**%R†**	**0.015**	**0.03**	**0.06**	**0.125**	**0.25**	**0.5**	**1**	**2**	**4**	**8**	**16**	**32**	**64**	**128**	**256**	**512**	**>512**
Ampicillin	**33.7%**							43.4	22.9					**33.7**				
Amoxicillin/Clavulanic Acid	**25.3%**							65.1	1.2		2.4	6.0		**25.3**				
Cefoxitin	**25.3%**								60.2	13.3	1.2		**25.3**					
Ceftiofur	**25.3%**						51.8	21.7	1.2			**25.3**						
Ceftriaxone	**0.0%**					73.5				1.2	1.2	16.9	7.2					
Cephalothin	**28.9%**								21.7	42.2	4.8	2.4	**1.2**	**27.7**				
Nalidixic Acid	**1.2%**							1.2	1.2	84.3	12.0			**1.2**				
Ciprofloxacin	**0.0%**	83.1	14.5	1.2		1.2												
Sulfamethoxazole	**14.5%**											32.5	33.7	15.7	3.6			**14.5**
Trimethoprim/Sulfamethoxazole	**0.0%**				97.6	2.4												
Amikacin	**0.0%**						8.4	47.0	41.0	3.6								
Gentamicin	**6.0%**					33.7	54.2	4.8			1.2	**2.4**	**3.6**					
Kanamycin	**4.8%**										94.0		1.2		**4.8**			
Streptomycin*	**26.5%**												73.5	**14.5**	**12.0**			
Chloramphenicol	**2.4%**									32.5	65.1			**2.4**				
Tetracycline	**27.7%**									72.3			**1.2**	**26.5**				

Vertical bars show the CLSI/NCCLS Susceptible/Resistant breakpoints for each drug where appropriate.

*Currently no CLSI/NCCLS breakpoints have been established for this organism/antimicrobial combination.

†Discrepancies between %R and sums of distribution %s are due to rounding.

Unshaded areas indicate the dilution ranges of the Sensititre plate used to test the 2003 isolates.

Figure 6b. MIC Distribution among *Salmonella* from Ground Turkey

Salmonella from Ground Turkey (N=114)		Distribution (%) of MICs (in µg/ml)																
Antimicrobial Agent	**%R†**	**0.015**	**0.03**	**0.06**	**0.125**	**0.25**	**0.5**	**1**	**2**	**4**	**8**	**16**	**32**	**64**	**128**	**256**	**512**	**>512**
Ampicillin	**28.9%**							36.8	31.6	1.8	0.9			**28.9**				
Amoxicillin/Clavulanic Acid	**11.4%**							58.8	11.4	0.9	1.8	15.8	**8.8**	**2.6**				
Cefoxitin	**2.6%**							1.8	55.3	31.6	7.0	1.8	**2.6**					
Ceftiofur	**2.6%**						41.2	54.4	1.8			**2.6**						
Ceftriaxone	**0.0%**					97.4					0.9		1.8					
Cephalothin	**28.9%**								5.3	49.1	14.9	1.8	**2.6**	**26.3**				
Nalidixic Acid	**4.4%**								0.9	82.5	11.4	0.9		**4.4**				
Ciprofloxacin	**0.0%**	86.0	8.8	0.9		3.5	0.9											
Sulfamethoxazole	**33.3%**											18.4	33.3	13.2	1.8		**0.9**	**32.5**
Trimethoprim/Sulfamethoxazole	**0.0%**				86.0	13.2	0.9											
Amikacin	**0.0%**							52.6	44.7	2.6								
Gentamicin	**22.8%**					25.4	37.7	5.3	3.5		5.3	**14.9**	**7.9**					
Kanamycin	**27.2%**										70.2		2.6	**14.0**	**13.2**			
Streptomycin*	**45.6%**												54.4	**20.2**	**25.4**			
Chloramphenicol	**0.9%**									13.2	83.3	2.6		**0.9**				
Tetracycline	**39.5%**									57.9	2.6			**39.5**				

Vertical bars show the CLSI/NCCLS Susceptible/Resistant breakpoints for each drug where appropriate.

*Currently no CLSI/NCCLS breakpoints have been established for this organism/antimicrobial combination.

†Discrepancies between %R and sums of distribution %s are due to rounding.

Unshaded areas indicate the dilution ranges of the Sensititre plate used to test the 2003 isolates.

Figure 6c. MIC Distribution among *Salmonella* from Ground Beef

Salmonella from Ground Beef (N=10)		Distribution (%) of MICs (in µg/ml)																
Antimicrobial Agent	**%R†**	**0.015**	**0.03**	**0.06**	**0.125**	**0.25**	**0.5**	**1**	**2**	**4**	**8**	**16**	**32**	**64**	**128**	**256**	**512**	**>512**
Ampicillin	**40.0%**							10.0	50.0					**40.0**↕				
Amoxicillin/Clavulanic Acid	**40.0%**							50.0	10.0					**40.0**↕				
Cefoxitin	**40.0%**								40.0	20.0			**40.0**					
Ceftiofur	**40.0%**						30.0	30.0				**40.0**						
Ceftriaxone	**10.0%**					60.0						30.0		**10.0**				
Cephalothin	**40.0%**									50.0	10.0			**40.0**				
Nalidixic Acid	**0.0%**								10.0	70.0	20.0							
Ciprofloxacin	**0.0%**	70.0	30.0															
Sulfamethoxazole	**40.0%**											20.0	30.0	10.0				**40.0**
Trimethoprim/Sulfamethoxazole	**0.0%**				60.0	40.0												
Amikacin	**0.0%**							60.0	40.0									
Gentamicin	**0.0%**					30.0	40.0	30.0										
Kanamycin	**0.0%**										100.0							
Streptomycin*	**40.0%**												60.0		**40.0**↕			
Chloramphenicol	**40.0%**									10.0	50.0			**40.0**↕				
Tetracycline	**40.0%**									60.0				**40.0**				

Vertical bars show the CLSI/NCCLS Susceptible/Resistant breakpoints for each drug where appropriate.

*Currently no CLSI/NCCLS breakpoints have been established for this organism/antimicrobial combination.

†Discrepancies between %R and sums of distribution %s are due to rounding.

Unshaded areas indicate the dilution ranges of the Sensititre plate used to test the 2003 isolates.

↕ MIC's for these isolates are greater than the highest dilution tested

Figure 6d. MIC Distribution among *Salmonella* from Pork Chops

***Salmonella* from Pork Chops (N=5)**		**Distribution (%) of MICs (in µg/ml)**																
Antimicrobial Agent	**%R[†]**	**0.015**	**0.03**	**0.06**	**0.125**	**0.25**	**0.5**	**1**	**2**	**4**	**8**	**16**	**32**	**64**	**128**	**256**	**512**	**>512**
Ampicillin	**40.0%**							40.0	20.0					**40.0**				
Amoxicillin/Clavulanic Acid	**20.0%**							40.0	20.0			20.0		**20.0**				
Cefoxitin	**20.0%**								20.0	20.0	40.0		**20.0**					
Ceftiofur	**20.0%**						60.0		20.0			**20.0**						
Ceftriaxone	**0.0%**					80.0							20.0					
Cephalothin	**40.0%**									60.0			**20.0**	**20.0**				
Nalidixic Acid	**0.0%**									80.0		20.0						
Ciprofloxacin	**0.0%**	60.0	20.0	20.0														
Sulfamethoxazole	**40.0%**											20.0	40.0					**40.0**
Trimethoprim/Sulfamethoxazole	**0.0%**				60.0	40.0												
Amikacin	**0.0%**							100.0										
Gentamicin	**0.0%**					40.0	40.0				20.0							
Kanamycin	**0.0%**										80.0		20.0					
Streptomycin*	**40.0%**												60.0	**20.0**	**20.0**			
Chloramphenicol	**40.0%**										60.0			**40.0**				
Tetracycline	**80.0%**									20.0				**80.0**				

Vertical bars show the CLSI/NCCLS Susceptible/Resistant breakpoints for each drug where appropriate.

*Currently no CLSI/NCCLS breakpoints have been established for this organism/antimicrobial combination.

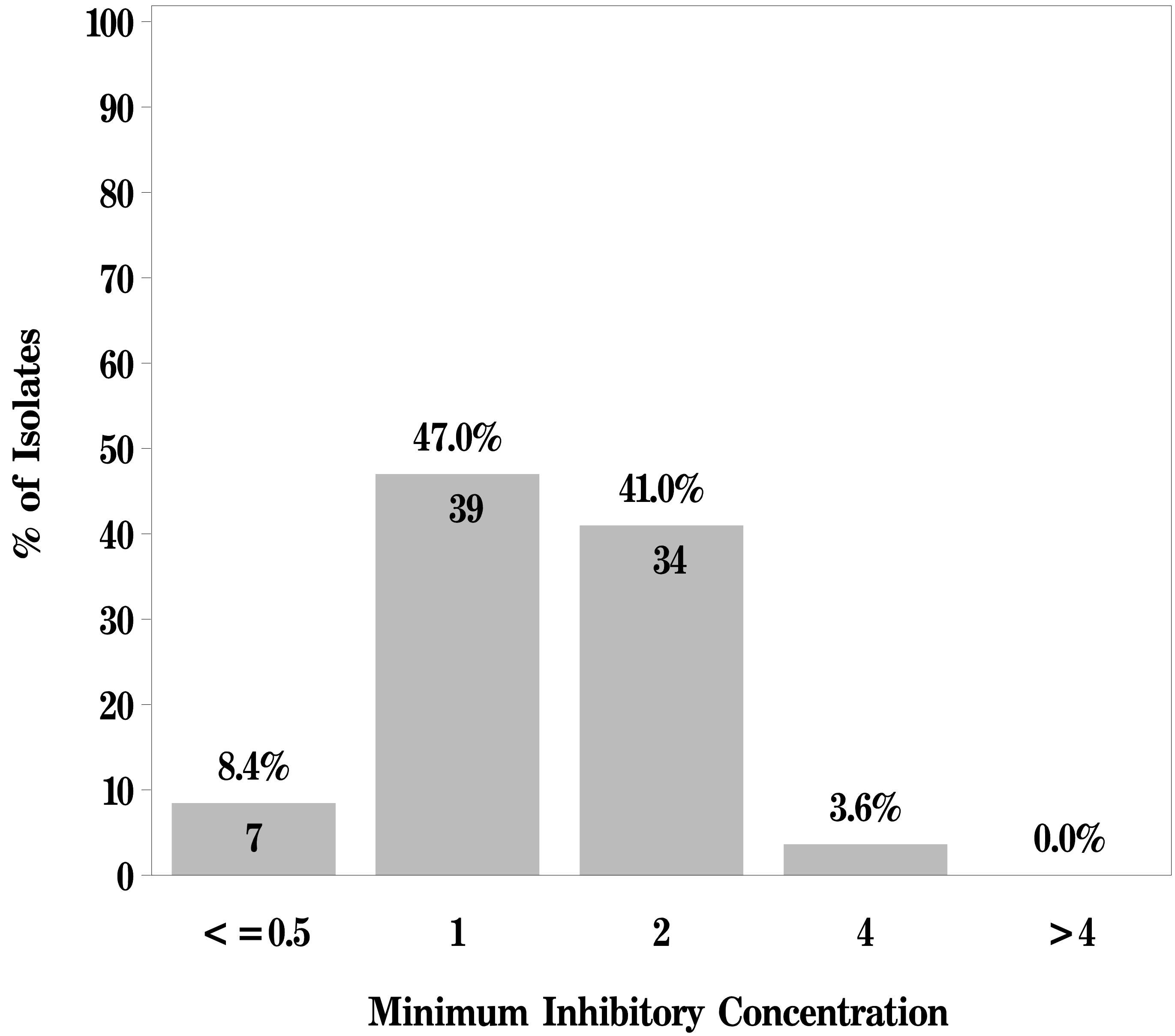
[†]Discrepancies between %R and sums of distribution %s are due to rounding.

Unshaded areas indicate the dilution ranges of the Sensititre plate used to test the 2003 isolates.

NARMS

Figure 7a: Minimum Inhibitory Concentration of Amikacin for *Salmonella* in Chicken Breast (N=83 Isolates)

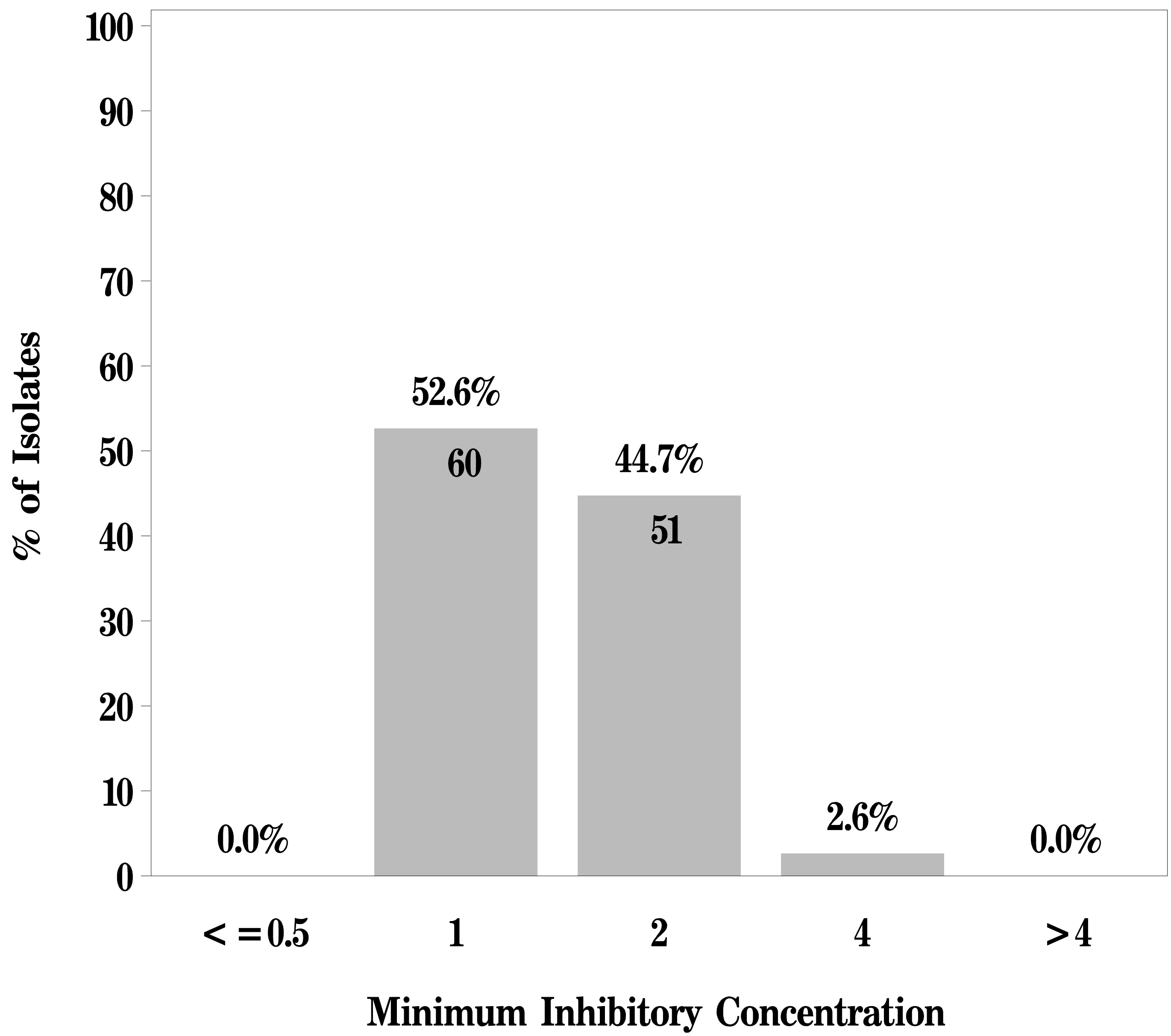
Breakpoints: Susceptible<=16 μg/mL Resistant>=64 μg/mL



NARMS

Figure 7a: Minimum Inhibitory Concentration of Amikacin for *Salmonella* in Ground Turkey (N=114 Isolates)

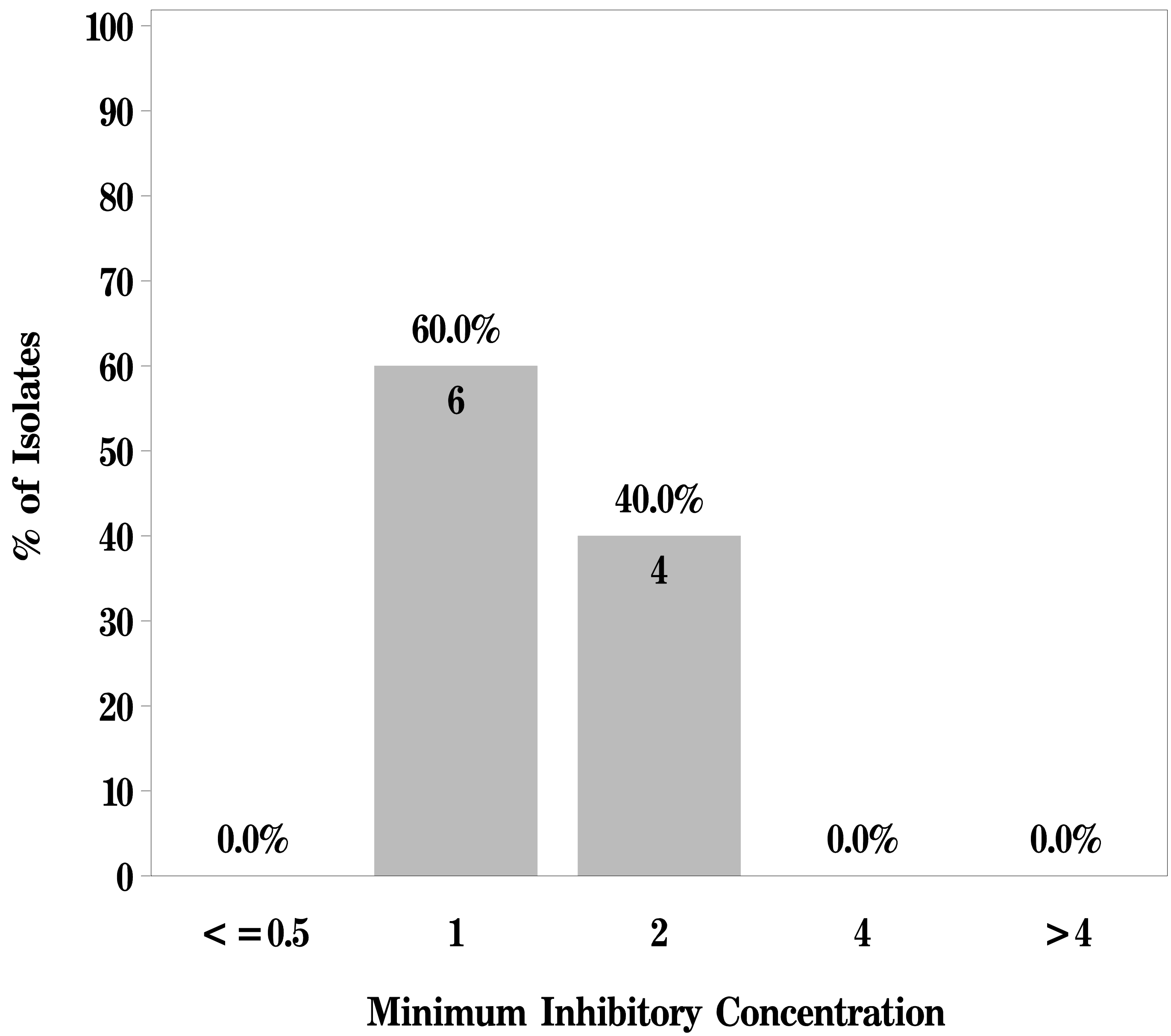
Breakpoints: Susceptible <=16 μg/mL Resistant >=64 μg/mL



NARMS

Figure 7a: Minimum Inhibitory Concentration of Amikacin for *Salmonella* in Ground Beef (N=10 Isolates)

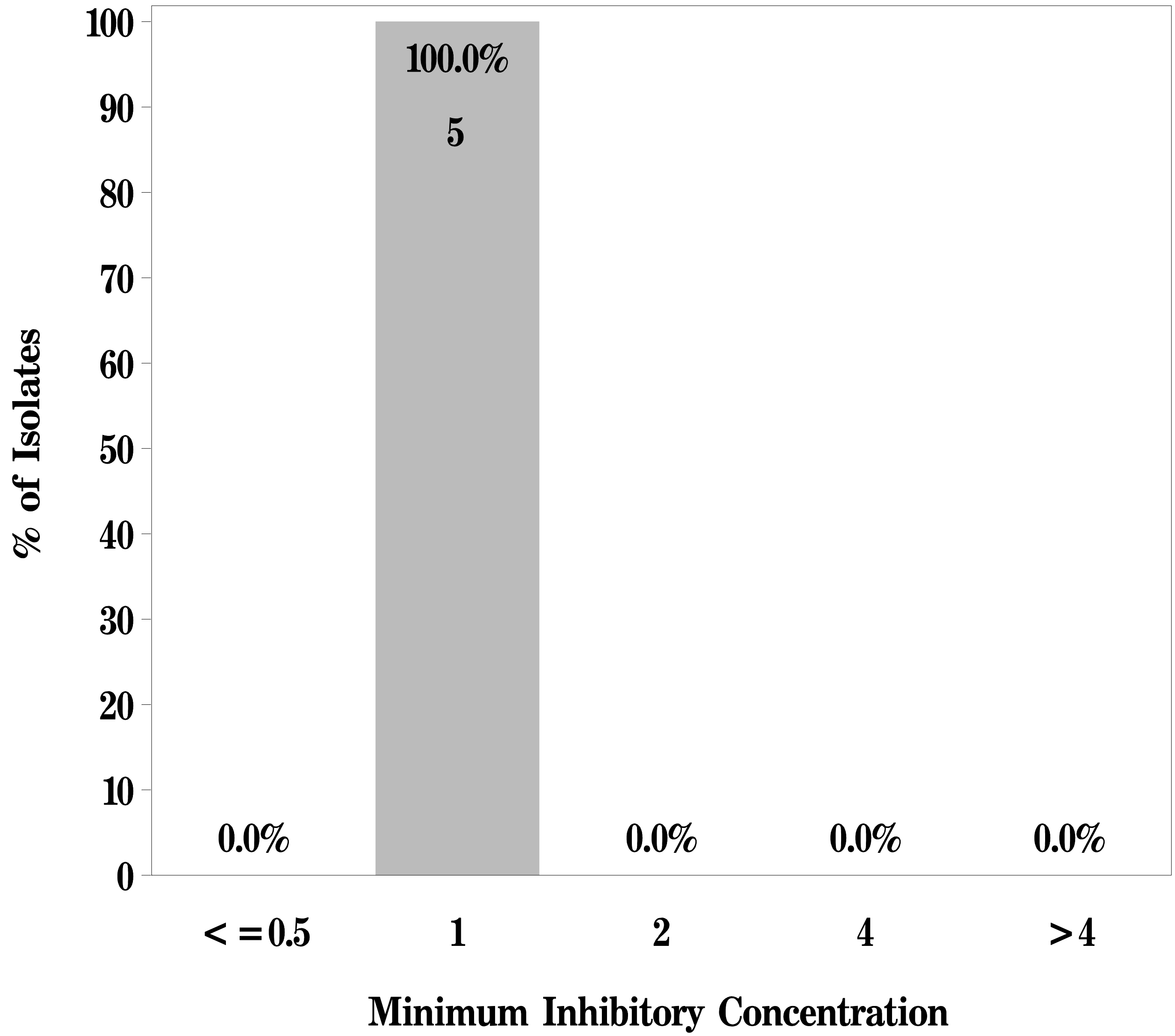
Breakpoints: Susceptible<=16 μg/mL Resistant>=64 μg/mL



NARMS

Figure 7a: Minimum Inhibitory Concentration of Amikacin for *Salmonella* in Pork Chop (N=5 Isolates)

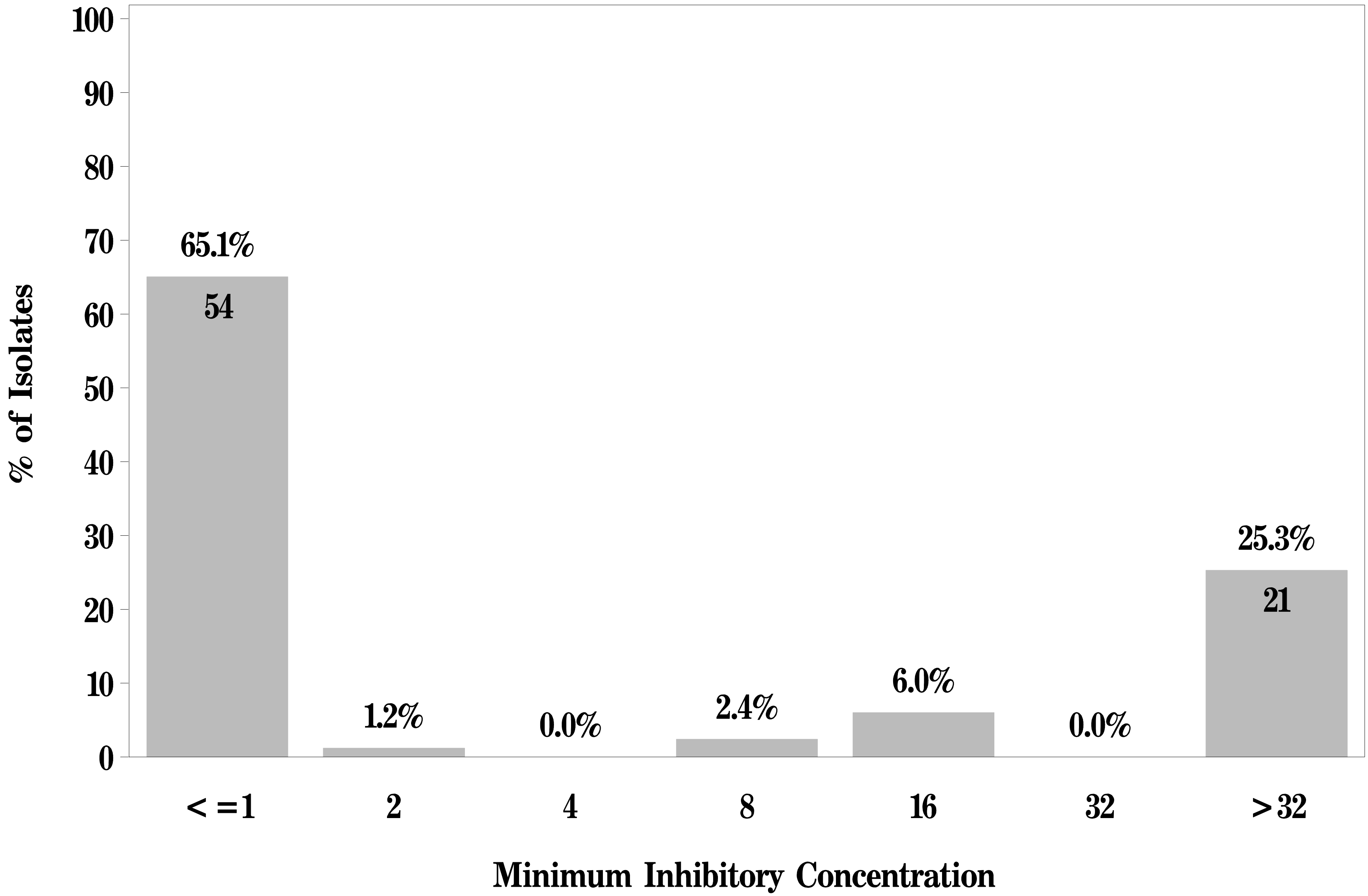
Breakpoints: Susceptible<=16 μg/mL Resistant>=64 μg/mL



NARMS

Figure 7b: Minimum Inhibitory Concentration of Amoxicillin/Clavulanic acid for *Salmonella* in Chicken Breast (N=83 Isolates)

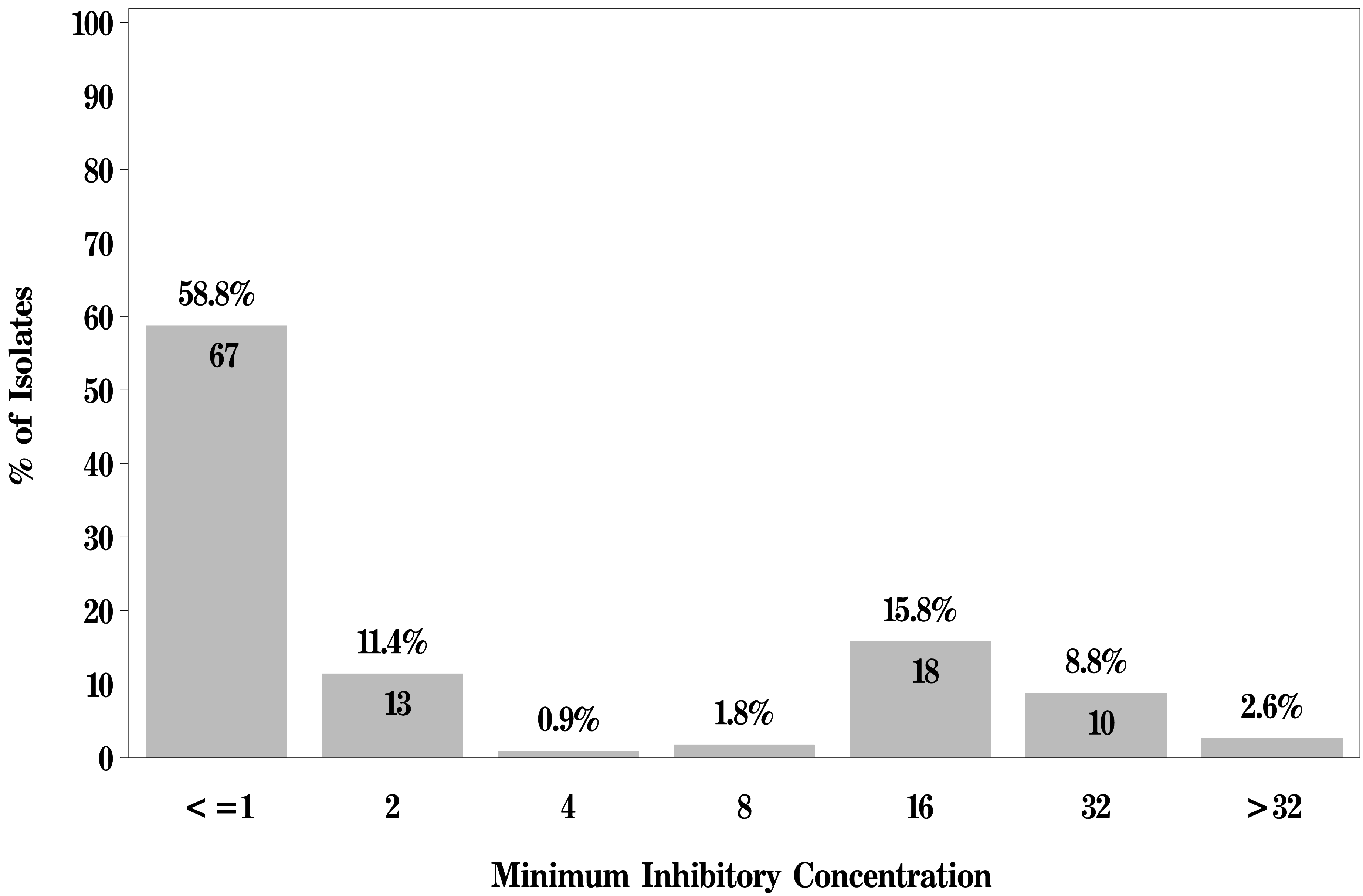
Breakpoints: Susceptible <=8 µg/mL Resistant >=32 µg/mL



NARMS

Figure 7b: Minimum Inhibitory Concentration of Amoxicillin/Clavulanic acid for *Salmonella* in Ground Turkey (N=114 Isolates)

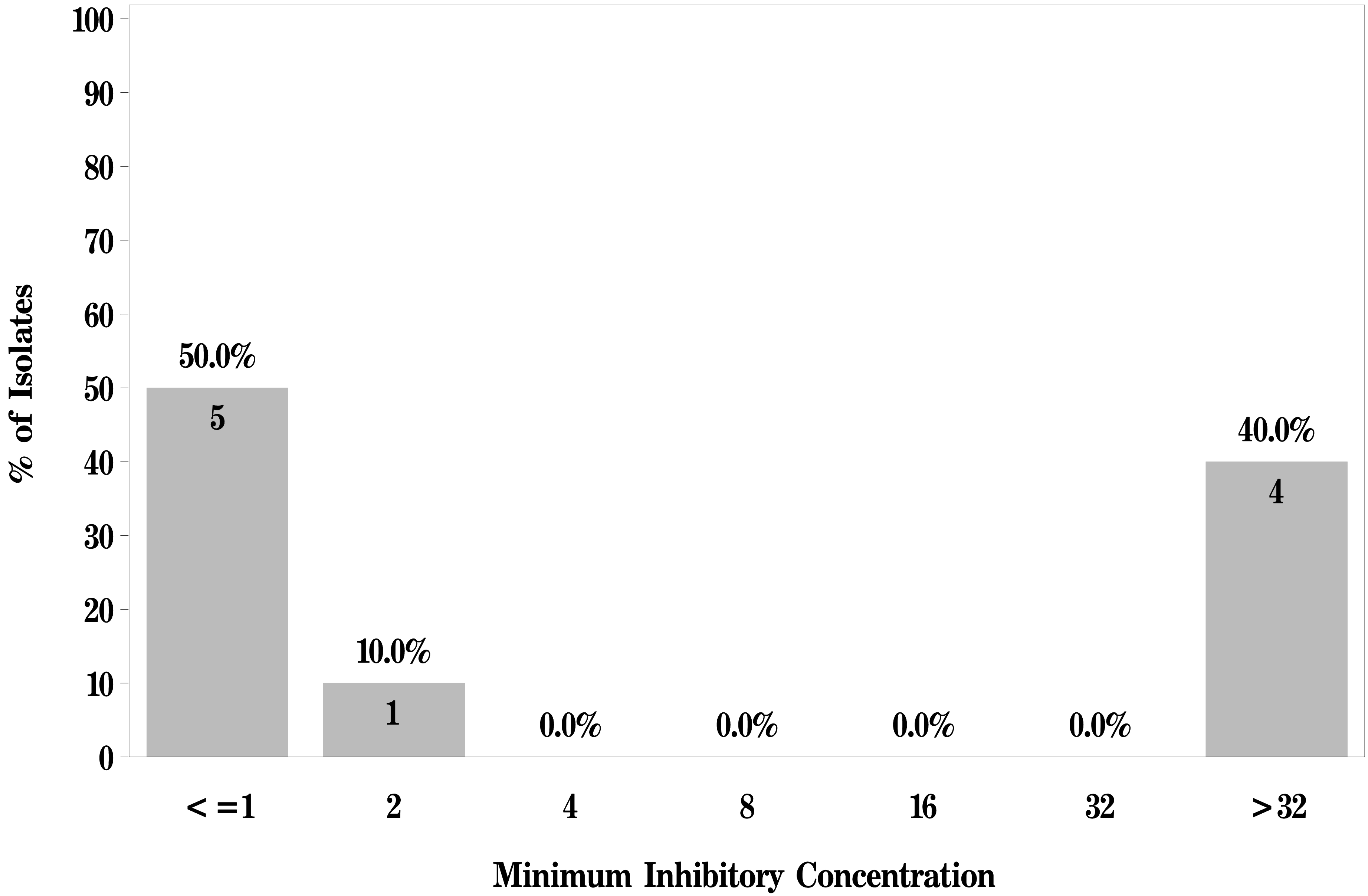
Breakpoints: Susceptible<=8 μg/mL Resistant>=32 μg/mL



NARMS

Figure 7b: Minimum Inhibitory Concentration of Amoxicillin/Clavulanic acid for *Salmonella* in Ground Beef (N=10 Isolates)

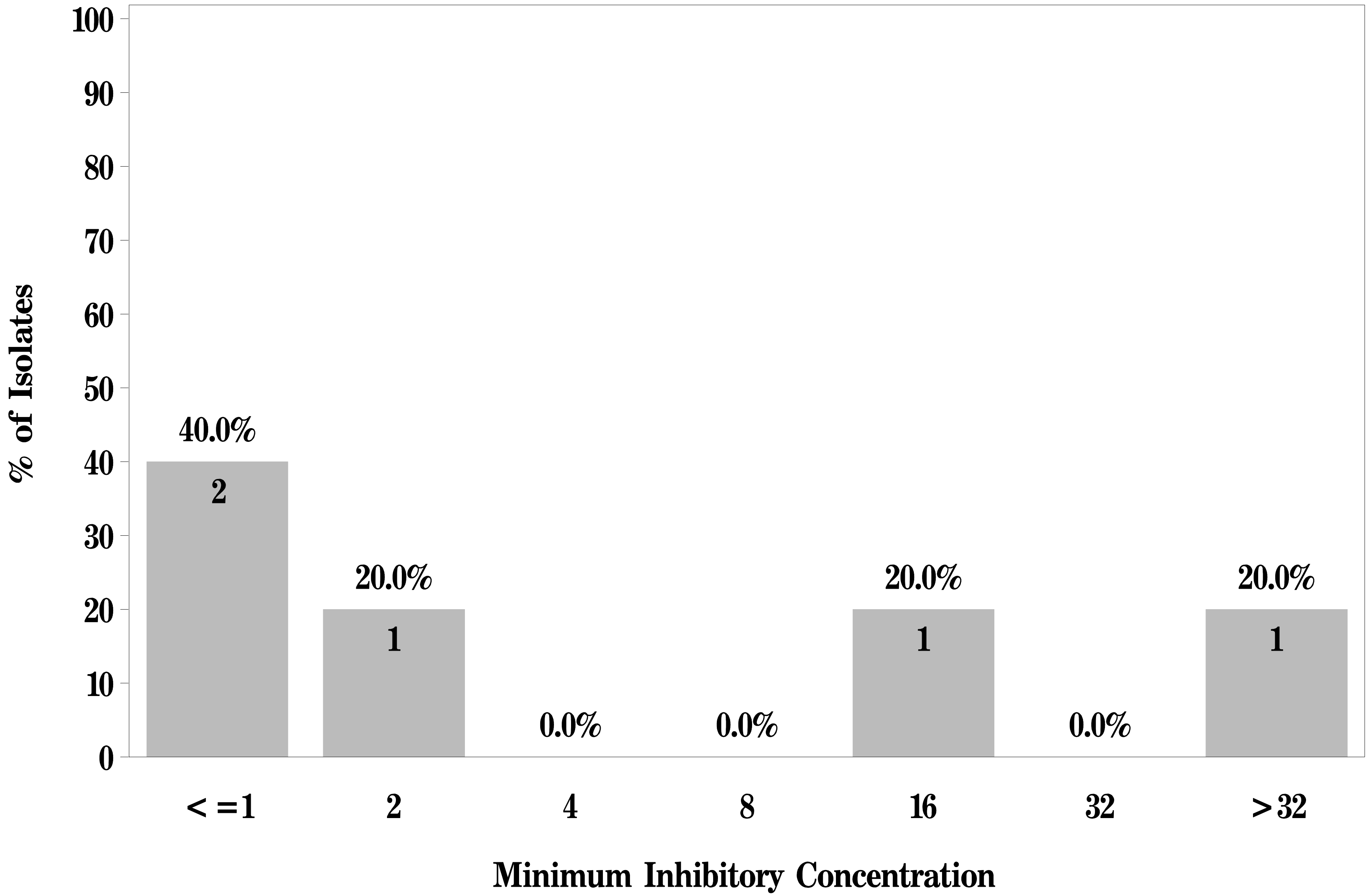
Breakpoints: Susceptible <=8 μg/mL Resistant >=32 μg/mL



NARMS

Figure 7b: Minimum Inhibitory Concentration of Amoxicillin/Clavulanic acid for *Salmonella* in Pork Chop (N=5 Isolates)

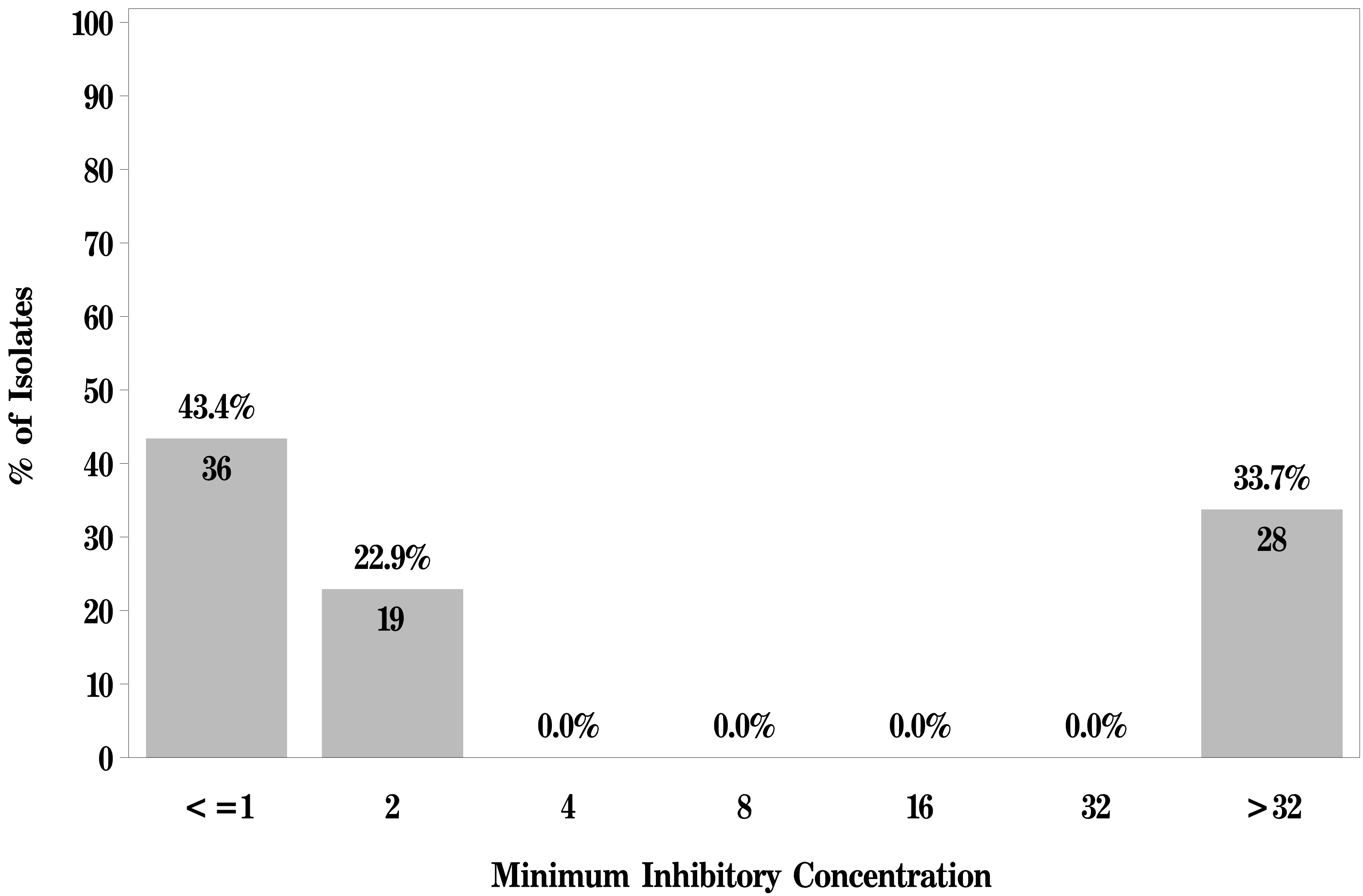
Breakpoints: Susceptible<=8 µg/mL Resistant>=32 µg/mL



NARMS

Figure 7c: Minimum Inhibitory Concentration of Ampicillin for *Salmonella* in Chicken Breast (N=83 Isolates)

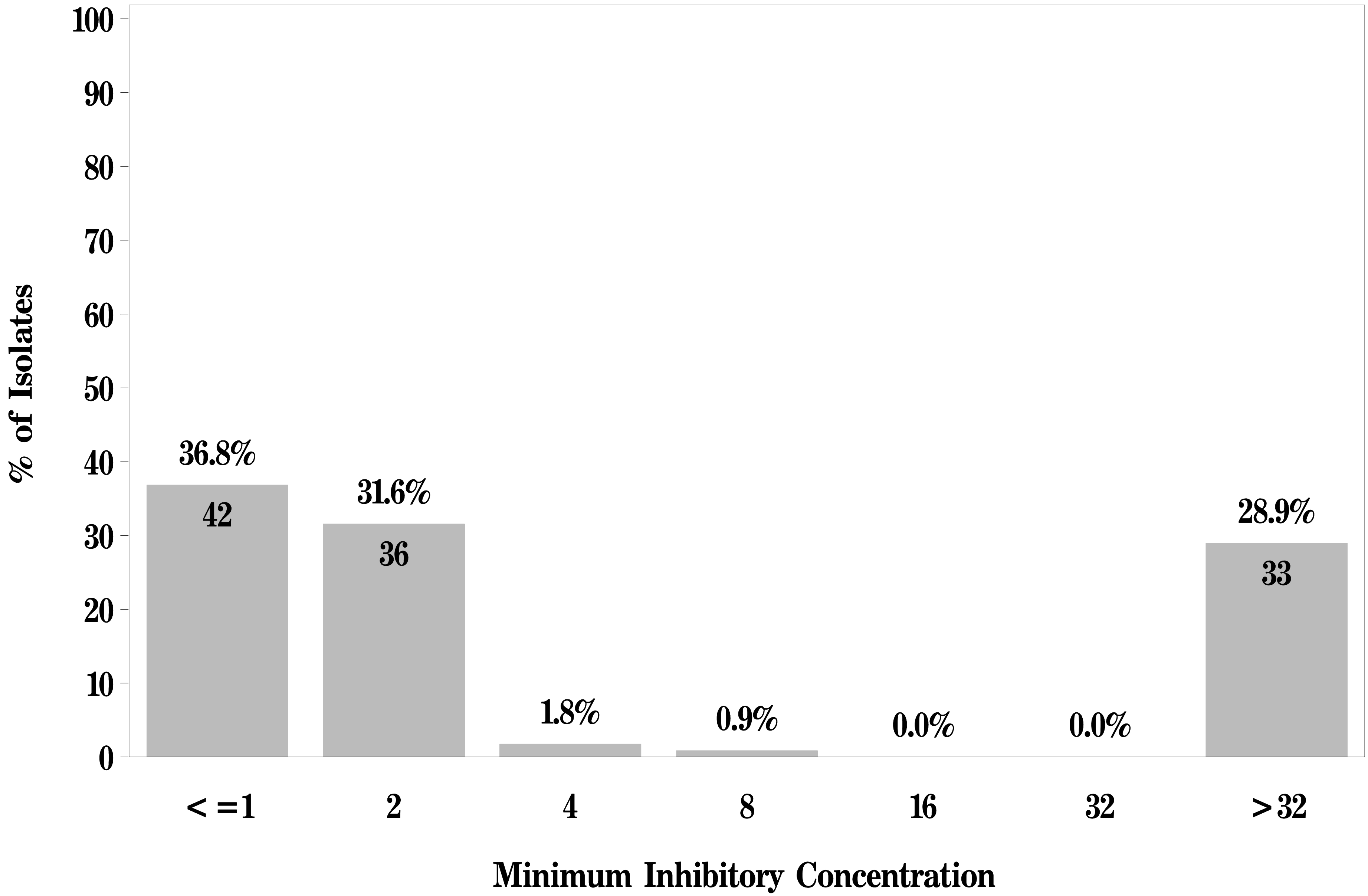
Breakpoints: Susceptible <=8 μg/mL Resistant >=32 μg/mL



NARMS

Figure 7c: Minimum Inhibitory Concentration of Ampicillin for *Salmonella* in Ground Turkey (N=114 Isolates)

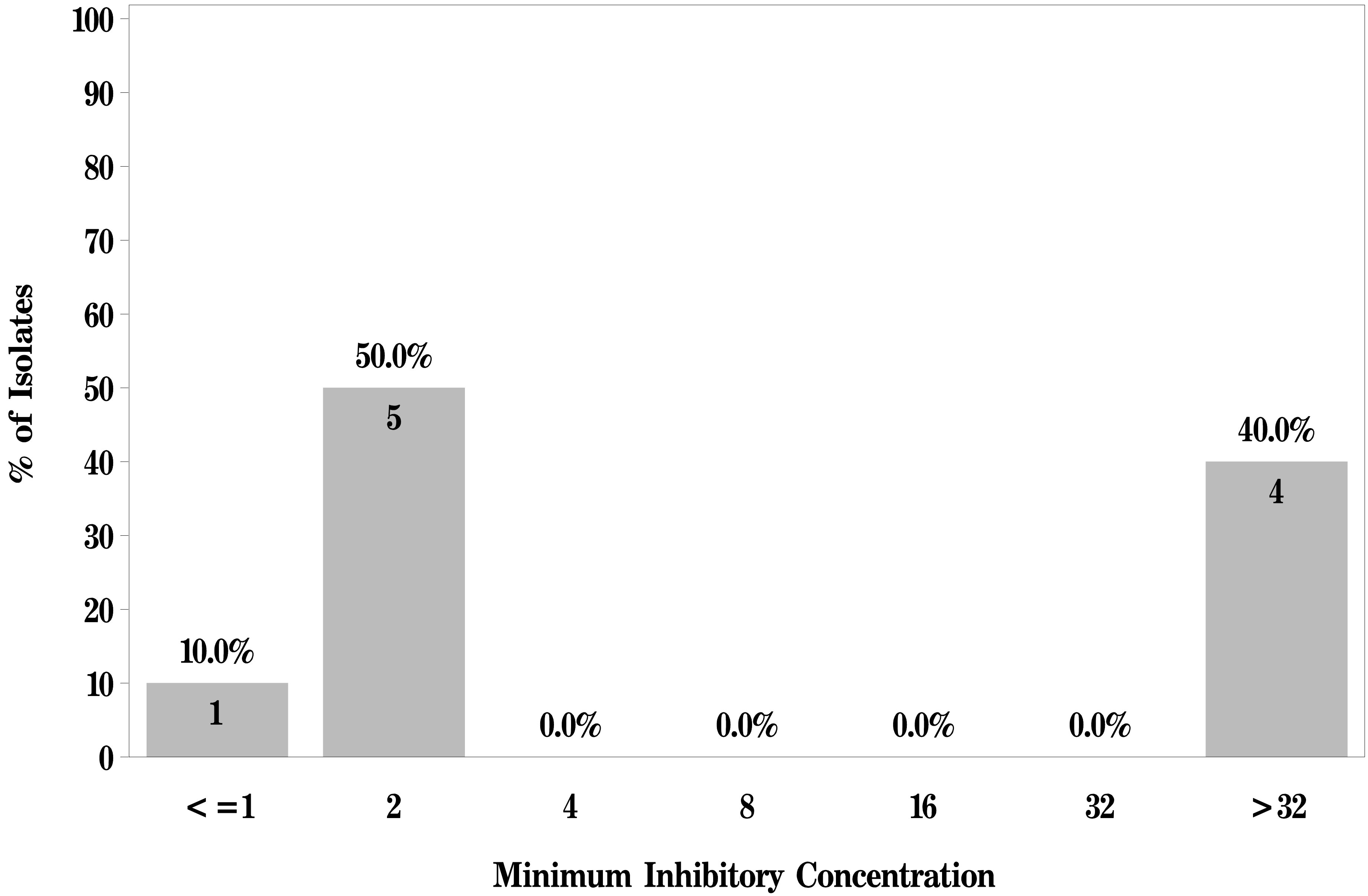
Breakpoints: Susceptible <=8 μg/mL Resistant >=32 μg/mL



NARMS

Figure 7c: Minimum Inhibitory Concentration of Ampicillin for *Salmonella* in Ground Beef (N=10 Isolates)

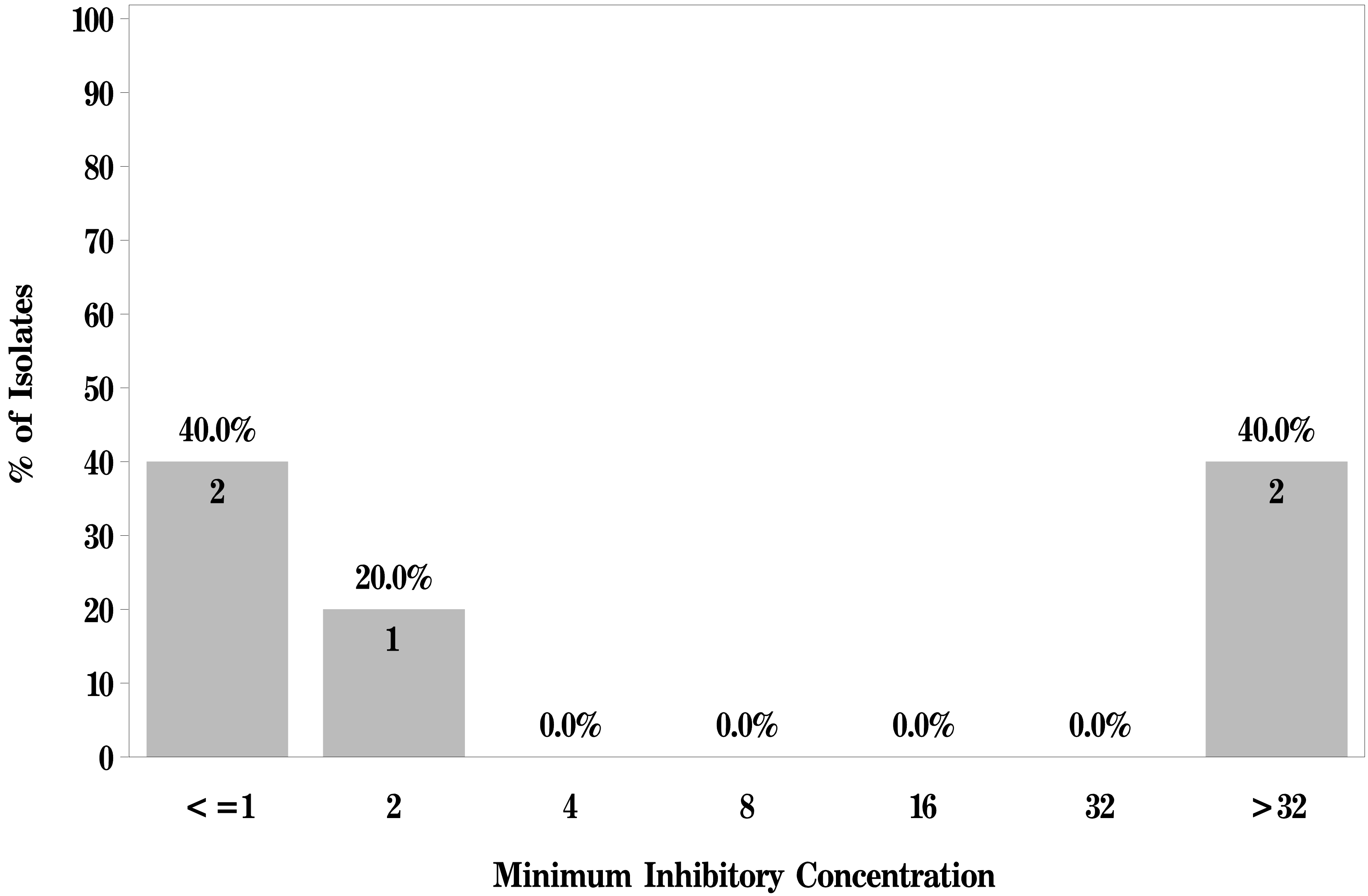
Breakpoints: Susceptible <=8 μg/mL Resistant >=32 μg/mL



NARMS

Figure 7c: Minimum Inhibitory Concentration of Ampicillin for *Salmonella* in Pork Chop (N=5 Isolates)

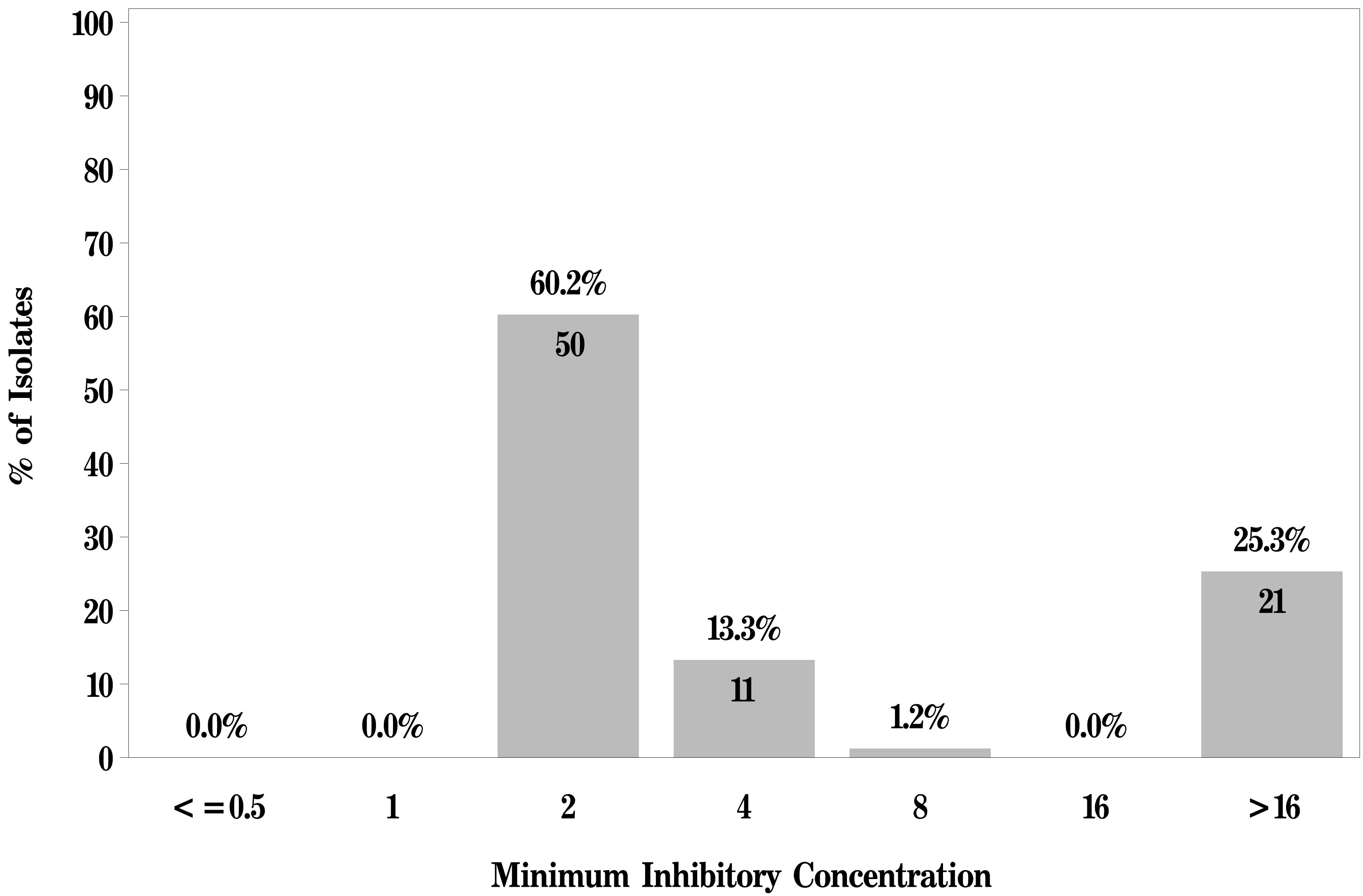
Breakpoints: Susceptible <=8 μg/mL Resistant >=32 μg/mL



NARMS

Figure 7d: Minimum Inhibitory Concentration of Cefoxitin for *Salmonella* in Chicken Breast (N=83 Isolates)

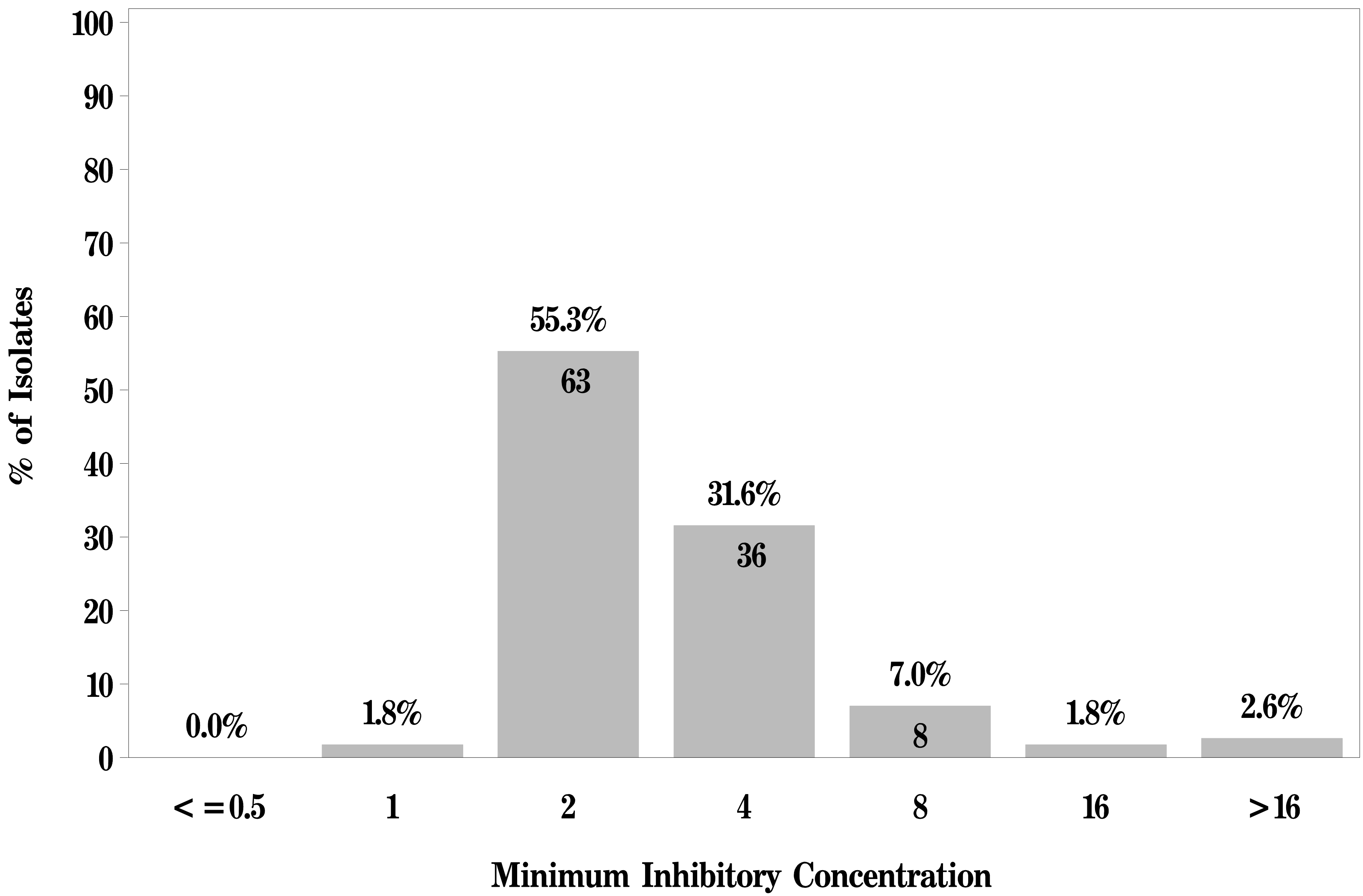
Breakpoints: Susceptible <=8 µg/mL Resistant >=32 µg/mL



NARMS

Figure 7d: Minimum Inhibitory Concentration of Cefoxitin for *Salmonella* in Ground Turkey (N=114 Isolates)

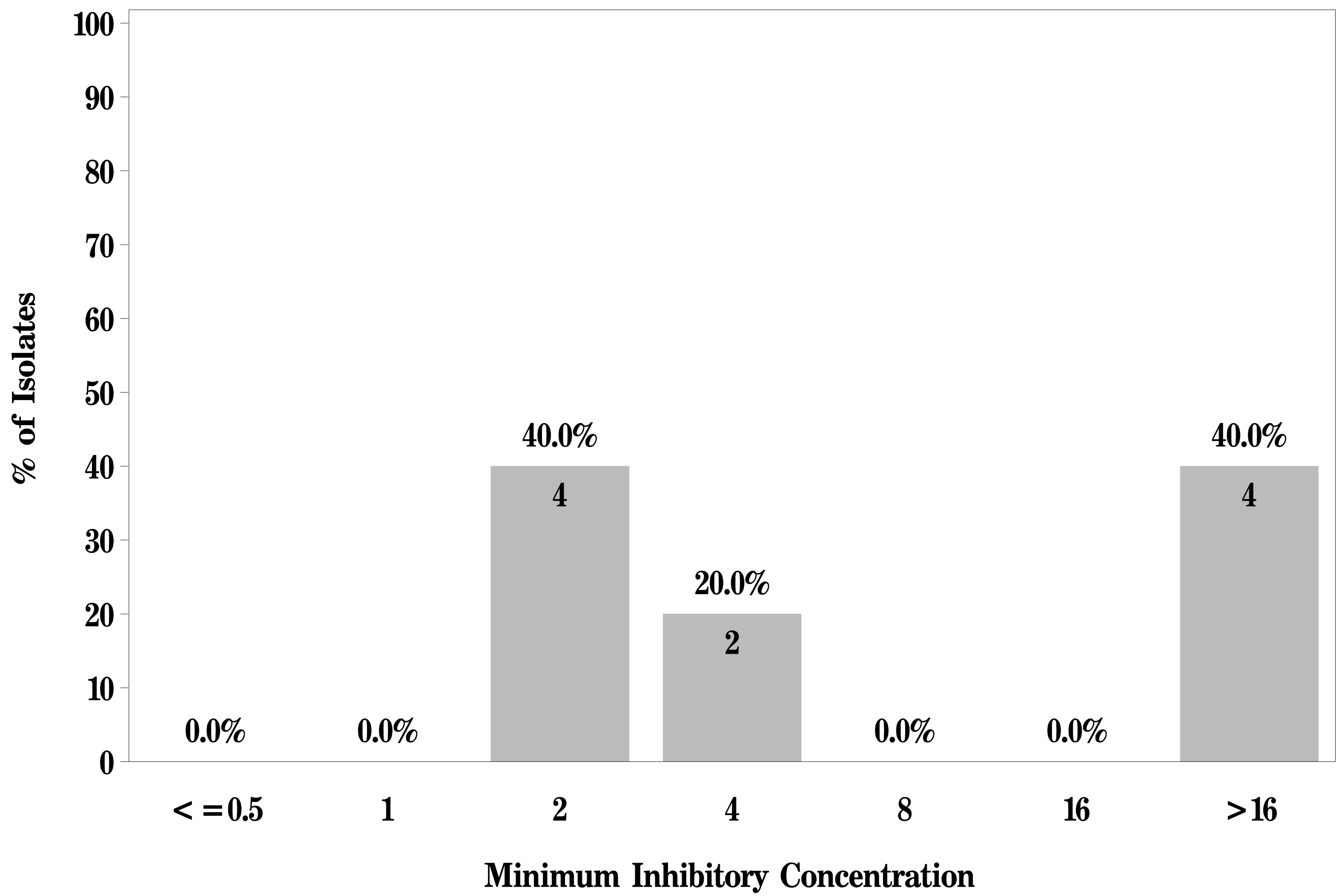
Breakpoints: Susceptible <=8 μg/mL Resistant >=32 μg/mL



NARMS

Figure 7d: Minimum Inhibitory Concentration of Cefoxitin for *Salmonella* in Ground Beef (N=10 Isolates)

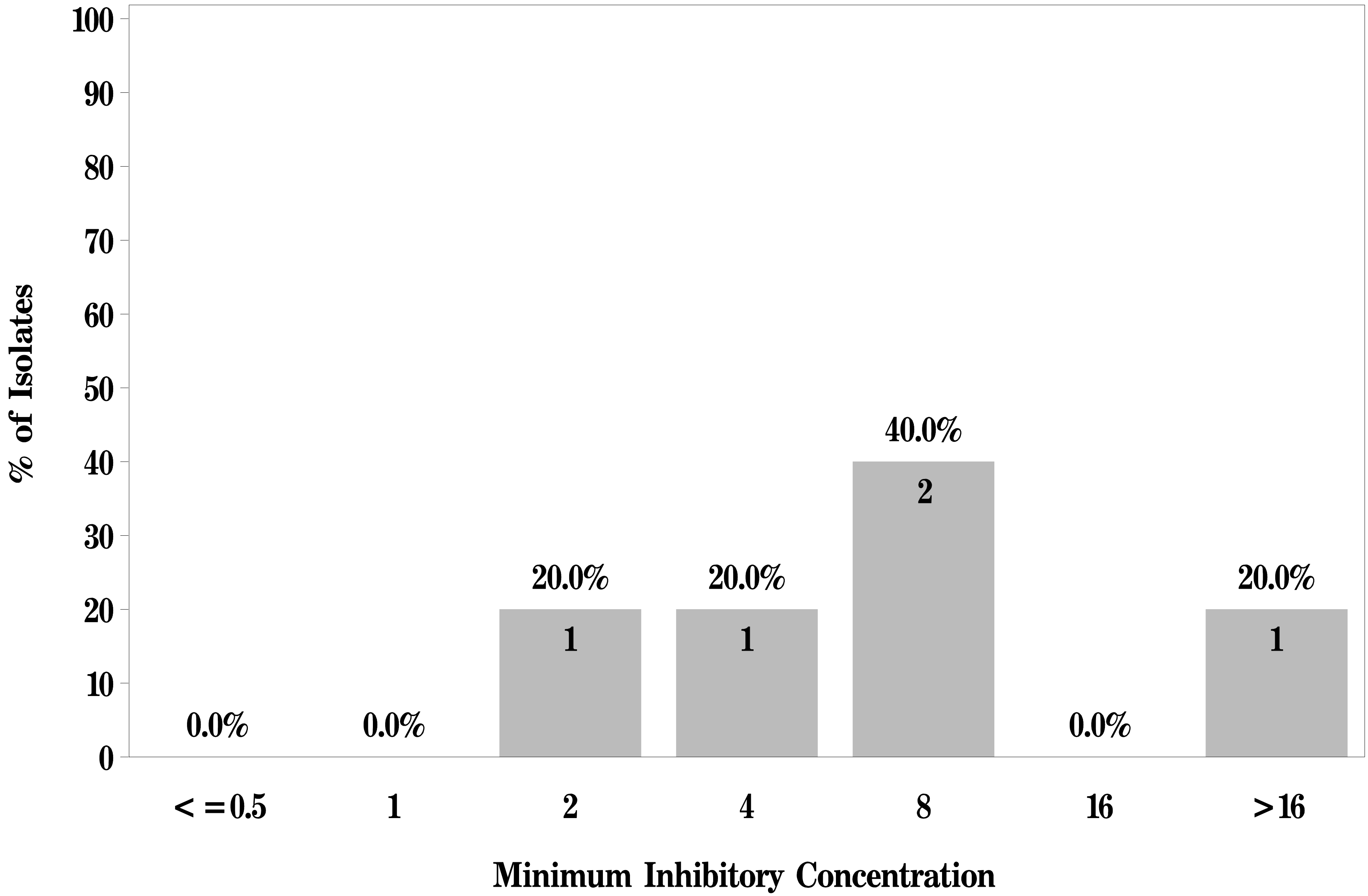
Breakpoints: Susceptible<=8 μg/mL Resistant>=32 μg/mL



NARMS

Figure 7d: Minimum Inhibitory Concentration of Cefoxitin for *Salmonella* in Pork Chop (N=5 Isolates)

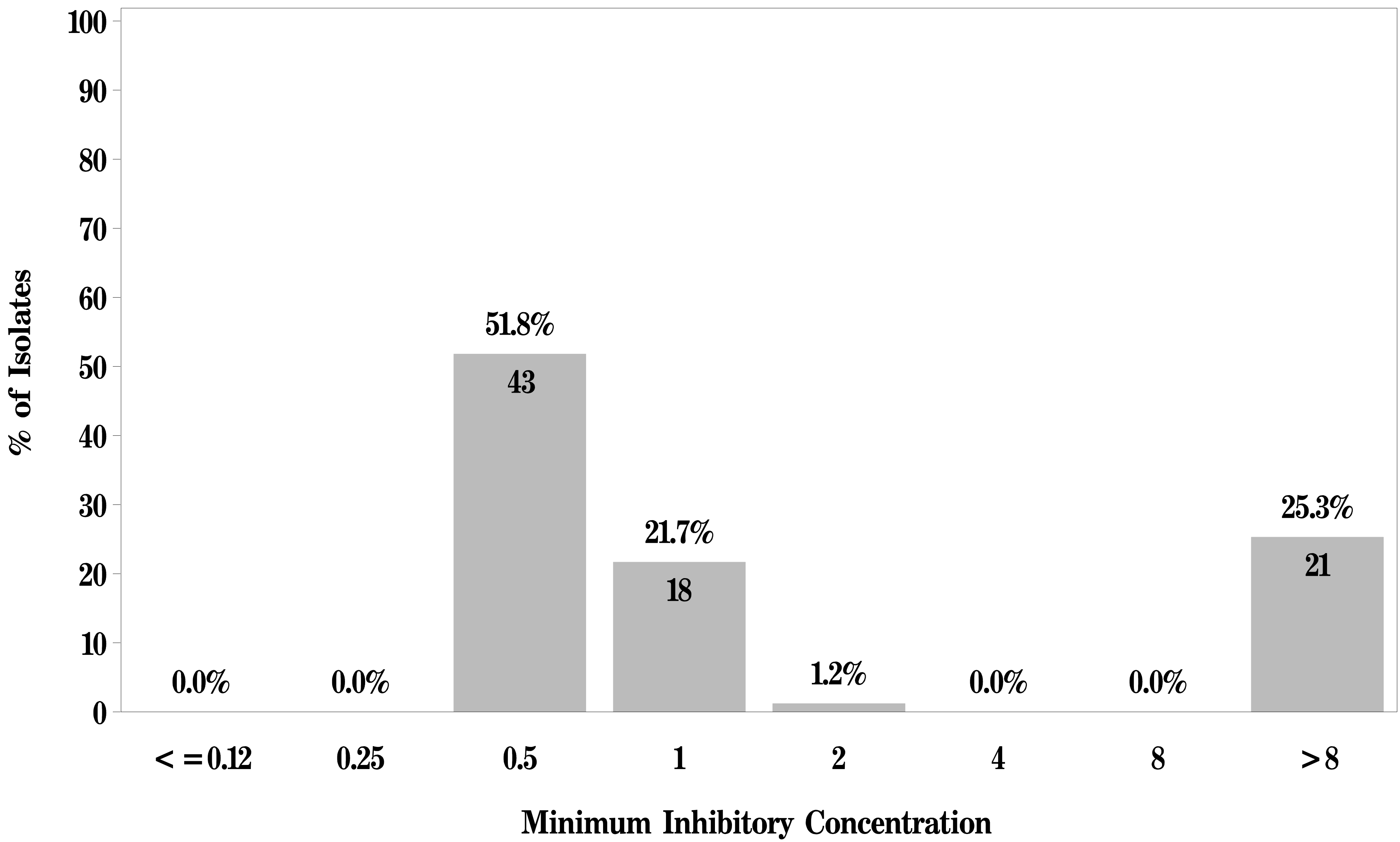
Breakpoints: Susceptible <=8 μg/mL Resistant >=32 μg/mL



NARMS

Figure 7e: Minimum Inhibitory Concentration of Ceftiofur for *Salmonella* in Chicken Breast (N=83 Isolates)

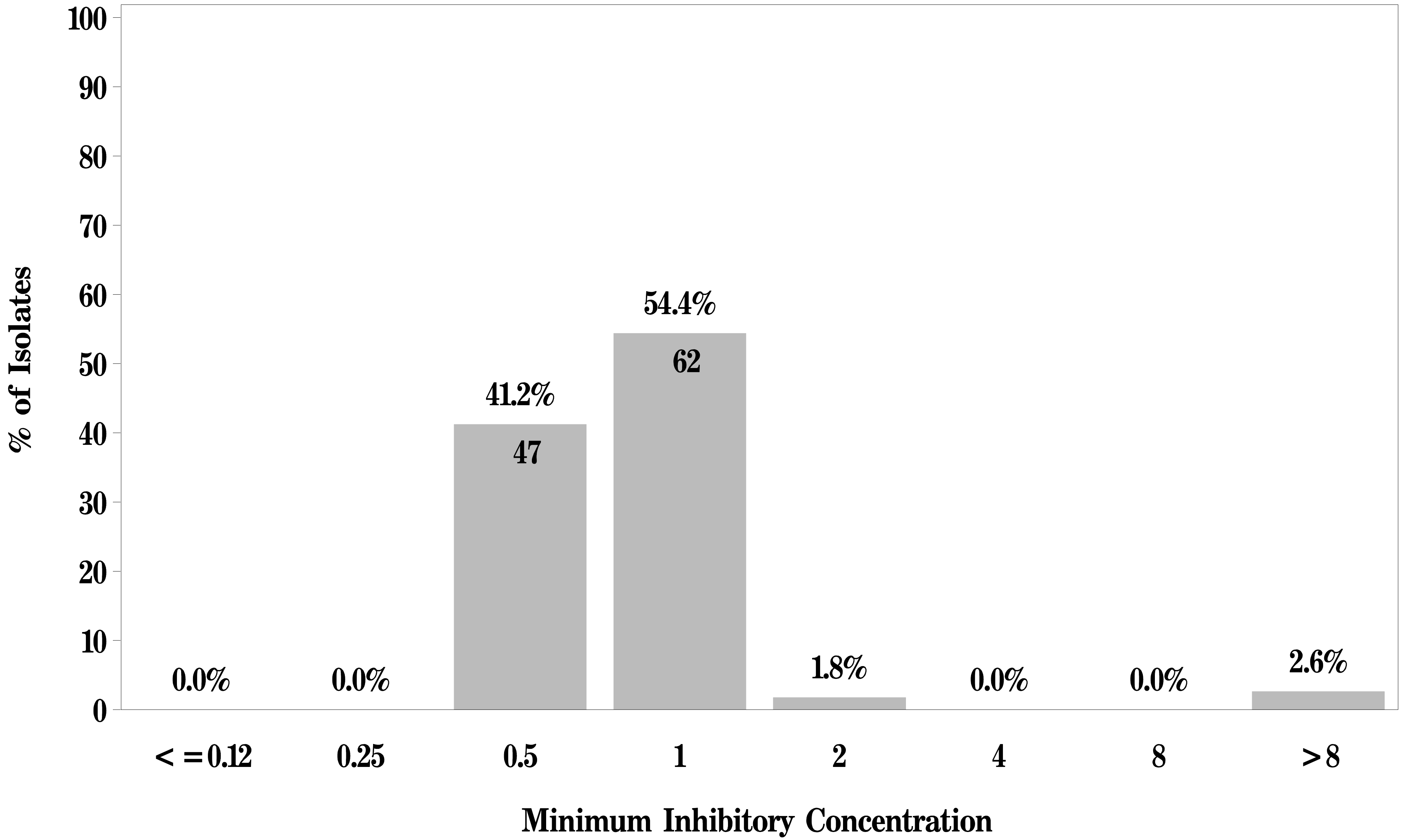
Breakpoints: Susceptible <=2 μg/mL Resistant >=8 μg/mL



NARMS

Figure 7e: Minimum Inhibitory Concentration of Ceftiofur for *Salmonella* in Ground Turkey (N=114 Isolates)

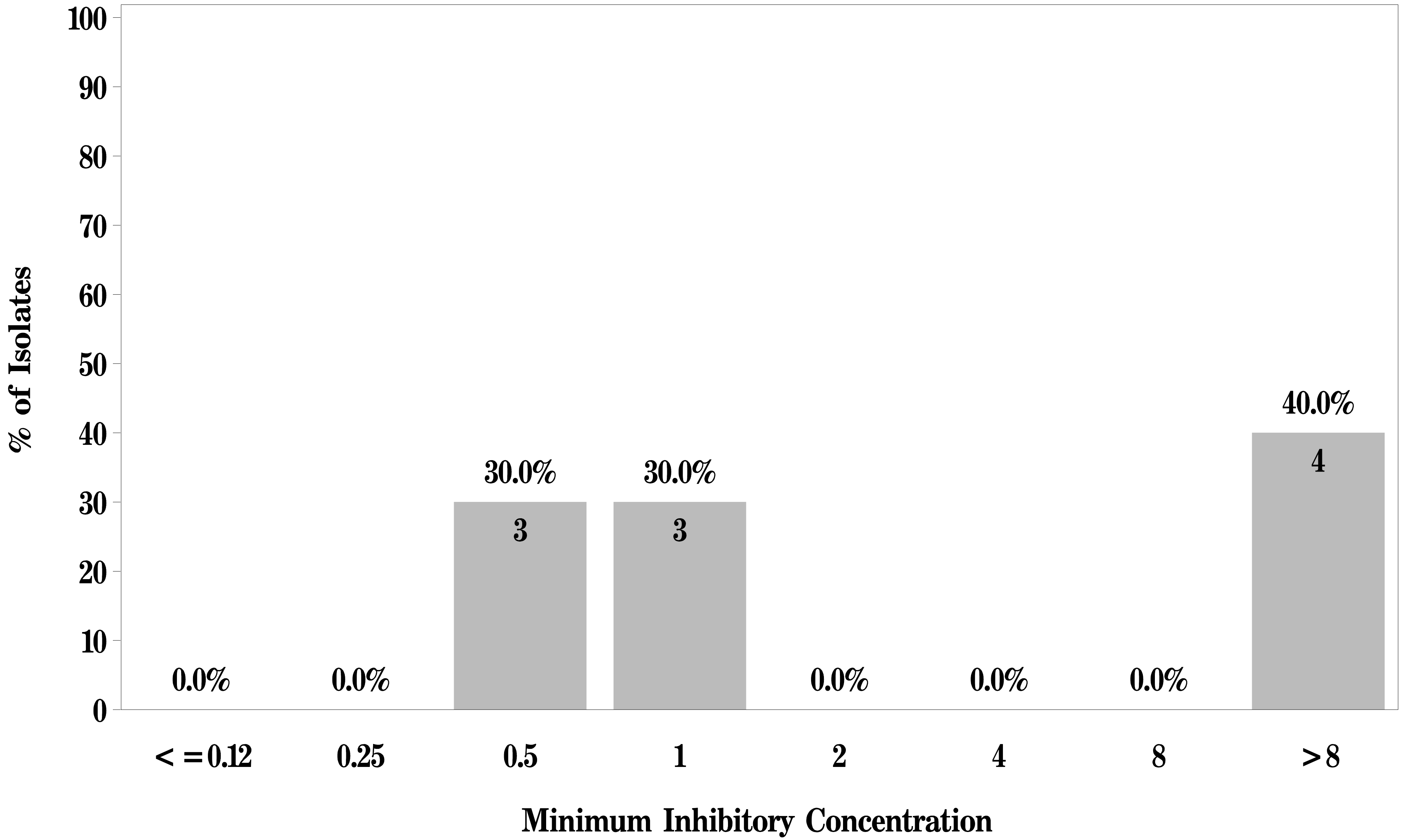
Breakpoints: Susceptible<=2 μg/mL Resistant>=8 μg/mL



NARMS

Figure 7e: Minimum Inhibitory Concentration of Ceftiofur for *Salmonella* in Ground Beef (N=10 Isolates)

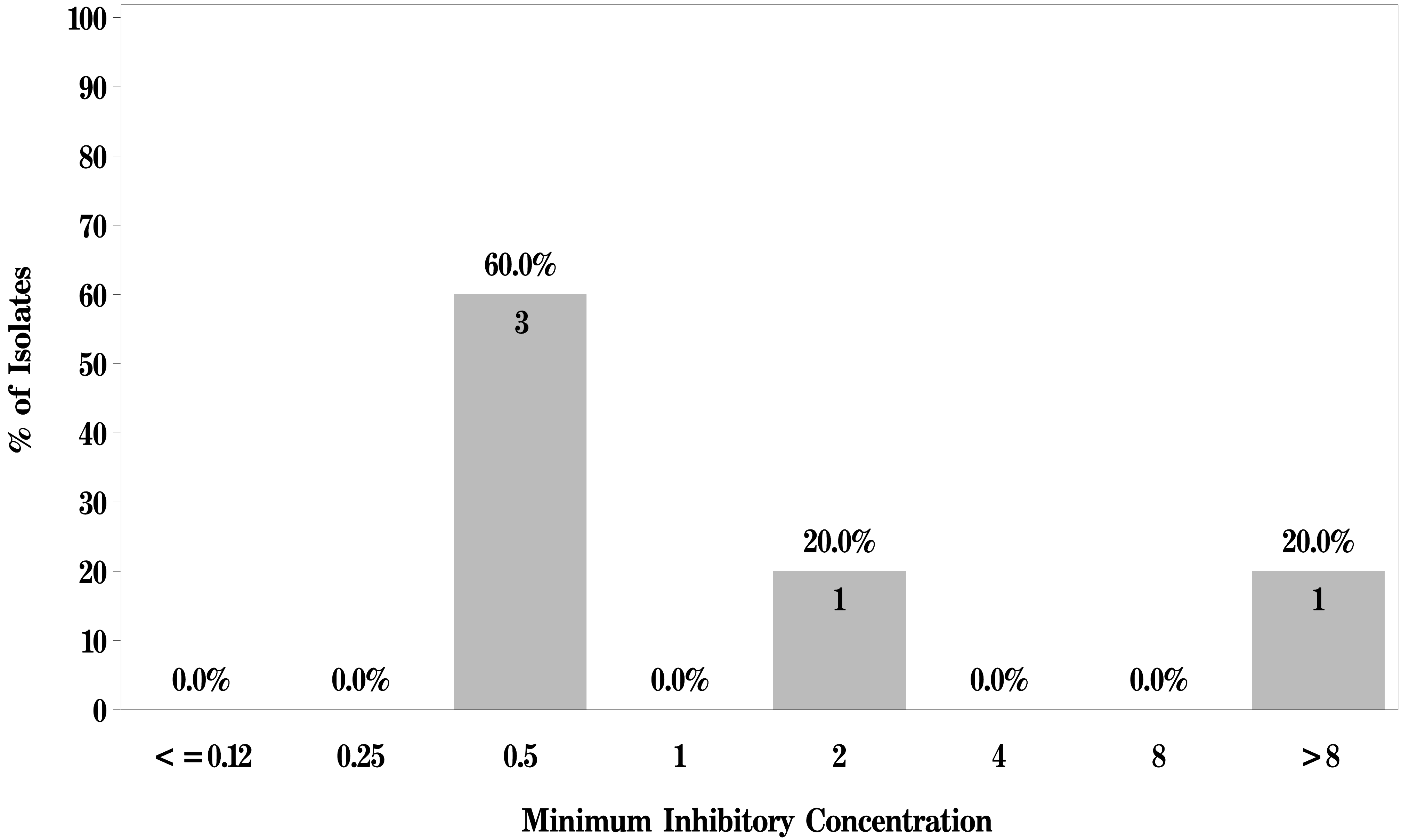
Breakpoints: Susceptible <=2 μg/mL Resistant >=8 μg/mL



NARMS

Figure 7e: Minimum Inhibitory Concentration of Ceftiofur for *Salmonella* in Pork Chop (N=5 Isolates)

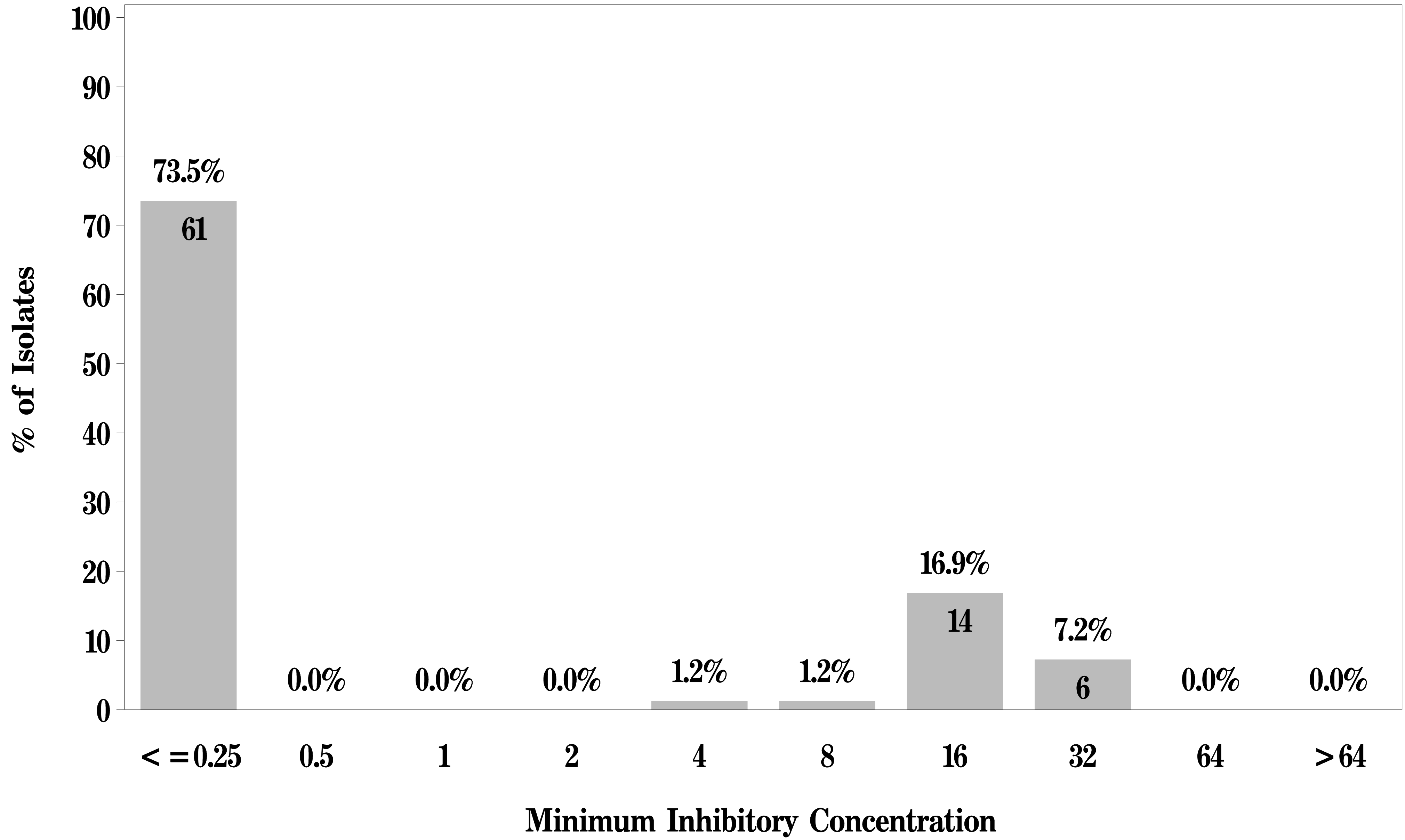
Breakpoints: Susceptible <=2 µg/mL Resistant >=8 µg/mL



NARMS

Figure 7f: Minimum Inhibitory Concentration of Ceftriaxone for *Salmonella* in Chicken Breast (N=83 Isolates)

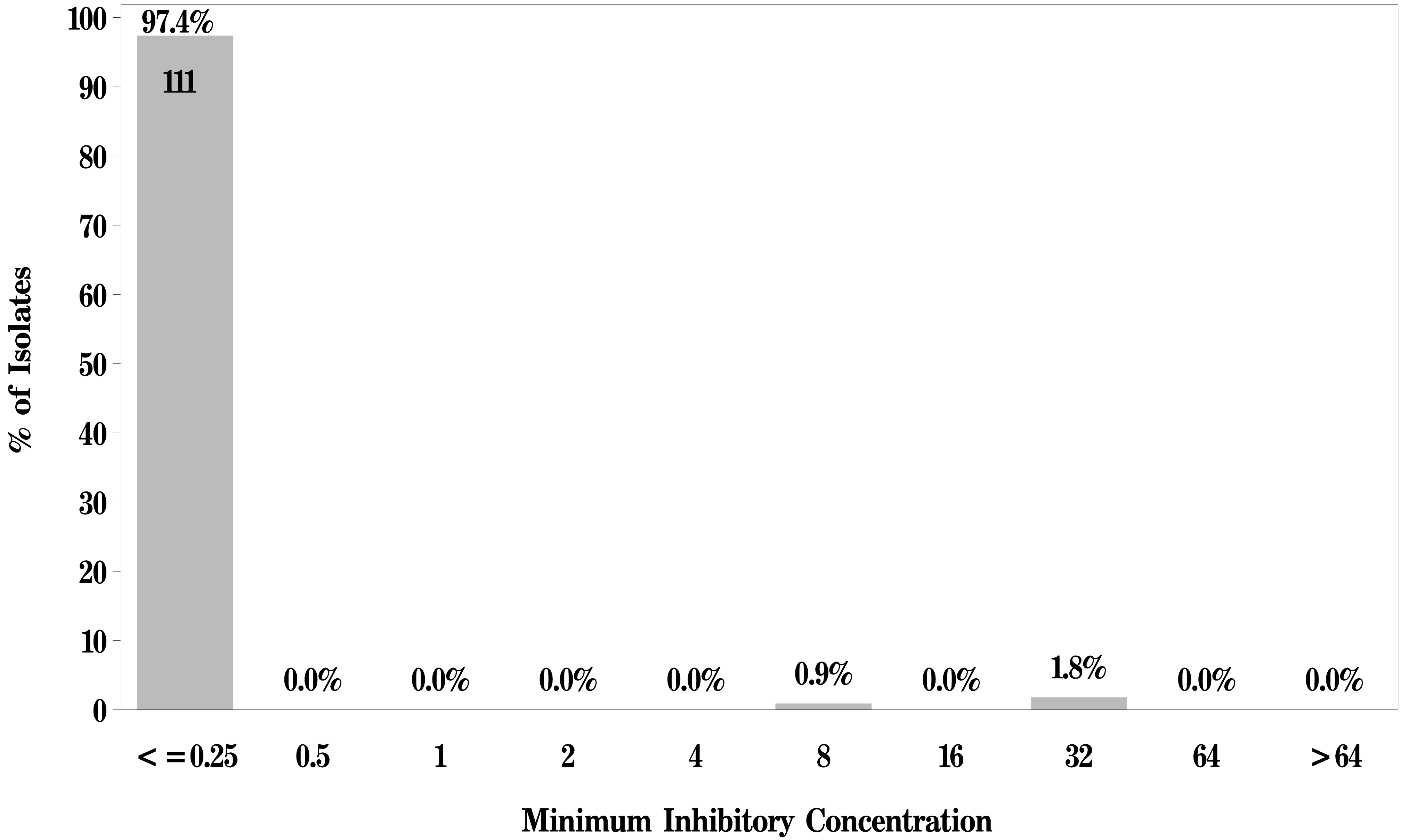
Breakpoints: Susceptible<=8 μg/mL Resistant>=64 μg/mL



NARMS

Figure 7f: Minimum Inhibitory Concentration of Ceftriaxone for *Salmonella* in Ground Turkey (N=114 Isolates)

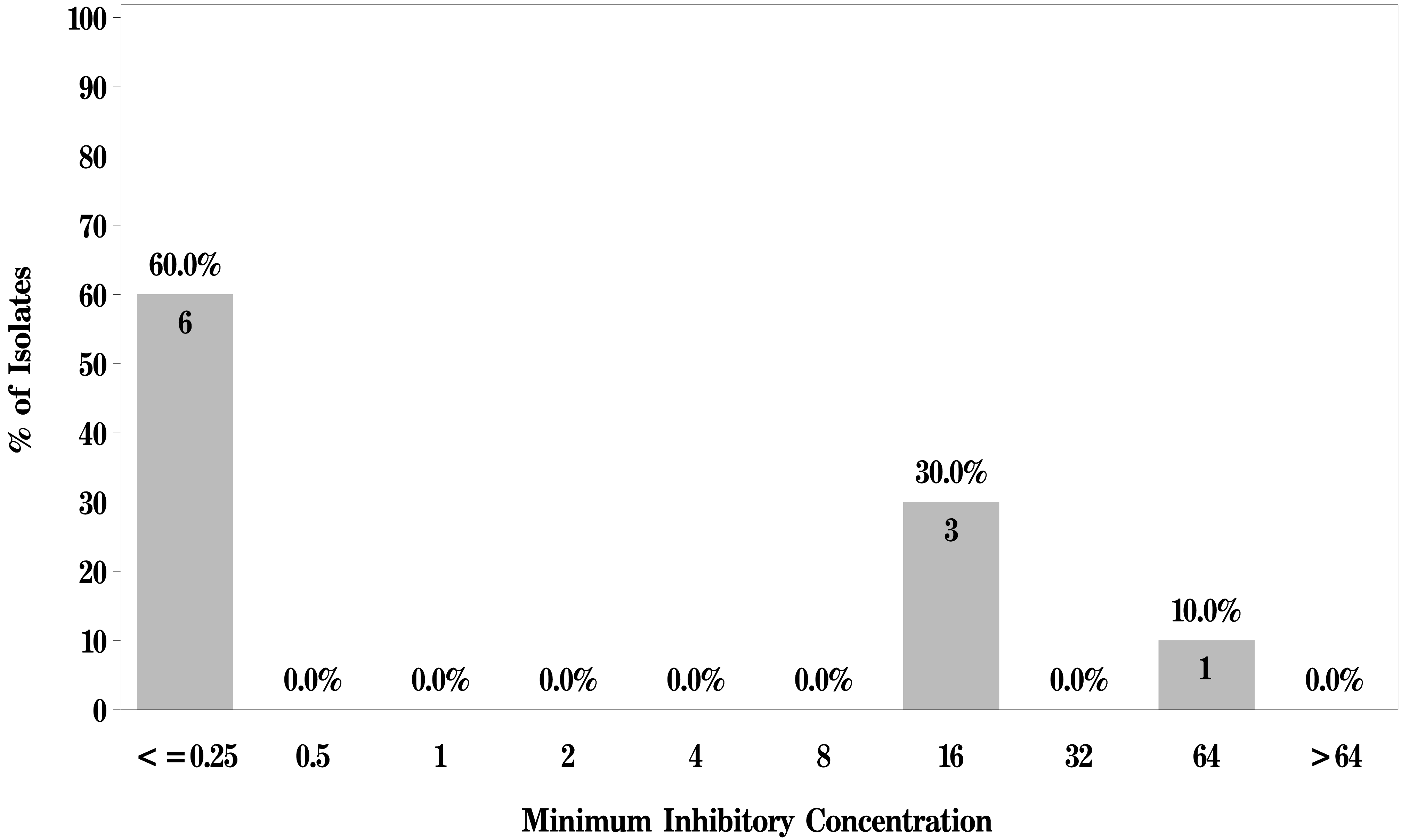
Breakpoints: Susceptible <=8 µg/mL Resistant >=64 µg/mL



NARMS

Figure 7f: Minimum Inhibitory Concentration of Ceftriaxone for *Salmonella* in Ground Beef (N=10 Isolates)

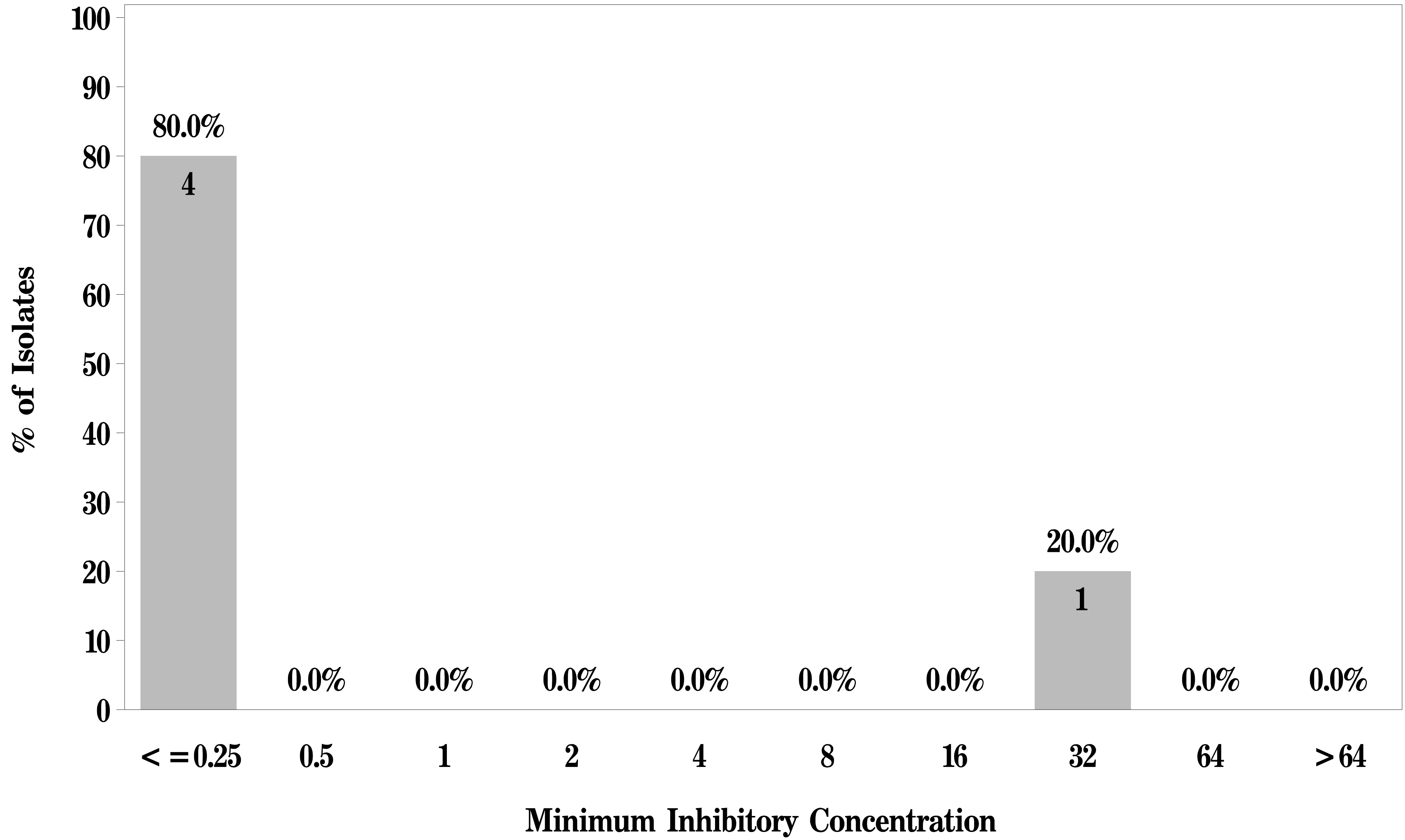
Breakpoints: Susceptible <=8 μg/mL Resistant >=64 μg/mL



NARMS

Figure 7f: Minimum Inhibitory Concentration of Ceftriaxone for *Salmonella* in Pork Chop (N=5 Isolates)

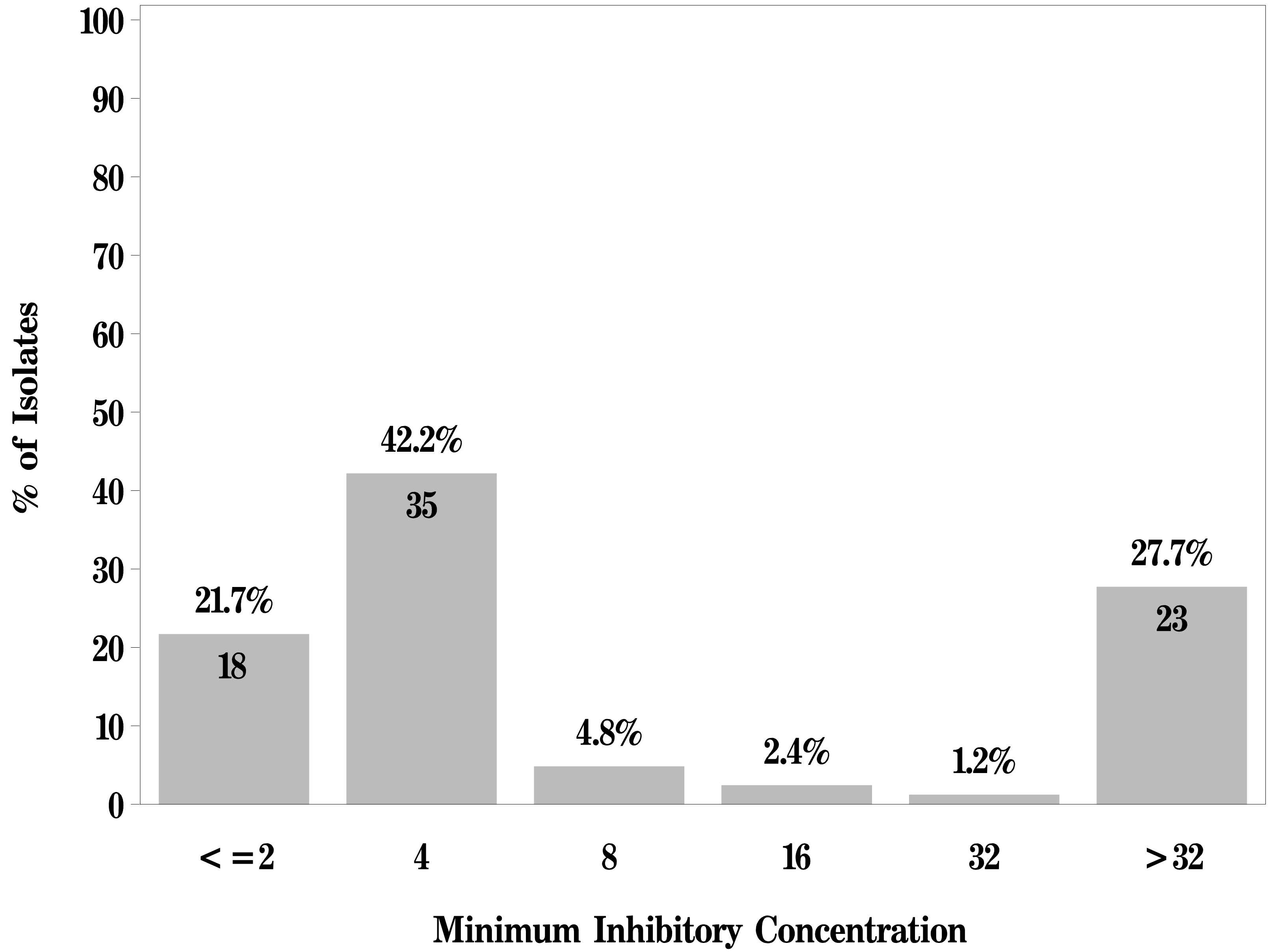
Breakpoints: Susceptible<=8 μg/mL Resistant>=64 μg/mL



NARMS

Figure 7g: Minimum Inhibitory Concentration of Cephalothin for *Salmonella* in Chicken Breast (N=83 Isolates)

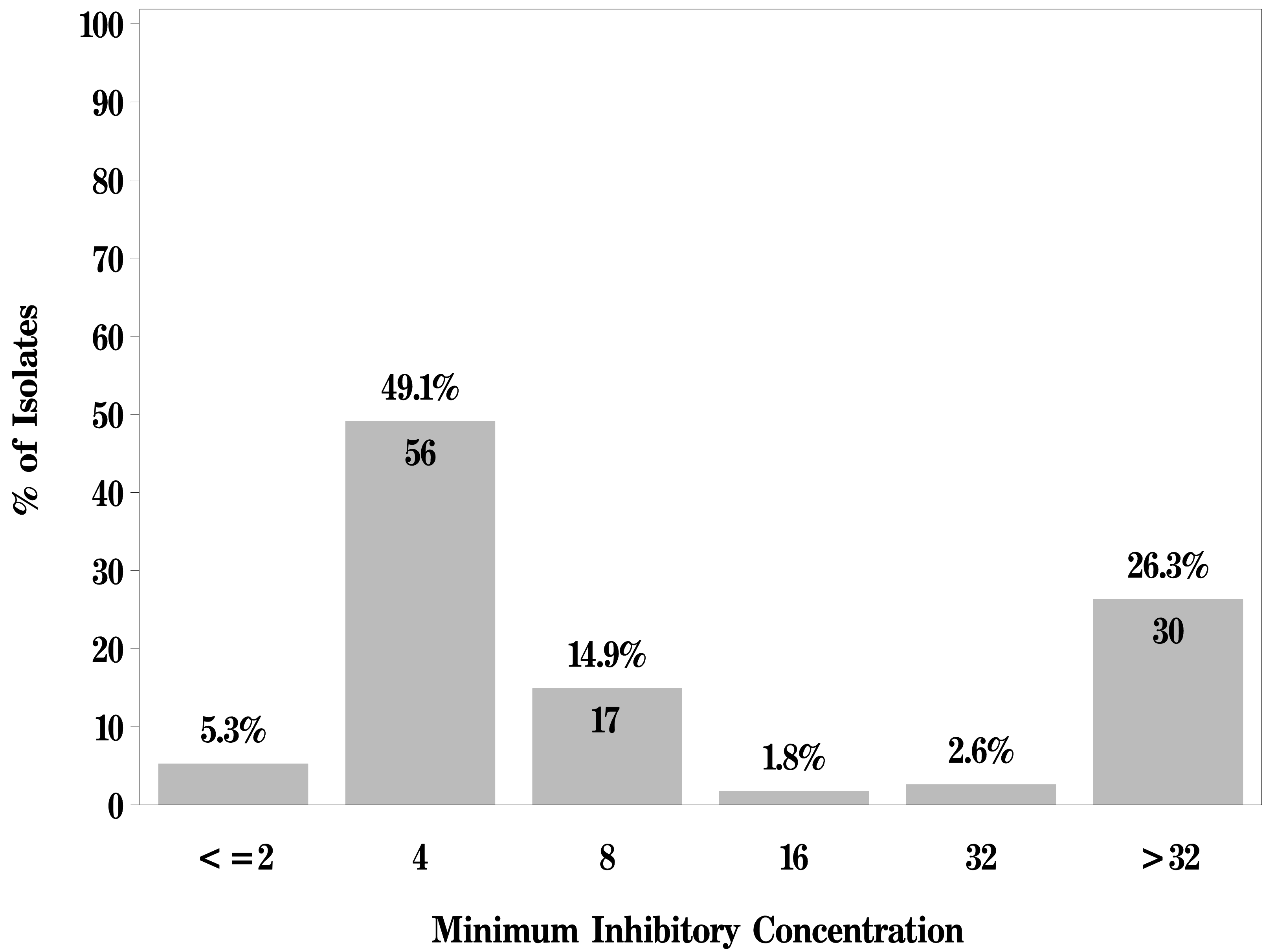
Breakpoints: Susceptible <=8 μg/mL Resistant >=32 μg/mL



NARMS

Figure 7g: Minimum Inhibitory Concentration of Cephalothin for *Salmonella* in Ground Turkey (N=114 Isolates)

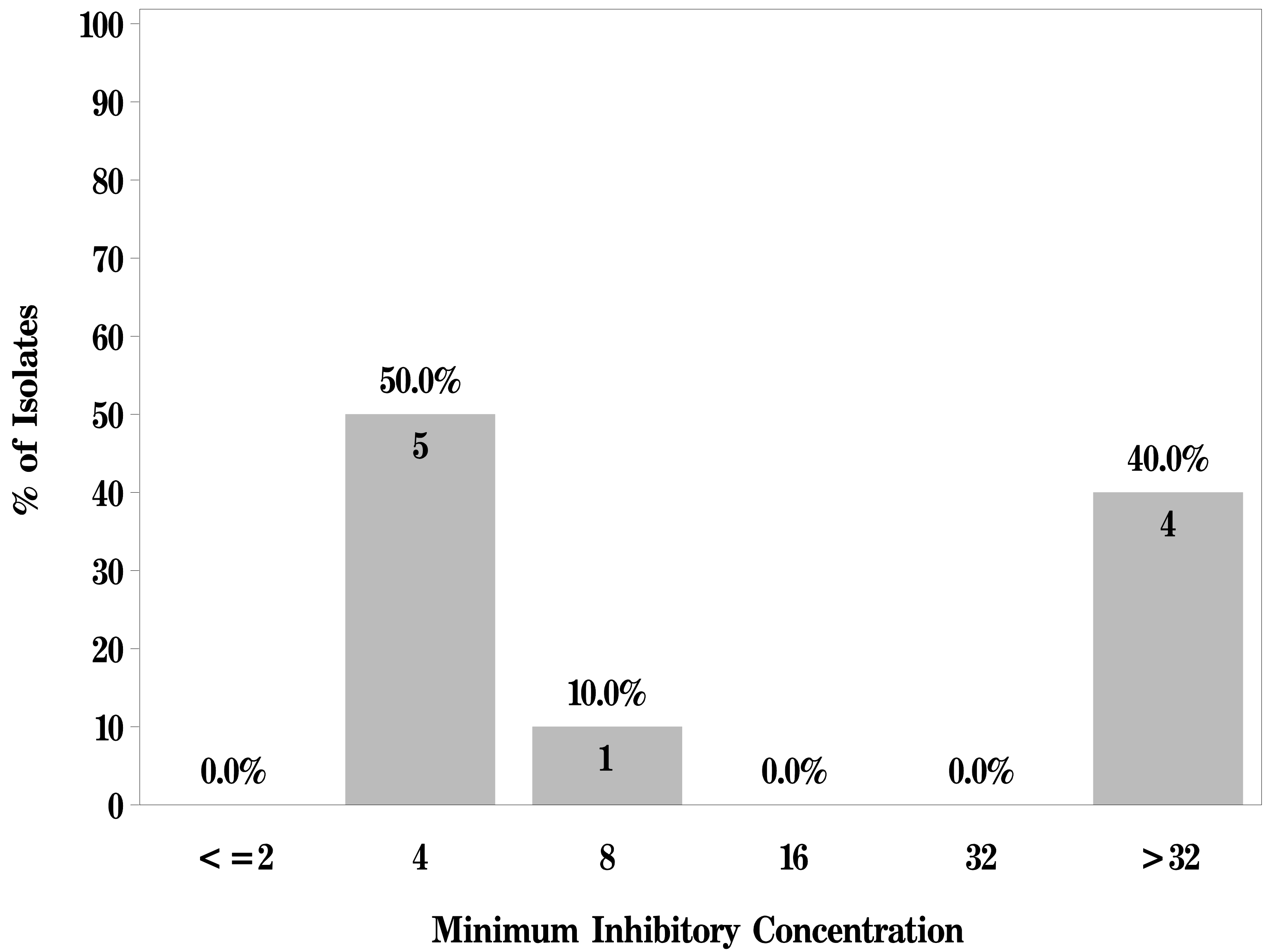
Breakpoints: Susceptible <=8 μg/mL Resistant >=32 μg/mL



NARMS

Figure 7g: Minimum Inhibitory Concentration of Cephalothin for *Salmonella* in Ground Beef (N=10 Isolates)

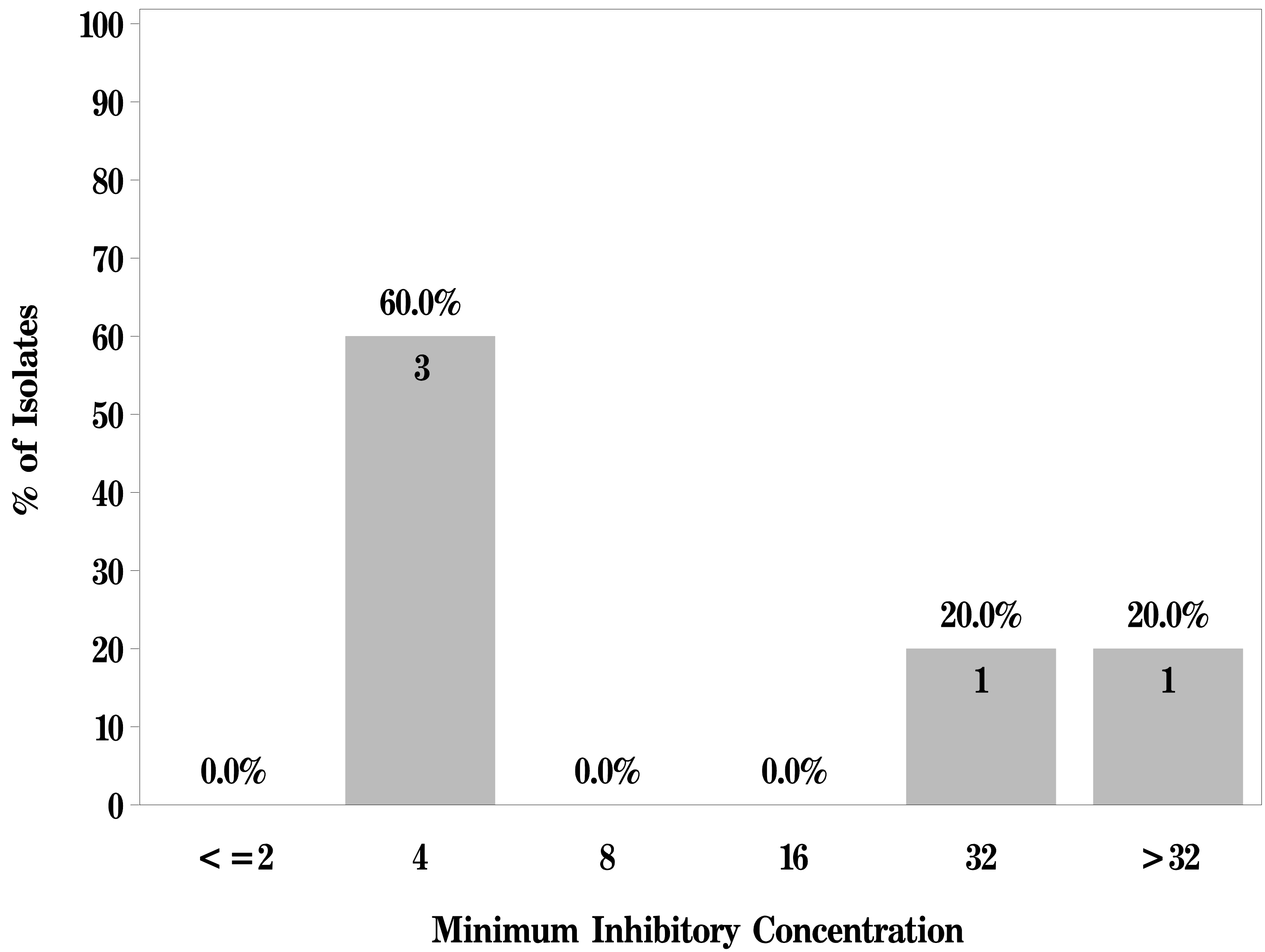
Breakpoints: Susceptible <=8 μg/mL Resistant >=32 μg/mL



NARMS

Figure 7g: Minimum Inhibitory Concentration of Cephalothin for *Salmonella* in Pork Chop (N=5 Isolates)

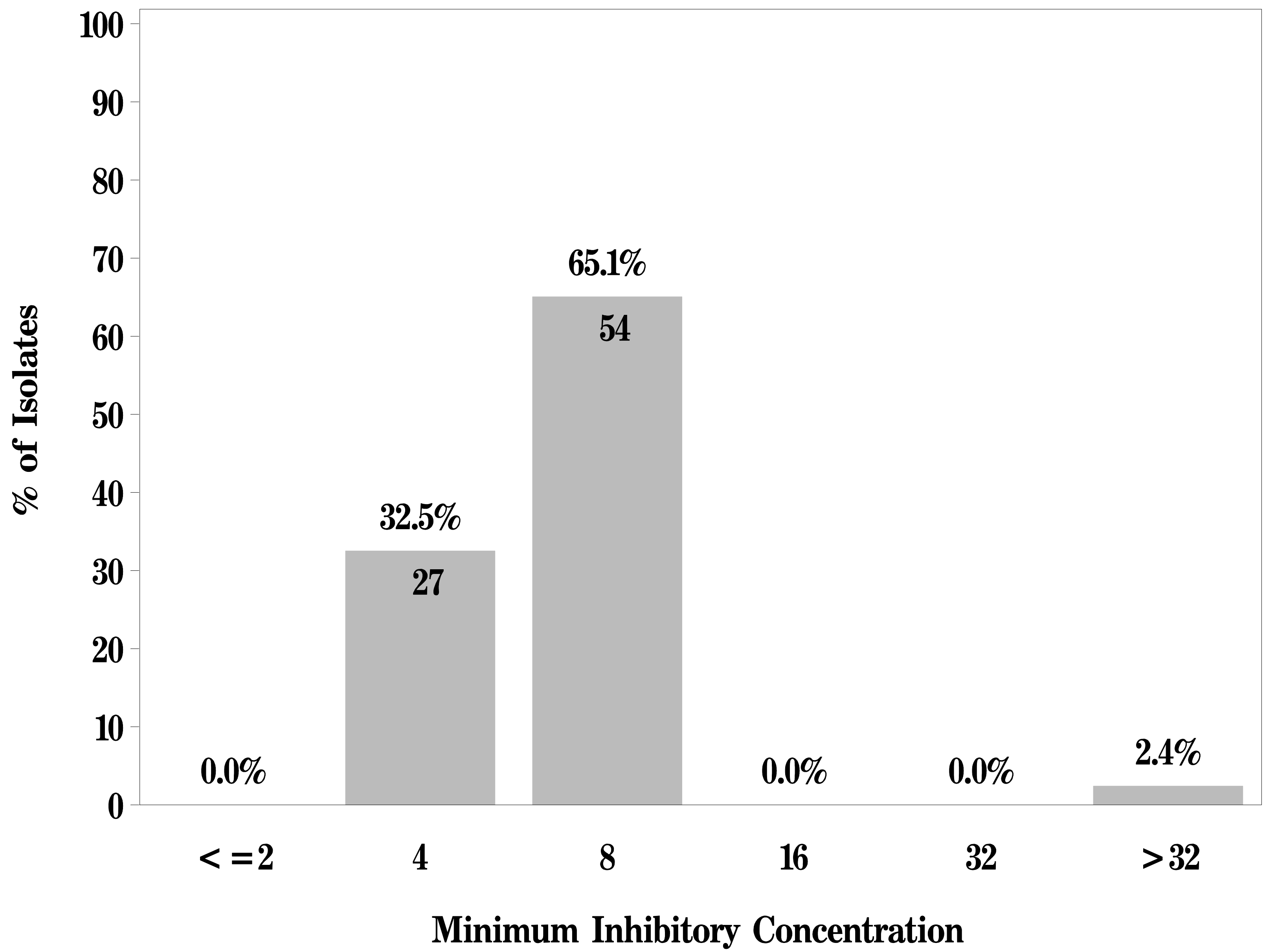
Breakpoints: Susceptible<=8 μg/mL Resistant>=32 μg/mL



NARMS

Figure 7h: Minimum Inhibitory Concentration of Chloramphenicol for *Salmonella* in Chicken Breast (N=83 Isolates)

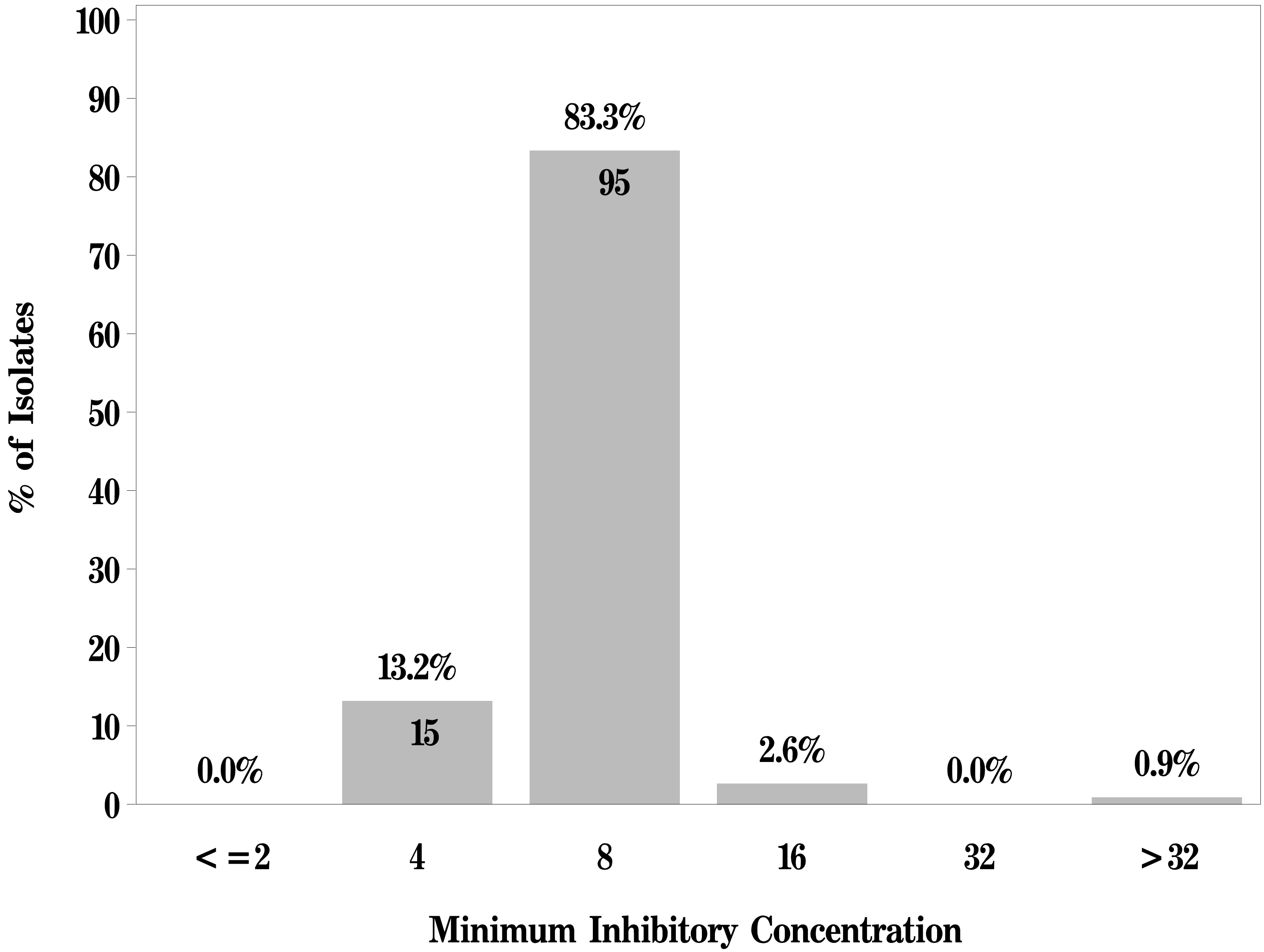
Breakpoints: Susceptible <=8 μg/mL Resistant >=32 μg/mL



NARMS

Figure 7h: Minimum Inhibitory Concentration of Chloramphenicol for *Salmonella* in Ground Turkey (N=114 Isolates)

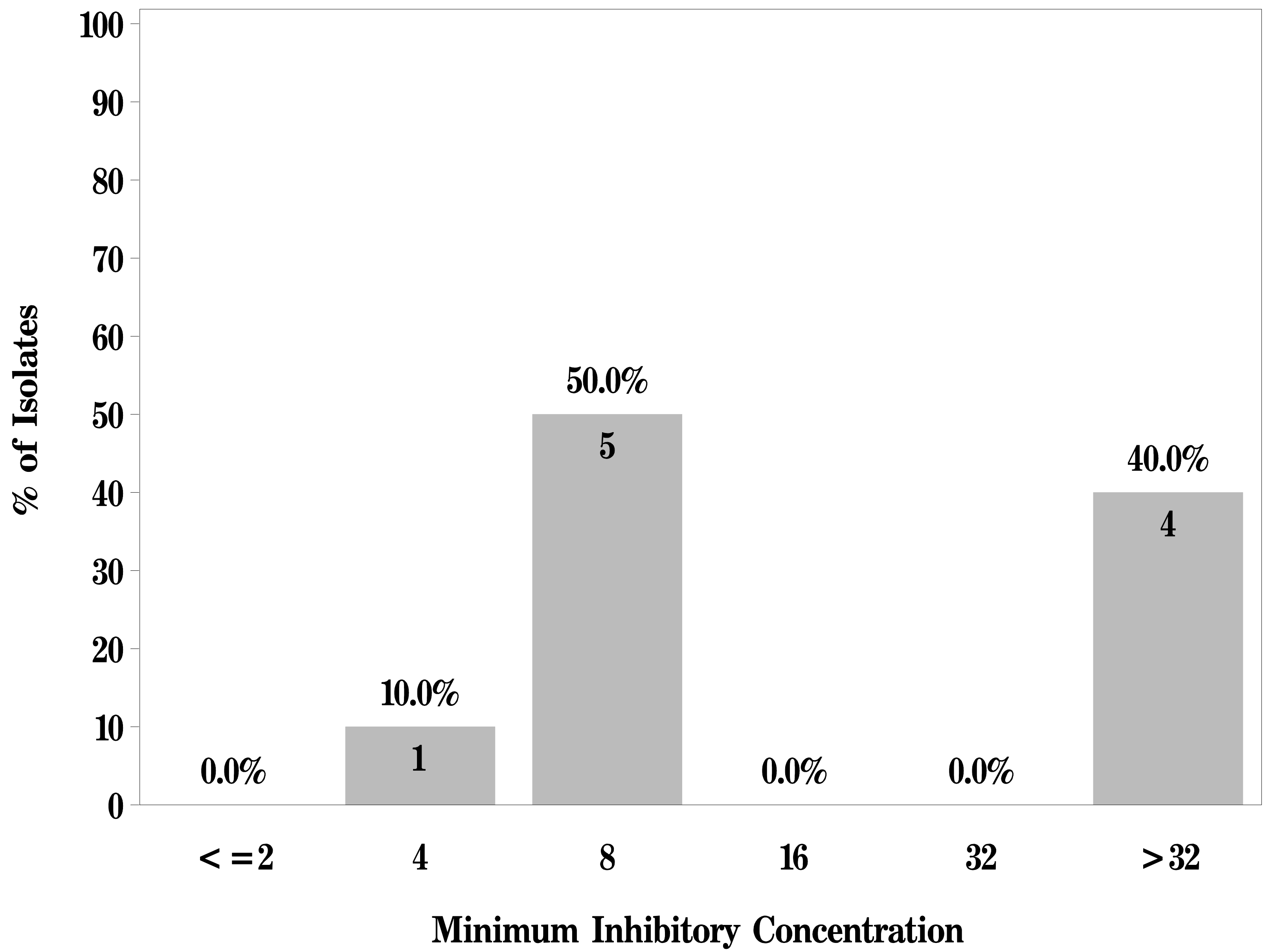
Breakpoints: Susceptible <=8 μg/mL Resistant >=32 μg/mL



NARMS

Figure 7h: Minimum Inhibitory Concentration of Chloramphenicol for *Salmonella* in Ground Beef (N=10 Isolates)

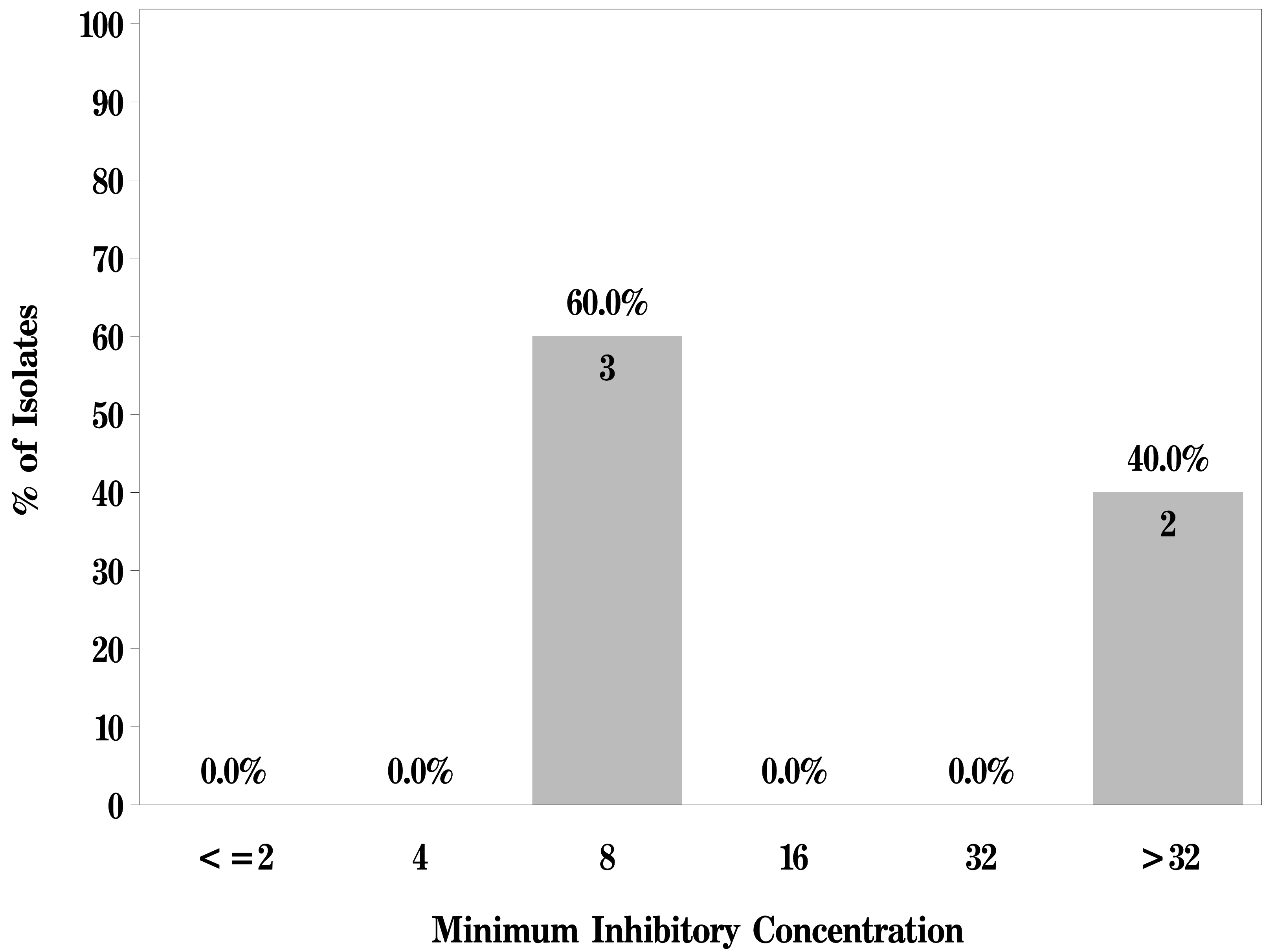
Breakpoints: Susceptible <=8 µg/mL Resistant >=32 µg/mL



NARMS

Figure 7h: Minimum Inhibitory Concentration of Chloramphenicol for *Salmonella* in Pork Chop (N=5 Isolates)

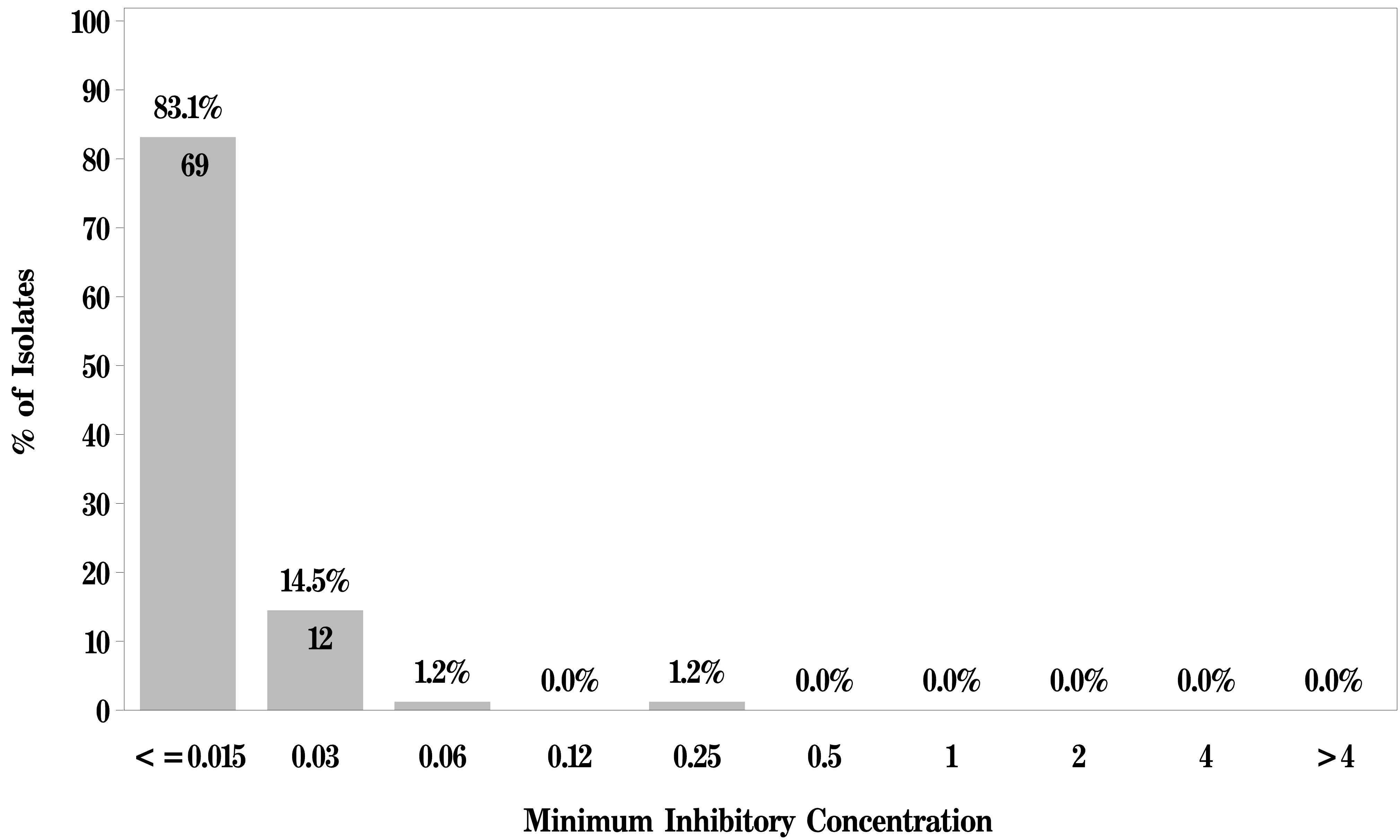
Breakpoints: Susceptible <=8 μg/mL Resistant >=32 μg/mL



NARMS

Figure 7i: Minimum Inhibitory Concentration of Ciprofloxacin for *Salmonella* in Chicken Breast (N=83 Isolates)

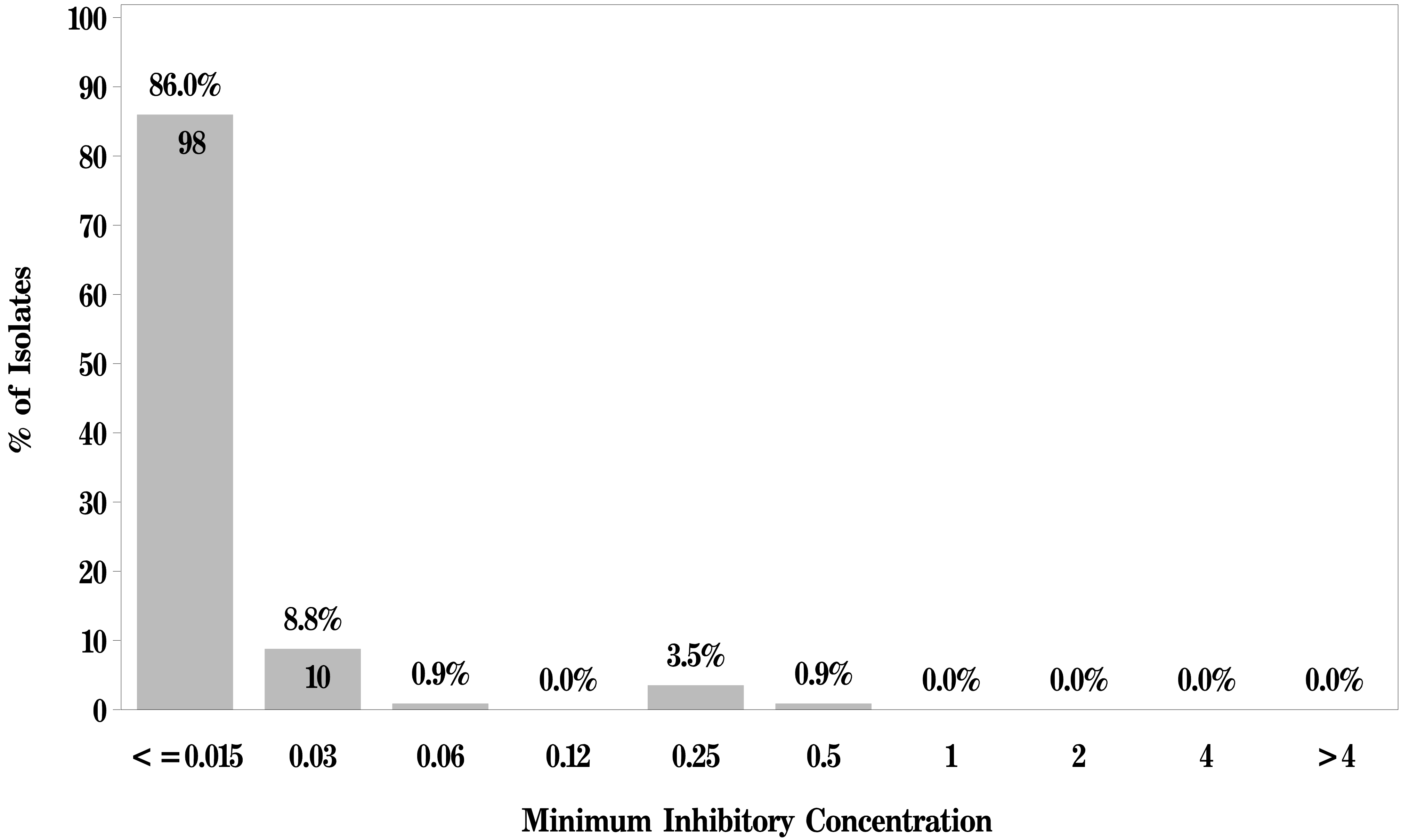
Breakpoints: Susceptible<=1 μg/mL Resistant>=4 μg/mL



NARMS

Figure 7i: Minimum Inhibitory Concentration of Ciprofloxacin for *Salmonella* in Ground Turkey (N=114 Isolates)

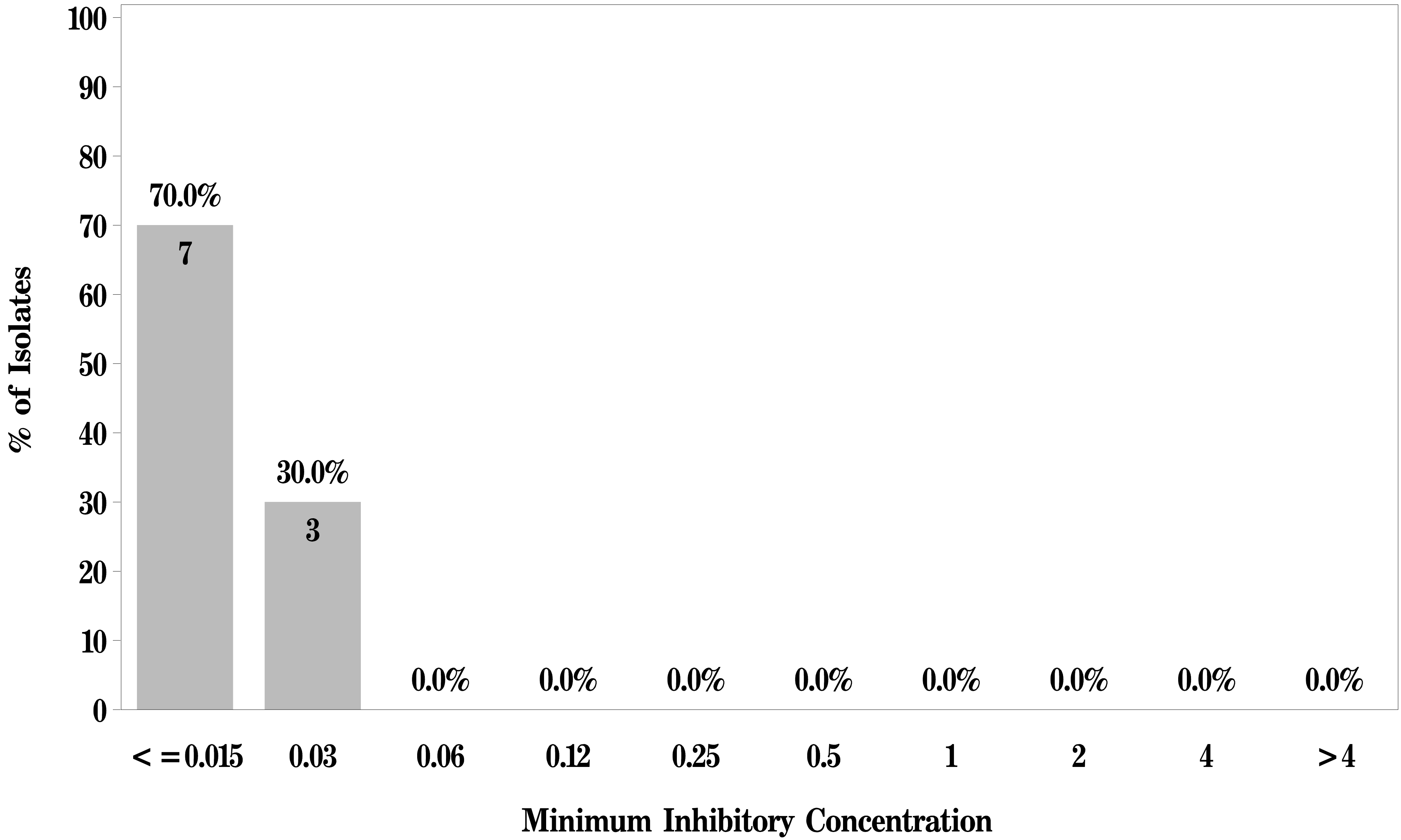
Breakpoints: Susceptible <=1 μg/mL Resistant >=4 μg/mL



NARMS

Figure 7i: Minimum Inhibitory Concentration of Ciprofloxacin for *Salmonella* in Ground Beef (N=10 Isolates)

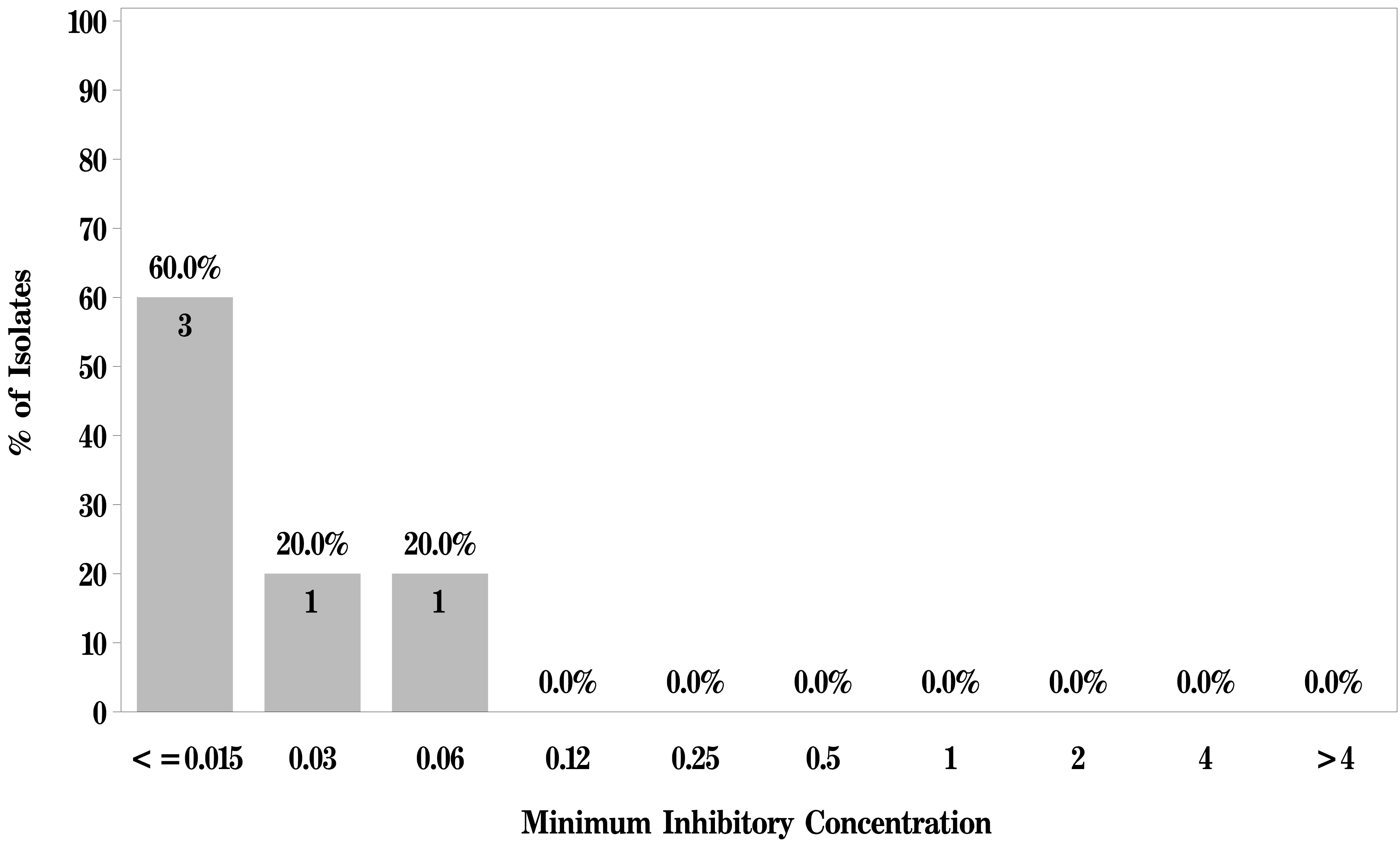
Breakpoints: Susceptible <=1 μg/mL Resistant >=4 μg/mL



NARMS

Figure 7i: Minimum Inhibitory Concentration of Ciprofloxacin for *Salmonella* in Pork Chop (N=5 Isolates)

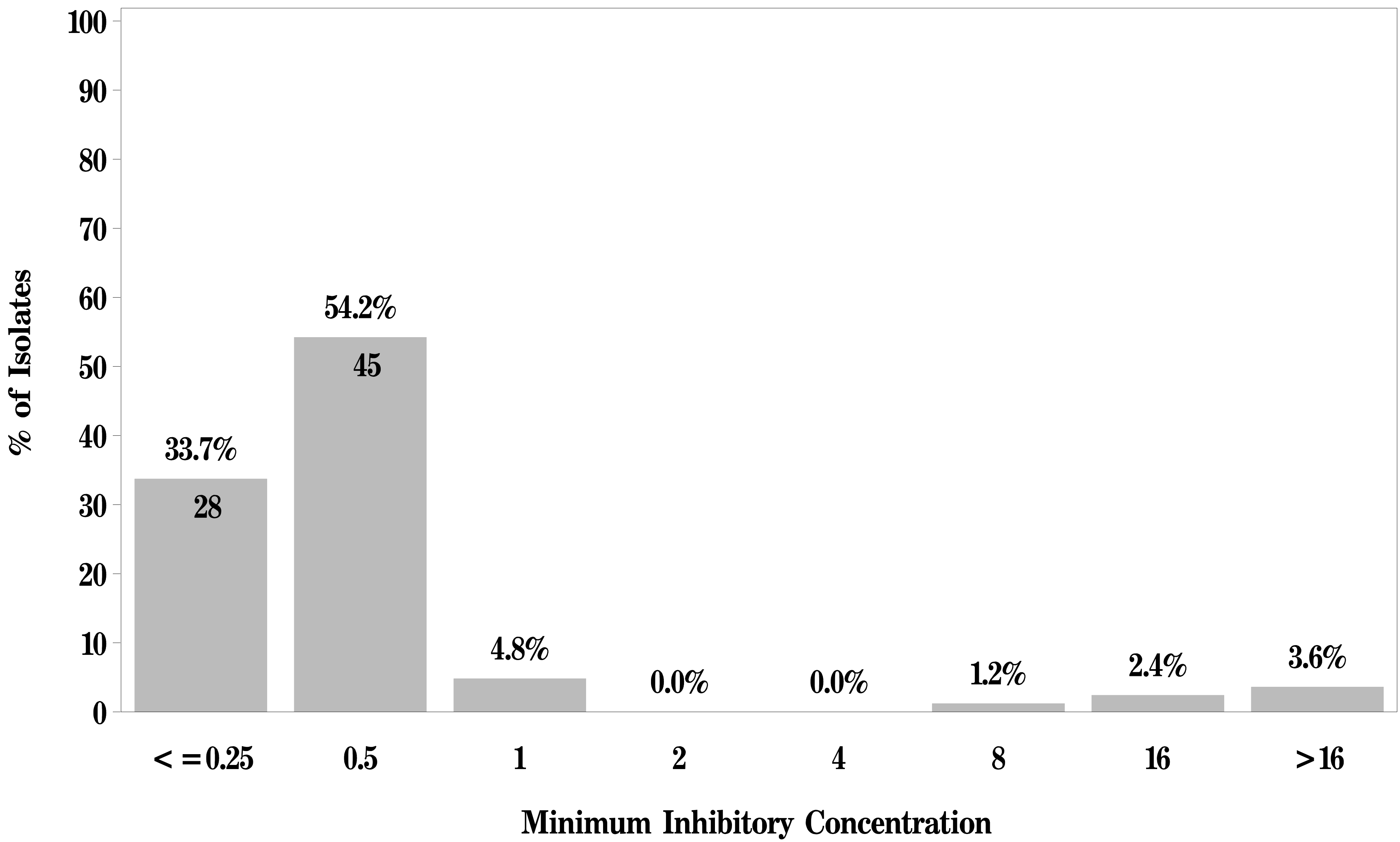
Breakpoints: Susceptible <=1 µg/mL Resistant >=4 µg/mL



NARMS

Figure 7j: Minimum Inhibitory Concentration of Gentamicin for *Salmonella* in Chicken Breast (N=83 Isolates)

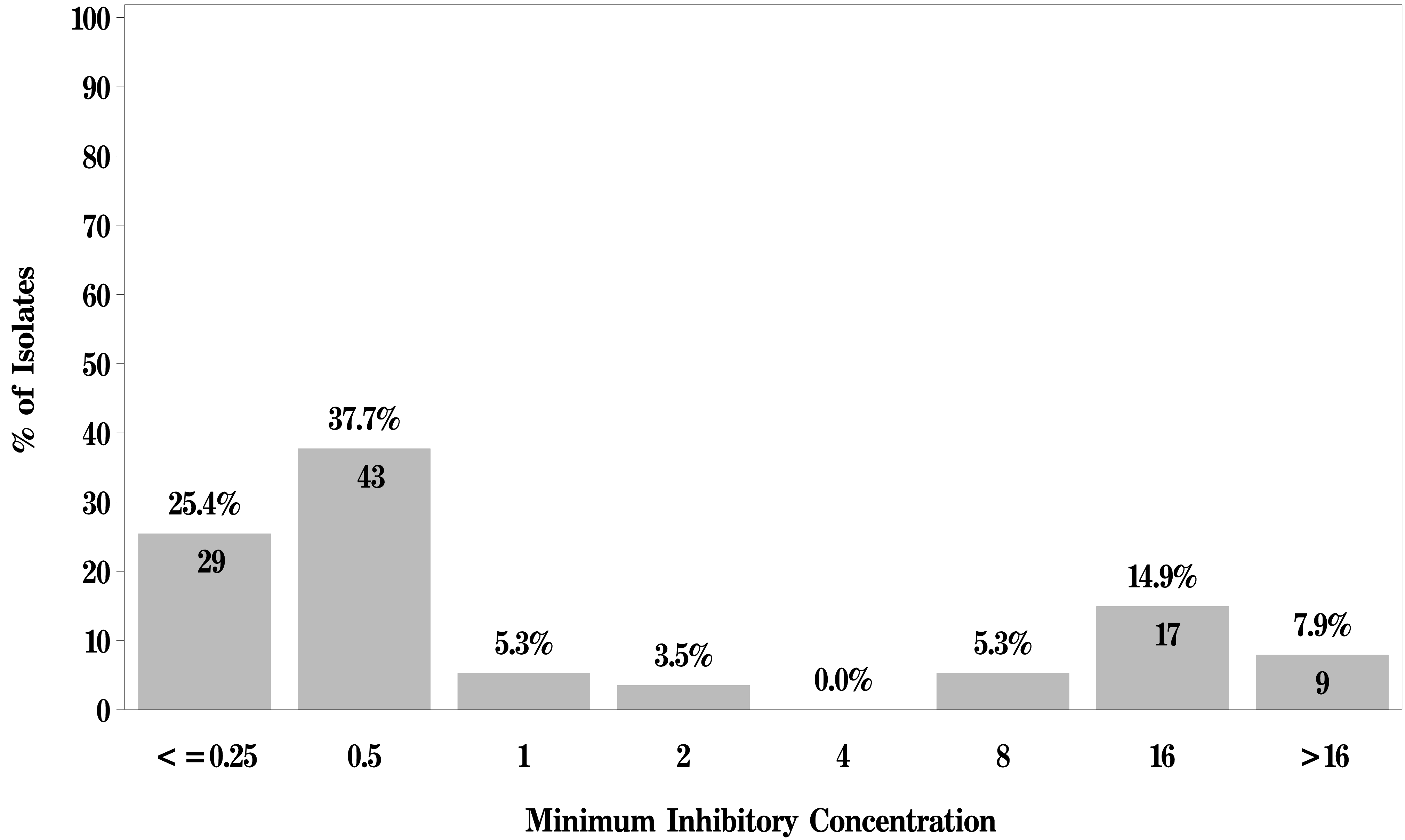
Breakpoints: Susceptible <=4 μg/mL Resistant >=16 μg/mL



NARMS

Figure 7j: Minimum Inhibitory Concentration of Gentamicin for *Salmonella* in Ground Turkey (N=114 Isolates)

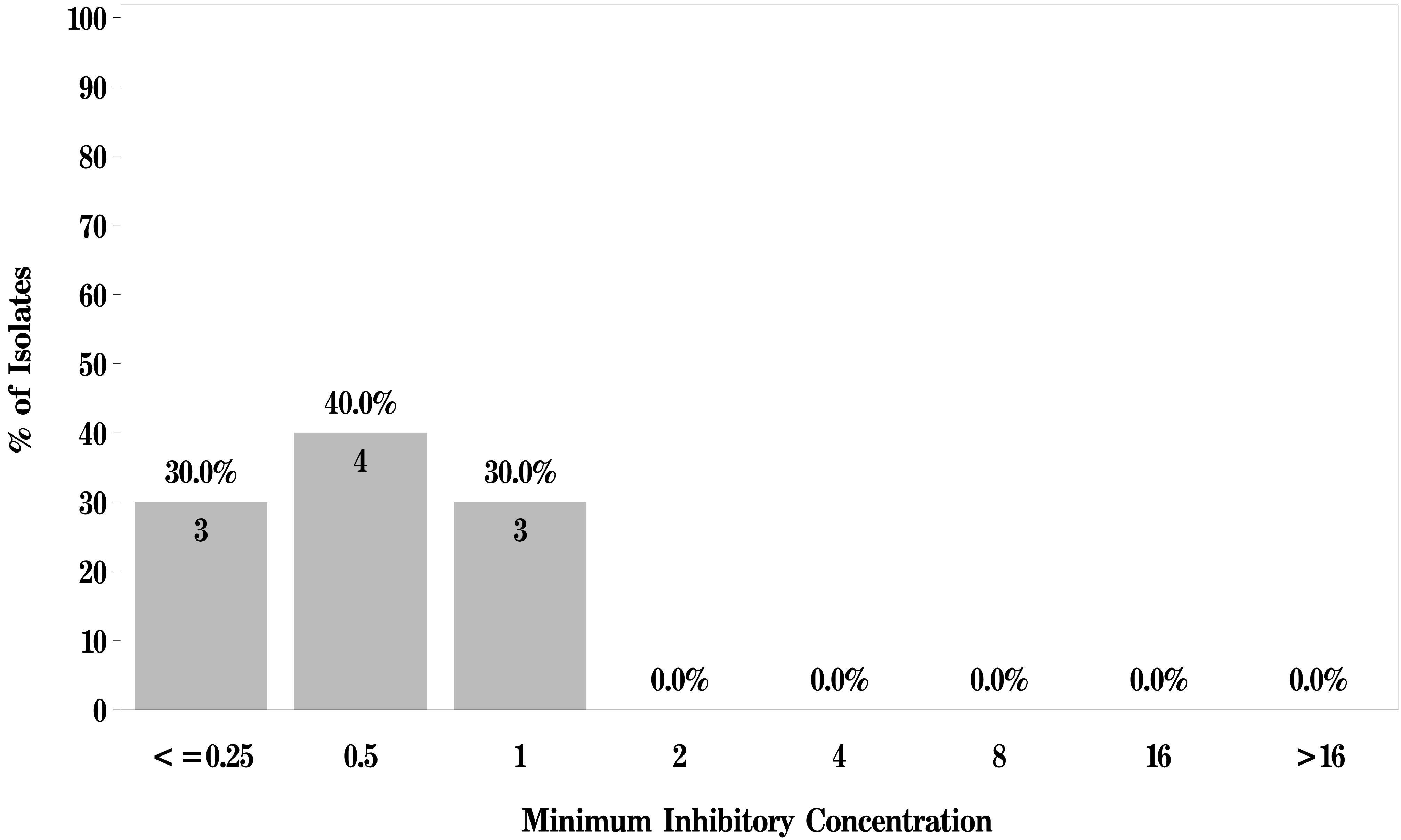
Breakpoints: Susceptible <=4 μg/mL Resistant >=16 μg/mL



NARMS

Figure 7j: Minimum Inhibitory Concentration of Gentamicin for *Salmonella* in Ground Beef (N=10 Isolates)

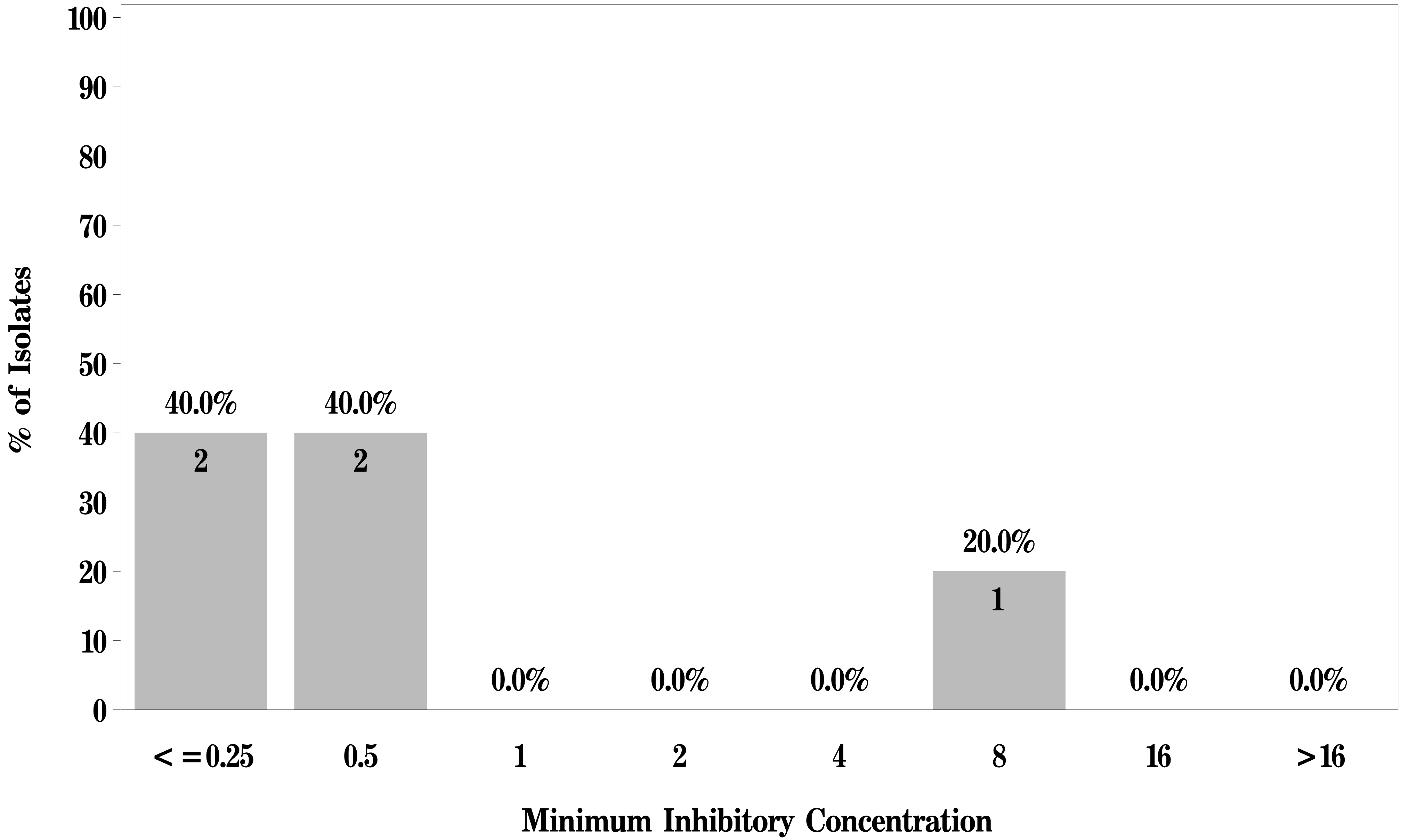
Breakpoints: Susceptible <=4 μg/mL Resistant >=16 μg/mL



NARMS

Figure 7j: Minimum Inhibitory Concentration of Gentamicin for *Salmonella* in Pork Chop (N=5 Isolates)

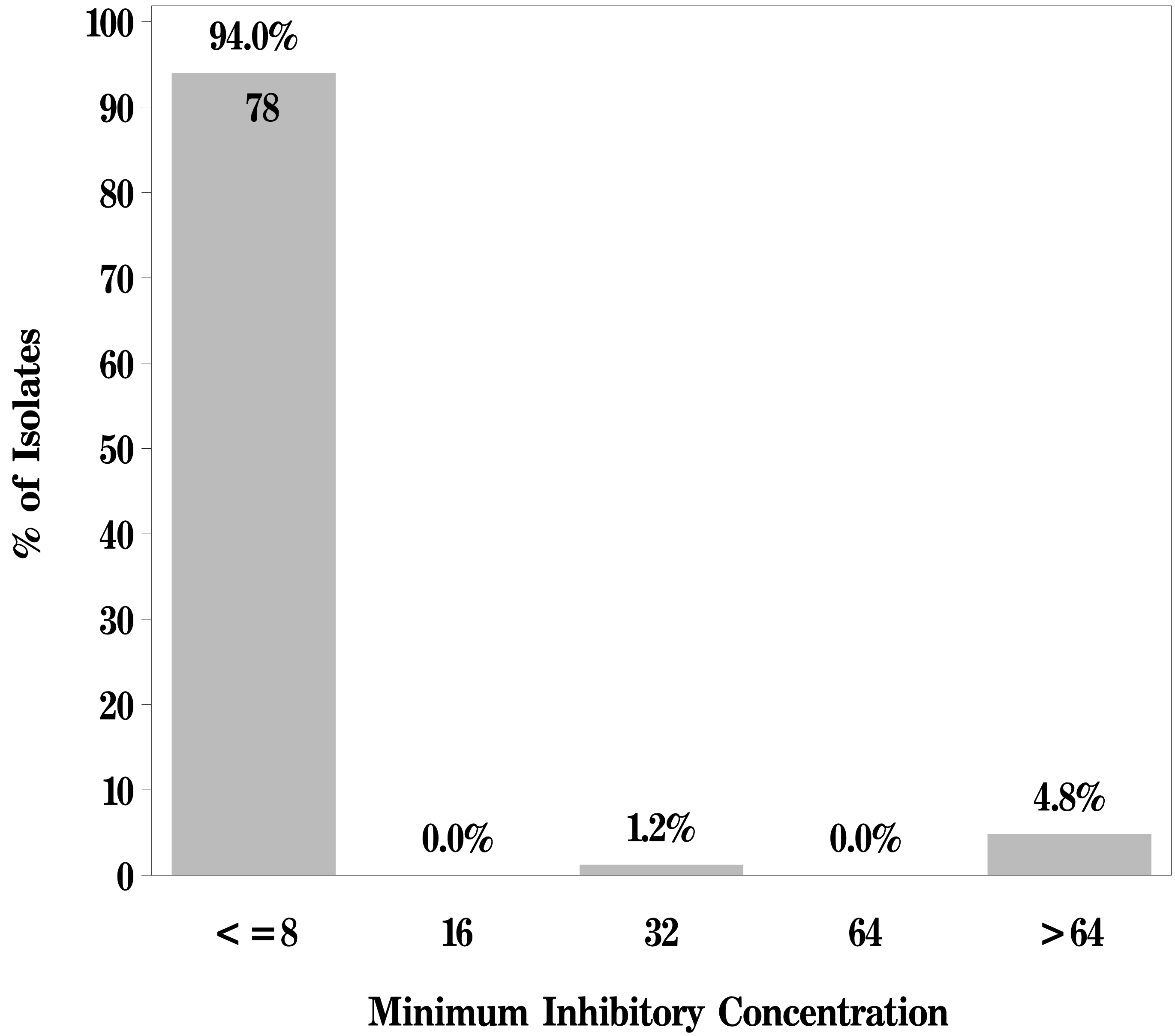
Breakpoints: Susceptible<=4 µg/mL Resistant>=16 µg/mL



NARMS

Figure 7k: Minimum Inhibitory Concentration of Kanamycin for *Salmonella* in Chicken Breast (N=83 Isolates)

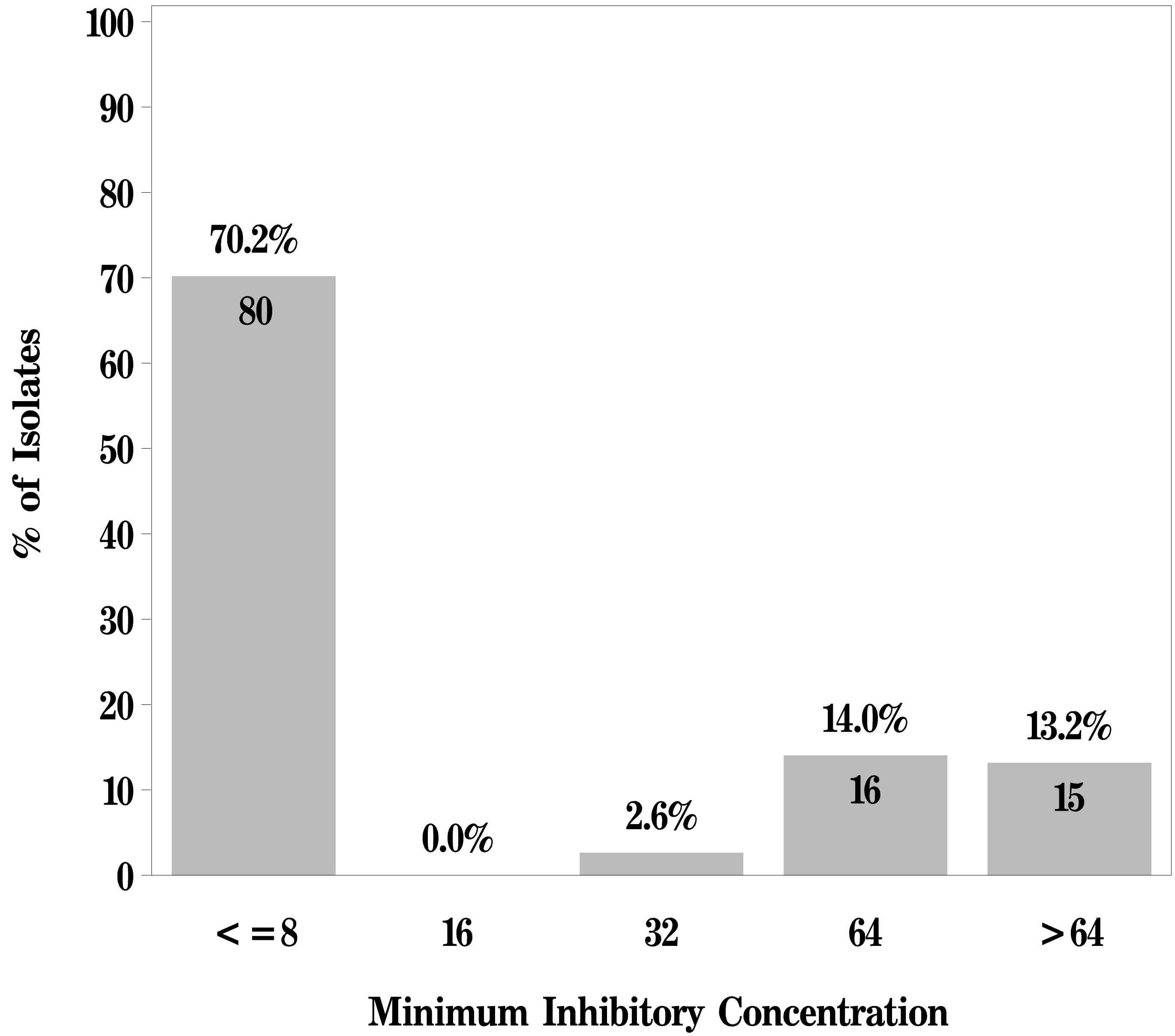
Breakpoints: Susceptible<=16 μg/mL Resistant>=64 μg/mL



NARMS

Figure 7k: Minimum Inhibitory Concentration of Kanamycin for *Salmonella* in Ground Turkey (N=114 Isolates)

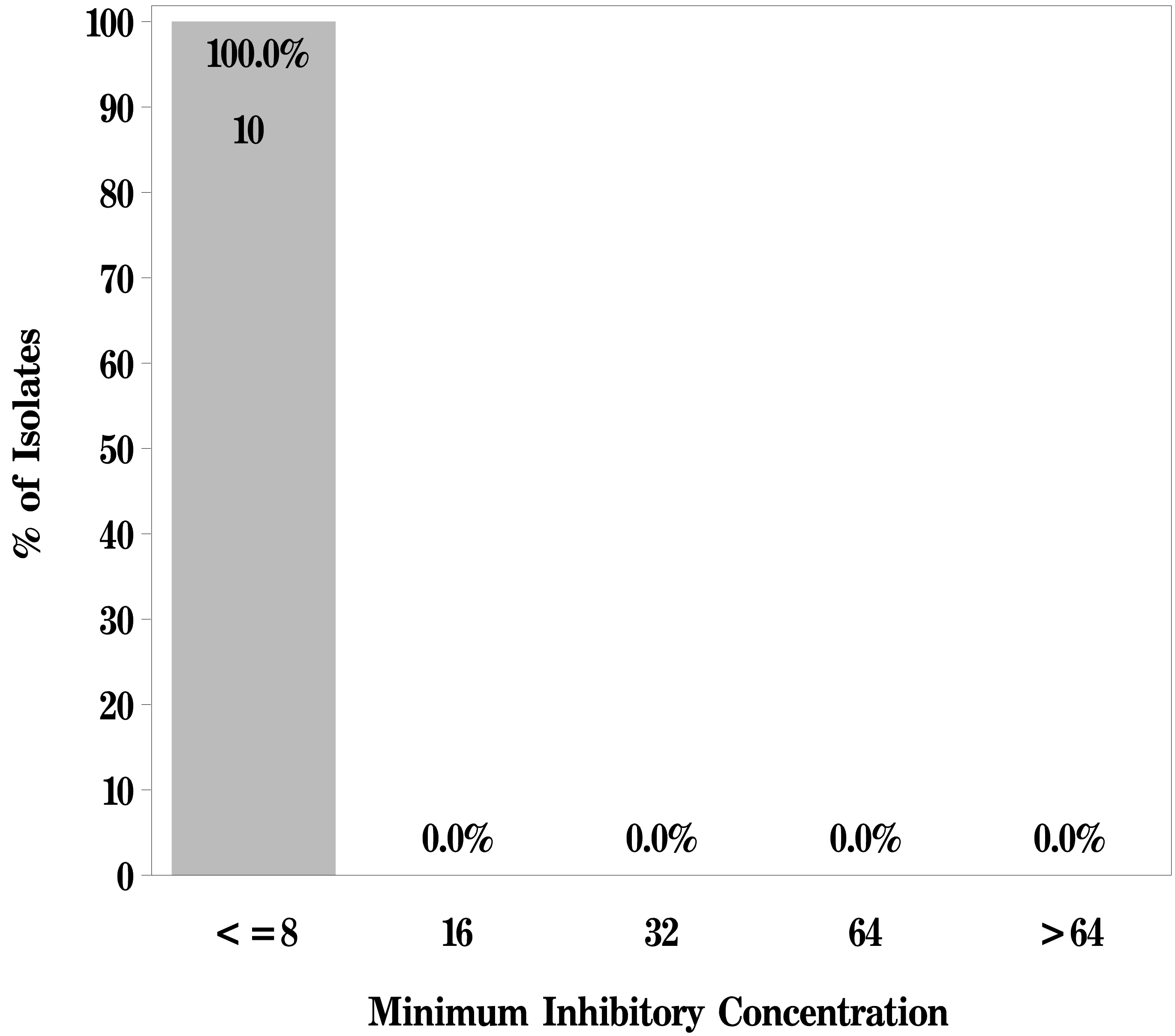
Breakpoints: Susceptible <=16 μg/mL Resistant >=64 μg/mL



NARMS

Figure 7k: Minimum Inhibitory Concentration of Kanamycin for *Salmonella* in Ground Beef (N=10 Isolates)

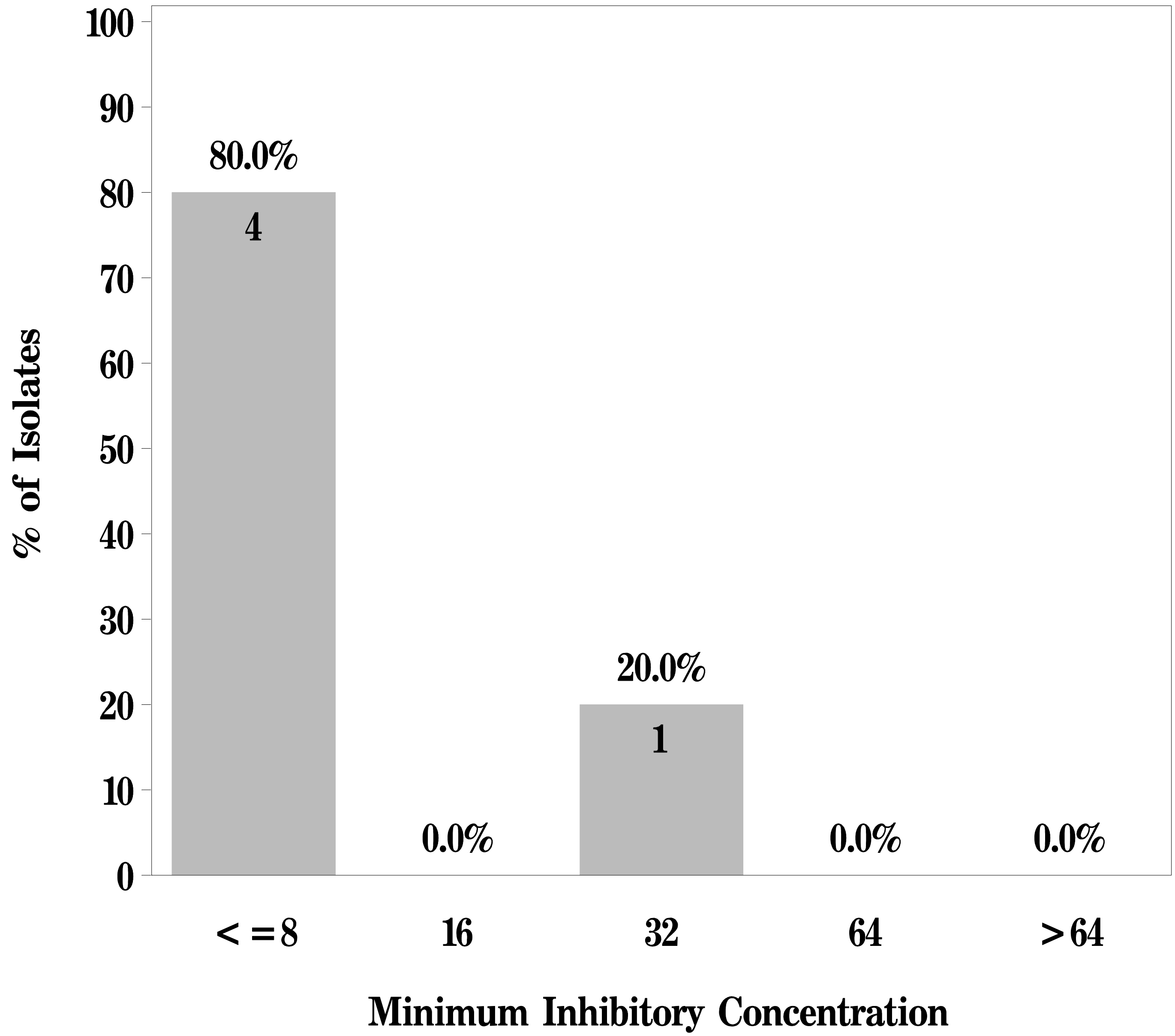
Breakpoints: Susceptible <=16 μg/mL Resistant >=64 μg/mL



NARMS

Figure 7k: Minimum Inhibitory Concentration of Kanamycin for *Salmonella* in Pork Chop (N=5 Isolates)

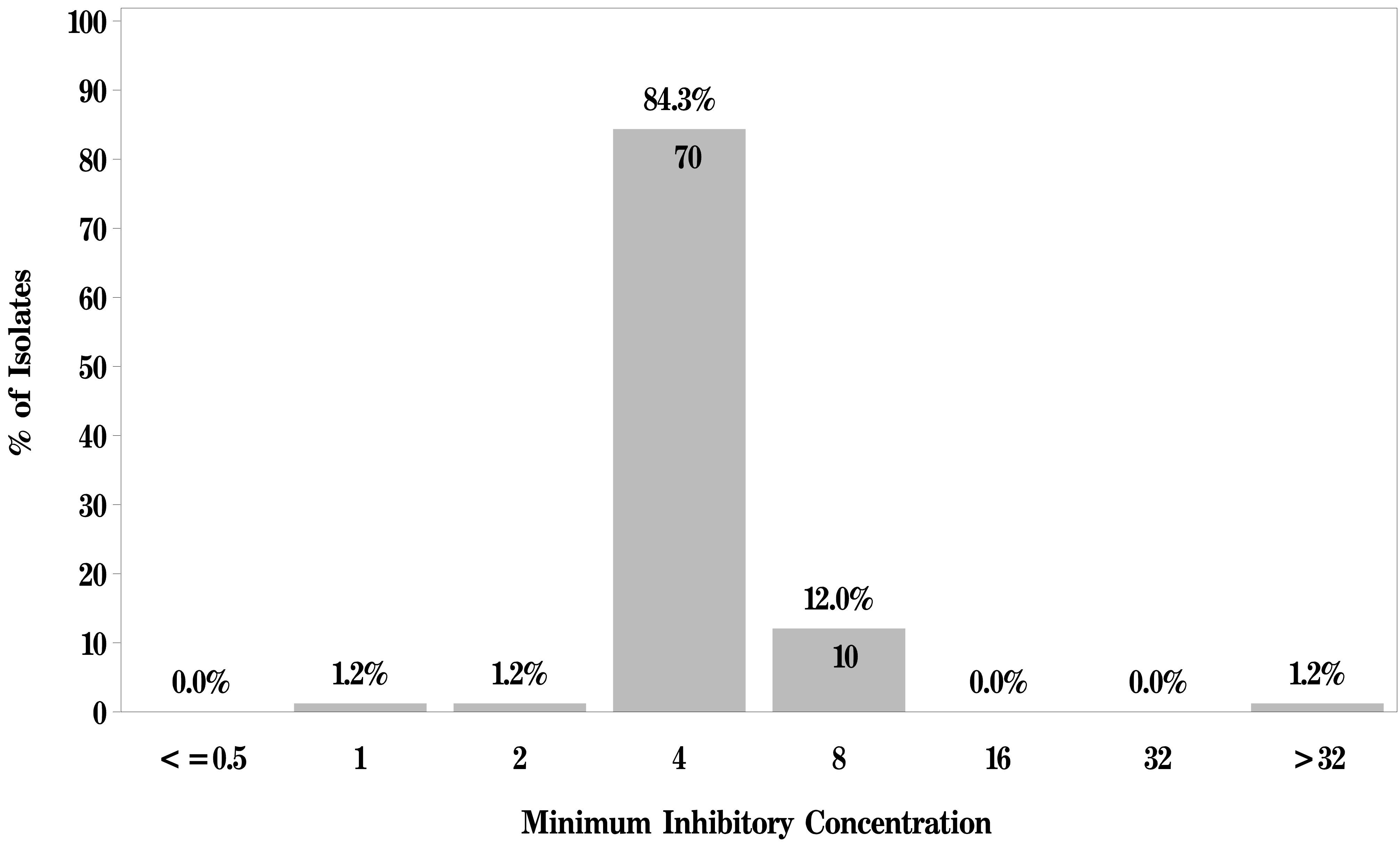
Breakpoints: Susceptible <=16 µg/mL Resistant >=64 µg/mL



NARMS

Figure 7l: Minimum Inhibitory Concentration of Nalidixic acid for *Salmonella* in Chicken Breast (N=83 Isolates)

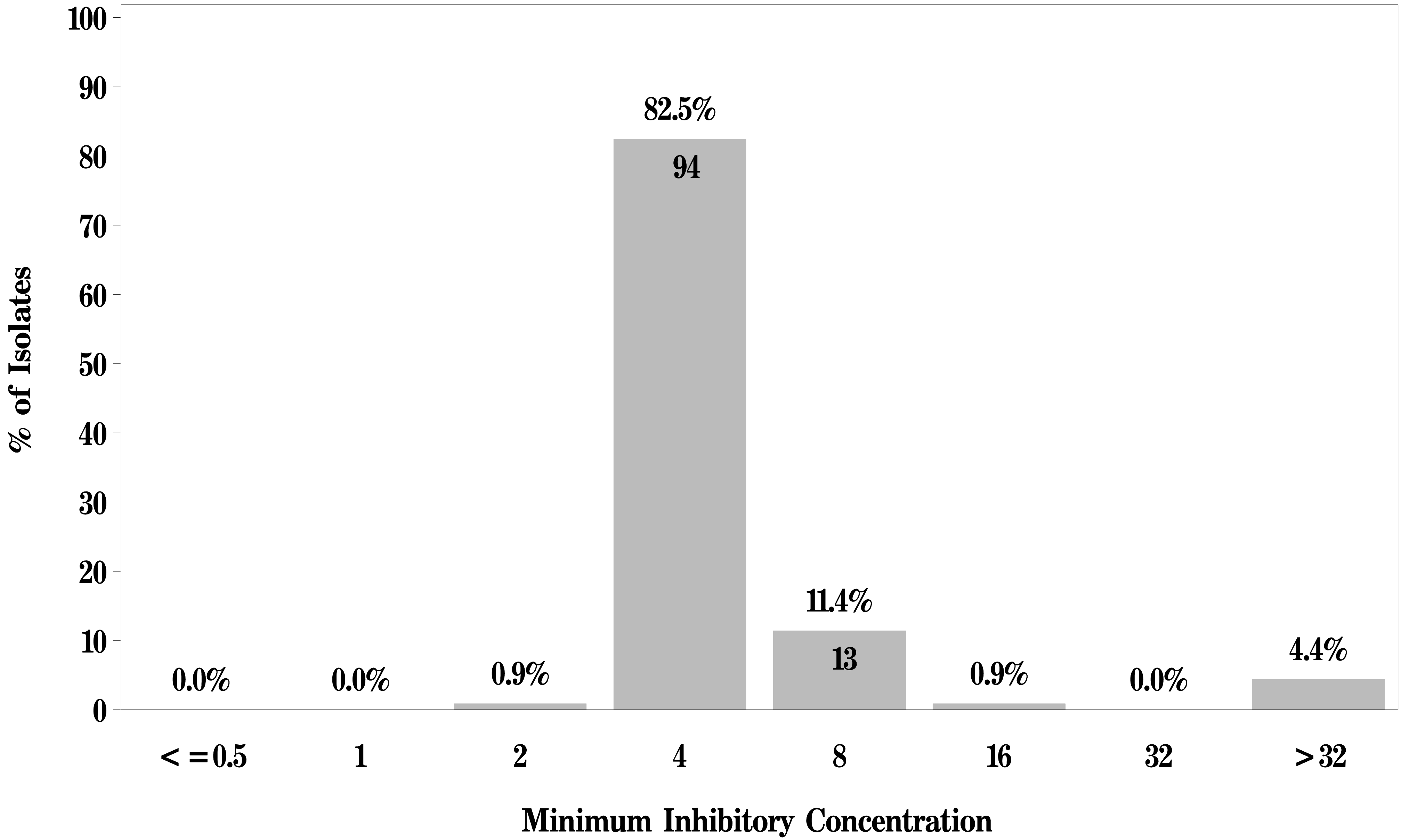
Breakpoints: Susceptible<=16 μg/mL Resistant>=32 μg/mL



NARMS

Figure 7l: Minimum Inhibitory Concentration of Nalidixic acid for *Salmonella* in Ground Turkey (N=114 Isolates)

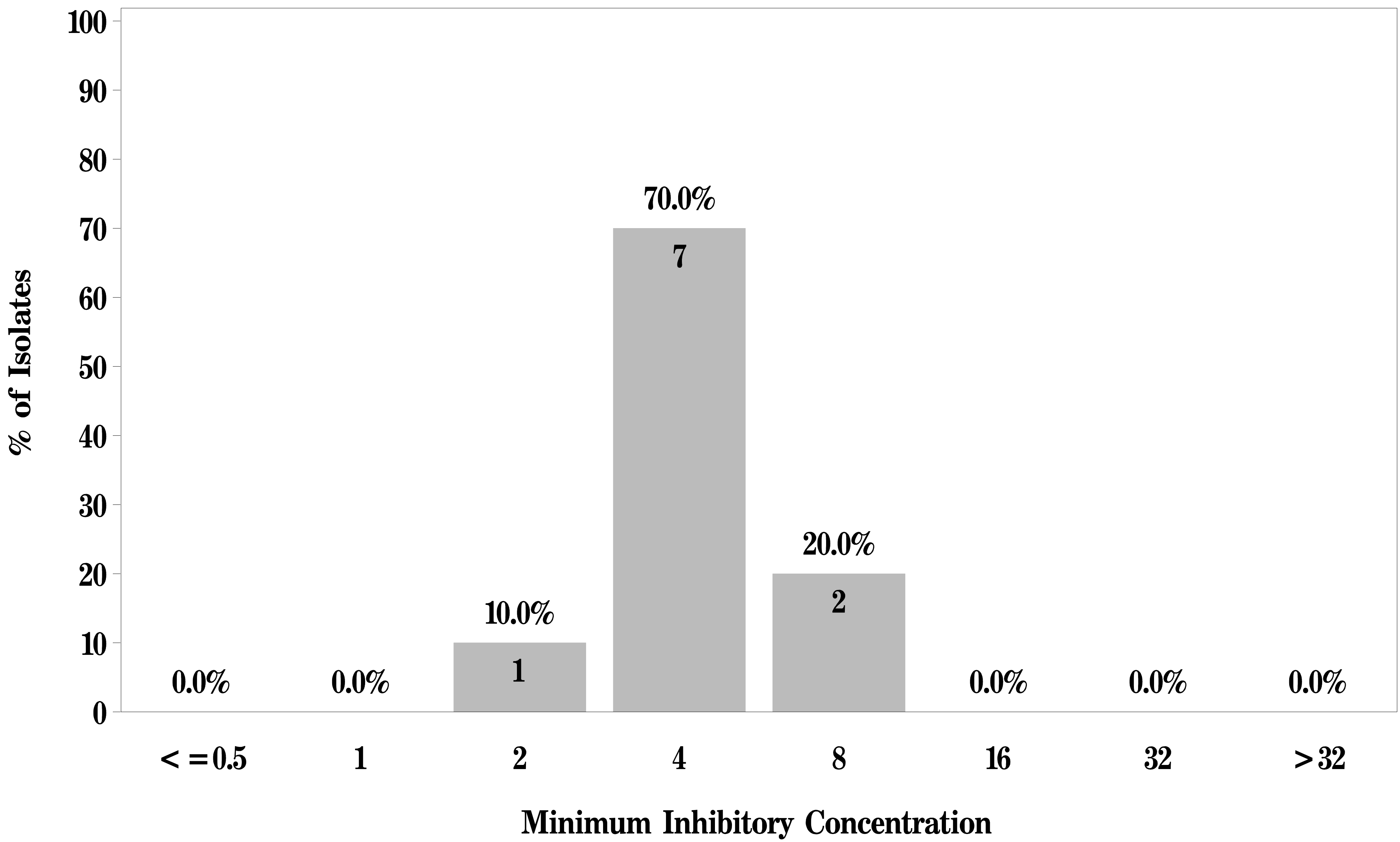
Breakpoints: Susceptible<=16 µg/mL Resistant>=32 µg/mL



NARMS

Figure 7l: Minimum Inhibitory Concentration of Nalidixic acid for *Salmonella* in Ground Beef (N=10 Isolates)

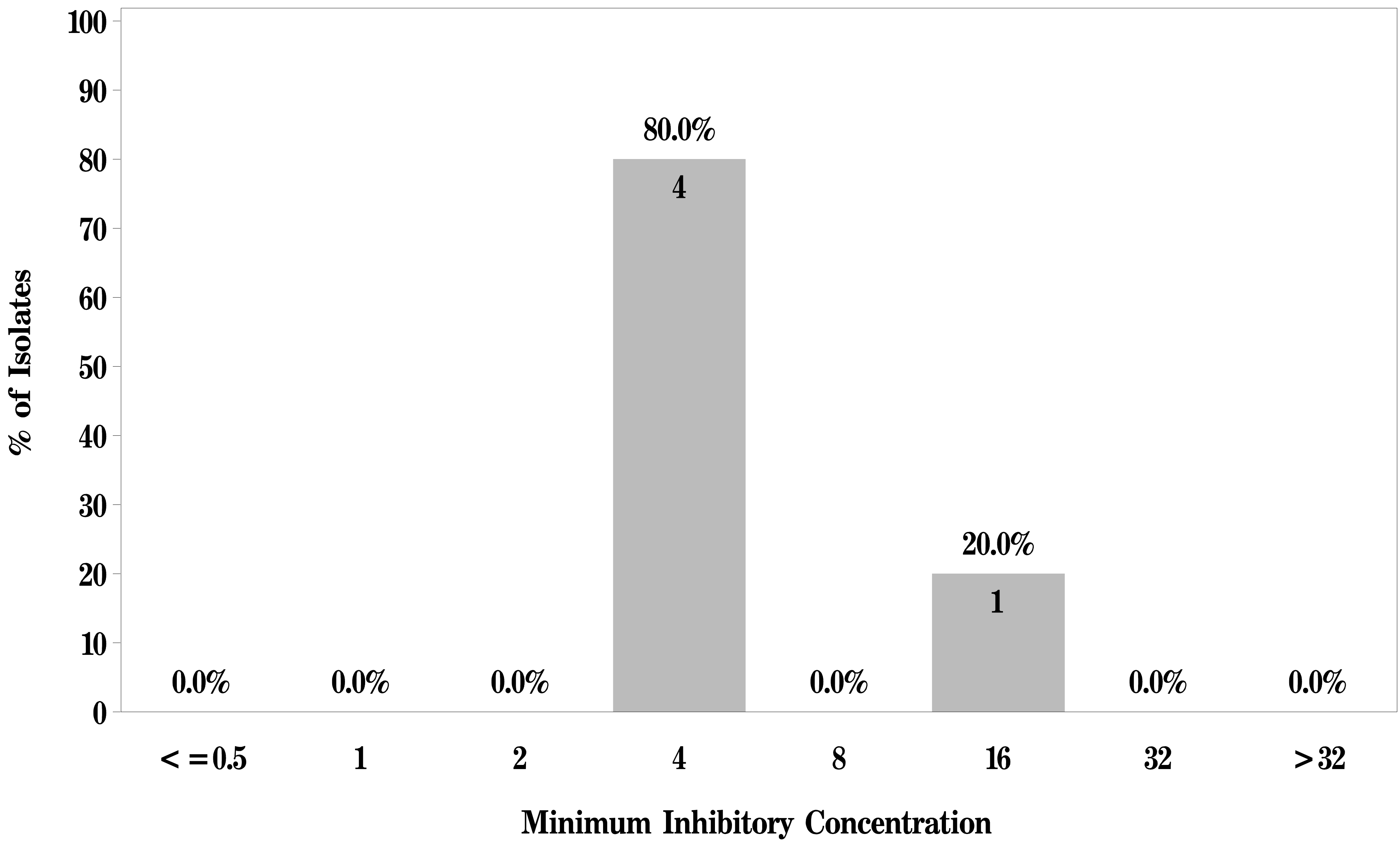
Breakpoints: Susceptible <=16 μg/mL Resistant >=32 μg/mL



NARMS

Figure 7l: Minimum Inhibitory Concentration of Nalidixic acid for *Salmonella* in Pork Chop (N=5 Isolates)

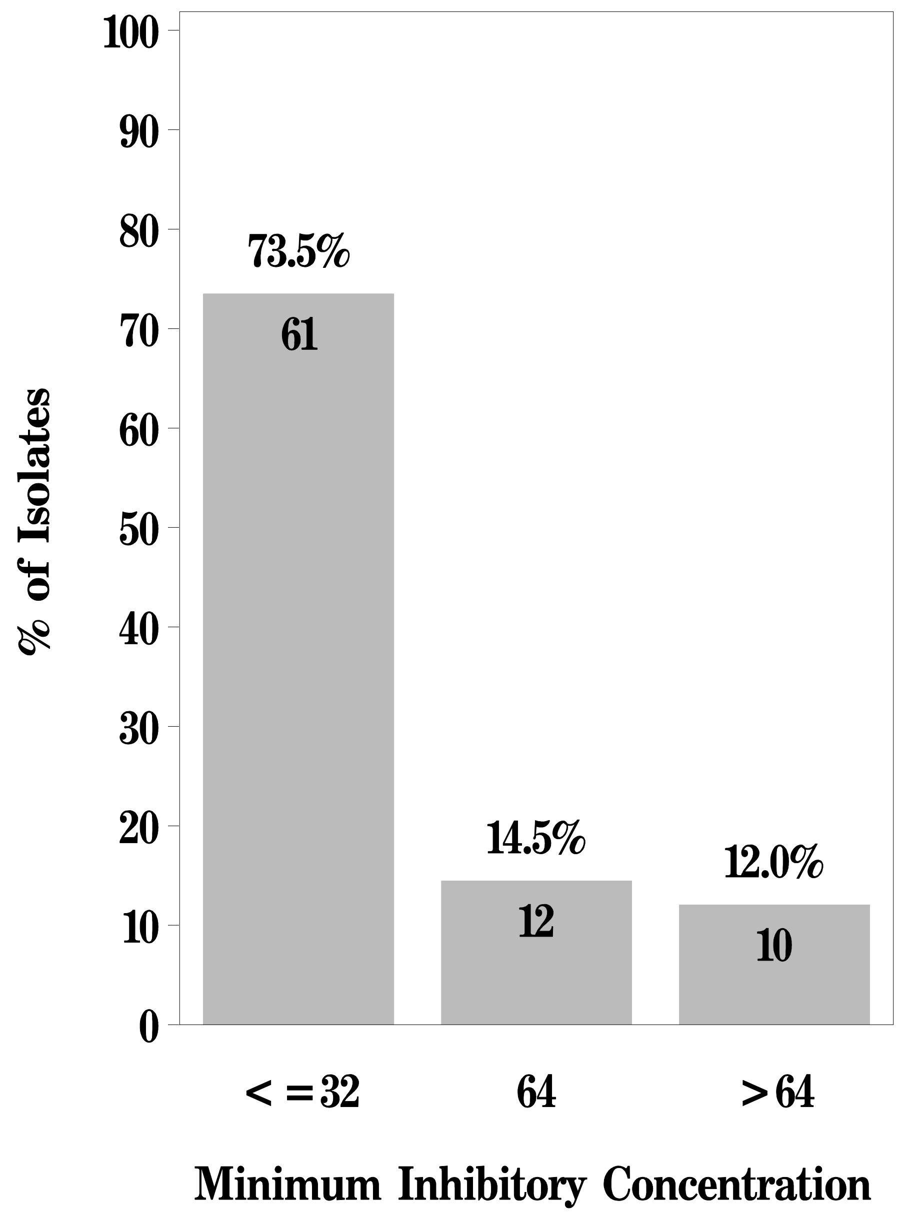
Breakpoints: Susceptible <=16 μg/mL Resistant >=32 μg/mL



NARMS

Figure 7m: Minimum Inhibitory Concentration of Streptomycin for *Salmonella* in Chicken Breast (N=83 Isolates)

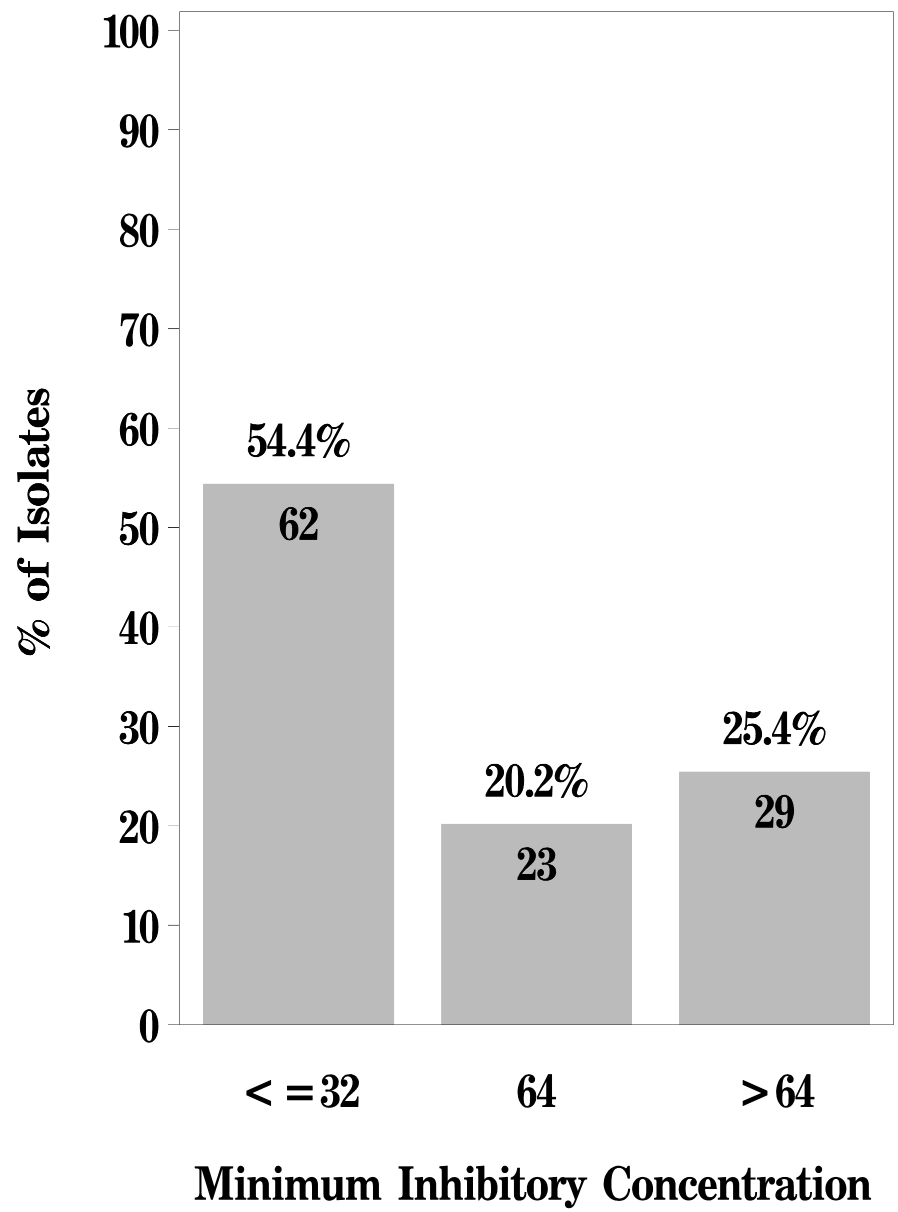
Breakpoints: Susceptible<=32 μg/mL Resistant>=64 μg/mL



NARMS

Figure 7m: Minimum Inhibitory Concentration of Streptomycin for *Salmonella* in Ground Turkey (N=114 Isolates)

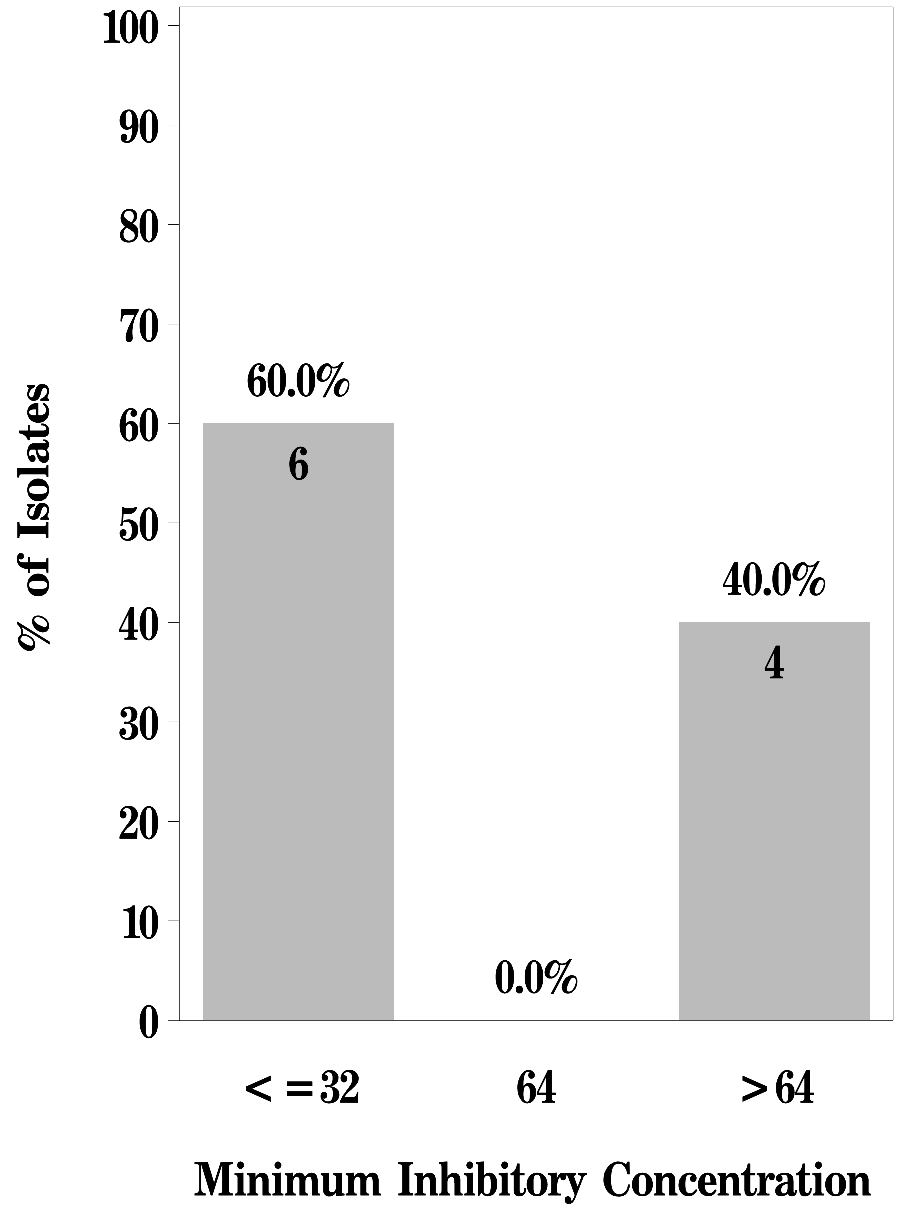
Breakpoints: Susceptible <=32 µg/mL Resistant >=64 µg/mL



NARMS

Figure 7m: Minimum Inhibitory Concentration of Streptomycin for *Salmonella* in Ground Beef (N=10 Isolates)

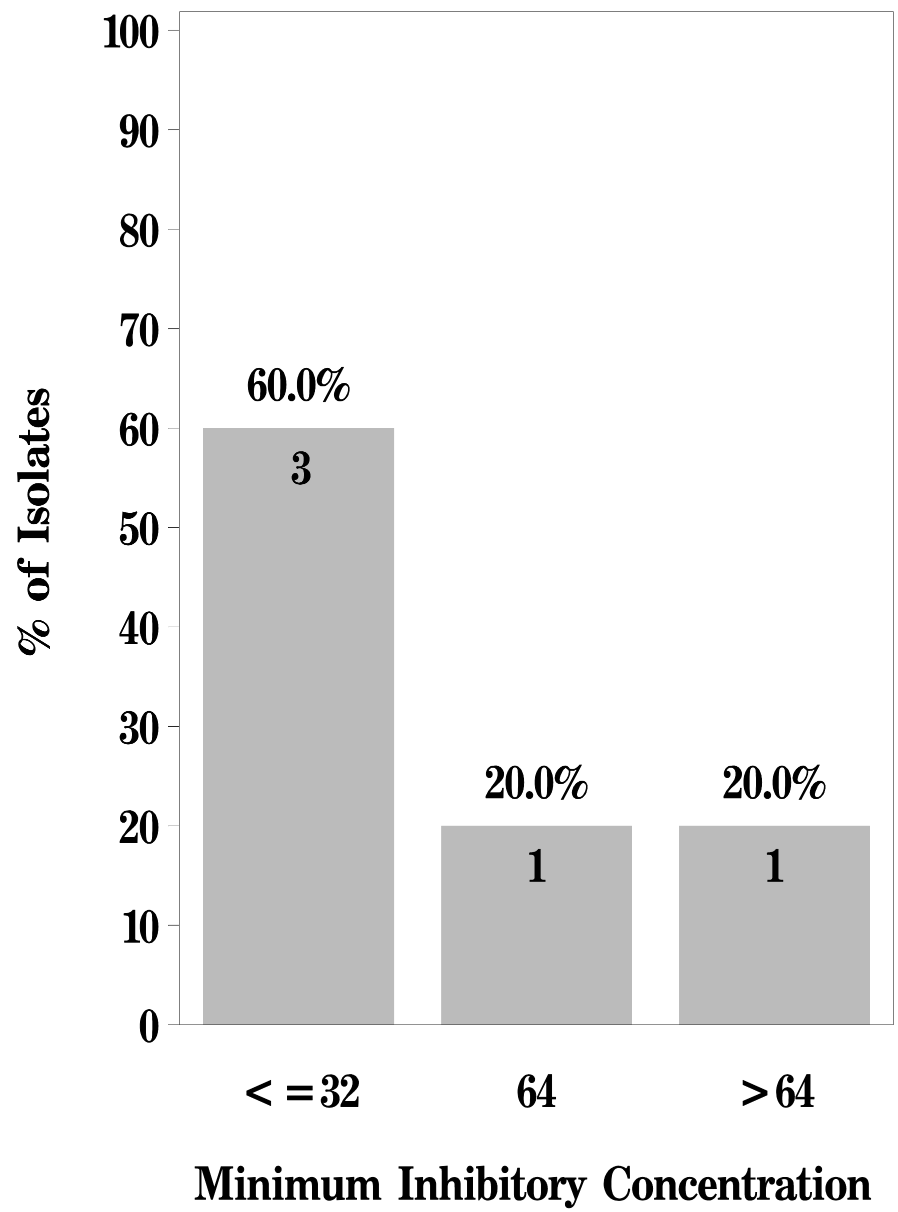
Breakpoints: Susceptible <=32 μg/mL Resistant >=64 μg/mL



NARMS

Figure 7m: Minimum Inhibitory Concentration of Streptomycin for *Salmonella* in Pork Chop (N=5 Isolates)

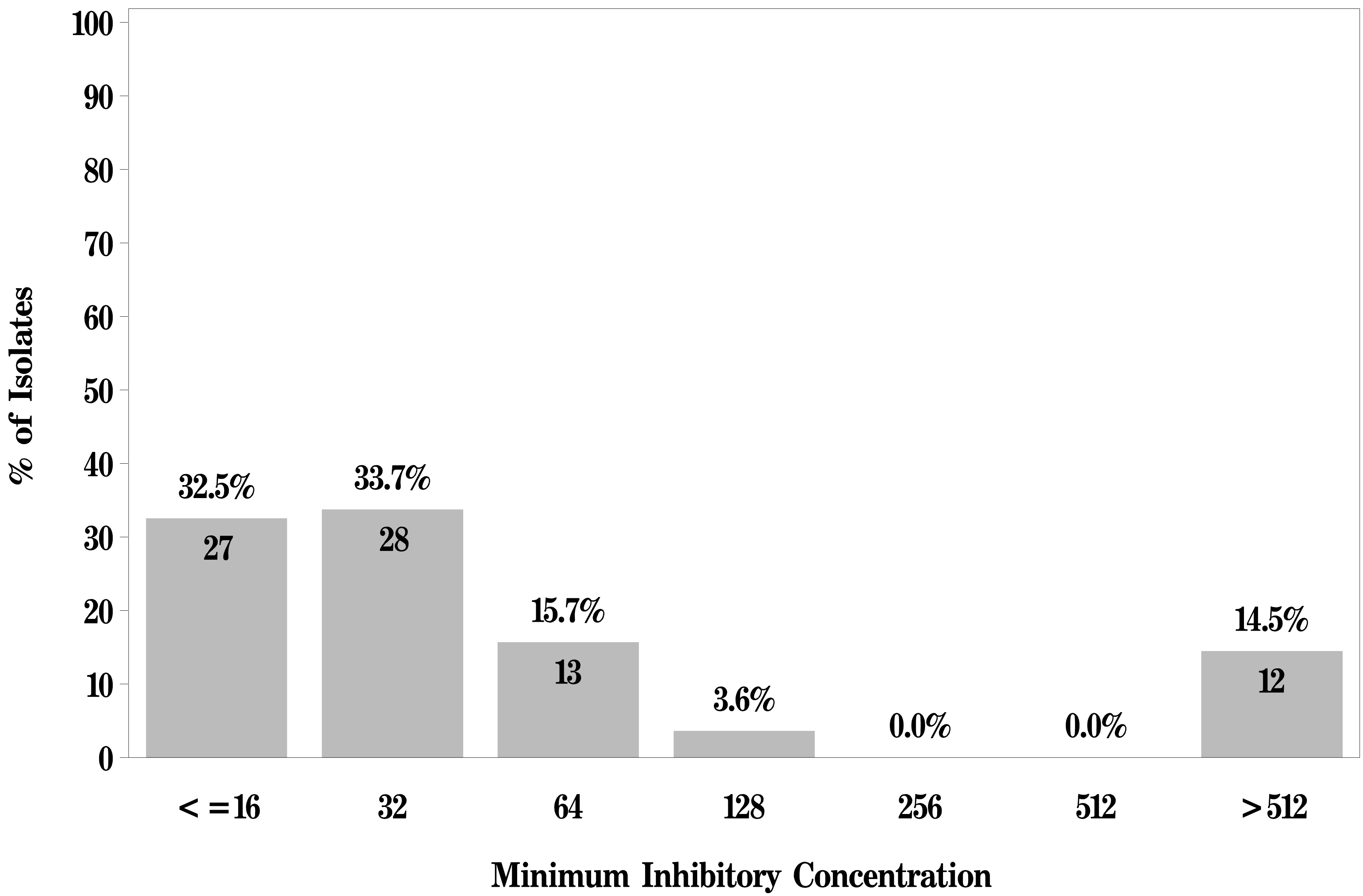
Breakpoints: Susceptible <=32 μg/mL Resistant >=64 μg/mL



NARMS

Figure 7n: Minimum Inhibitory Concentration of Sulfamethoxazole for *Salmonella* in Chicken Breast (N=83 Isolates)

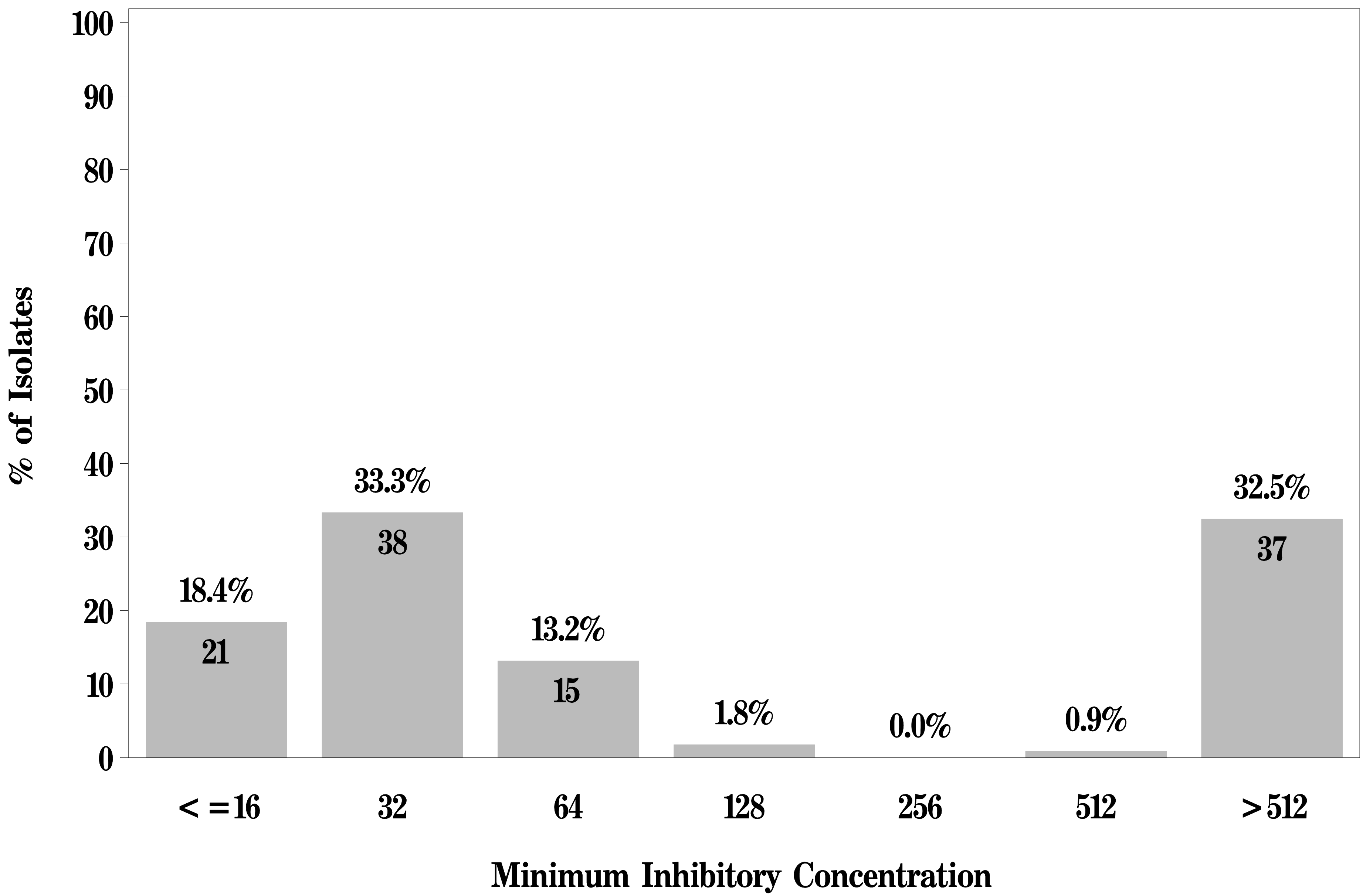
Breakpoints: Susceptible<=256 μg/mL Resistant>=512 μg/mL



NARMS

Figure 7n: Minimum Inhibitory Concentration of Sulfamethoxazole for *Salmonella* in Ground Turkey (N=114 Isolates)

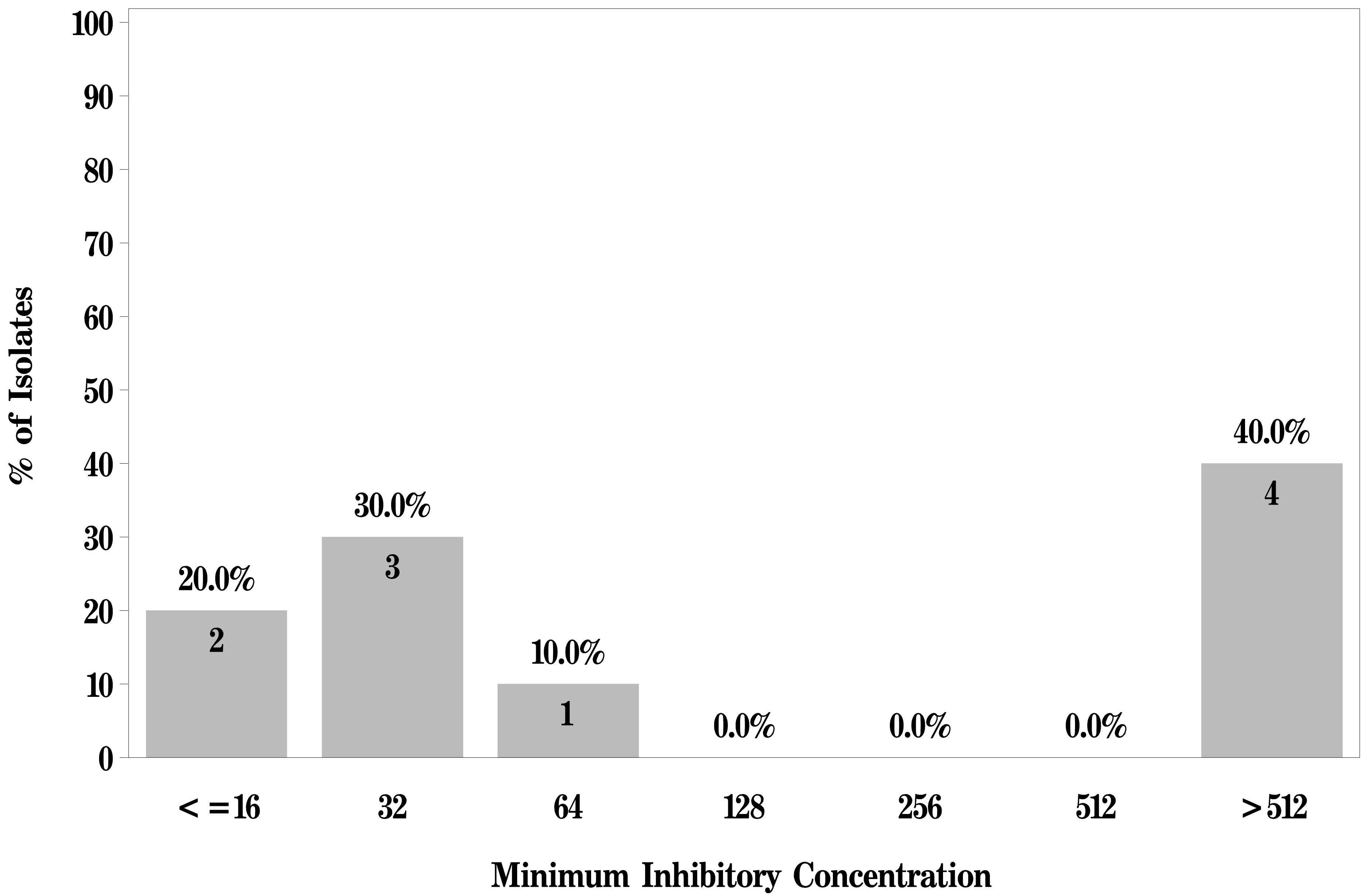
Breakpoints: Susceptible<=256 μg/mL Resistant>=512 μg/mL



NARMS

Figure 7n: Minimum Inhibitory Concentration of Sulfamethoxazole for *Salmonella* in Ground Beef (N=10 Isolates)

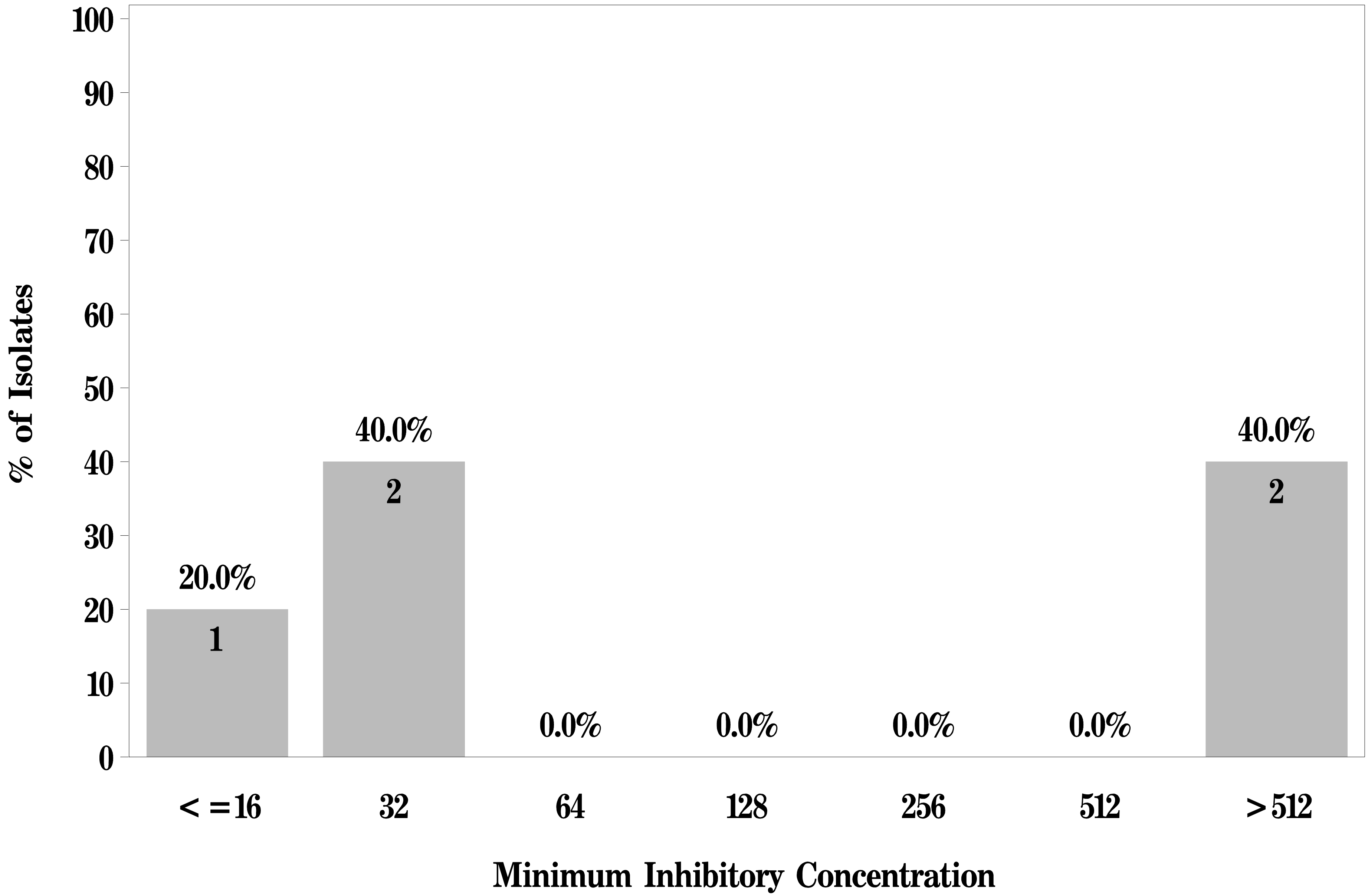
Breakpoints: Susceptible <=256 μg/mL Resistant >=512 μg/mL



NARMS

Figure 7n: Minimum Inhibitory Concentration of Sulfamethoxazole for *Salmonella* in Pork Chop (N=5 Isolates)

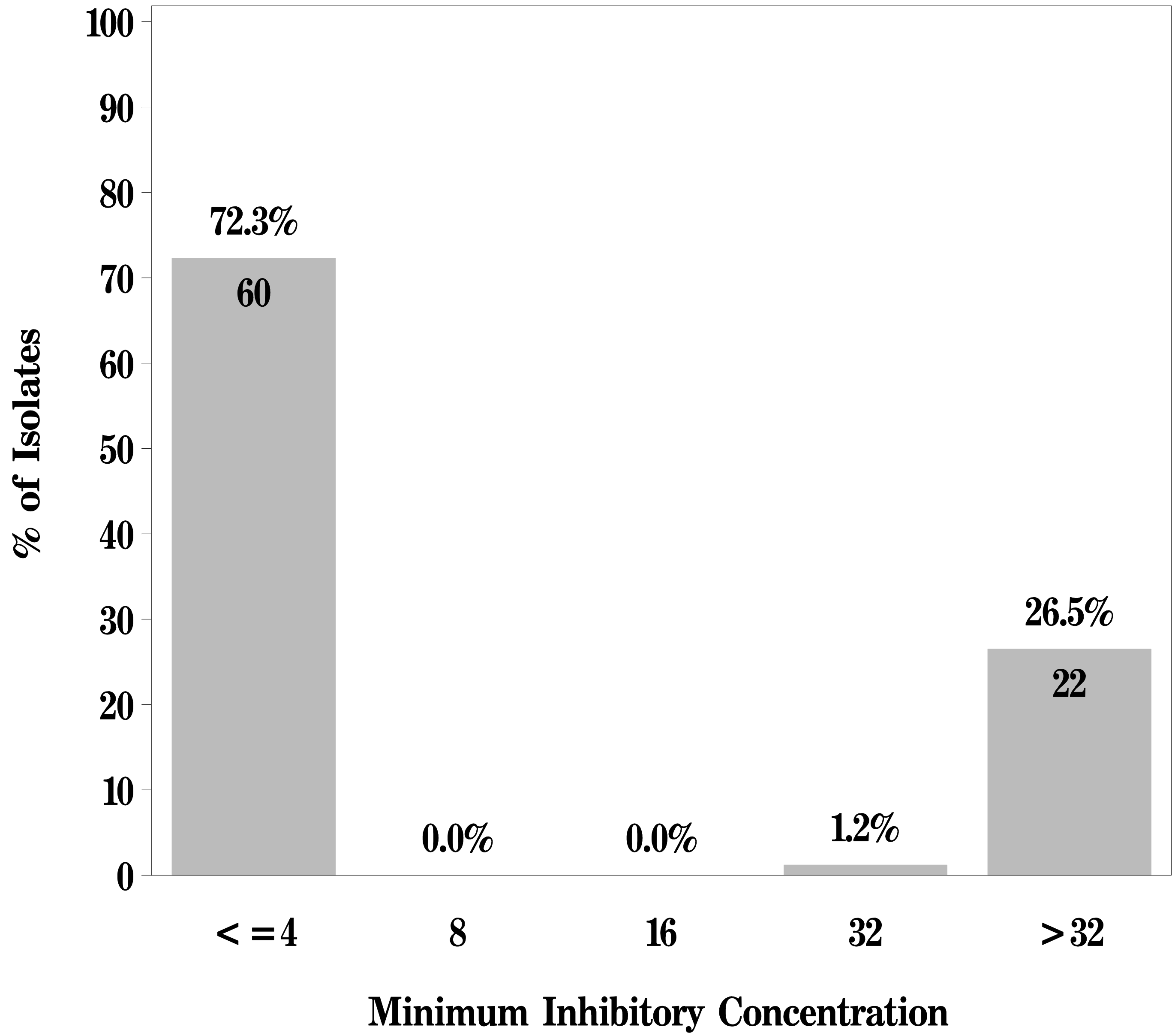
Breakpoints: Susceptible <=256 µg/mL Resistant >=512 µg/mL



NARMS

Figure 7o: Minimum Inhibitory Concentration of Tetracycline for *Salmonella* in Chicken Breast (N=83 Isolates)

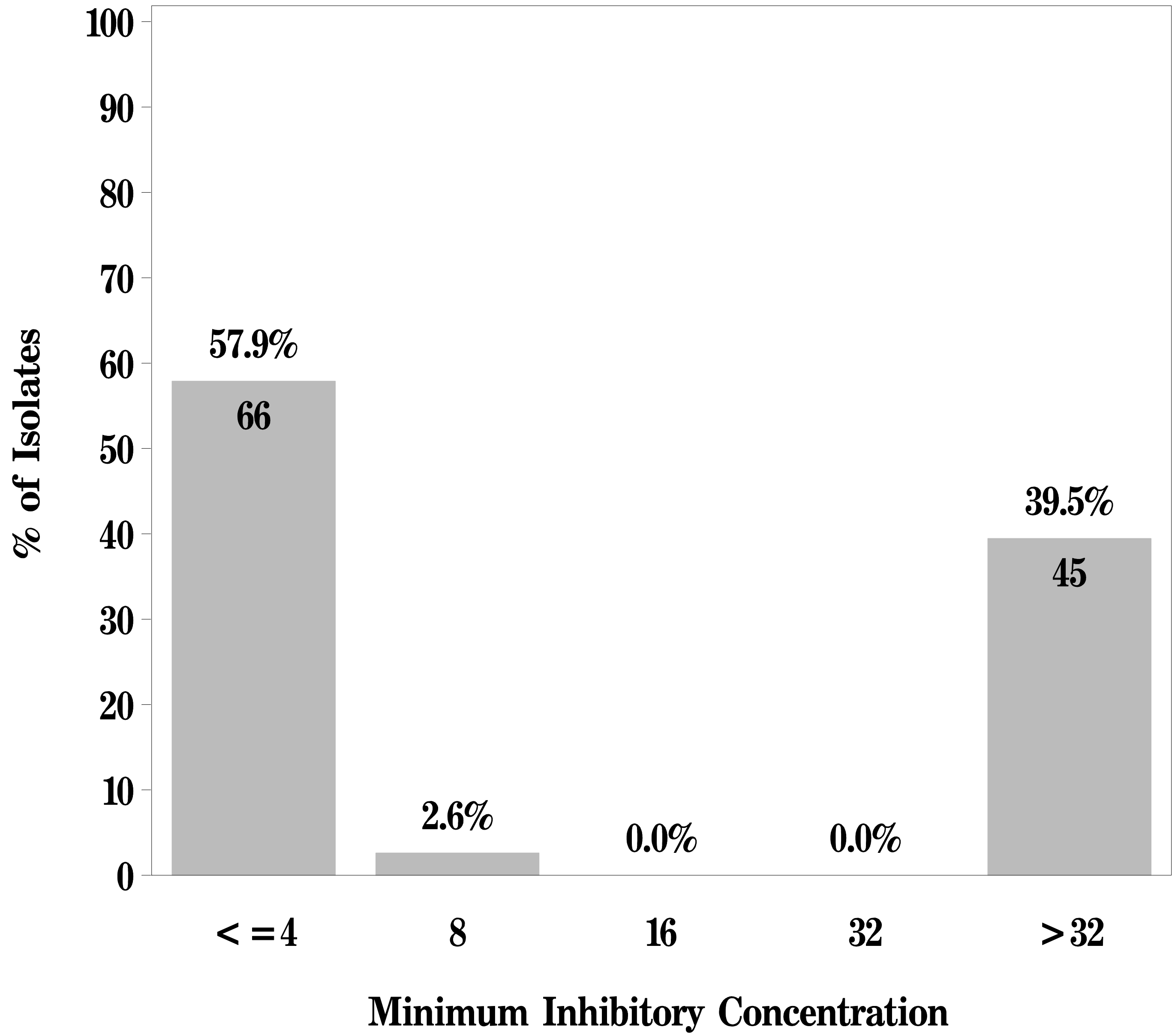
Breakpoints: Susceptible <=4 μg/mL Resistant >=16 μg/mL



NARMS

Figure 7o: Minimum Inhibitory Concentration of Tetracycline for *Salmonella* in Ground Turkey (N=114 Isolates)

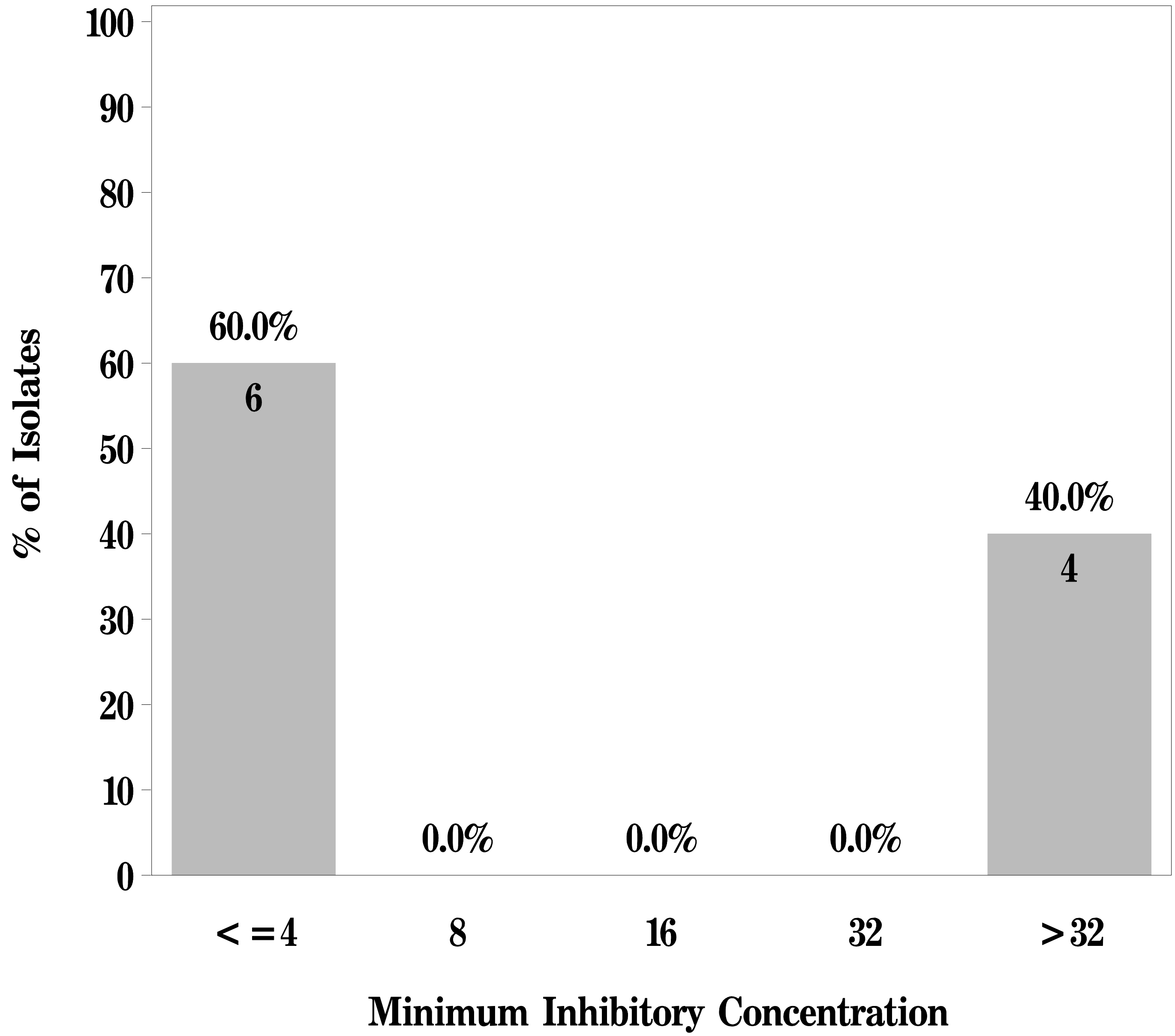
Breakpoints: Susceptible <=4 μg/mL Resistant >=16 μg/mL



NARMS

Figure 7o: Minimum Inhibitory Concentration of Tetracycline for *Salmonella* in Ground Beef (N=10 Isolates)

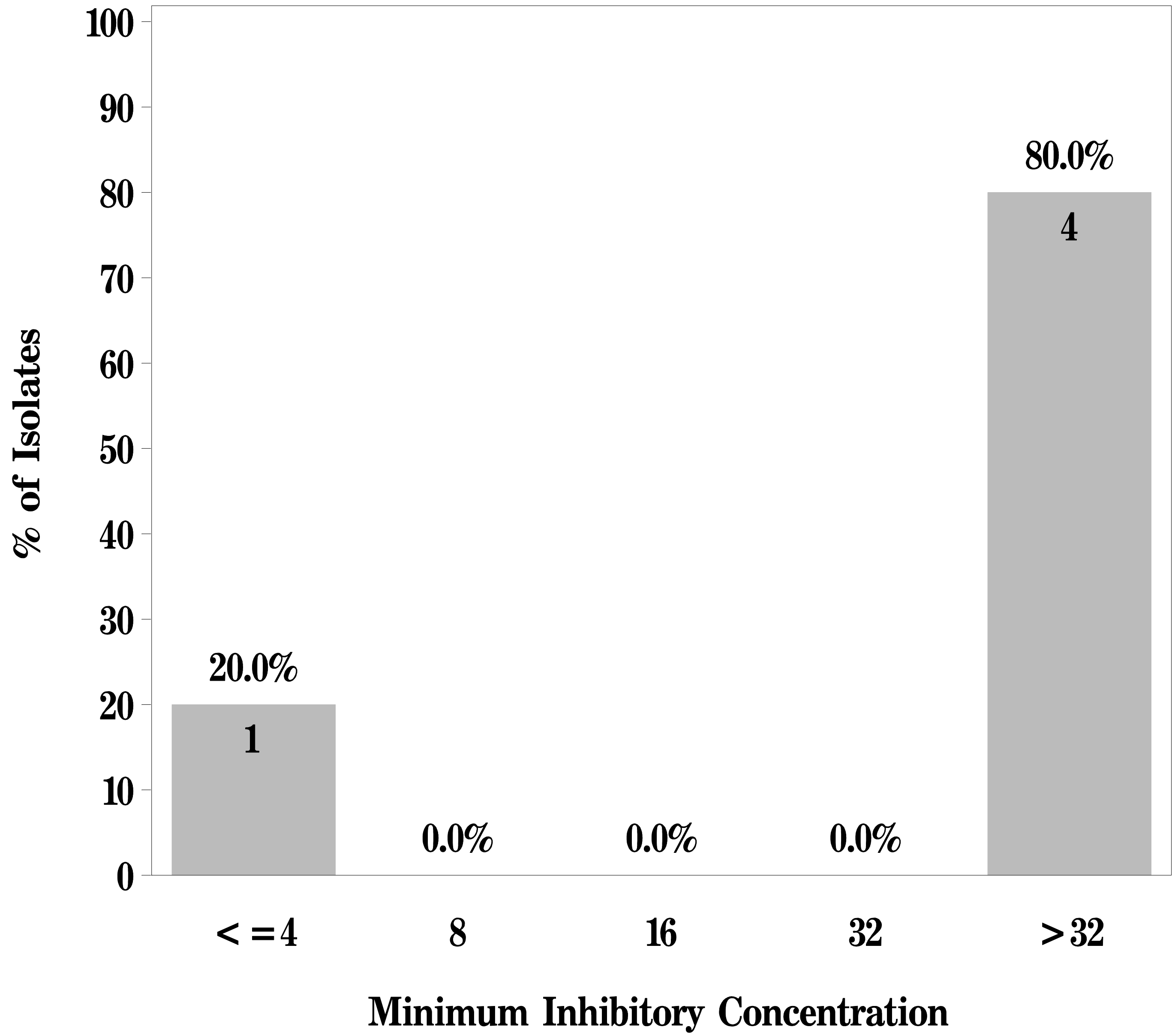
Breakpoints: Susceptible <=4 μg/mL Resistant >=16 μg/mL



NARMS

Figure 7o: Minimum Inhibitory Concentration of Tetracycline for *Salmonella* in Pork Chop (N=5 Isolates)

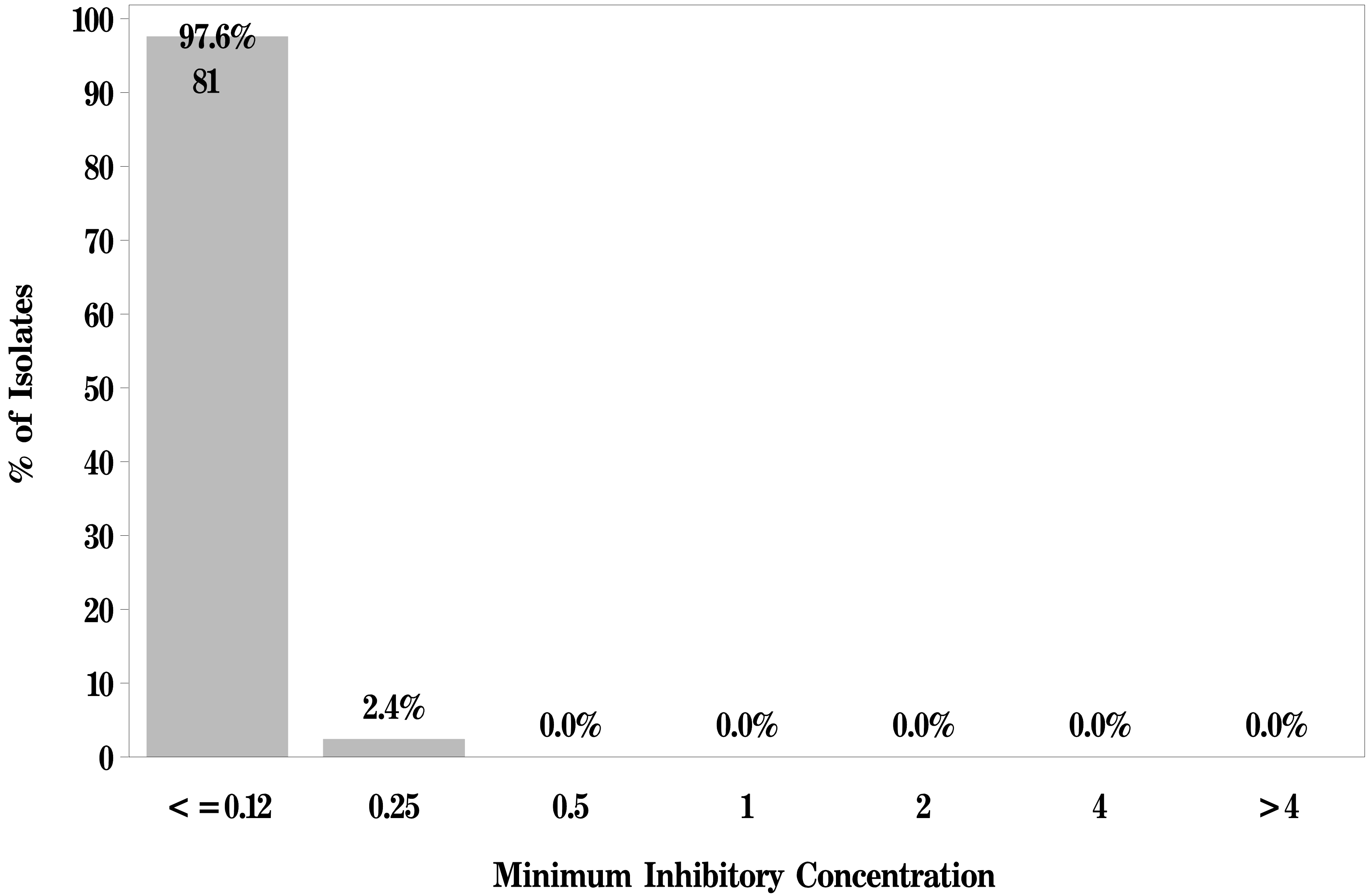
Breakpoints: Susceptible <=4 μg/mL Resistant >=16 μg/mL



NARMS

Figure 7p: Minimum Inhibitory Concentration of Trimethoprim/sulfamethoxazole for *Salmonella* in Chicken Breast (N=83 Isolates)

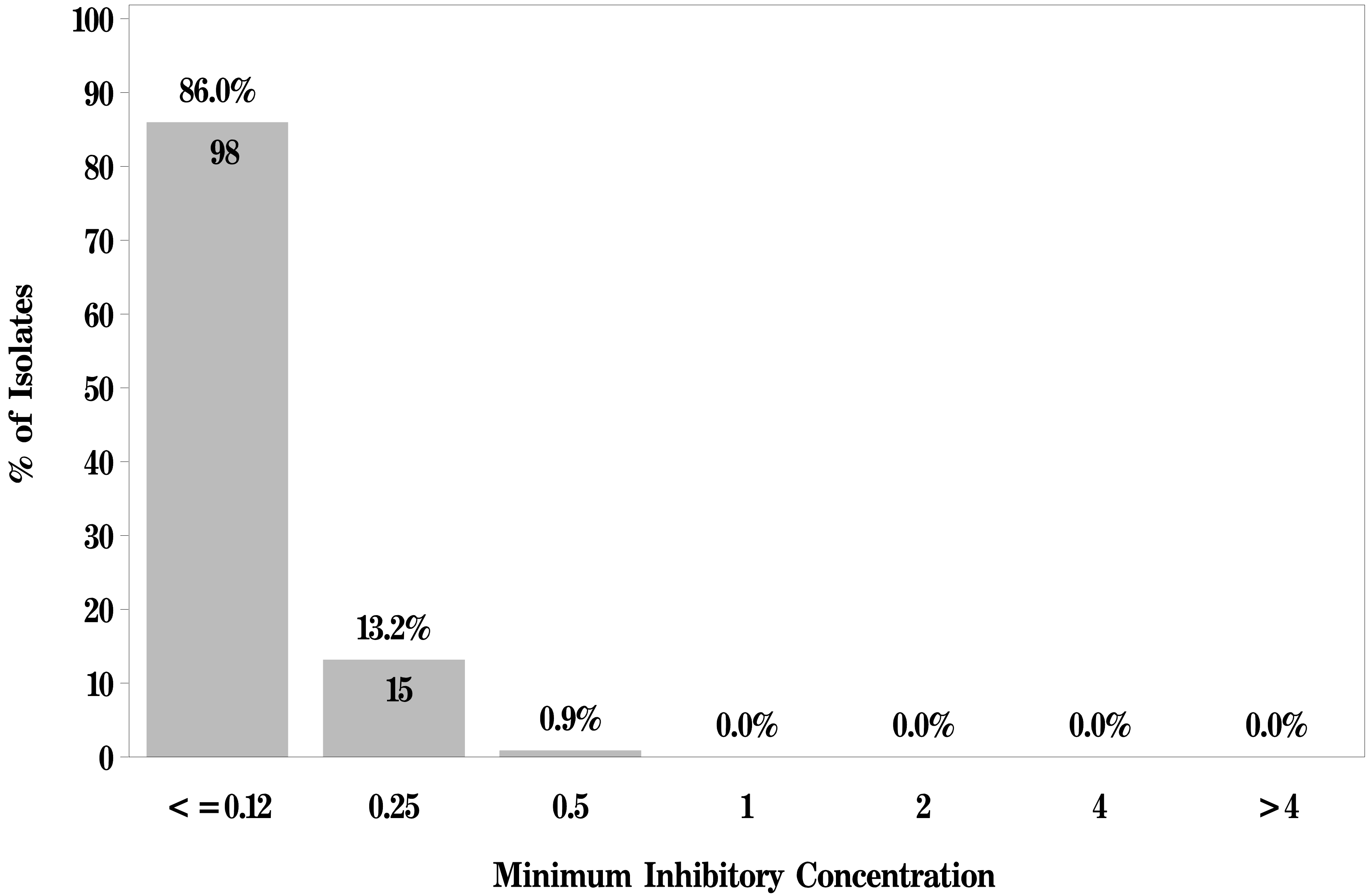
Breakpoints: Susceptible<=2 μg/mL Resistant>=4 μg/mL



NARMS

Figure 7p: Minimum Inhibitory Concentration of Trimethoprim/sulfamethoxazole for *Salmonella* in Ground Turkey (N=114 Isolates)

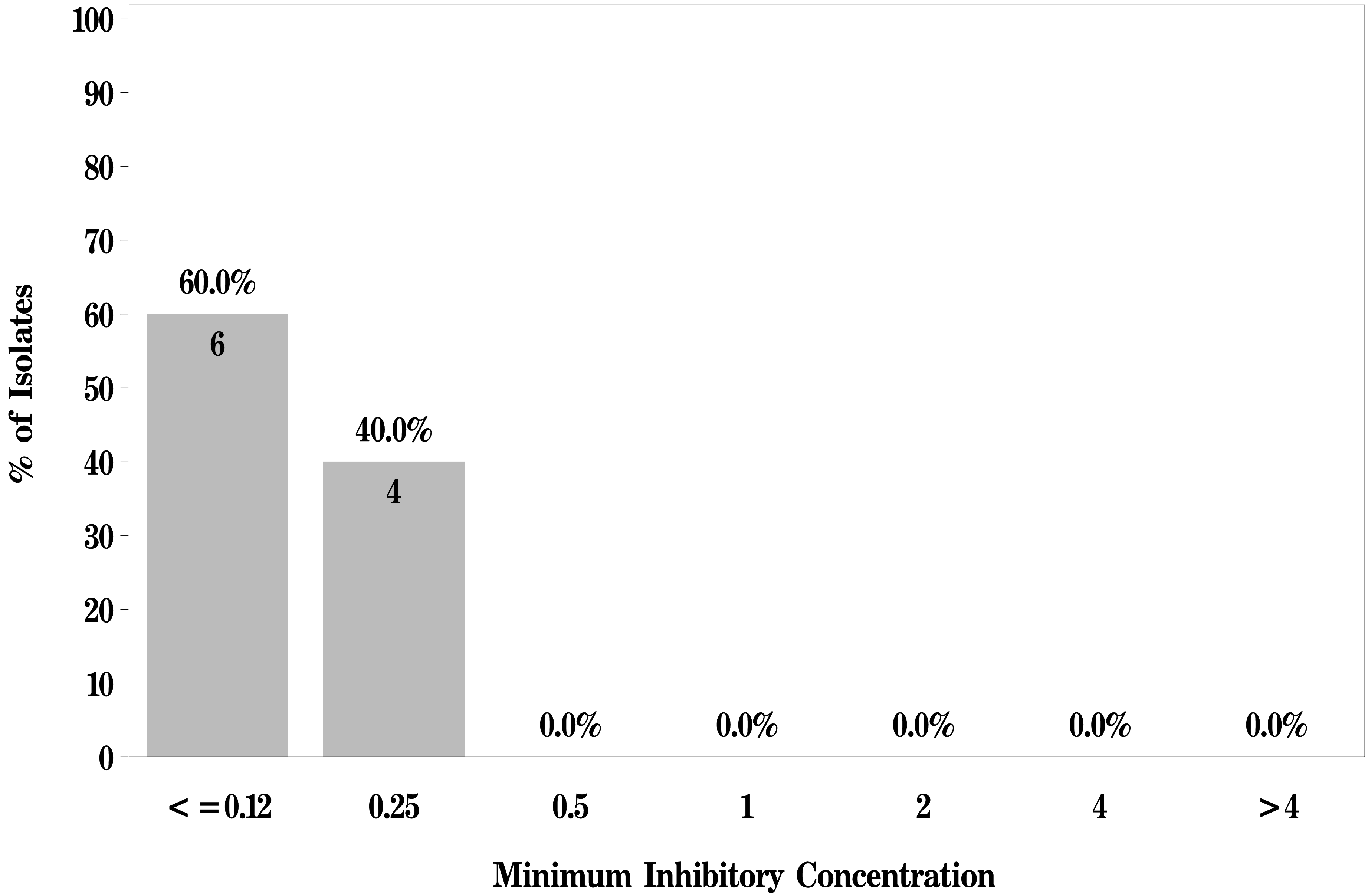
Breakpoints: Susceptible <=2 μg/mL Resistant >=4 μg/mL



NARMS

Figure 7p: Minimum Inhibitory Concentration of Trimethoprim/sulfamethoxazole for *Salmonella* in Ground Beef (N=10 Isolates)

Breakpoints: Susceptible<=2 μg/mL Resistant>=4 μg/mL



NARMS

Figure 7p: Minimum Inhibitory Concentration of Trimethoprim/sulfamethoxazole for *Salmonella* in Pork Chop (N=5 Isolates)

Breakpoints: Susceptible <=2 μg/mL Resistant >=4 μg/mL

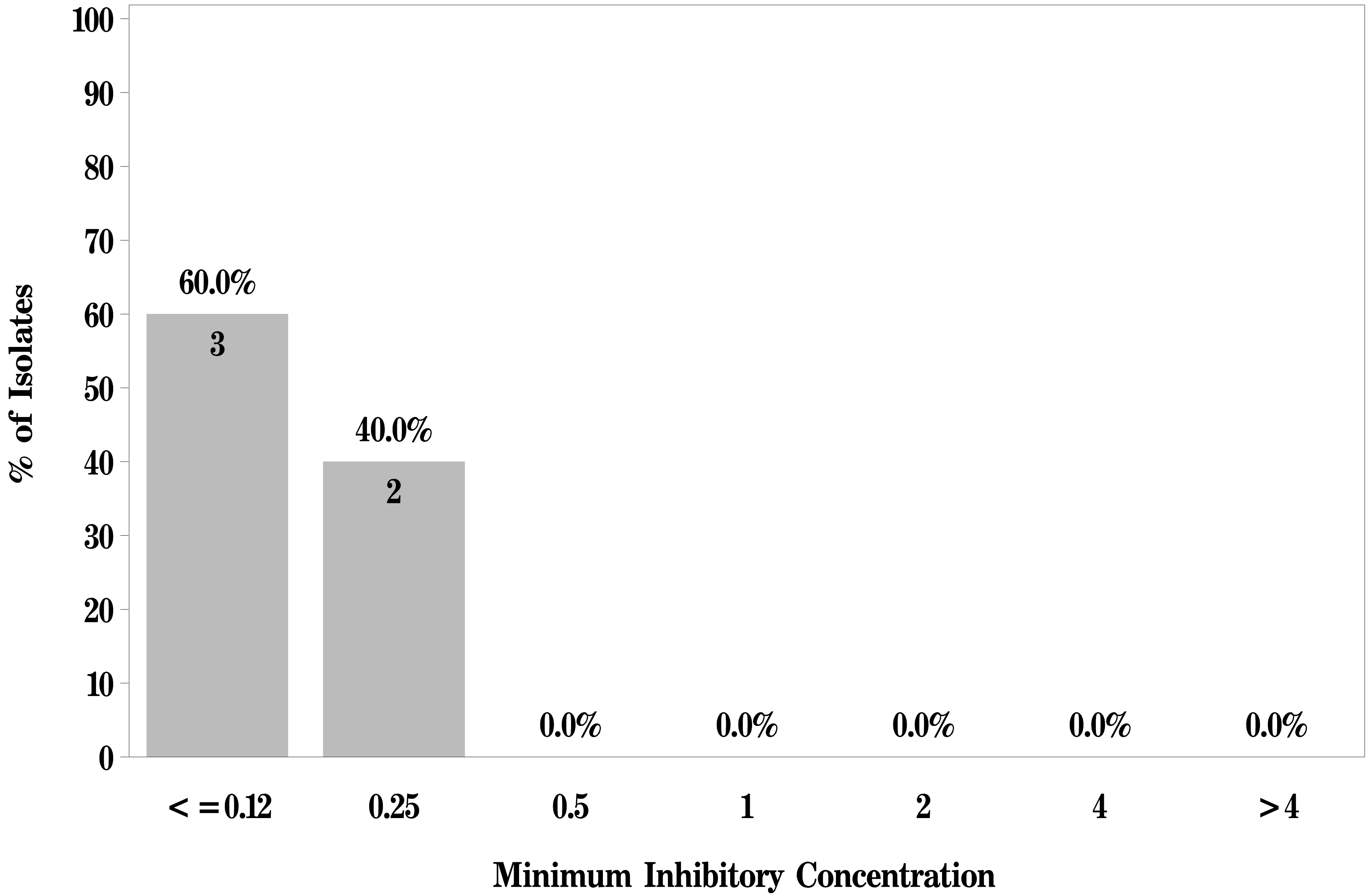


Table 11. Antimicrobial Resistance* among *Salmonella* Isolates by Serotype, 2003

Serotype	*Antimicrobial Agent*															
	STR	**TET**	**AMP**	**CEP**	**SMX**	**AMC**	**KAN**	**GEN**	**FOX**	**TIO**	**CHL**	**NAL**	**AXO**	**AMI**	**CIP**	**COT**
Heidelberg (n=48)	29.2%	29.2%	12.5%	12.5%	14.6%	8.3%	22.9%	14.6%	2.1%	2.1%	-†	-	-	-	-	-
Saintpaul (n=26)	61.5%	19.2%	65.4%	65.4%	69.2%	26.9%	53.8%	42.3%	-	-	-	19.2%	-	-	-	-
Typhimurium‡ (n=26)	23.1%	34.6%	73.1%	65.4%	34.6%	61.5%	19.2%	-	61.5%	61.5%	15.4%	3.8%	-	-	-	-
Kentucky (n=24)	62.5%	58.3%	20.8%	20.8%	8.3%	20.8%	-	8.3%	20.8%	20.8%	-	-	-	-	-	-
Hadar (n=13)	84.6%	100.0%	30.8%	23.1%	7.7%	-	7.7%	7.7%	-	-	-	-	-	-	-	-
Reading (n=13)	7.7%	23.1%	7.7%	7.7%	15.4%	-	-	15.4%	-	-	-	-	-	-	-	-
Mbandaka (n=7)	-	28.6%	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Agona (n=6)	33.3%	100.0%	33.3%	33.3%	100.0%	16.7%	-	33.3%	16.7%	16.7%	-	-	-	-	-	-
Enteritidis (n=6)	-	-	33.3%	33.3%	-	16.7%	-	-	16.7%	16.7%	-	-	-	-	-	-
Montevideo (n=5)	60.0%	-	-	-	20.0%	-	40.0%	20.0%	-	-	-	-	-	-	-	-
Senftenberg (n=5)	40.0%	-	60.0%	60.0%	-	-	40.0%	20.0%	-	-	-	-	-	-	-	-
Haardt (n=4)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Newport (n=4)	75.0%	50.0%	50.0%	50.0%	75.0%	50.0%	-	25.0%	50.0%	50.0%	50.0%	-	-	-	-	-
Brandenburg (n=3)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dublin (n=3)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	-	-	100.0%	100.0%	100.0%	-	33.3%	-	-	-
Schwarzengrund (n=3)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bredeney (n=2)	100.0%	-	100.0%	100.0%	100.0%	-	-	100.0%	-	-	-	-	-	-	-	-
I 4, 5, 12, : i : - (n=2)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
IIIa:18:z4, z32: (n=2)	-	50.0%	-	-	-	-	-	-	-	-	-	-	-	-	-	-
IIIa:18:z4, z23 :- (n=2)	100.0%	50.0%	50.0%	-	100.0%	-	-	50.0%	-	-	-	-	-	-	-	-
Johannesburg (n=1)	-	100.0%	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Anatum (n=1)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chester (n=1)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
I 4, 12 : r :- (n=1)	-	100.0%	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Infantis (n=1)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Muenchen (n=1)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sandiego (n=1)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total % R (N=212)	**37.7%**	**35.8%**	**31.6%**	**29.7%**	**26.4%**	**18.4%**	**16.5%**	**14.6%**	**13.7%**	**13.7%**	**4.2%**	**2.8%**	**0.5%**	**0.0%**	**0.0%**	**0.0%**

* Where % Resistance = (# isolates per serotype resistant to antimicrobial) / (total # isolates per serotype).
† Dashes indicates 0.0% resistance to antimicrobial.
‡ Includes Typhimurium var. Copenhagen.

Table 12. Antimicrobial Resistance* among *Salmonella* by Meat Type in Overall Top 6 Serotypes, 2003

Meat Type	*Serotype*	*Antimicrobial Agent*															
		STR	**TET**	**AMP**	**CEP**	**SMX**	**AMC**	**KAN**	**GEN**	**FOX**	**TIO**	**CHL**	**NAL**	**AXO**	**AMI**	**CIP**	**COT**
Chicken Breast	Heidelberg (n=16)	12.5%	-†	18.8%	12.5%	12.5%	6.3%	-	18.8%	6.3%	6.3%	-	-	-	-	-	-
	Saintpaul (n=2)	50.0%	-	50.0%	50.0%	50.0%	-	-	-	-	-	-	50.0%	-	-	-	-
	Typhimurium‡ (n=22)	18.2%	31.8%	72.7%	63.6%	63.6%	18.2%	-	63.6%	63.6%	-	9.1%	-	-	-	-	-
	Kentucky (n=20)	65.0%	60.0%	25.0%	25.0%	5.0%	25.0%	-	5.0%	25.0%	25.0%	-	-	-	-	-	-
	Hadar (n=2)	50.0%	100.0%	50.0%	-	-	-	-	-	-	-	-	-	-	-	-	-
	Reading (n=0)	§															
Ground Turkey	Heidelberg (n=32)	37.5%	43.8%	9.4%	12.5%	15.6%	9.4%	34.4%	12.5%	-	-	-	-	-	-	-	-
	Saintpaul (n=24)	62.5%	20.8%	66.7%	66.7%	70.8%	29.2%	58.3%	45.8%	-	-	-	16.7%	-	-	-	-
	Typhimurium (n=2)	50.0%	50.0%	100.0%	100.0%	100.0%	50.0%	-	100.0%	100.0%	50.0%	50.0%	-	-	-	-	50.0%
	Kentucky (n=4)	50.0%	50.0%	-	-	25.0%	-	-	25.0%	-	-	-	-	-	-	-	-
	Hadar (n=11)	90.9%	100.0%	27.3%	27.3%	9.1%	-	9.1%	9.1%	-	-	-	-	-	-	-	-
	Reading (n=13)	7.7%	23.1%	7.7%	7.7%	15.4%	-	-	15.4%	-	-	-	-	-	-	-	-
Ground Beef	Heidelberg (n=0)																
	Saintpaul (n=0)																
	Kentucky (n=0)																
	Typhimurium (n=1)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Hadar (n=0)																
	Reading (n=0)																
Pork Chop	Heidelberg (n=0)																
	Saintpaul (n=0)																
	Kentucky (n=0)																
	Typhimurium (n=1)	100.0%	100.0%	100.0%	100.0%	100.0%	-	-	-	-	-	100.0%	-	-	-	-	-
	Hadar (n=0)																
	Reading (n=0)																

* Where % Resistance = (# isolates per serotype resistant to antimicrobial) / (total # isolates per serotype).

† Dashes indicate 0.0% resistance to antimicrobial.

‡ Includes Typhimurium var. Copenhagen.

§ Grey areas indicate serotype not isolated from that meat type.

Table 13. Antimicrobial Resistance[*] among *Salmonella* by Top 6 Serotypes within Meat Type, 2003

Meat Type	Serotype	Antimicrobial Agent															
		STR	TET	AMP	CEP	SMX	AMC	KAN	GEN	FOX	TIO	CHL	NAL	AXO	AMI	CIP	COT
Chicken Breast	Typhimurium[†] (n=22)	18.2%	31.8%	72.7%	63.6%	31.8%	63.6%	18.2%	-[‡]	63.6%	63.6%	9.1%	-	-	-	-	-
	Kentucky (n=20)	65.0%	60.0%	25.0%	25.0%	5.0%	25.0%	-	5.0%	25.0%	25.0%	-	-	-	-	-	-
	Heidelberg (n=16)	12.5%	-	18.8%	12.5%	12.5%	6.3%	-	18.8%	6.3%	6.3%	-	-	-	-	-	-
	Mbandaka (n=7)	-	28.6%	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Enteritidis (n=4)	-	-	50.0%	50.0%	-	25.0%	-	-	25.0%	25.0%	-	-	-	-	-	-
	Haardt (n=4)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ground Turkey	Heidelberg (n=32)	37.5%	43.8%	9.4%	12.5%	15.6%	9.4%	34.4%	12.5%	-	-	-	-	-	-	-	-
	Saintpaul (n=24)	62.5%	20.8%	66.7%	66.7%	70.8%	29.2%	58.3%	45.8%	-	-	-	16.7%	-	-	-	-
	Reading (n=13)	7.7%	23.1%	7.7%	7.7%	15.4%	-	-	15.4%	-	-	-	-	-	-	-	-
	Hadar (n=11)	90.9%	100.0%	27.3%	27.3%	9.1%	-	9.1%	9.1%	-	-	-	-	-	-	-	-
	Agona (n=6)	33.3%	100.0%	33.3%	33.3%	100.0%	16.7%	-	33.3%	16.7%	16.7%	-	-	-	-	-	-
	Senftenberg (n=5)	40.0%	-	60.0%	60.0%	-	-	40.0%	20.0%	-	-	-	-	-	-	-	-
Ground Beef	Dublin (n=3)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	-	-	100.0%	100.0%	100.0%	-	33.3%	-	-	-
	Montevideo (n=2)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Enteritidis (n=1)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Infantis (n=1)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Newport (n=1)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	-	-	100.0%	100.0%	100.0%	-	-	-	-	-
	Typhimurium (n=1)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pork Chop[§]	Johannesburg (n=2)	-	100.0%	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Brandenburg (n=1)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Newport (n=1)	100.0%	100.0%	100.0%	100.0%	100.0%	-	-	-	-	-	100.0%	-	-	-	-	-
	Typhimurium (n=1)	100.0%	100.0%	100.0%	100.0%	100.0%	-	-	-	-	-	100.0%	-	-	-	-	-

[*] Where % Resistance = (# isolates per serotype resistant to antimicrobial) / (total # isolates per serotype).

[†] Includes Typhimurium var. Copenhagen.

[‡] Dashes indicate 0.0% resistance to antimicrobial.

[§] Only four serotypes isolated from pork chops.

Table 14. Antimicrobial Resistance[*] among *Salmonella* by Site, Meat Type, and Antimicrobial Agent, 2003

Site	Meat Type	Antimicrobial Agent															
		STR	TET	AMP	CEP	SMX	AMC	KAN	GEN	FOX	TIO	CHL	NAL	AXO	AMI	CIP	COT
CA	CB (n=4)	25.0%	25.0%	25.0%	25.0%	-[†]	-	-	25.0%	-	-	-	-	-	-	-	-
	GT (n=6)	66.7%	66.7%	16.7%	16.7%	50.0%	16.7%	33.3%	33.3%	16.7%	16.7%	16.7%	-	-	-	-	-
	GB (n=1)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	-	-	100.0%	100.0%	100.0%	-	-	-	-	-
	PC (n=1)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Total (n=12)	**50.0%**	**50.0%**	**25.0%**	**25.0%**	**33.3%**	**16.7%**	**16.7%**	**25.0%**	**16.7%**	**16.7%**	**16.7%**	**8.3%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**
CT	CB (n=9)	33.3%	66.7%	77.8%	77.8%	44.4%	77.8%	33.3%	-	77.8%	77.8%	-	-	-	-	-	-
	GT (n=8)	-	25.0%	-	-	25.0%	-	-	-	-	-	-	37.5%	-	-	-	-
	GB (n=0)	[‡]															
	PC (n=0)																
	Total (n=17)	**17.6%**	**47.1%**	**41.2%**	**41.2%**	**35.3%**	**41.2%**	**17.6%**	**0.0%**	**41.2%**	**41.2%**	**0.0%**	**17.6%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**
GA	CB (n=8)	12.5%	37.5%	25.0%	25.0%	-	25.0%	-	-	25.0%	25.0%	-	-	-	-	-	-
	GT (n=27)	40.7%	44.4%	29.6%	29.6%	29.6%	7.4%	33.3%	22.2%	-	-	-	-	-	-	-	-
	GB (n=2)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	PC (n=0)																
	Total (n=37)	**32.4%**	**40.5%**	**27.0%**	**27.0%**	**21.6%**	**10.8%**	**24.3%**	**16.2%**	**5.4%**	**5.4%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**
MD	CB (n=18)	27.8%	11.1%	66.7%	55.6%	16.7%	44.4%	-	-	44.4%	44.4%	11.1%	5.6%	-	-	-	-
	GT (n=25)	44.0%	28.0%	40.0%	40.0%	36.0%	16.0%	24.0%	28.0%	4.0%	4.0%	-	-	-	-	-	-
	GB (n=3)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	PC (n=1)	100.0%	100.0%	100.0%	100.0%	100.0%	-	-	-	-	-	100.0%	-	-	-	-	-
	Total (n=47)	**36.2%**	**21.3%**	**48.9%**	**44.7%**	**27.7%**	**25.5%**	**12.8%**	**14.9%**	**19.1%**	**19.1%**	**6.4%**	**2.1%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**
MN	CB (n=13)	-	-	7.7%	-	-	-	-	-	-	-	-	-	-	-	-	-
	GT (n=11)	18.2%	27.3%	18.2%	18.2%	27.3%	9.1%	18.2%	27.3%	-	-	-	-	-	-	-	-
	GB (n=1)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	-	-	100.0%	100.0%	100.0%	-	100.0%	-	-	-
	PC (n=0)																
	Total (n=25)	**12.0%**	**16.0%**	**16.0%**	**12.0%**	**16.0%**	**8.0%**	**8.0%**	**12.0%**	**4.0%**	**4.0%**	**4.0%**	**0.0%**	**4.0%**	**0.0%**	**0.0%**	**0.0%**

[*] Where % Resistance = (# isolates resistant to antimicrobial per meat type per site) / (total # isolates per meat type per site).
[†] Dashes indicate 0.0% resistance to antimicrobial.
[‡] Grey areas indicate no isolates from meat type for that site.

Table 14(cont'd). Percent Resistance among *Salmonella* Isolates by Site, Meat Type, and Antimicrobial Agent, 2003

Site	Meat Type	Antimicrobial Agent															
		STR	TET	AMP	CEP	SMX	AMC	KAN	GEN	FOX	TIO	CHL	NAL	AXO	AMI	CIP	COT
NY	CB (n=11)	54.5%	63.6%	36.4%	36.4%	18.2%	36.4%	9.1%	9.1%	36.4%	36.4%	-	-	-	-	-	-
	GT (n=20)	60.0%	25.0%	45.0%	45.0%	55.0%	25.0%	40.0%	35.0%	5.0%	5.0%	-	5.0%	-	-	-	-
	GB (n=0)																
	PC (n=2)	-	100.0%	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Total (n=33)	**54.5%**	**42.4%**	**39.4%**	**39.4%**	**39.4%**	**27.3%**	**27.3%**	**24.2%**	**15.2%**	**15.2%**	**0.0%**	**3.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**
OR	CB (n=17)	-	100.0%	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	GT (n=5)	60.0%	60.0%	60.0%	60.0%	-	-	-	-	-	-	-	-	-	-	-	-
	GB (n=2)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	-	-	100.0%	100.0%	100.0%	-	-	-	-	-
	PC (n=1)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	-	-	100.0%	100.0%	100.0%	-	-	-	-	-
	Total (n=25)	**44.0%**	**36.0%**	**28.0%**	**24.0%**	**24.0%**	**12.0%**	**0.0%**	**12.0%**	**12.0%**	**12.0%**	**12.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**
TN	CB (n=3)	33.3%	33.3%	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	GT (n=12)	75.0%	75.0%	-	-	16.7%	-	33.3%	8.3%	-	-	-	-	-	-	-	-
	GB (n=1)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	PC (n=0)																
	Total (n=16)	**62.5%**	**62.5%**	**0.0%**	**0.0%**	**12.5%**	**0.0%**	**25.0%**	**6.3%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**
	Total %R (N=212)	**37.7%**	**35.8%**	**31.6%**	**29.7%**	**26.4%**	**18.4%**	**16.5%**	**14.6%**	**13.7%**	**13.7%**	**4.2%**	**2.8%**	**0.5%**	**0.0%**	**0.0%**	**0.0%**

Table 15. Number of *Salmonella* (N=212) Resistant to Multiple Antimicrobial Agents, 2003

Meat Type	***Number of Antimicrobials***				
	0	**1**	**2-4**	**5-7**	**≥8**
CB	39	4	16	20	4
GT	39	12	37	22	4
GB	6	0	0	0	4
PC	1	2	0	1	1
Total	**85**	**18**	**53**	**43**	**13**

Table 16. Overall *Campylobacter* Species Identified, 2003

Species	*N*
C. coli	147
C. jejuni	330
C. lari	2
Total	**479**

Table 17. *Campylobacter* Species by Meat Type, 2003

Species	*Chicken Breast*		*Ground Turkey*		*Ground Beef*		*Pork Chop*	
	n	*%*[*]	*n*	*%*	*n*	*%*	*n*	*%*
***C. coli* (n=147)**	142	96.6%	1	0.7%	0	0.0%	4	2.7%
***C. jejuni* (n=330)**	325	98.5%	4	1.2%	1	0.3%	0	-[†]
***C. lari* (n=2)**	2	100.0%	0	-	0	-	0	-
Total (N=479)	**469**	**97.9%**	**5**	**1.0%**	**1**	**0.2%**	**4**	**0.8%**

[*] Where % = (# of isolates per species per meat type) / (total # of isolates per species).

[†] Dashes indicate no isolates from that species per meat type.

Table 18. *Campylobacter* Species by Site and Meat Type, 2003

Site	Species	Chicken Breast		Ground Turkey		Ground Beef		Pork Chop	
		n	%*	n	%	n	%	n	%
CA	*C. coli* (n=12)	10	83.3%	0	-†	0	-	2	16.7%
	C. jejuni (n=54)	54	100.0%	0	-	0	-	0	-
	Total (n=66)	64	97.0%	0	-	0	-	2	3.0%
CT	*C. coli* (n=4)	4	100.0%	0	-	0	-	0	-
	C. jejuni (n=46)	46	100.0%	0	-	0	-	0	-
	Total (n=50)	50	100.0%	0	-	0	-	0	-
GA	*C. coli* (n=19)	18	94.7%	1	5.3%	0	-	0	-
	C. jejuni (n=59)	58	98.3%	1	1.7%	0	-	0	-
	Total (n=78)	76	97.4%	2	2.6%	0	-	0	-
MD	*C. coli* (n=21)	21	100.0%	0	-	0	-	0	-
	C. jejuni (n=18)	17	94.4%	0	-	1	5.6%	0	-
	Total (n=39)	38	97.4%	0	-	1	2.6%	0	-
MN	*C. coli* (n=20)	19	95.0%	0	-	0	-	1	5.0%
	C. jejuni (n=46)	43	93.5%	3	6.5%	0	-	0	-
	Total (n=66)	62	93.9%	3	4.5%	0	-	1	1.5%
NY	*C. coli* (n=36)	36	100.0%	0	-	0	-	0	-
	C. jejuni (n=39)	39	100.0%	0	-	0	-	0	-
	Total (n=75)	75	100.0%	0	-	0	-	0	-
OR	*C. coli* (n=3)	2	66.7%	0	-	0	-	1	33.3%
	C. jejuni (n=41)	41	100.0%	0	-	0	-	0	-
	C. lari (n=2)	2	100.0%	0	-	0	-	0	-
	Total (n=46)	45	97.8%	0	-	0	-	1	2.2%
TN	*C. coli* (n=32)	32	100.0%	0	-	0	-	0	-
	C. jejuni (n=27)	27	100.0%	0	-	0	-	0	-
	Total (n=59)	59	100.0%	0	-	0	-	0	-

* Where % = (# isolates per species per meat type per site) / (total # isolates per species per site).

† Dashes indicate no isolates of that species were isolated from that meat type for that site.

Table 19. *Campylobacter* Isolates by Month for All Sites, 2003

Month	***n***	**%***
January	34	7.1%
February	32	6.7%
March	28	5.8%
April	30	6.3%
May	42	8.8%
June	42	8.8%
July	53	11.1%
August	29	6.1%
September	50	10.4%
October	61	12.7%
November	26	5.4%
December	52	10.9%
Total (N)	**479**	**100.0%**

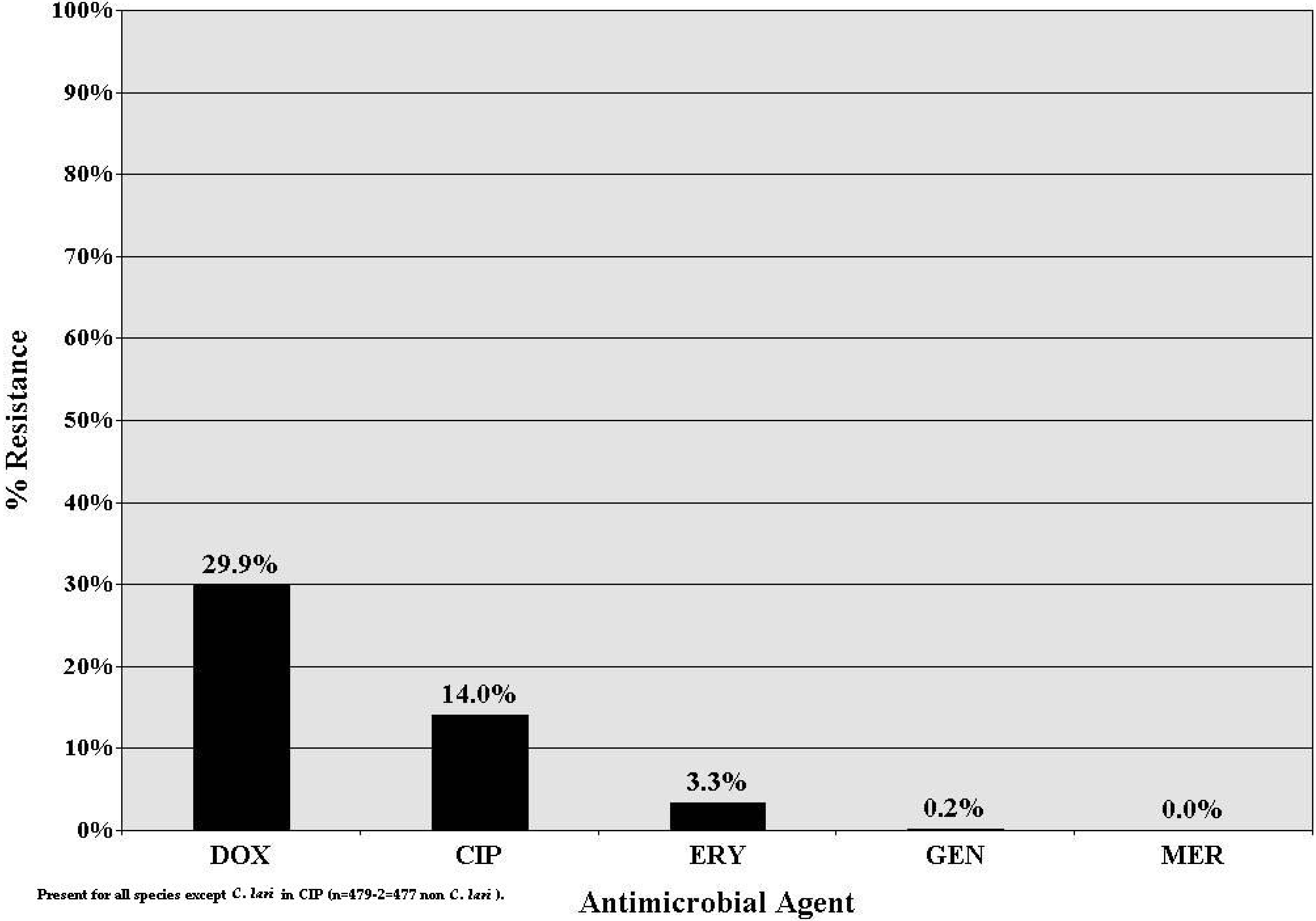
* Where % = (n / N).

Table 20. Antimicrobial Resistance (%R) among *Campylobacter* Isolates (N=479), 2003

Antimicrobial Agent	*n*	*%R*[*]
Doxycycline	143	29.9%
Ciprofloxacin[†]	67	14.0%
Erythromycin	16	3.3%
Gentamicin	1	0.2%
Meropenem	0	0.0%

[*] Where % R = (n / N).
[†] % R calculated based on N = 477; two *C. lari* isolates were excluded from analysis due to intrinsic resistance to quinolones.

Figure 8. Antimicrobial Resistance among *Campylobacter* Isolates (n=479), 2003



Present for all species except *C. lari* in CIP (n=479-2=477 non *C. lari*).

Figure 9. MIC Distribution Among All Antimicrobial Agents

***Campylobacter* from All Meats (N=479)**		**Distribution (%) of MICs (in µg/ml)**														
Antimicrobial Agent	**%R[†]**	**0.008**	**0.015**	**0.03**	**0.06**	**0.125**	**0.25**	**0.5**	**1**	**2**	**4**	**8**	**16**	**32**	**64**	**>64**
Doxycycline	**29.9%**				17.1	23.4	5.4	1.7	1.5	2.5	4.4	14.2	**16.5**	**11.5**	**1.9**	
Ciprofloxacin	**14.0%**				1.9	48.6	26.7	8.1		0.2	**0.4**	**1.9**	**5.0***	**6.7**	**0.4**	
Erythromycin	**3.3%**						2.3	16.1	43.6	23.0	11.7	**0.4**	**0.2**			**2.7**
Gentamicin	**0.2%**					1.0	21.5	62.4	14.2	0.6				**0.2**		
Meropenem[‡]	**0.0%**		21.9	50.1	15.9	10.0	0.6	1.0	0.2	0.2						

Vertical bars show the NARMS Susceptible/Resistant breakpoints for each drug.

*Includes 2 *C.lari* that are intrinsically resistant to Ciprofloxacin.

[†]Discrepancies between %R and sums of distribution %s are due to rounding.

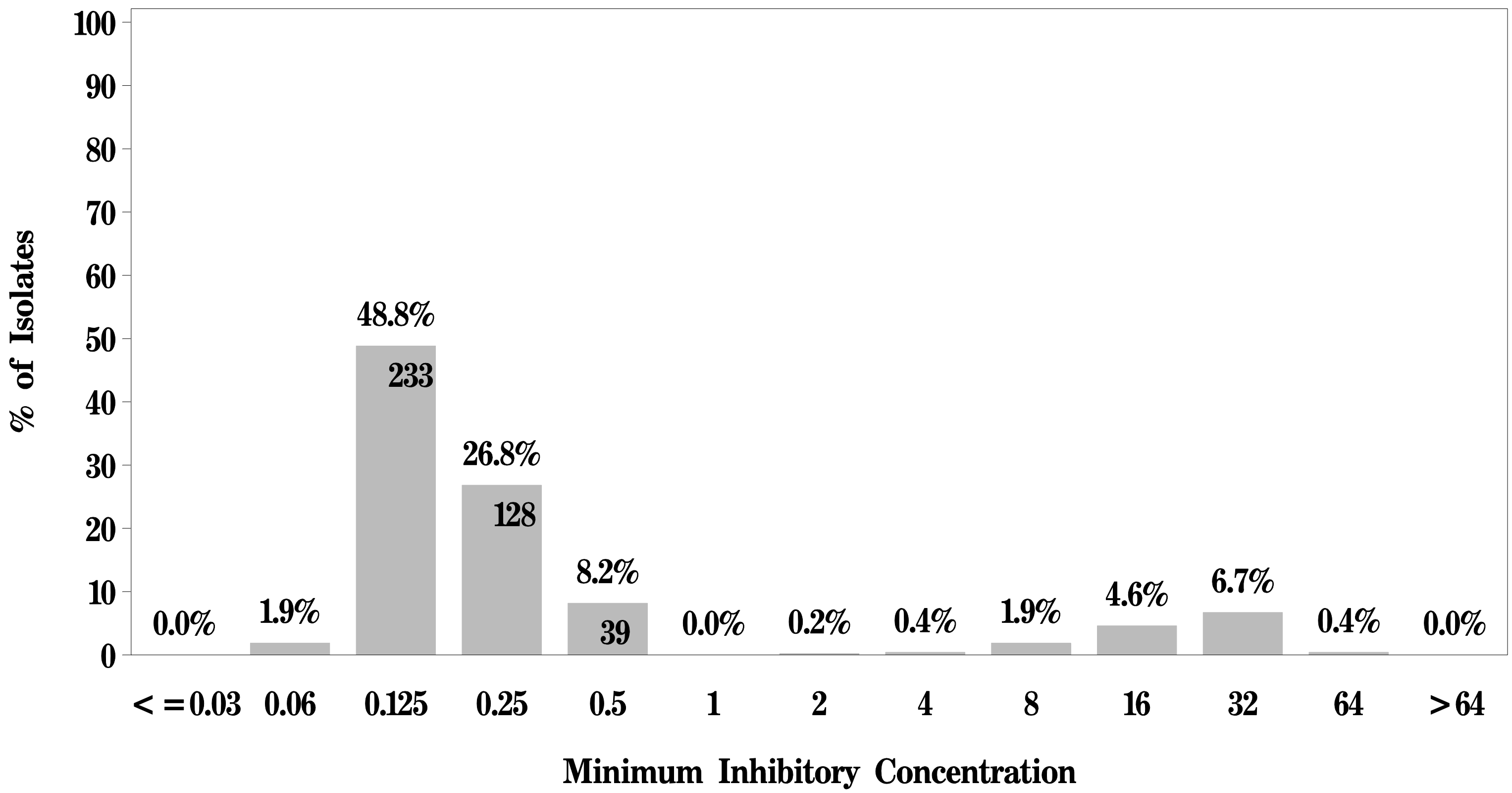
[‡]Lowest Meropenem dilution tested was 0.001 µg/ml.

Unshaded areas indicate the dilution ranges used to test the 2003 isolates.

NARMS

Figure 9a: Minimum Inhibitory Concentration of Ciprofloxacin* for *Campylobacter* (N=477 Isolates)

Breakpoints: Susceptible <=1 µg/mL Resistant >=4 µg/mL

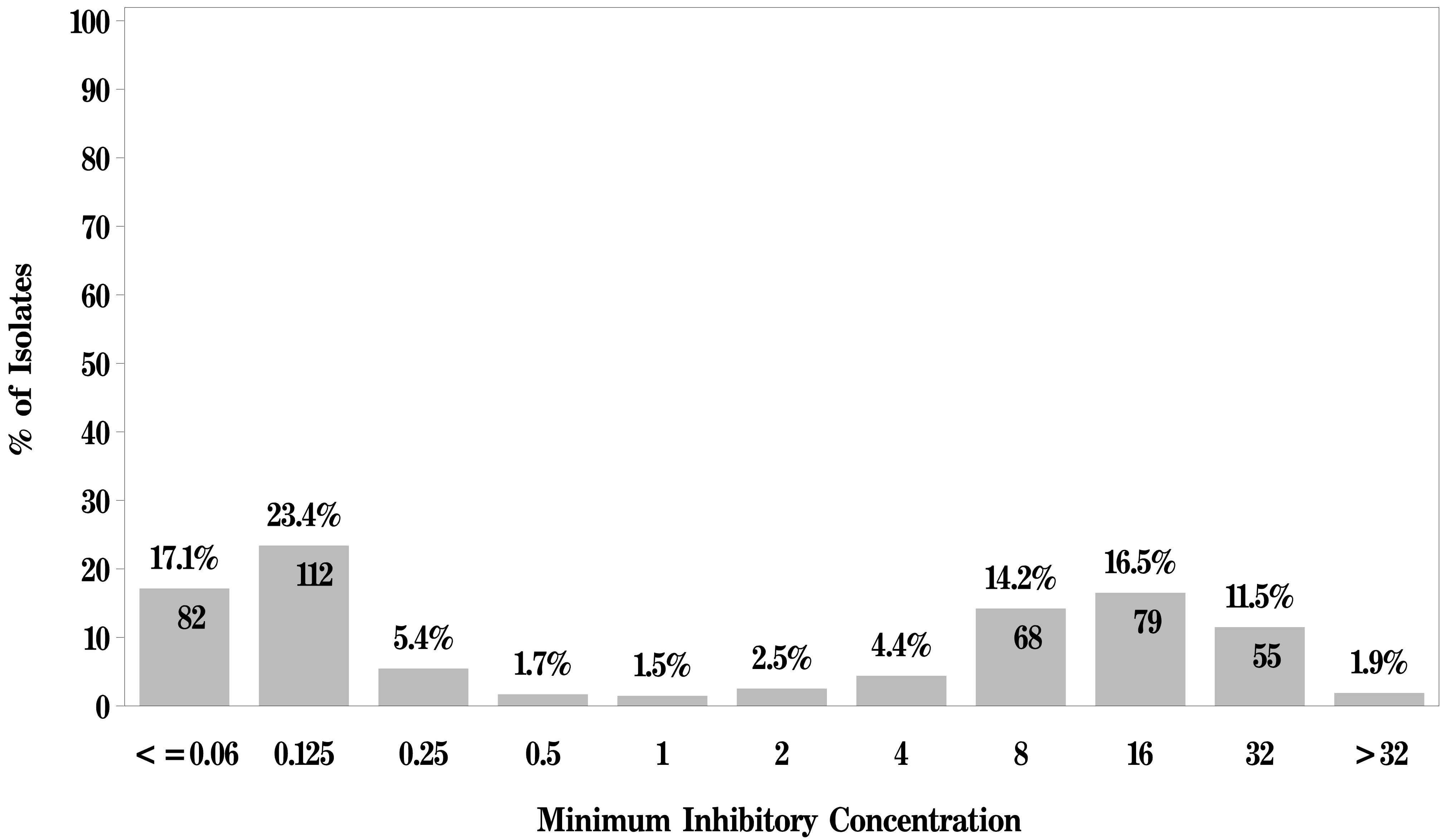


*Presented for all species except *C. lari* (N=479−2=477)

NARMS

Figure 9b: Minimum Inhibitory Concentration of Doxycycline for *Campylobacter* (N=479 Isolates)

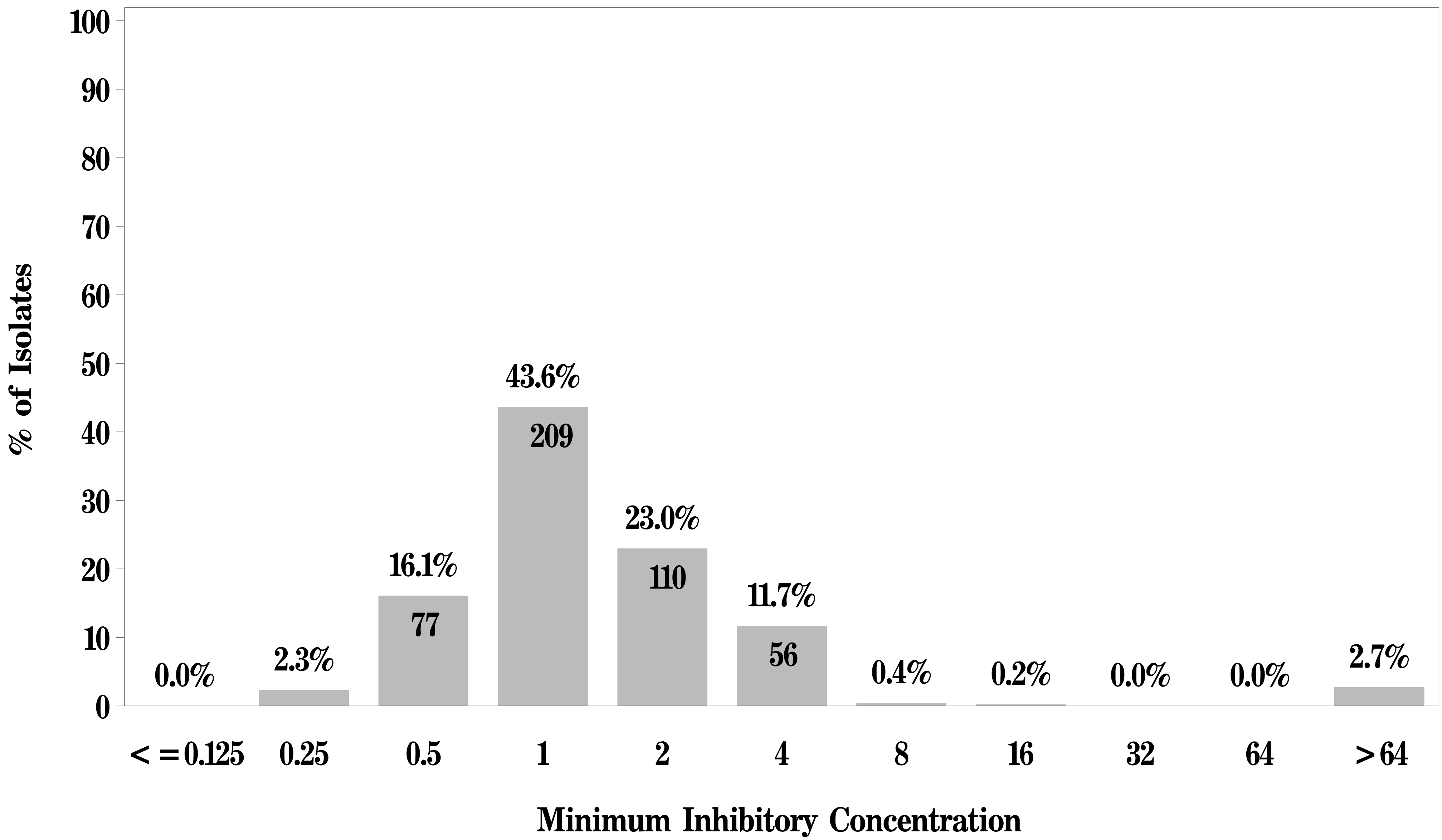
Breakpoints: Susceptible <=4 μg/mL Resistant >=16 μg/mL



NARMS

Figure 9c: Minimum Inhibitory Concentration of Erythromycin for *Campylobacter* (N=479 Isolates)

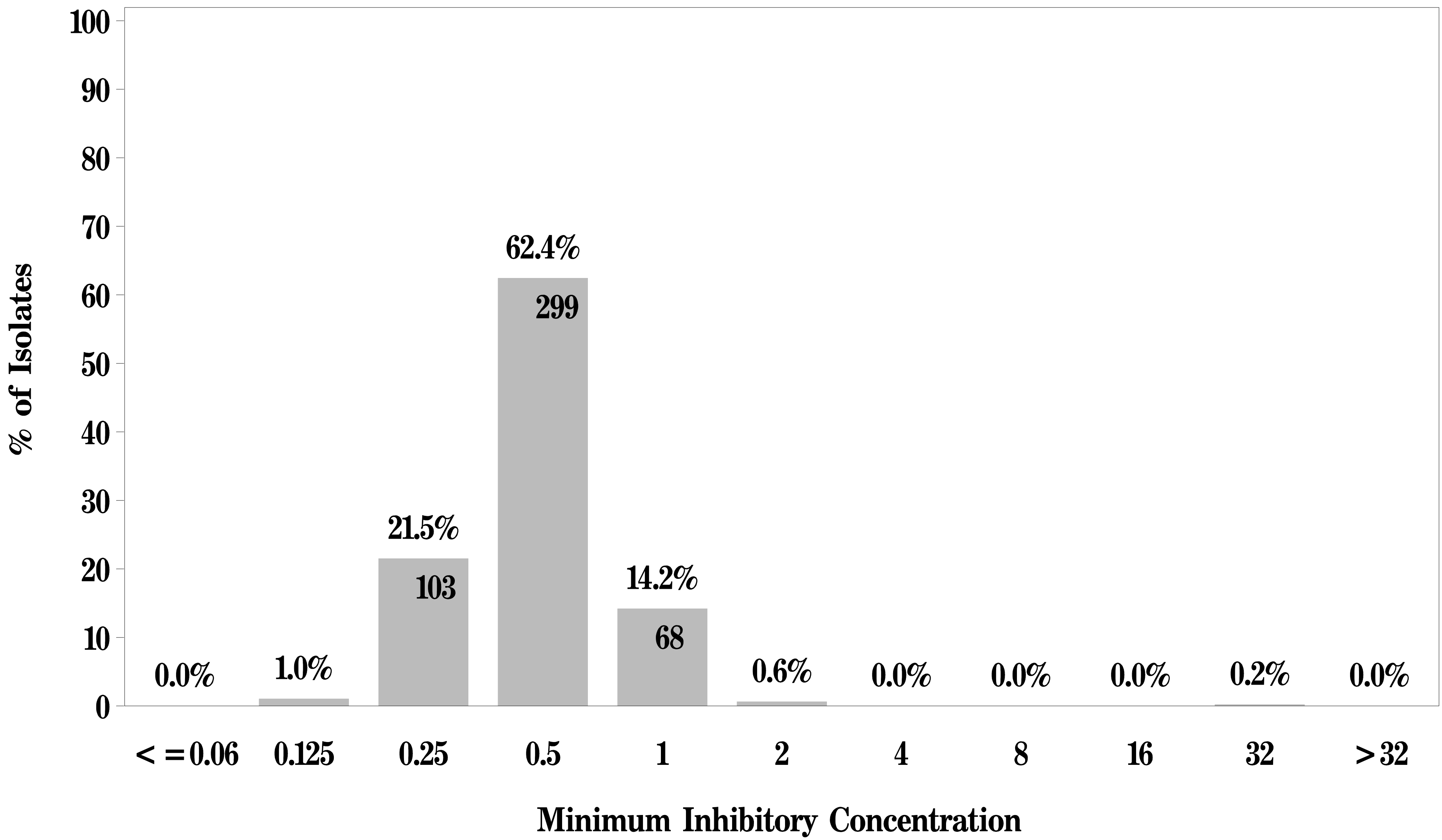
Breakpoints: Susceptible<=0.5 μg/mL Resistant>=8 μg/mL



NARMS

Figure 9d: Minimum Inhibitory Concentration of Gentamicin for *Campylobacter* (N=479 Isolates)

Breakpoints: Susceptible <=4 µg/mL Resistant >=16 µg/mL



NARMS

Figure 9e: Minimum Inhibitory Concentration of Meropenem for *Campylobacter* (N=479 Isolates)

Breakpoints: Susceptible <=4 μg/mL Resistant >=16 μg/mL

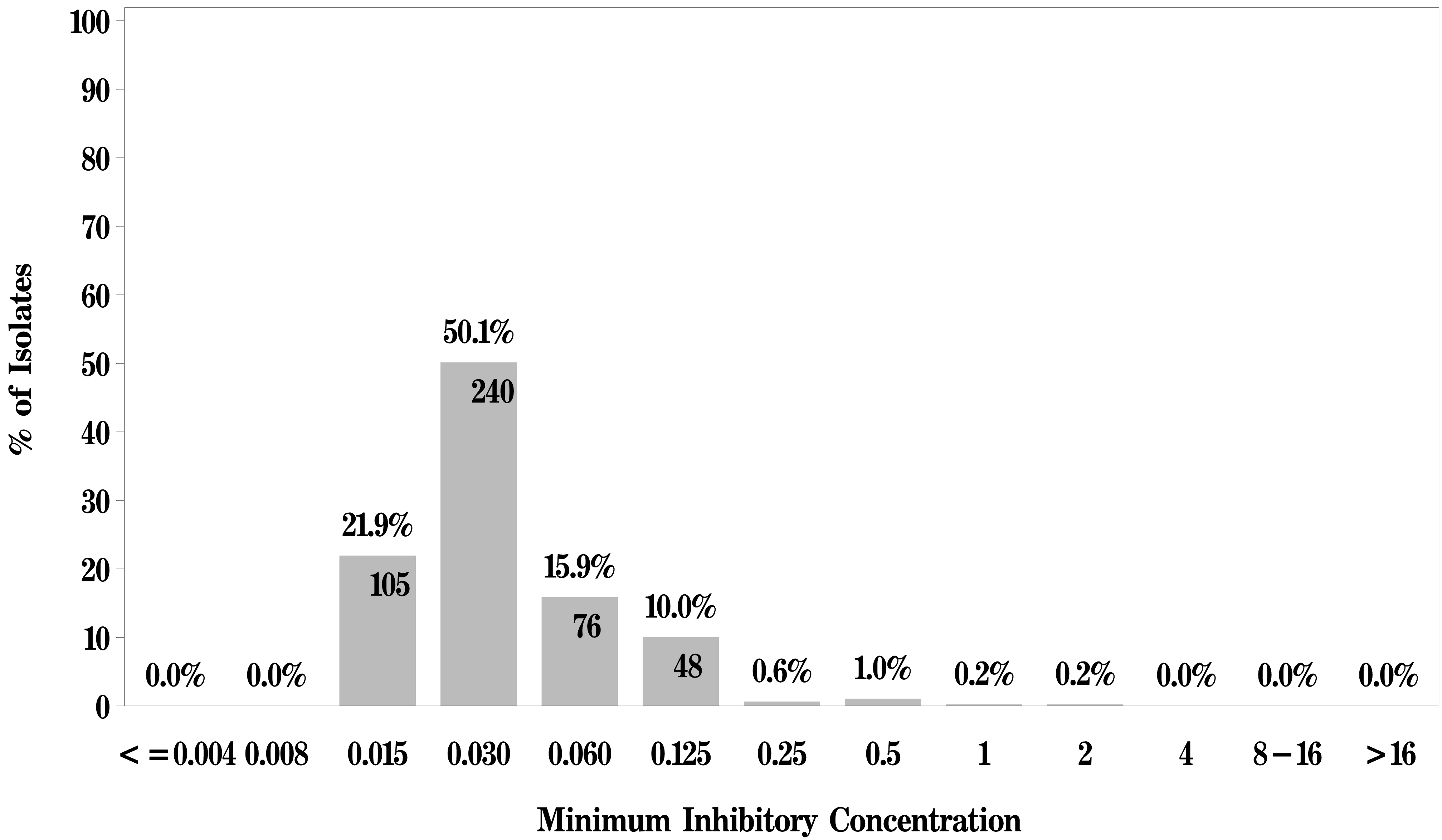


Table 21. Antimicrobial Resistance[*] among *Campylobacter* by Meat Type, 2003

Antimicrobial Agent	*Chicken Breast (n=469)*	*Ground Turkey (n=5)*	*Ground Beef (n=1)*	*Pork Chop (n=4)*
Doxycycline	29.4%	60.0%	-[†]	50.0%
Ciprofloxacin	14.1%[‡]	20.0%	-	-
Erythromycin	2.8%	-	-	75.0%
Gentamicin	0.2%	-	-	-
Meropenem	-	-	-	-

[*] Where % Resistance = (# isolates per meat type resistant to antimicrobial) / (total # isolates per meat type).
[†] Dashes indicate 0.0% resistance to antimicrobial.
[‡] % resistance calculated based on N = 467. Two *C. lari* isolates from chicken breast were excluded from analysis due to intrinsic resistance to quinolones.

Figure 10a. MIC Distribution among *Campylobacter* from Chicken Breast

***Campylobacter* from Chicken Breast (N=469)**		**Distribution (%) of MICs (in µg/ml)**														
Antimicrobial Agent	**%R**[†]	**0.008**	**0.015**	**0.03**	**0.06**	**0.125**	**0.25**	**0.5**	**1**	**2**	**4**	**8**	**16**	**32**	**64**	**>64**
Doxycycline	**29.4%**				17.3	23.7	5.5	1.7	1.3	2.6	4.5	14.1	**16.0**	**11.5**	**1.9**	
Ciprofloxacin	**14.1%**				1.9	48.8	26.2	8.3		0.2	**0.4**	**1.9**	**4.9***	**6.8**	**0.4**	
Erythromycin	**2.8%**						2.3	16.2	43.7	23.0	11.9	**0.4**	**0.2**			**2.1**
Gentamicin	**0.2%**					1.1	21.7	62.9	13.6	0.4				**0.2**		
Meropenem[‡]	**0.0%**		22.4	50.1	15.6	10.0	0.6	1.1	0.2							

Vertical bars show the NARMS Susceptible/Resistant breakpoints for each drug.

*Includes 2 *C.lari* that are intrinsically resistant to Ciprofloxacin.

[†]Discrepancies between %R and sums of distribution %s are due to rounding.

[‡]Lowest Meropenem dilution tested was 0.001 µg/ml.

Unshaded areas indicate the dilution ranges used to test the 2003 isolates.

Figure 10b. MIC Distribution among *Campylobacter* from Ground Turkey

***Campylobacter* from Ground Turkey (N=5)**		**Distribution (%) of MICs (in µg/ml)**														
Antimicrobial Agent	**%R[†]**	**0.008**	**0.015**	**0.03**	**0.06**	**0.125**	**0.25**	**0.5**	**1**	**2**	**4**	**8**	**16**	**32**	**64**	**>64**
Doxycycline	**60.0%**					20.0						20.0	**40.0**	**20.0**		
Ciprofloxacin	**20.0%**					40.0	40.0						**20.0**			
Erythromycin	**0.0%**							20.0	60.0	20.0						
Gentamicin	**0.0%**						20.0	40.0	40.0							
Meropenem[‡]	**0.0%**			80.0						20.0						

Vertical bars show the NARMS Susceptible/Resistant breakpoints for each drug.

*Includes 2 *C.lari* that are intrinsically resistant to Ciprofloxacin.

[†]Discrepancies between %R and sums of distribution %s are due to rounding.

[‡]Lowest Meropenem dilution tested was 0.001 µg/ml.

Unshaded areas indicate the dilution ranges used to test the 2003 isolates.

Figure 10c. MIC Distribution among *Campylobacter* from Ground Beef

***Campylobacter* from Ground Beef (N=1)**		**Distribution (%) of MICs (in µg/ml)**														
Antimicrobial Agent	**%R†**	**0.008**	**0.015**	**0.03**	**0.06**	**0.125**	**0.25**	**0.5**	**1**	**2**	**4**	**8**	**16**	**32**	**64**	**>64**
Doxycycline	**0.0%**				100.0											
Ciprofloxacin	**0.0%**						100.0									
Erythromycin	**0.0%**								100.0							
Gentamicin	**0.0%**							100.0								
Meropenem‡	**0.0%**			100.0												

Vertical bars show the NARMS Susceptible/Resistant breakpoints for each drug.

*Includes 2 *C.lari* that are intrinsically resistant to Ciprofloxacin.

†Discrepancies between %R and sums of distribution %s are due to rounding.

‡Lowest Meropenem dilution tested was 0.001 µg/ml.

Unshaded areas indicate the dilution ranges used to test the 2003 isolates.

Figure 10d. MIC Distribution among *Campylobacter* from Pork Chop

***Campylobacter* from Pork Chop (N=4)**		**Distribution (%) of MICs (in µg/ml)**														
Antimicrobial Agent	**%R**[†]	**0.008**	**0.015**	**0.03**	**0.06**	**0.125**	**0.25**	**0.5**	**1**	**2**	**4**	**8**	**16**	**32**	**64**	**>64**
Doxycycline	**50.0%**								25.0			25.0	**50.0**			
Ciprofloxacin	**0.0%**					50.0	50.0									
Erythromycin	**75.0%**									25.0						**75.0**
Gentamicin	**0.0%**							25.0	50.0	25.0						
Meropenem[‡]	**0.0%**				75.0	25.0										

Vertical bars show the NARMS Susceptible/Resistant breakpoints for each drug.

*Includes 2 *C.lari* that are intrinsically resistant to Ciprofloxacin.

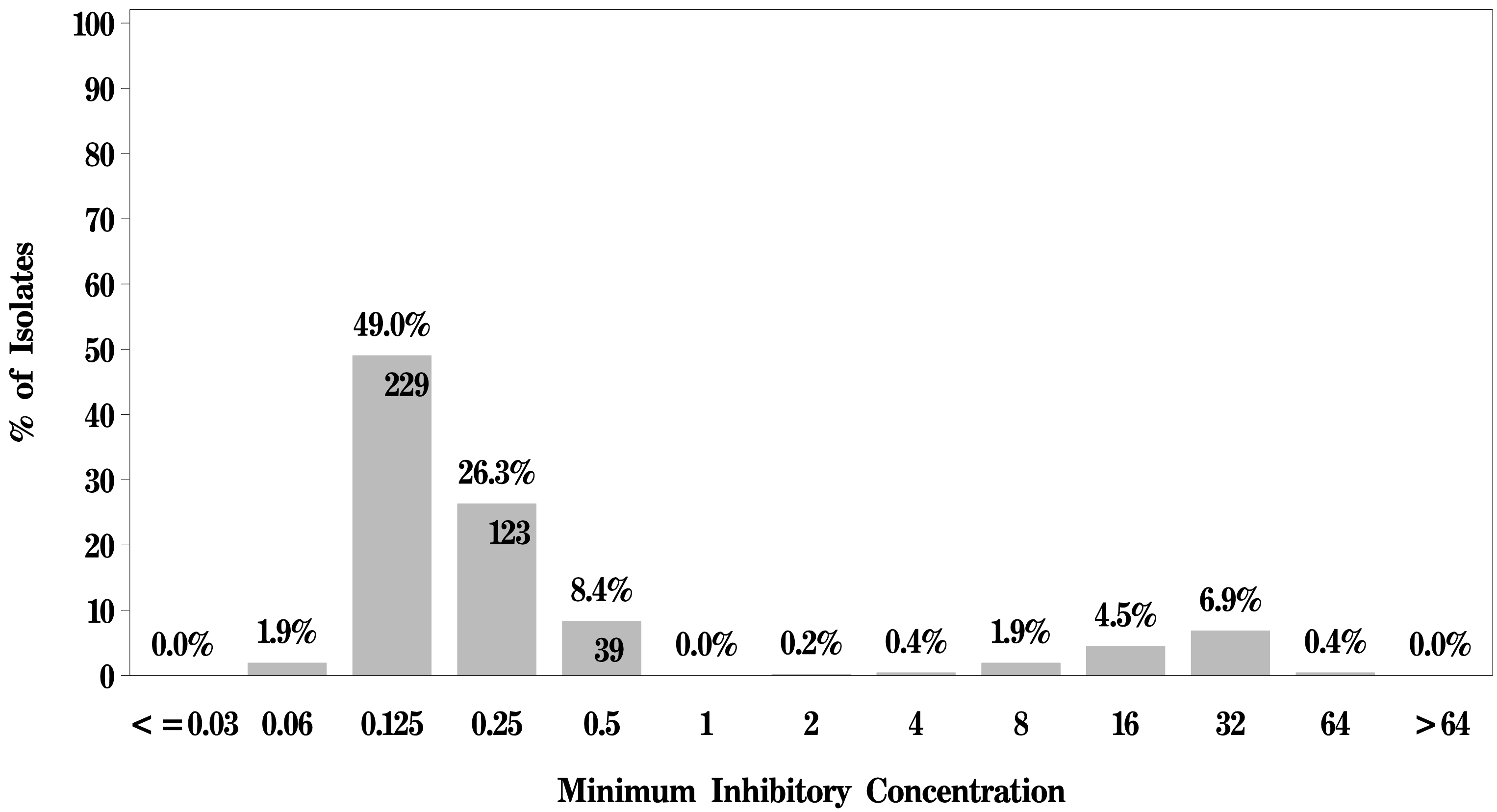
[†]Discrepancies between %R and sums of distribution %s are due to rounding.

[‡]Lowest Meropenem dilution tested was 0.001 µg/ml.

Unshaded areas indicate the dilution ranges used to test the 2003 isolates.

NARMS

Figure 11a: Minimum Inhibitory Concentration of Ciprofloxacin*
for *Campylobacter* in Chicken Breast (N=467 Isolates)
Breakpoints: Susceptible <=1μg/mL Resistant >=4μg/mL

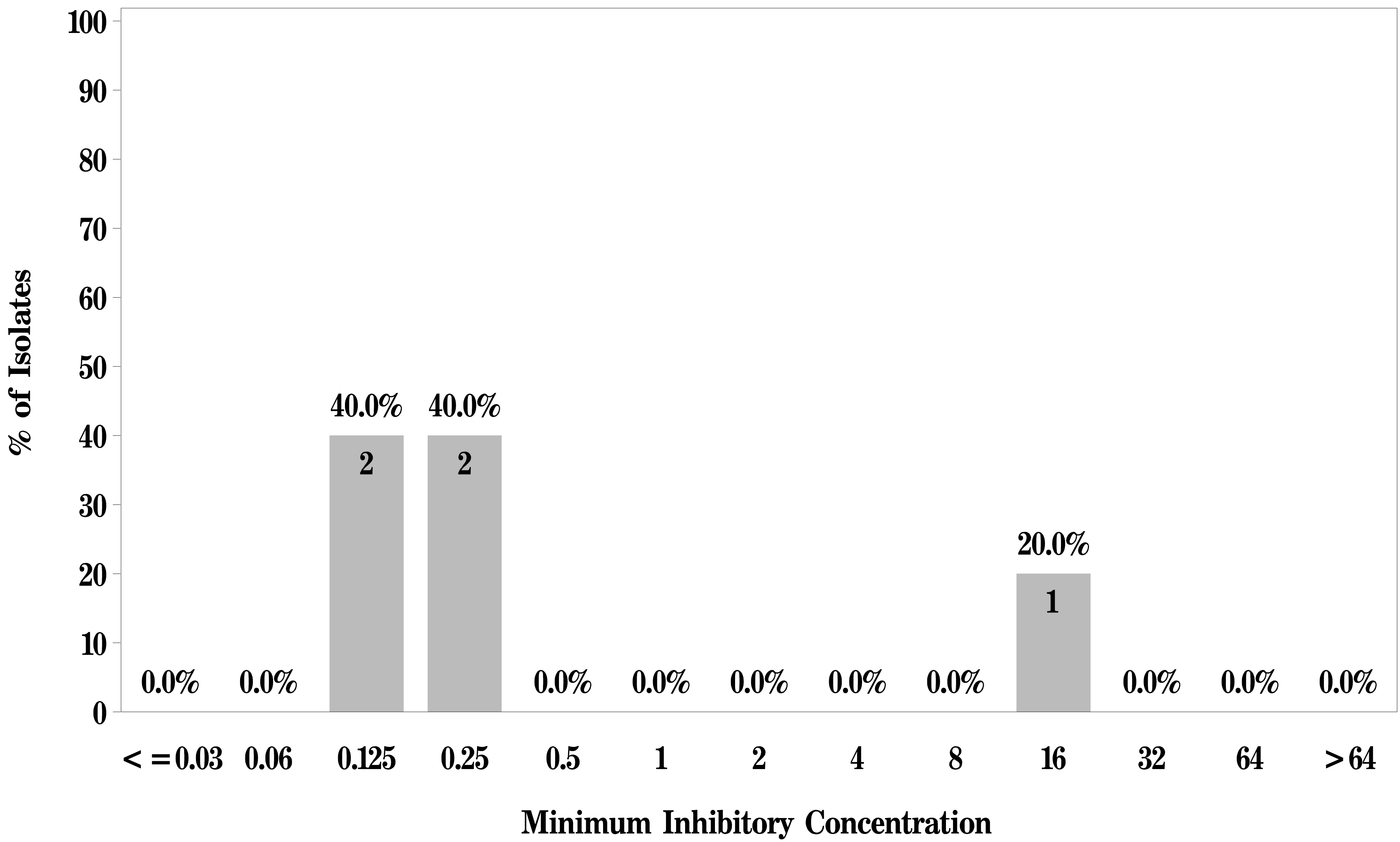


*Presented for all species except *C. lari* (N=469−2=467)

NARMS

Figure 11a: Minimum Inhibitory Concentration of Ciprofloxacin for *Campylobacter* in Ground Turkey (N=5 Isolates)

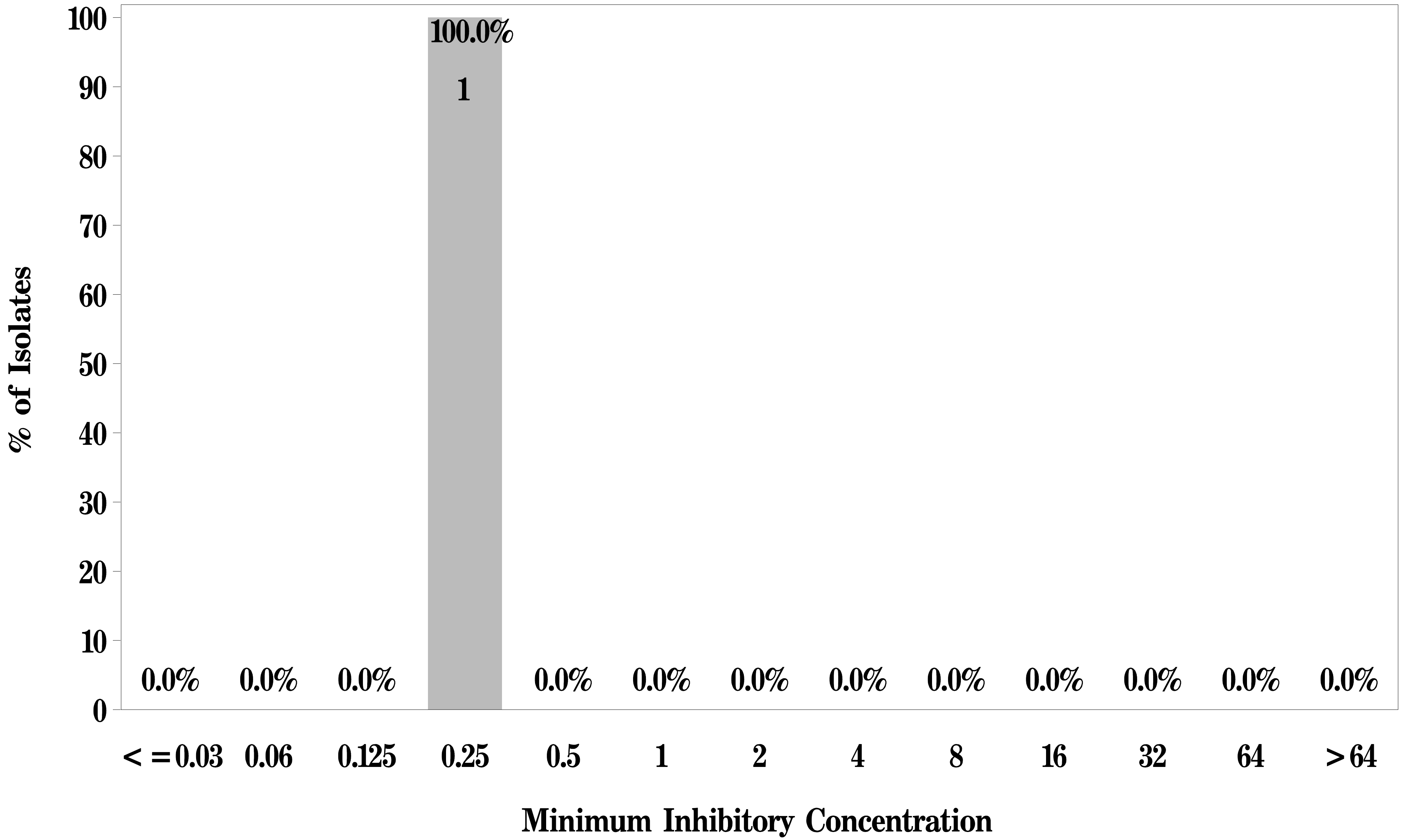
Breakpoints: Susceptible<=1 μg/mL Resistant>=4 μg/mL



NARMS

Figure 11a: Minimum Inhibitory Concentration of Ciprofloxacin for *Campylobacter* in Ground Beef (N=1 Isolates)

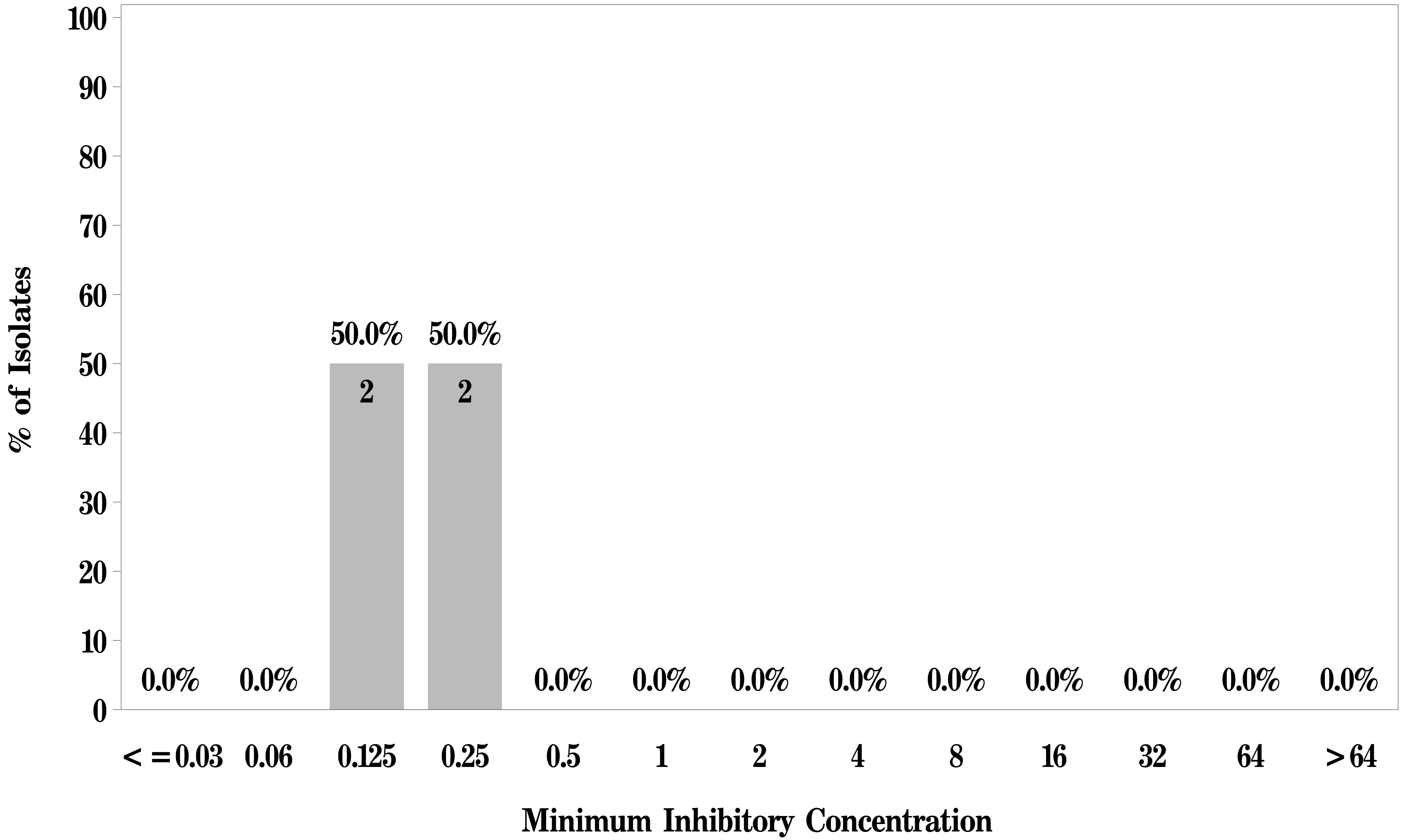
Breakpoints: Susceptible <=1 μg/mL Resistant >=4 μg/mL



NARMS

Figure 11a: Minimum Inhibitory Concentration of Ciprofloxacin for *Campylobacter* in Pork Chop (N=4 Isolates)

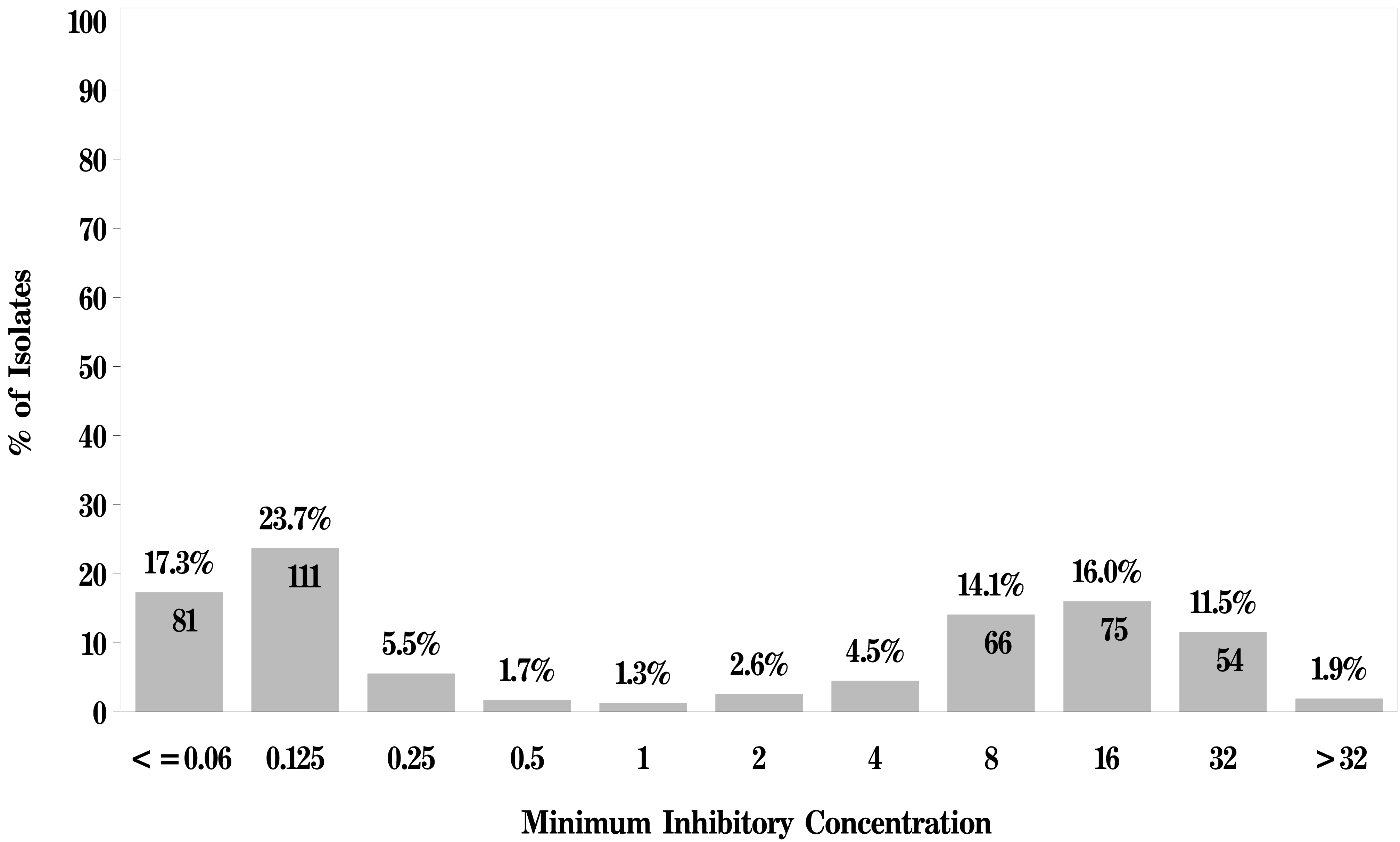
Breakpoints: Susceptible<=1 μg/mL Resistant>=4 μg/mL



NARMS

Figure 11b: Minimum Inhibitory Concentration of Doxycycline for *Campylobacter* in Chicken Breast (N=469 Isolates)

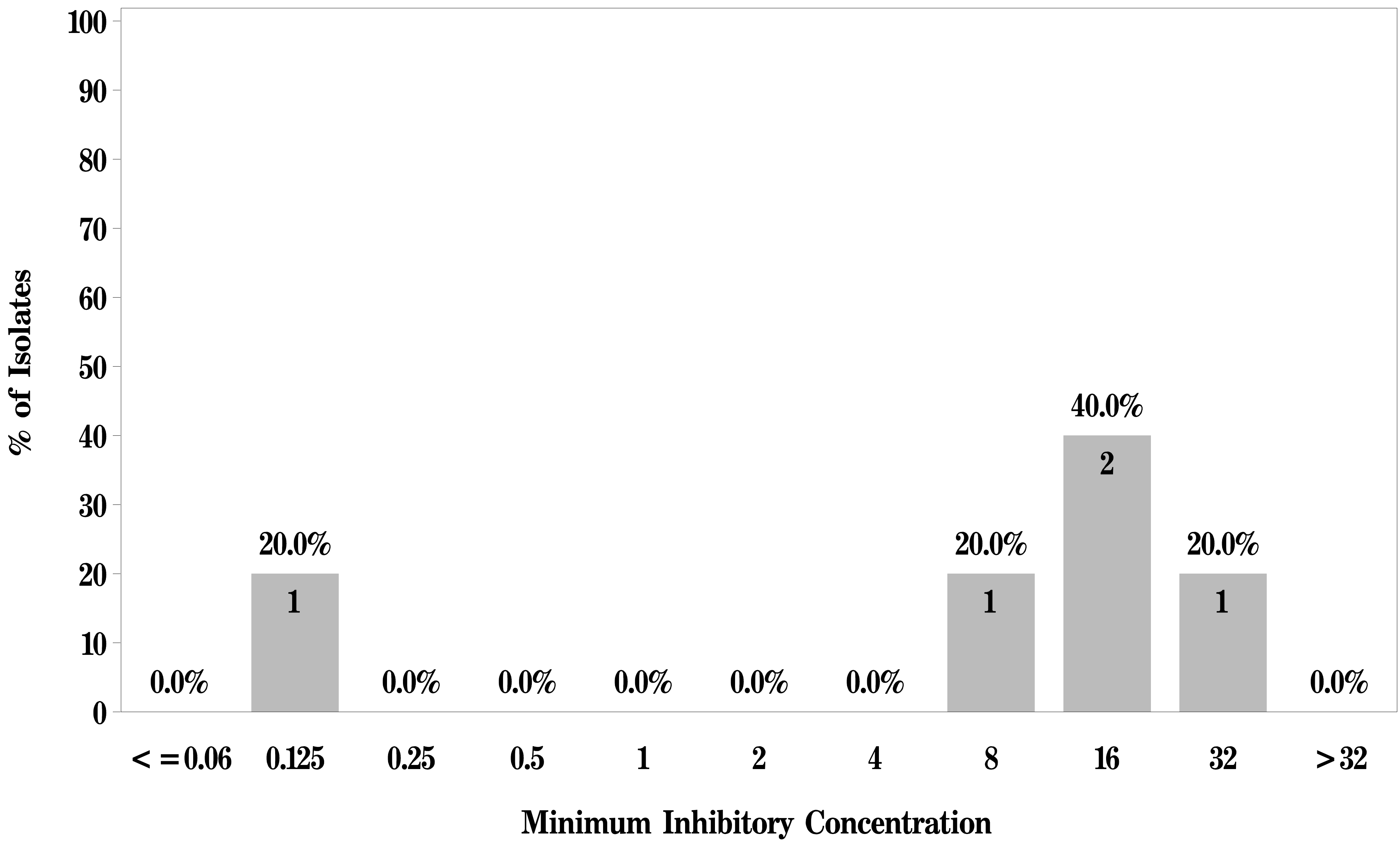
Breakpoints: Susceptible <=4 μg/mL Resistant >=16 μg/mL



NARMS

Figure 11b: Minimum Inhibitory Concentration of Doxycycline for *Campylobacter* in Ground Turkey (N=5 Isolates)

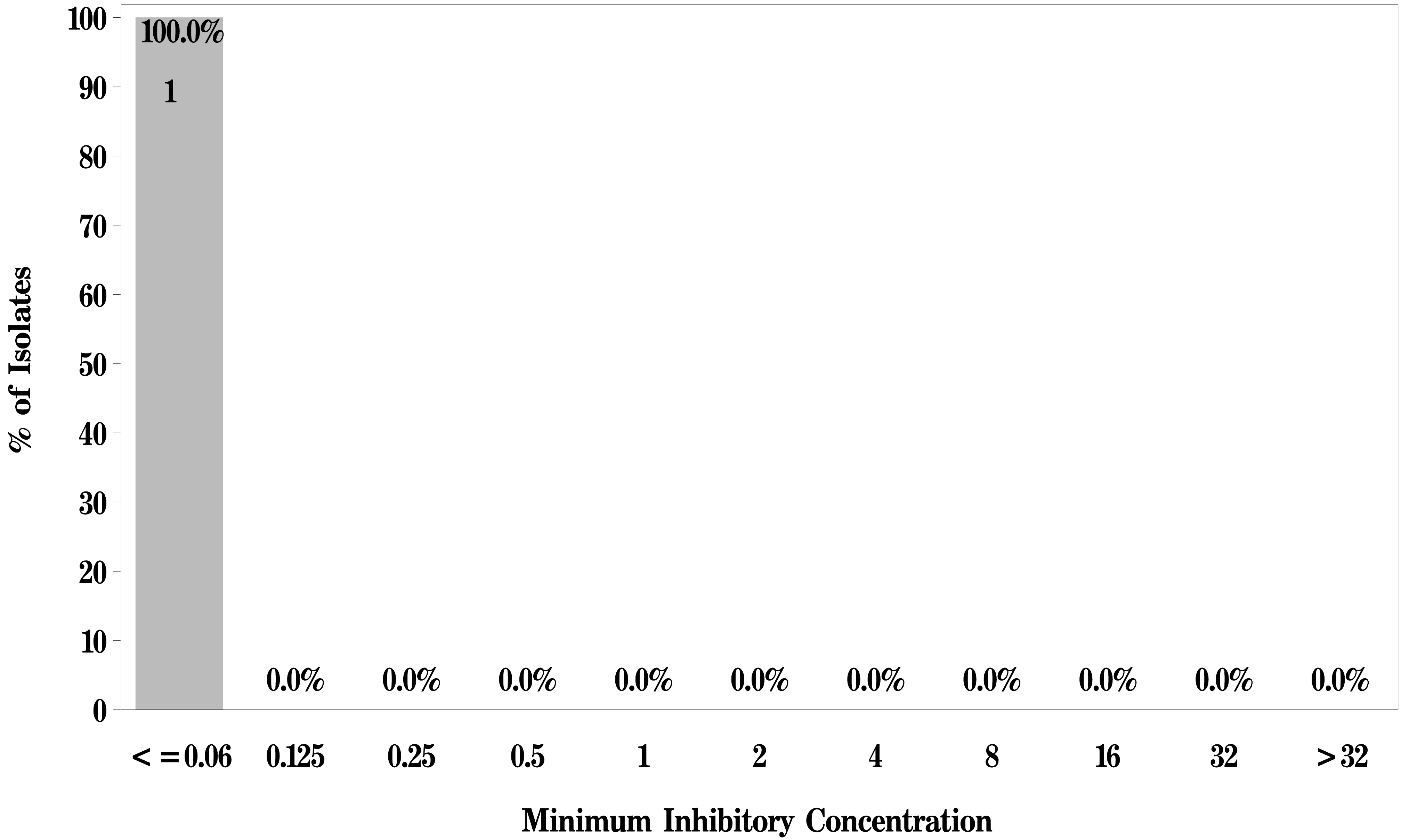
Breakpoints: Susceptible <=4 μg/mL Resistant >=16 μg/mL



NARMS

Figure 11b: Minimum Inhibitory Concentration of Doxycycline for *Campylobacter* in Ground Beef (N=1 Isolates)

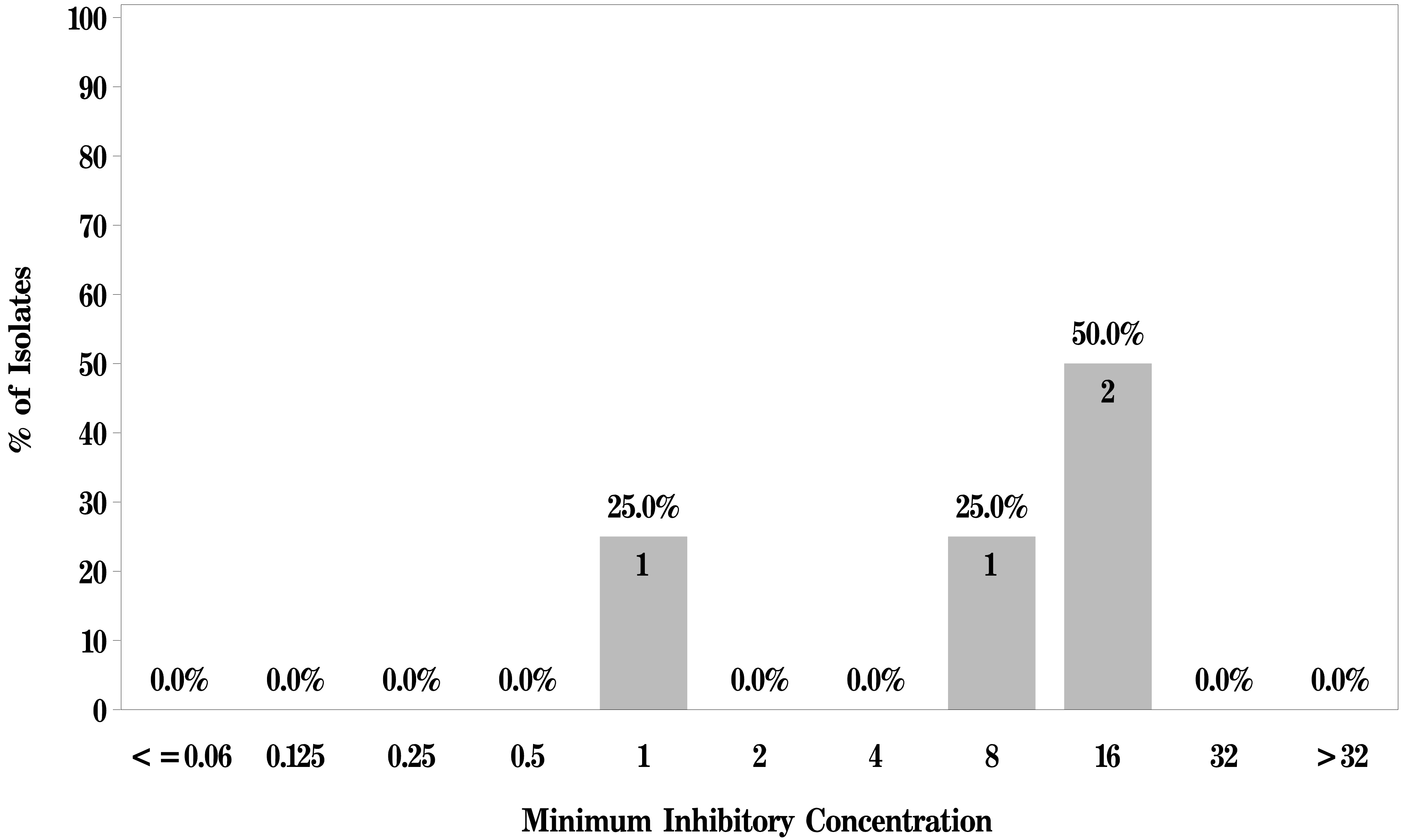
Breakpoints: Susceptible <=4 μg/mL Resistant >=16 μg/mL



NARMS

Figure 11b: Minimum Inhibitory Concentration of Doxycycline for *Campylobacter* in Pork Chop (N=4 Isolates)

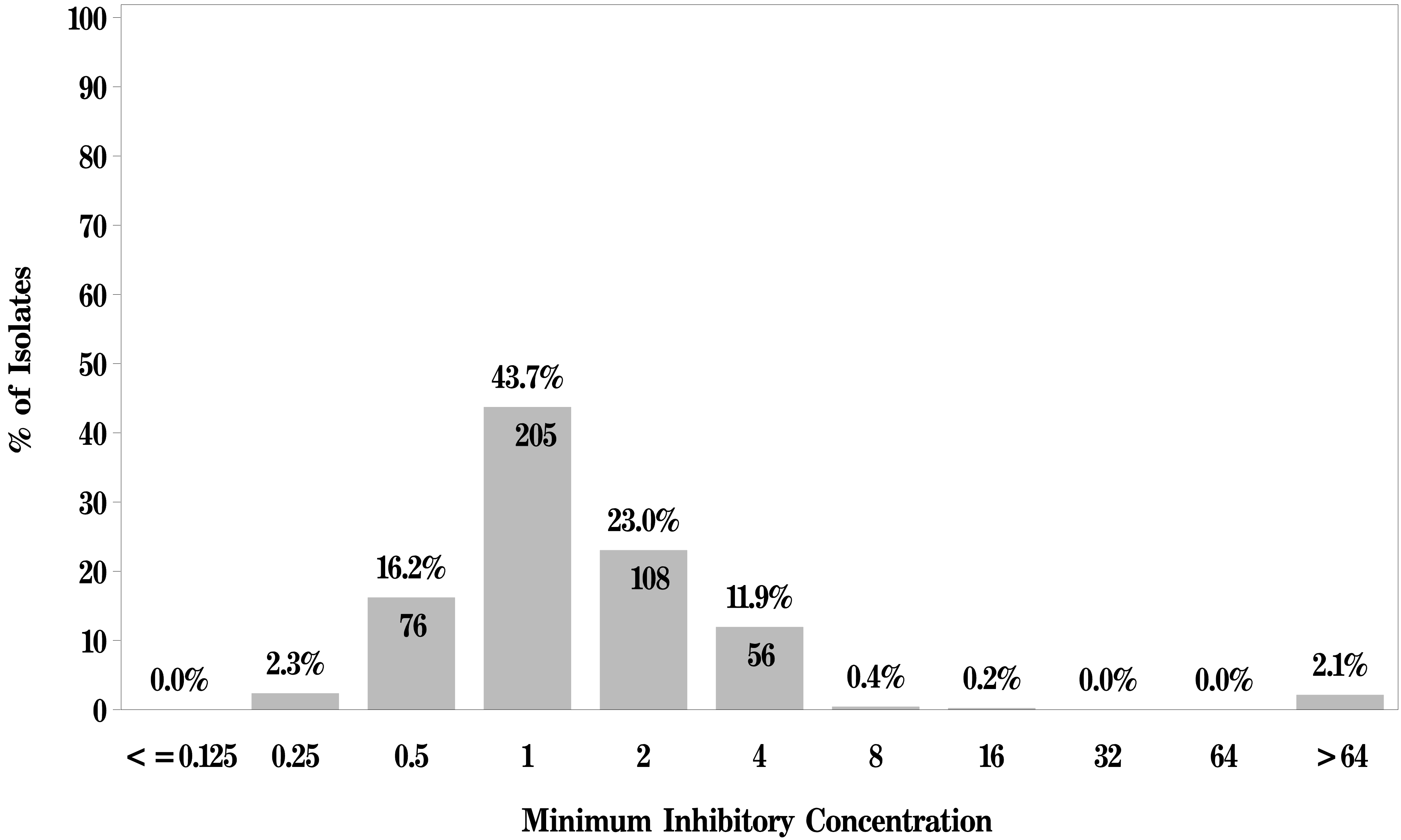
Breakpoints: Susceptible <=4 μg/mL Resistant >=16 μg/mL



NARMS

Figure 11c: Minimum Inhibitory Concentration of Erythromycin for *Campylobacter* in Chicken Breast (N=469 Isolates)

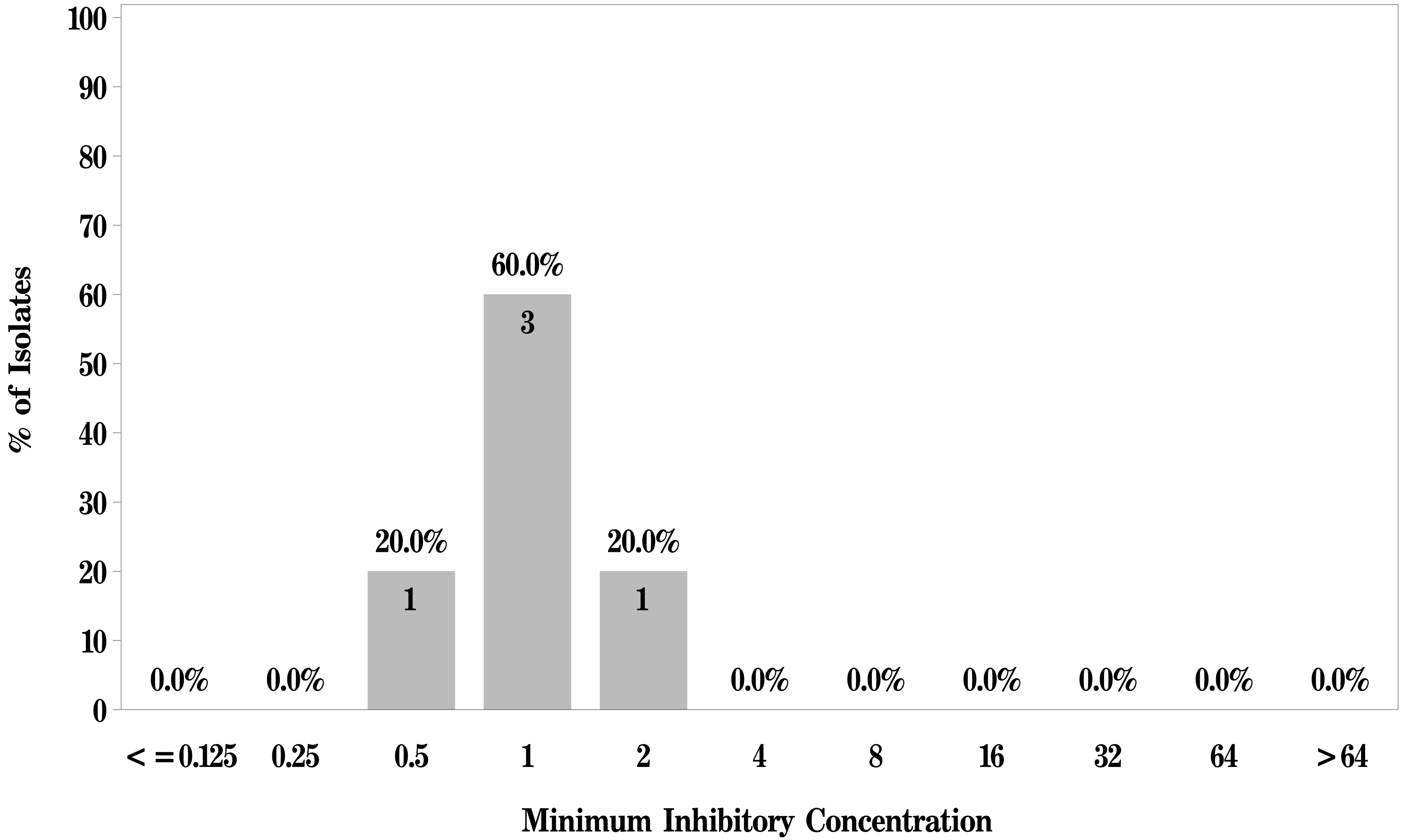
Breakpoints: Susceptible <=0.5 μg/mL Resistant >=8 μg/mL



NARMS

Figure 11c: Minimum Inhibitory Concentration of Erythromycin for *Campylobacter* in Ground Turkey (N=5 Isolates)

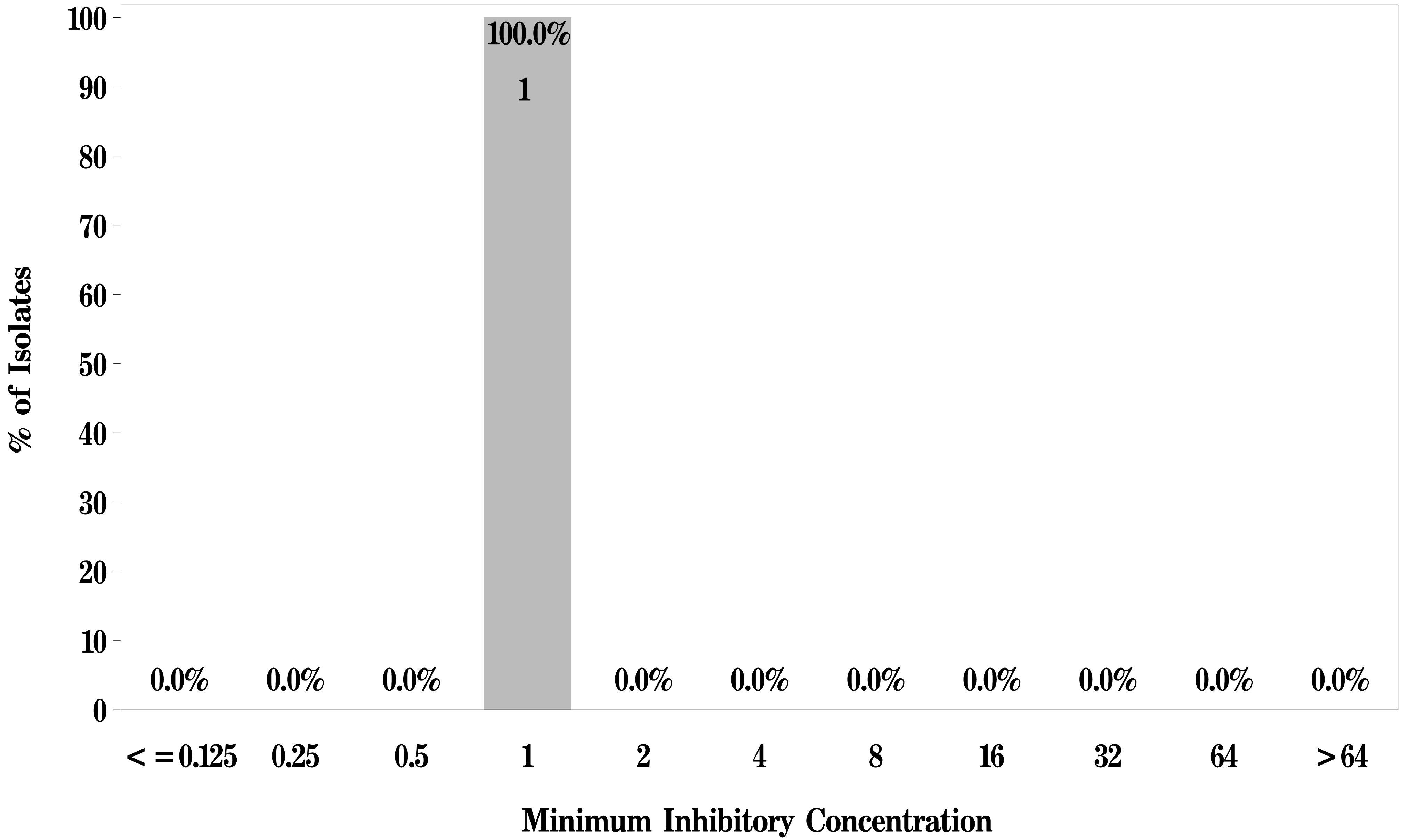
Breakpoints: Susceptible <=0.5 μg/mL Resistant >=8 μg/mL



NARMS

Figure 11c: Minimum Inhibitory Concentration of Erythromycin for *Campylobacter* in Ground Beef (N=1 Isolates)

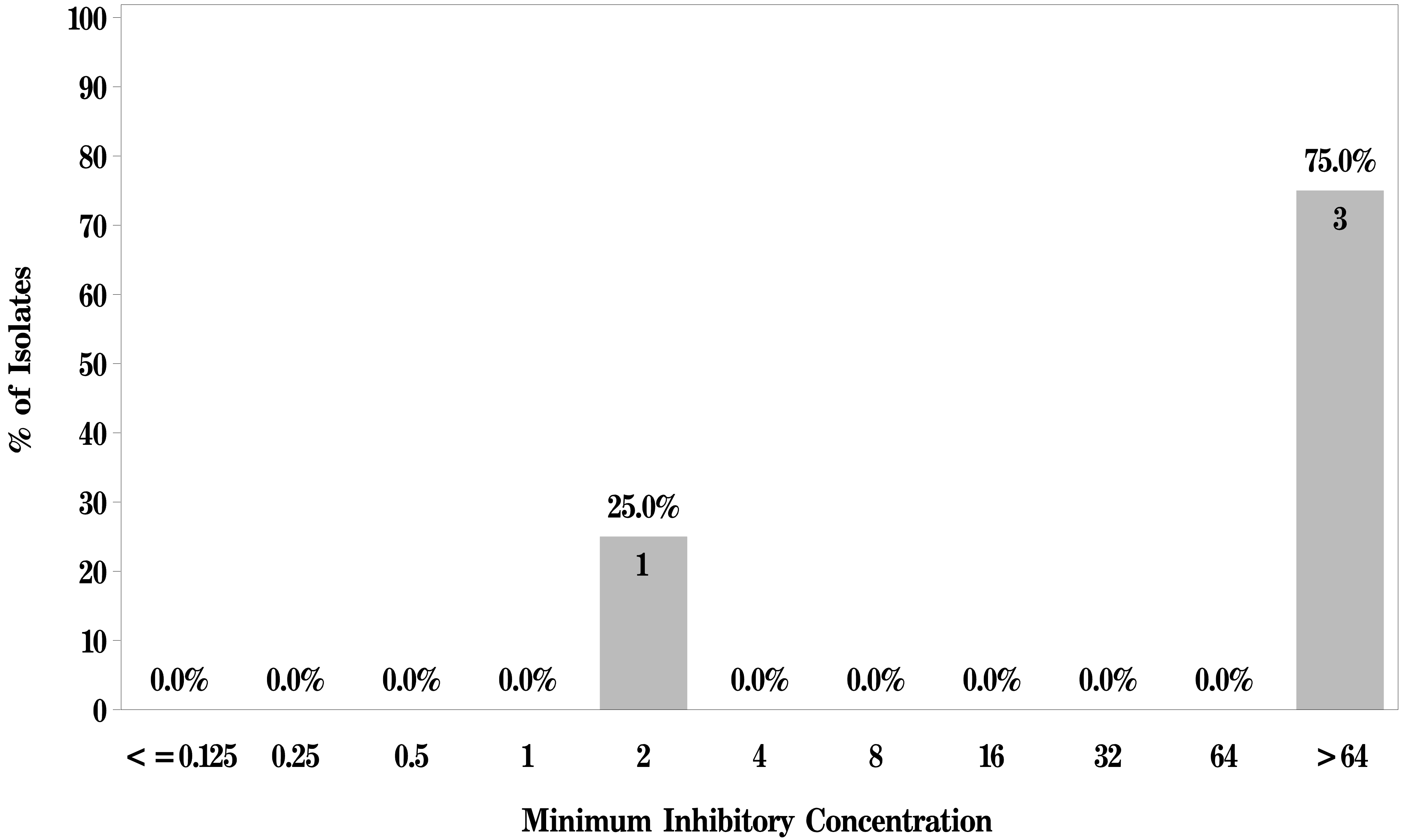
Breakpoints: Susceptible <=0.5 μg/mL Resistant >=8 μg/mL



NARMS

Figure 11c: Minimum Inhibitory Concentration of Erythromycin for *Campylobacter* in Pork Chop (N=4 Isolates)

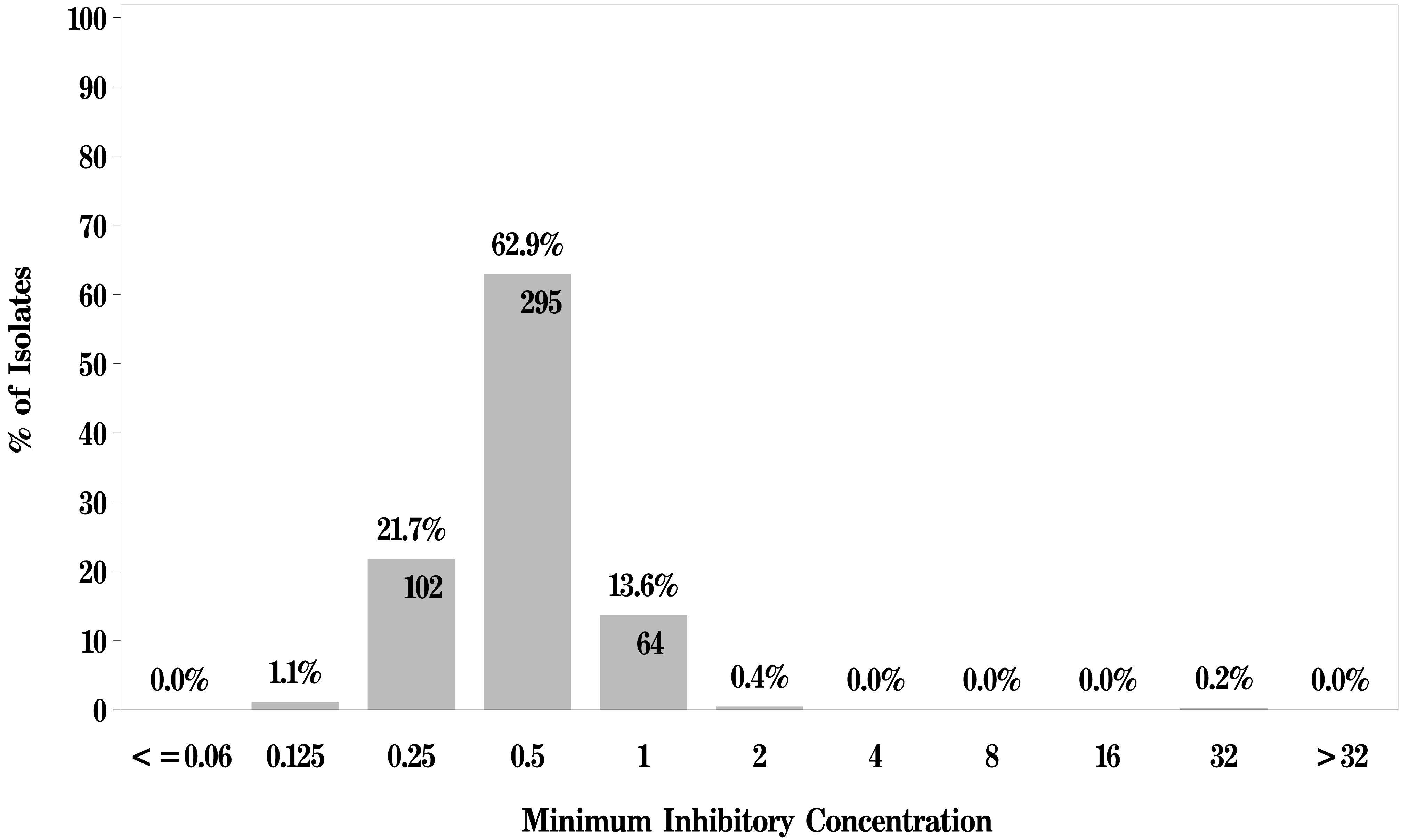
Breakpoints: Susceptible <=0.5 μg/mL Resistant >=8 μg/mL



NARMS

Figure 11d: Minimum Inhibitory Concentration of Gentamicin for *Campylobacter* in Chicken Breast (N=469 Isolates)

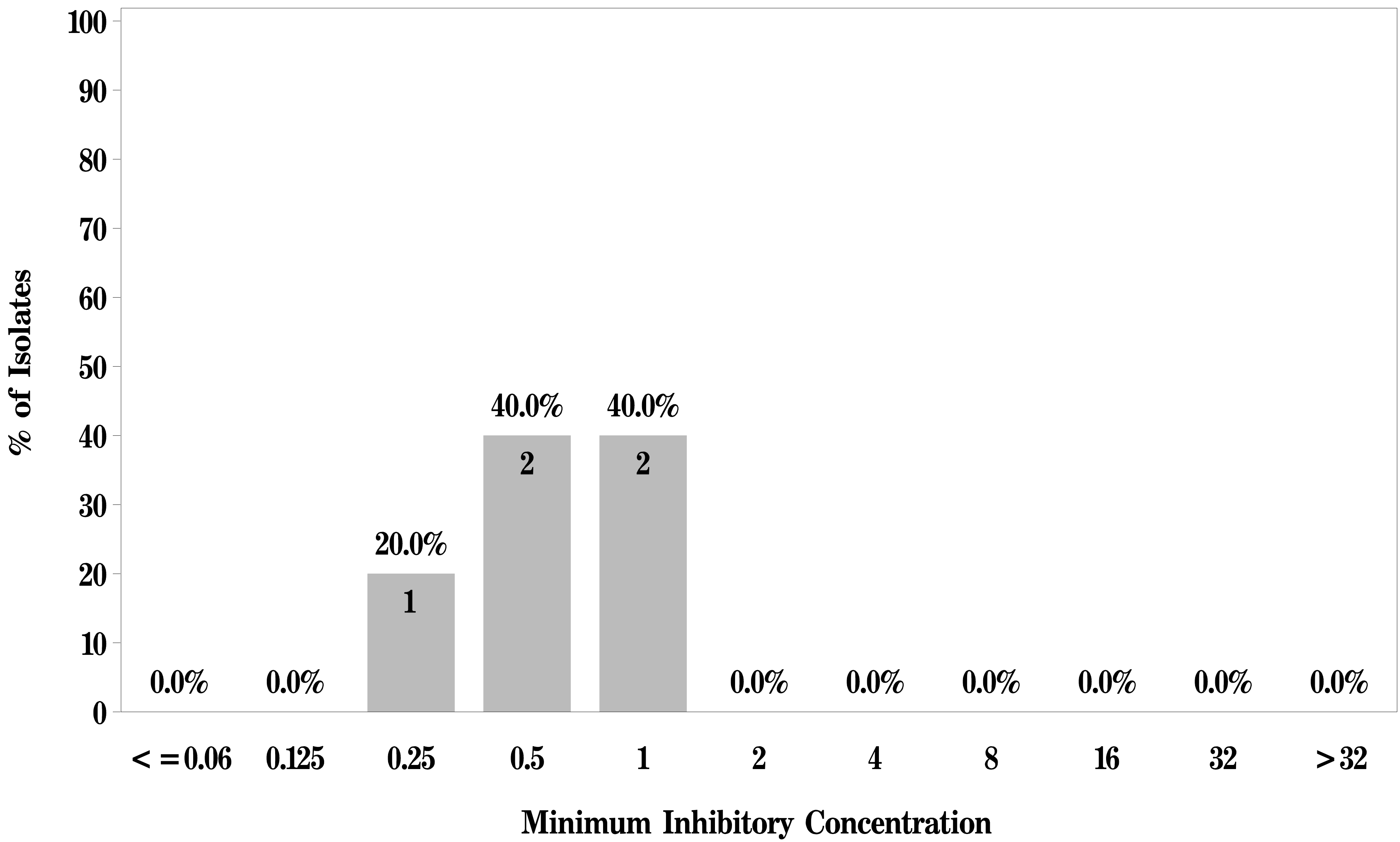
Breakpoints: Susceptible <=4 μg/mL Resistant >=16 μg/mL



NARMS

Figure 11d: Minimum Inhibitory Concentration of Gentamicin for *Campylobacter* in Ground Turkey (N=5 Isolates)

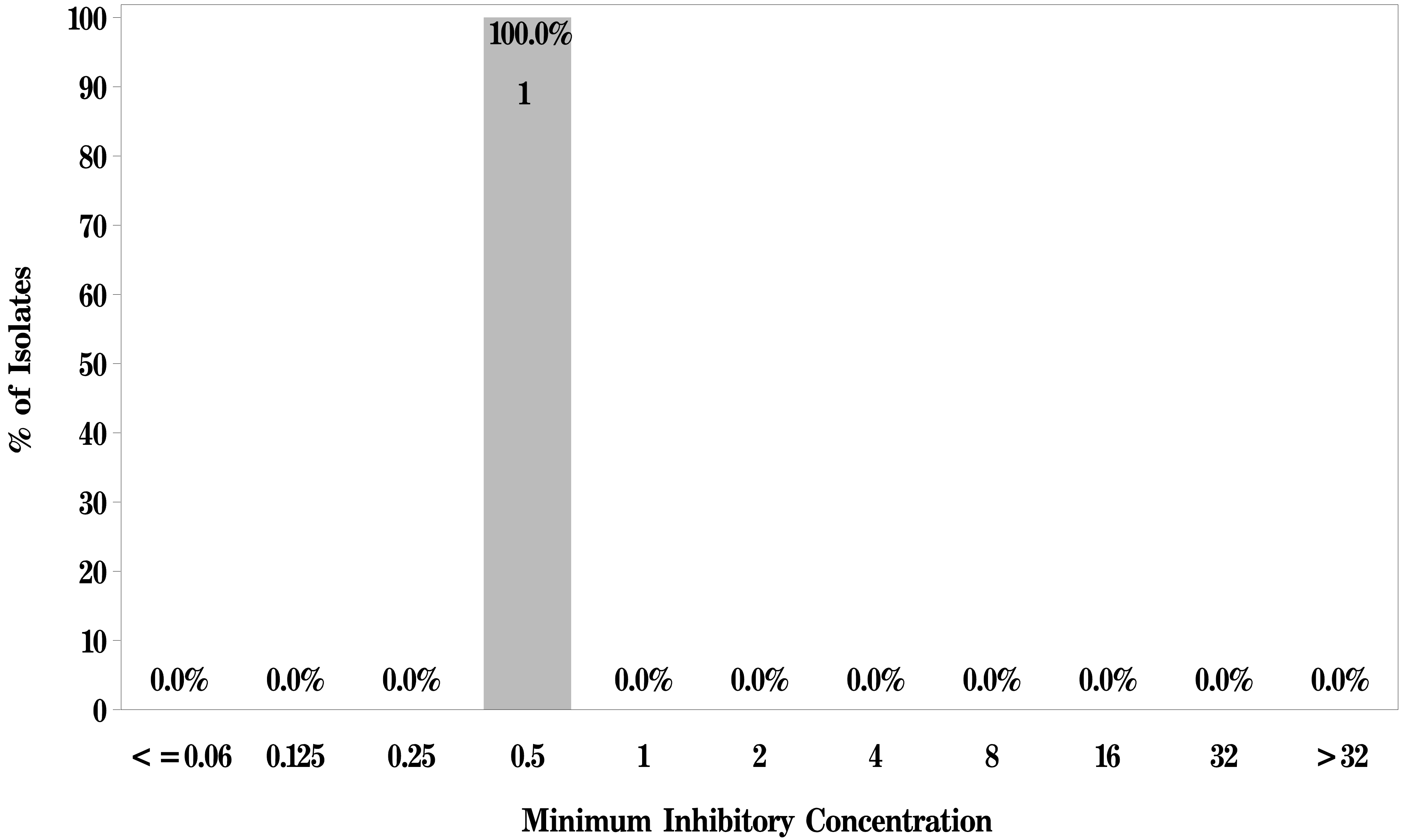
Breakpoints: Susceptible <=4 μg/mL Resistant >=16 μg/mL



NARMS

Figure 11d: Minimum Inhibitory Concentration of Gentamicin for *Campylobacter* in Ground Beef (N=1 Isolates)

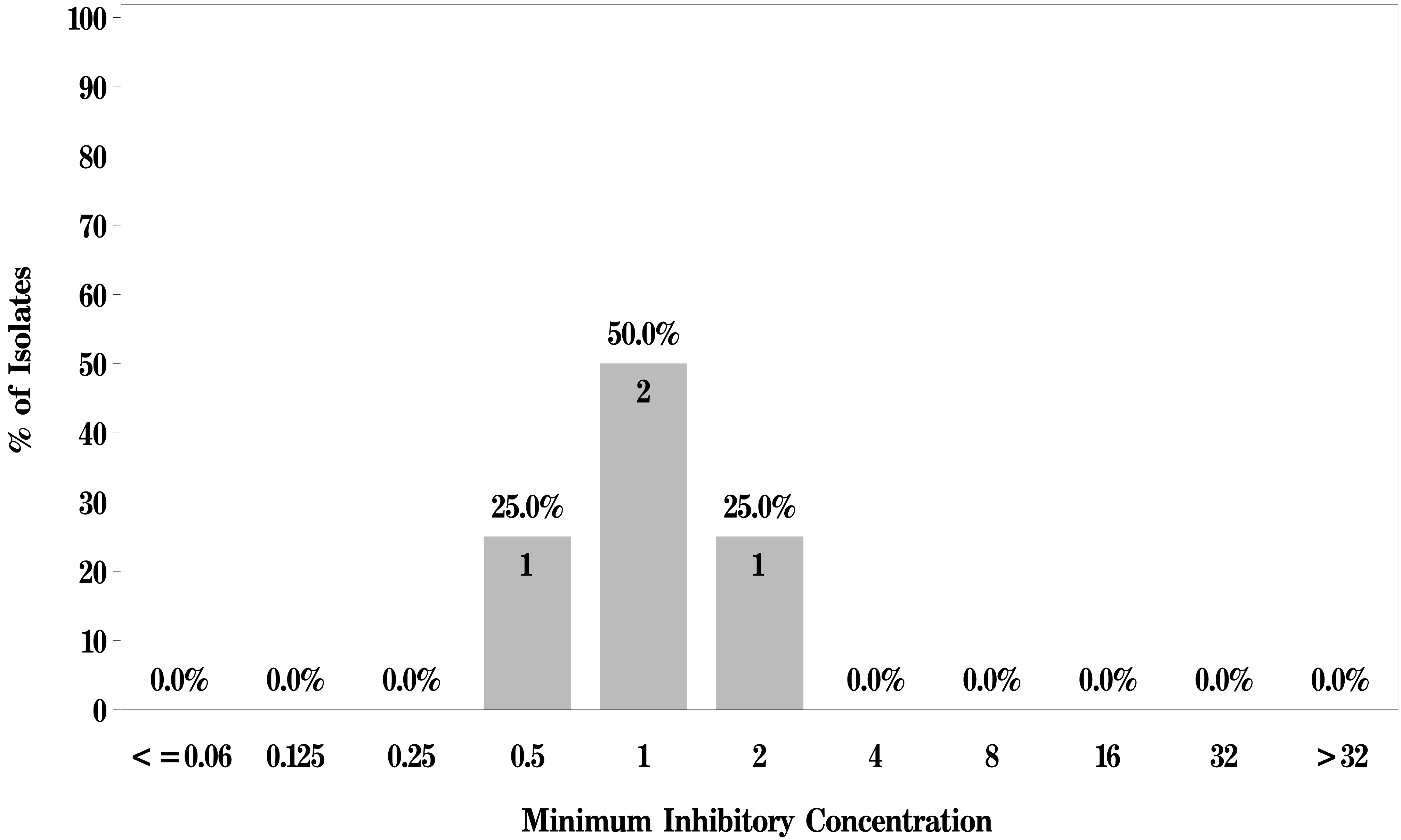
Breakpoints: Susceptible <=4 µg/mL Resistant >=16 µg/mL



NARMS

Figure 11d: Minimum Inhibitory Concentration of Gentamicin for *Campylobacter* in Pork Chop (N=4 Isolates)

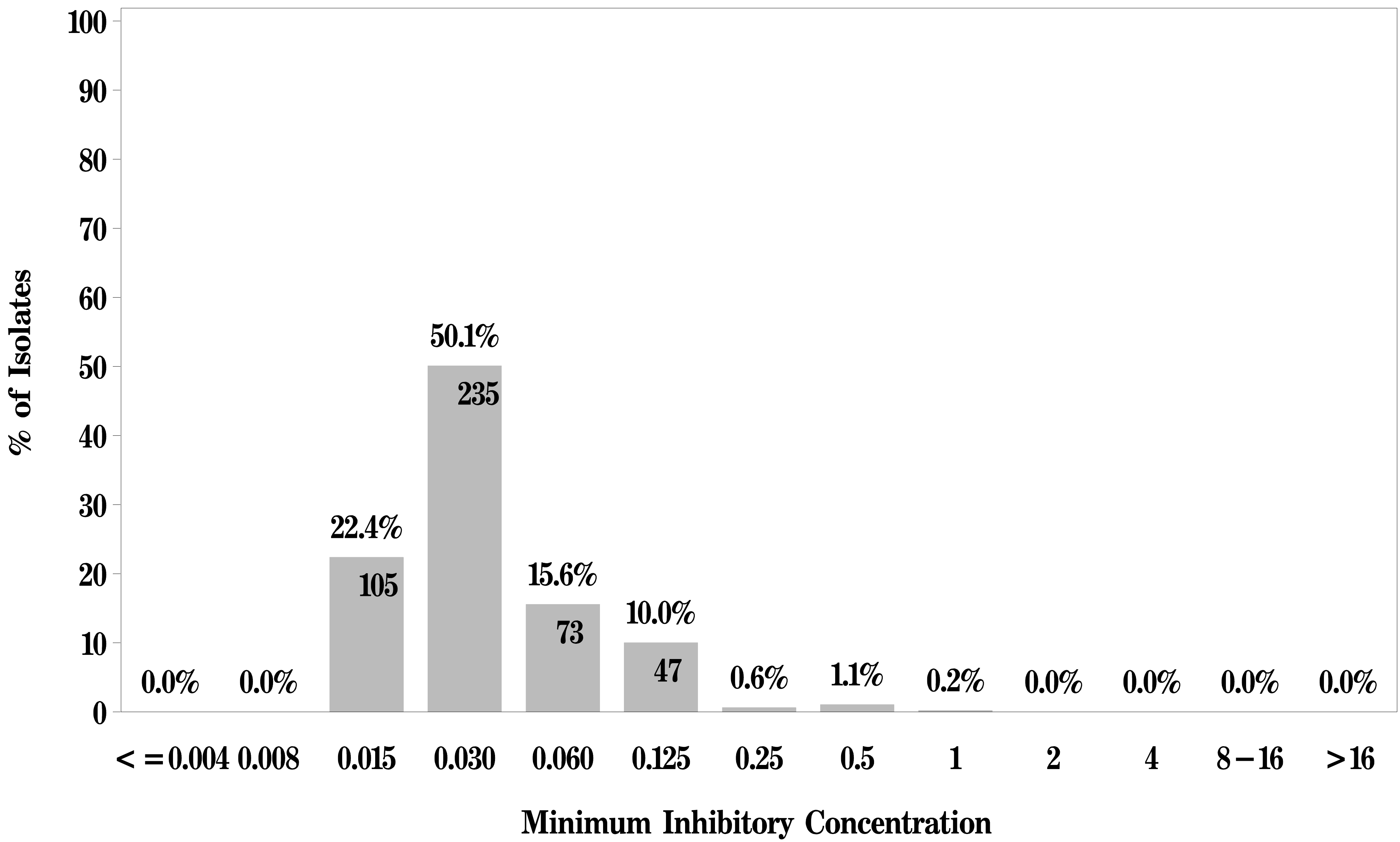
Breakpoints: Susceptible <=4 μg/mL Resistant >=16 μg/mL



NARMS

Figure 11e: Minimum Inhibitory Concentration of Meropenem for *Campylobacter* in Chicken Breast (N=469 Isolates)

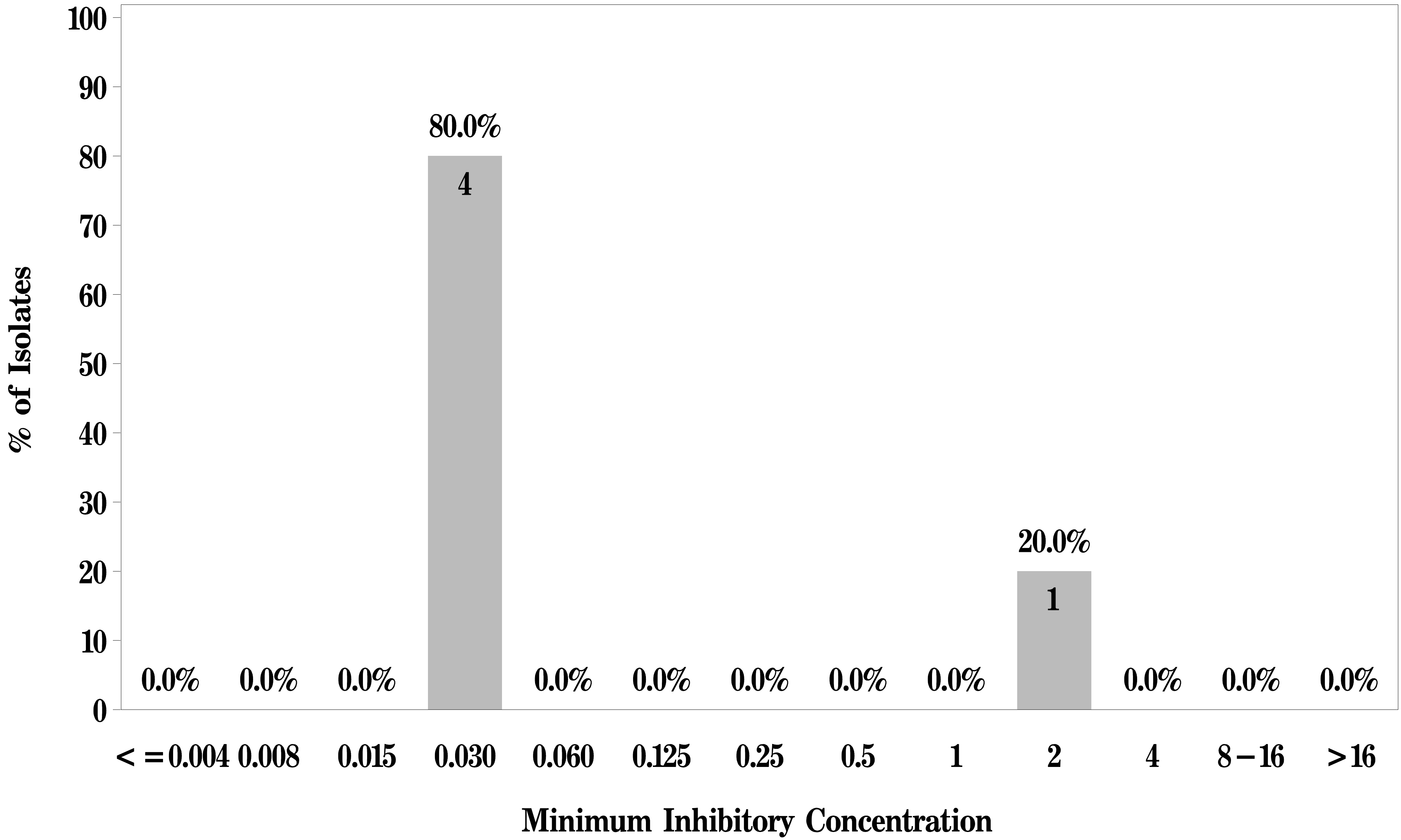
Breakpoints: Susceptible <=4 µg/mL Resistant >=16 µg/mL



NARMS

Figure 11e: Minimum Inhibitory Concentration of Meropenem for *Campylobacter* in Ground Turkey (N=5 Isolates)

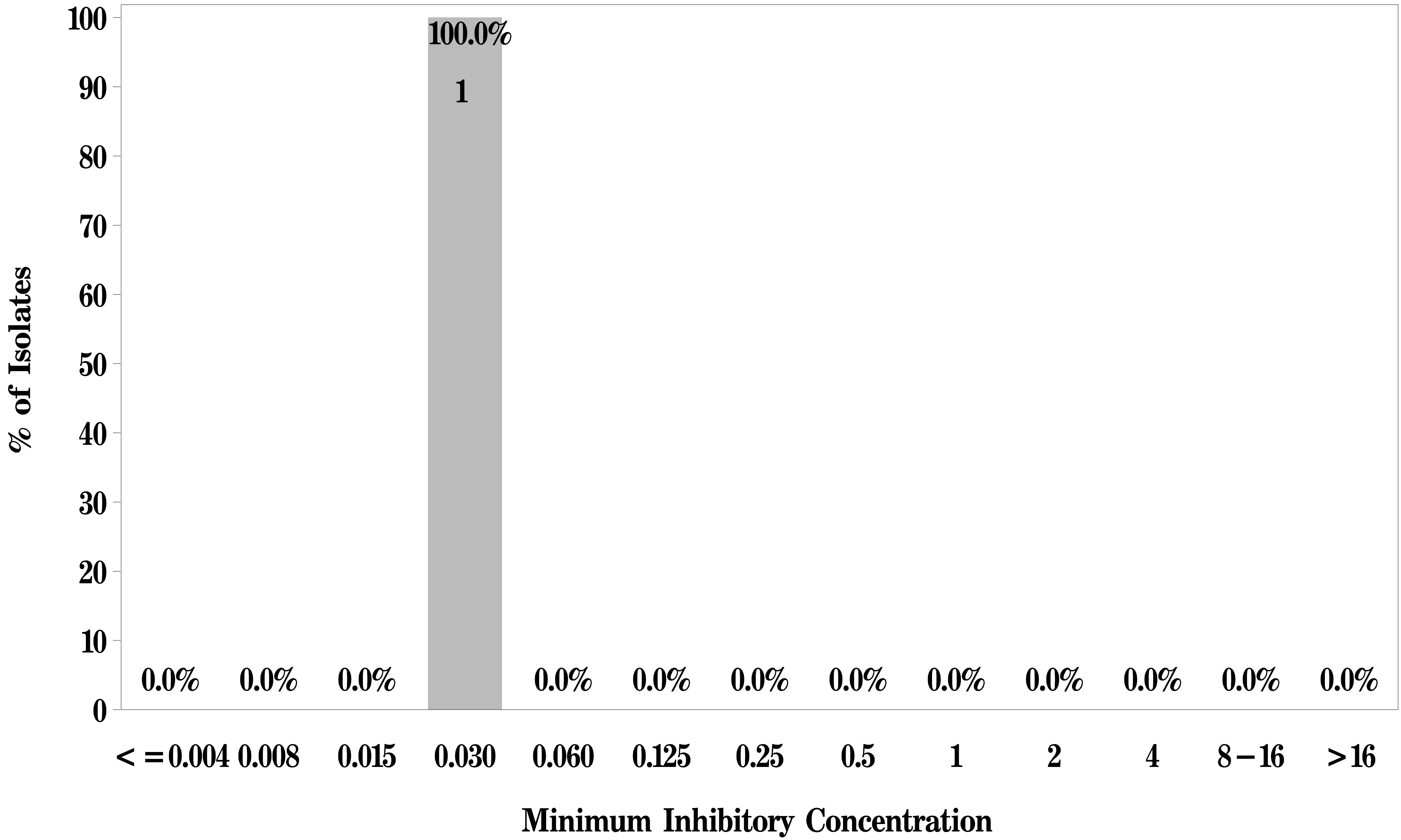
Breakpoints: Susceptible <=4 μg/mL Resistant >=16 μg/mL



NARMS

Figure 11e: Minimum Inhibitory Concentration of Meropenem for *Campylobacter* in Ground Beef (N=1 Isolates)

Breakpoints: Susceptible <=4 μg/mL Resistant >=16 μg/mL



NARMS

Figure 11e: Minimum Inhibitory Concentration of Meropenem for *Campylobacter* in Pork Chop (N=4 Isolates)

Breakpoints: Susceptible<=4 μg/mL Resistant>=16 μg/mL

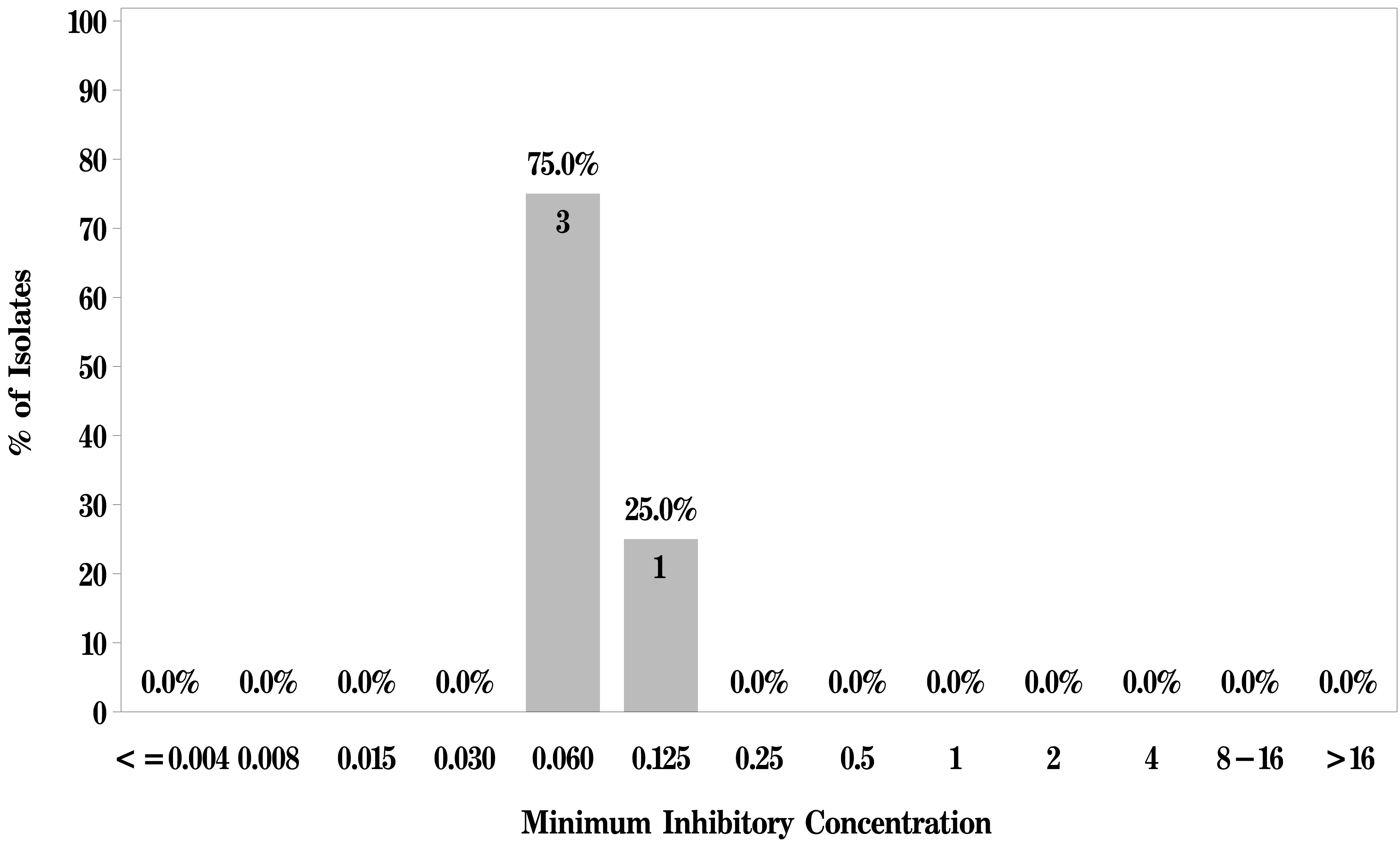


Table 22. Antimicrobial Resistance* among *Campylobacter* by Species, 2003

Species	Antimicrobial Agent				
	DOX	CIP	ERY	GEN	MER
C. coli (n=147)	44.9%	13.6%	10.9%	-†	-
C. jejuni (n=330)	23.3%	14.2%	-	0.3%	-
C. lari (n=2)	-	N/A	-	-	-
Total %R (N=479)	**29.9%**	**14.0%‡**	**3.3%**	**0.2%**	**0.0%**

* Where % Resistance = (# isolates per species resistant to antimicrobial) / (total # isolates per species).

† Dashes indicate 0.0% resistance to antimicrobial.

‡ % R calculated based on N = 477; two *C. lari* isolates excluded from analysis due to intrinsic resistance to quinolones.

Table 23. Antimicrobial Resistance[*] among *Campylobacter* Species by Meat Type, 2003

Meat Type	*Species*	*Antimicrobial Agent*				
		DOX	**CIP**	**ERY**	**GEN**	**MER**
Chicken Breast	***C. coli*** (n=142)	45.1%	13.4%	9.2%	-	-
	C. jejuni (n=325)	22.8%	14.5%	-	0.3%	-
	C. lari (n=2)	-[†]	N/A[‡]	-	-	-
Ground Turkey	***C. coli*** (n=1)	-	100.0%	-	-	-
	C. jejuni (n=4)	75.0%	-	-	-	-
Ground Beef	***C. coli*** (n=0)	[§]				
	C. jejuni (n=1)	-	-	-	-	-
Pork Chop	***C. coli*** (n=4)	50.0%	-	75.0%	-	-
	C. jejuni (n=0)					

[*] Where % Resistance = (# isolates per species resistant to antimicrobial within meat type) / (total # isolates per species within meat type).
[†] Dashes indicate 0.0% resistance to antimicrobial.
[‡] No % resistance was calculated for *C. lari* because they are intrinsically resistant to quinolones.
[§] Grey areas indicate species not isolated from that meat type.

Table 24. Antimicrobial Resistance* among *Campylobacter* by Site, Meat Type, and Antimicrobial Agent, 2003

Site	Meat Type	Antimicrobial Agent				
		DOX	CIP	ERY	GEN	MER
CA	CB (n=64)	28.1%	10.9%	-†	1.6%	-
	GT (n=0)	‡				
	GB (n=0)					
	PC (n=2)	50.0%	-	100.0%	-	-
	Total (n=66)	**28.8%**	**10.6%**	**3.0%**	**1.5%**	**0.0%**
CT	CB (n=50)	26.0%	12.0%	-	-	-
	GT (n=0)					
	GB (n=0)					
	PC (n=0)					
	Total (n=50)	**26.0%**	**12.0%**	**0.0%**	**0.0%**	**0.0%**
GA	CB (n=76)	23.7%	11.8%	3.9%	-	-
	GT (n=2)	50.0%	50.0%	-	-	-
	GB (n=0)					
	PC (n=0)					
	Total (n=78)	**24.4%**	**12.8%**	**3.8%**	**0.0%**	**0.0%**
MD	CB (n=38)	21.1%	21.1%	-	-	-
	GT (n=0)					
	GB (n=1)	-	-	-	-	-
	PC (n=0)					
	Total (n=39)	**20.5%**	**20.5%**	**0.0%**	**0.0%**	**0.0%**
MN	CB (n=62)	29.0%	3.2%	-	-	-
	GT (n=3)	66.7%	-	-	-	-
	GB (n=0)					
	PC (n=1)	100.0%	-	100.0%	-	-
	Total (n=66)	**31.8%**	**3.0%**	**1.5%**	**0.0%**	**0.0%**
NY	CB (n=75)	52.0%	28.0%	1.3%	-	-
	GT (n=0)					
	GB (n=0)					
	PC (n=0)					
	Total (n=75)	**52.0%**	**28.0%**	**1.3%**	**0.0%**	**0.0%**
OR	CB (n=45)	4.4%	2.3%§	-	-	-
	GT (n=0)					
	GB (n=0)					
	PC (n=1)	-	-	-	-	-
	Total (n=46)	**4.3%**	**2.2%**	**0.0%**	**0.0%**	**0.0%**
TN	CB (n=59)	37.3%	20.3%	15.3%	-	-
	GT (n=0)					
	GB (n=0)					
	PC (n=0)					
	Total (n=59)	**37.3%**	**20.3%**	**15.3%**	**0.0%**	**0.0%**
	Total %R (N=479)	**29.9%**	**14.0%**	**3.3%**	**0.2%**	**0.0%**

* Where % Resistance = (# isolates resistant to antimicrobial per meat type per site) / (total # isolates per meat type per site).
† Dashes indicate 0.0% resistance to antimicrobial.
‡ Grey areas indicate no isolates were recovered from that meat type for that site.
§ Two *C. lari* isolates from chicken breast in Oregon were excluded from analysis due to intrinsic resistance to quinolones. Ciprofloxacin % R calculated based on n = 43.

Table 25. Number of *Campylobacter* (N=479) Resistant to Multiple Antimicrobial Agents, 2003

Meat Type	***Antimicrobial Agents***			
	0	**1**	**2**	**3**
CB	283	159	22	5
GT	1	4	0	0
GB	1	0	0	0
PC	1	1	2	0
Total	**286**	**164**	**24**	**5**

Table 26. Overall *Enterococcus* Species Identified, 2003

	Species	n
1.	***E. faecalis***	1014
2.	***E. faecium***	575
3.	***E. hirae***	129
4.	***E. gallinarum***	12
5.	***E. durans***	8
6.	***E. avium***	3
7.	***E. casseliflavus***	1
	Total	**1742**

Table 27. *Enterococcus* Species by Meat Type, 2003

Species	***Chicken Breast***		***Ground Turkey***		***Ground Beef***		***Pork Chop***	
	n	**%***	**n**	**%**	**n**	**%**	**n**	**%**
E. faecalis (n=1014)	188	18.5%	289	28.5%	224	22.1%	313	30.9%
E. faecium (n=575)	248	43.1%	118	20.5%	112	19.5%	97	16.9%
E. hirae (n=129)	28	21.7%	3	2.3%	84	65.1%	14	10.9%
E. gallinarium (n=12)	0	-†	8	66.7%	4	33.3%	0	-
E. durans (n=8)	1	12.5%	0	-	7	87.5%	0	-
E. avium (n=3)	1	33.3%	0	-	0	-	2	66.7%
E. casseliflavus **(**n=1**)**	0	-	0	-	1	100.0%	0	-
Total (N=1742)	466	26.8%	418	24.0%	432	24.8%	426	24.5%

* Where % = (# isolates per species per meat) / (total # isolates per species).

† Dashes indicate no isolates of that species were isolated from that meat type.

Table 28. *Enterococcus* Species by Site and Meat Type, 2003

Site	Species	Chicken Breast		Ground Turkey		Ground Beef		Pork Chop	
		n	*%*[*]	*n*	*%*	*n*	*%*	*n*	*%*
GA	*E. faecalis* (n=421)	99	23.5%	118	28.0%	95	22.6%	109	25.9%
	E. faecium (n=32)	16	50.0%	1	3.1%	10	31.3%	5	15.6%
	E. hirae (n=18)	4	22.2%		-[†]	12	66.7%	2	11.1%
	E. gallinarum (n=2)		-	1	50.0%	1	50.0%		-
	E. durans (n=1)		-		-	1	100.0%		-
	Total (n=474)	**119**	**25.1%**	**120**	**25.3%**	**119**	**25.1%**	**116**	**24.5%**
MD	*E. faecalis* (n=110)	9	8.2%	33	30.0%	31	28.2%	37	33.6%
	E. faecium (n=233)	93	39.9%	64	27.5%	35	15.0%	41	17.6%
	E. hirae (n=43)	9	20.9%	3	7.0%	21	48.8%	10	23.3%
	E. gallinarum (n=5)		-	3	60.0%	2	40.0%		-
	E. durans (n=4)	1	25.0%		-	3	75.0%		-
	E. avium (n=3)	1	33.3%		-		-	2	66.7%
	Total (n=398)	**113**	**28.4%**	**103**	**25.9%**	**92**	**23.1%**	**90**	**22.6%**
OR	*E. faecalis* (n=248)	43	17.3%	72	29.0%	52	21.0%	81	32.7%
	E. faecium (n=149)	74	49.7%	32	21.5%	22	14.8%	21	14.1%
	E. hirae (n=38)	2	5.3%		-	35	92.1%	1	2.6%
	E. gallinarum (n=5)		-	4	80.0%	1	20.0%		-
	E. durans (n=1)		-		-	1	100.0%		-
	E. casseliflavus (n=1)		-		-	1	100.0%		-
	Total (n=442)	**119**	**26.9%**	**108**	**24.4%**	**112**	**25.3%**	**103**	**23.3%**
TN	*E. faecalis* (n=235)	37	15.7%	66	28.1%	46	19.6%	86	36.6%
	E. faecium (n=161)	65	40.4%	21	13.0%	45	28.0%	30	18.6%
	E. hirae (n=30)	13	43.3%		-	16	53.3%	1	3.3%
	E. durans (n=2)		-		-	2	100.0%		-
	Total (n=428)	**115**	**26.9%**	**87**	**20.3%**	**109**	**25.5%**	**117**	**27.3%**

[*] Where % = (# isolates per species per meat type per site) / (total # isolates per species per site).
[†] Dashes indicate no isolates for that species were isolated from that meat type.

Table 29. *Enterococcus* Isolates by Month for All Sites, 2003

Month	*n*	*%*[*]
January	154	8.8%
February	146	8.4%
March	139	8.0%
April	145	8.3%
May	144	8.3%
June	147	8.4%
July	139	8.0%
August	154	8.8%
September	129	7.4%
October	155	8.9%
November	148	8.5%
December	142	8.2%
Total (N)	**1742**	**100.0%**

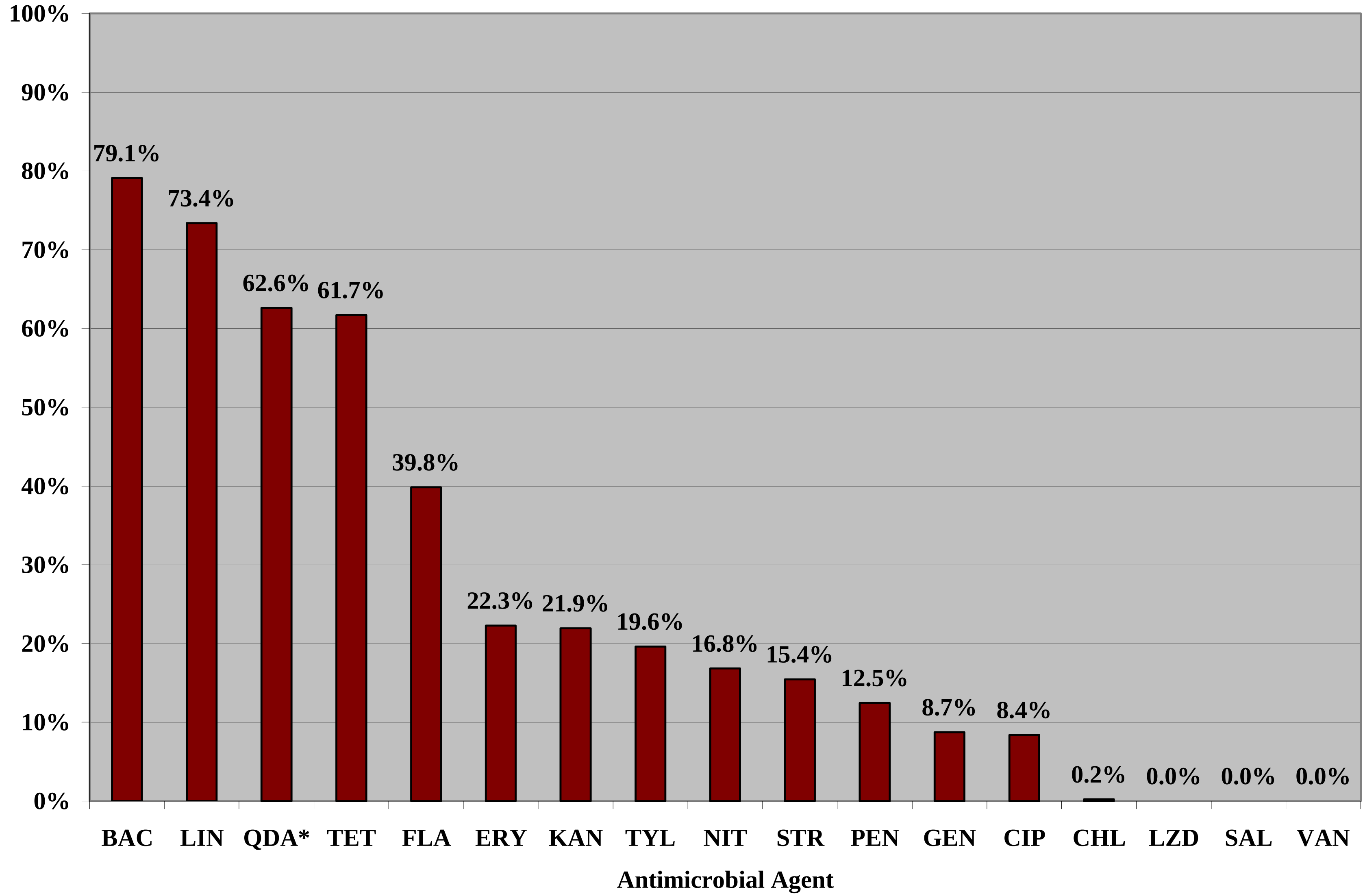
[*] Where % = (n / N).

Table 30. Antimicrobial Resistance (%R) among *Enterococcus* Isolates (N=1742), 2003

Antimicrobial Agent	n	%R*
Bacitracin	1378	79.1%
Lincomycin	1278	73.4%
Tetracycline	1075	61.7%
Flavomycin	694	39.8%
Quinupristin-Dalfopristin†	456	62.6%
Erythromycin	388	22.3%
Kanamycin	382	21.9%
Tylosin	342	19.6%
Penicillin	217	12.5%
Streptomycin	269	15.4%
Nitrofurantoin	293	16.8%
Ciprofloxacin	146	8.4%
Gentamicin	152	8.7%
Chloramphenicol	4	0.2%
Salinomycin	0	0.0%
Linezolid	0	0.0%
Vancomycin	0	0.0%

* Where % R = (n / N).
† Presented for all species except *E. faecalis* (n = 1014).

Figure 12. Antimicrobial Resistance among *Enterococcus* Isolates (N=1742), 2003



*** Presented for all species except *E. faecalis* in QDA (N=1742-1014=728 non- *faecalis*)**

Figure 13. MIC Distribution among all Antimicrobial Agents

***Enterococcus* from All Meats (N=1742)**		Distribution (%) of MICs (in µg/ml)																		
Antimicrobial Agent	**%R†**	**0.015**	**0.03**	**0.06**	**0.125**	**0.25**	**0.5**	**1**	**2**	**4**	**8**	**16**	**32**	**64**	**128**	**256**	**512**	**1024**	**2048**	**>2048**
Bacitracin*	**79.1%**										2.5	2.6	3.8	11.9	**25.7**	**53.4**				
Chloramphenicol	**0.2%**								0.2	6.4	92.1	1.1		**0.2**						
Ciprofloxacin	**8.4%**				0.1	2.5	12.6	55.2	21.2	**6.9**	**1.4**									
Erythromycin	**22.3%**						33.9	27.7	8.4	7.7	**1.5**	**20.8**								
Tylosin*	**19.6%**					0.1	0.2	2.2	51.3	23.4	3.1	0.2		**19.6**						
Gentamicin	**8.7%**														91.1	0.2	**0.4**	**0.9**	**7.5**	
Kanamycin*	**21.9%**														66.7	11.4	**7.0**	**1.5**	**13.4**	
Streptomycin*	**15.4%**																84.6	**2.6**	**2.8**	**10.1**
Lincomycin*	**73.4%**							6.8	0.4	0.2	5.6	13.6	**40.9**	**32.5**						
Linezolid	**0.0%**						0.1	3.1	96.2	0.6										
Nitrofurantoin	**16.8%**									0.1	34.2	24.2	5.3	19.5	**10.6**	**6.2**				
Flavomycin*	**39.8%**							23.4	31.5	4.1	0.6	0.6	**0.2**	**39.7**						
Salinomycin*	**0.0%**							57.7	18.7	13.7	9.9	0.1								
Penicillin	**12.5%**						5.3	2.3	8.9	65.7	5.3	**4.0**	**8.5**							
Tetracycline	**61.7%**									37.3	1.0	**1.0**	**4.0**	**56.7**						
Quinupristin/Dalfopristin↑	**62.6%**							14.6	22.8	**38.7**	**12.8**	**9.5**	**1.6**							
Vancomycin	**0.0%**						17.3	54.5	24.2	3.2	0.7									

Vertical bars show the CLSI/NCCLS Susceptible/Resistant breakpoints for each drug where appropriate.

*Currently no CLSI/NCCLS breakpoints have been established for this organism/antimicrobial combination.

†Discrepancies between %R and sums of distribution %s are due to rounding.

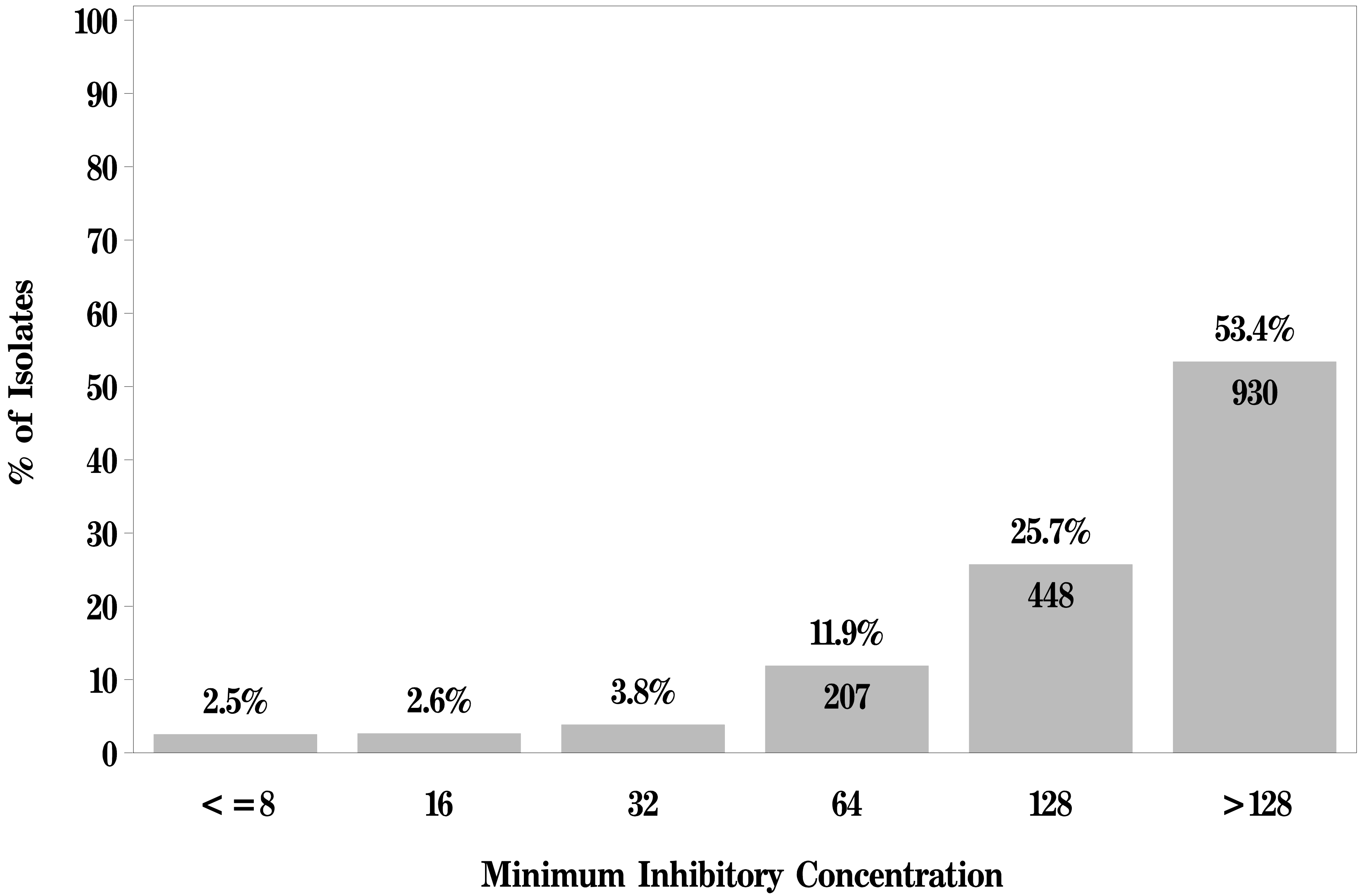
Unshaded areas indicate the dilution ranges of the Sensititre plate used to test the 2003 isolates.

↑ Presented for all species except *E. faecalis* in QDA (n=1742-1014= 728 non *E. faecalis*)

NARMS

Figure 13a: Minimum Inhibitory Concentration of Bacitracin for *Enterococcus* (N=1742 Isolates)

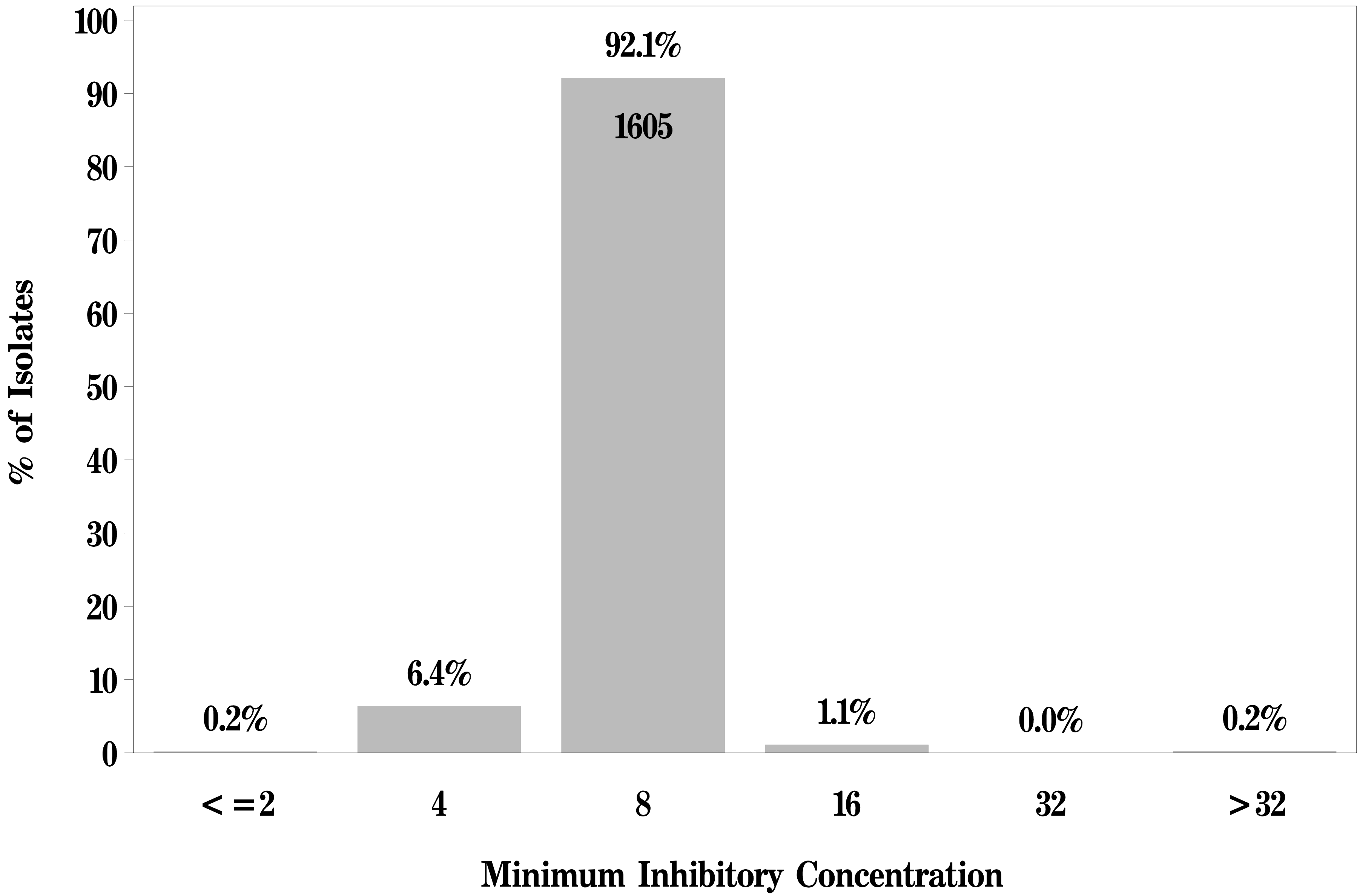
Breakpoints: Susceptible <=32 μg/mL Resistant >=128 μg/mL



NARMS

Figure 13b: Minimum Inhibitory Concentration of Chloramphenicol for *Enterococcus* (N=1742 Isolates)

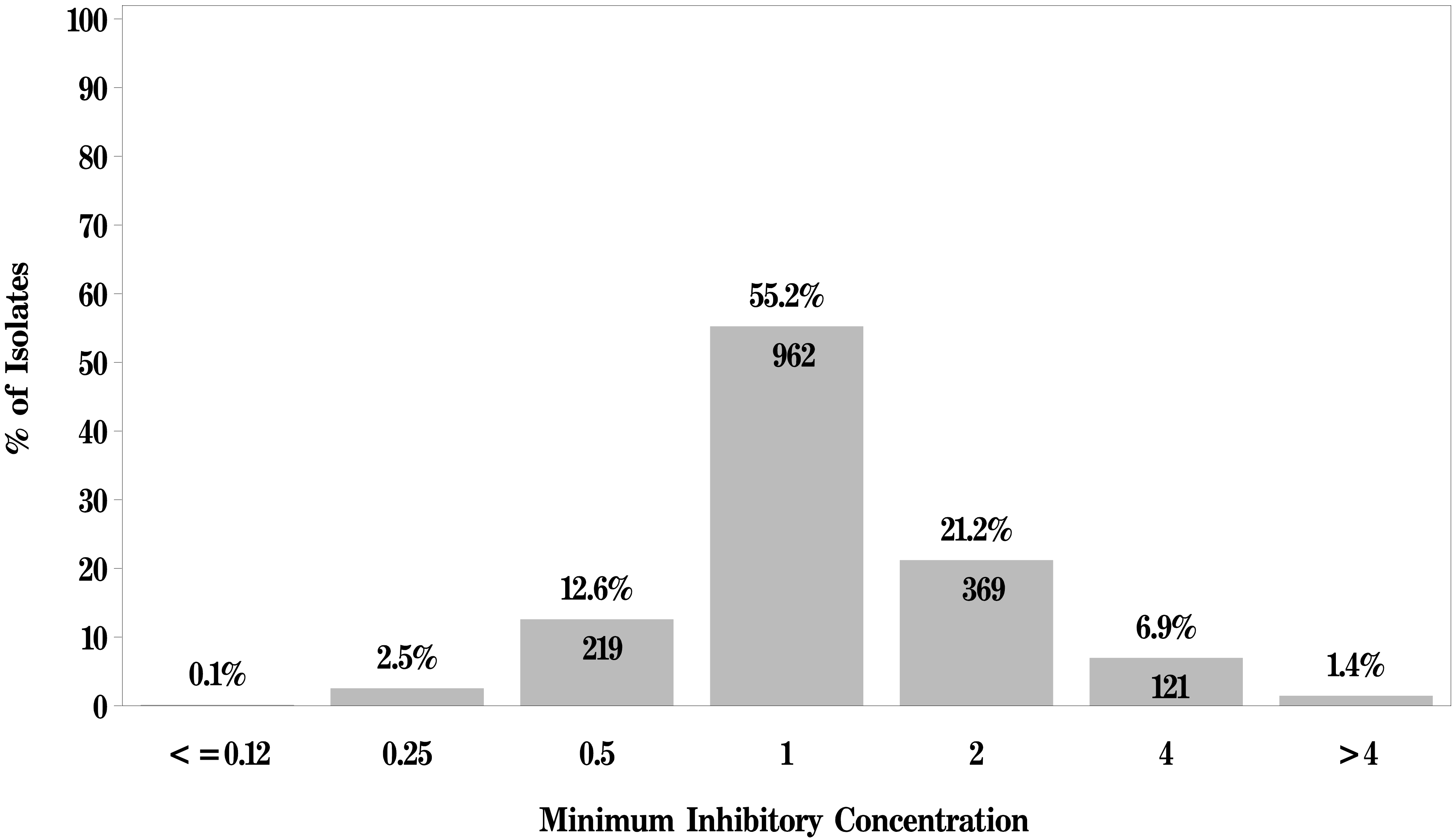
Breakpoints: Susceptible<=8 µg/mL Resistant>=32 µg/mL



NARMS

Figure 13c: Minimum Inhibitory Concentration of Ciprofloxacin for *Enterococcus* (N=1742 Isolates)

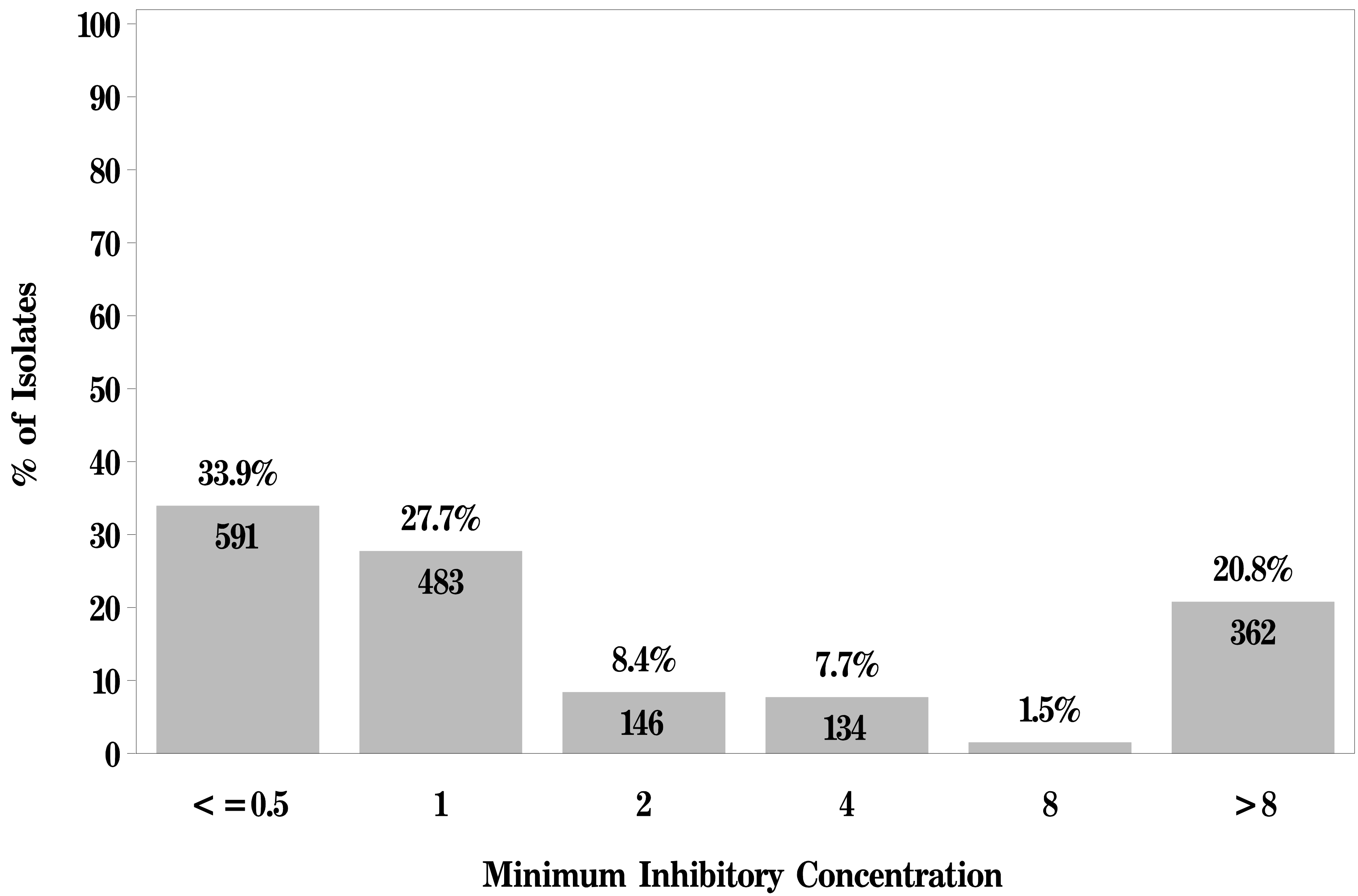
Breakpoints: Susceptible <=1 μg/mL Resistant >=4 μg/mL



NARMS

Figure 13d: Minimum Inhibitory Concentration of Erythromycin for *Enterococcus* (N=1742 Isolates)

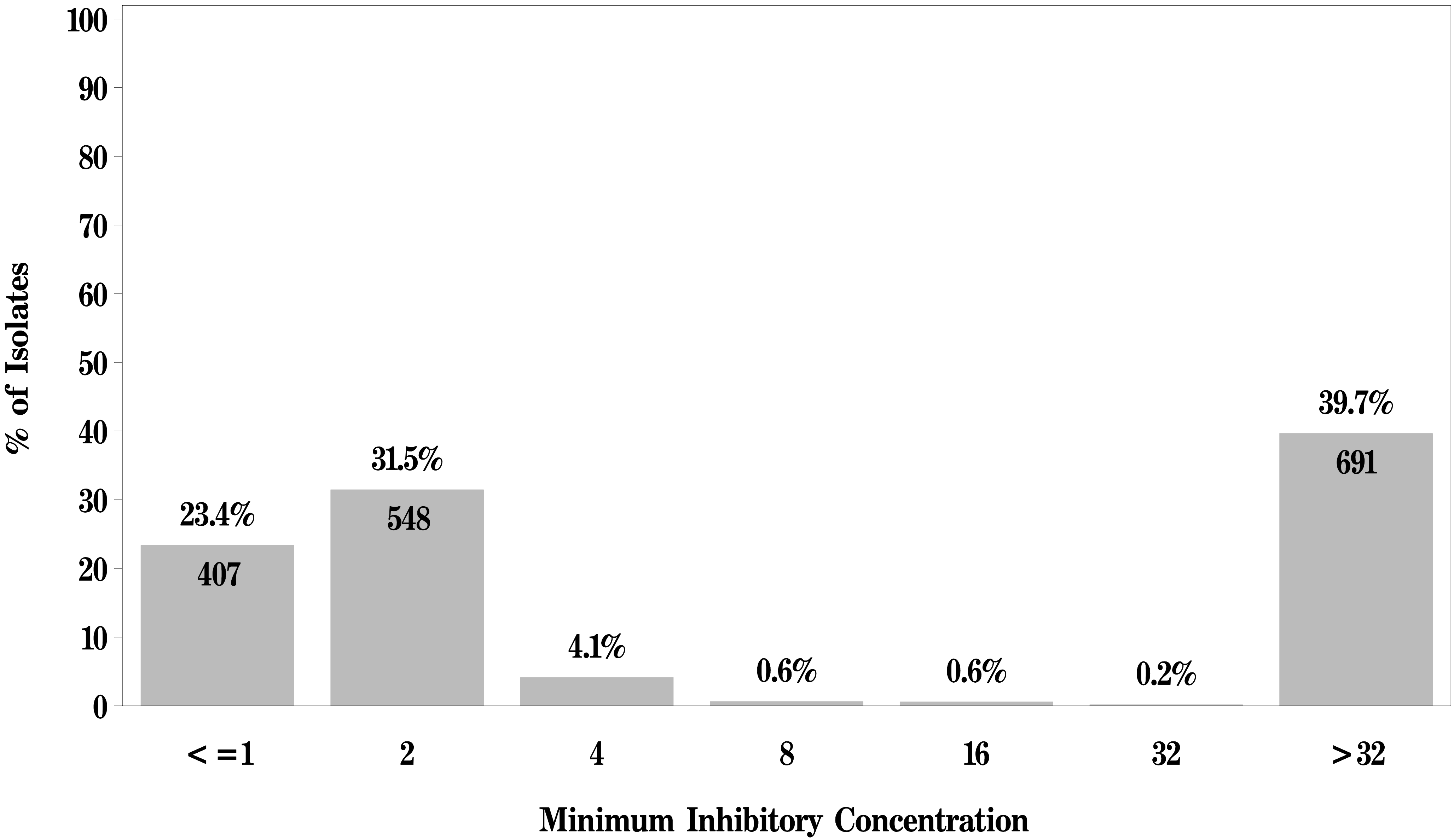
Breakpoints: Susceptible<=.5 μg/mL Resistant>=8 μg/mL



NARMS

Figure 13e: Minimum Inhibitory Concentration of Flavomycin for *Enterococcus* (N=1742 Isolates)

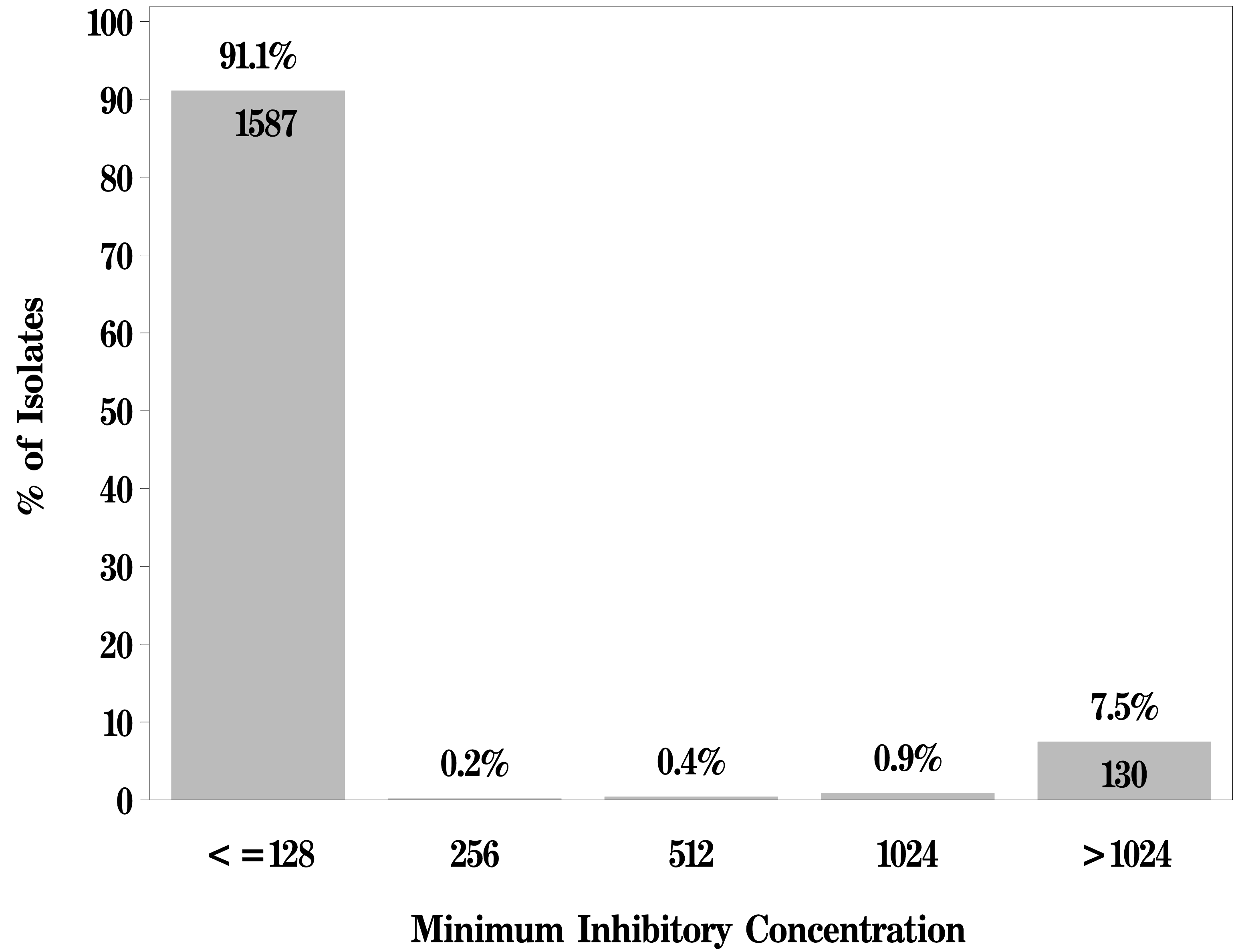
Breakpoints: Susceptible <=8 µg/mL Resistant >=32 µg/mL



NARMS

Figure 13f: Minimum Inhibitory Concentration of Gentamicin for *Enterococcus* (N=1742 Isolates)

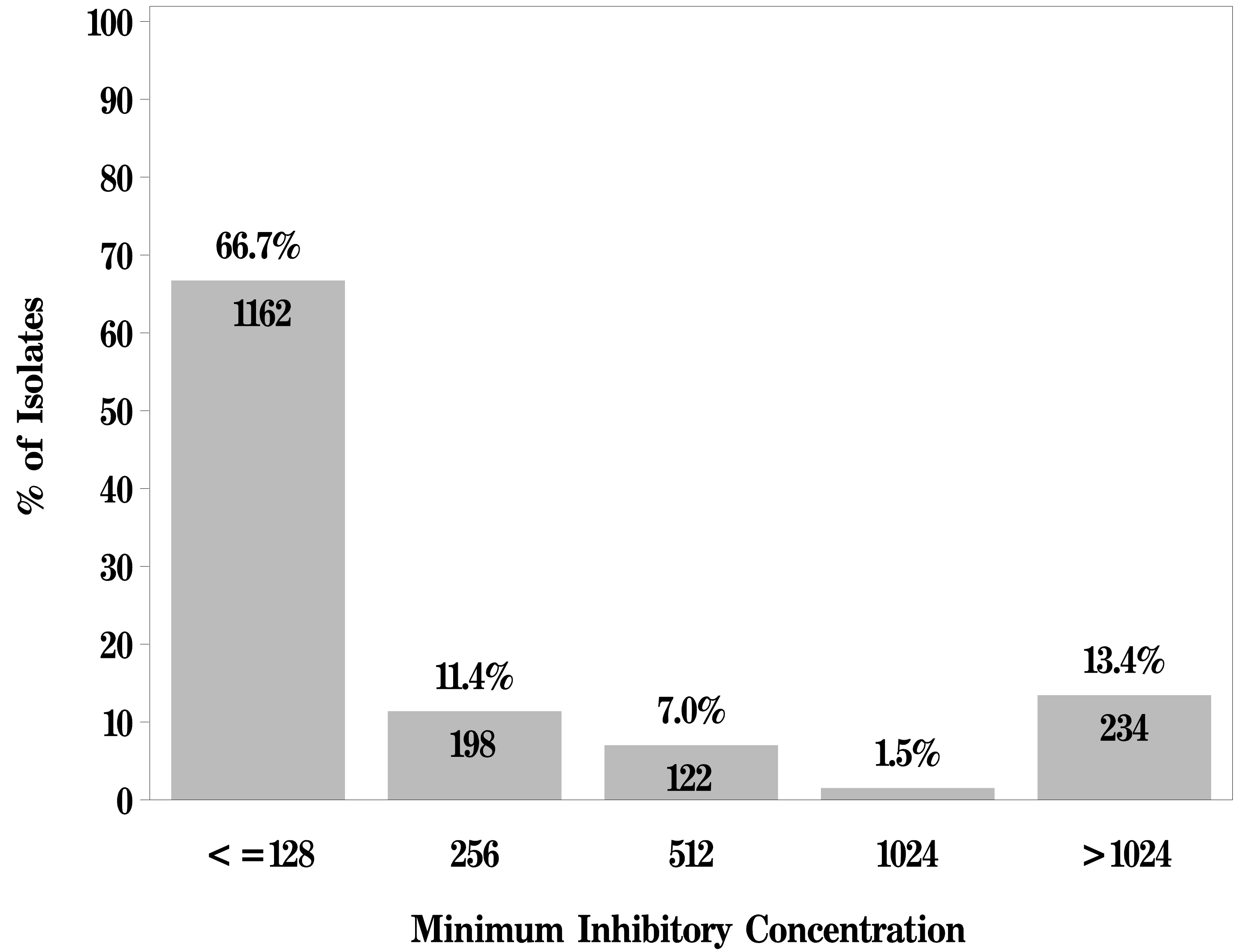
Breakpoints: Susceptible<500 μg/mL Resistant>=500 μg/mL



NARMS

Figure 13g: Minimum Inhibitory Concentration of Kanamycin for *Enterococcus* (N=1742 Isolates)

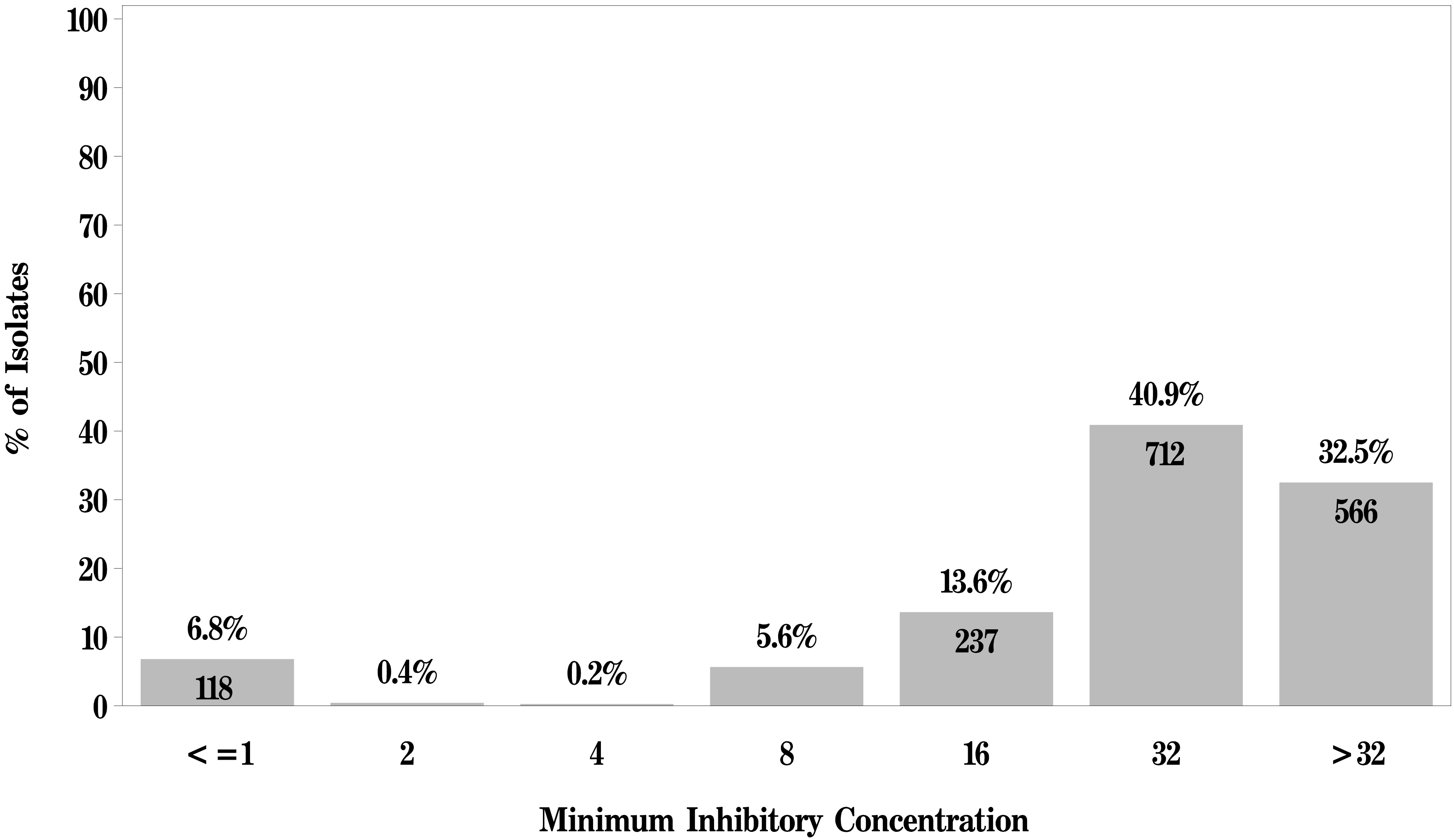
Breakpoints: Susceptible<=128 μg/mL Resistant>=512 μg/mL



NARMS

Figure 13h: Minimum Inhibitory Concentration of Lincomycin for *Enterococcus* (N=1742 Isolates)

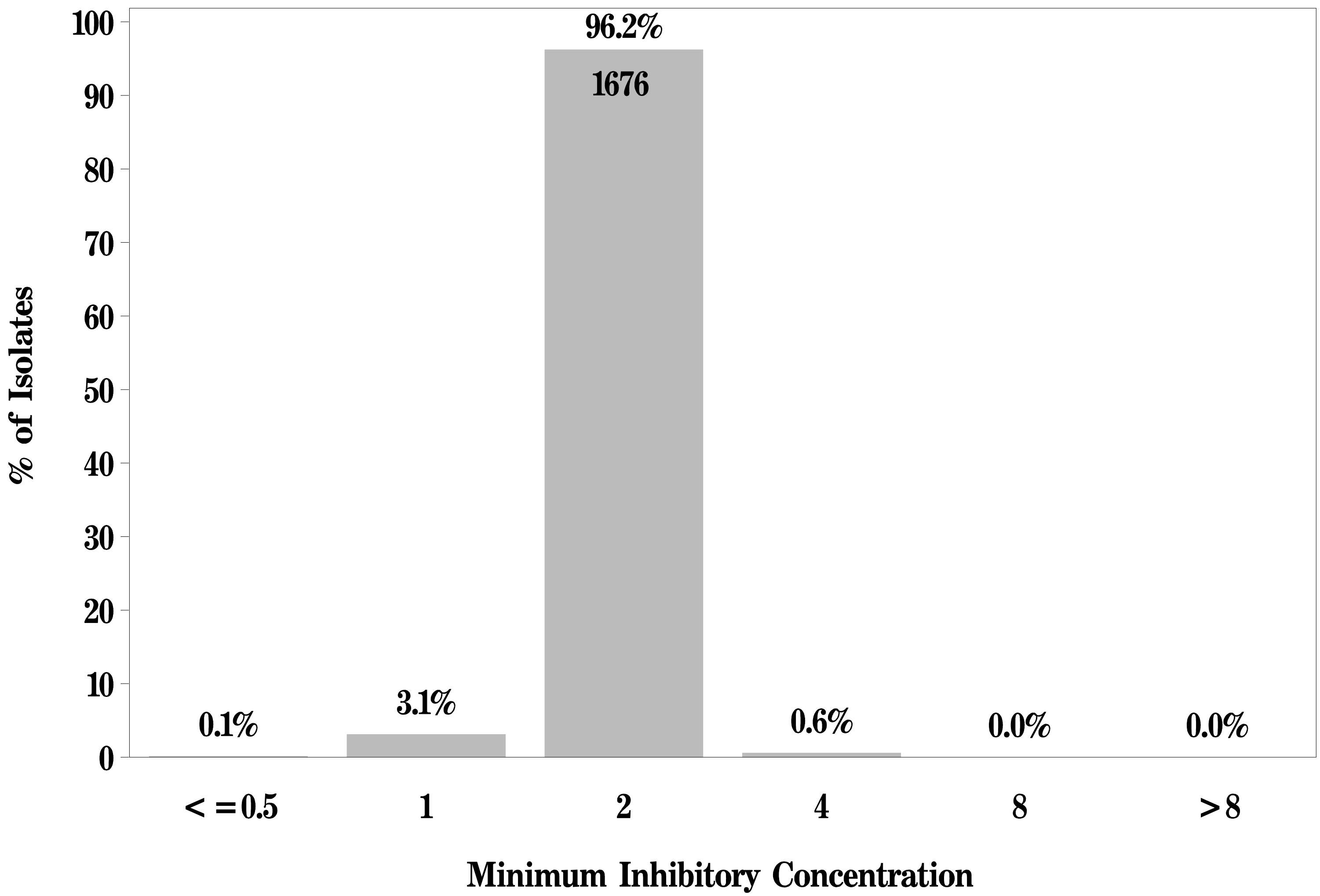
Breakpoints: Susceptible <=8 µg/mL Resistant >=32 µg/mL



NARMS

Figure 13i: Minimum Inhibitory Concentration of Linezolid for *Enterococcus* (N=1742 Isolates)

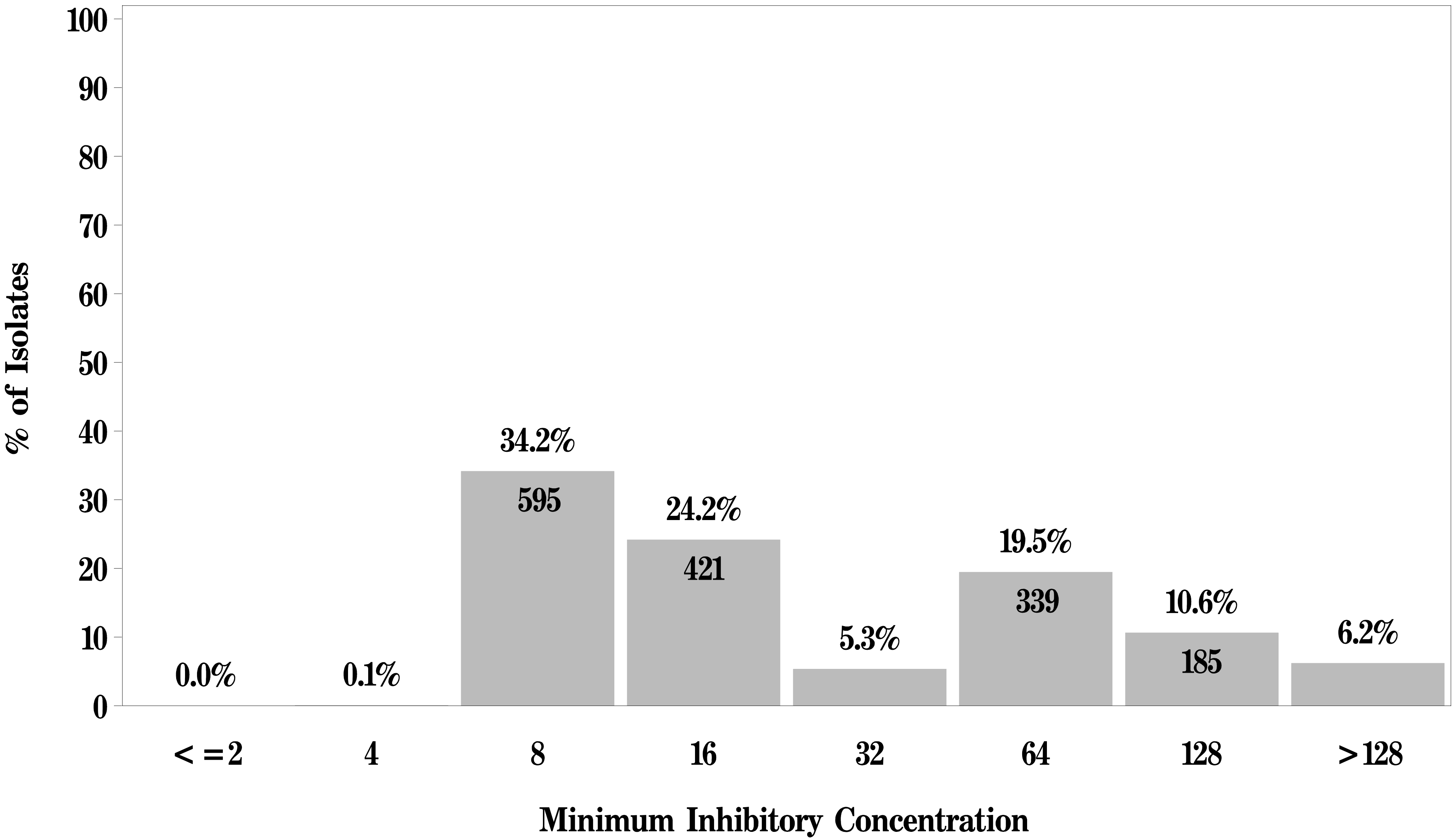
Breakpoints: Susceptible<=2 µg/mL Resistant>=8 µg/mL



NARMS

Figure 13j: Minimum Inhibitory Concentration of Nitrofurantoin for *Enterococcus* (N=1742 Isolates)

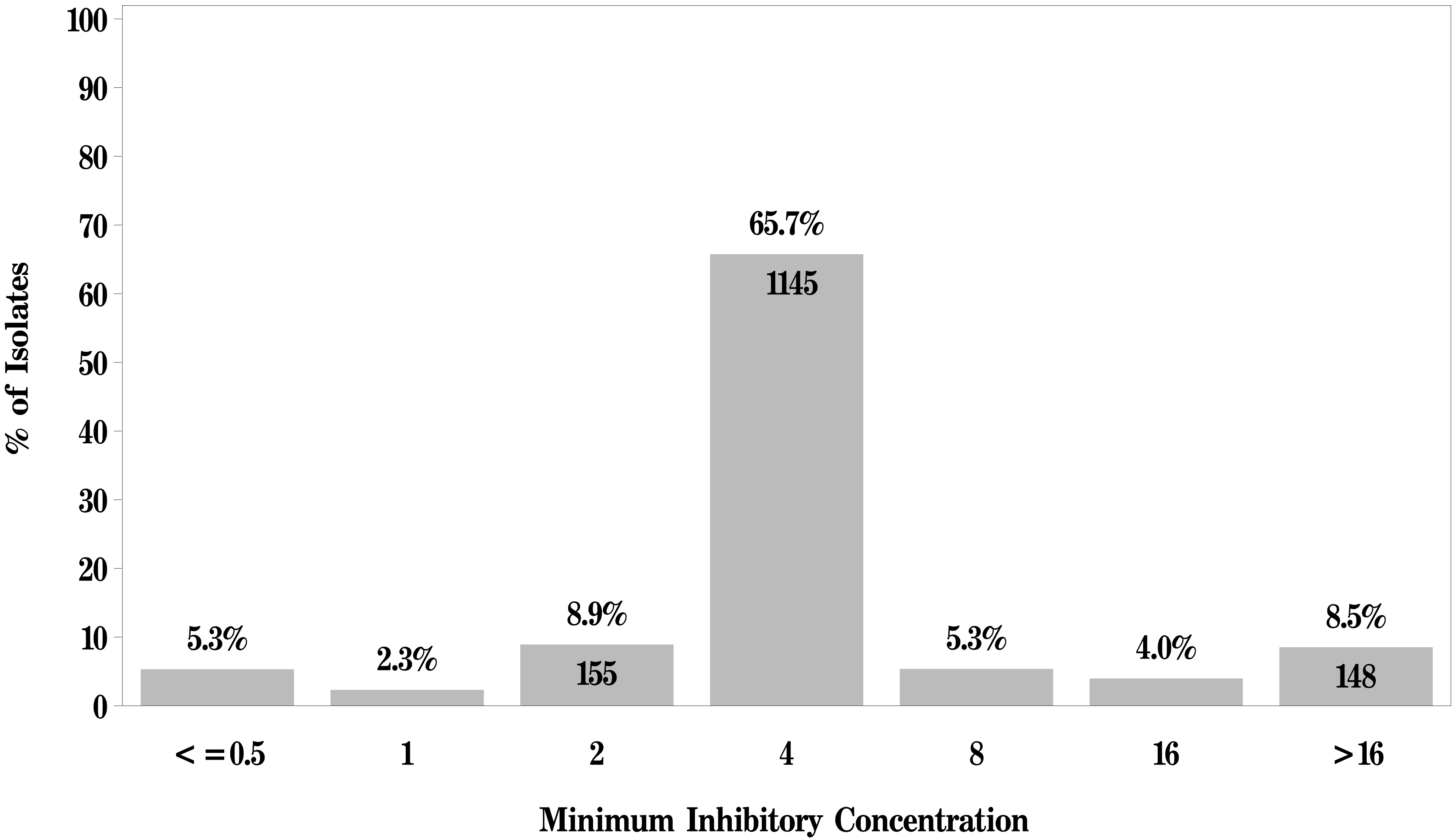
Breakpoints: Susceptible <=32 μg/mL Resistant >=128 μg/mL



NARMS

Figure 13k: Minimum Inhibitory Concentration of Penicillin for *Enterococcus* (N=1742 Isolates)

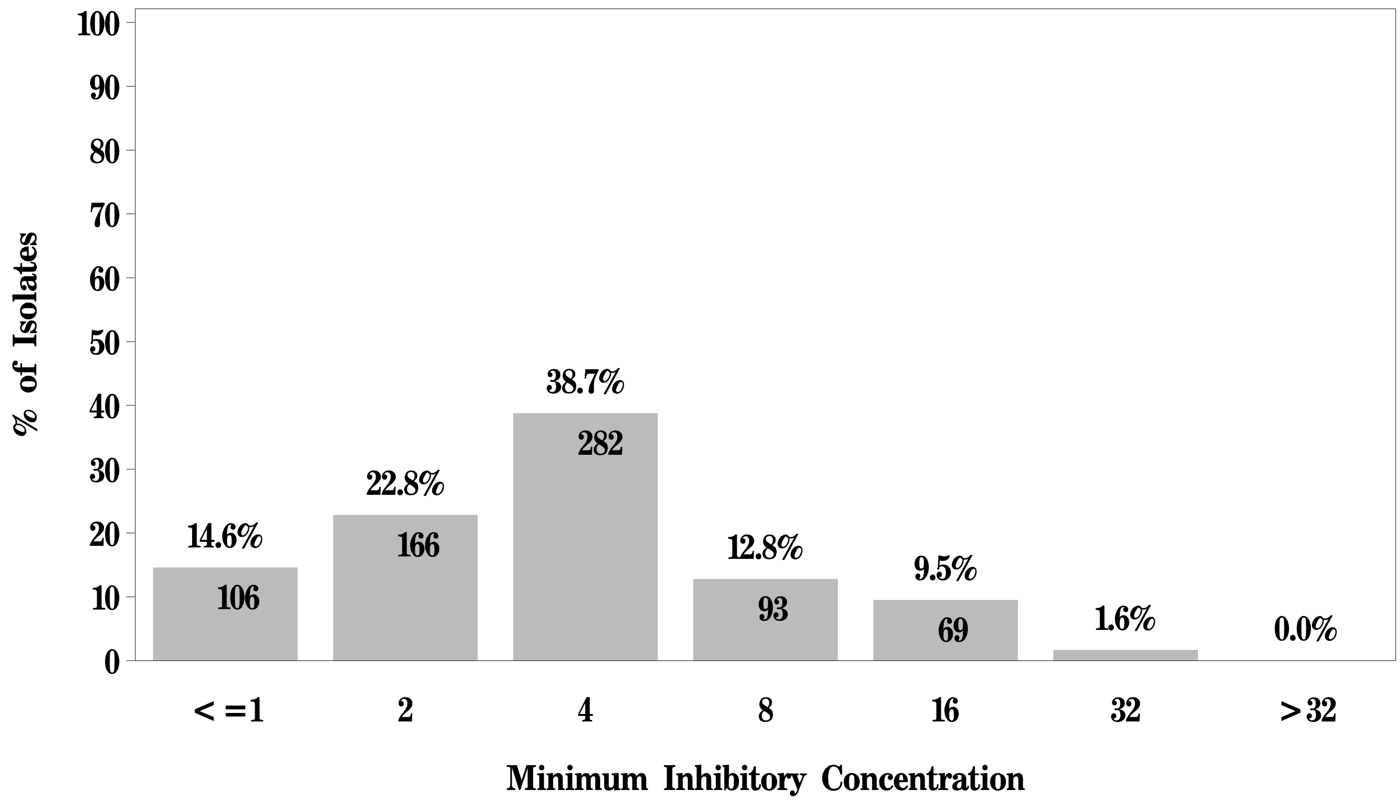
Breakpoints: Susceptible <=8 μg/mL Resistant >=16 μg/mL



NARMS

Figure 13l: Minimum Inhibitory Concentration of Quinupristin−dalfopristin* for *Enterococcus* (N=728 Isolates)

Breakpoints: Susceptible <=1 µg/mL Resistant >=4 µg/mL

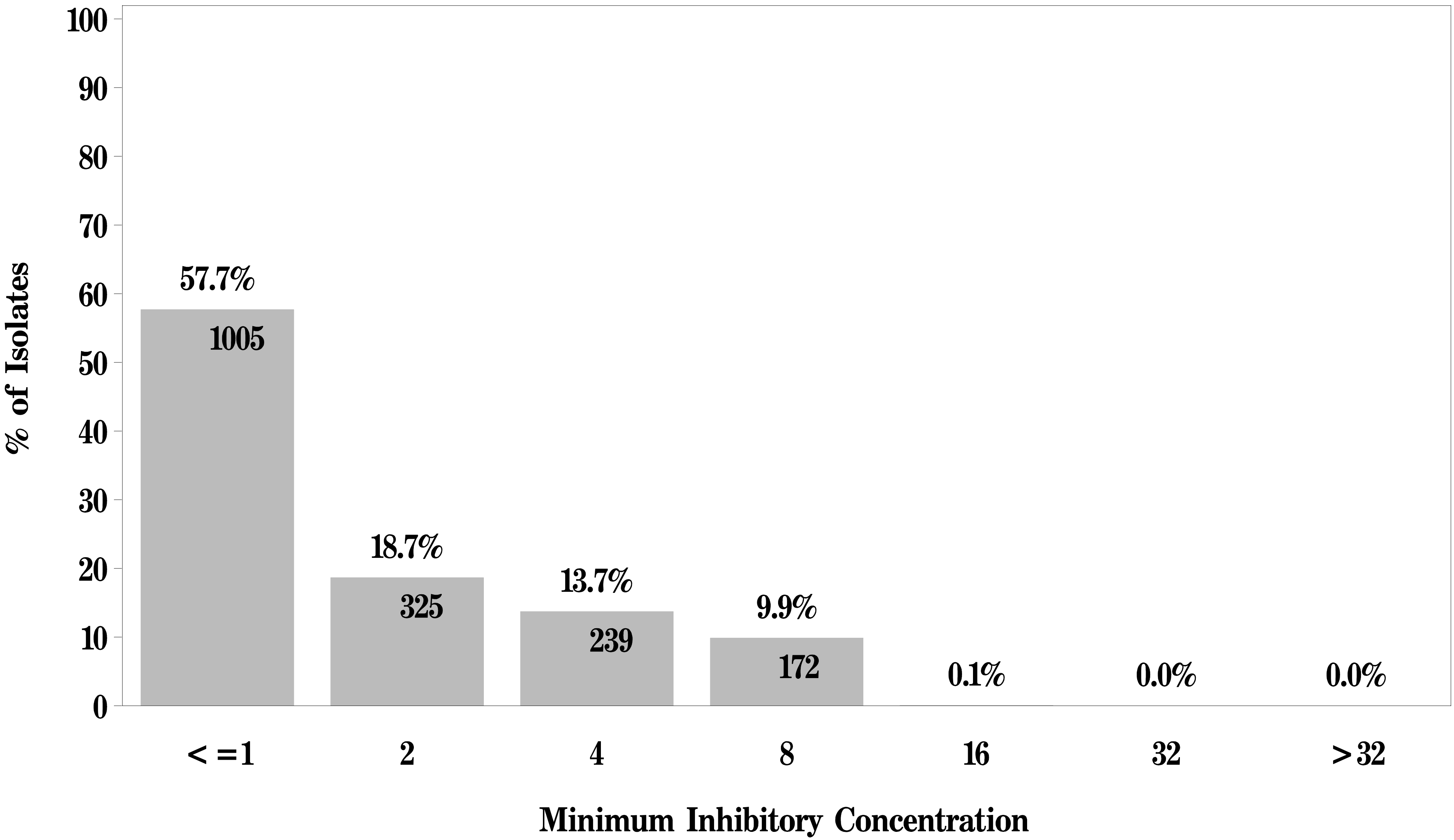


*Presented for all species except *E.faecalis* (N=1742−1014=728)

NARMS

Figure 13m: Minimum Inhibitory Concentration of Salinomycin for *Enterococcus* (N=1742 Isolates)

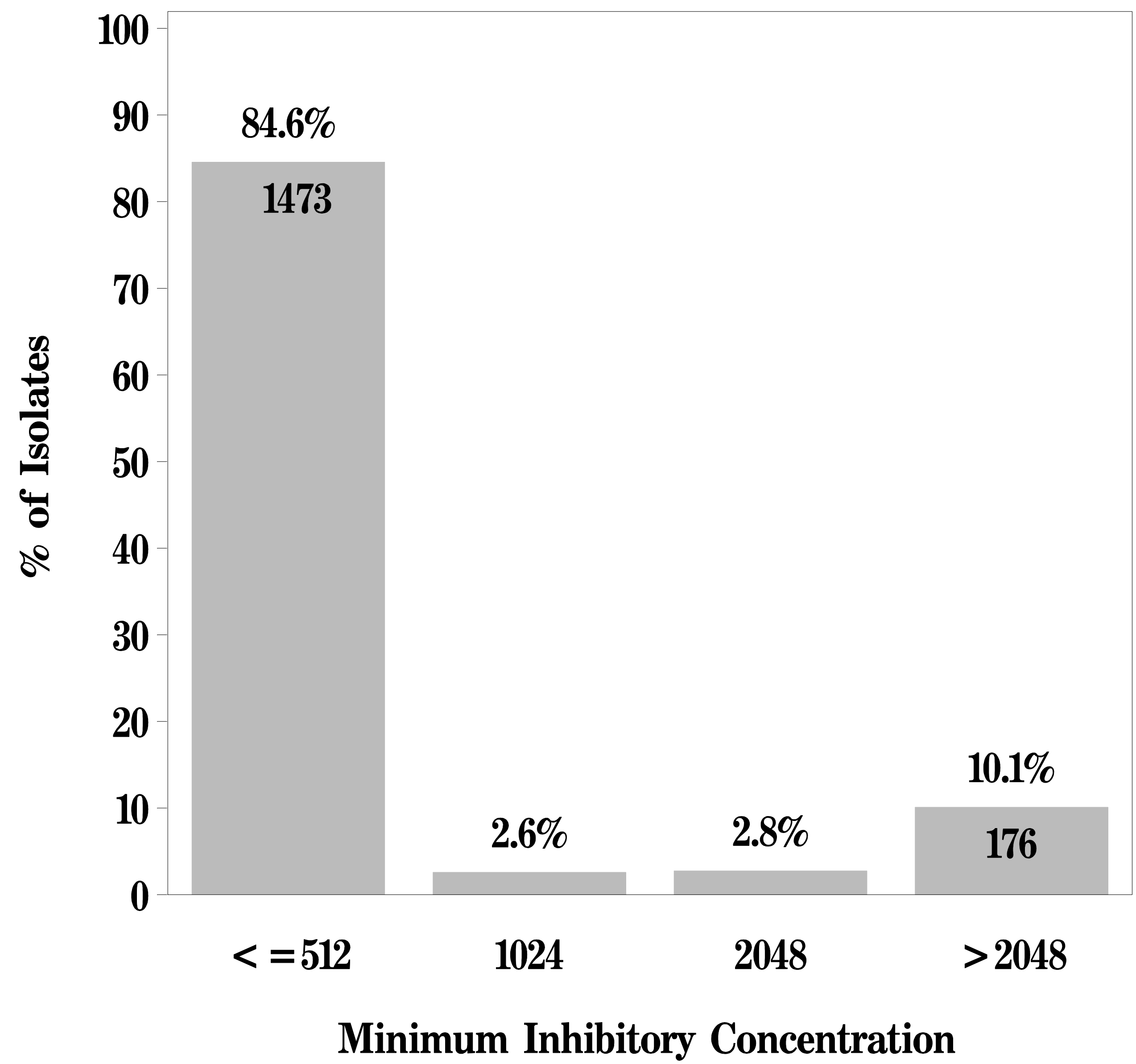
Breakpoints: Susceptible <=8 µg/mL Resistant >=32 µg/mL



NARMS

Figure 13n: Minimum Inhibitory Concentration of Streptomycin for *Enterococcus* (N=1742 Isolates)

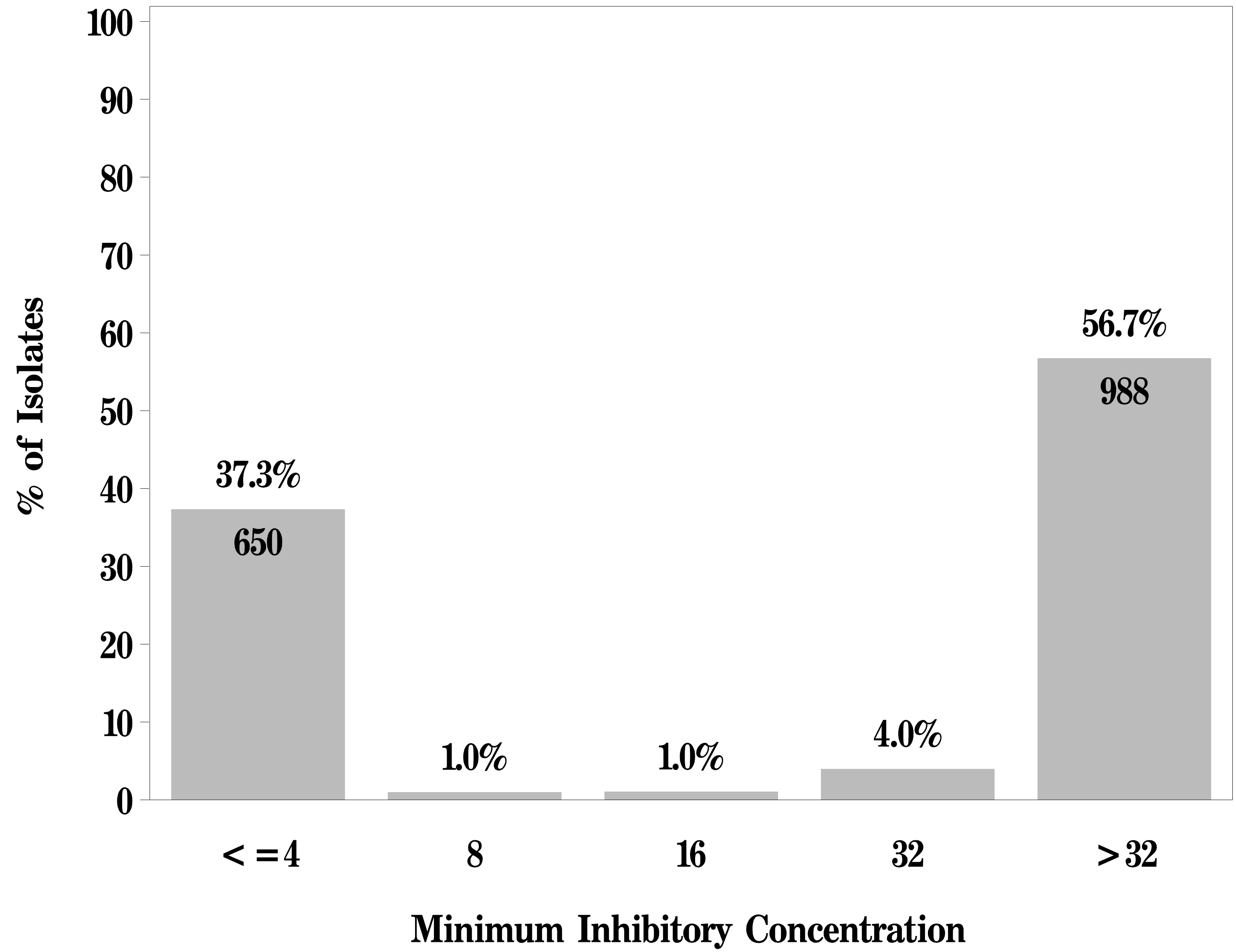
Breakpoints: Susceptible<1000 μg/mL Resistant>=1000 μg/mL



NARMS

Figure 13o: Minimum Inhibitory Concentration of Tetracycline for *Enterococcus* (N=1742 Isolates)

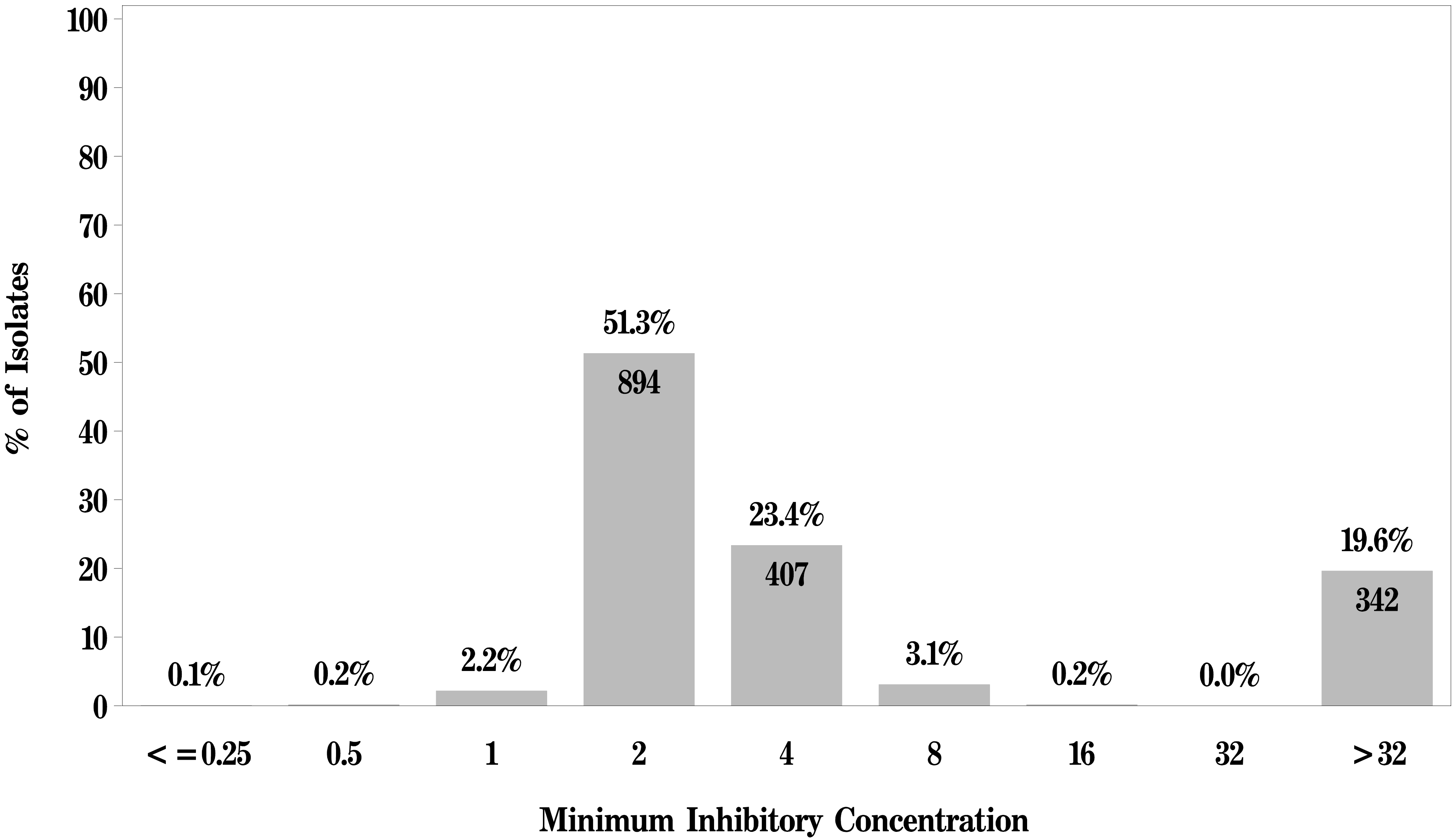
Breakpoints: Susceptible <=4 μg/mL Resistant >=16 μg/mL



NARMS

Figure 13p: Minimum Inhibitory Concentration of Tylosin for *Enterococcus* (N=1742 Isolates)

Breakpoints: Susceptible <=8 µg/mL Resistant >=32 µg/mL



NARMS

Figure 13q: Minimum Inhibitory Concentration of Vancomycin for *Enterococcus* (N=1742 Isolates)

Breakpoints: Susceptible <=4 μg/mL Resistant >=32 μg/mL

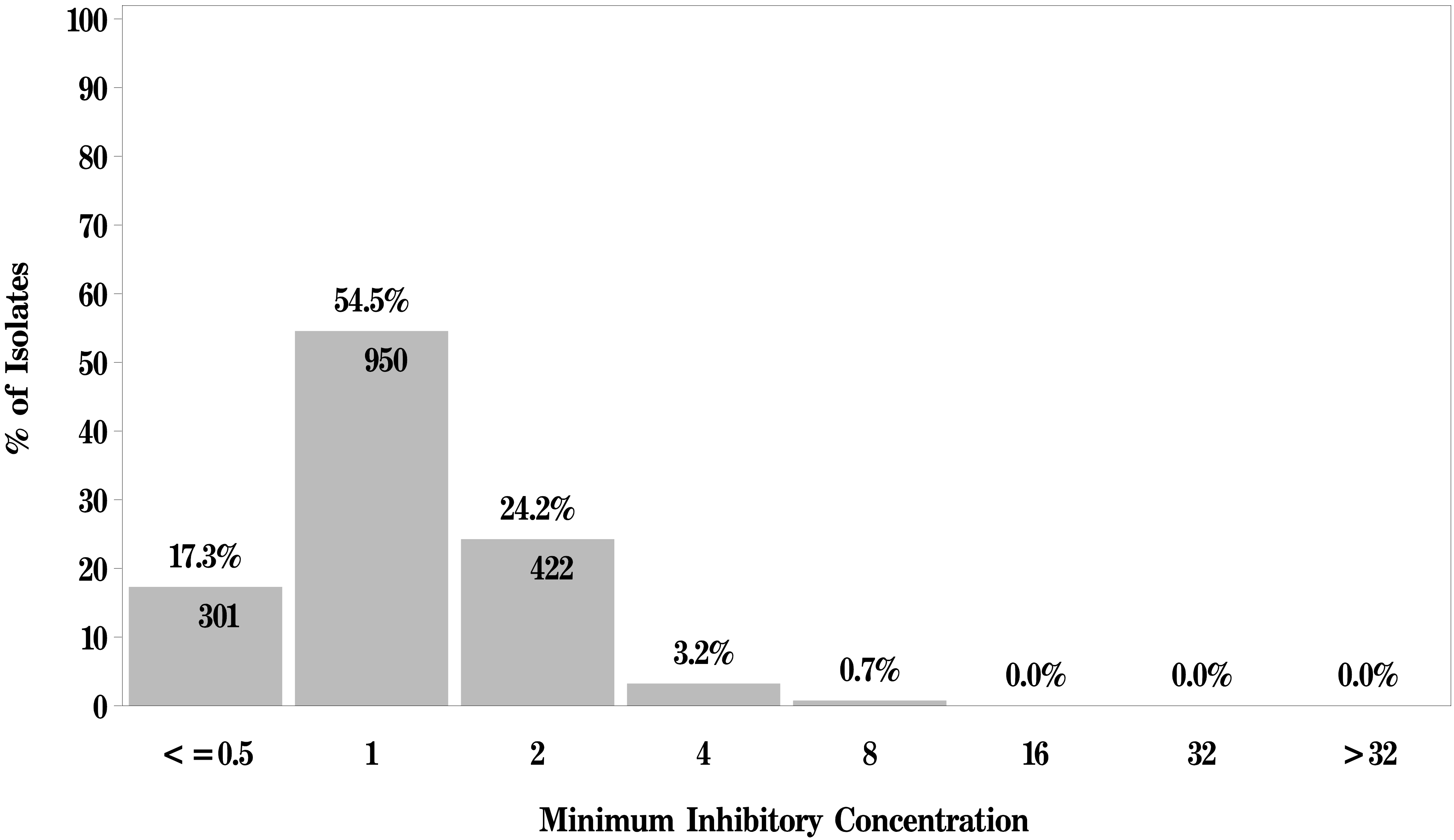


Table 31. Antimicrobial Resistance* among *Enterococcus* by Meat Type for all Sites, 2003

Antimicrobial Agent	*Chicken Breast (N=466)*		*Ground Turkey (N=418)*		*Ground Beef (N=432)*		*Pork Chop (N=426)*	
	n	***%****	***n***	***%***	***n***	***%***	***n***	***%***
Bacitracin	438	94.0%	378	90.4%	284	65.7%	278	65.3%
Lincomycin	364	78.1%	363	86.8%	266	61.6%	285	66.9%
Quinupristin-Dalfopristin†‡	172	61.9%	103	79.8%	113	54.3%	68	60.2%
Tetracycline	276	59.2%	365	87.3%	120	27.8%	314	73.7%
Flavomycin	268	57.5%	125	29.9%	201	46.5%	100	23.5%
Erythromycin	145	31.1%	180	43.1%	34	7.9%	29	6.8%
Kanamycin	147	31.5%	165	39.5%	42	9.7%	28	6.6%
Tylosin	131	28.1%	161	38.5%	25	5.8%	25	5.9%
Nitrofurantoin	166	35.6%	66	15.8%	43	10.0%	18	4.2%
Streptomycin	99	21.2%	126	30.1%	18	4.2%	26	6.1%
Penicillin	130	27.9%	77	18.4%	9	2.1%	1	0.2%
Gentamicin	52	11.2%	95	22.7%	4	0.9%	1	0.2%
Ciprofloxacin	54	11.6%	47	11.2%	38	8.8%	7	1.6%
Chloramphenicol	0	-§	0	-	0	-	4	0.9%
Linezolid	0	-	0	-	0	-	0	-
Salinomycin	0	-	0	-	0	-	0	-
Vancomycin	0	-	0	-	0	-	0	-

* Where % Resistance = (# isolates per meat type resistant to antimicrobial) / (total # isolates per meat type).
† Data presented for all species except *E. faecalis*, which is considered intrinsically resistant to Quinupristin-Dalfopristin.
‡ Number of *E. faecalis* in CB = 188, GT = 289, GB =224, PC = 313.
§ Dashes indicate 0.0% resistance to antimicrobial.

Figure 14a. MIC Distribution among *Enterococcus* from Chicken Breast

Enterococcus **from Chicken Breast (N=466)**		**Distribution (%) of MICs (in µg/ml)**																		
Antimicrobial Agent	**%R**	**0.015**	**0.03**	**0.06**	**0.125**	**0.25**	**0.5**	**1**	**2**	**4**	**8**	**16**	**32**	**64**	**128**	**256**	**512**	**1024**	**2048**	**>2048**
Bacitracin*	**94.0%**										0.4	0.2	0.9	4.5	**18.2**	**75.8**				
Chloramphenicol	**0.0%**								0.2	5.6	93.3	0.9								
Ciprofloxacin	**11.6%**				0.2	3.2	7.7	50.4	26.8	**10.5**	**1.1**									
Erythromycin	**31.1%**						36.5	16.5	9.0	6.9	**1.3**	**29.8**								
Tylosin*	**28.1%**							1.1	35.8	30.9	3.6	0.4		**28.1**						
Gentamicin	**11.2%**														88.4	0.4	**1.1**	**2.4**	**7.7**	
Kanamycin*	**31.5%**														45.5	23.0	**13.3**	**2.8**	**15.5**	
Streptomycin*	**21.2%**																78.8	**5.4**	**5.2**	**10.7**
Lincomycin*	**78.1%**							6.9		0.4	2.8	11.8	**18.2**	**59.9**						
Linezolid	**0.0%**							3.0	96.1	0.9										
Nitrofurantoin	**35.6%**										22.5	15.5	5.6	20.8	**15.0**	**20.6**				
Flavomycin*	**57.5%**							16.7	22.3	1.7	0.6	1.1		**57.5**						
Salinomycin*	**0.0%**							25.1	12.7	32.8	29.2	0.2								
Penicillin	**27.9%**						1.3	0.4	7.1	54.5	8.8	**10.1**	**17.8**							
Tetracycline	**59.2%**									38.8	1.9	**1.9**	**6.9**	**50.4**						
Quinupristin/Dalfopristin↑	**61.9%**							11.9	26.3	**33.1**	**15.5**	**10.8**	**2.5**							
Vancomycin	**0.0%**						19.1	60.9	17.8	2.1										

Vertical bars show the CLSI/NCCLS Susceptible/Resistant breakpoints for each drug where appropriate.

*Currently no CLSI/NCCLS breakpoints have been established for this organism/antimicrobial combination.

†Discrepancies between %R and sums of distribution %s are due to rounding.

Unshaded areas indicate the dilution ranges of the Sensititre plate used to test the 2003 isolates.

↑ Presented for all species except *E. faecalis* in QDA (n=466-188= 278 non *E. faecalis*)

Figure 14b. MIC Distribution among *Enterococcus* from Ground Turkey

Enterococcus from Ground Turkey (N=418)		Distribution (%) of MICs (in µg/ml)																		
Antimicrobial Agent	**%R**	**0.015**	**0.03**	**0.06**	**0.125**	**0.25**	**0.5**	**1**	**2**	**4**	**8**	**16**	**32**	**64**	**128**	**256**	**512**	**1024**	**2048**	**>2048**
Bacitracin*	**90.4%**										0.7		1.4	**7.4**	19.1	71.3				
Chloramphenicol	**0.0%**								0.2	5.5	92.1	2.2								
Ciprofloxacin	**11.2%**					1.0	9.1	56.0	22.7	**8.6**	**2.6**									
Erythromycin	**43.1%**						28.0	22.7	3.8	2.4	**2.2**	**40.9**								
Tylosin*	**38.5%**							0.5	41.1	18.7	1.2			**38.5**						
Gentamicin	**22.7%**														77.0	0.2	**0.2**	**0.7**	**21.8**	
Kanamycin*	**39.5%**														51.4	9.1	**6.2**	**1.0**	**32.3**	
Streptomycin*	**30.1%**																69.9	**3.1**	**3.6**	**23.4**
Lincomycin*	**86.8%**							3.3	0.5		0.7	8.6	**34.9**	**51.9**						
Linezolid	**0.0%**							6.5	93.1	0.5										
Nitrofurantoin	**15.8%**										44.3	23.9	1.9	14.1	**13.9**	**1.9**				
Flavomycin*	**29.9%**							28.2	35.4	4.8	1.0	0.7	**0.5**	**29.4**						
Salinomycin*	**0.0%**							68.2	9.6	16.7	5.5									
Penicillin	**18.4%**						1.0	0.5	9.1	67.7	3.3	**4.1**	**14.4**							
Tetracycline	**87.3%**									12.2	0.5	**1.0**	**2.4**	**84.0**						
Quinupristin/Dalfopristin↑	**79.8%**							7.0	13.2	**28.7**	**20.9**	**27.1**	**3.1**							
Vancomycin	**0.0%**						6.7	55.7	30.1	5.5	1.9									

Vertical bars show the CLSI/NCCLS Susceptible/Resistant breakpoints for each drug where appropriate.

*Currently no CLSI/NCCLS breakpoints have been established for this organism/antimicrobial combination.

†Discrepancies between %R and sums of distribution %s are due to rounding.

Unshaded areas indicate the dilution ranges of the Sensititre plate used to test the 2003 isolates.

↑ Presented for all species except *E. faecalis* in QDA (n=418-289= 129 non *E. faecalis*)

Figure 14c. MIC Distribution among *Enterococcus* from Ground Beef

Enterococcus from Ground Beef (N=432)		Distribution (%) of MICs (in µg/ml)																		
Antimicrobial Agent	**%R**	**0.015**	**0.03**	**0.06**	**0.125**	**0.25**	**0.5**	**1**	**2**	**4**	**8**	**16**	**32**	**64**	**128**	**256**	**512**	**1024**	**2048**	**>2048**
Bacitracin*	**65.7%**										7.2	9.5	5.1	12.5	**32.9**	**32.9**				
Chloramphenicol	**0.0%**									10.0	89.4	0.7								
Ciprofloxacin	**8.8%**					3.2	22.0	45.4	20.6	**6.7**	**2.1**									
Erythromycin	**79.0%**						40.0	32.2	10.9	9.0	1.6	**6.3**								
Tylosin*	**5.8%**							4.6	63.0	20.6	5.8	0.2		**5.8**						
Gentamicin	**0.9%**														99.1			**0.2**	**0.7**	
Kanamycin*	**9.7%**														83.6	6.7	**5.3**	**1.6**	**2.8**	
Streptomycin*	**4.2%**																95.8	**1.4**	**1.2**	**1.6**
Lincomycin*	**61.6%**							12.7	1.2	0.2	5.6	18.8	**54.4**	**7.2**						
Linezolid	**0.0%**						0.2	0.9	97.9	0.9										
Nitrofurantoin	**10.0%**										30.6	22.9	10.6	25.9	**9.3**	**0.7**				
Flavomycin*	**46.5%**							21.8	26.9	4.4	0.2	0.2	**0.2**	**46.3**						
Salinomycin*	**0.0%**							61.1	33.8	2.8	2.3									
Penicillin	**2.1%**						6.5	6.5	13.2	65.3	6.5	**1.2**	**0.9**							
Tetracycline	**27.8%**									71.5	0.7	**0.2**	**2.8**	**24.8**						
Quinupristin/Dalfopristin↑	**54.3%**							25.0	20.7	**47.6**	**5.3**	**1.4**								
Vancomycin	**0.0%**						26.4	49.3	21.3	1.9	1.2									

Vertical bars show the CLSI/NCCLS Susceptible/Resistant breakpoints for each drug where appropriate.

*Currently no CLSI/NCCLS breakpoints have been established for this organism/antimicrobial combination.

†Discrepancies between %R and sums of distribution %s are due to rounding.

Unshaded areas indicate the dilution ranges of the Sensititre plate used to test the 2003 isolates.

↑ Presented for all species except *E. faecalis* in QDA (n=432-224= 208 non *E. faecalis*)

Figure 14d. MIC Distribution among *Enterococcus* from Pork Chops

Enterococcus from Pork Chops (N=426)		Distribution (%) of MICs (in µg/ml)																		
Antimicrobial Agent	**%R**	**0.015**	**0.03**	**0.06**	**0.125**	**0.25**	**0.5**	**1**	**2**	**4**	**8**	**16**	**32**	**64**	**128**	**256**	**512**	**1024**	**2048**	**>2048**
Bacitracin*	**73.7%**										1.9	0.9	8.2	23.7	**33.1**	**32.2**				
Chloramphenicol	**0.9%**								0.2	4.5	93.7	0.7		**0.9**						
Ciprofloxacin	**1.6%**				0.2	2.6	11.7	69.7	14.1	**1.6**										
Erythromycin	**6.8%**						30.8	40.4	9.6	12.4	**0.9**	**5.9**								
Tylosin*	**5.9%**					0.2	0.7	2.6	66.4	22.5	1.6			**5.9**						
Gentamicin	**0.2%**														99.8		**0.2**			
Kanamycin*	**6.6%**														87.8	5.6	**2.6**	**0.5**	**3.5**	
Streptomycin*	**6.1%**																93.9	**0.2**	**0.9**	**4.9**
Lincomycin*	**66.9%**							4.0		0.2	13.6	15.3	**57.7**	**9.2**						
Linezolid	**0.0%**						0.2	2.1	97.7											
Nitrofurantoin	**4.2%**									0.2	40.6	35.2	3.1	16.7	**4.0**	**0.2**				
Flavomycin*	**23.5%**							27.5	42.3	5.9	0.7	0.2		**23.5**						
Salinomycin*	**0.0%**							79.6	18.8	0.9	0.7									
Penicillin	**0.2%**						12.7	1.9	6.3	76.5	2.3		**0.2**							
Tetracycline	**73.7%**									25.6	0.7	0.9	3.5	**69.2**						
Quinupristin/Dalfopristin↑	**60.2%**							10.6	29.2	**47.8**	**10.6**	**0.9**	**0.9**							
Vancomycin	**0.0%**						16.4	51.6	28.4	3.5										

Vertical bars show the CLSI/NCCLS Susceptible/Resistant breakpoints for each drug where appropriate.

*Currently no CLSI/NCCLS breakpoints have been established for this organism/antimicrobial combination.

†Discrepancies between %R and sums of distribution %s are due to rounding.

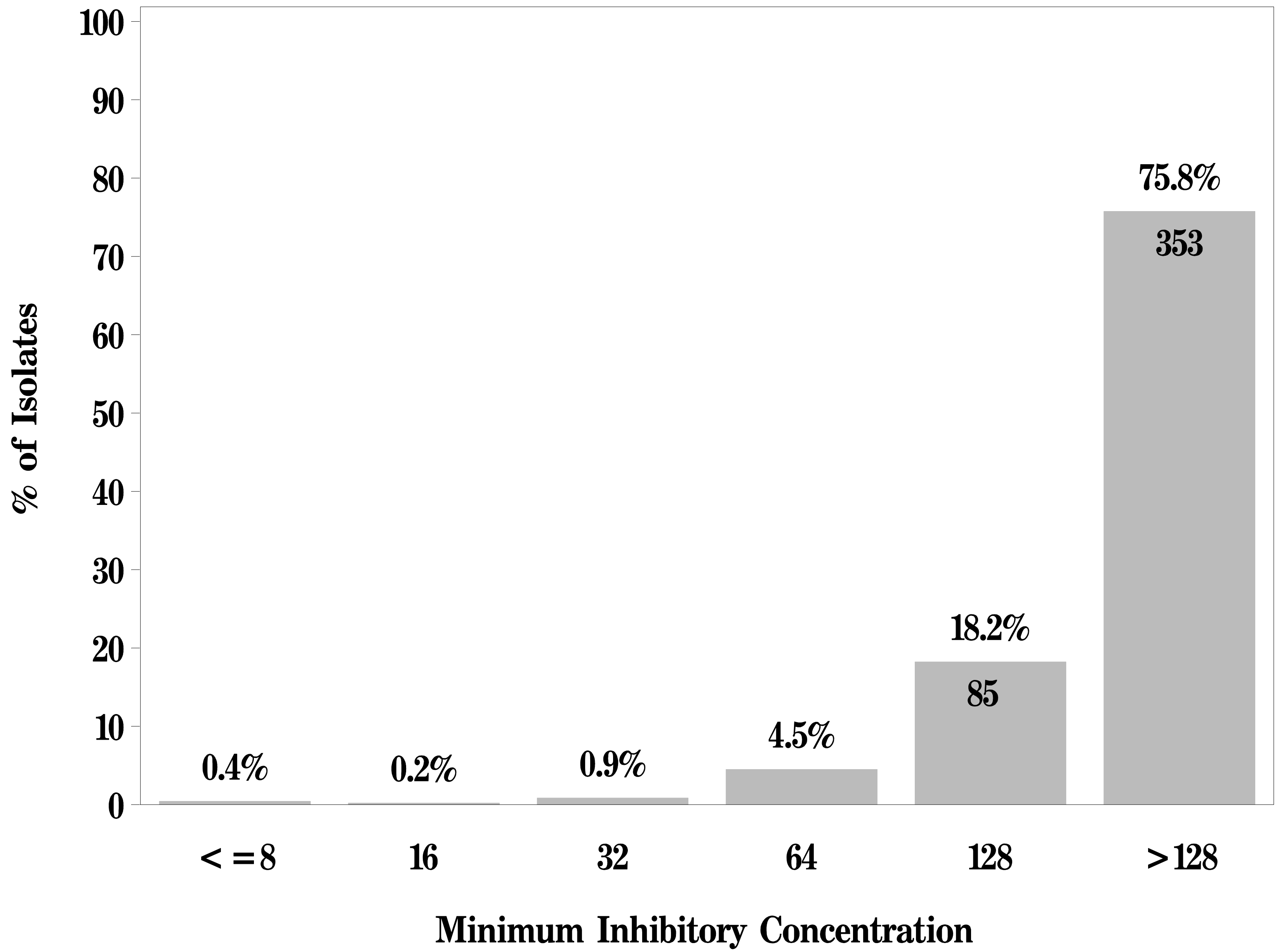
Unshaded areas indicate the dilution ranges of the Sensititre plate used to test the 2003 isolates.

↑ Presented for all species except *E. faecalis* in QDA (n=426-313= 113 non *E. faecalis*)

NARMS

Figure 15a: Minimum Inhibitory Concentration of Bacitracin for *Enterococcus* in Chicken Breast (N=466 Isolates)

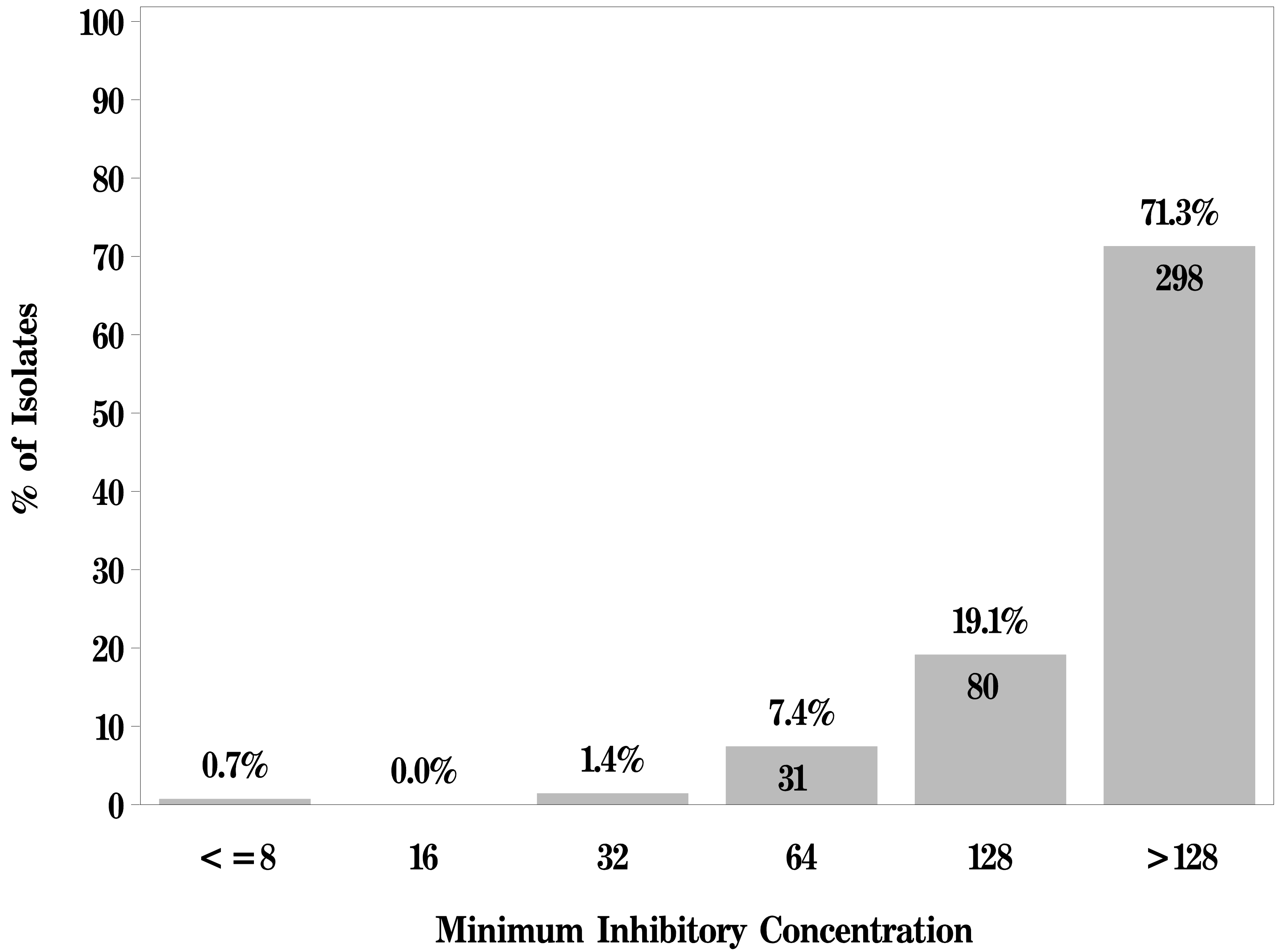
Breakpoints: Susceptible<=32 µg/mL Resistant>=128 µg/mL



NARMS

Figure 15a: Minimum Inhibitory Concentration of Bacitracin for *Enterococcus* in Ground Turkey (N=418 Isolates)

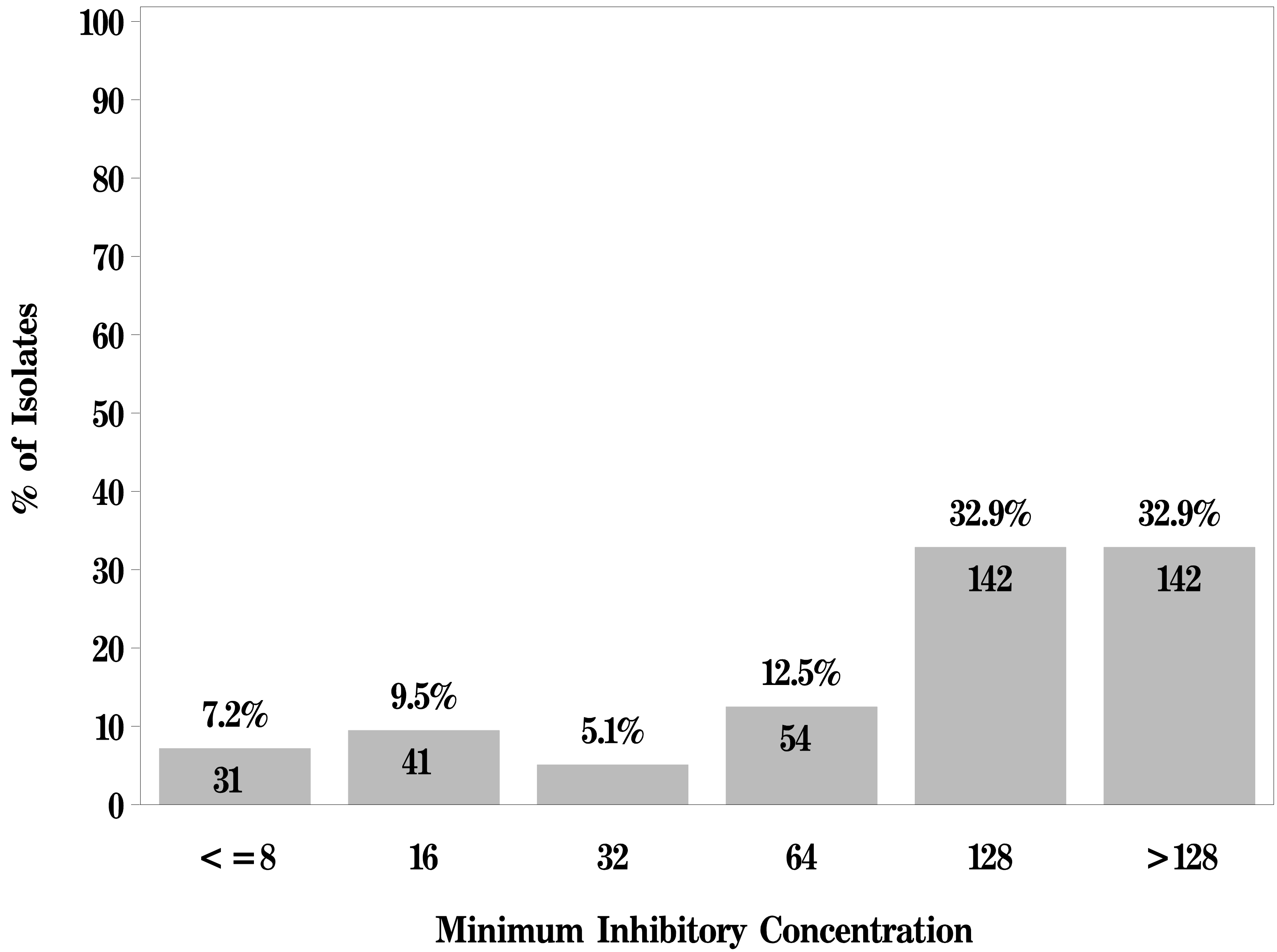
Breakpoints: Susceptible <=32 µg/mL Resistant >=128 µg/mL



NARMS

Figure 15a: Minimum Inhibitory Concentration of Bacitracin for *Enterococcus* in Ground Beef (N=432 Isolates)

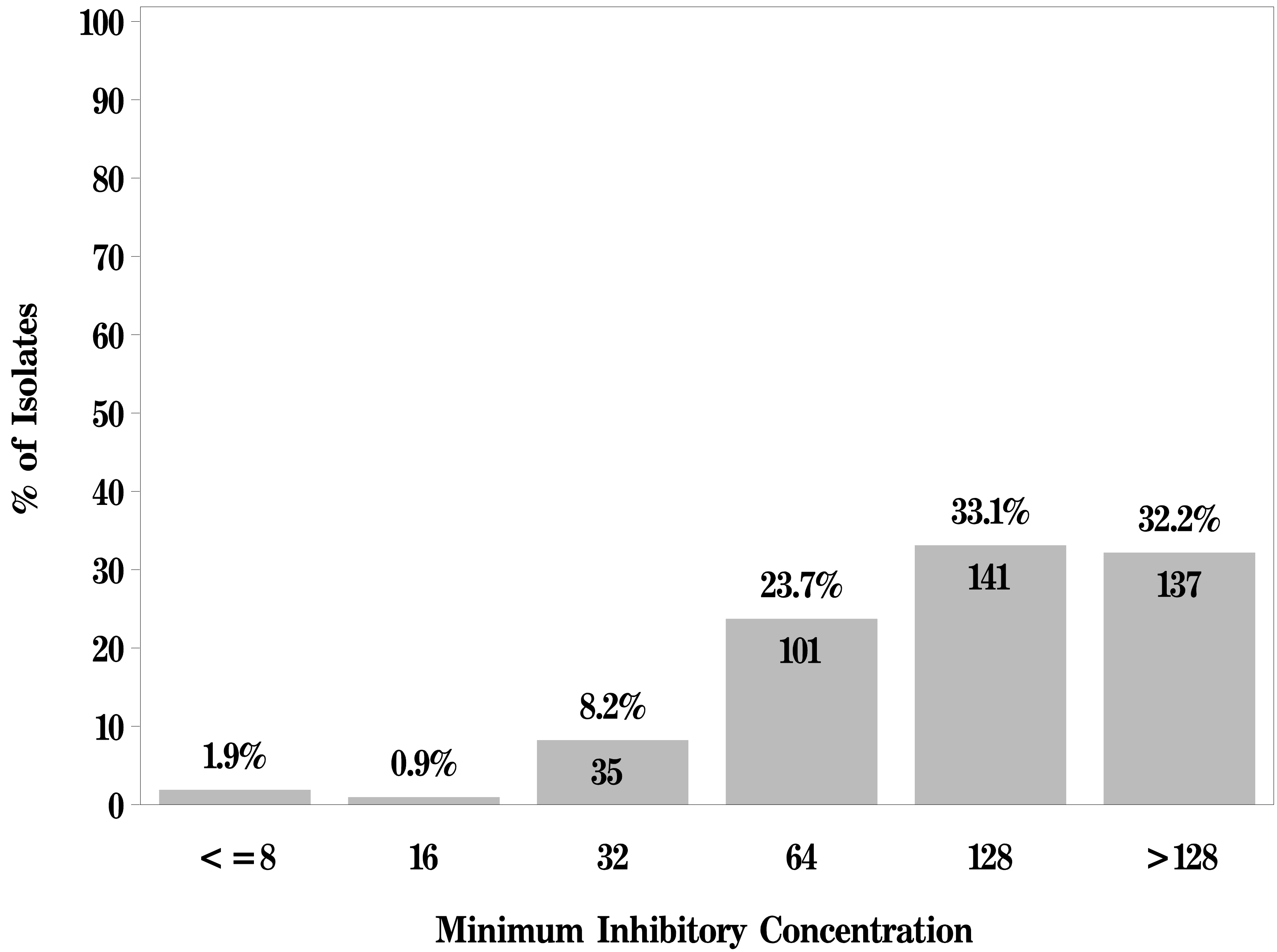
Breakpoints: Susceptible<=32 µg/mL Resistant>=128 µg/mL



NARMS

Figure 15a: Minimum Inhibitory Concentration of Bacitracin for *Enterococcus* in Pork Chop (N=426 Isolates)

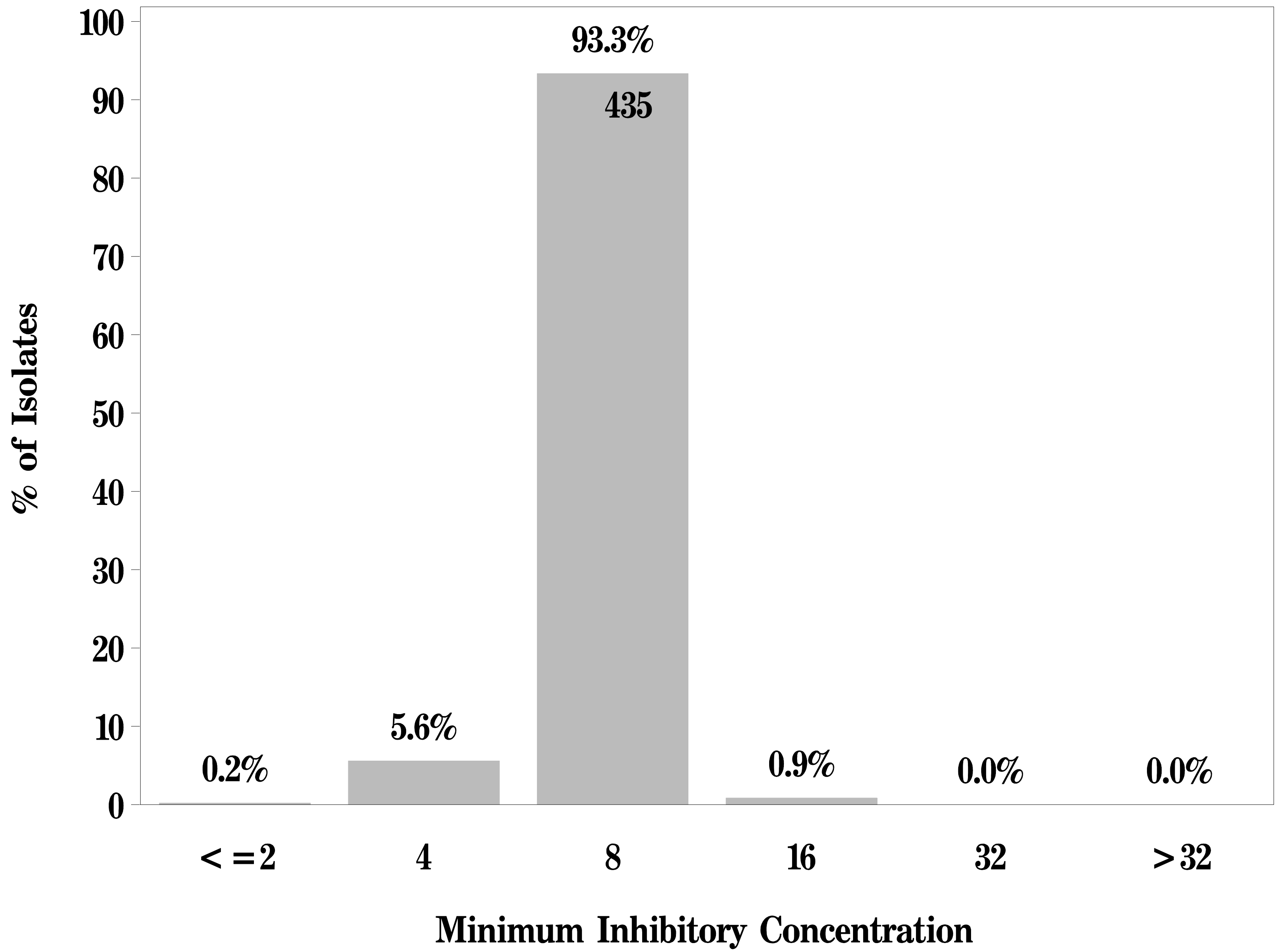
Breakpoints: Susceptible <=32 µg/mL Resistant >=128 µg/mL



NARMS

Figure 15b: Minimum Inhibitory Concentration of Chloramphenicol for *Enterococcus* in Chicken Breast (N=466 Isolates)

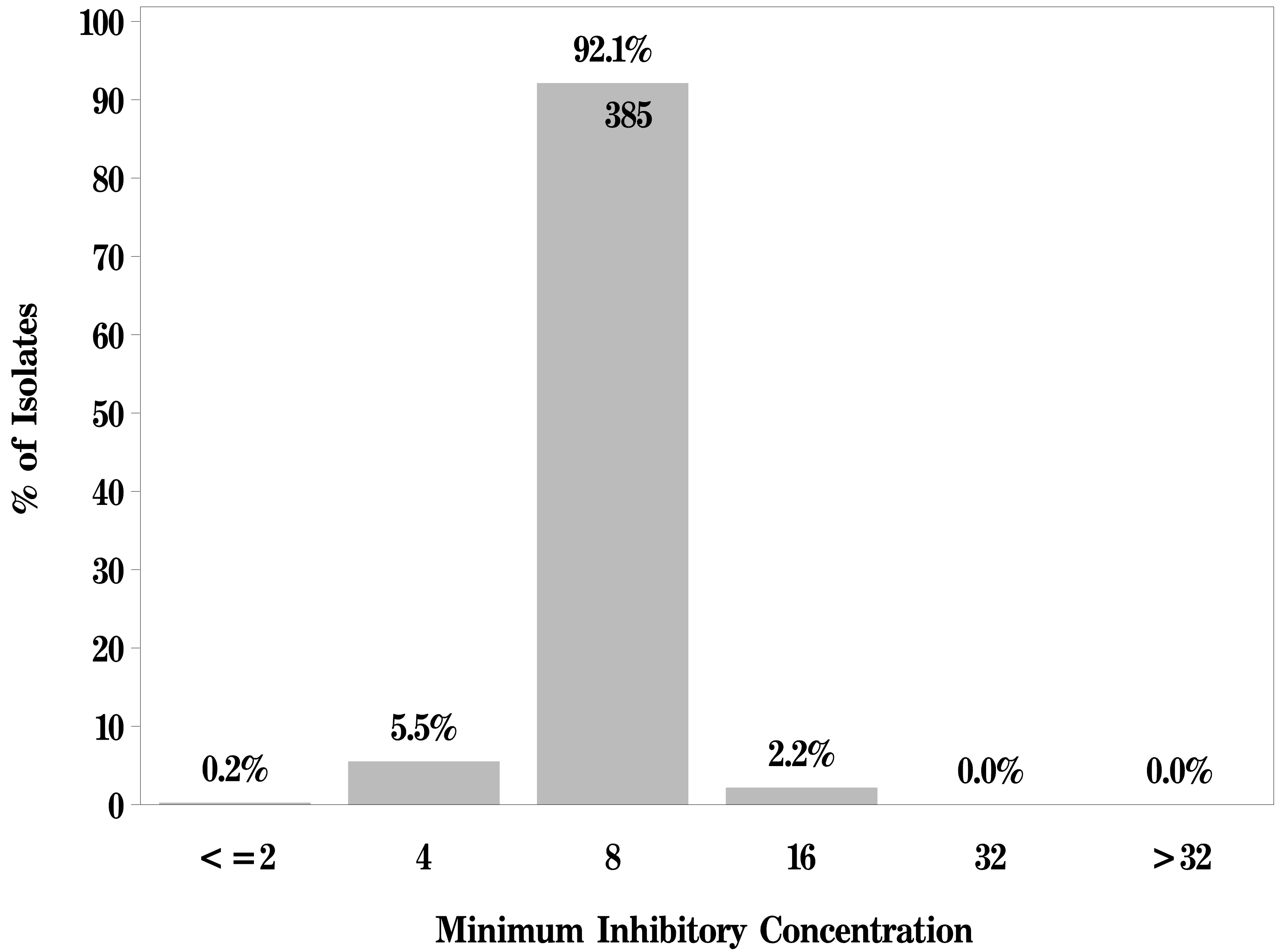
Breakpoints: Susceptible <=8 µg/mL Resistant >=32 µg/mL



NARMS

Figure 15b: Minimum Inhibitory Concentration of Chloramphenicol for *Enterococcus* in Ground Turkey (N=418 Isolates)

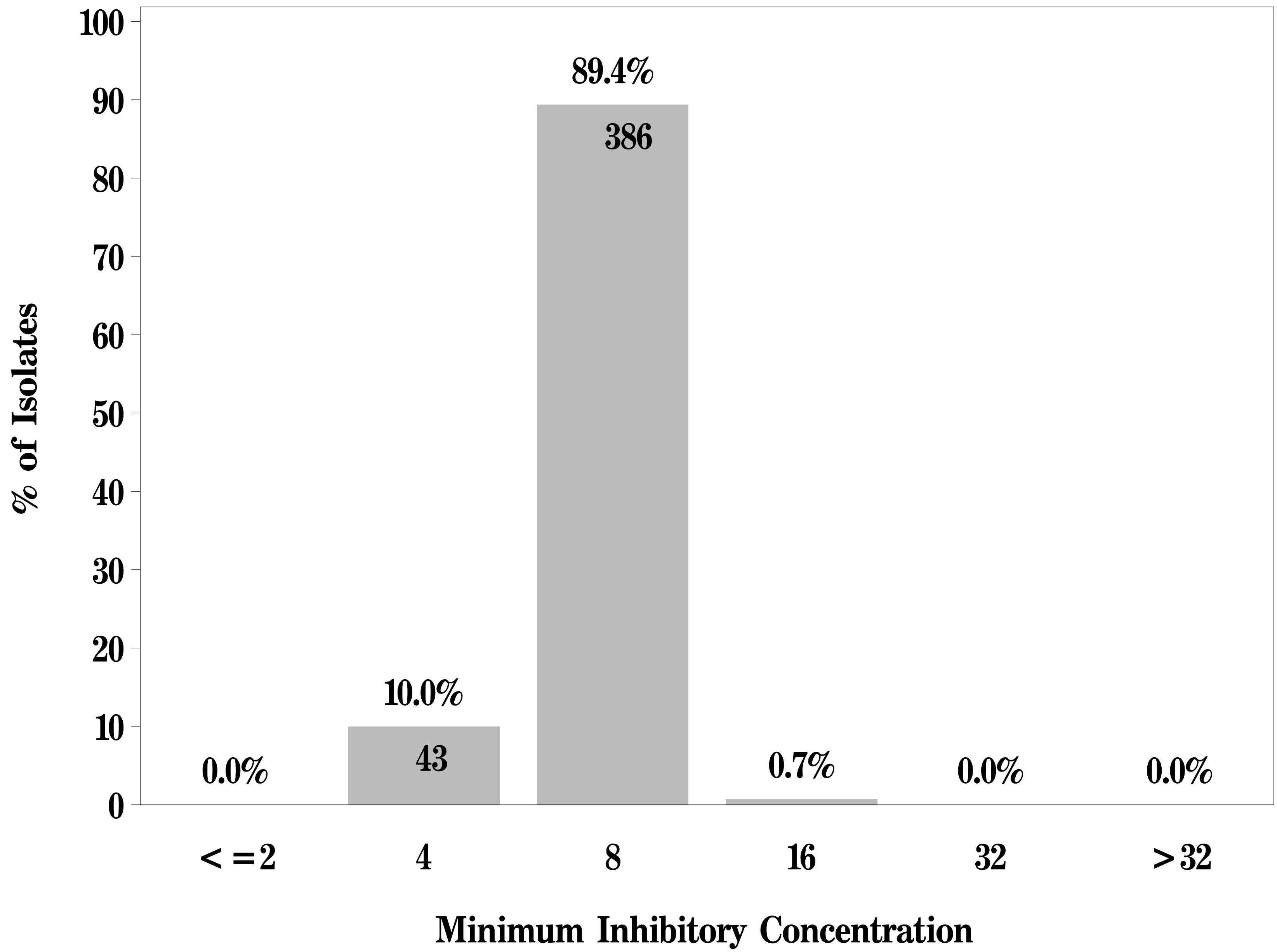
Breakpoints: Susceptible <=8 µg/mL Resistant >=32 µg/mL



NARMS

Figure 15b: Minimum Inhibitory Concentration of Chloramphenicol for *Enterococcus* in Ground Beef (N=432 Isolates)

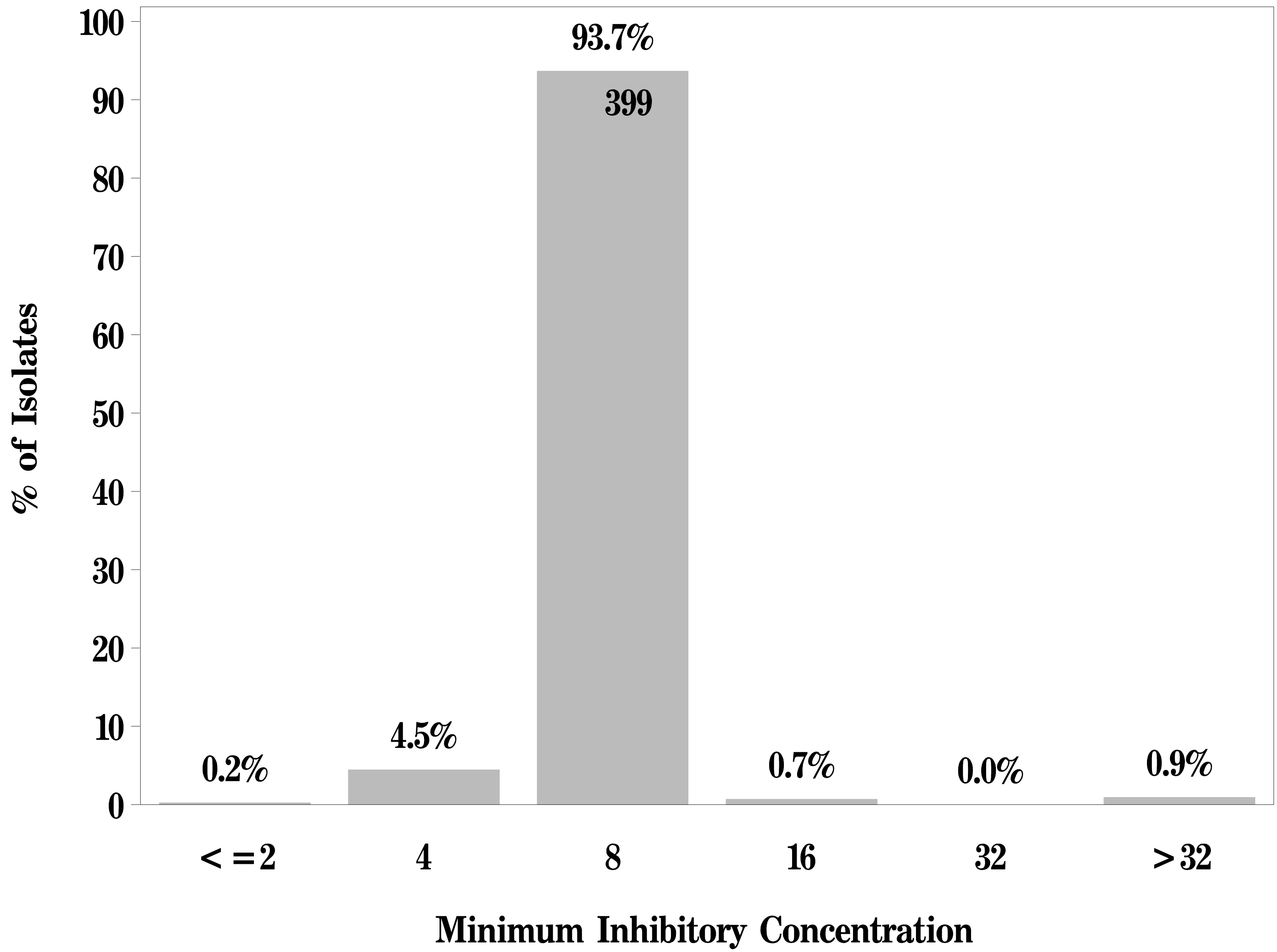
Breakpoints: Susceptible <=8 μg/mL Resistant >=32 μg/mL



NARMS

Figure 15b: Minimum Inhibitory Concentration of Chloramphenicol for *Enterococcus* in Pork Chop (N=426 Isolates)

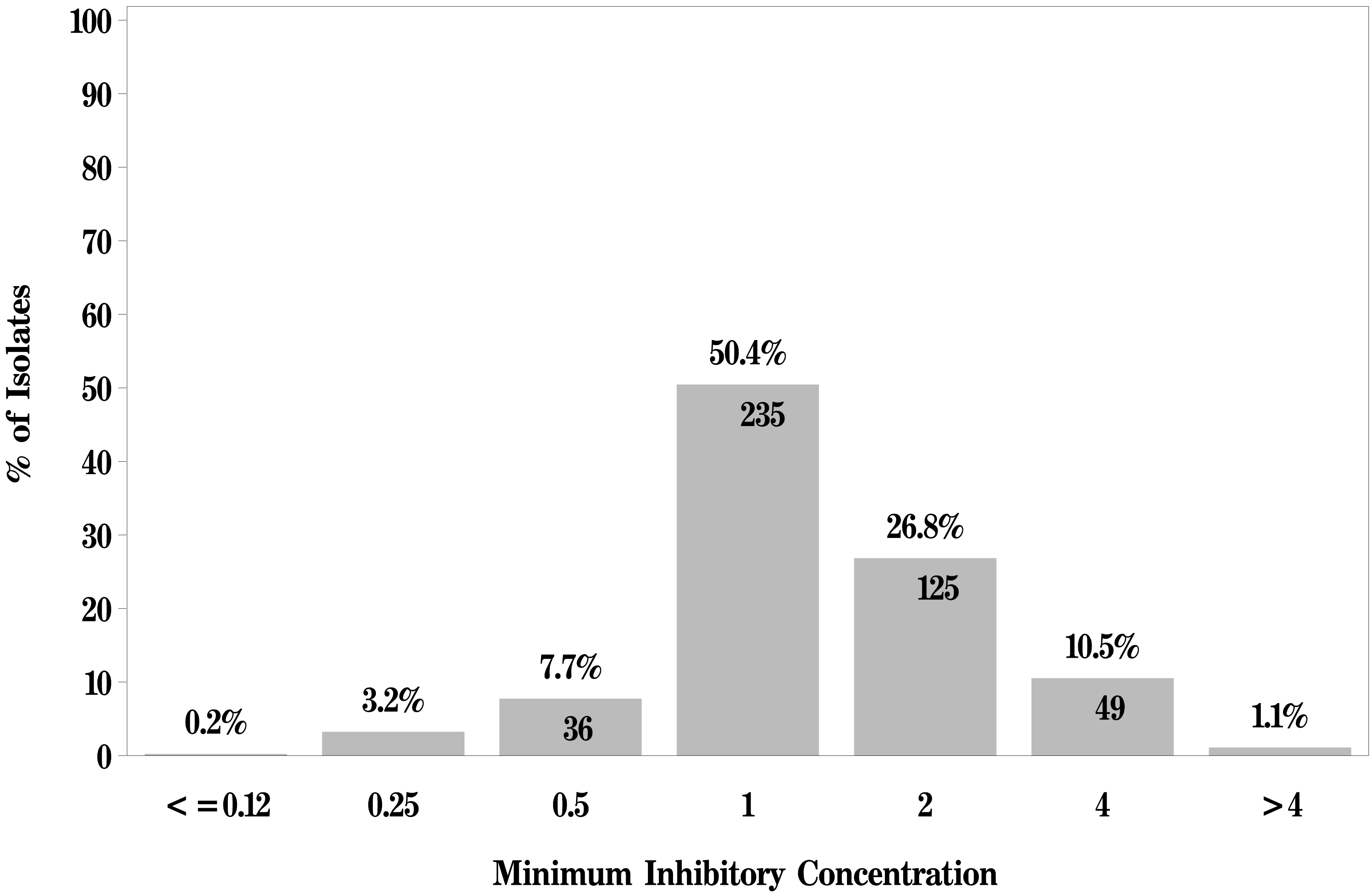
Breakpoints: Susceptible <=8 µg/mL Resistant >=32 µg/mL



NARMS

Figure 15c: Minimum Inhibitory Concentration of Ciprofloxacin for *Enterococcus* in Chicken Breast (N=466 Isolates)

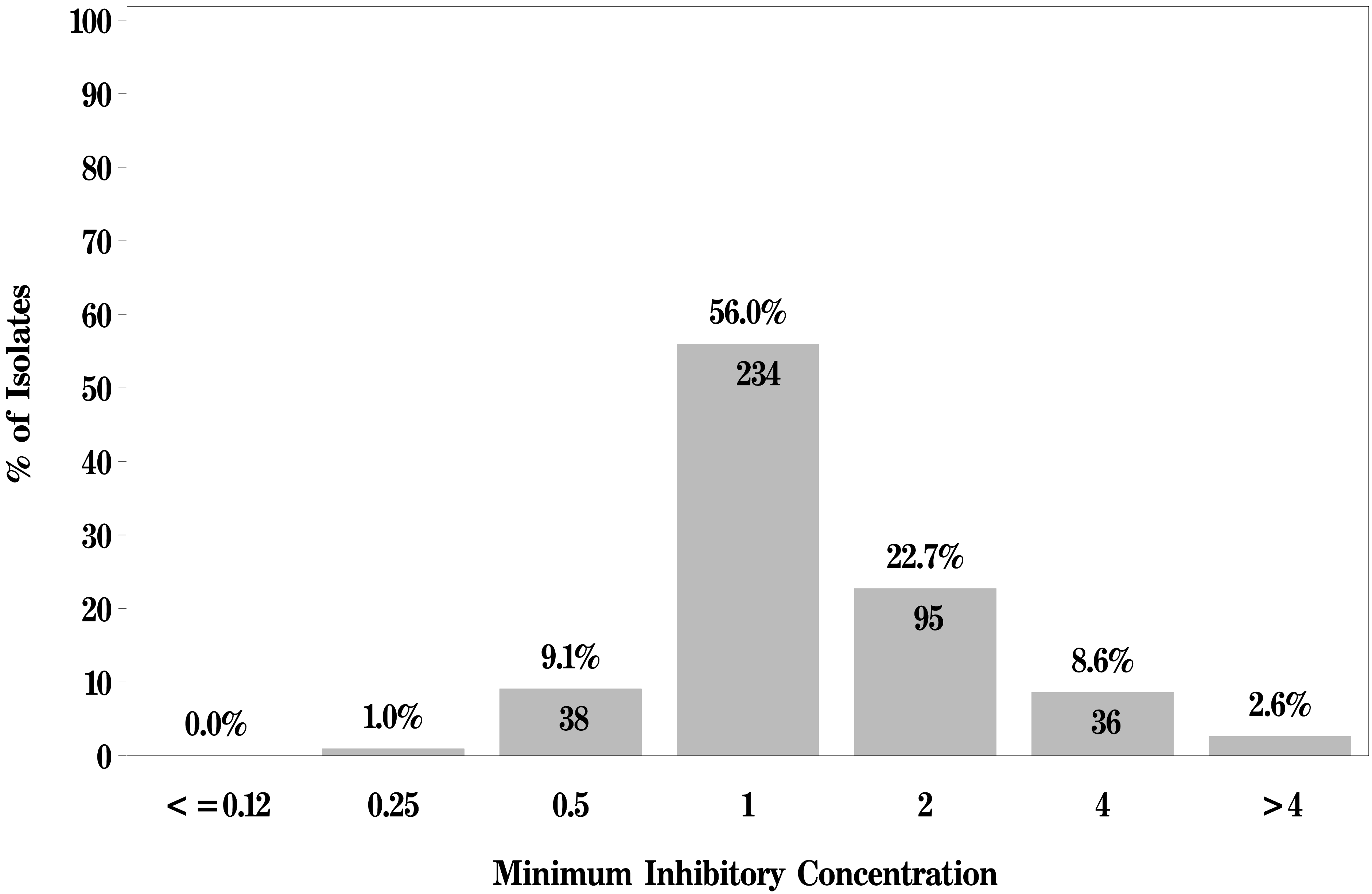
Breakpoints: Susceptible<=1 μg/mL Resistant>=4 μg/mL



NARMS

Figure 15c: Minimum Inhibitory Concentration of Ciprofloxacin for *Enterococcus* in Ground Turkey (N=418 Isolates)

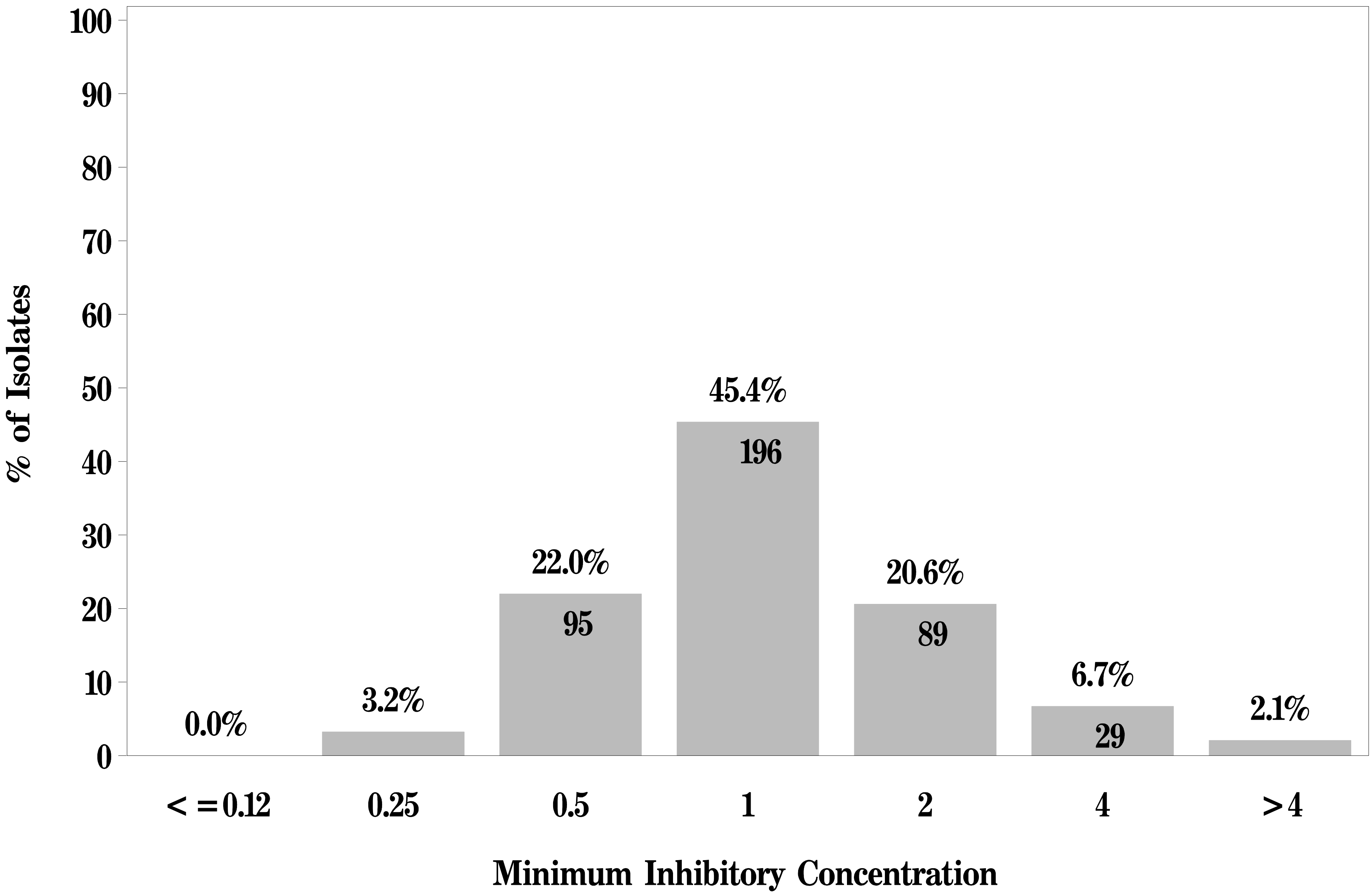
Breakpoints: Susceptible<=1 μg/mL Resistant>=4 μg/mL



NARMS

Figure 15c: Minimum Inhibitory Concentration of Ciprofloxacin for *Enterococcus* in Ground Beef (N=432 Isolates)

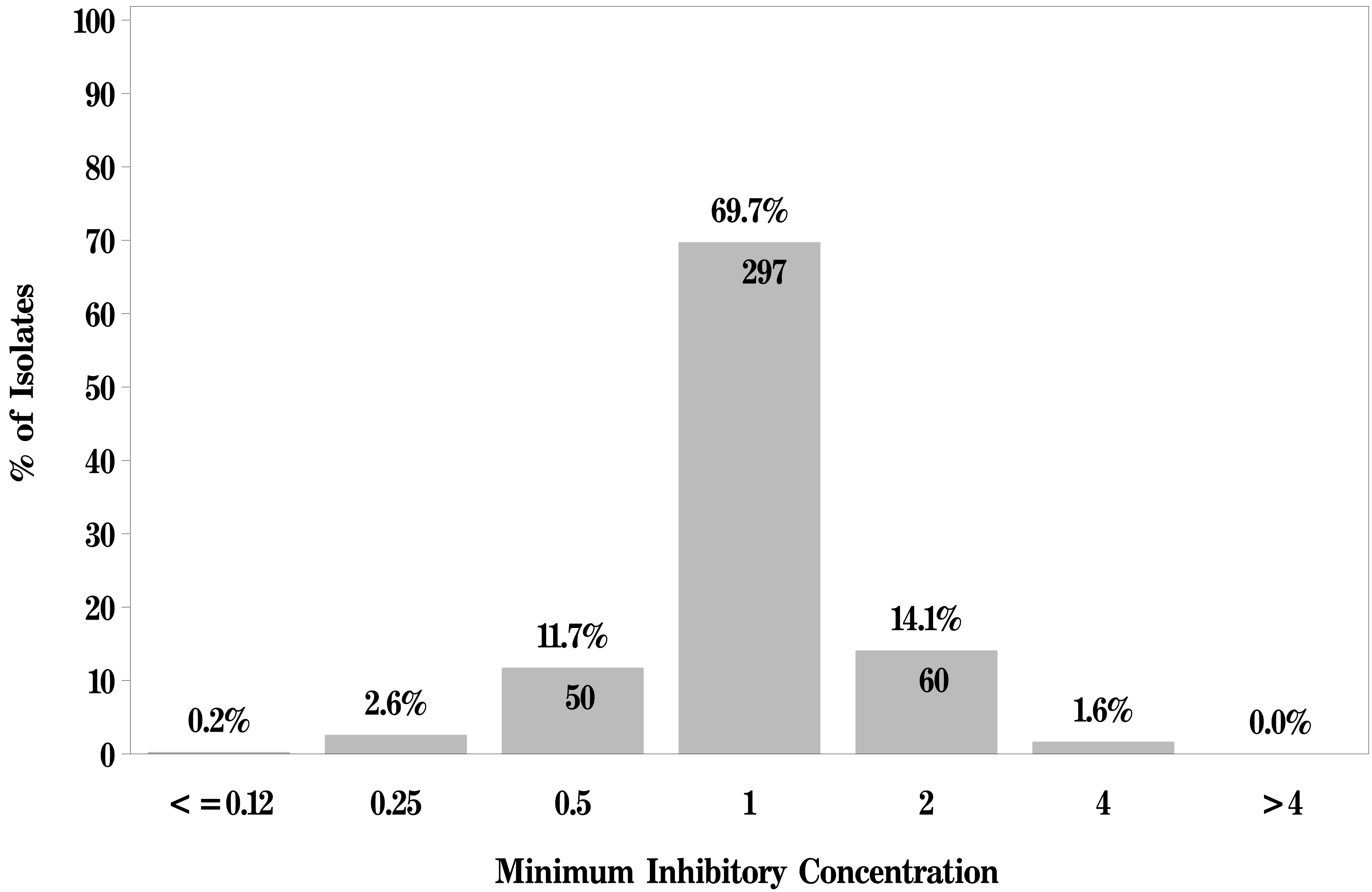
Breakpoints: Susceptible <=1 µg/mL Resistant >=4 µg/mL



NARMS

Figure 15c: Minimum Inhibitory Concentration of Ciprofloxacin for *Enterococcus* in Pork Chop (N=426 Isolates)

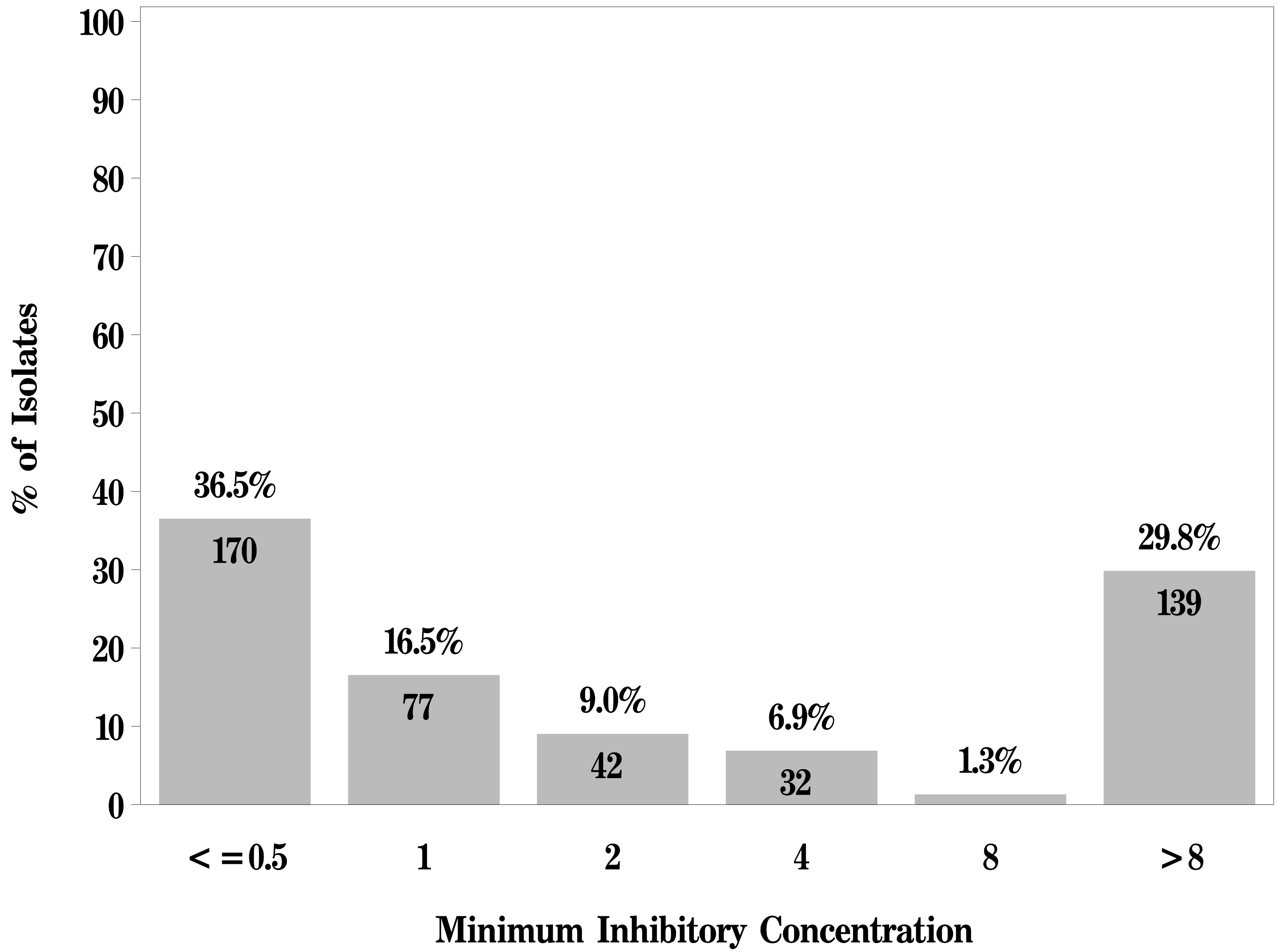
Breakpoints: Susceptible <=1 µg/mL Resistant >=4 µg/mL



NARMS

Figure 15d: Minimum Inhibitory Concentration of Erythromycin for *Enterococcus* in Chicken Breast (N=466 Isolates)

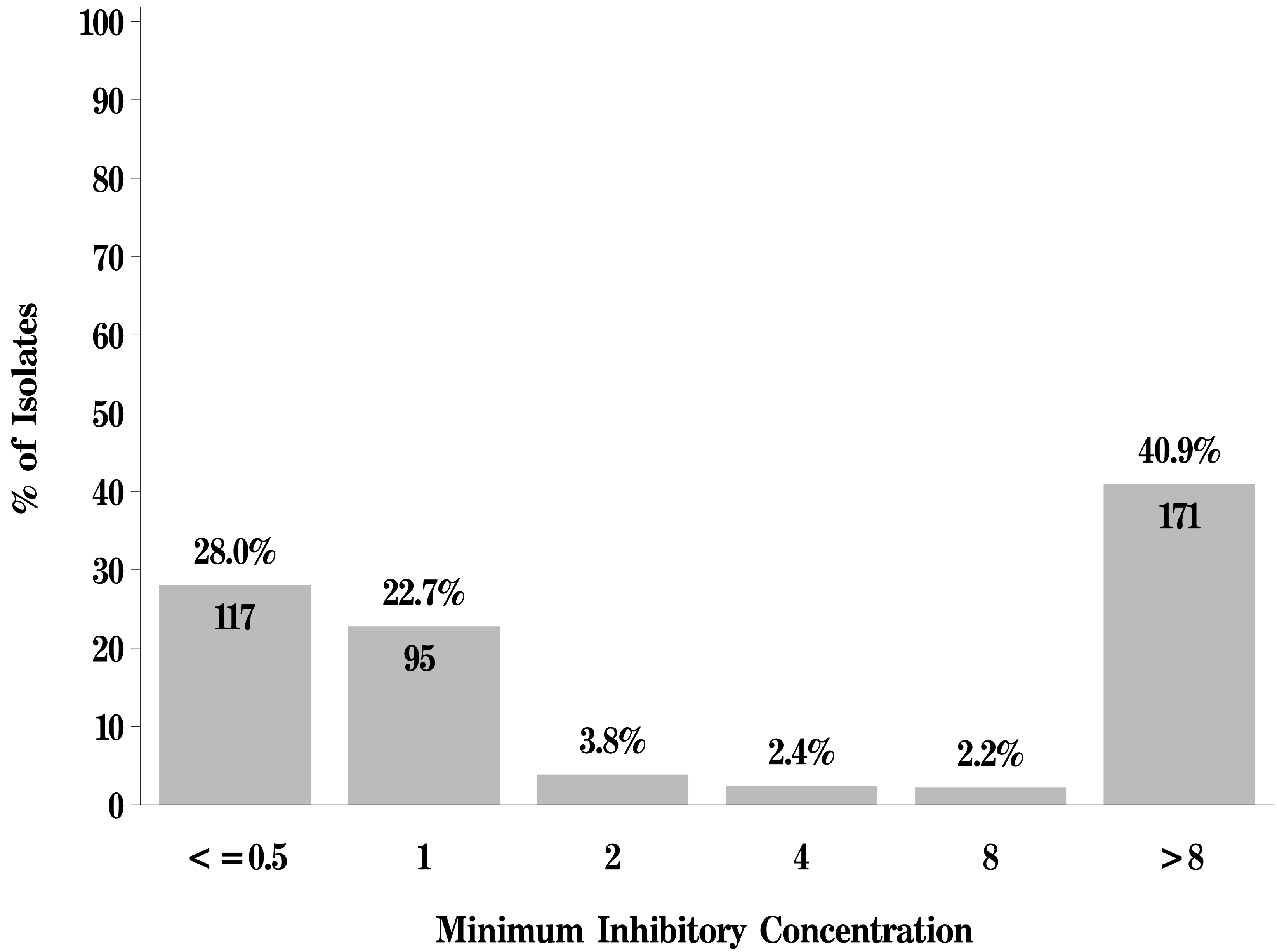
Breakpoints: Susceptible<=.5 μg/mL Resistant>=8 μg/mL



NARMS

Figure 15d: Minimum Inhibitory Concentration of Erythromycin for *Enterococcus* in Ground Turkey (N=418 Isolates)

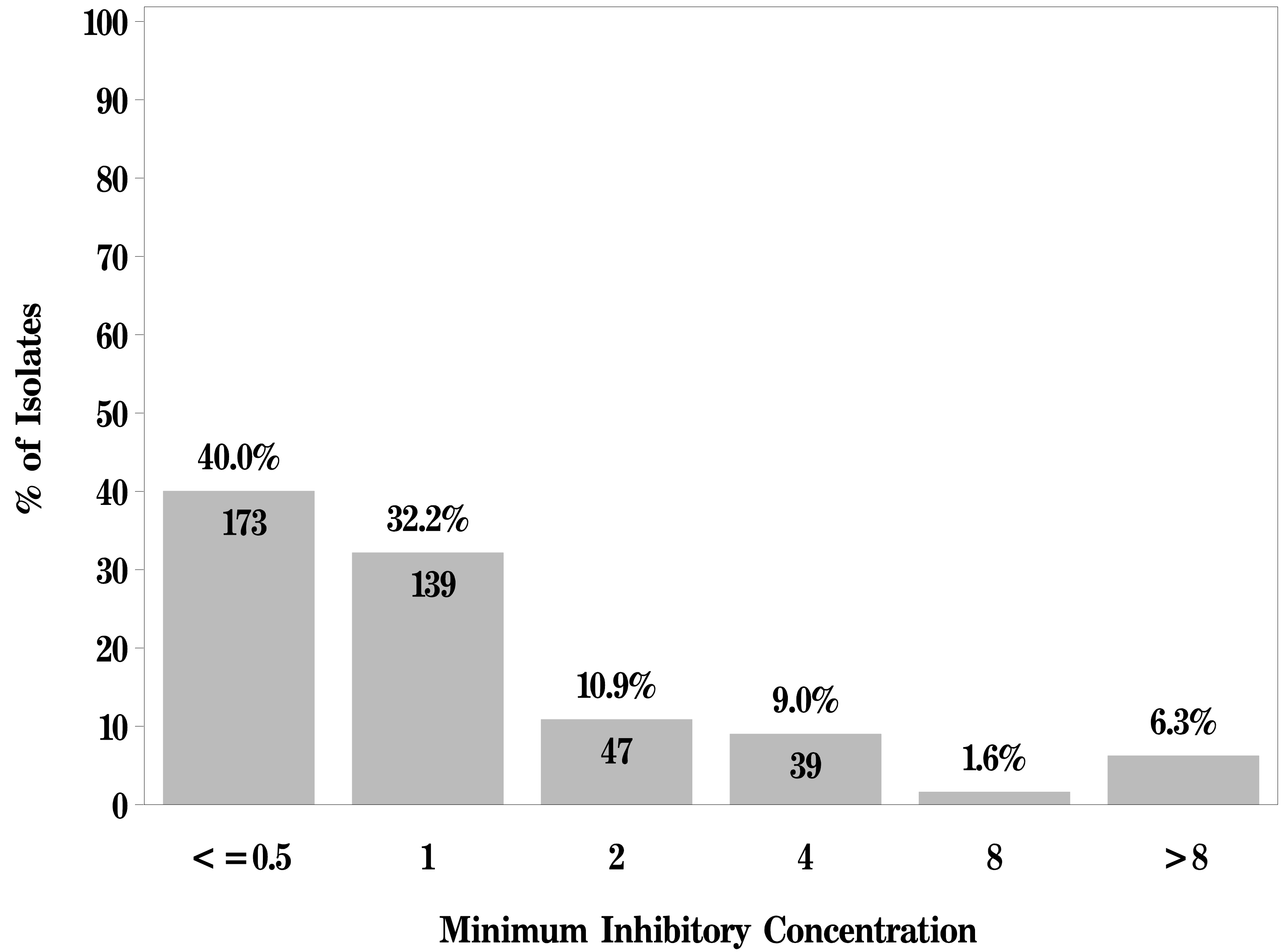
Breakpoints: Susceptible <=.5 μg/mL Resistant >=8 μg/mL



NARMS

Figure 15d: Minimum Inhibitory Concentration of Erythromycin for *Enterococcus* in Ground Beef (N=432 Isolates)

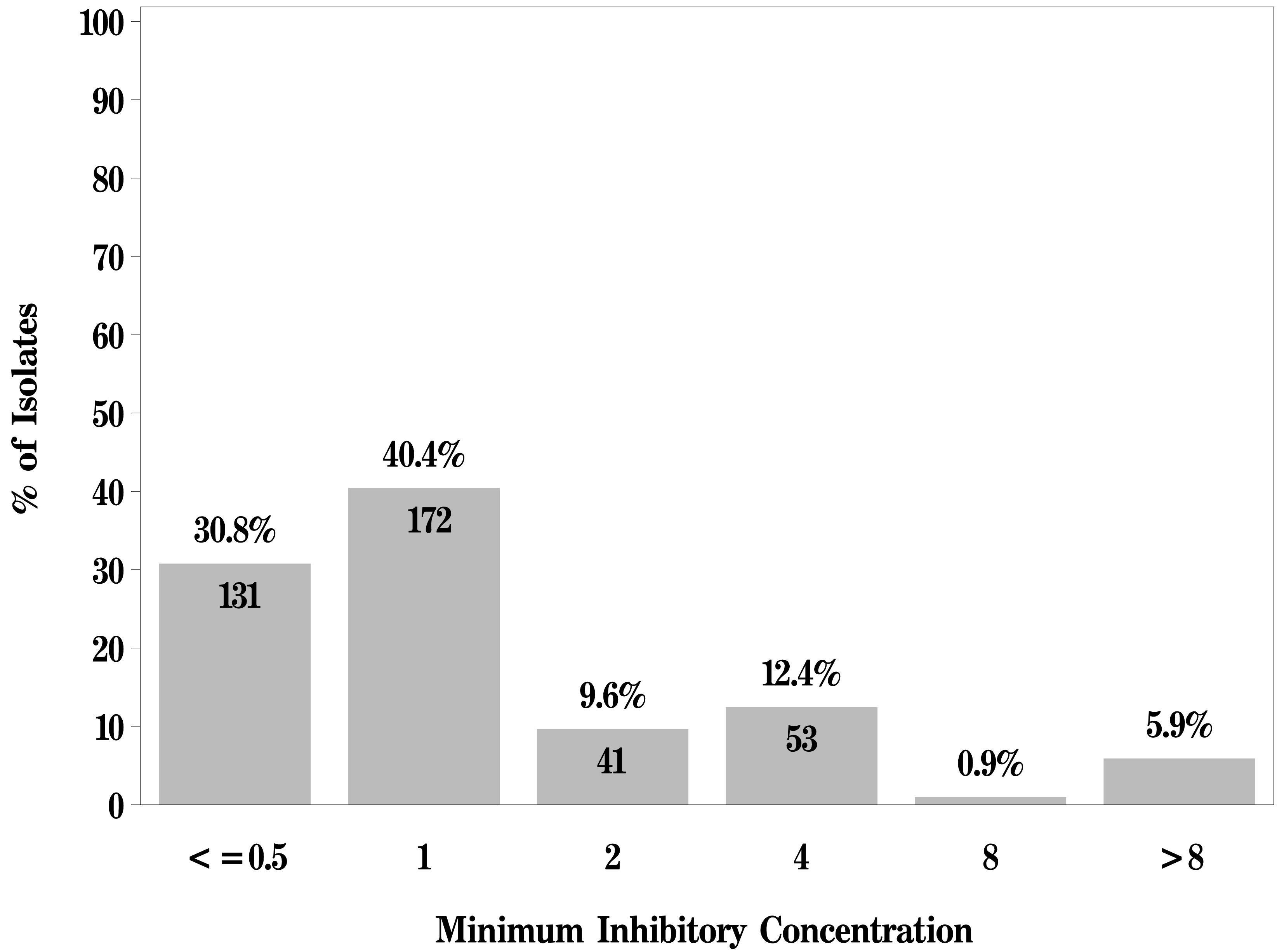
Breakpoints: Susceptible<=.5 μg/mL Resistant>=8 μg/mL



NARMS

Figure 15d: Minimum Inhibitory Concentration of Erythromycin for *Enterococcus* in Pork Chop (N=426 Isolates)

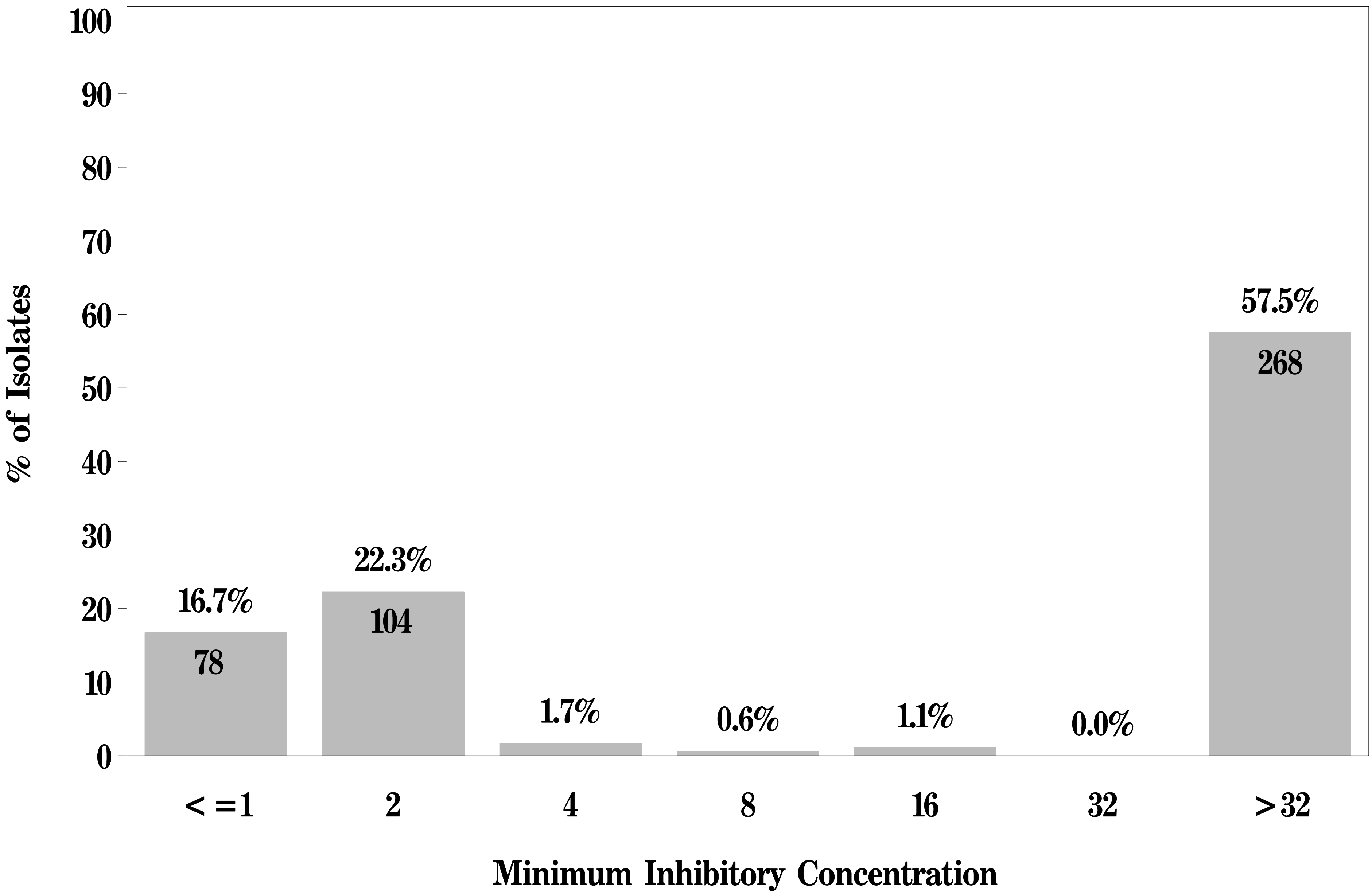
Breakpoints: Susceptible <=.5 μg/mL Resistant >=8 μg/mL



NARMS

Figure 15e: Minimum Inhibitory Concentration of Flavomycin for *Enterococcus* in Chicken Breast (N=466 Isolates)

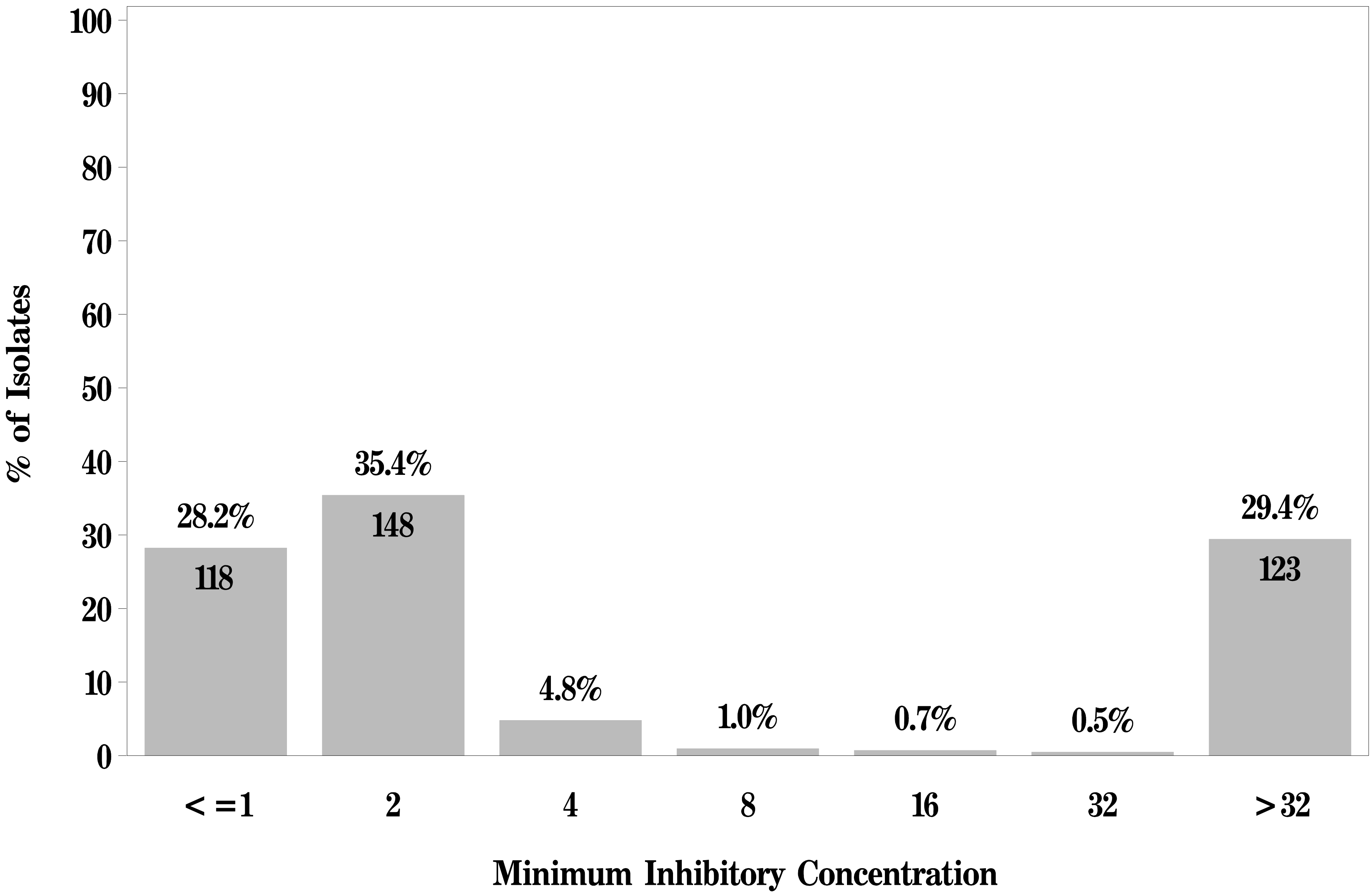
Breakpoints: Susceptible <=8 μg/mL Resistant >=32 μg/mL



NARMS

Figure 15e: Minimum Inhibitory Concentration of Flavomycin for *Enterococcus* in Ground Turkey (N=418 Isolates)

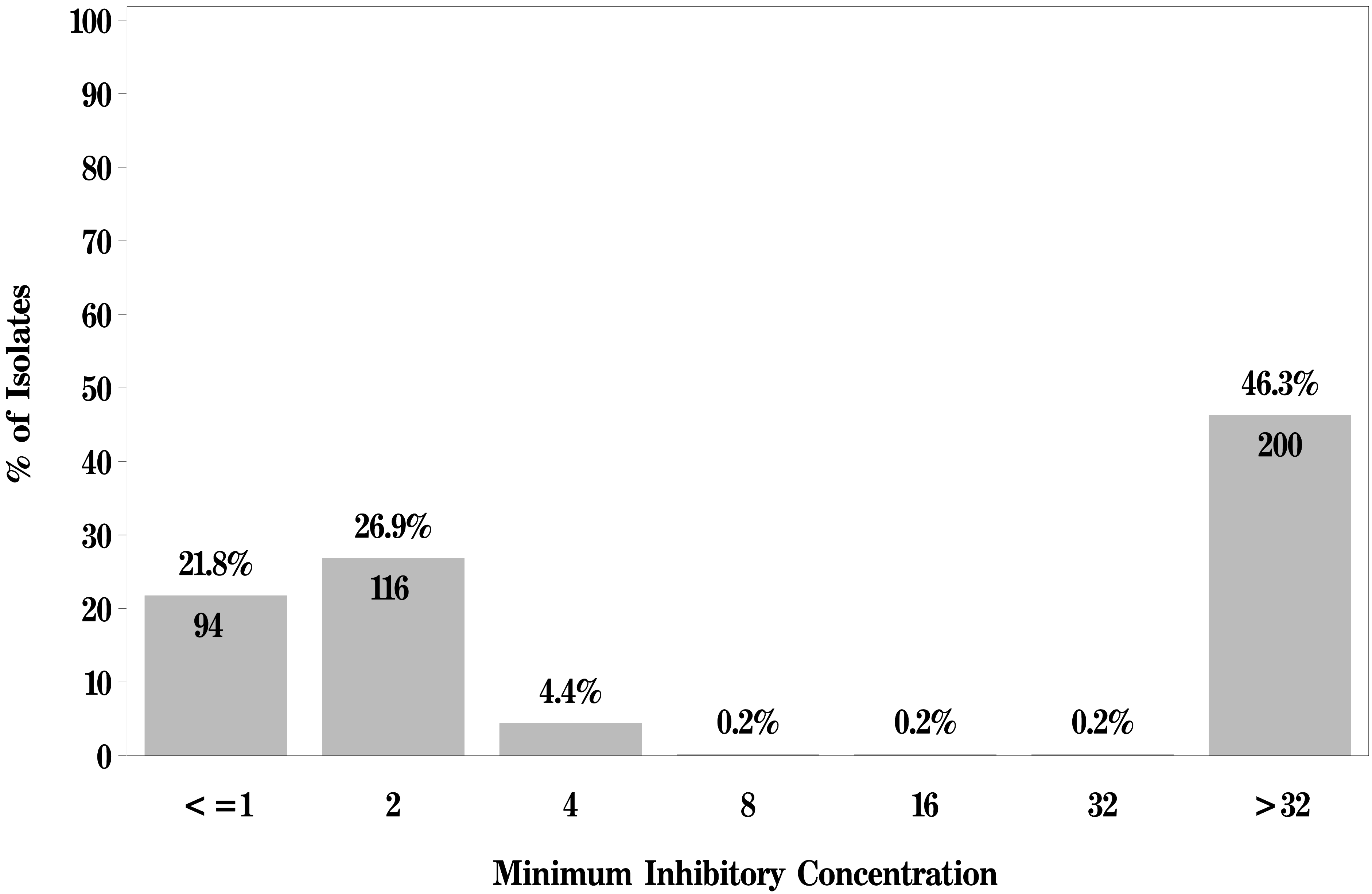
Breakpoints: Susceptible <=8 μg/mL Resistant >=32 μg/mL



NARMS

Figure 15e: Minimum Inhibitory Concentration of Flavomycin for *Enterococcus* in Ground Beef (N=432 Isolates)

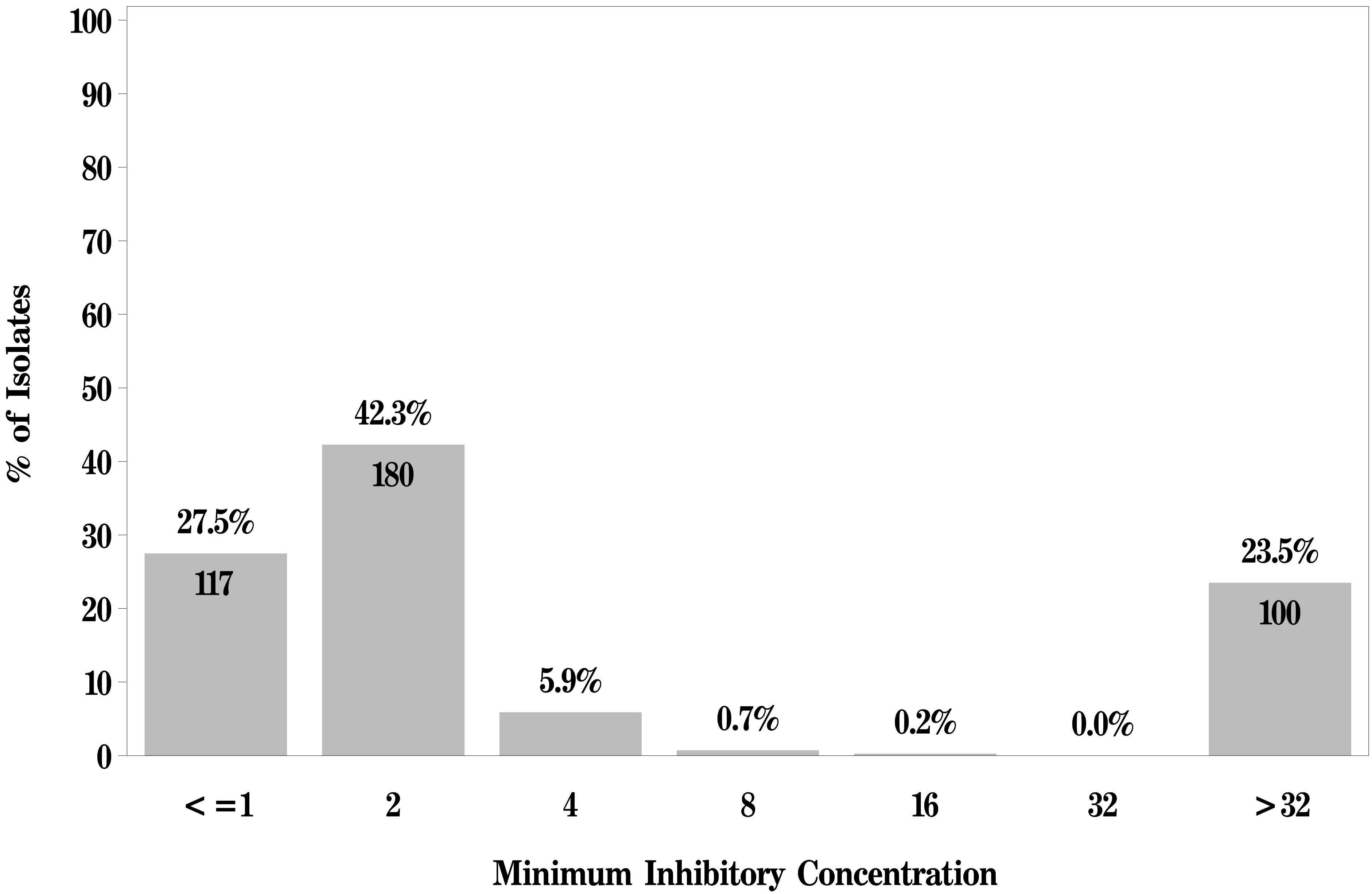
Breakpoints: Susceptible <=8 μg/mL Resistant >=32 μg/mL



NARMS

Figure 15e: Minimum Inhibitory Concentration of Flavomycin for *Enterococcus* in Pork Chop (N=426 Isolates)

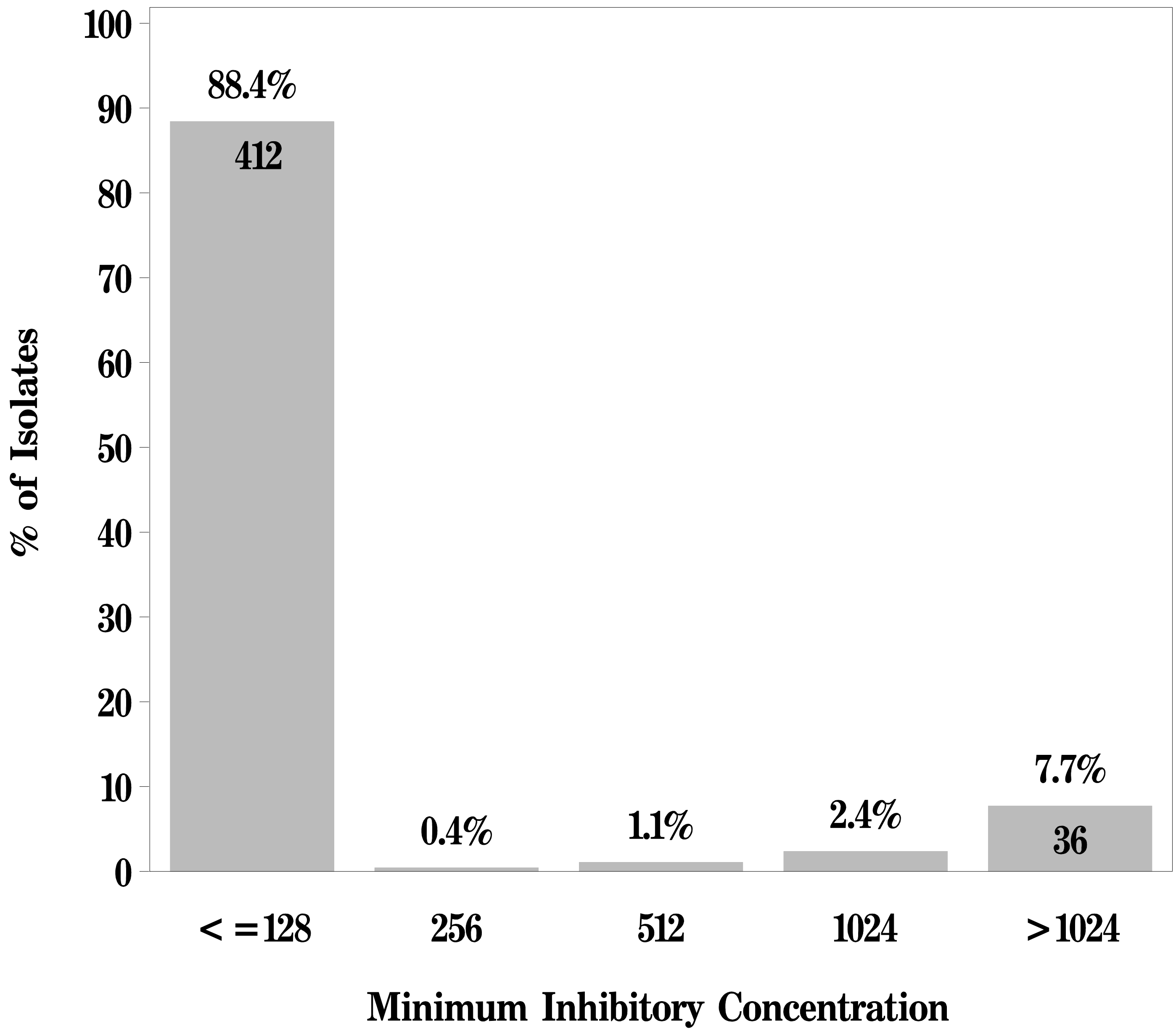
Breakpoints: Susceptible<=8 μg/mL Resistant>=32 μg/mL



NARMS

Figure 15f: Minimum Inhibitory Concentration of Gentamicin for *Enterococcus* in Chicken Breast (N=466 Isolates)

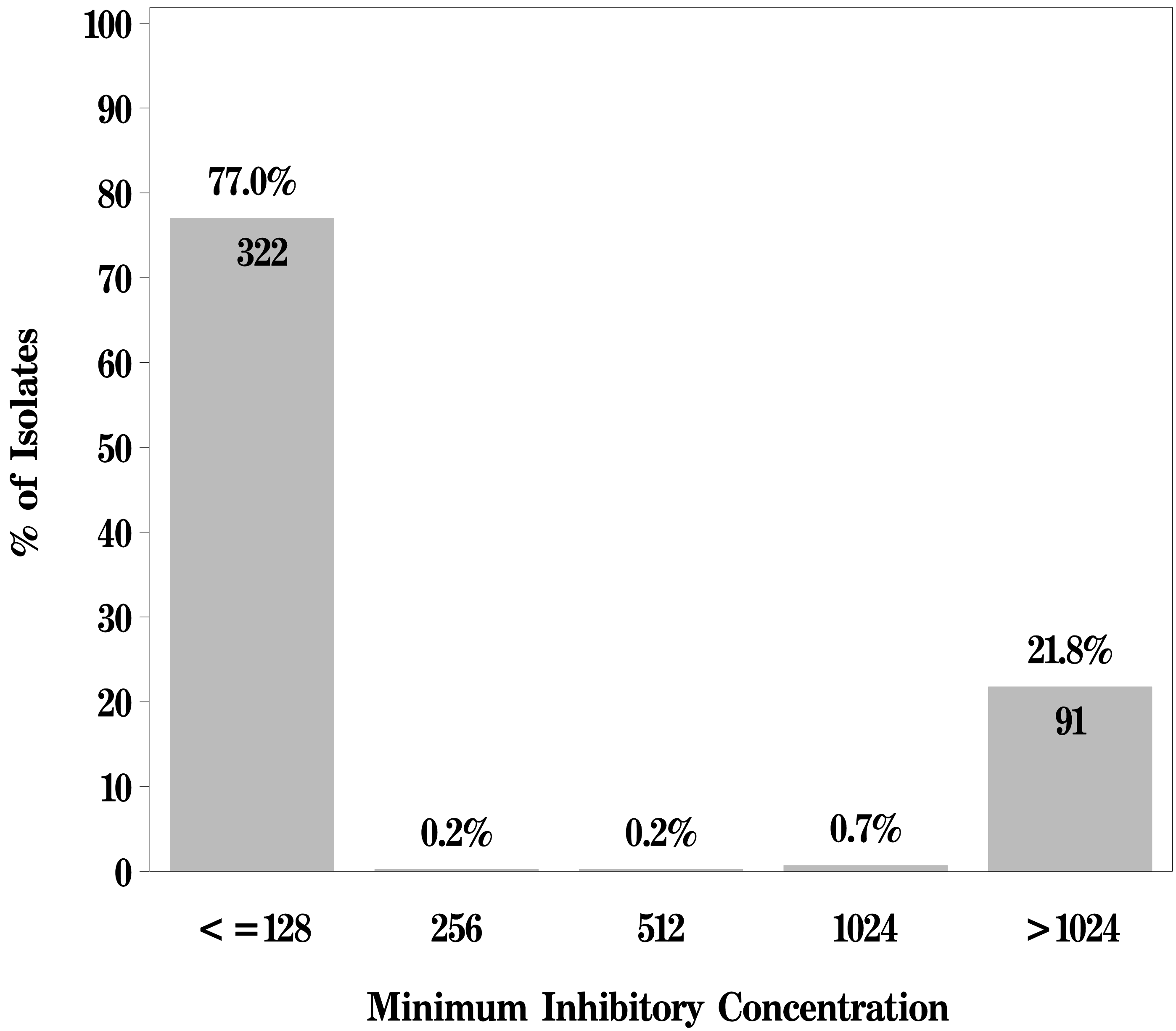
Breakpoints: Susceptible<500 μg/mL Resistant>=500 μg/mL



NARMS

Figure 15f: Minimum Inhibitory Concentration of Gentamicin for *Enterococcus* in Ground Turkey (N=418 Isolates)

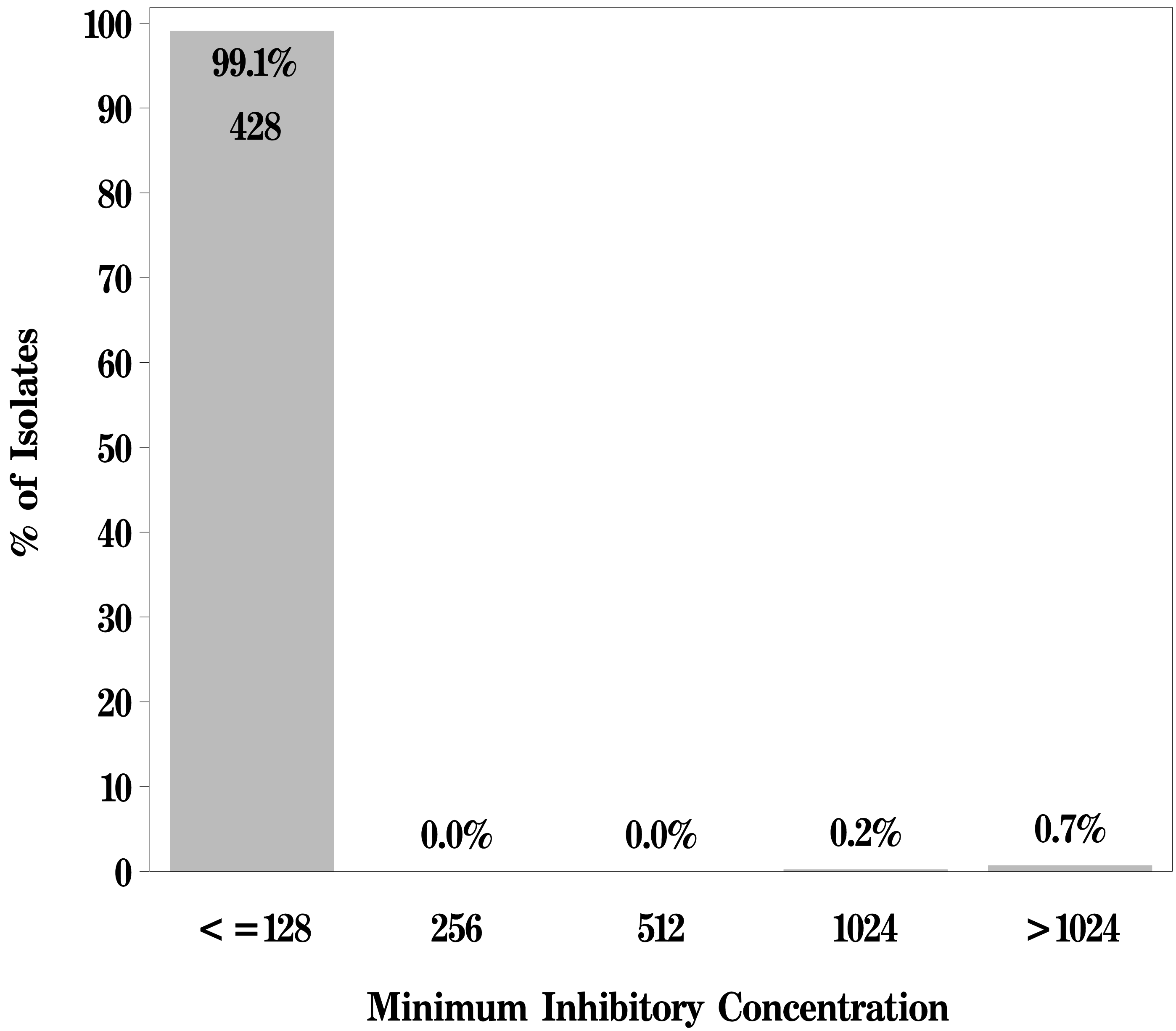
Breakpoints: Susceptible<500 μg/mL Resistant>=500 μg/mL



NARMS

Figure 15f: Minimum Inhibitory Concentration of Gentamicin for *Enterococcus* in Ground Beef (N=432 Isolates)

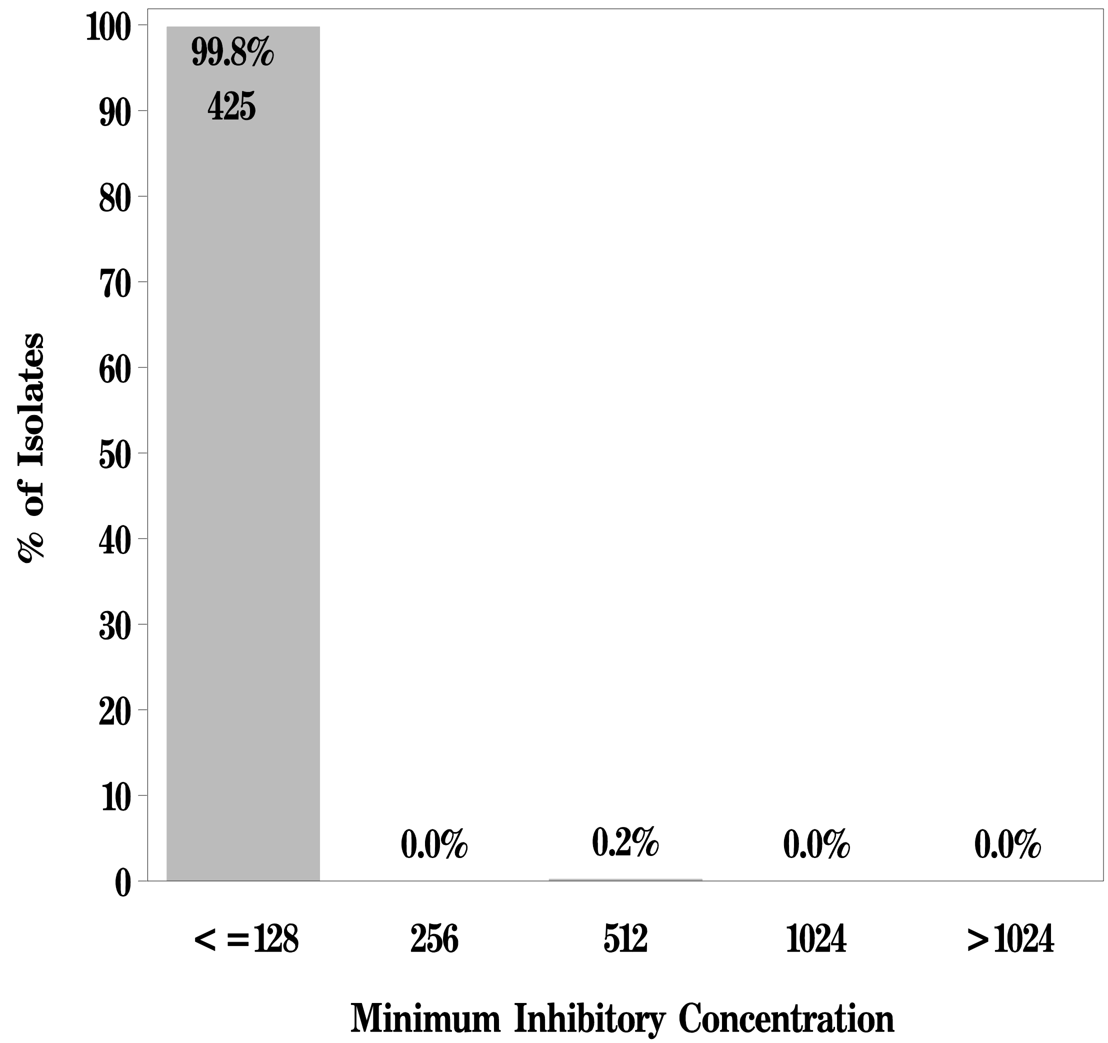
Breakpoints: Susceptible<500 μg/mL Resistant>=500 μg/mL



NARMS

Figure 15f: Minimum Inhibitory Concentration of Gentamicin for *Enterococcus* in Pork Chop (N=426 Isolates)

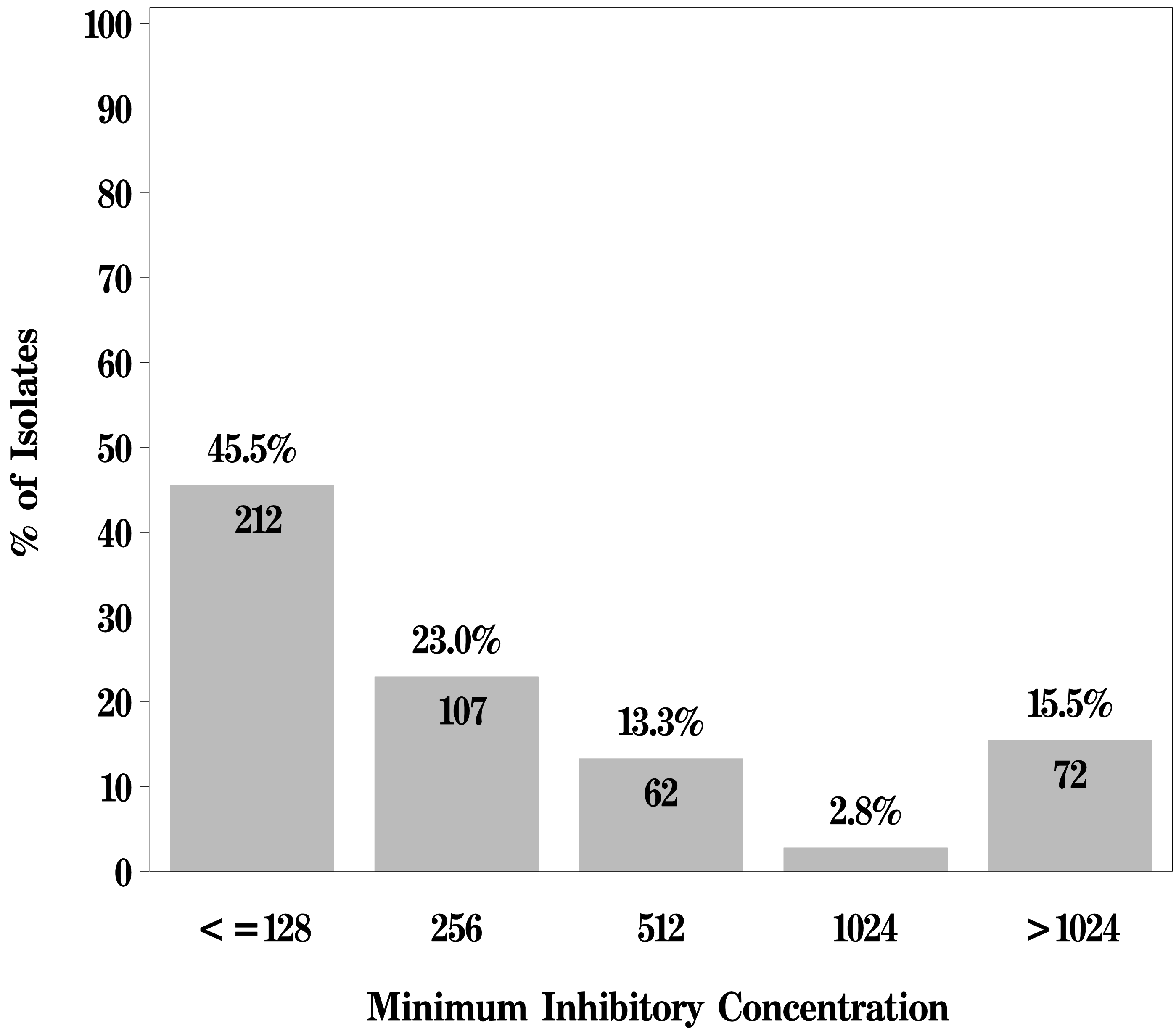
Breakpoints: Susceptible<500 µg/mL Resistant>=500 µg/mL



NARMS

Figure 15g: Minimum Inhibitory Concentration of Kanamycin for *Enterococcus* in Chicken Breast (N=466 Isolates)

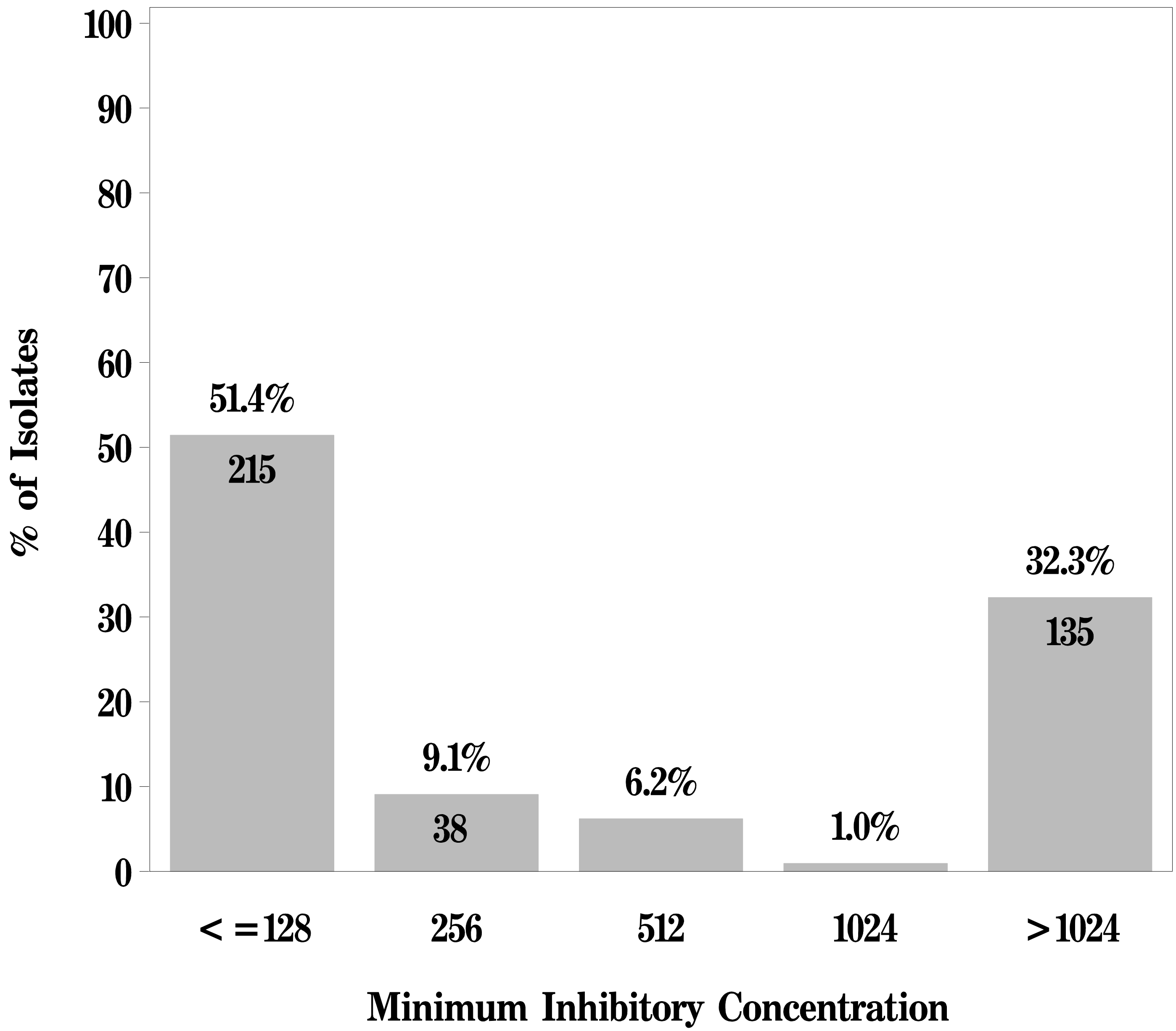
Breakpoints: Susceptible <=128 μg/mL Resistant >=512 μg/mL



NARMS

Figure 15g: Minimum Inhibitory Concentration of Kanamycin for *Enterococcus* in Ground Turkey (N=418 Isolates)

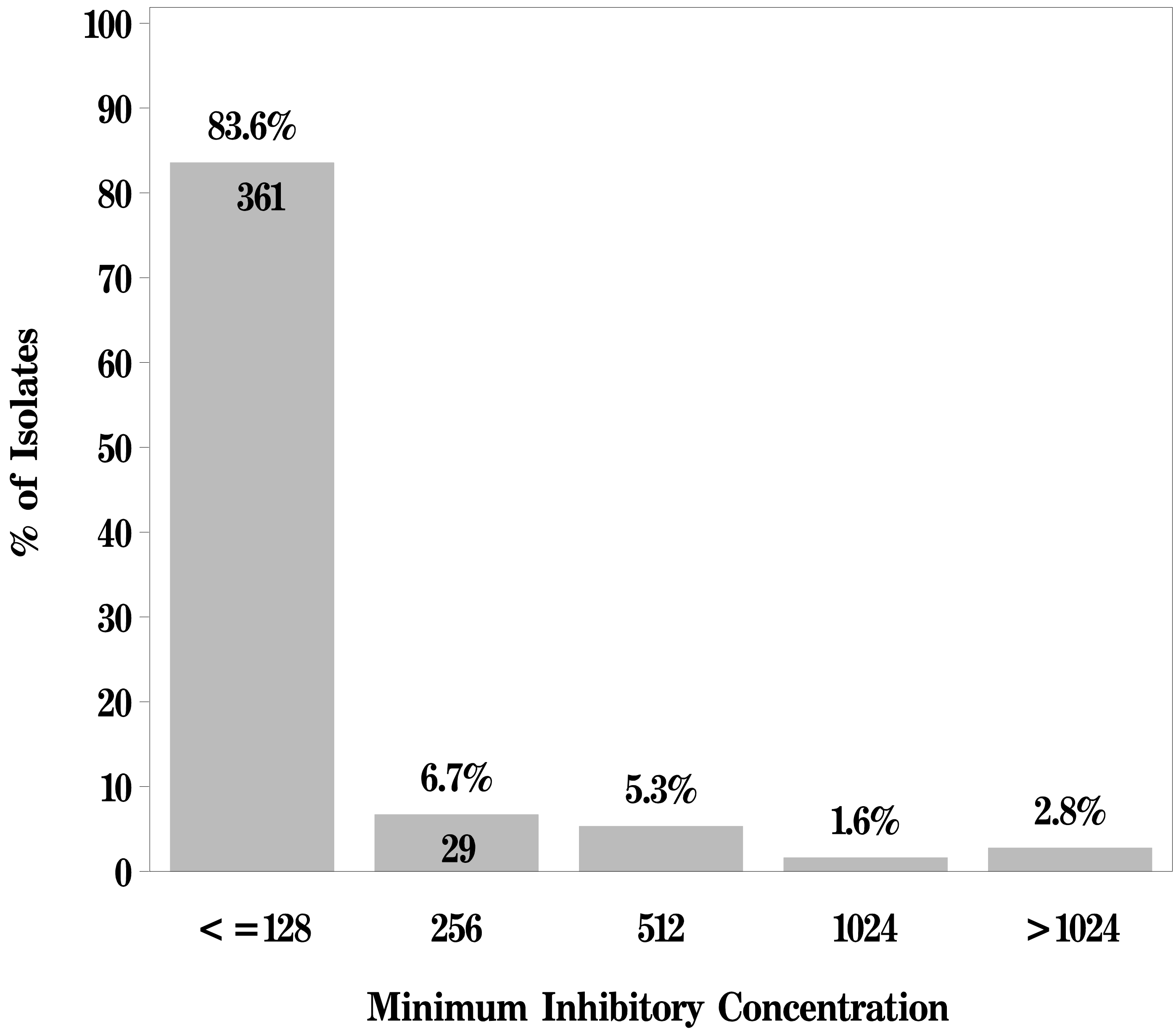
Breakpoints: Susceptible<=128 μg/mL Resistant>=512 μg/mL



NARMS

Figure 15g: Minimum Inhibitory Concentration of Kanamycin for *Enterococcus* in Ground Beef (N=432 Isolates)

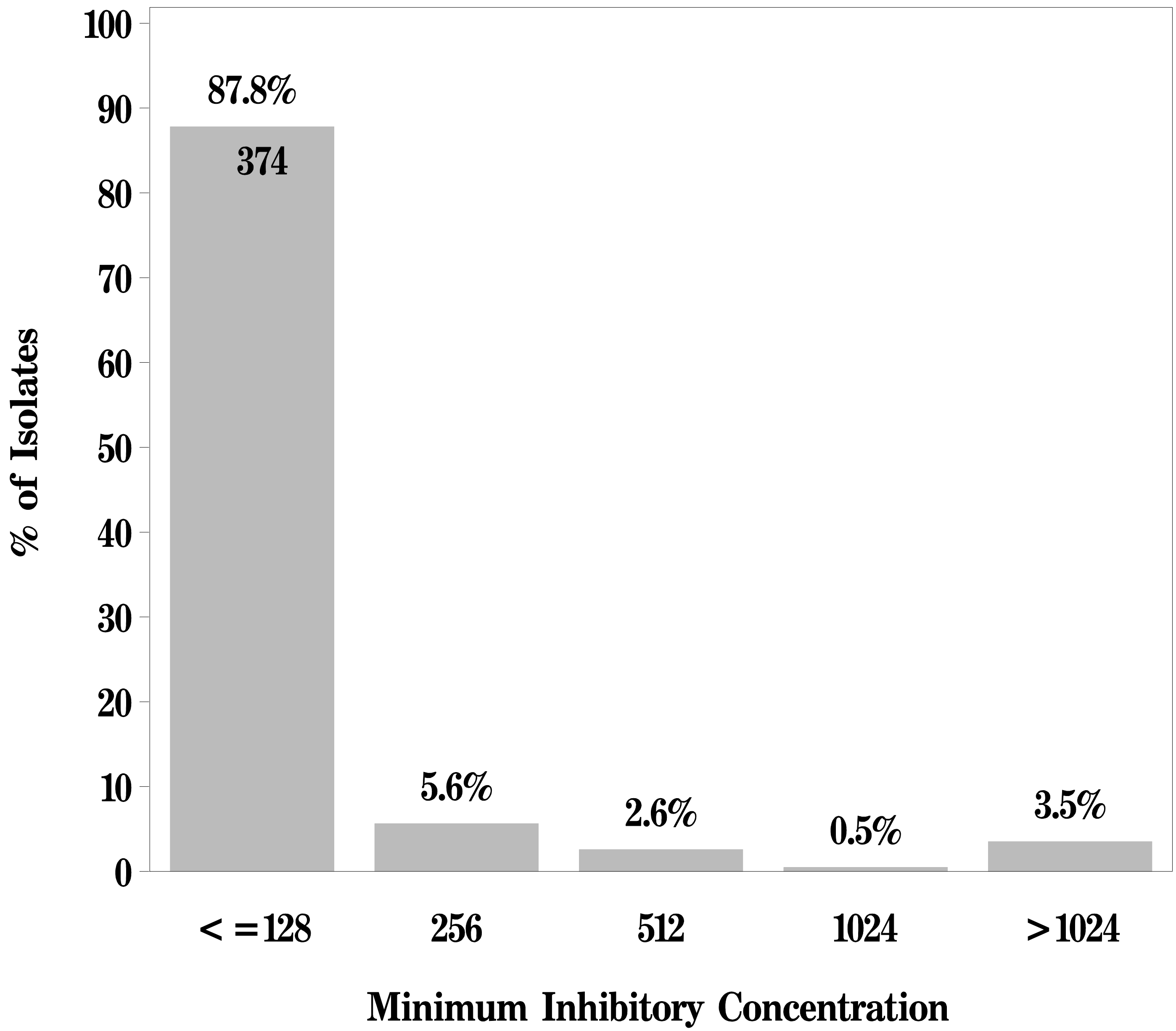
Breakpoints: Susceptible<=128 µg/mL Resistant>=512 µg/mL



NARMS

Figure 15g: Minimum Inhibitory Concentration of Kanamycin for *Enterococcus* in Pork Chop (N=426 Isolates)

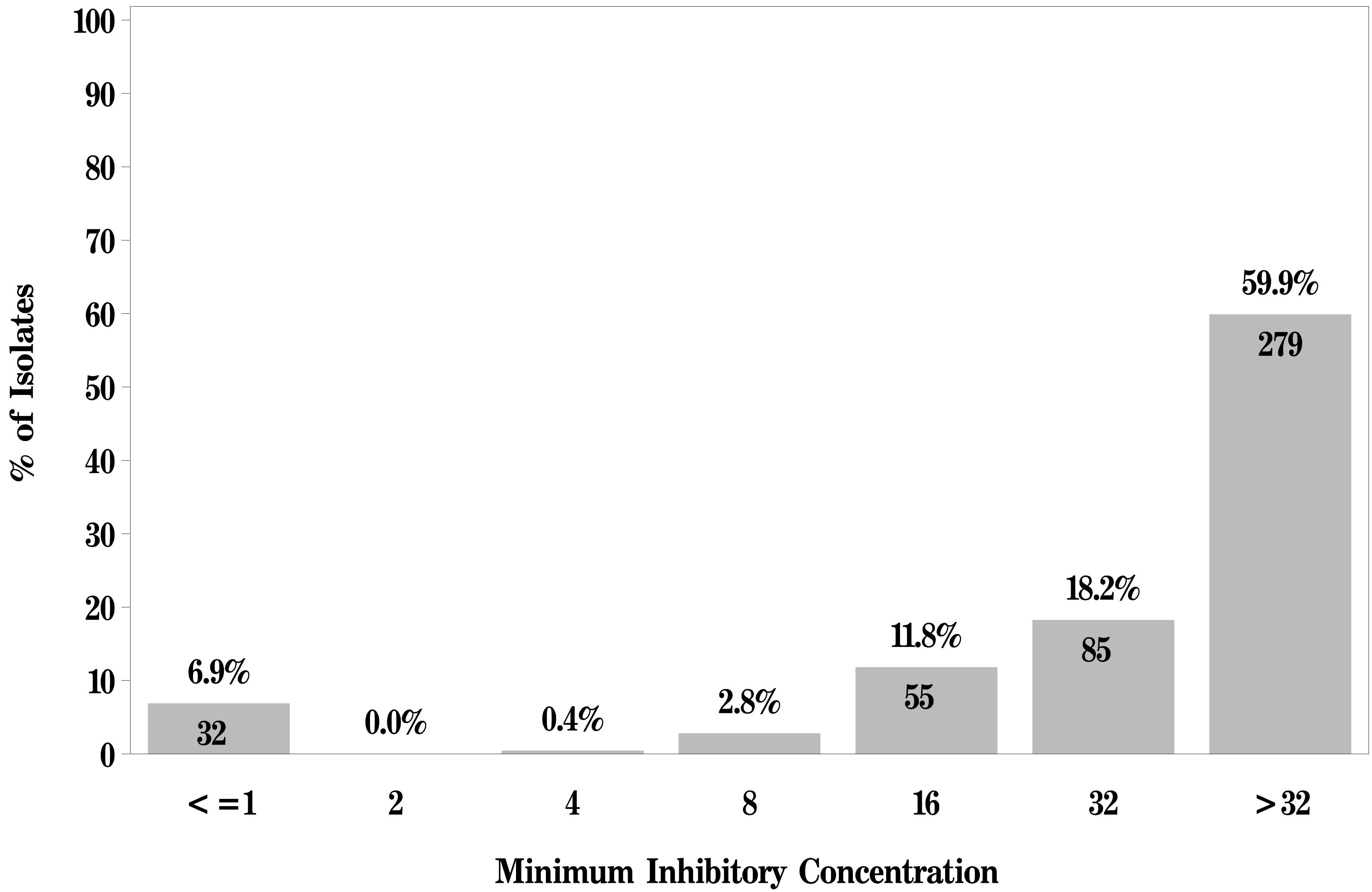
Breakpoints: Susceptible<=128 μg/mL Resistant>=512 μg/mL



NARMS

Figure 15h: Minimum Inhibitory Concentration of Lincomycin for *Enterococcus* in Chicken Breast (N=466 Isolates)

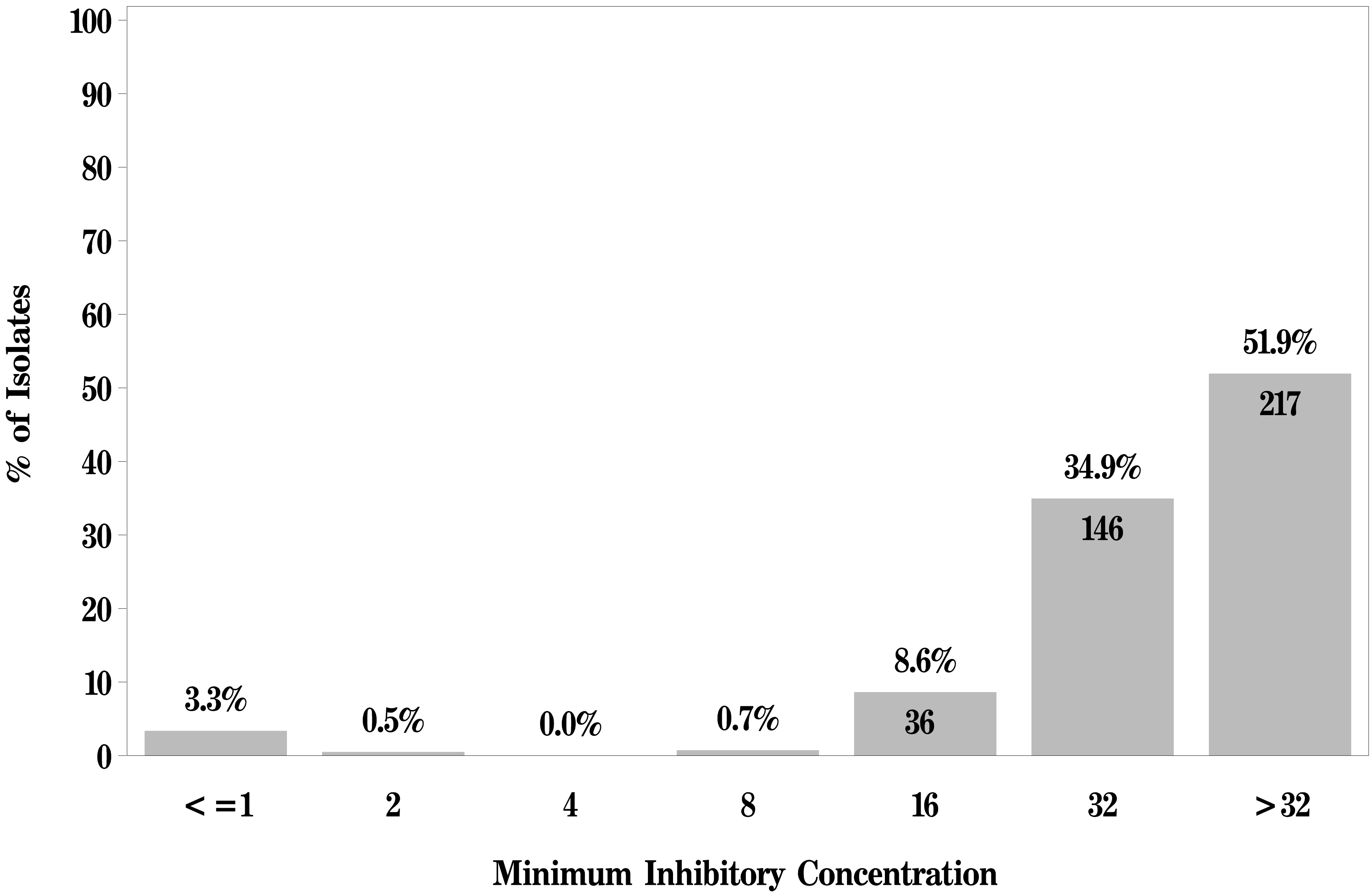
Breakpoints: Susceptible<=8 μg/mL Resistant>=32 μg/mL



NARMS

Figure 15h: Minimum Inhibitory Concentration of Lincomycin for *Enterococcus* in Ground Turkey (N=418 Isolates)

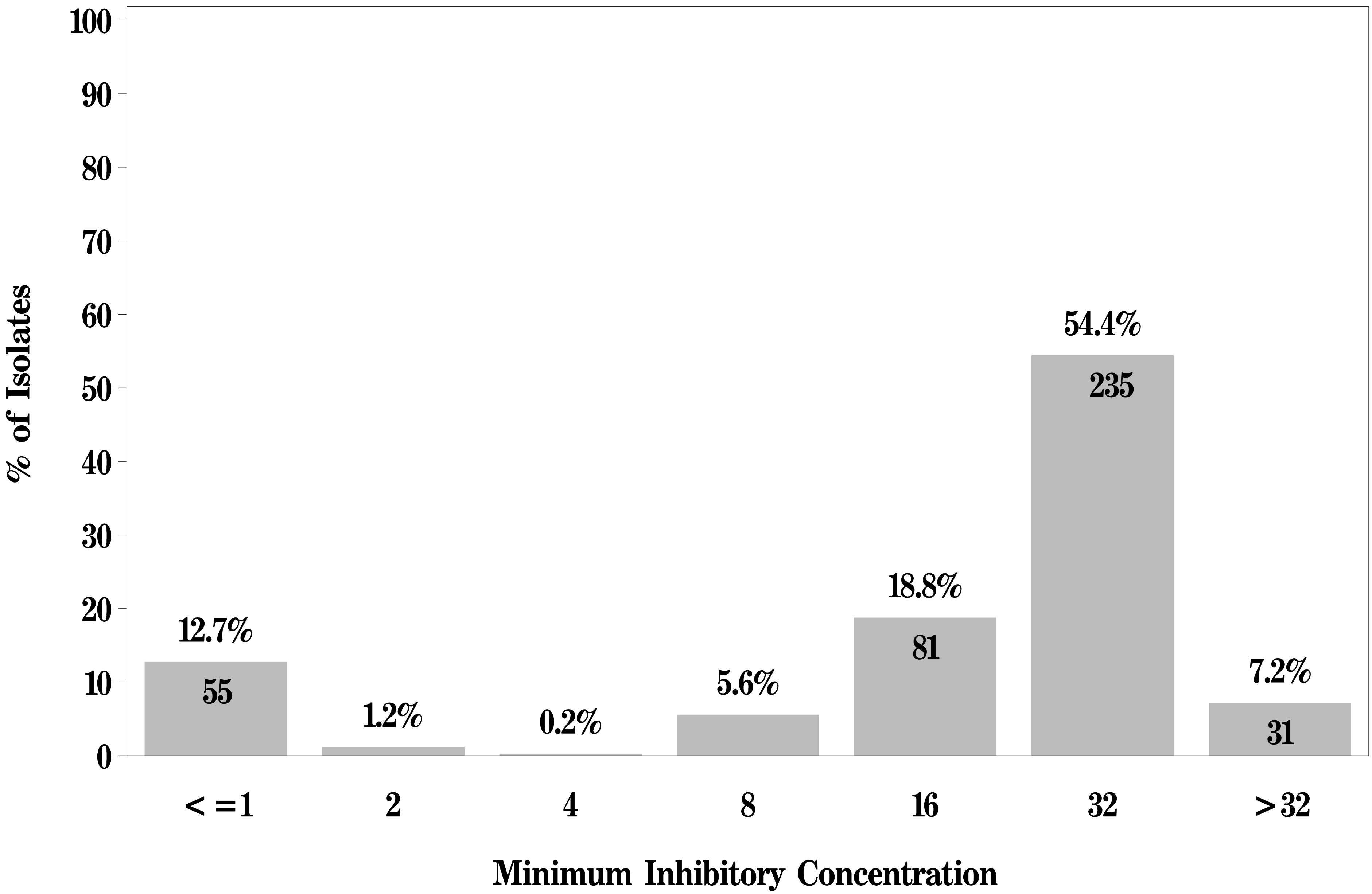
Breakpoints: Susceptible<=8 µg/mL Resistant>=32 µg/mL



NARMS

Figure 15h: Minimum Inhibitory Concentration of Lincomycin for *Enterococcus* in Ground Beef (N=432 Isolates)

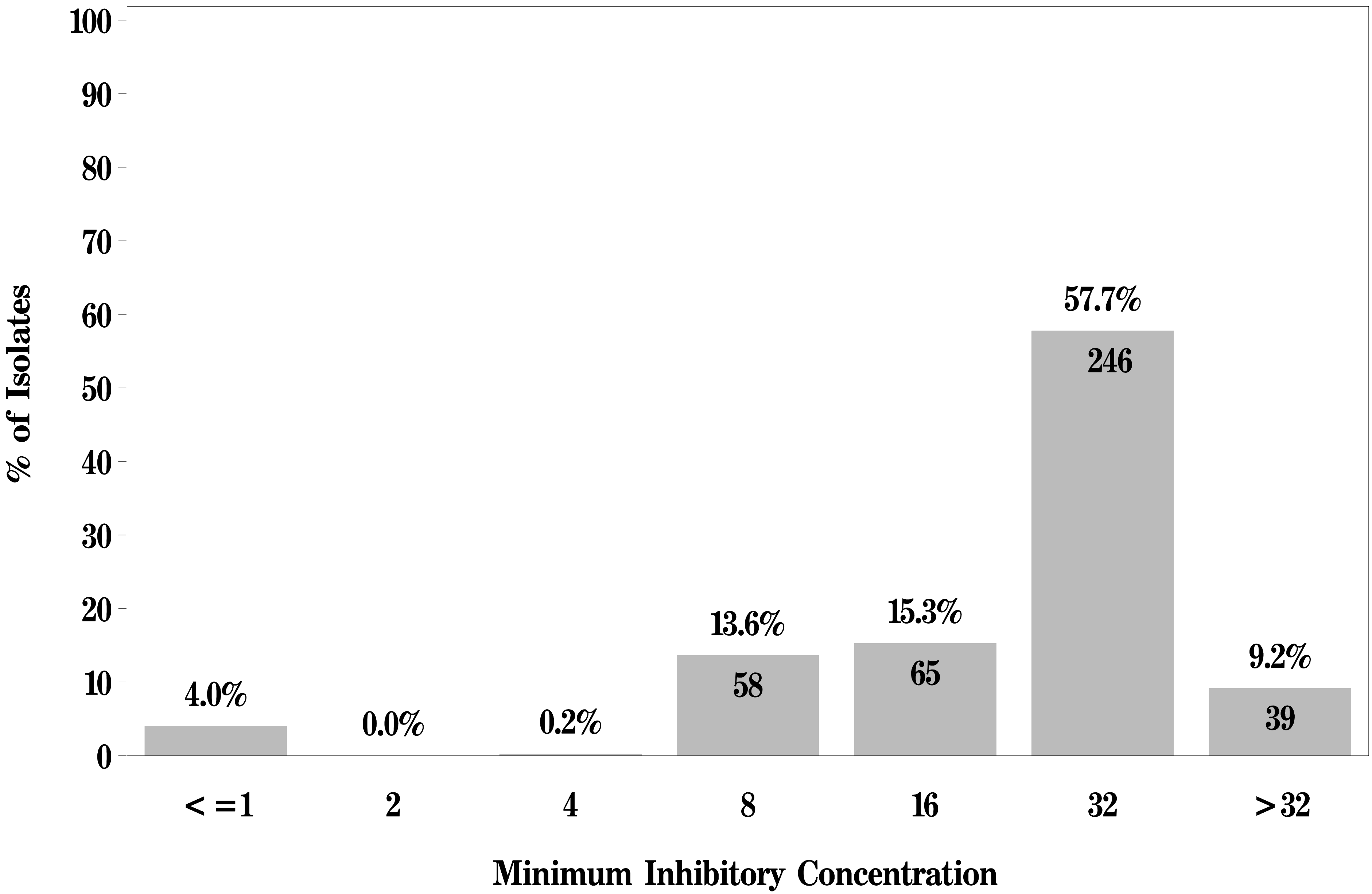
Breakpoints: Susceptible <=8 μg/mL Resistant >=32 μg/mL



NARMS

Figure 15h: Minimum Inhibitory Concentration of Lincomycin for *Enterococcus* in Pork Chop (N=426 Isolates)

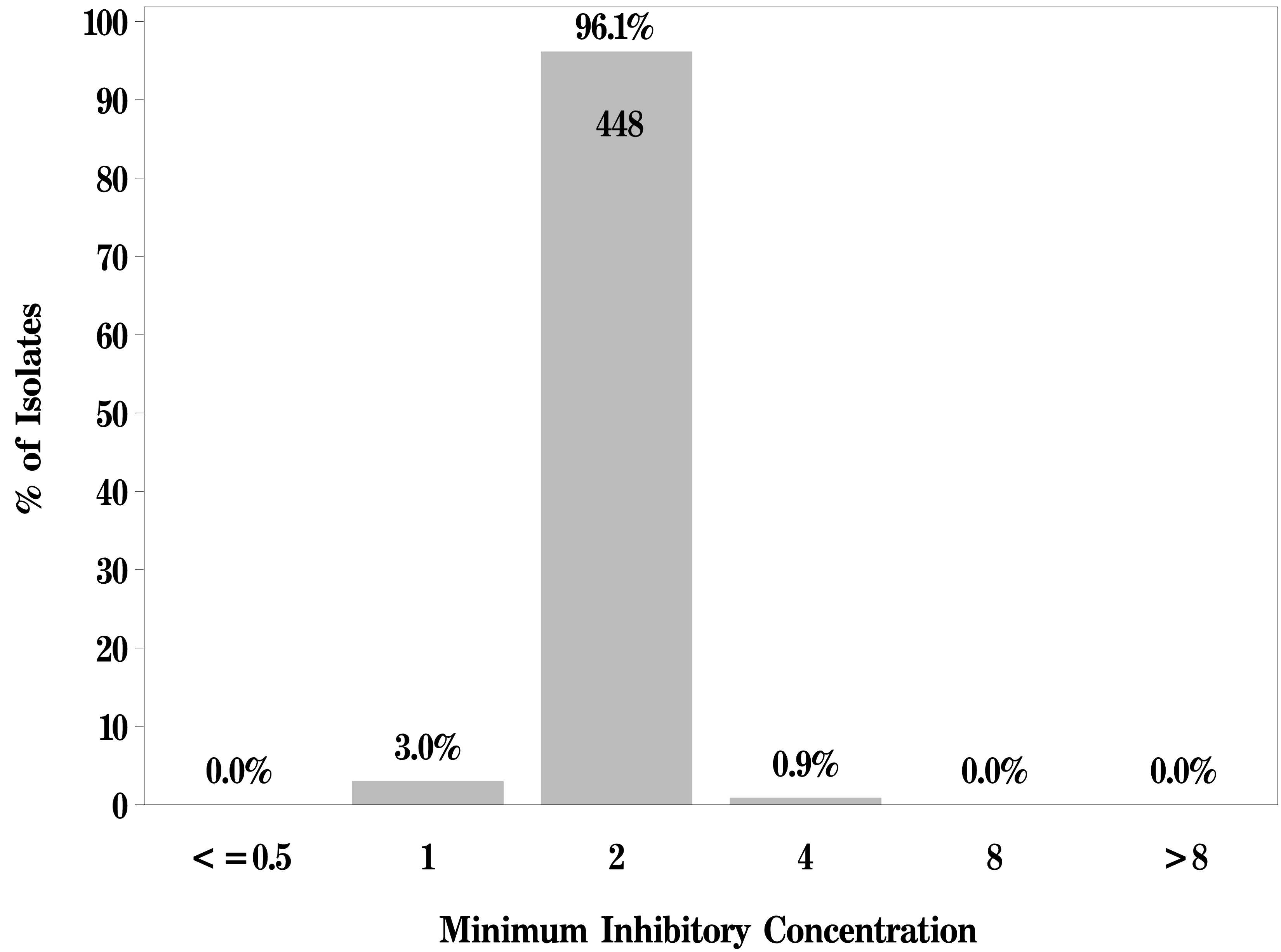
Breakpoints: Susceptible<=8 μg/mL Resistant>=32 μg/mL



NARMS

Figure 15i: Minimum Inhibitory Concentration of Linezolid for *Enterococcus* in Chicken Breast (N=466 Isolates)

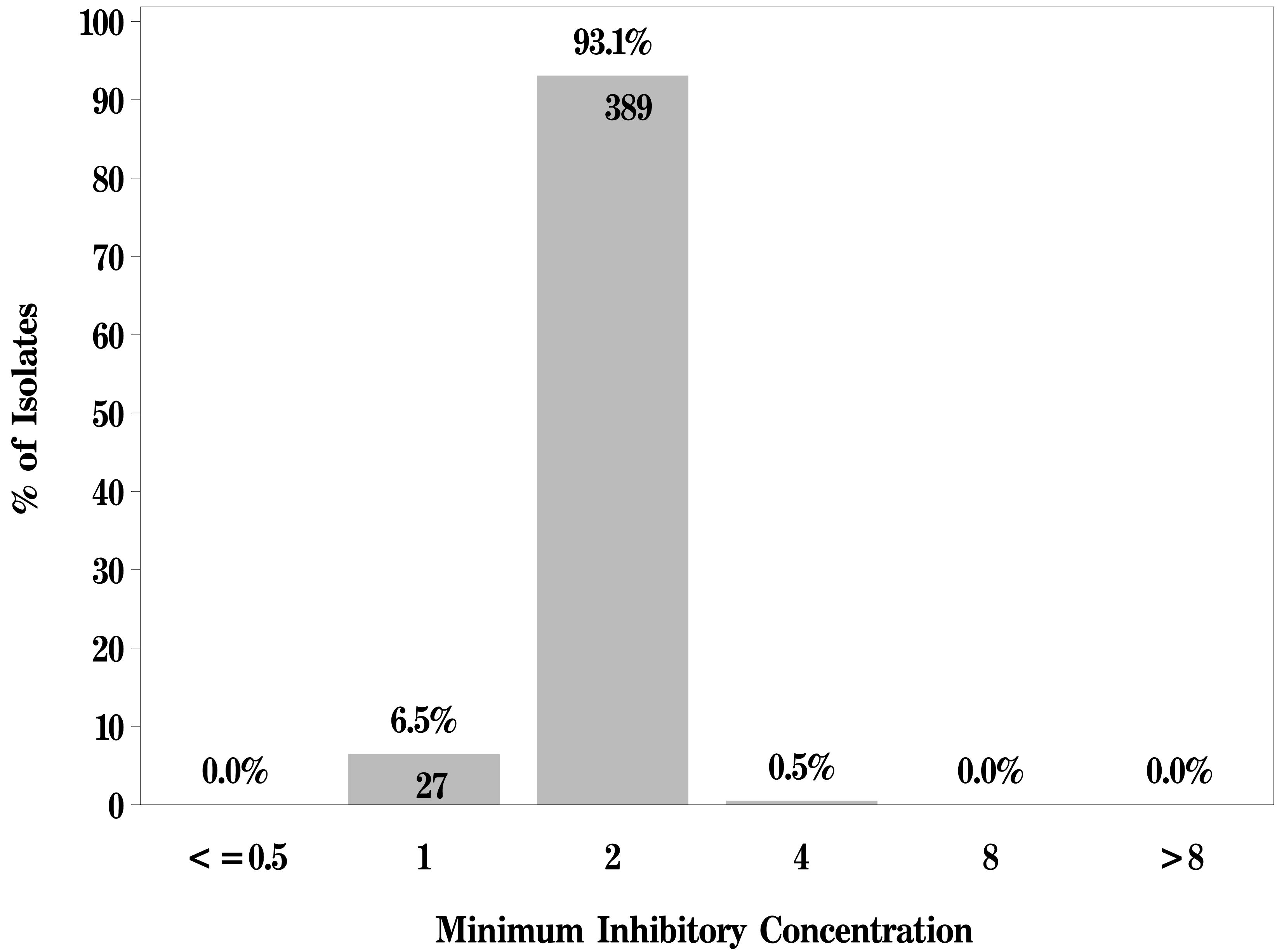
Breakpoints: Susceptible<=2 µg/mL Resistant>=8 µg/mL



NARMS

Figure 15i: Minimum Inhibitory Concentration of Linezolid for *Enterococcus* in Ground Turkey (N=418 Isolates)

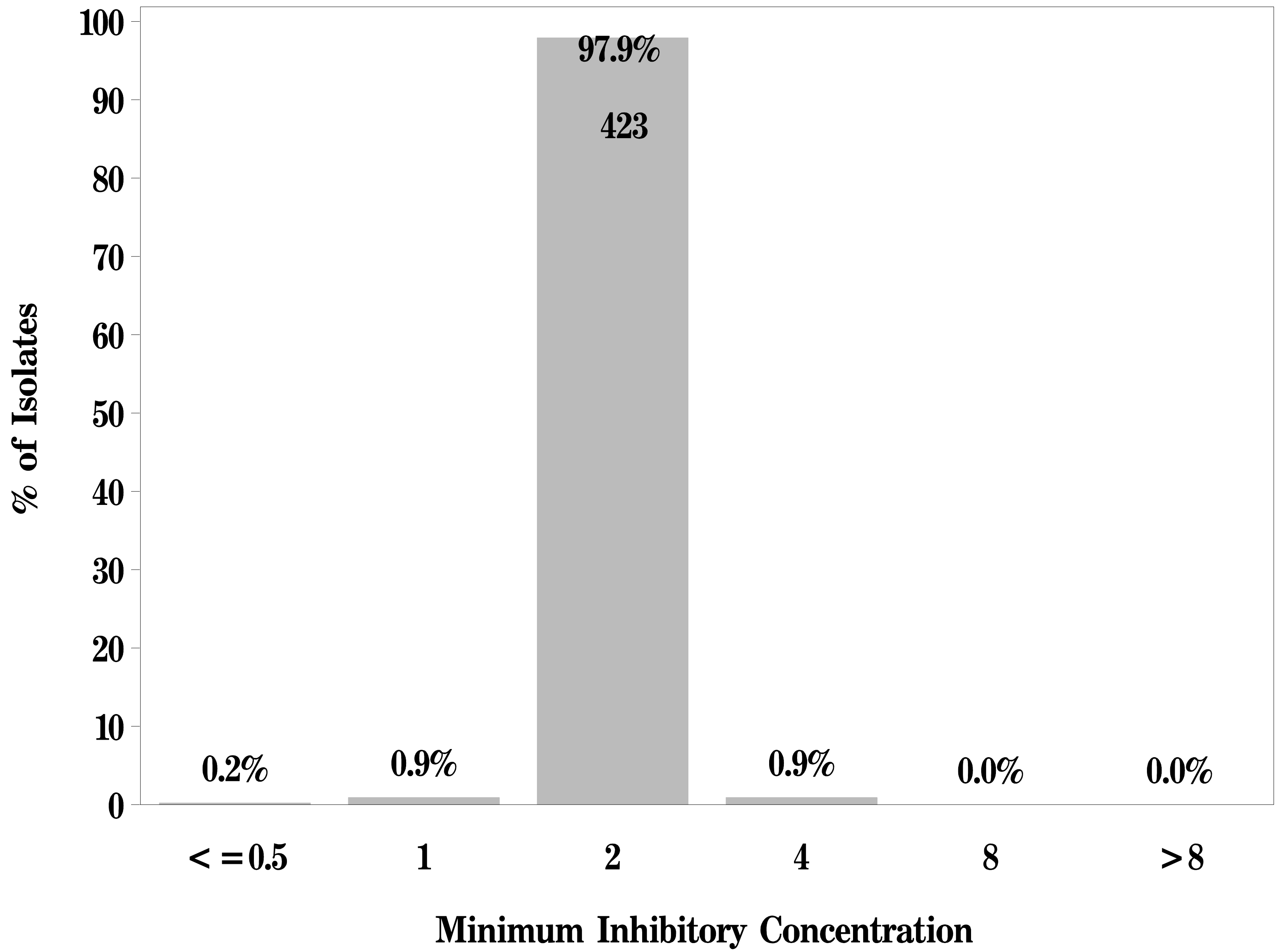
Breakpoints: Susceptible <=2 μg/mL Resistant >=8 μg/mL



NARMS

Figure 15i: Minimum Inhibitory Concentration of Linezolid for *Enterococcus* in Ground Beef (N=432 Isolates)

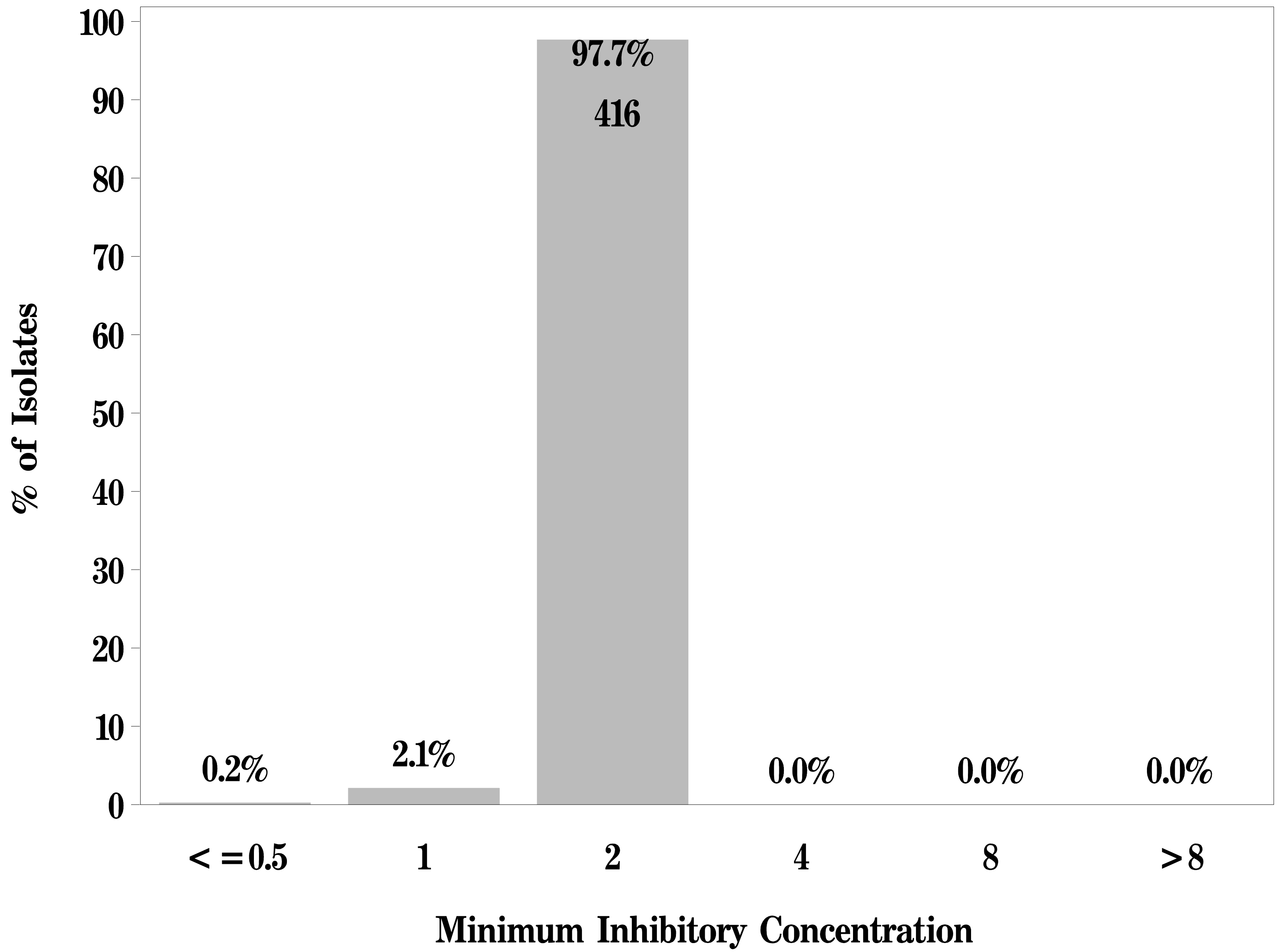
Breakpoints: Susceptible<=2 µg/mL Resistant>=8 µg/mL



NARMS

Figure 15i: Minimum Inhibitory Concentration of Linezolid for *Enterococcus* in Pork Chop (N=426 Isolates)

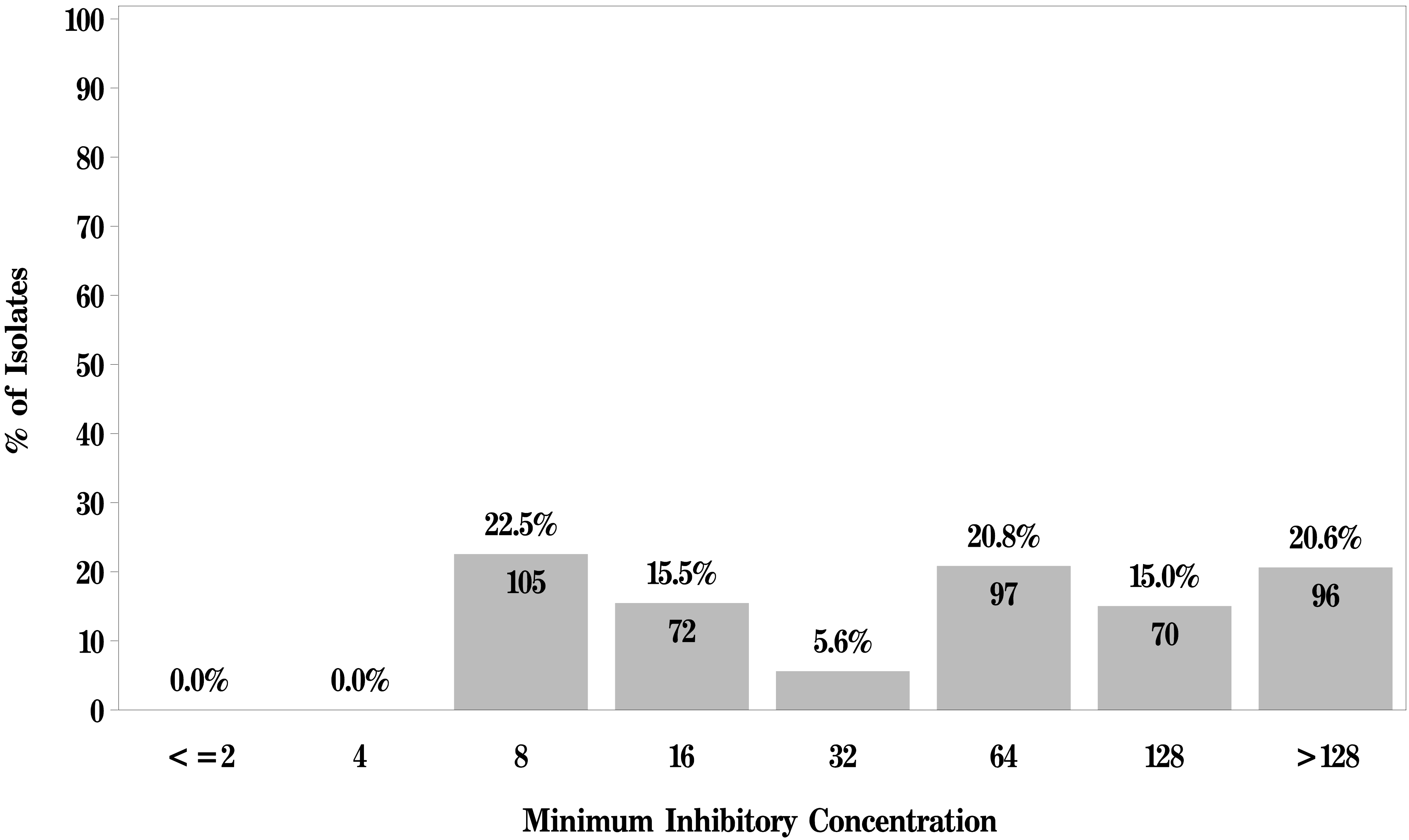
Breakpoints: Susceptible<=2 µg/mL Resistant>=8 µg/mL



NARMS

Figure 15j: Minimum Inhibitory Concentration of Nitrofurantoin for *Enterococcus* in Chicken Breast (N=466 Isolates)

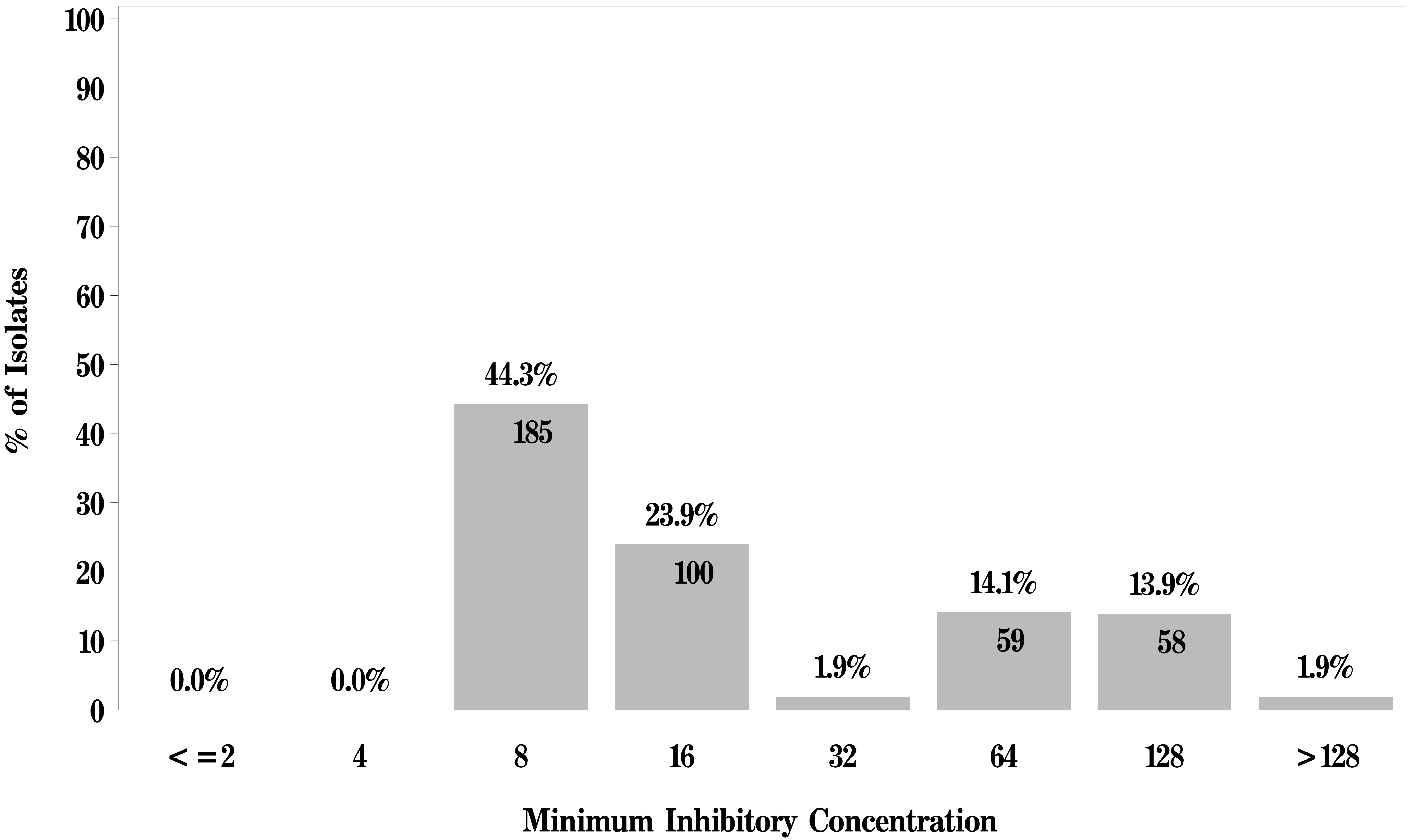
Breakpoints: Susceptible<=32 μg/mL Resistant>=128 μg/mL



NARMS

Figure 15j: Minimum Inhibitory Concentration of Nitrofurantoin for *Enterococcus* in Ground Turkey (N=418 Isolates)

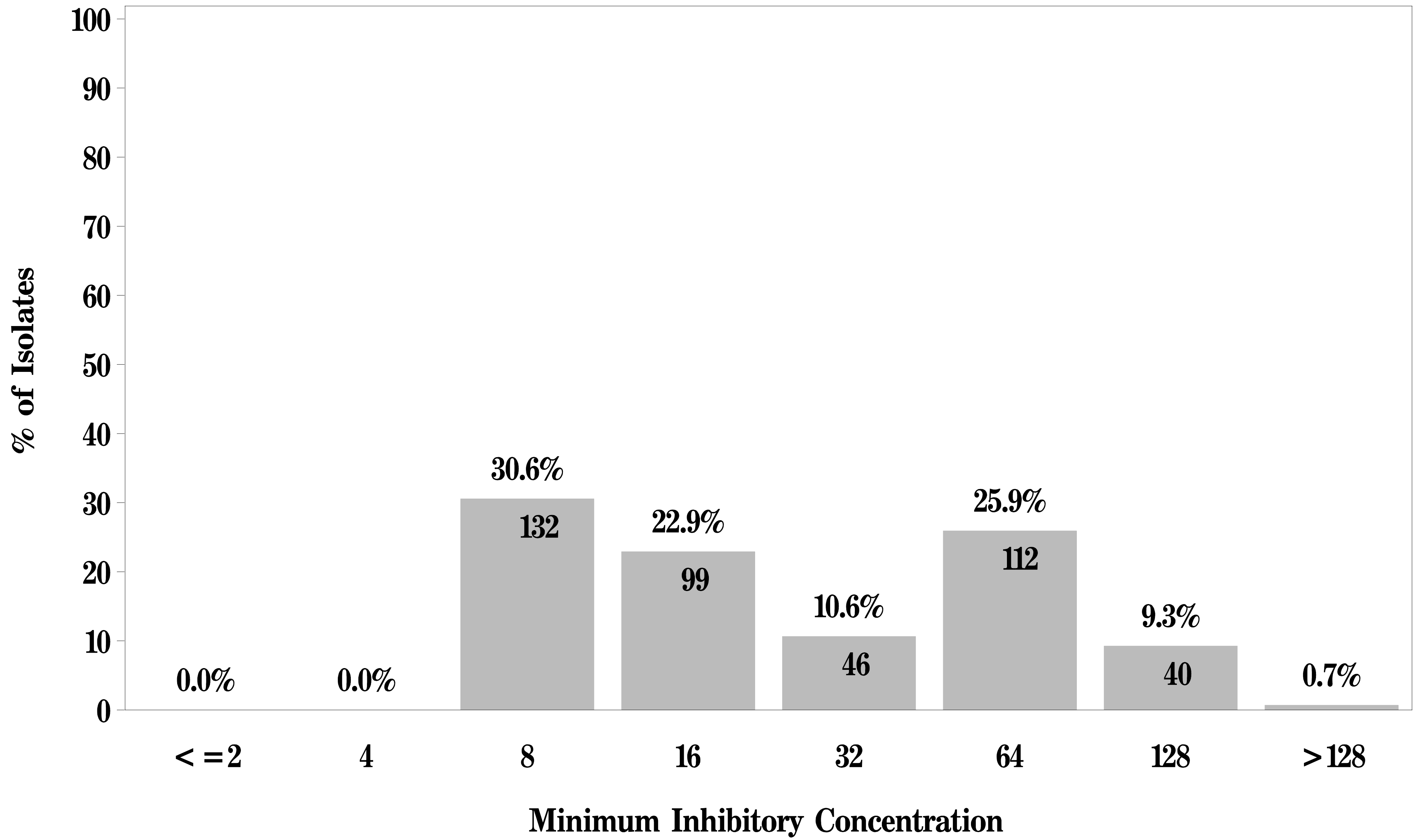
Breakpoints: Susceptible<=32 µg/mL Resistant>=128 µg/mL



NARMS

Figure 15j: Minimum Inhibitory Concentration of Nitrofurantoin for *Enterococcus* in Ground Beef (N=432 Isolates)

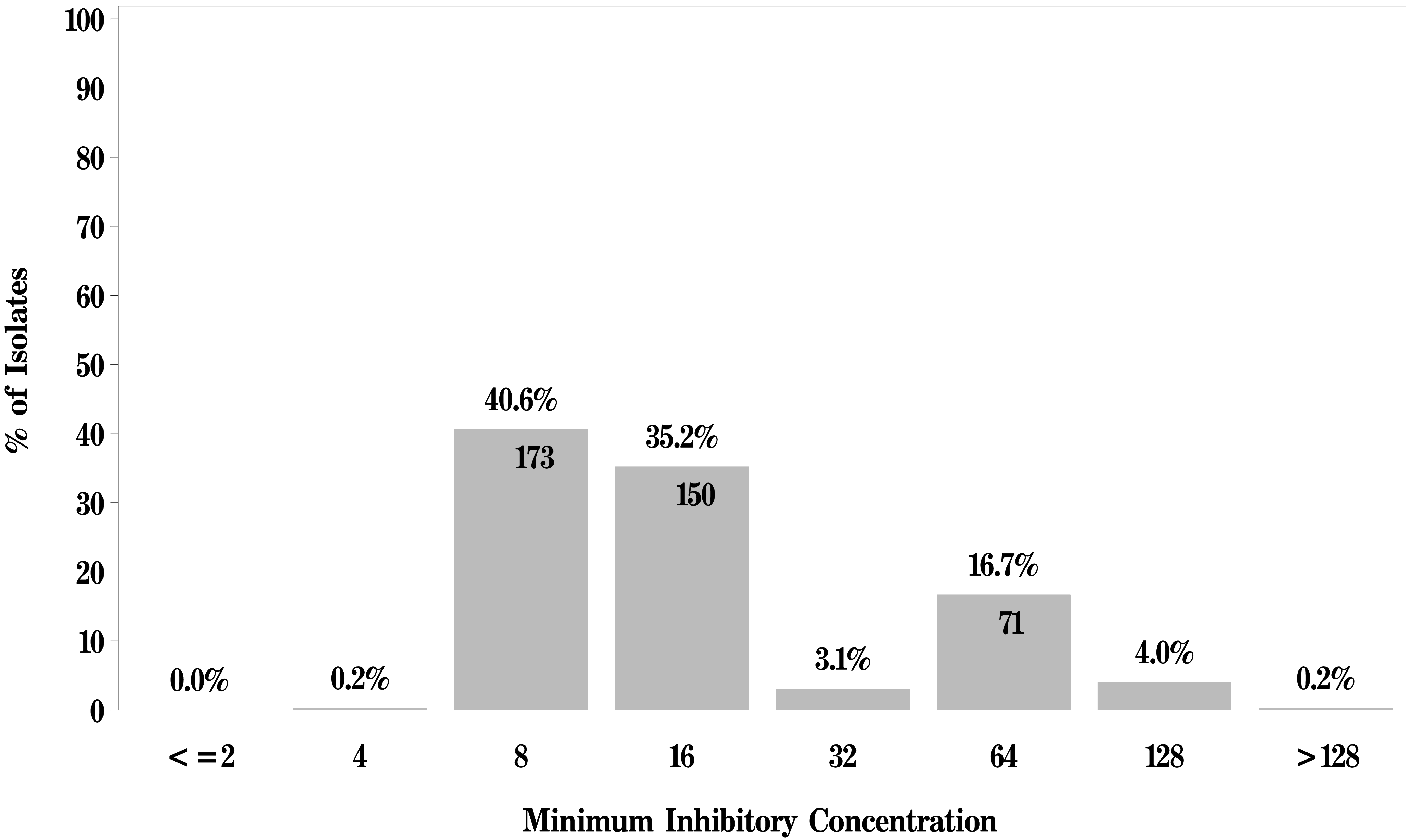
Breakpoints: Susceptible <=32 μg/mL Resistant >=128 μg/mL



NARMS

Figure 15j: Minimum Inhibitory Concentration of Nitrofurantoin for *Enterococcus* in Pork Chop (N=426 Isolates)

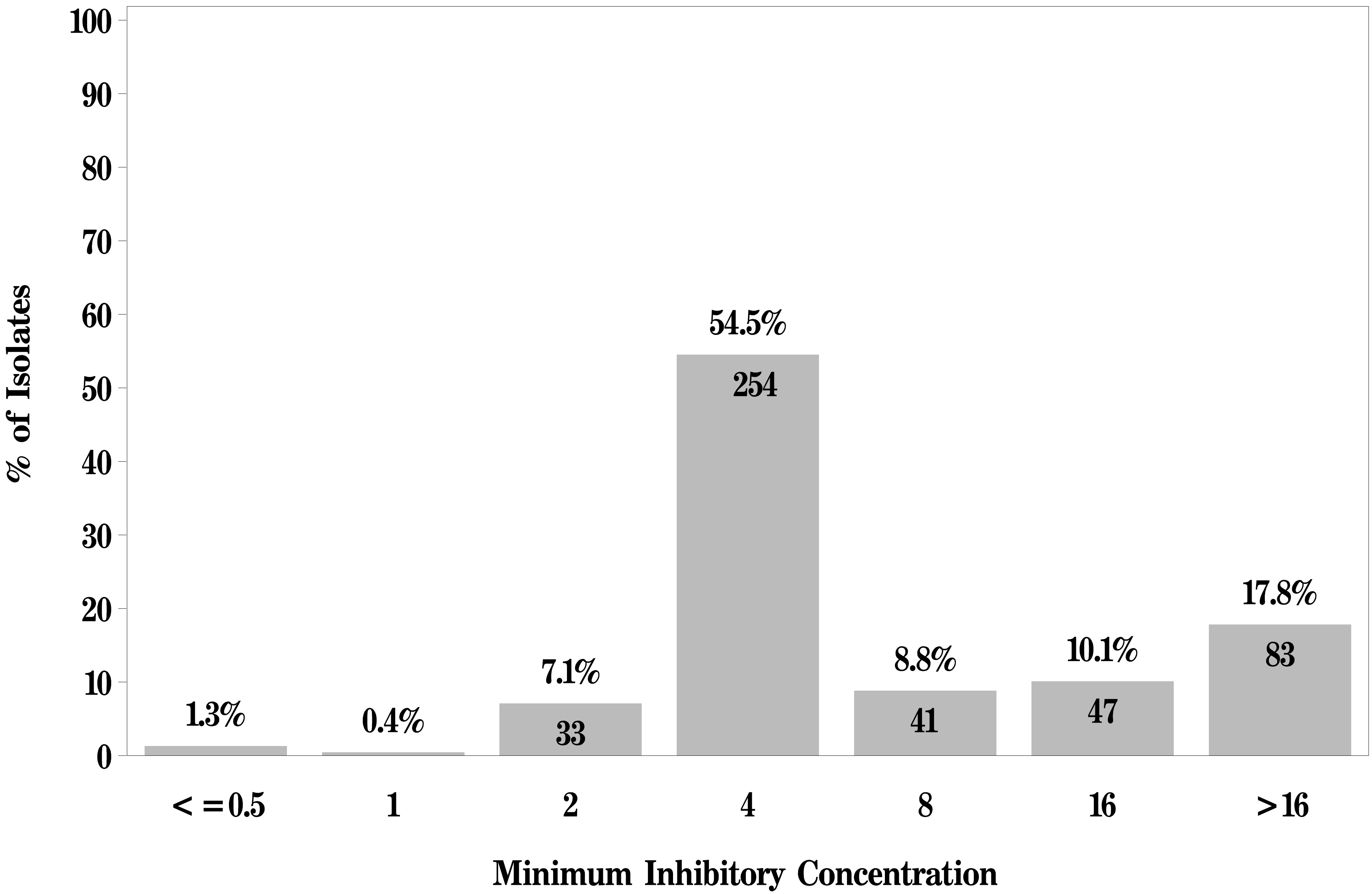
Breakpoints: Susceptible <=32 μg/mL Resistant >=128 μg/mL



NARMS

Figure 15k: Minimum Inhibitory Concentration of Penicillin for *Enterococcus* in Chicken Breast (N=466 Isolates)

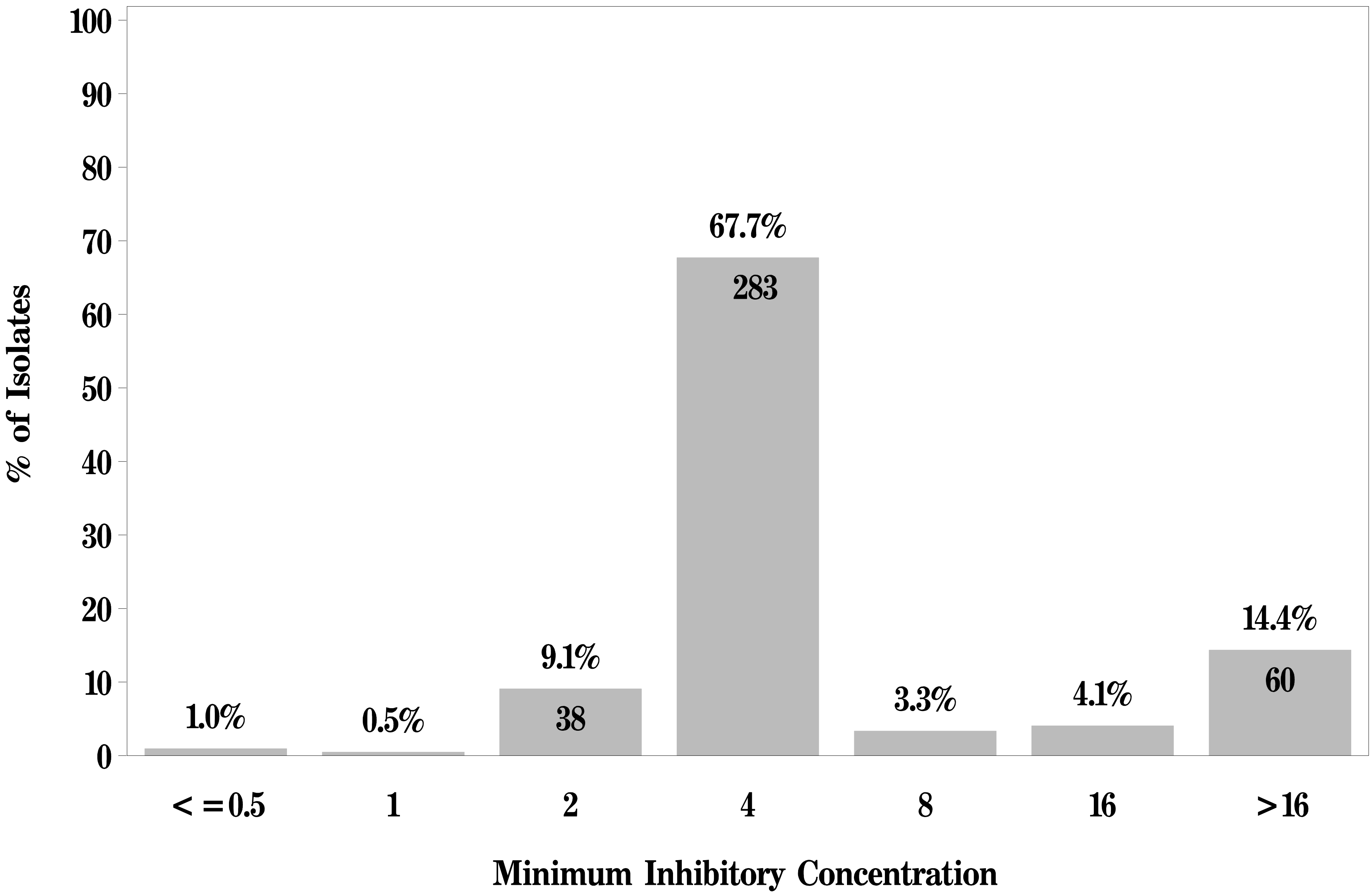
Breakpoints: Susceptible<=8 μg/mL Resistant>=16 μg/mL



NARMS

Figure 15k: Minimum Inhibitory Concentration of Penicillin for *Enterococcus* in Ground Turkey (N=418 Isolates)

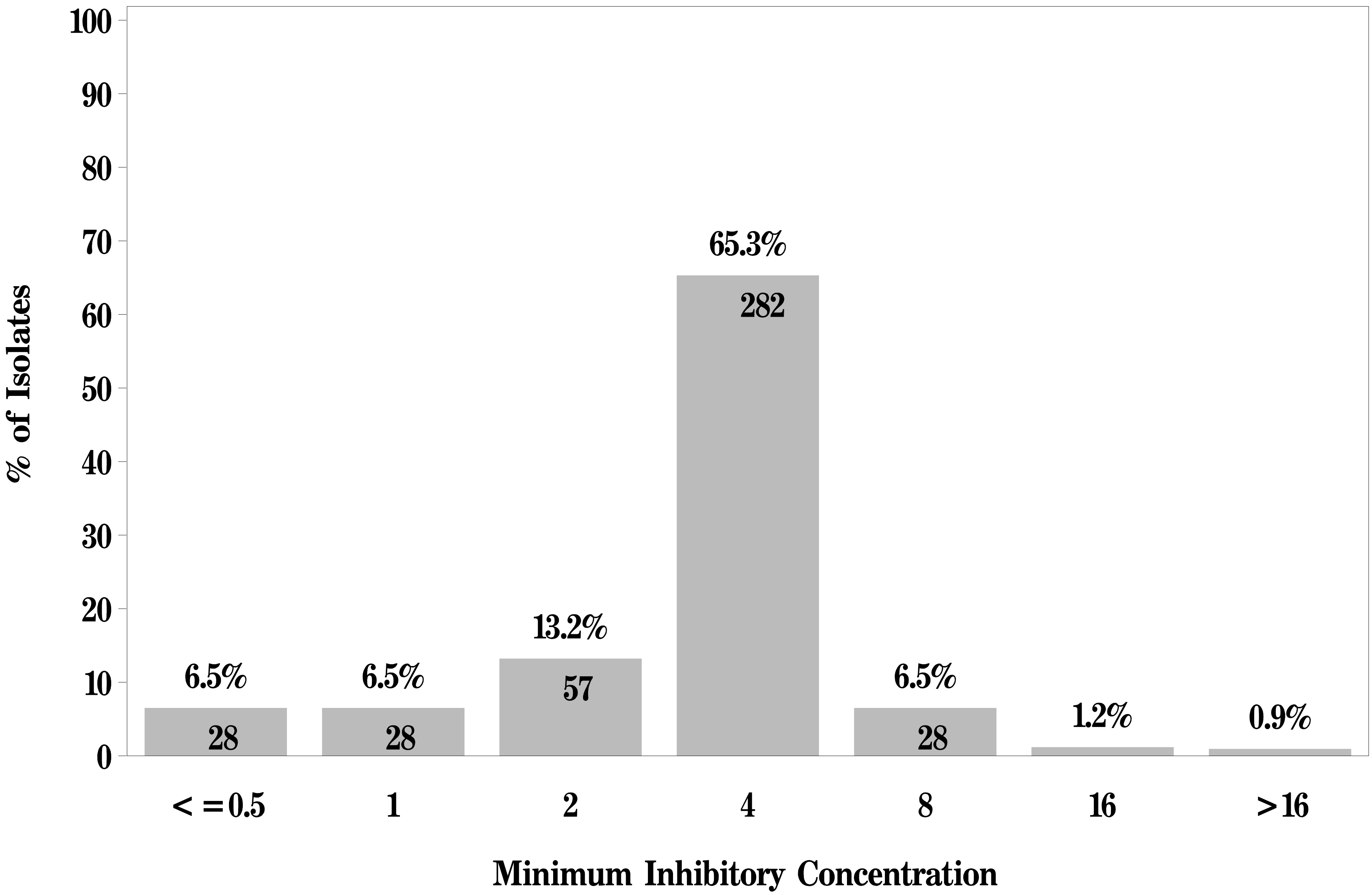
Breakpoints: Susceptible<=8 μg/mL Resistant>=16 μg/mL



NARMS

Figure 15k: Minimum Inhibitory Concentration of Penicillin for *Enterococcus* in Ground Beef (N=432 Isolates)

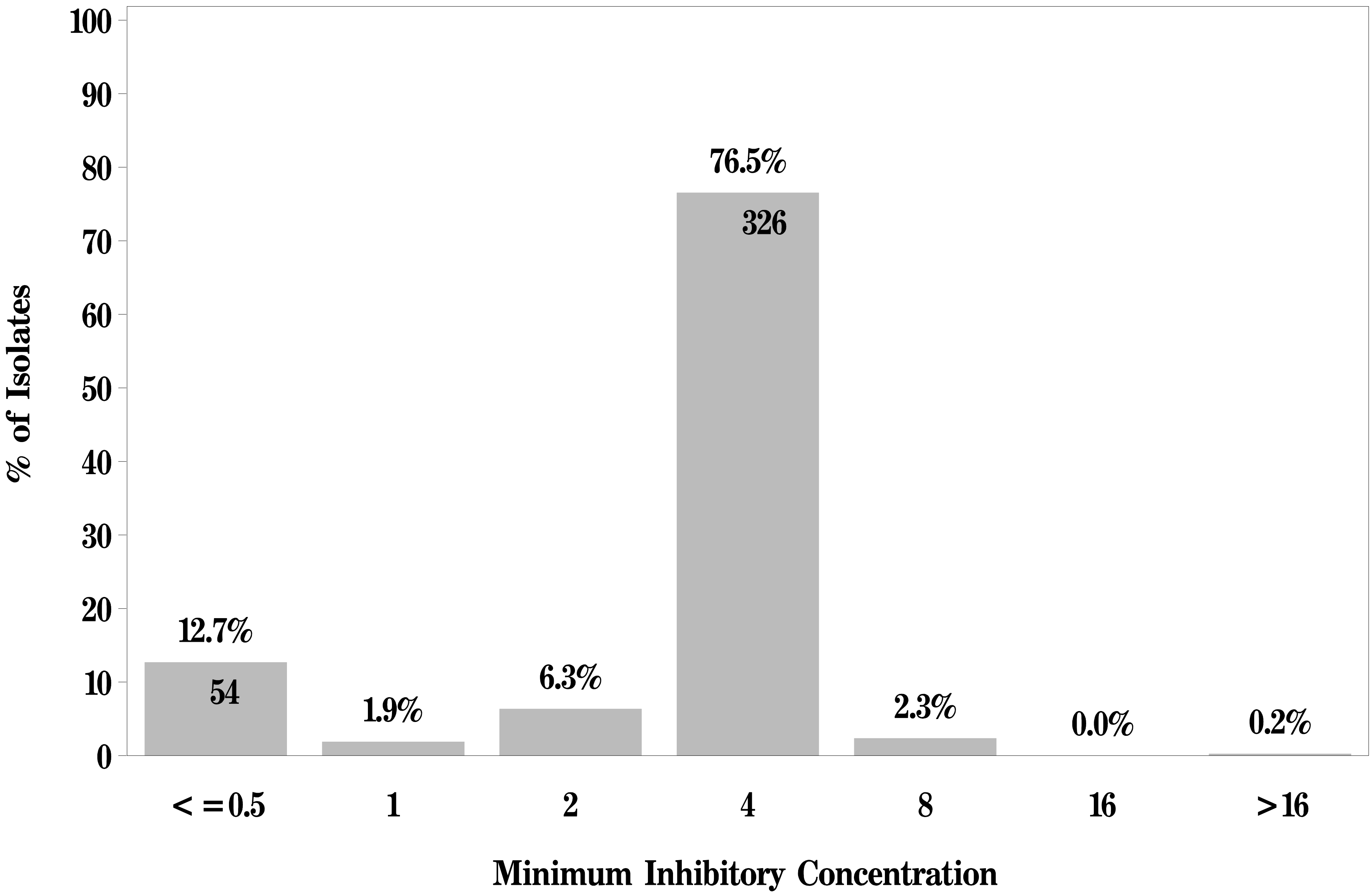
Breakpoints: Susceptible<=8 μg/mL Resistant>=16 μg/mL



NARMS

Figure 15k: Minimum Inhibitory Concentration of Penicillin for *Enterococcus* in Pork Chop (N=426 Isolates)

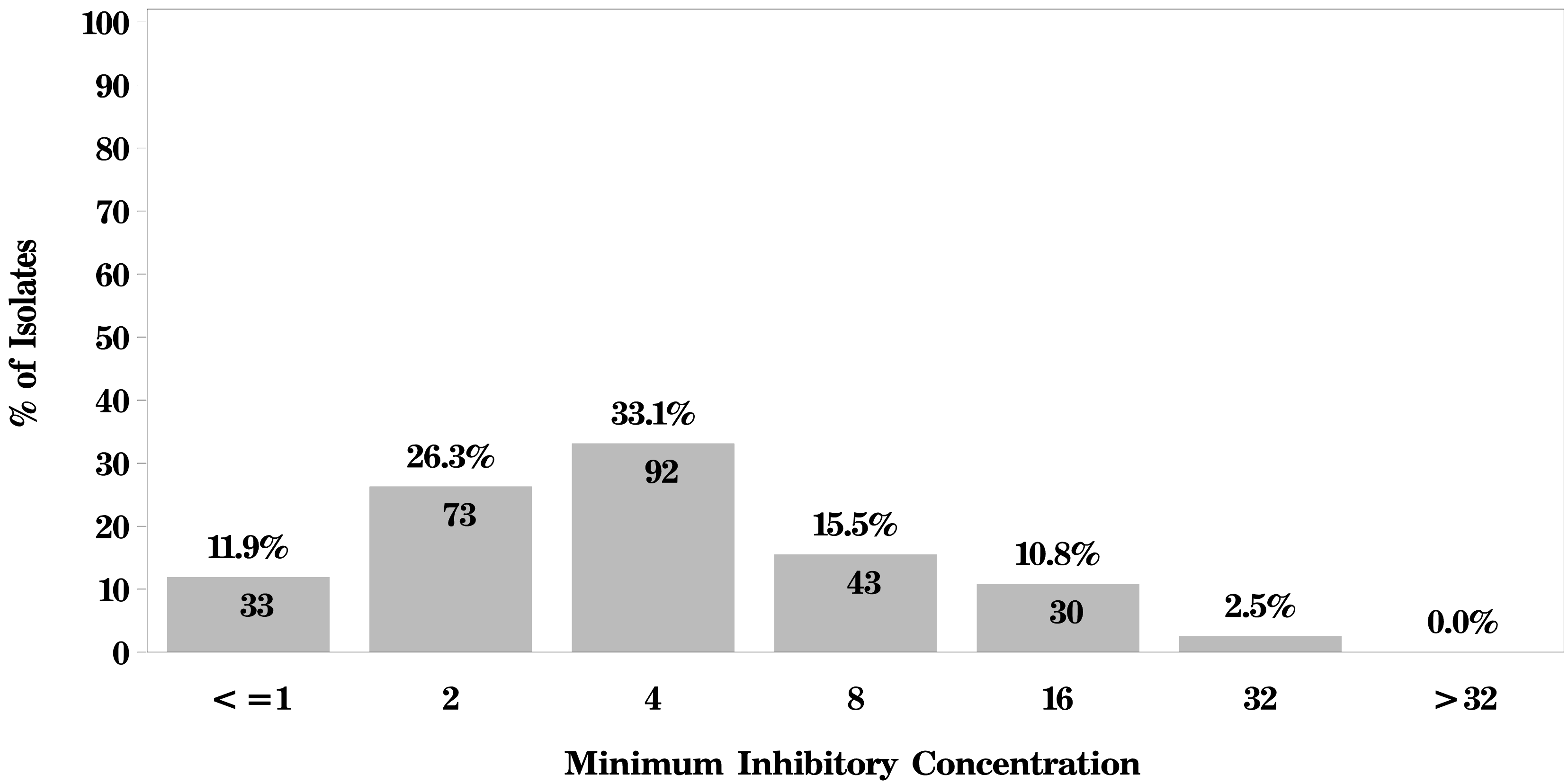
Breakpoints: Susceptible<=8 µg/mL Resistant>=16 µg/mL



NARMS

Figure 15l: Minimum Inhibitory Concentration of Quinupristin−dalfopristin for *Enterococcus* in Chicken Breast (N=278 Isolates)

Breakpoints: Susceptible <=1 μg/mL Resistant >=4 μg/mL

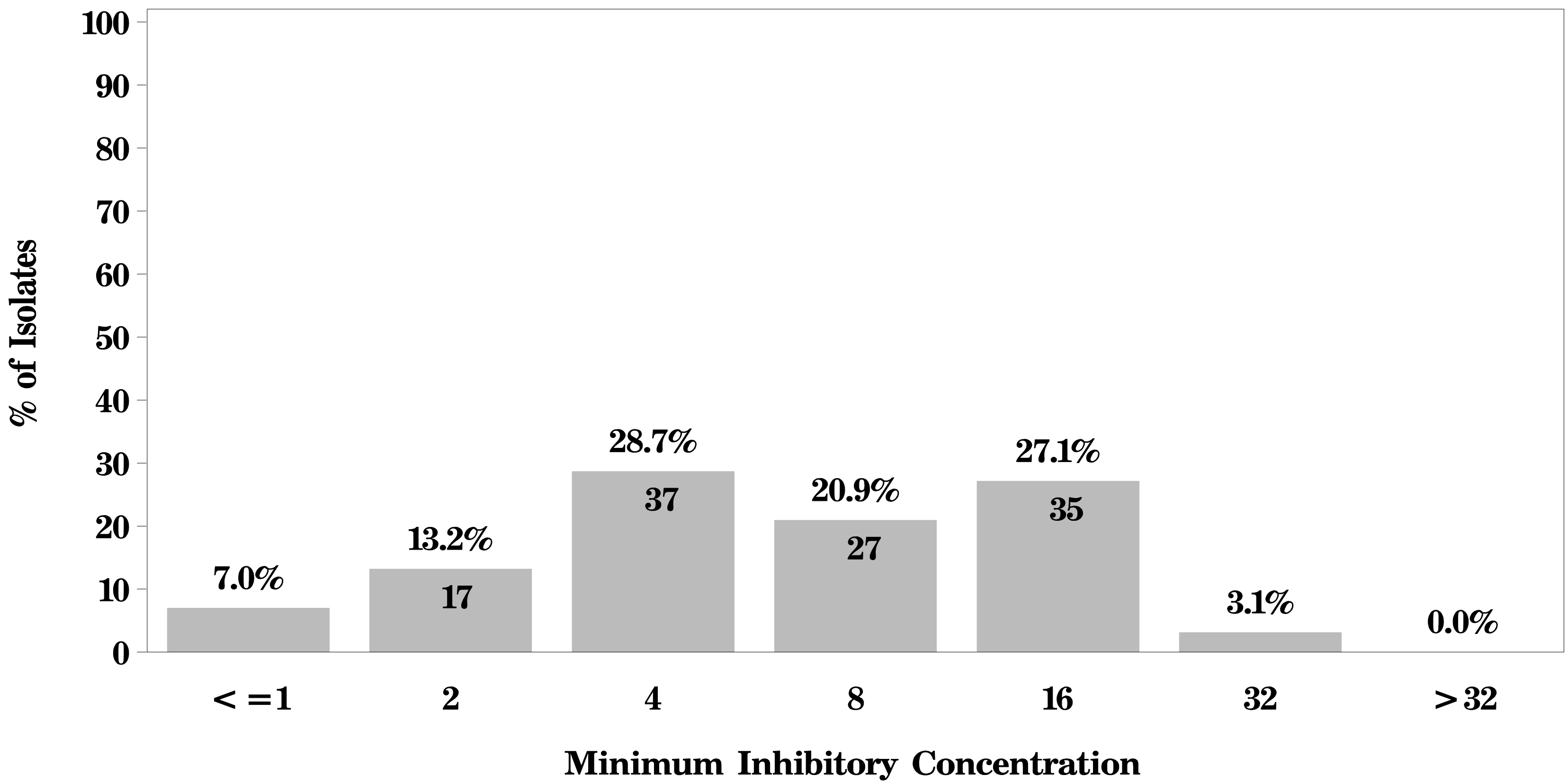


*Presented for all species except *E.faecalis* (N=466−188=278)

NARMS

Figure 15l: Minimum Inhibitory Concentration of Quinupristin−dalfopristin for *Enterococcus* in Ground Turkey (N=129 Isolates)

Breakpoints: Susceptible <=1 µg/mL Resistant >=4 µg/mL

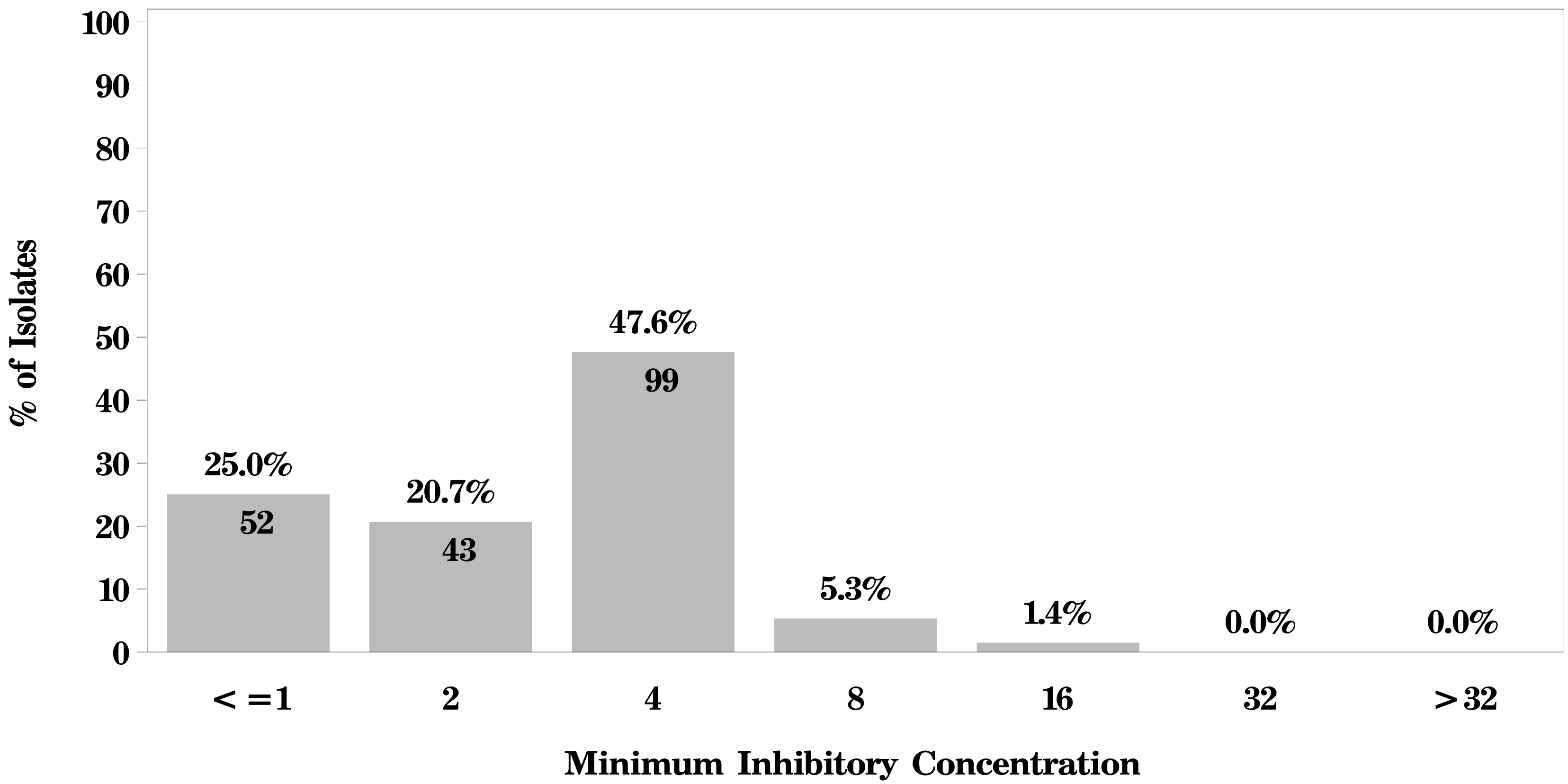


*Presented for all species except *E.faecalis* (N=418−289=129)

NARMS

Figure 15l: Minimum Inhibitory Concentration of Quinupristin−dalfopristin for *Enterococcus* in Ground Beef (N=208 Isolates)

Breakpoints: Susceptible <=1 μg/mL Resistant >=4 μg/mL

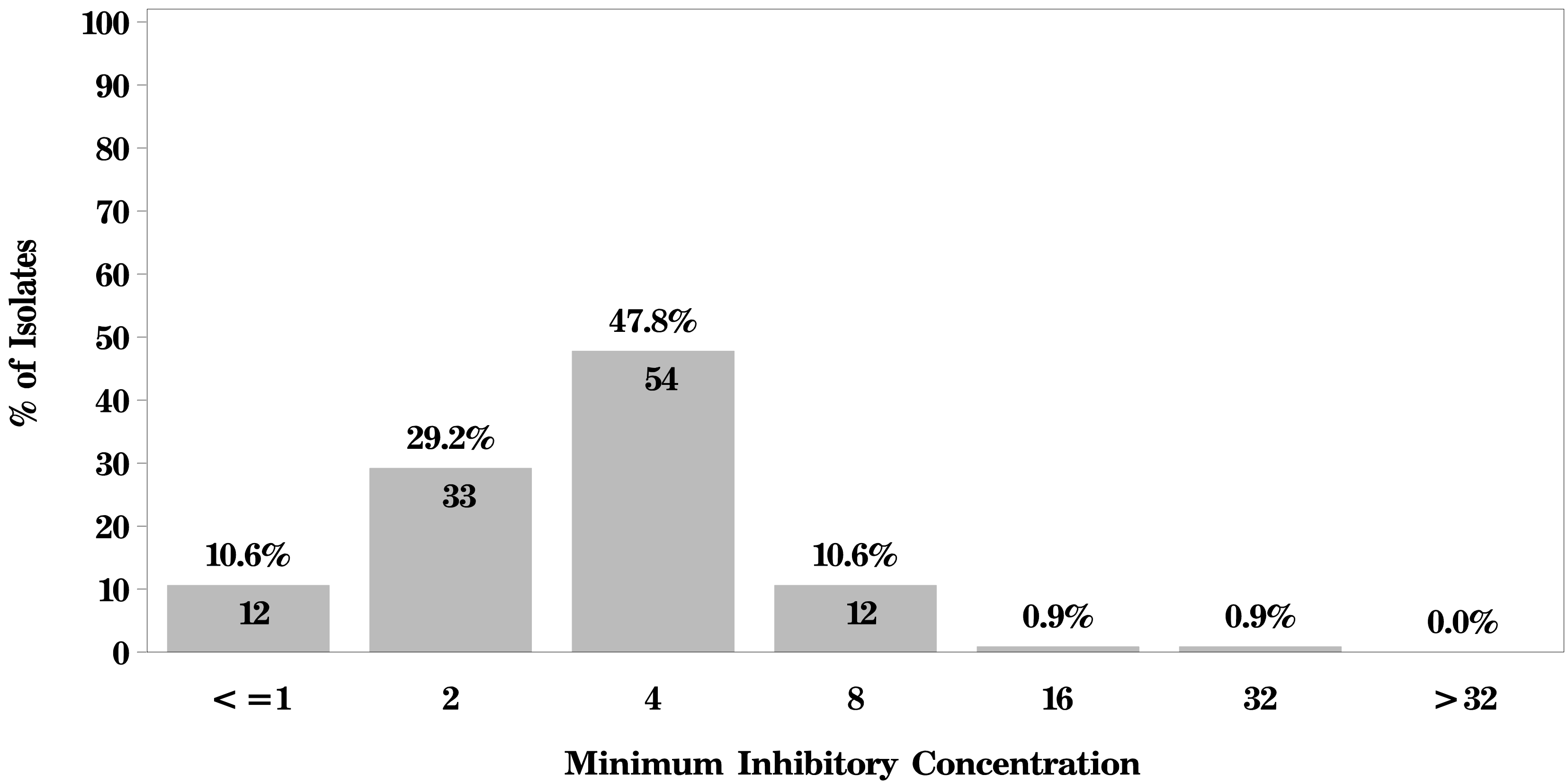


*Presented for all species except *E.faecalis* (N=432−224=208)

NARMS

Figure 15l: Minimum Inhibitory Concentration of Quinupristin−dalfopristin for *Enterococcus* in Pork Chop (N=113 Isolates)

Breakpoints: Susceptible <=1 µg/mL Resistant >=4 µg/mL

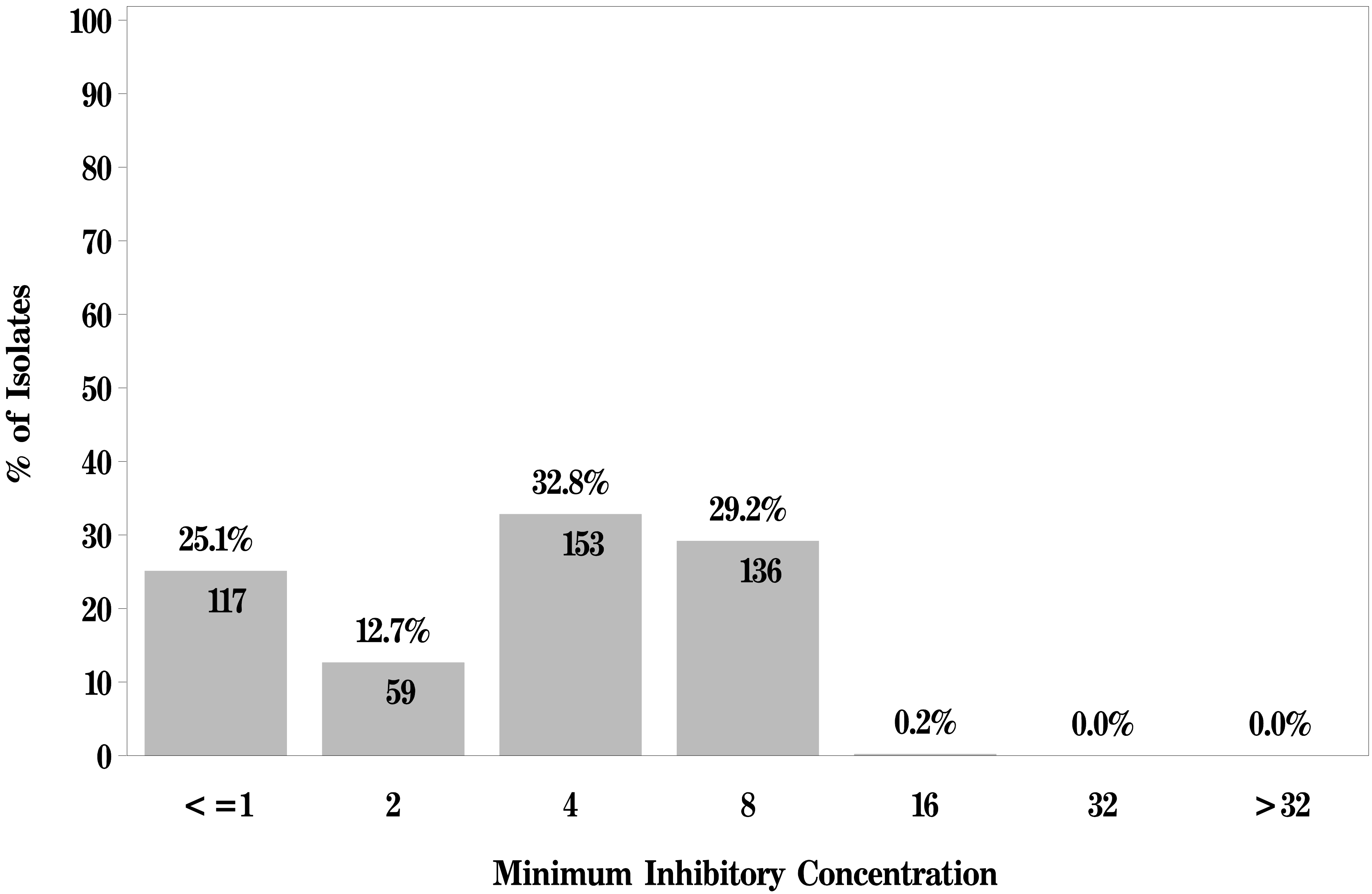


*Presented for all species except *E.faecalis* (N=426−313=113)

NARMS

Figure 15m: Minimum Inhibitory Concentration of Salinomycin for *Enterococcus* in Chicken Breast (N=466 Isolates)

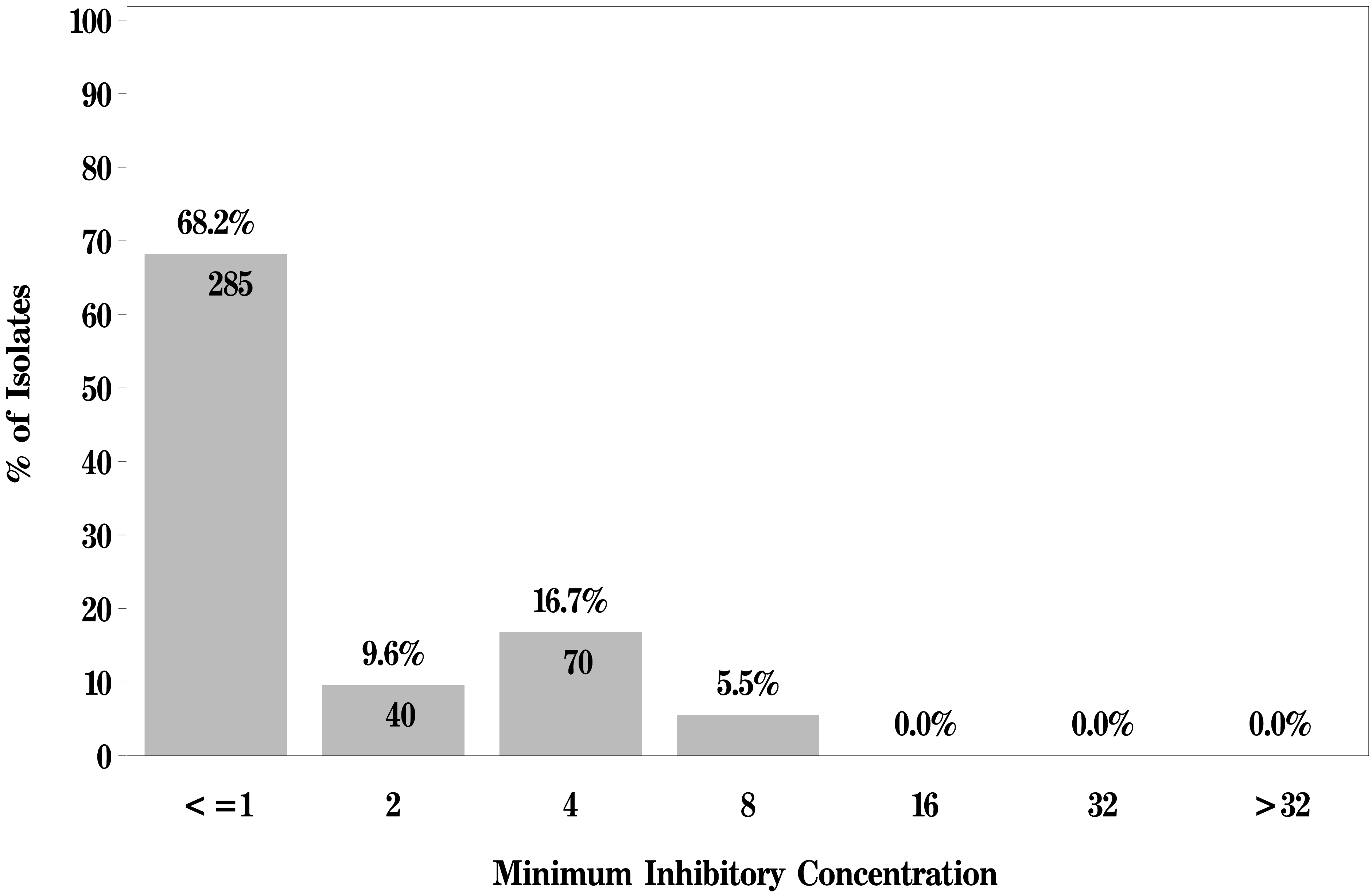
Breakpoints: Susceptible<=8 µg/mL Resistant>=32 µg/mL



NARMS

Figure 15m: Minimum Inhibitory Concentration of Salinomycin for *Enterococcus* in Ground Turkey (N=418 Isolates)

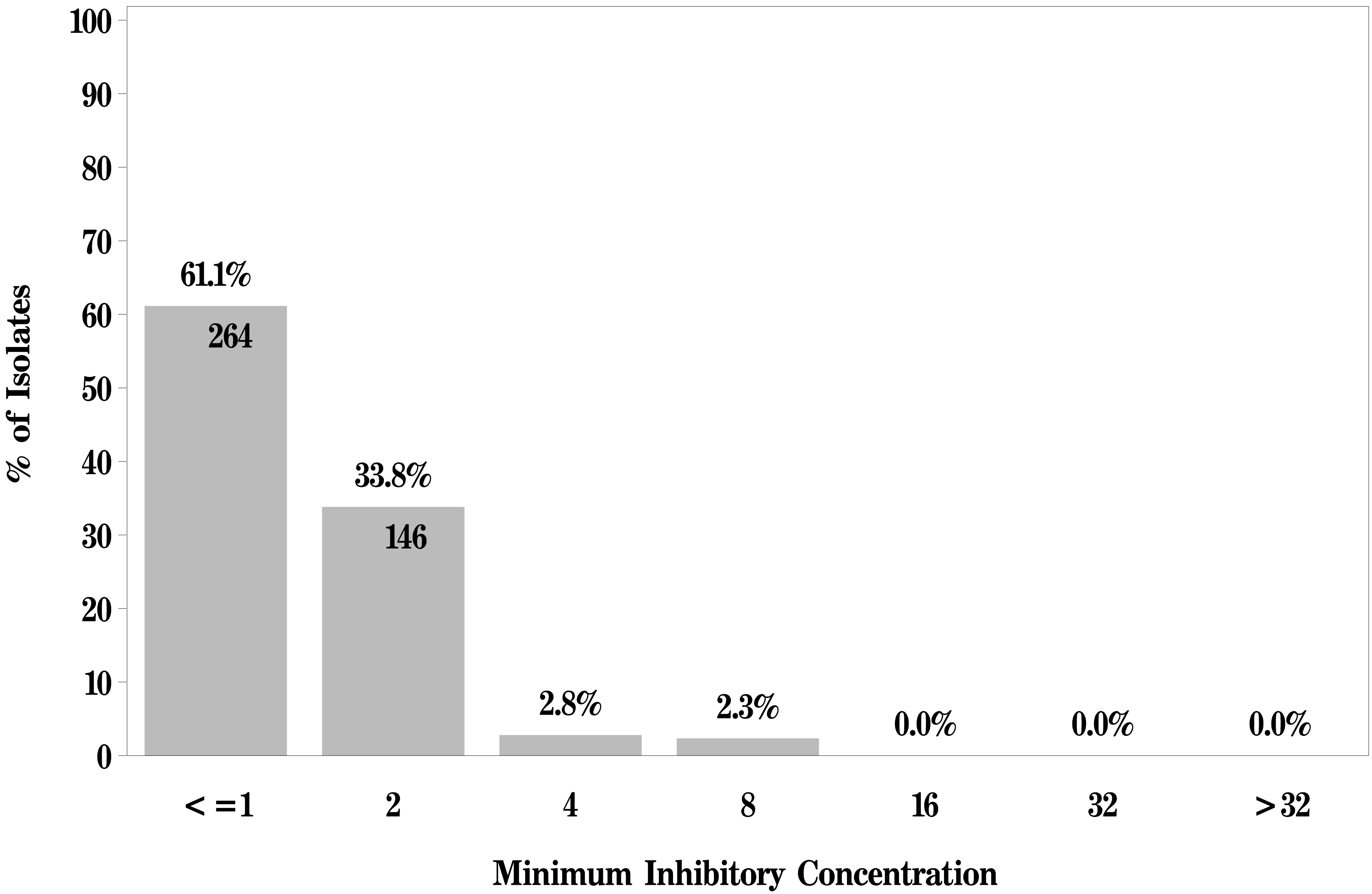
Breakpoints: Susceptible <=8 μg/mL Resistant >=32 μg/mL



NARMS

Figure 15m: Minimum Inhibitory Concentration of Salinomycin for *Enterococcus* in Ground Beef (N=432 Isolates)

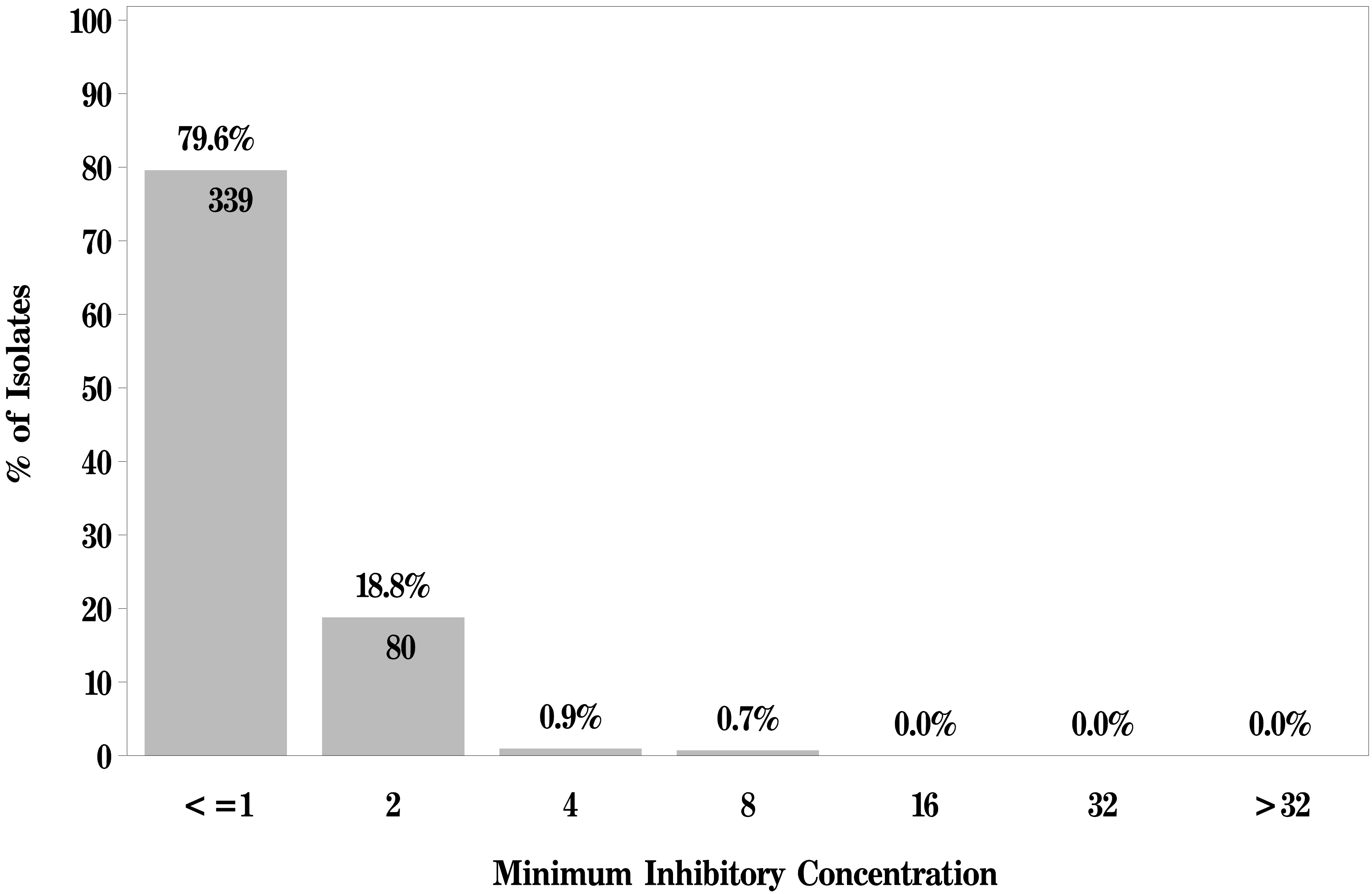
Breakpoints: Susceptible <=8 µg/mL Resistant >=32 µg/mL



NARMS

Figure 15m: Minimum Inhibitory Concentration of Salinomycin for *Enterococcus* in Pork Chop (N=426 Isolates)

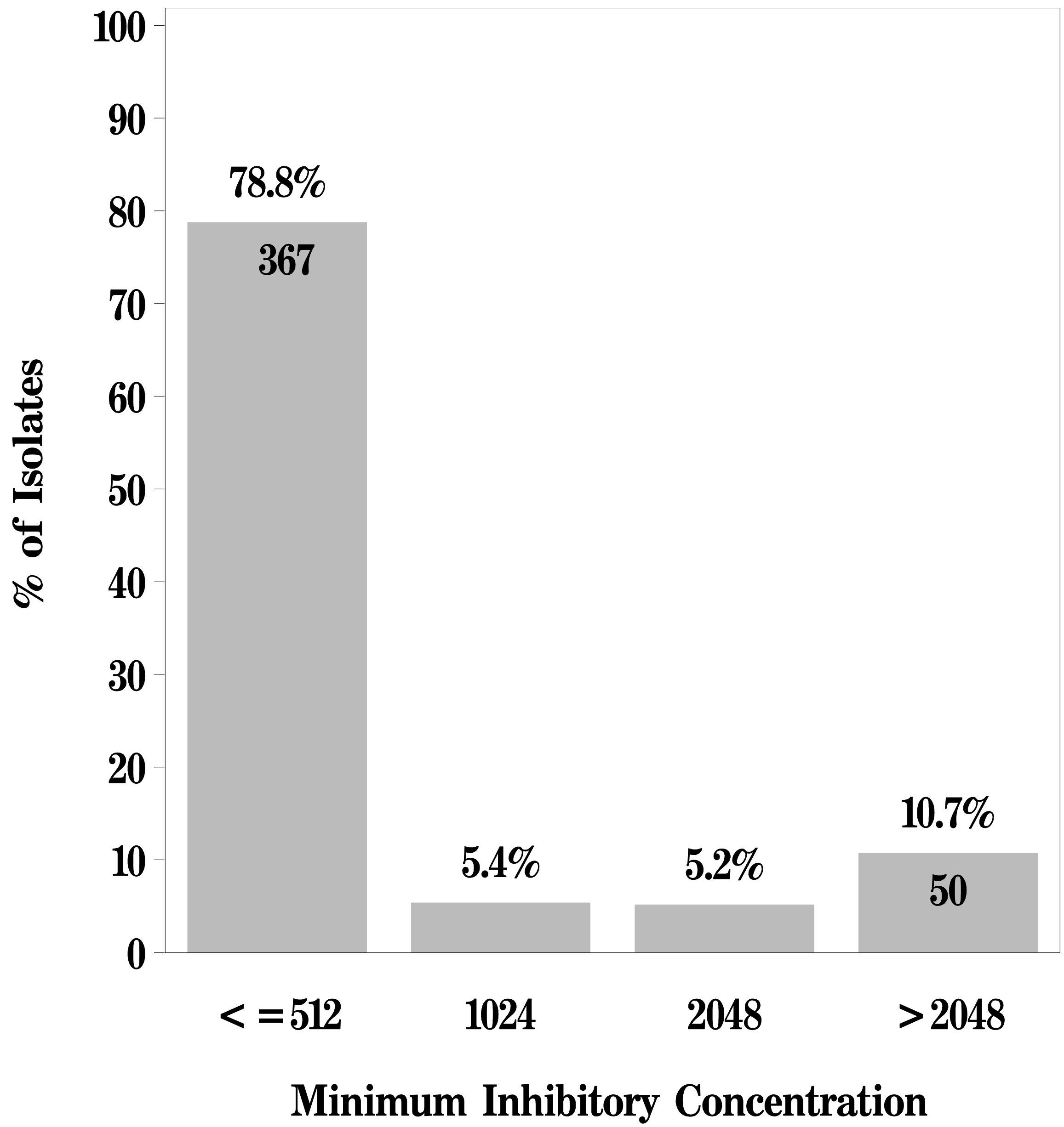
Breakpoints: Susceptible <=8 μg/mL Resistant >=32 μg/mL



NARMS

Figure 15n: Minimum Inhibitory Concentration of Streptomycin for *Enterococcus* in Chicken Breast (N=466 Isolates)

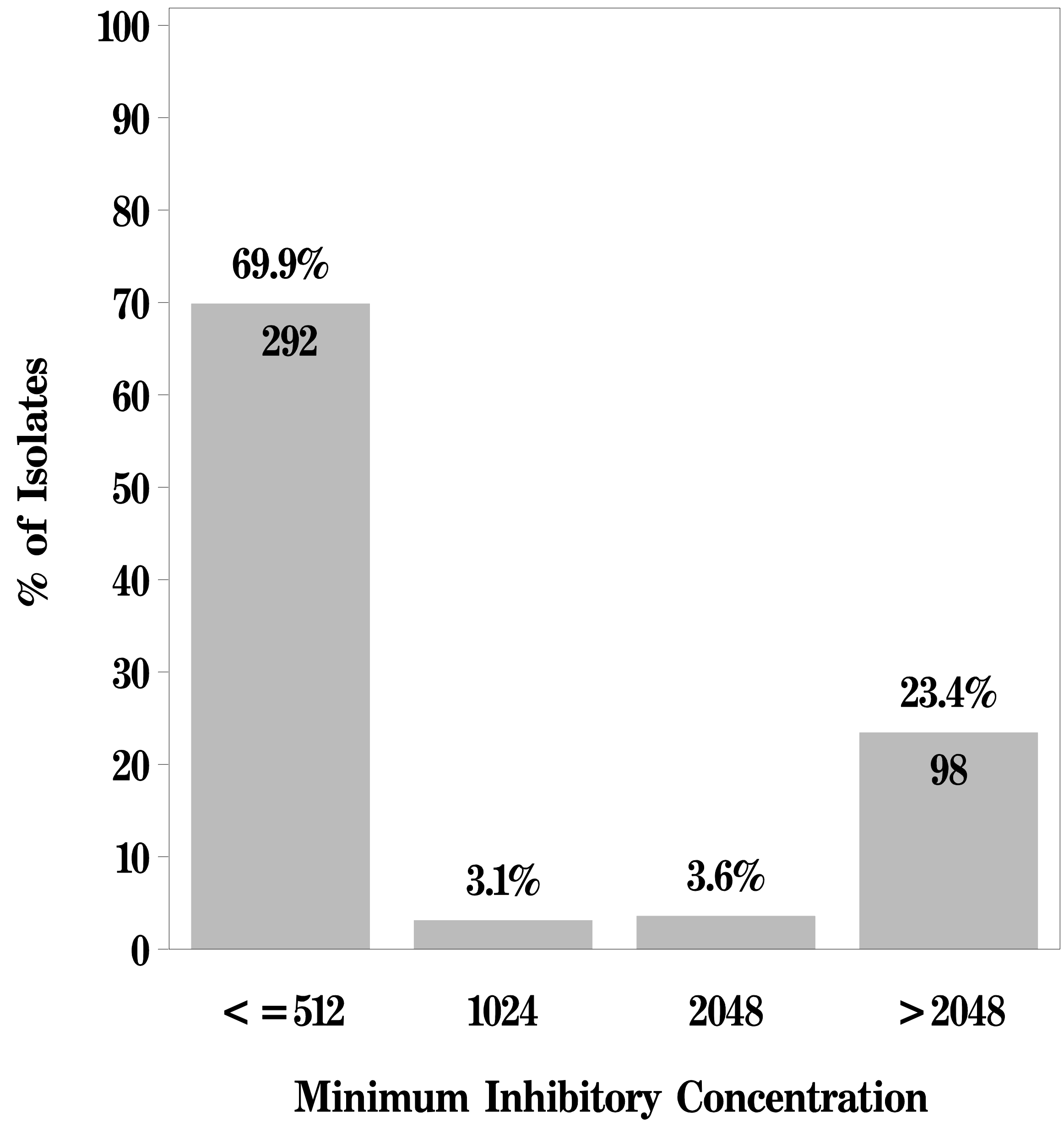
Breakpoints: Susceptible<1000 μg/mL Resistant>=1000 μg/mL



NARMS

Figure 15n: Minimum Inhibitory Concentration of Streptomycin for *Enterococcus* in Ground Turkey (N=418 Isolates)

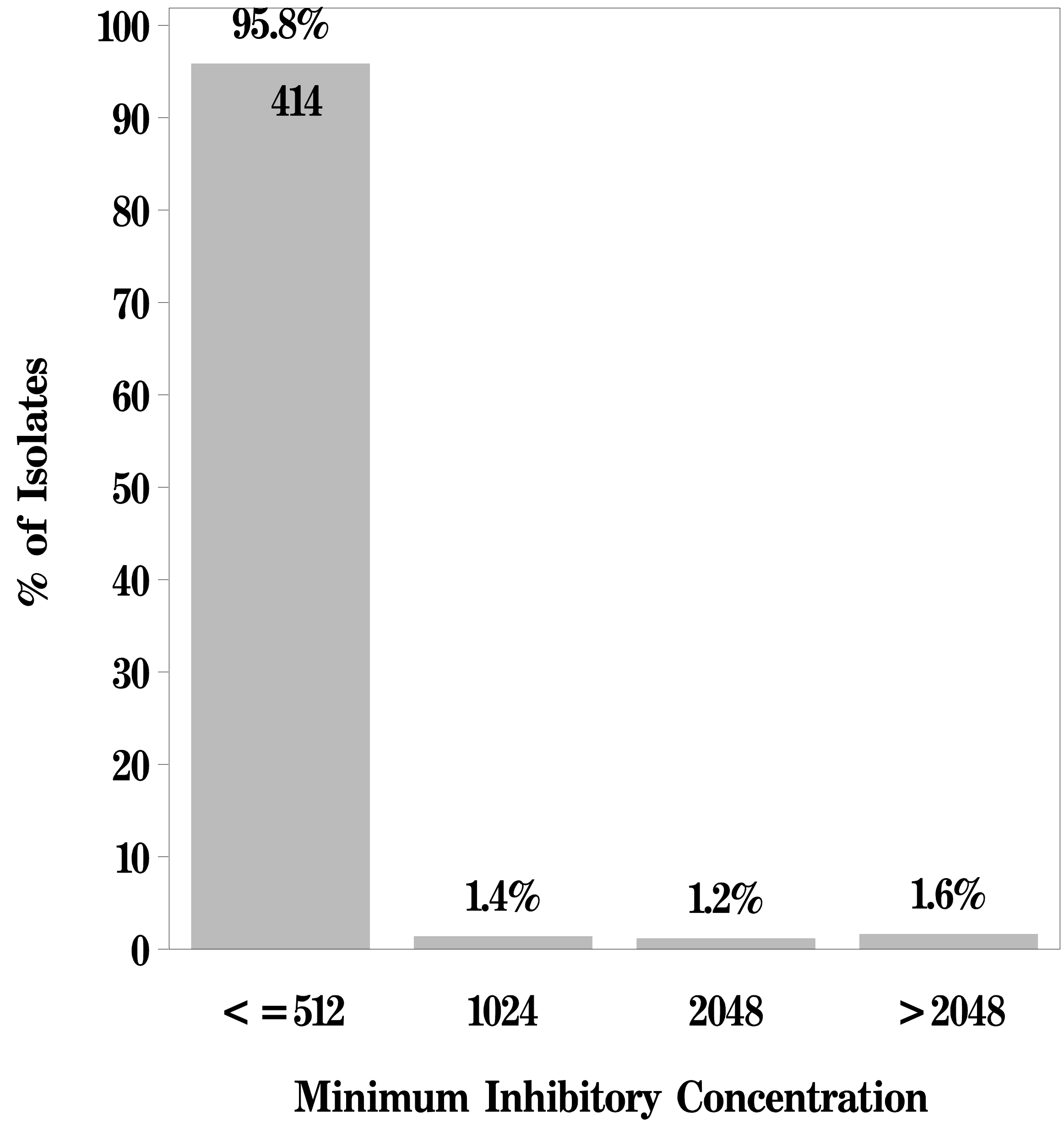
Breakpoints: Susceptible<1000 µg/mL Resistant>=1000 µg/mL



NARMS

Figure 15n: Minimum Inhibitory Concentration of Streptomycin for *Enterococcus* in Ground Beef (N=432 Isolates)

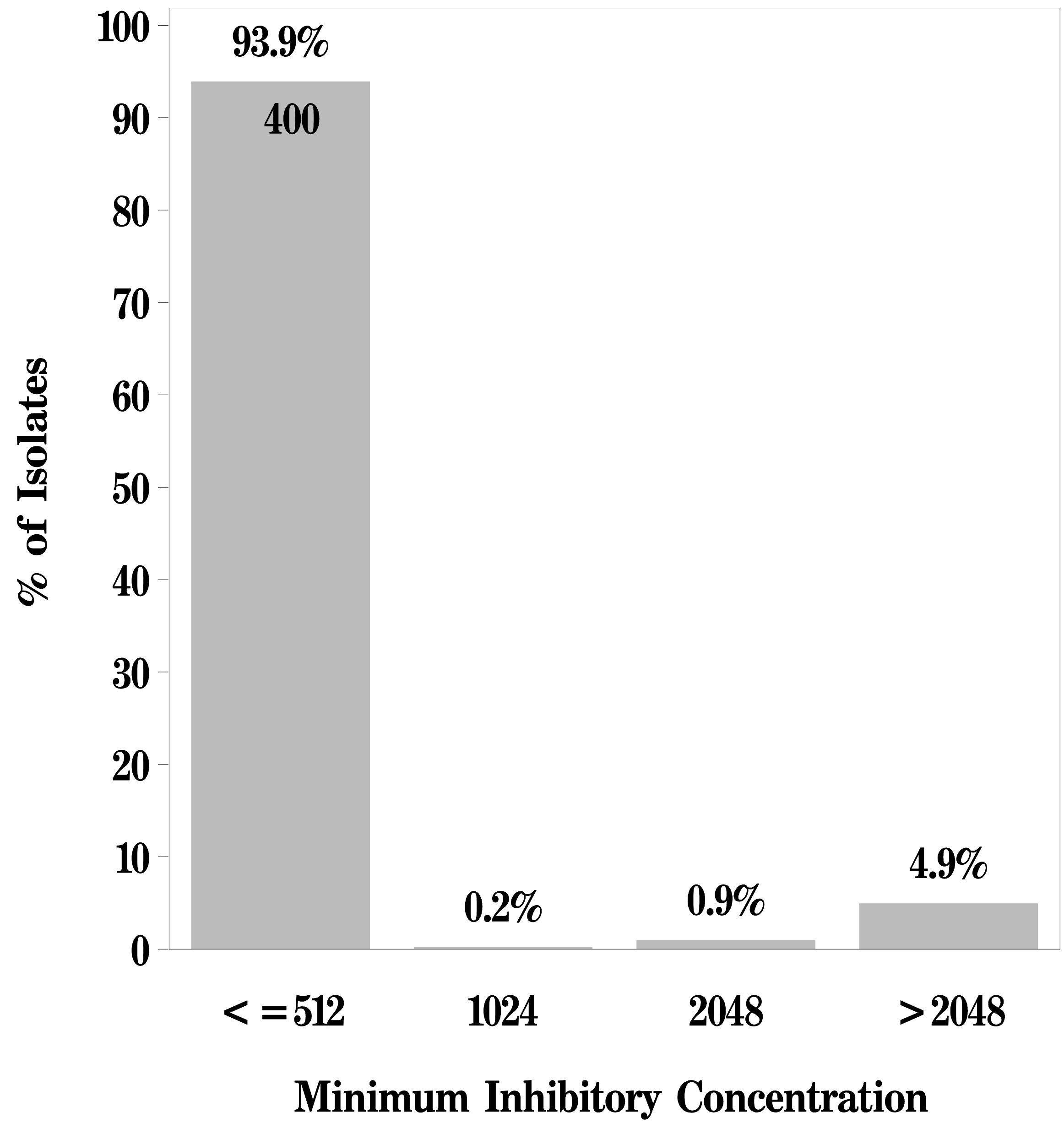
Breakpoints: Susceptible<1000 µg/mL Resistant>=1000 µg/mL



NARMS

Figure 15n: Minimum Inhibitory Concentration of Streptomycin for *Enterococcus* in Pork Chop (N=426 Isolates)

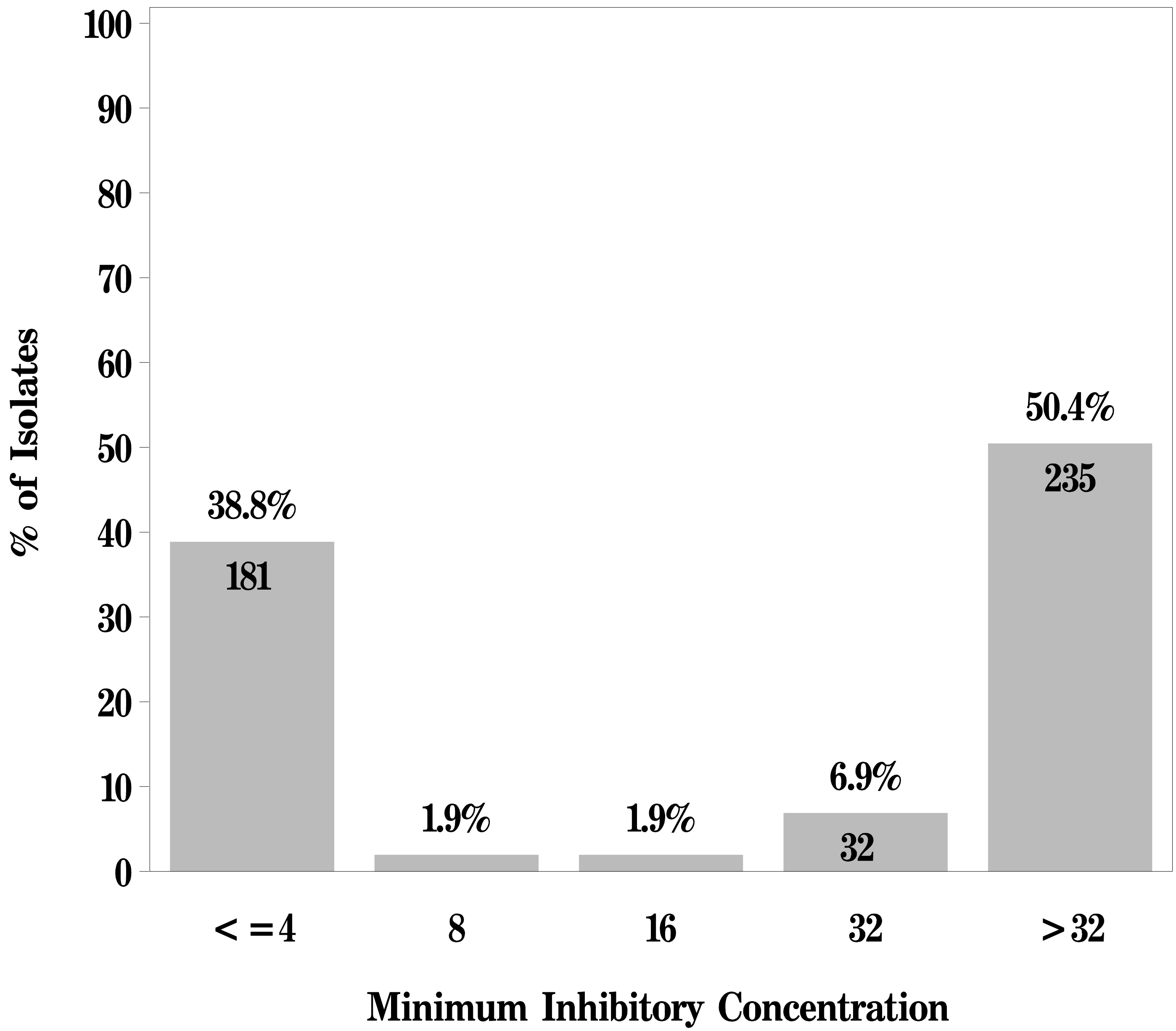
Breakpoints: Susceptible<1000 μg/mL Resistant>=1000 μg/mL



NARMS

Figure 15o: Minimum Inhibitory Concentration of Tetracycline for *Enterococcus* in Chicken Breast (N=466 Isolates)

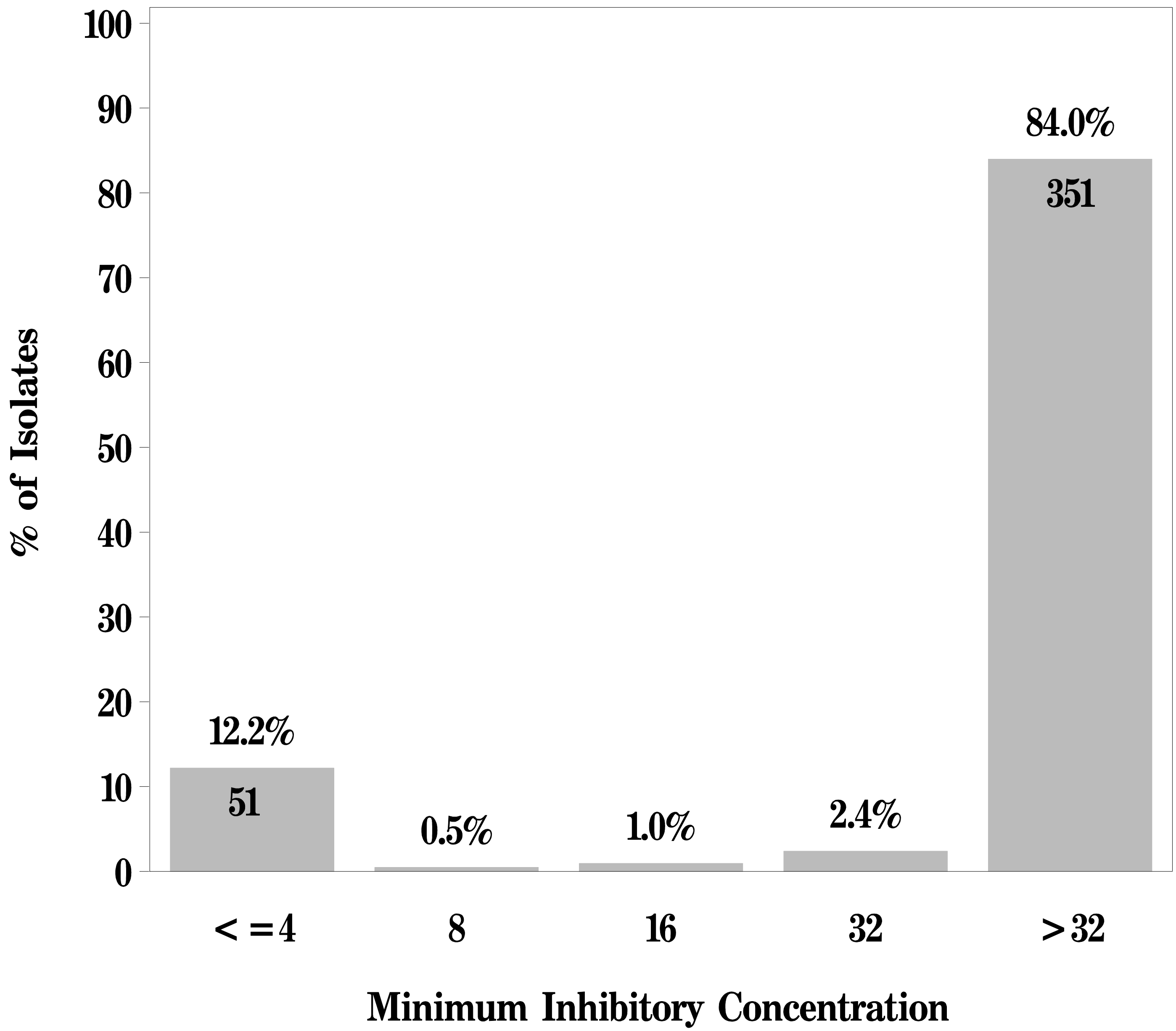
Breakpoints: Susceptible <=4 μg/mL Resistant >=16 μg/mL



NARMS

Figure 15o: Minimum Inhibitory Concentration of Tetracycline for *Enterococcus* in Ground Turkey (N=418 Isolates)

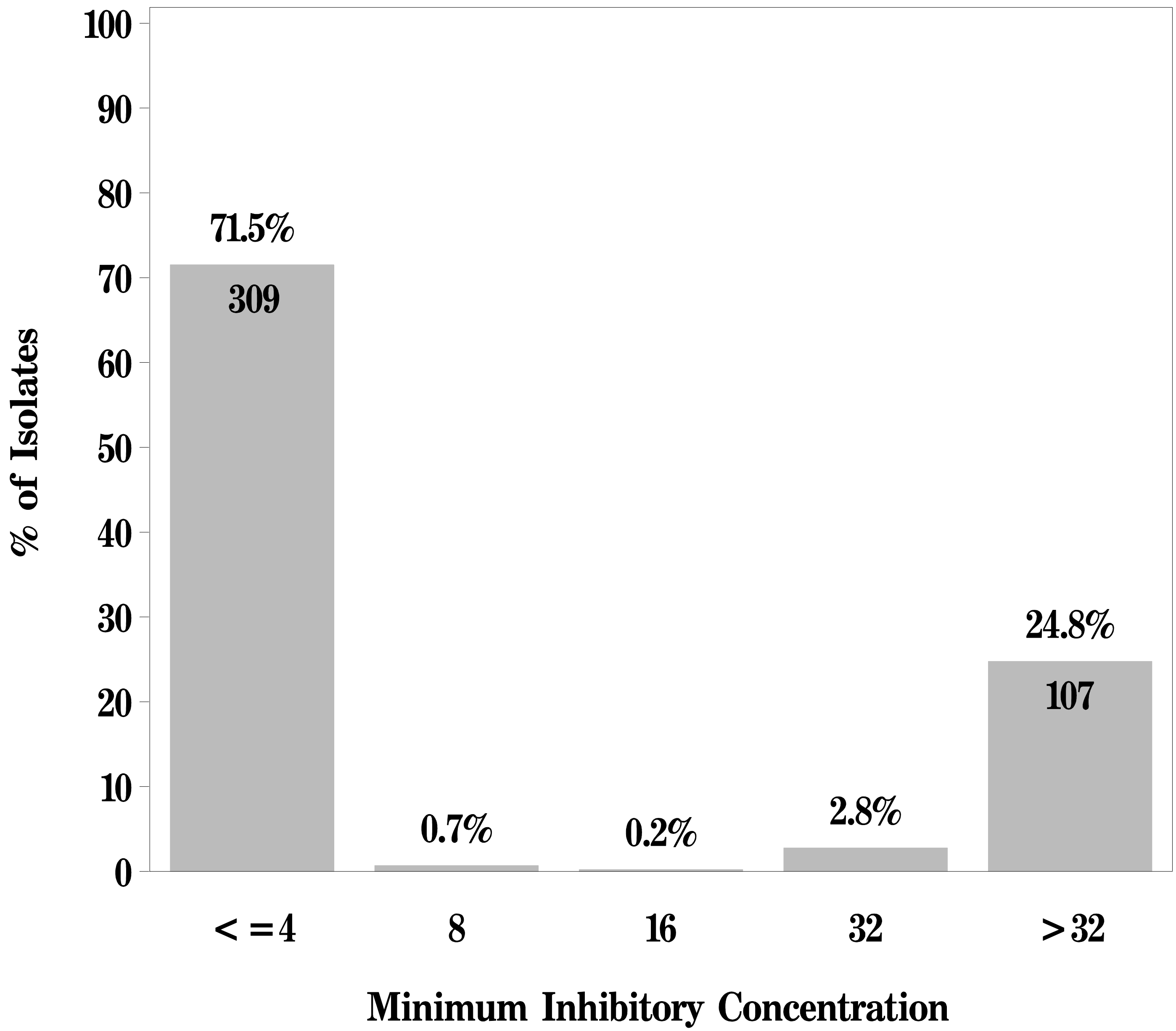
Breakpoints: Susceptible <=4 μg/mL Resistant >=16 μg/mL



NARMS

Figure 15o: Minimum Inhibitory Concentration of Tetracycline for *Enterococcus* in Ground Beef (N=432 Isolates)

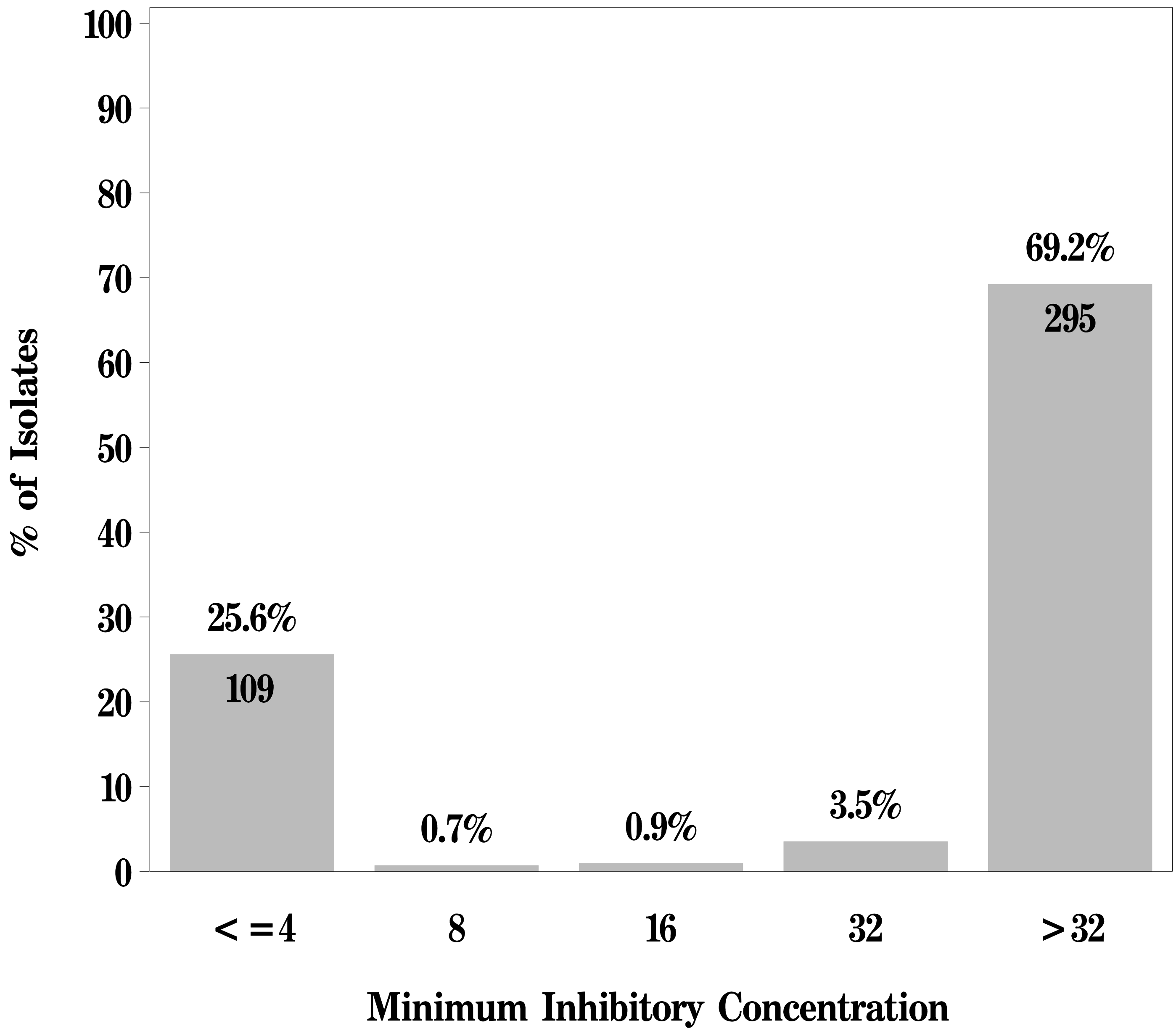
Breakpoints: Susceptible <=4 µg/mL Resistant >=16 µg/mL



NARMS

Figure 15o: Minimum Inhibitory Concentration of Tetracycline for *Enterococcus* in Pork Chop (N=426 Isolates)

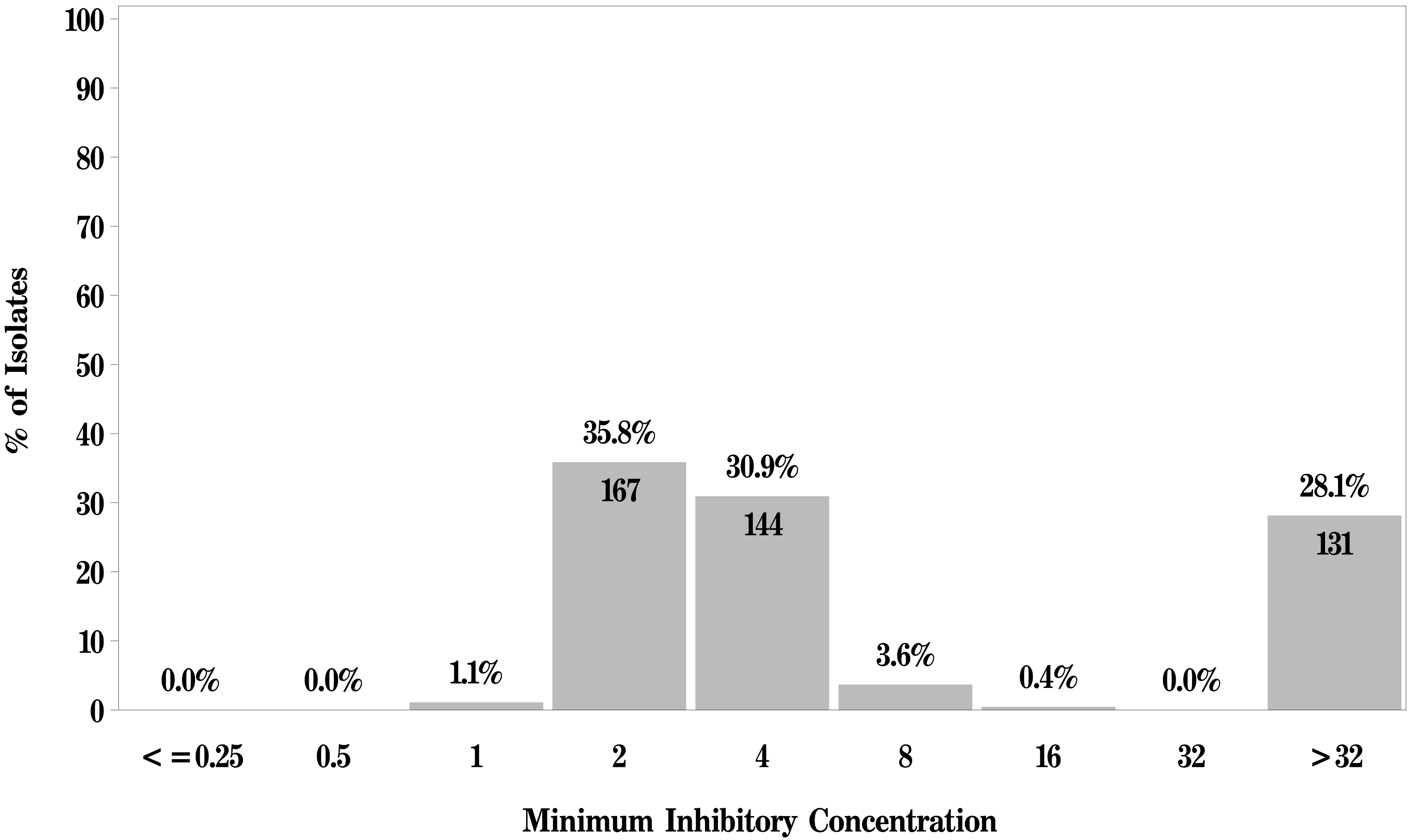
Breakpoints: Susceptible <=4 μg/mL Resistant >=16 μg/mL



NARMS

Figure 15p: Minimum Inhibitory Concentration of Tylosin for *Enterococcus* in Chicken Breast (N=466 Isolates)

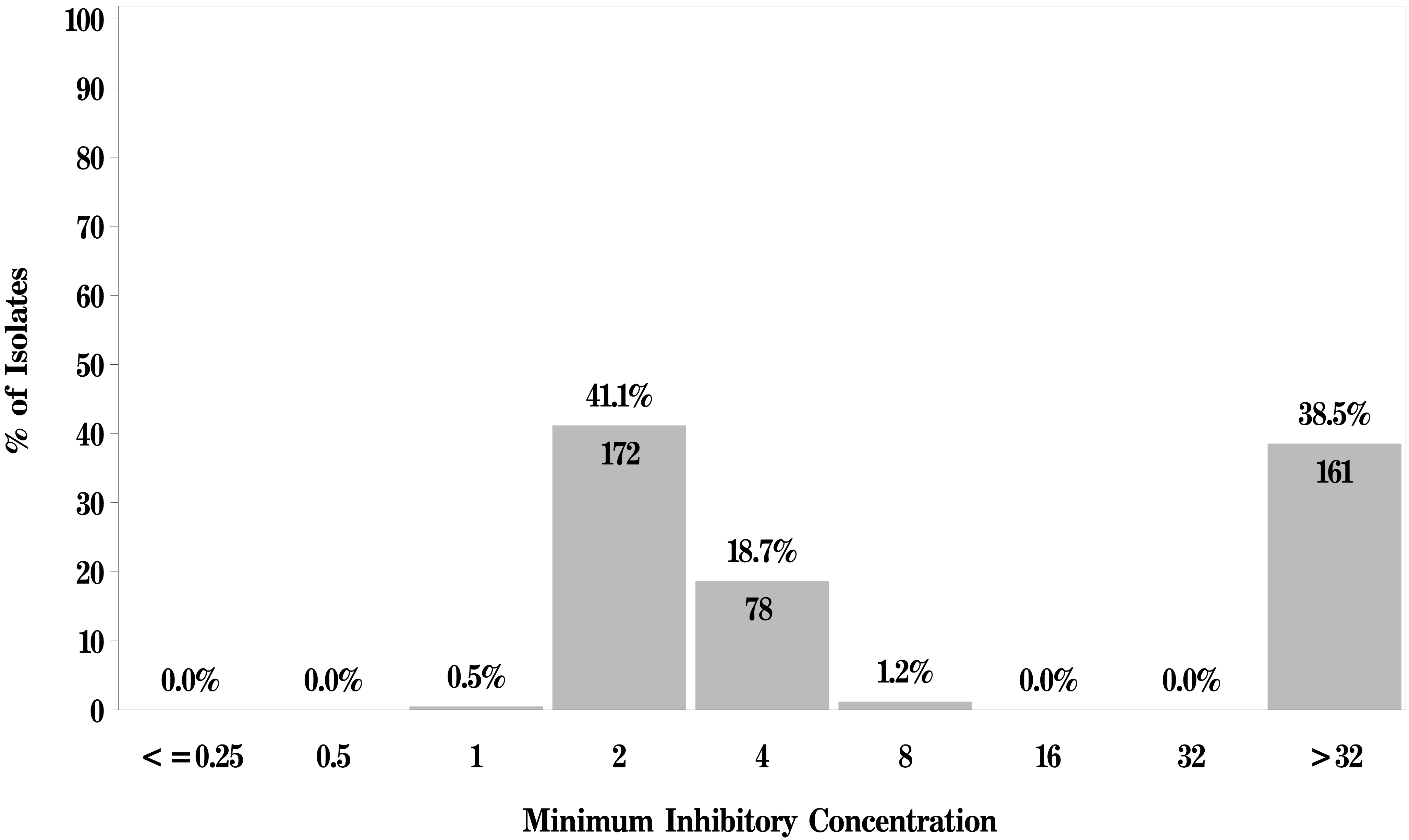
Breakpoints: Susceptible <=8 μg/mL Resistant >=32 μg/mL



NARMS

Figure 15p: Minimum Inhibitory Concentration of Tylosin for *Enterococcus* in Ground Turkey (N=418 Isolates)

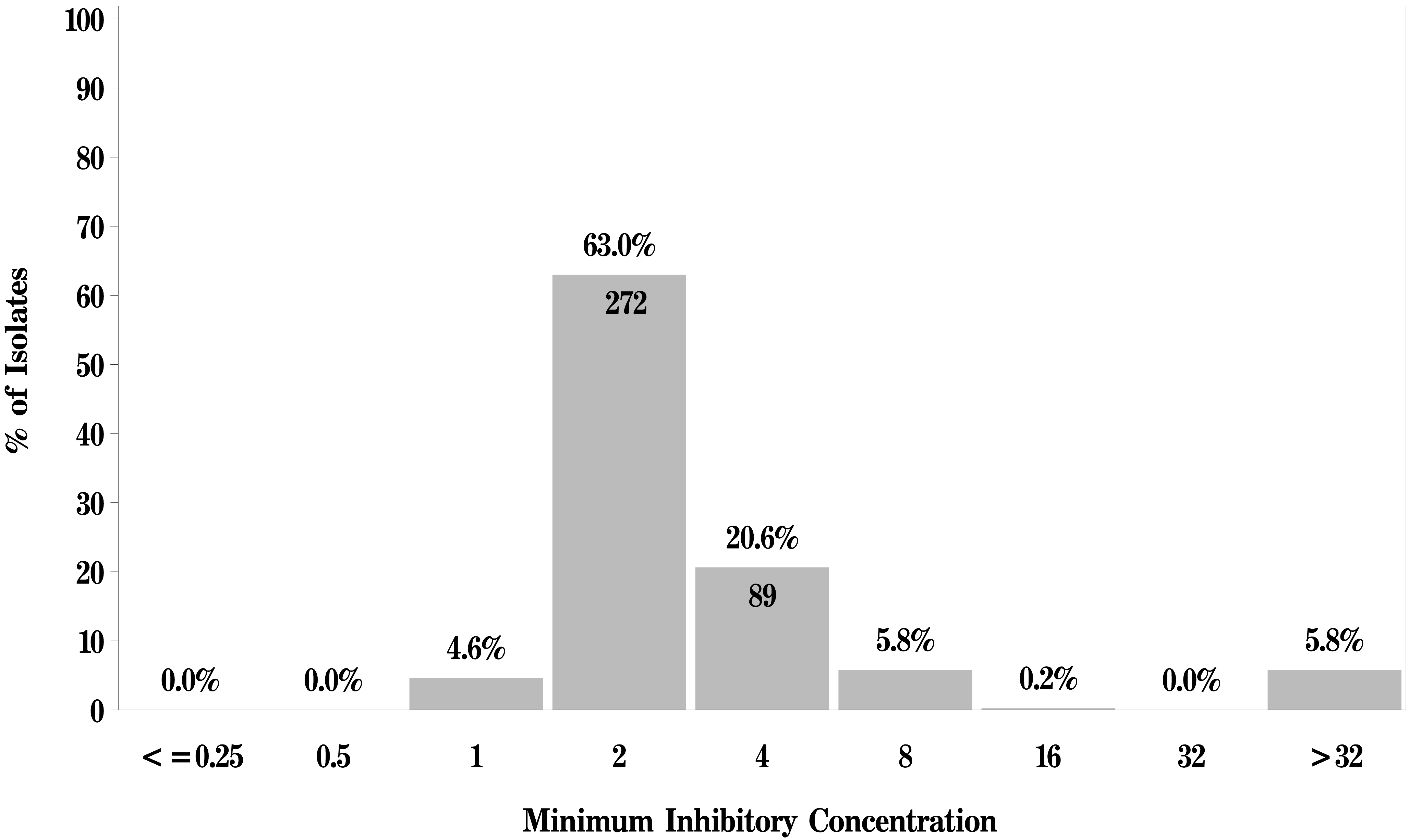
Breakpoints: Susceptible <=8 μg/mL Resistant >=32 μg/mL



NARMS

Figure 15p: Minimum Inhibitory Concentration of Tylosin for *Enterococcus* in Ground Beef (N=432 Isolates)

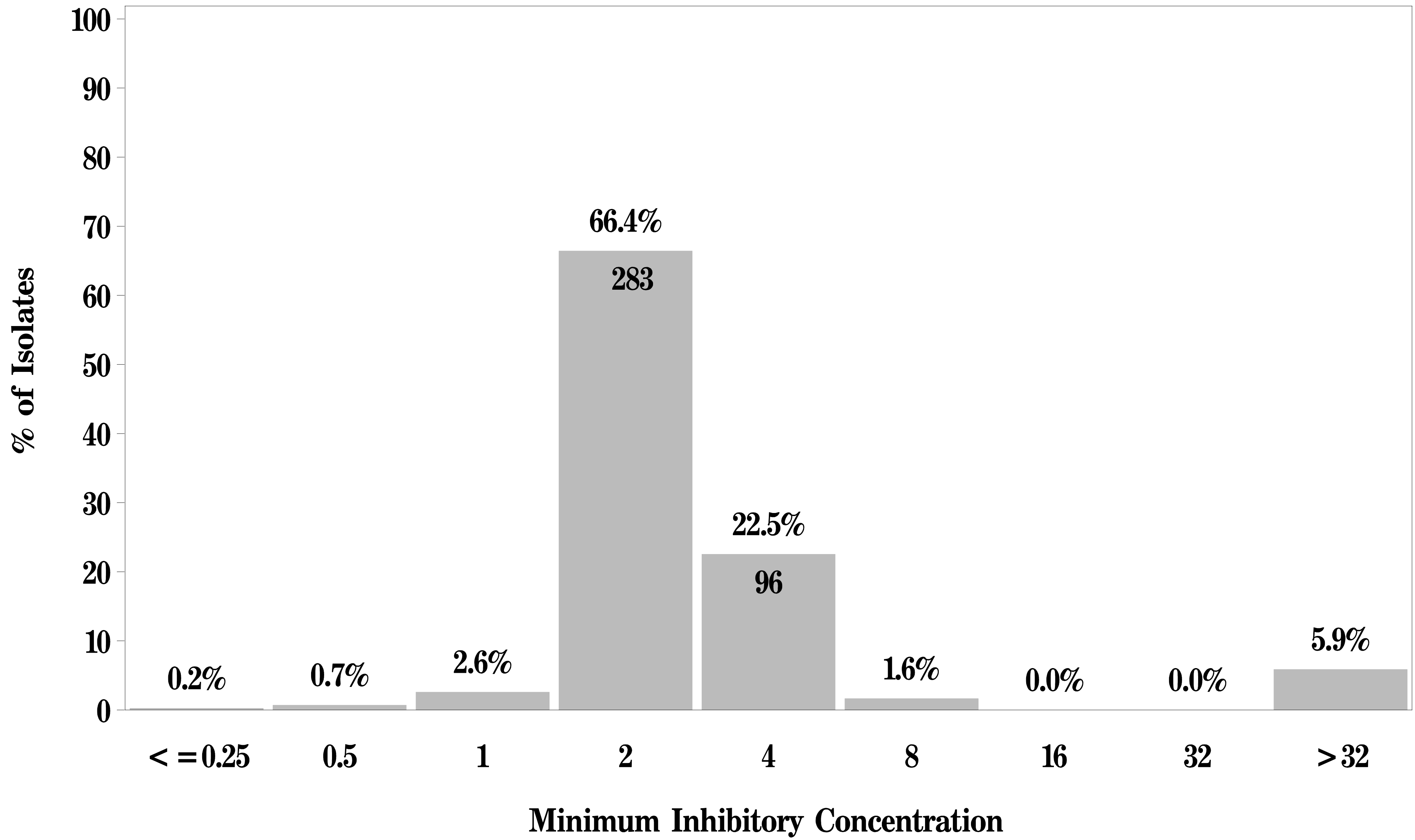
Breakpoints: Susceptible<=8 μg/mL Resistant>=32 μg/mL



NARMS

Figure 15p: Minimum Inhibitory Concentration of Tylosin for *Enterococcus* in Pork Chop (N=426 Isolates)

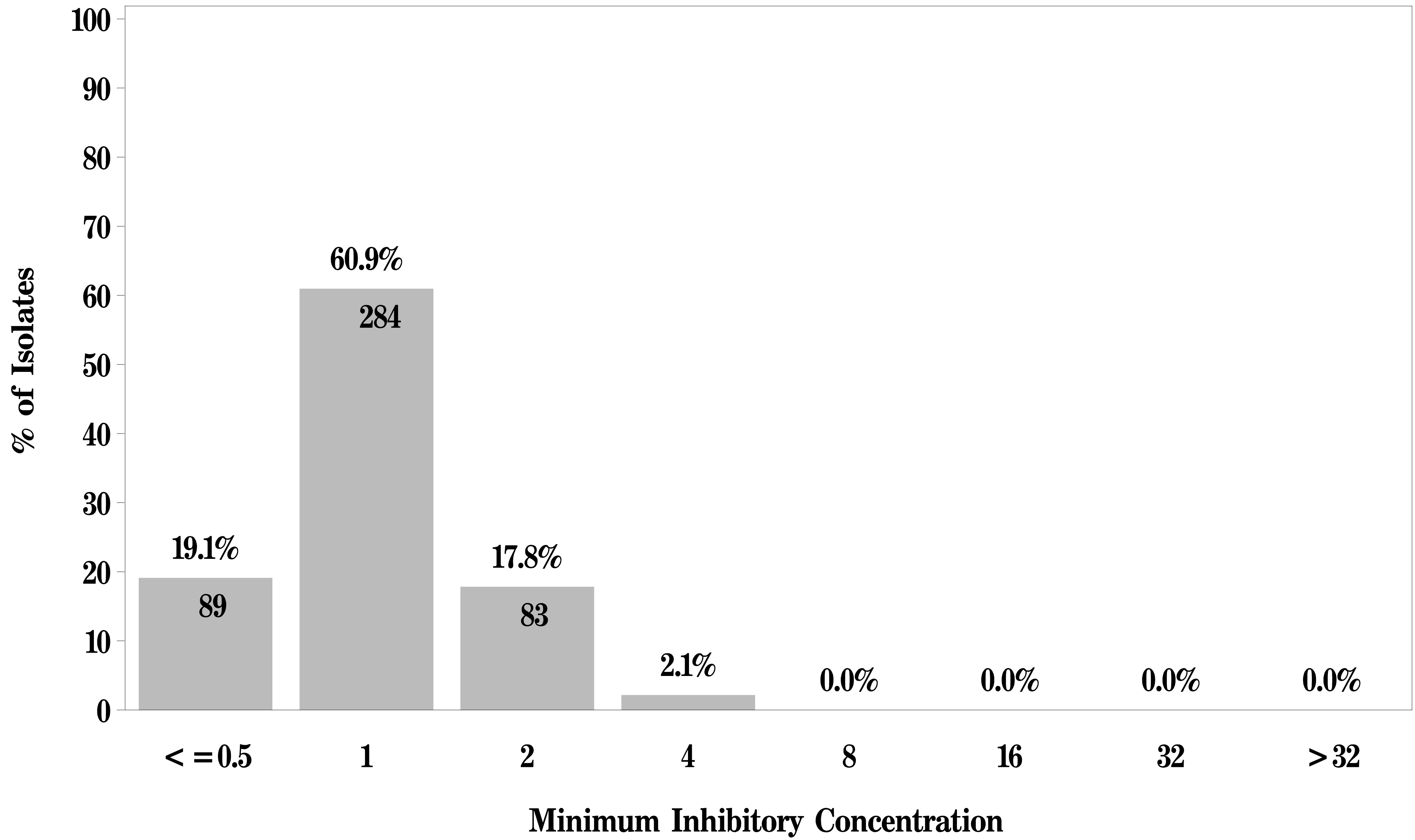
Breakpoints: Susceptible <=8 μg/mL Resistant >=32 μg/mL



NARMS

Figure 15q: Minimum Inhibitory Concentration of Vancomycin for *Enterococcus* in Chicken Breast (N=466 Isolates)

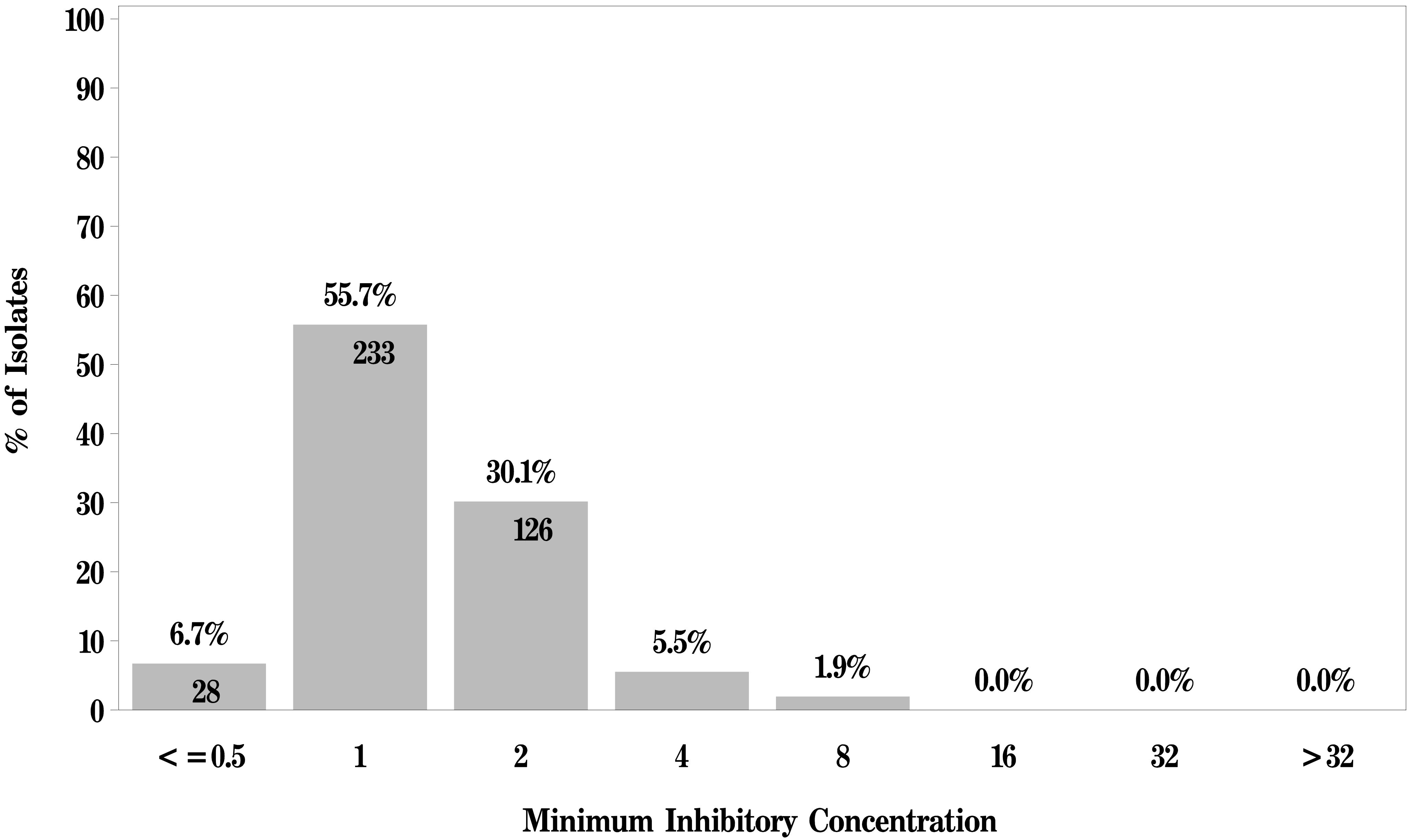
Breakpoints: Susceptible <=4 μg/mL Resistant >=32 μg/mL



NARMS

Figure 15q: Minimum Inhibitory Concentration of Vancomycin for *Enterococcus* in Ground Turkey (N=418 Isolates)

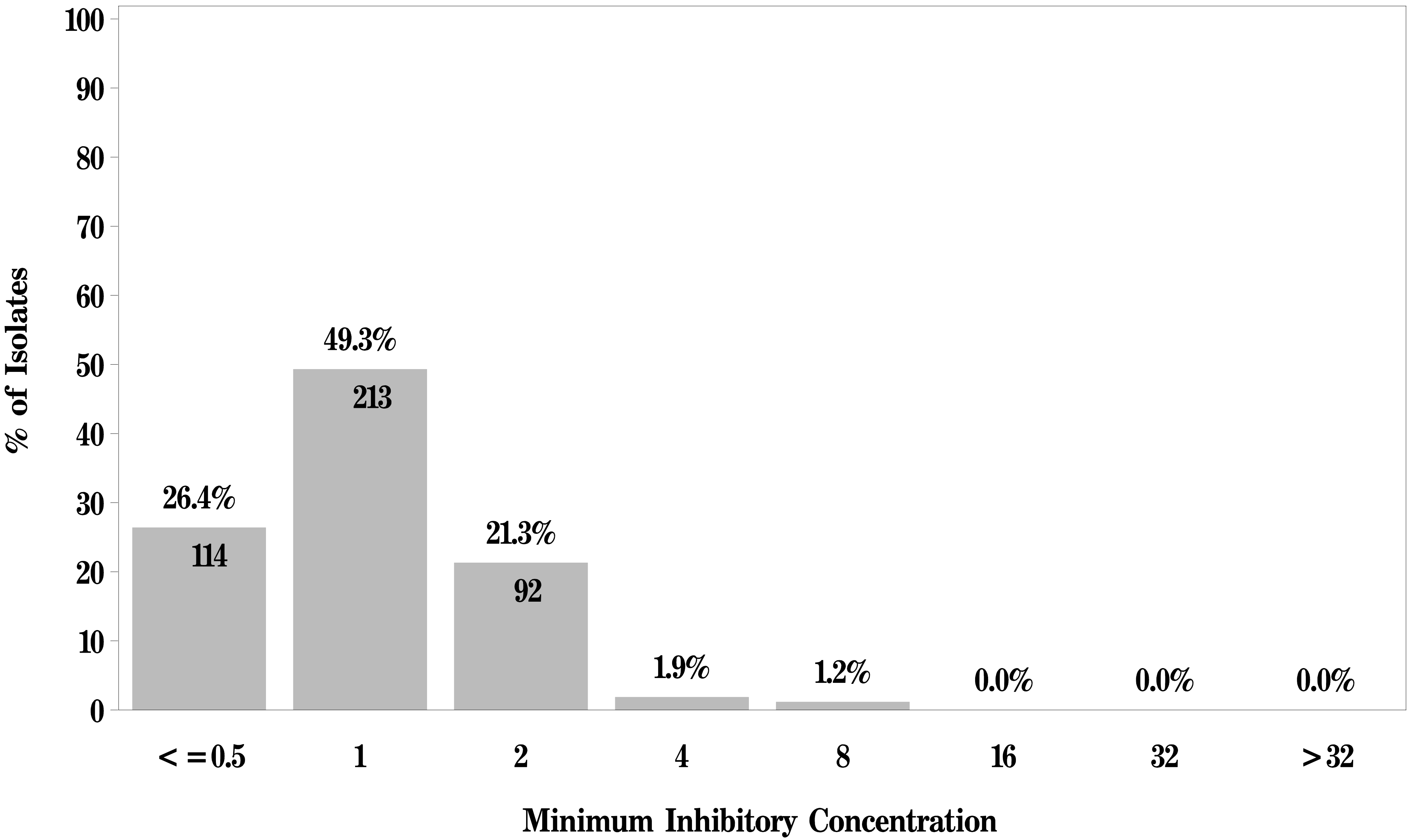
Breakpoints: Susceptible <=4 µg/mL Resistant >=32 µg/mL



NARMS

Figure 15q: Minimum Inhibitory Concentration of Vancomycin for *Enterococcus* in Ground Beef (N=432 Isolates)

Breakpoints: Susceptible <=4 μg/mL Resistant >=32 μg/mL



NARMS

Figure 15q: Minimum Inhibitory Concentration of Vancomycin for *Enterococcus* in Pork Chop (N=426 Isolates)

Breakpoints: Susceptible <=4 µg/mL Resistant >=32 µg/mL

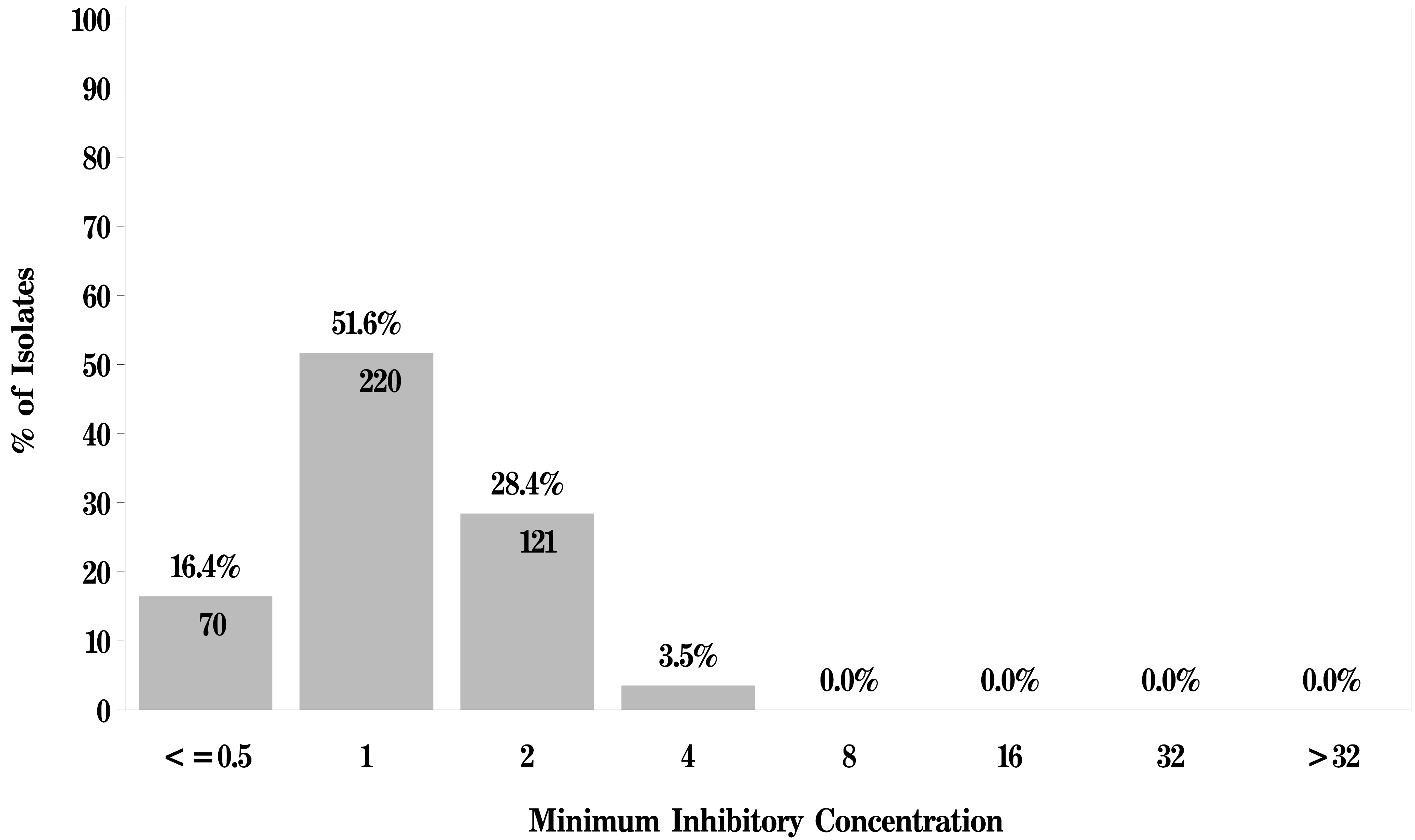


Table 32. Antimicrobial Resistance[*] among *Enterococcus* by Species, 2003

Species	***Antimicrobial Agent***																
	QDA	**BAC**	**LIN**	**TET**	**FLA**	**ERY**	**KAN**	**TYL**	**NIT**	**STR**	**PEN**	**GEN**	**CIP**	**CHL**	**LZD**	**SAL**	**VAN**
E. avium (n=3)	-[†]	100.0%	33.3%	33.3%	100.0%	33.3%	-	33.3%	33.3%	33.3%	-	-	33.3%	33.3%	-	-	-
E. casseliflavus (n=1)	100.0%	100.0%	-	-	100.0%	-	-	-	-	-	-	-	-	-	-	-	-
E. durans (n=8)	50.0%	75.0%	25.0%	50.0%	75.0%	12.5%	12.5%	12.5%	37.5%	12.5%	12.5%	-	-	-	-	-	-
E. faecalis (n=1014)	[‡]	78.9%	89.1%	66.4%	-	23.7%	17.7%	23.7%	0.6%	16.4%	-	12.1%	0.1%	0.3%	-	-	-
E. faecium (n=575)	62.8%	90.6%	49.9%	58.3%	95.1%	19.3%	32.0%	11.5%	48.5%	15.0%	37.2%	5.0%	24.9%	-	-	-	-
E. gallinarum (n=12)	75.0%	100.0%	58.3%	25.0%	100.0%	-	-	-	-	-	-	-	8.3%	-	-	-	-
E. hirae (n=129)	62.8%	27.1%	60.5%	45.7%	96.9%	27.1%	14.0%	26.4%	3.1%	11.6%	1.6%	-	-	-	-	-	-
Total (N=1742)	82.2%	79.1%	73.4%	61.7%	39.8%	22.3%	21.9%	19.6%	16.8%	15.4%	12.5%	8.7%	8.4%	0.2%	-	-	-

[*] Where % Resistance = (# isolates per species resistant to antimicrobial) / (total # isolates per species).
[†] Dashes indicate 0.0% resistance to antimicrobial.
[‡] QDA resistance is not presented for *E. faecalis*.

Table 33. Antimicrobial Resistance[*] among *Enterococcus faecalis* & *E. faecium* by Meat Type, 2003

Meat Type	Species	QDA	BAC	LIN	TET	FLA	KAN	ERY	TYL	NIT	STR	PEN	GEN	CIP	CHL	LZD	SAL	VAN
		Antimicrobial Agent																
Chicken Breast	***E. faecalis*** (n=188)	-[†]	88.3%	97.3%	68.6%	-[‡]	28.2%	43.1%	42.6%	1.1%	22.9%	-	20.2%	-	-	-	-	-
	E. faecium (n=248)	59.7%	98.8%	62.5%	51.6%	96.8%	34.3%	17.3%	12.5%	64.5%	16.9%	51.2%	5.6%	21.8%	-	-	-	-
Ground Turkey	***E. faecalis*** (n=289)	-[†]	87.9%	94.1%	87.9%	-	36.0%	43.6%	43.9%	1.4%	30.4%	-	27.7%	-	-	-	-	-
	E. faecium (n=118)	79.7%	96.6%	70.3%	91.5%	96.6%	50.0%	44.1%	27.1%	52.5%	32.2%	65.3%	12.7%	39.0%	-	-	-	-
Ground Beef	***E. faecalis*** (n=224)	-[†]	75.4%	83.0%	20.5%	-	3.1%	4.9%	4.9%	-	5.4%	-	1.8%	0.4%	-	-	-	-
	E. faecium (n=112)	50.0%	88.4%	25.9%	28.6%	96.4%	26.8%	8.9%	0.9%	36.6%	2.7%	8.0%	-	33.0%	-	-	-	-
Pork Chop	***E. faecalis*** (n=313)	-[†]	67.4%	83.7%	78.0%	-	4.8%	7.0%	7.0%	-	7.3%	-	0.3%	-	1.0%	-	-	-
	E. faecium (n=97)	64.9%	64.9%	20.6%	69.1%	87.6%	10.3%	6.2%	2.1%	16.5%	3.1%	1.0%	-	6.2%	-	-	-	-
Total (N=1589)		**84.1%**	**83.1%**	**74.9%**	**63.4%**	**34.4%**	**22.8%**	**22.1%**	**19.3%**	**17.9%**	**15.9%**	**13.5%**	**9.6%**	**9.1%**	**0.2%**		-	-

[*] Where % Resistance = (# isolates resistant to antimicrobial per meat type per site) / (total # isolates per meat type per site).

[†] QDA resistance is not presented for *E. faecalis*.

[‡] Dashes indicate 0.0% resistance to antimicrobial.

Table 34. Antimicrobial Resistance* among *Enterococcus* by Site, Meat Type, and Antimicrobial Agent, 2003

Site	*Meat Type*	***Antimicrobial Agent***																
		QDA†	**BAC**	**LIN**	**TET**	**FLA**	**ERY**	**KAN**	**TYL**	**NIT**	**STR**	**PEN**	**GEN**	**CIP**	**CHL**	**LZD**	**SAL**	**VAN**
GA	CB (n=119)	75.0%	89.9%	90.8%	72.3%	15.1%	52.1%	26.9%	49.6%	5.0%	26.9%	1.7%	13.4%	2.5%	-‡	-	-	-
	GT (n=120)	100.0%	88.3%	96.7%	93.3%	1.7%	36.7%	25.8%	37.5%	0.8%	24.2%	0.8%	20.0%	0.8%	-	-	-	-
	GB (n=119)	66.7%	61.3%	77.3%	19.3%	16.0%	5.9%	5.9%	5.9%	4.2%	5.0%	-	1.7%	1.7%	-	-	-	-
	PC (n=116)	100.0%	59.5%	72.4%	84.5%	4.3%	3.4%	2.6%	3.4%	-	6.0%	-	-	-	-	-	-	-
	Total (N=474)	**75.5%**	**74.9%**	**84.4%**	**67.3%**	**9.3%**	**24.7%**	**15.4%**	**24.3%**	**2.5%**	**15.6%**	**0.6%**	**8.9%**	**1.3%**	**-**	**-**	**-**	**-**
MD	CB (n=113)	64.4%	98.2%	76.1%	69.9%	87.6%	27.4%	32.7%	21.2%	62.8%	11.5%	55.8%	0.9%	20.4%	-	-	-	-
	GT (n=103)	91.4%	97.1%	91.3%	89.3%	64.1%	49.5%	50.5%	41.7%	49.5%	40.8%	54.4%	19.4%	24.3%	-	-	-	-
	GB (n=92	44.3%	76.1%	63.0%	29.3%	66.3%	8.7%	15.2%	7.6%	17.4%	5.4%	7.6%	-	20.7%	-	-	-	-
	PC (n=90)	35.8%	70.0%	44.4%	64.4%	57.8%	5.6%	7.8%	3.3%	13.3%	3.3%	1.1%	-	7.8%	1.1%	-	-	-
	Total (N=398)	**61.5%**	**86.4%**	**69.8%**	**64.3%**	**69.8%**	**23.9%**	**27.6%**	**19.3%**	**37.7%**	**15.8%**	**31.9%**	**5.3%**	**18.6%**	**0.3%**	**-**	**-**	**-**
OR	CB (n=119)	34.2%	96.6%	63.0%	48.7%	62.2%	15.1%	34.5%	14.3%	54.6%	10.9%	43.7%	15.1%	17.6%	-	-	-	-
	GT (n=108)	58.3%	88.9%	65.7%	78.7%	33.3%	41.7%	38.0%	32.4%	6.5%	32.4%	11.1%	18.5%	8.3%	-	-	-	-
	GB (n=112)	55.0%	58.0%	52.7%	39.3%	53.6%	4.5%	5.4%	3.6%	10.7%	2.7%	0.9%	-	7.1%	-	-	-	-
	PC (n=103)	90.9%	68.0%	82.5%	62.1%	12.6%	8.7%	4.9%	7.8%	1.9%	6.8%	-	1.0%	-	2.9%	-	-	-
	Total (N=442)	**51.5%**	**78.3%**	**65.6%**	**56.8%**	**41.4%**	**17.4%**	**21.0%**	**14.5%**	**19.5%**	**13.1%**	**14.7%**	**8.8%**	**8.6%**	**0.7%**	**-**	**-**	**-**
TN	CB (n=115)	82.1%	91.3%	82.6%	46.1%	67.0%	29.6%	32.2%	27.0%	20.9%	35.7%	11.3%	14.8%	6.1%	-	-	-	-
	GT (n=87)	76.2%	87.4%	94.3%	87.4%	24.1%	46.0%	47.1%	43.7%	8.0%	23.0%	9.2%	35.6%	13.8%	-	-	-	-
	GB (n=109)	58.7%	69.7%	52.3%	23.9%	56.0%	12.8%	13.8%	6.4%	9.2%	3.7%	0.9%	1.8%	8.3%	-	-	-	-
	PC (n=117)	71.0%	65.0%	65.0%	80.3%	25.6%	9.4%	11.1%	8.5%	3.4%	7.7%	-	-	-	-	-	-	-
	Total (N=428)	**72.0%**	**77.8%**	**72.4%**	**58.2%**	**44.2%**	**23.1%**	**24.8%**	**20.1%**	**10.5%**	**17.3%**	**5.1%**	**11.7%**	**6.5%**	**-**	**-**	**-**	**-**
Total (N=1742)		**62.6%**	**79.1%**	**73.4%**	**61.7%**	**39.8%**	**22.3%**	**21.9%**	**19.6%**	**16.8%**	**15.4%**	**12.5%**	**8.7%**	**8.4%**	**0.2%**	**-**	**-**	**-**

* Where % Resistance = (# isolates resistant to antimicrobial per meat type per site) / (total # isolates per meat type per site).

† Data does not include *E. faecalis* in QDA, as it is considered intrinsically resistant.

‡ Dashes indicate 0.0% resistance to antimicrobial.

Table 35. Number of *Enterococcus faecalis* (N=1014) Resistant to Multiple Antimicrobial Agents,[*] 2003

Meat Type	*Number of Antimicrobials*				
	0	**1**	**2-4**	**5-7**	**≥8**
CB	1	13	80	89	5
GT	7	14	125	106	37
GB	15	53	147	5	4
PC	9	38	246	18	2
Total	**31**	**118**	**598**	**218**	**48**

[*] Data does not include QDA, as *E. faecalis* is considered intrinsically resistant.

Table 36. Number of *Enterococcus faecium* (N=575) Resistant to Multiple Antimicrobial Agents, 2003

Meat Type	*Number of Antimicrobials*				
	0	**1**	**2-4**	**5-7**	**≥8**
CB	0	0	73	122	53
GT	1	0	20	37	60
GB	0	8	65	36	3
PC	0	3	81	10	3
Total	**1**	**11**	**239**	**205**	**119**

Table 37. *Escherichia coli* by Meat Type, 2003

Meat Type	*N*[*]	*n*[†]	*%* [‡]
Chicken Breast	477	396	83.0%
Ground Turkey	447	333	74.5%
Ground Beef	470	311	66.2%
Pork Chop	479	218	45.5%
Total	**1873**	**1258**	**67.2%**

[*] Where N = Number of retail meat samples.
[†] Where n = number of *E. coli* positive samples.
[‡] Where % = (n / N).

Table 38. *Escherichia coli* by Site and Meat Type, 2003

Meat Type	*Chicken Breast*		*Ground Turkey*		*Ground Beef*		*Pork Chop*	
	n	*%*[*]	*n*	*%*	*n*	*%*	*n*	*%*
***Georgia* (n=395)**	120	30.4%	117	29.6%	90	22.8%	68	17.2%
***Maryland* (n=374)**	113	30.2%	103	27.5%	87	23.3%	71	19.0%
***Oregon* (n=212)**	78	36.8%	49	23.1%	57	26.9%	28	13.2%
***Tennessee* (n=277)**	85	30.7%	64	23.1%	77	27.8%	51	18.4%
Total (N=1258)	396	31.5%	333	26.5%	311	24.7%	218	17.3%

[*] Where % Positive = (# isolates per meat type per site) / (total # isolates for that site).

Table 39. *Escherichia coli* Isolates by Month for All Sites, 2003

Month	*n*	*%*[*]
January	110	8.7%
February	101	8.0%
March	126	10.0%
April	112	8.9%
May	118	9.4%
June	104	8.3%
July	92	7.3%
August	111	8.8%
September	86	6.8%
October	86	6.8%
November	105	8.3%
December	107	8.5%
Total	**1258**	**100.0%**

[*] Where % Positive = (# isolates per month) / (total # isolates).

Figure 16. Antimicrobial Resistance among *E. coli* isolates (n =1258), 2003.

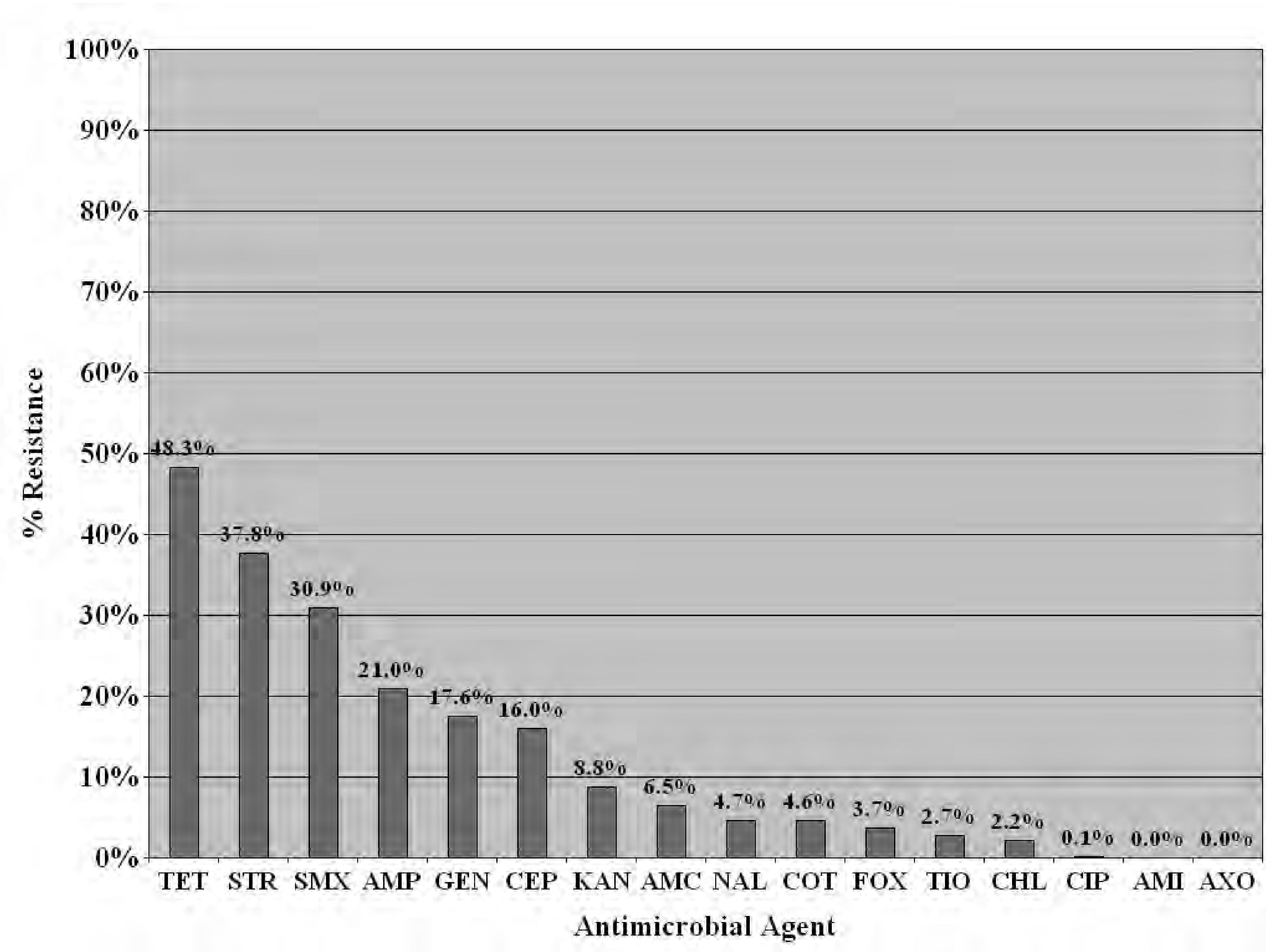


Figure 17. MIC Distribution among all Antimicrobial Agents

E. coli **from All Meats Types (N=1258)**		Distribution (%) of MICs (in µg/ml)																
Antimicrobial Agent	**%R**	**0.015**	**0.03**	**0.06**	**0.125**	**0.25**	**0.5**	**1**	**2**	**4**	**8**	**16**	**32**	**64**	**128**	**256**	**512**	**>512**
Ampicillin	**21.0%**							3.7	24.2	46.7	4.1	0.4	**0.2**	**20.7**				
Amoxicillin/Clavulanic Acid	**6.5%**							3.9	18.7	51.3	17.3	2.3	**2.6**	**3.9**				
Cefoxitin	**3.7%**							0.5	14.1	55.2	23.3	3.3	**3.7**					
Ceftiofur	**2.7%**				6.1	51.2	37.0	2.1	0.4	0.5	**1.8**	**0.9**						
Ceftriaxone	**0.0%**					94.6	0.7	1.3	0.2	0.5	1.3	1.3	0.2					
Cephalothin	**16.0%**								1.0	6.8	35.8	40.5	**8.3**	**7.6**				
Nalidixic Acid	**4.7%**						0.1	2.9	44.6	45.9	1.7	0.1	**0.1**	**4.6**				
Ciprofloxacin	**0.1%**	91.7	3.4	0.2	2.0	2.3	0.4				**0.1**							
Sulfamethoxazole	**30.9%**											67.5	1.3	0.2		0.1	**0.1**	**30.8**
Trimethoprim/Sulfamethoxazole	**4.6%**				88.0	4.5	2.0	0.6	0.2		**4.6**							
Amikacin	**0.0%**						0.5	20.4	63.1	13.2	2.8							
Gentamicin	**17.6%**					4.1	49.8	24.4	2.8	0.4	1.0	**6.4**	**11.2**					
Kanamycin	**8.8%**										84.7	5.6	0.8	**0.2**	**8.6**			
Streptomycin*	**37.8%**												62.3	**11.5**	**26.2**			
Chloramphenicol	**2.2%**								1.2	20.8	71.5	4.2	**0.9**	**1.4**				
Tetracycline	**48.3%**									49.9	1.7	**1.3**	**1.0**	**46.1**				

Vertical bars show the CLSI/NCCLS Susceptible/Resistant breakpoints for each drug where appropriate.

*Currently no CLSI/NCCLS breakpoints have been established for this organism/antimicrobial combination.

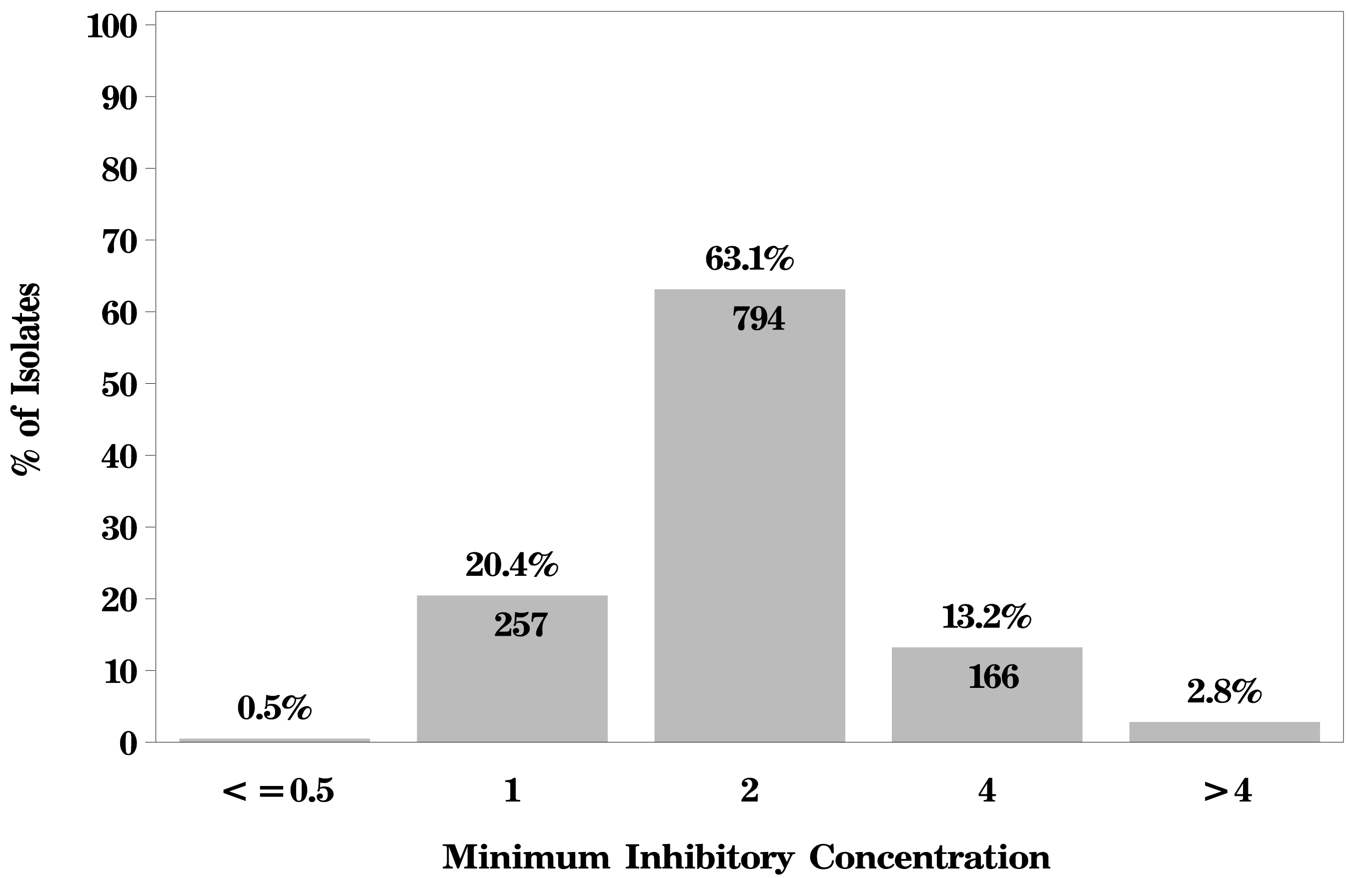
†Discrepancies between %R and sums of distribution %s are due to rounding.

Unshaded areas indicate the dilution ranges of the Sensititre plate used to test the 2003 isolates.

NARMS

Figure 17a: Minimum Inhibitory Concentration of Amikacin for *Escherichia coli* (N=1258 Isolates)

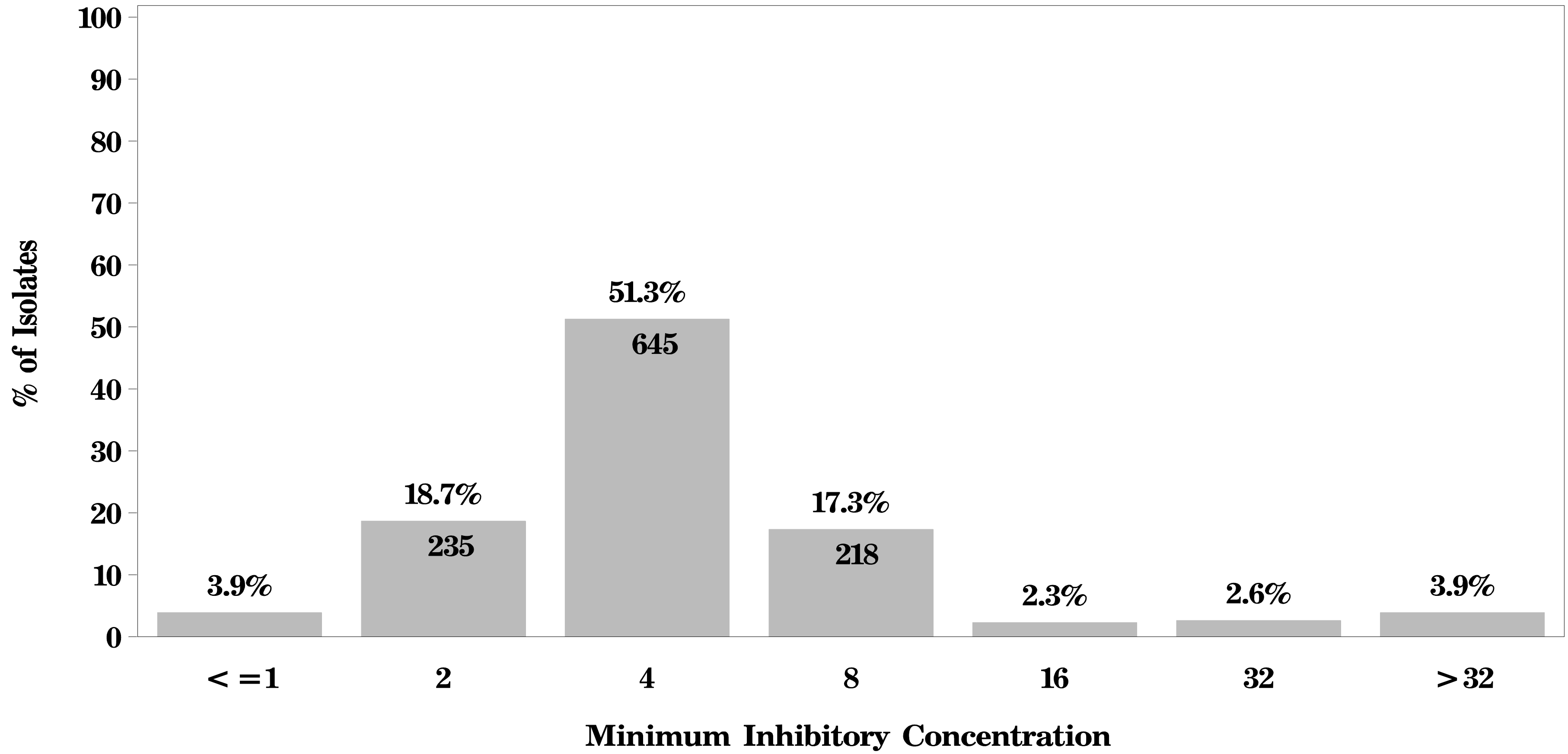
Breakpoints: Susceptible <=16 μg/mL Resistant >=64 μg/mL



NARMS

Figure 17b: Minimum Inhibitory Concentration of Amoxicillin/Clavulanic acid for *Escherichia coli* (N=1258 Isolates)

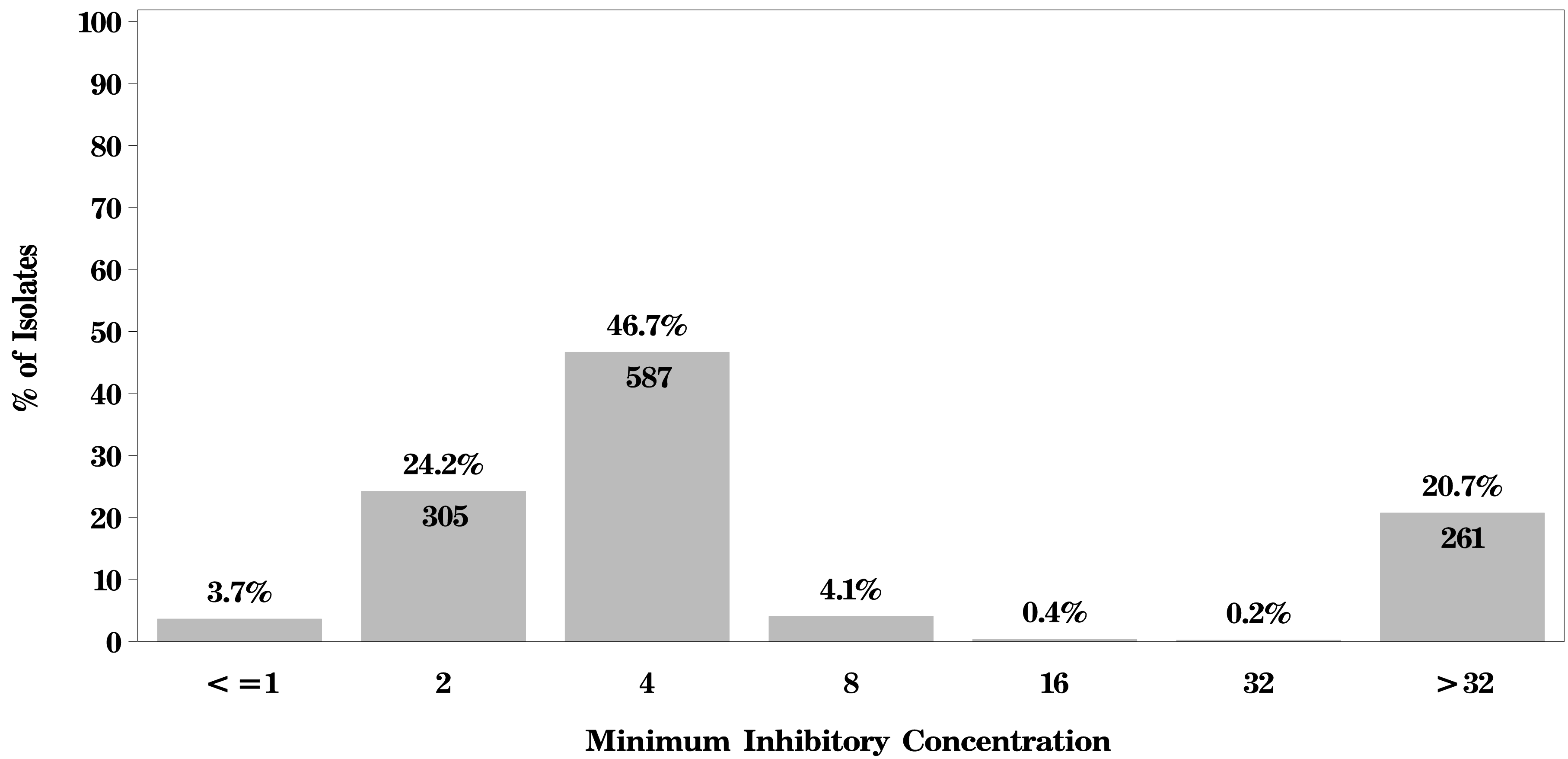
Breakpoints: Susceptible <=8 μg/mL Resistant >=32 μg/mL



NARMS

Figure 17c: Minimum Inhibitory Concentration of Ampicillin for *Escherichia coli* (N=1258 Isolates)

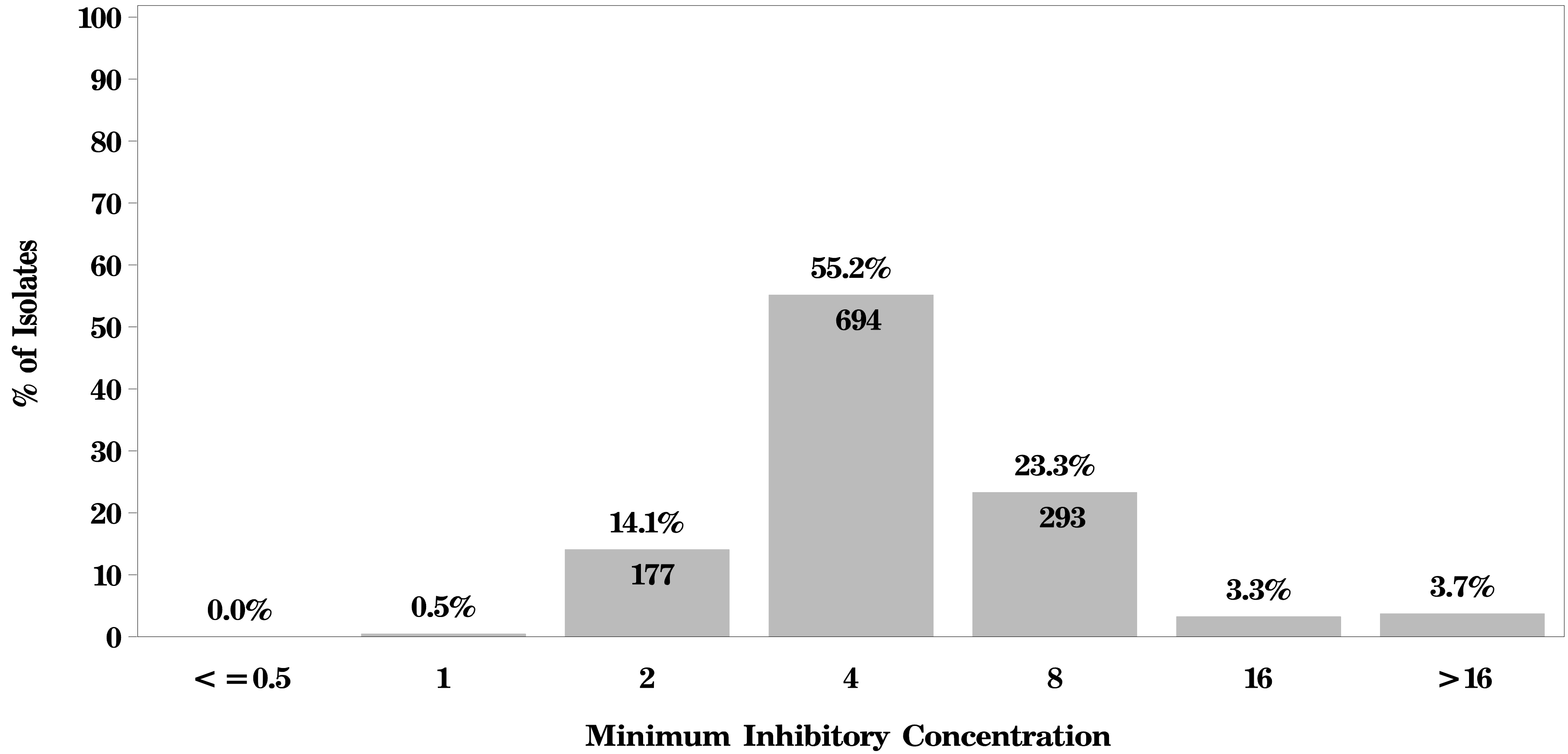
Breakpoints: Susceptible <=8 μg/mL Resistant >=32 μg/mL



NARMS

Figure 17d: Minimum Inhibitory Concentration of Cefoxitin for *Escherichia coli* (N=1258 Isolates)

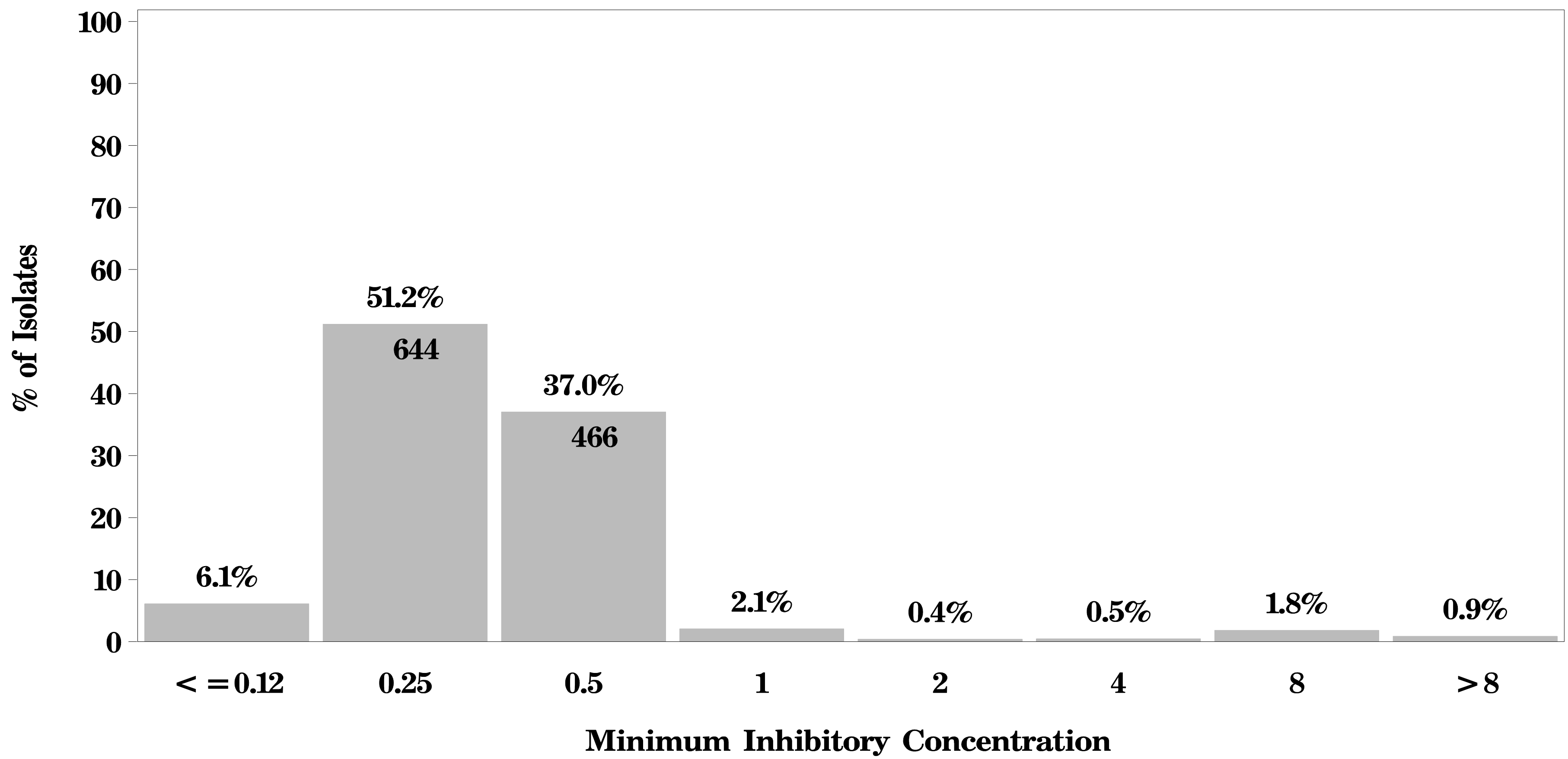
Breakpoints: Susceptible<=8 μg/mL Resistant>=32 μg/mL



NARMS

Figure 17e: Minimum Inhibitory Concentration of Ceftiofur for *Escherichia coli* (N=1258 Isolates)

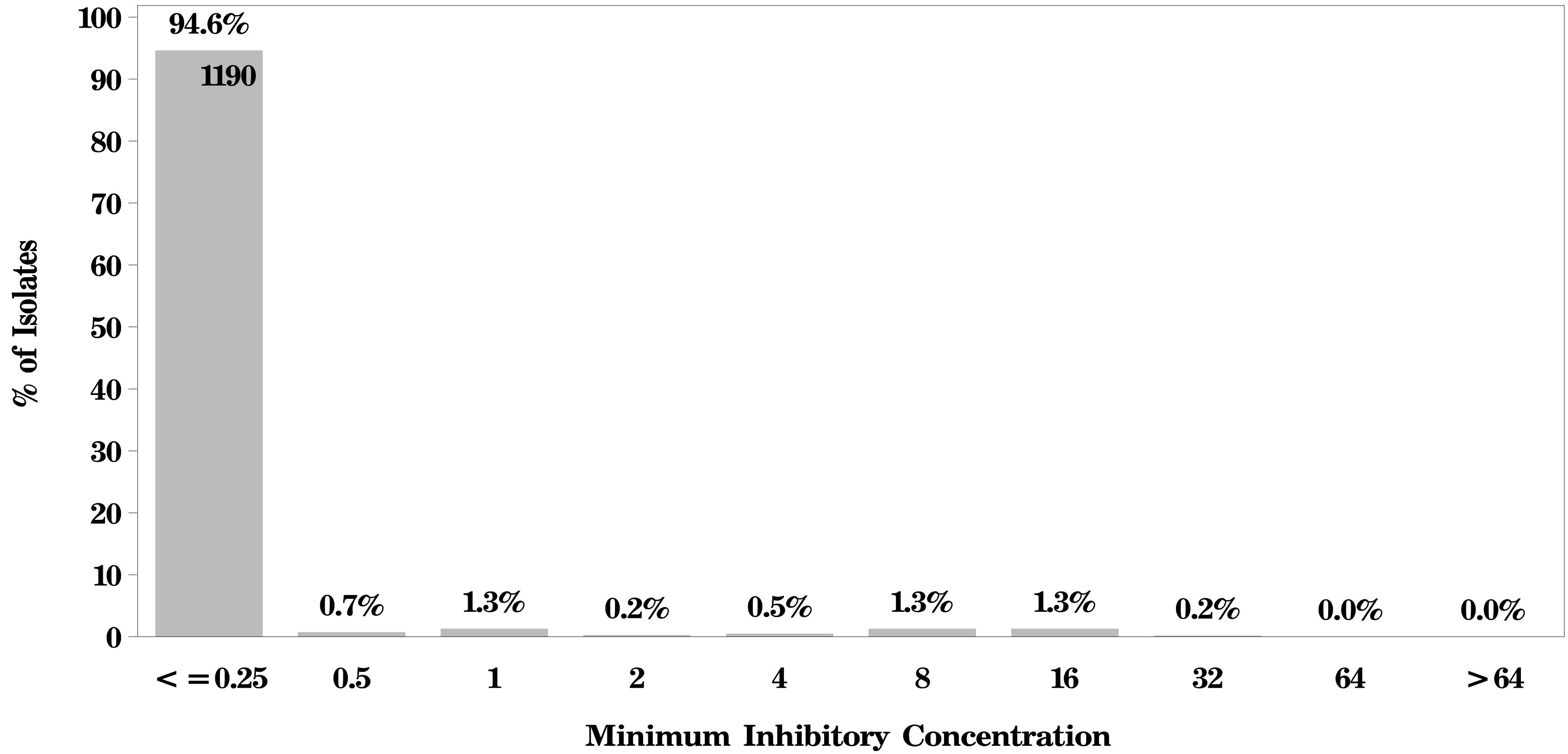
Breakpoints: Susceptible<=2 µg/mL Resistant>=8 µg/mL



NARMS

Figure 17f: Minimum Inhibitory Concentration of Ceftriaxone for *Escherichia coli* (N=1258 Isolates)

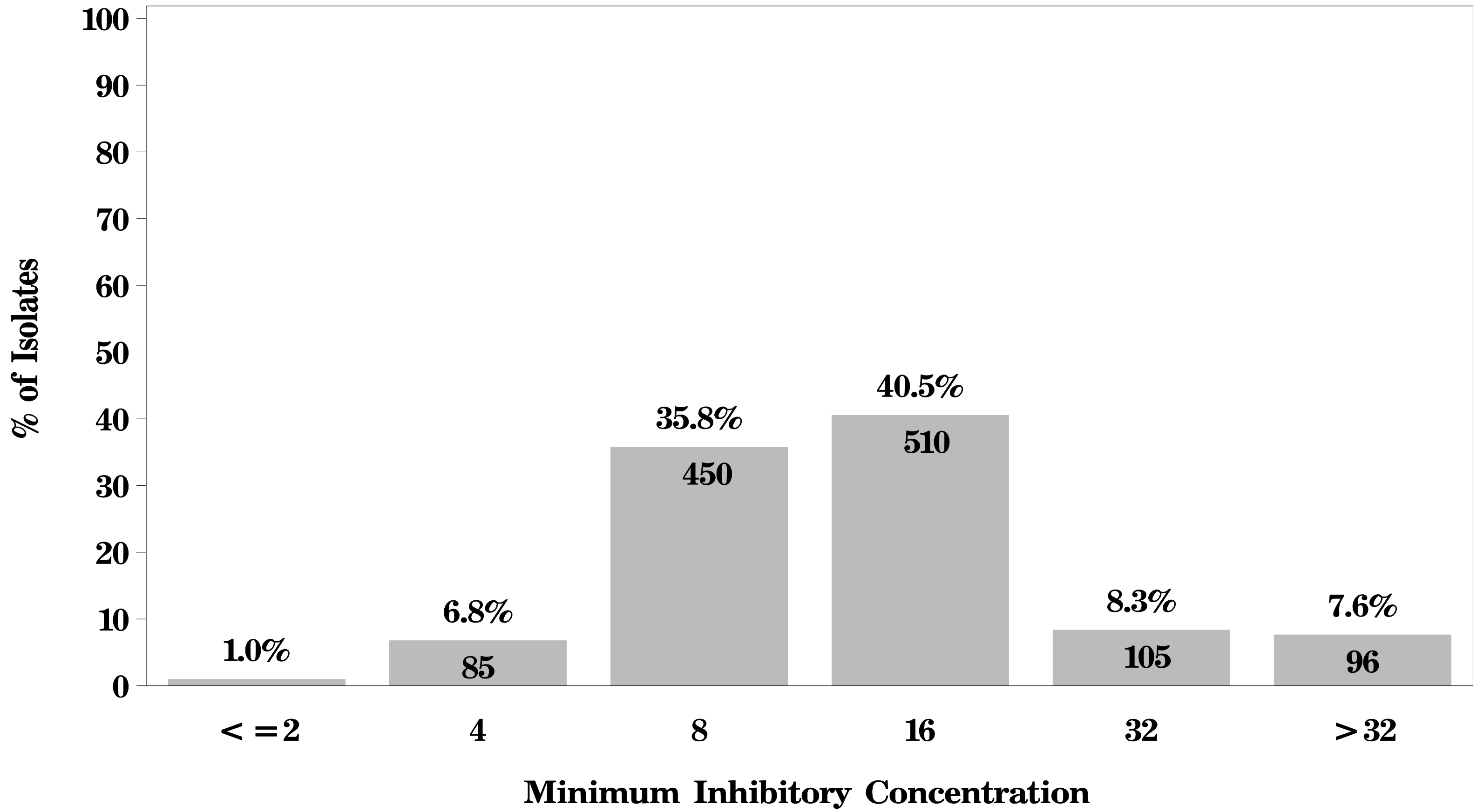
Breakpoints: Susceptible <=8 μg/mL Resistant >=64 μg/mL



NARMS

Figure 17g: Minimum Inhibitory Concentration of Cephalothin for *Escherichia coli* (N=1258 Isolates)

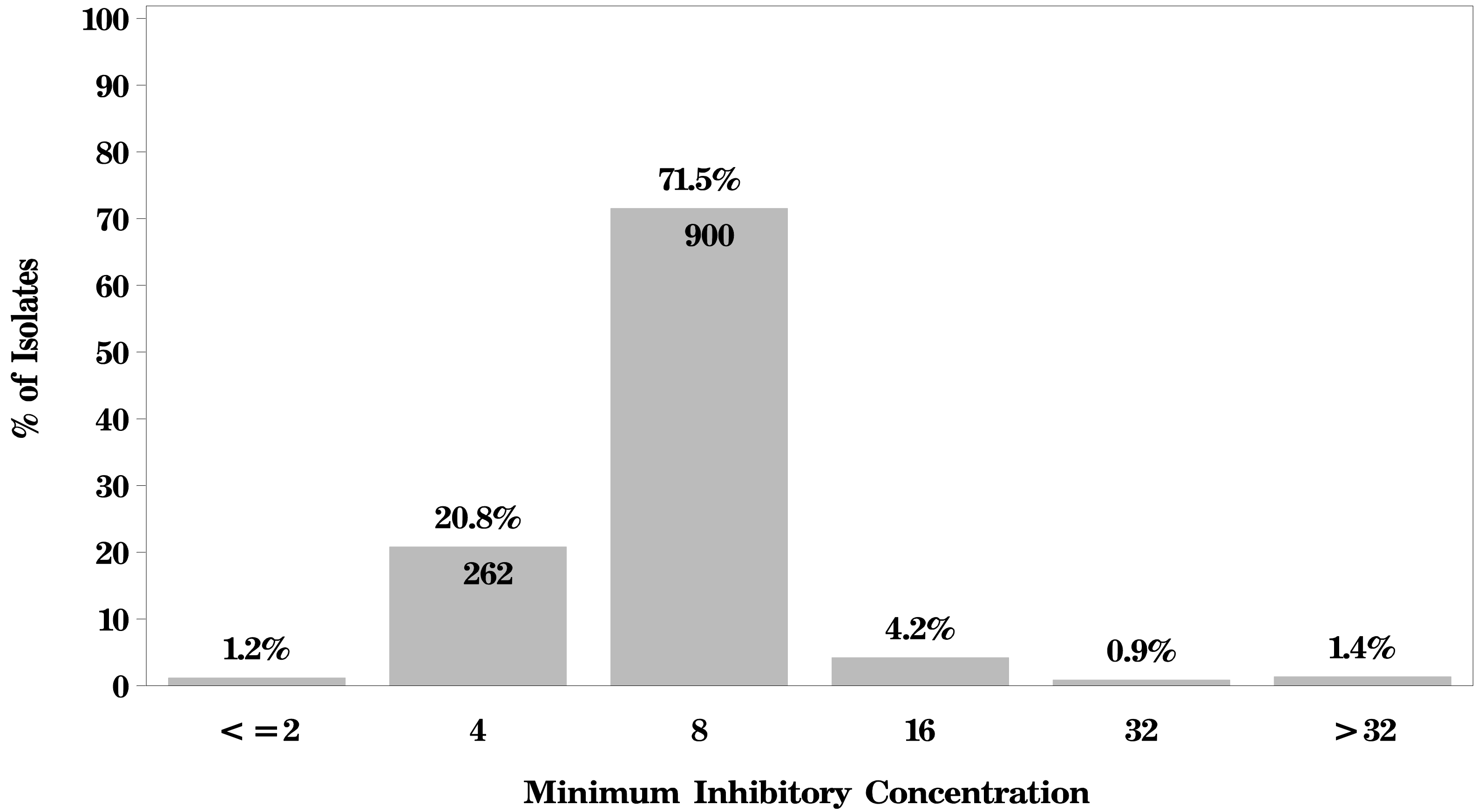
Breakpoints: Susceptible <=8 μg/mL Resistant >=32 μg/mL



NARMS

Figure 17h: Minimum Inhibitory Concentration of Chloramphenicol for *Escherichia coli* (N=1258 Isolates)

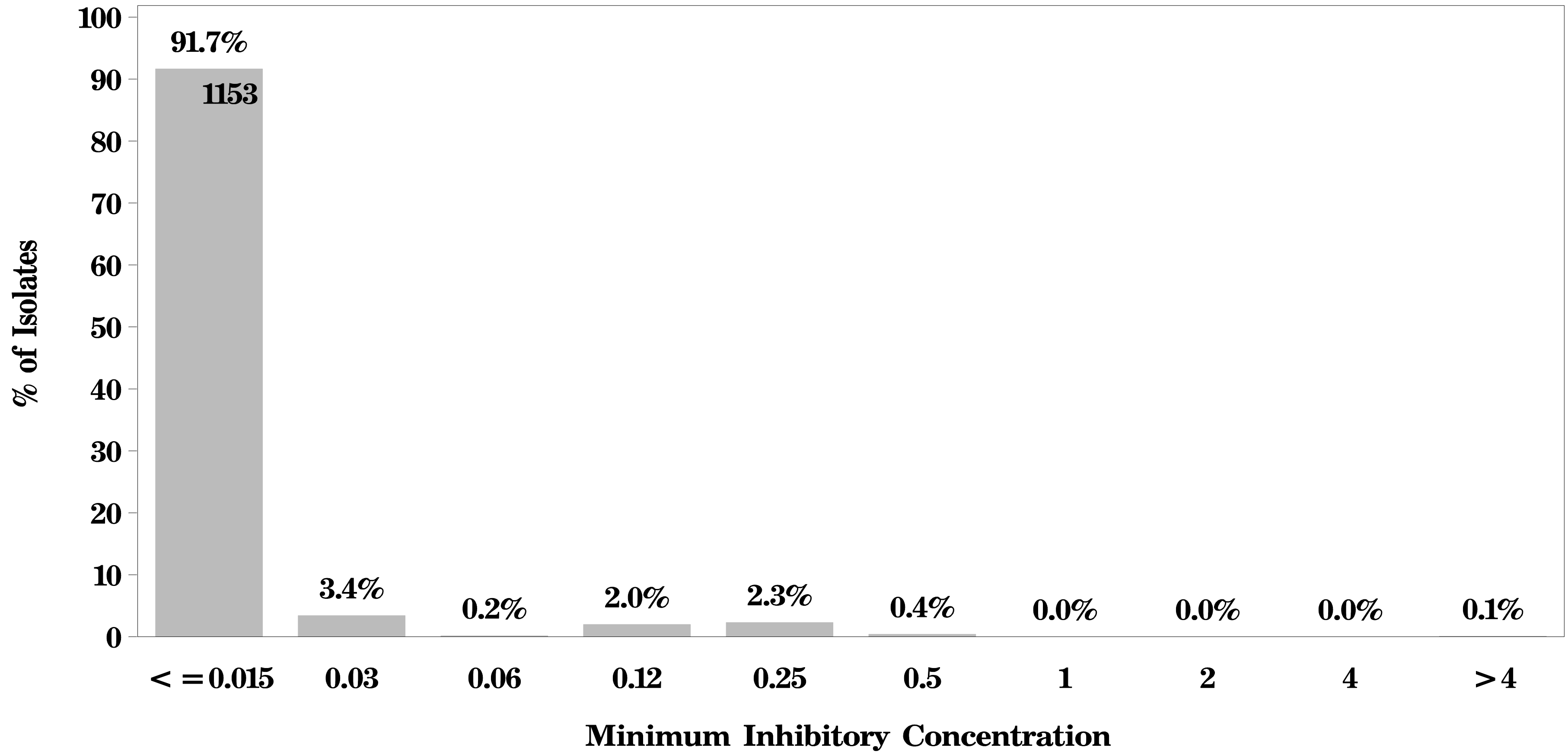
Breakpoints: Susceptible <=8 μg/mL Resistant >=32 μg/mL



NARMS

Figure 17i: Minimum Inhibitory Concentration of Ciprofloxacin for *Escherichia coli* (N=1258 Isolates)

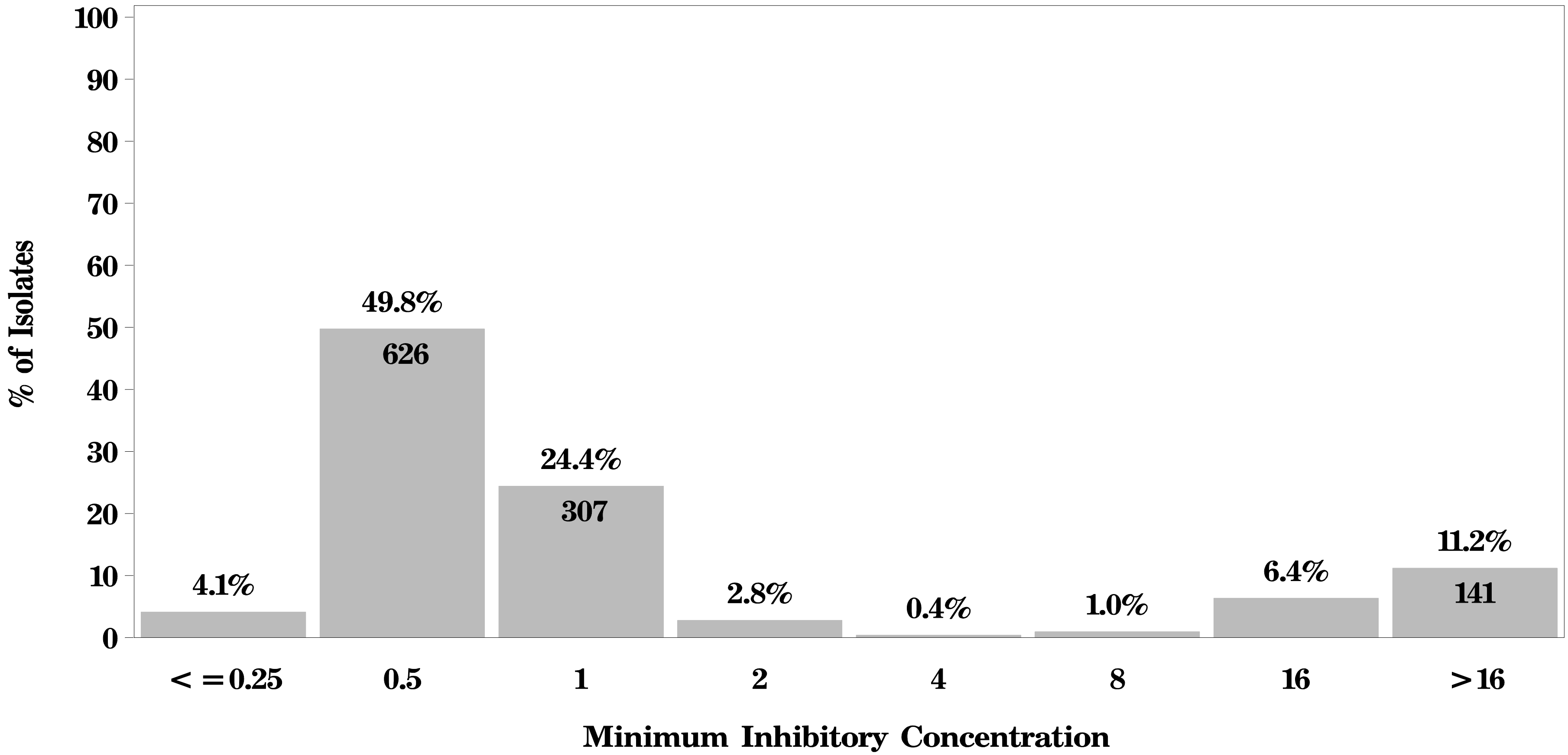
Breakpoints: Susceptible <=1 μg/mL Resistant >=4 μg/mL



NARMS

Figure 17j: Minimum Inhibitory Concentration of Gentamicin for *Escherichia coli* (N=1258 Isolates)

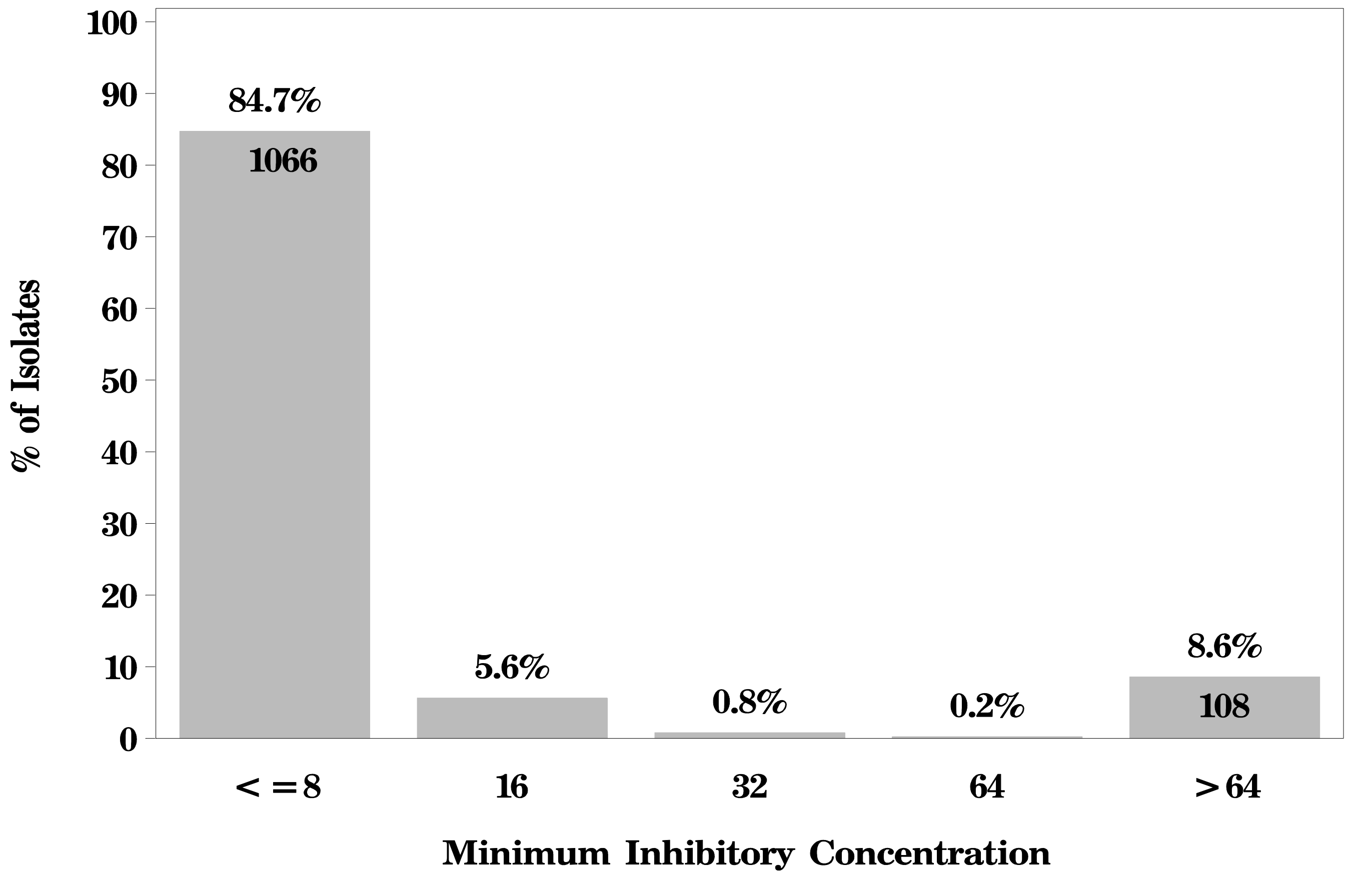
Breakpoints: Susceptible <=4 μg/mL Resistant >=16 μg/mL



NARMS

Figure 17k: Minimum Inhibitory Concentration of Kanamycin for *Escherichia coli* (N=1258 Isolates)

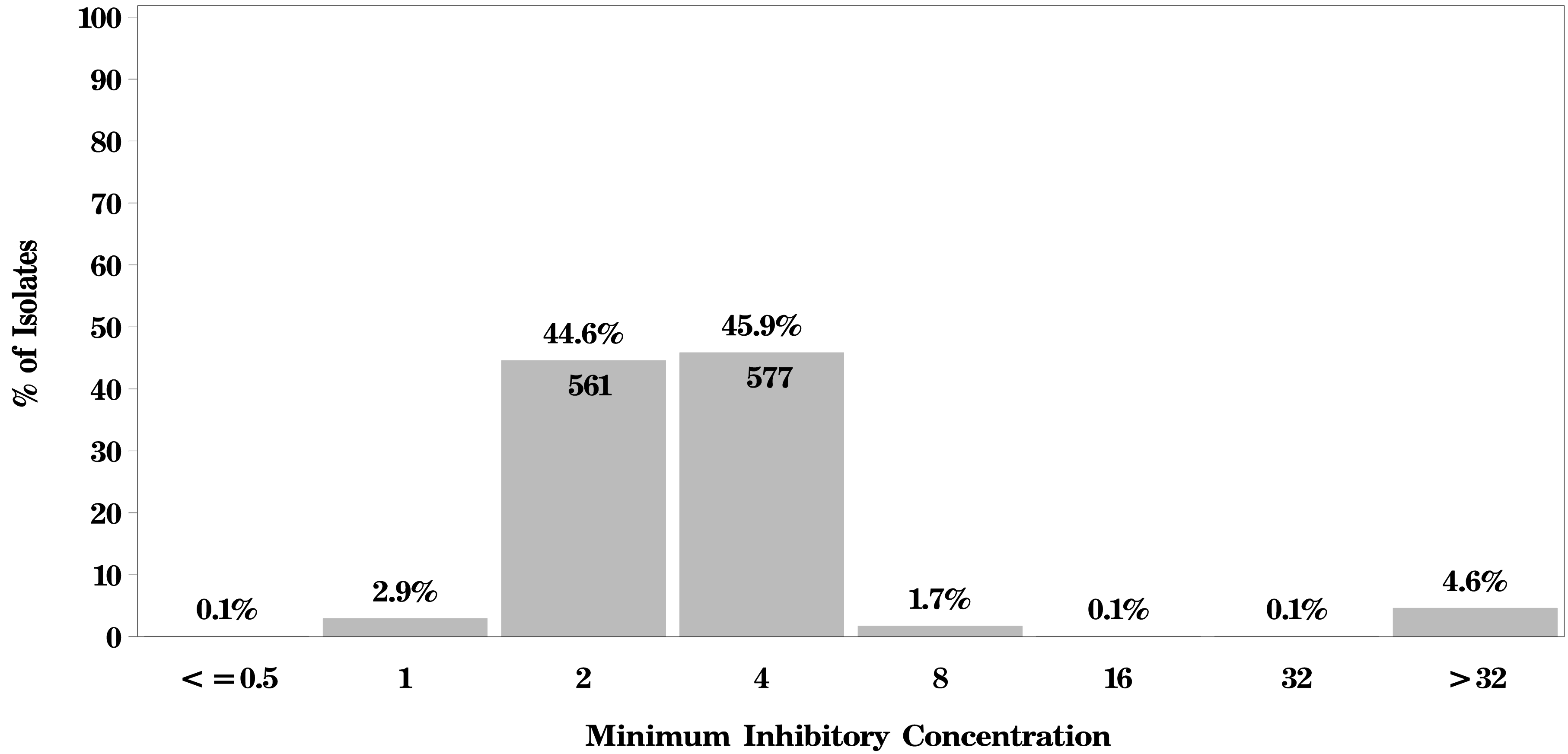
Breakpoints: Susceptible<=16 μg/mL Resistant>=64 μg/mL



NARMS

Figure 17l: Minimum Inhibitory Concentration of Nalidixic acid for *Escherichia coli* (N=1258 Isolates)

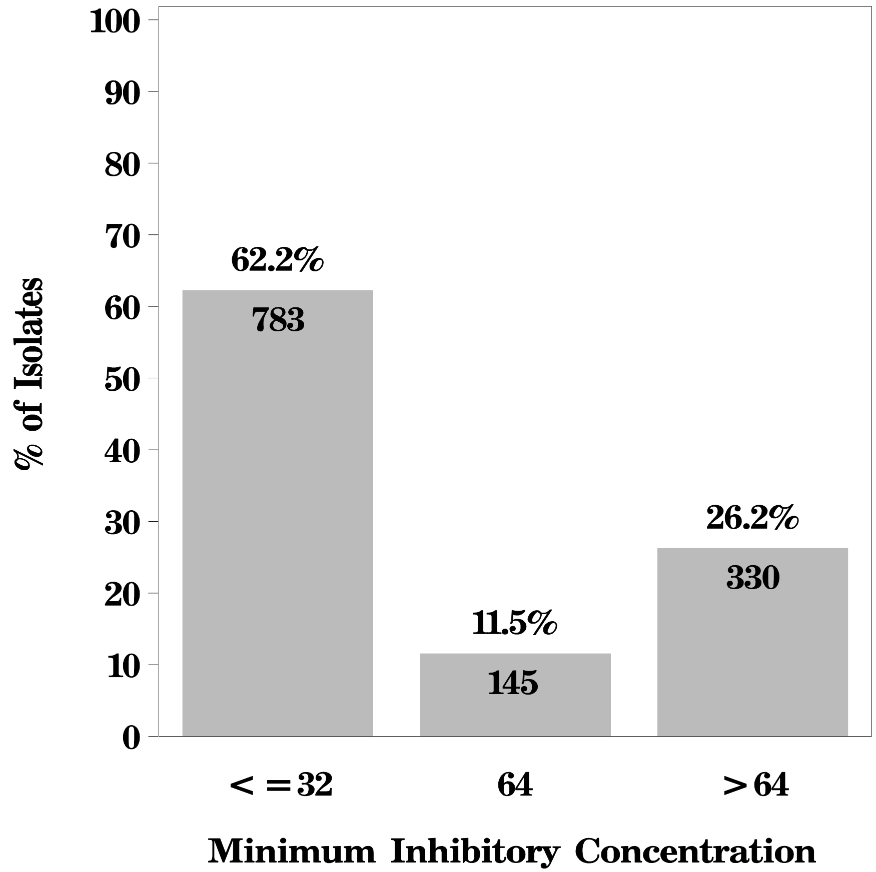
Breakpoints: Susceptible<=16 μg/mL Resistant>=32 μg/mL



NARMS

Figure 17m: Minimum Inhibitory Concentration of Streptomycin for *Escherichia coli* (N=1258 Isolates)

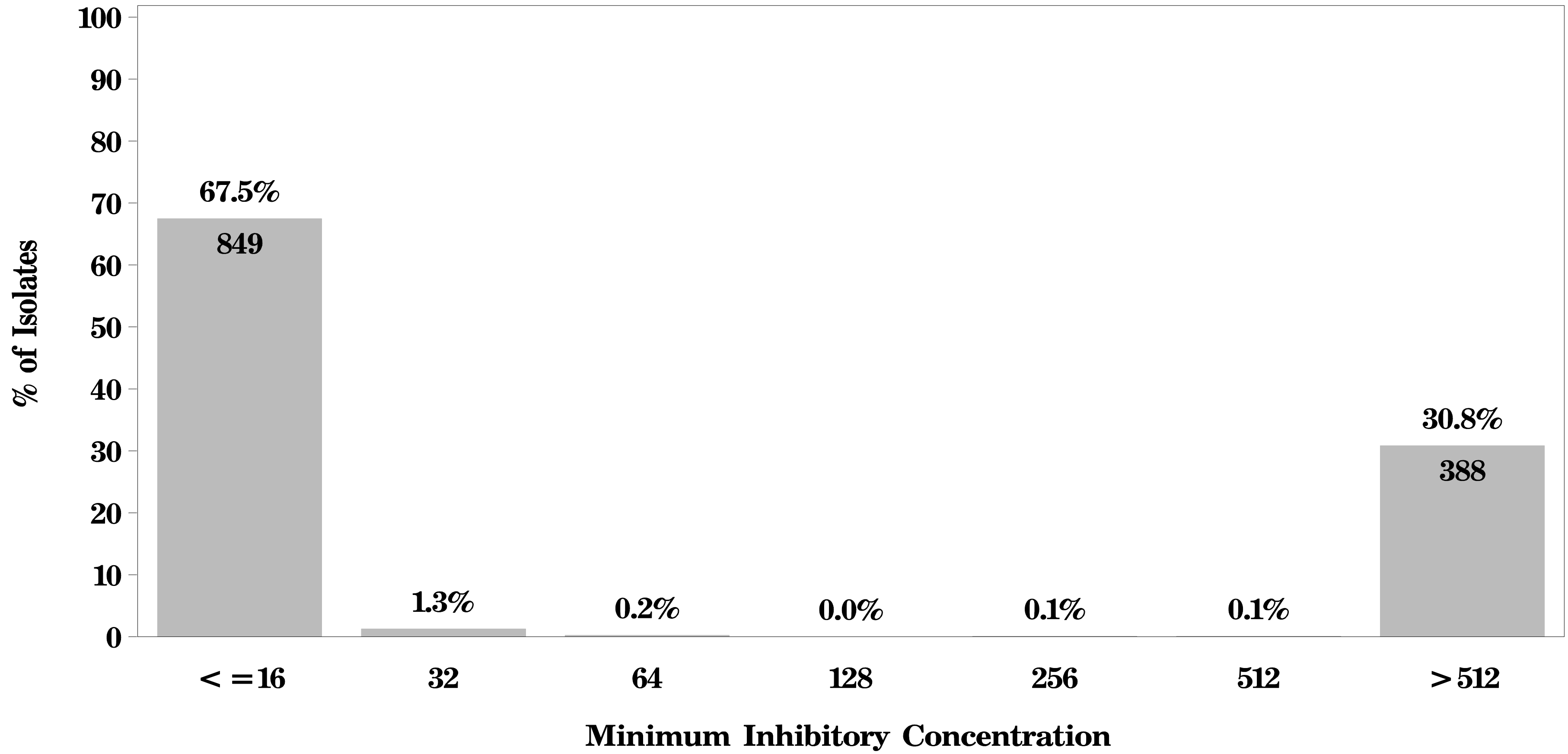
Breakpoints: Susceptible <=32 µg/mL Resistant >=64 µg/mL



NARMS

Figure 17n: Minimum Inhibitory Concentration of Sulfamethoxazole for *Escherichia coli* (N=1258 Isolates)

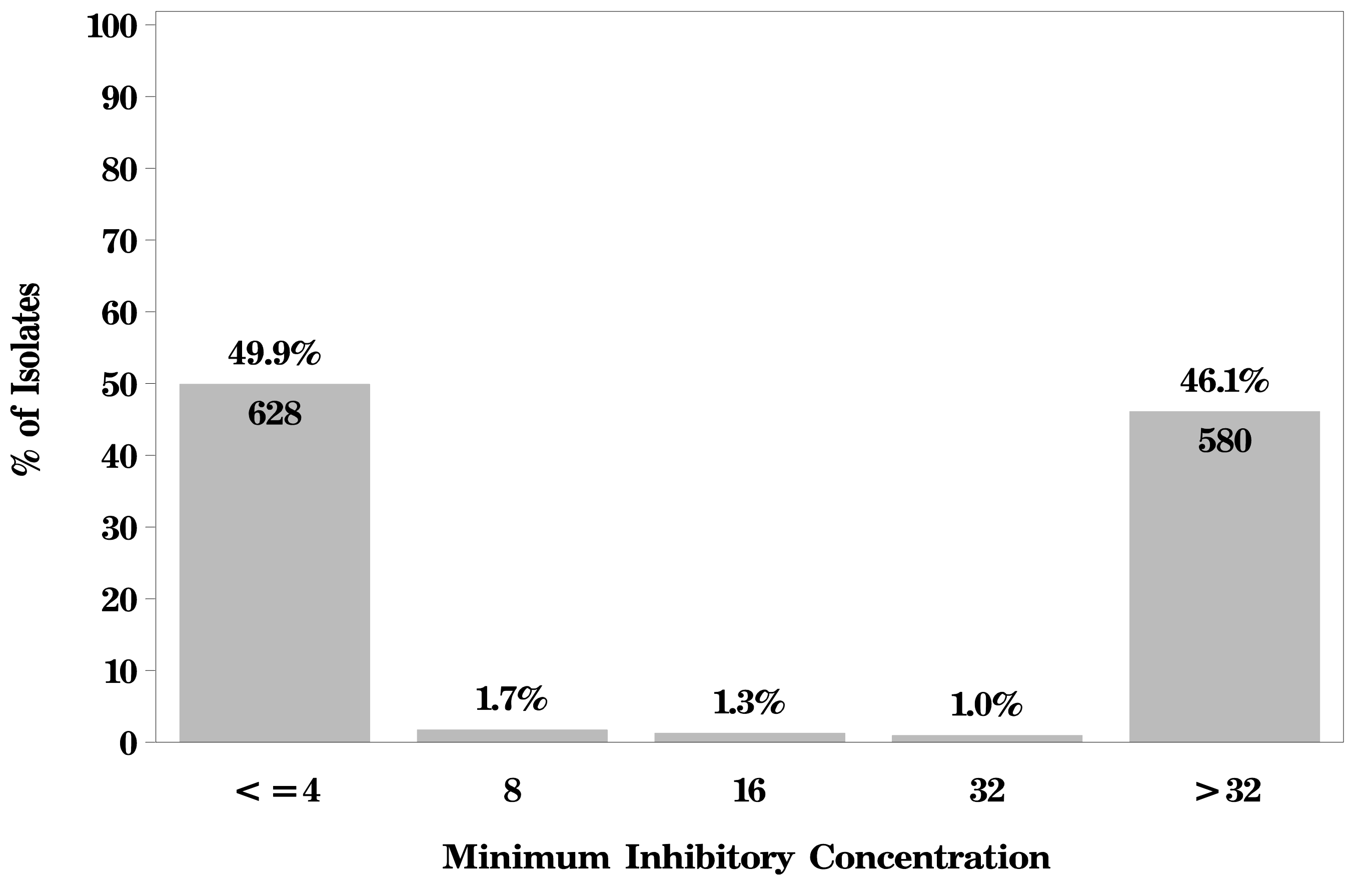
Breakpoints: Susceptible <=256 µg/mL Resistant >=512 µg/mL



NARMS

Figure 17o: Minimum Inhibitory Concentration of Tetracycline for *Escherichia coli* (N=1258 Isolates)

Breakpoints: Susceptible <=4 μg/mL Resistant >=16 μg/mL



NARMS

Figure 17p: Minimum Inhibitory Concentration of Trimethoprim/sulfamethoxazole for *Escherichia coli* (N=1258 Isolates)

Breakpoints: Susceptible <=2 μg/mL Resistant >=4 μg/mL

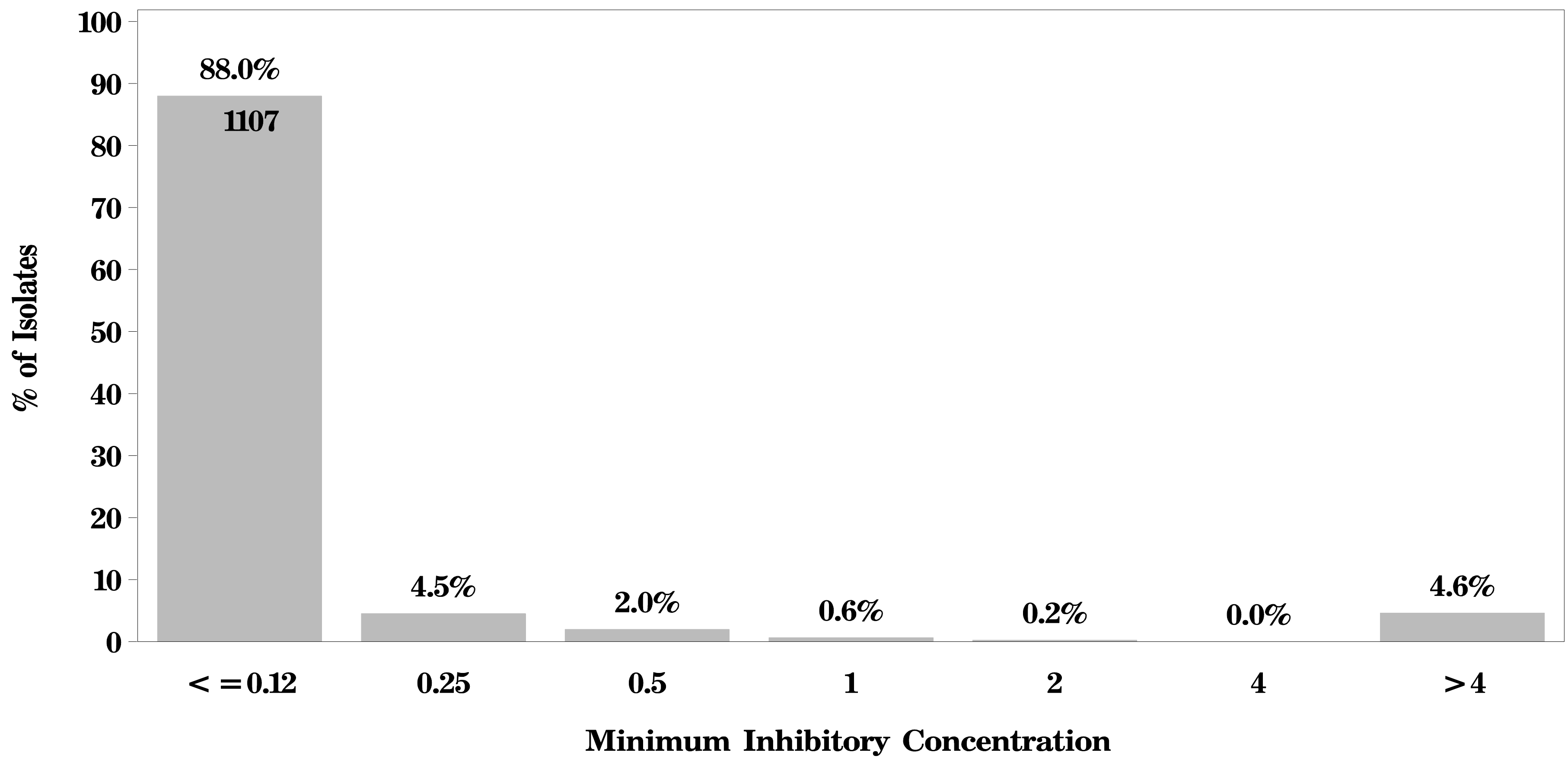


Table 40. Antimicrobial Resistance (%R) among *E. coli* Isolates (N=1258), 2003

Antimicrobial Agent	*n*	*%R*[*]
Tetracycline	608	48.3%
Streptomycin	475	37.8%
Sulfamethoxazole	389	30.9%
Ampicillin	264	21.0%
Gentamicin	221	17.6%
Cephalothin	201	16.0%
Kanamycin	111	8.8%
Amoxicillin/Clavulanic Acid	82	6.5%
Nalidixic Acid	59	4.7%
Trimethoprim/Sulfamethoxazole	58	4.6%
Cefoxitin	47	3.7%
Ceftiofur	34	2.7%
Chloramphenicol	28	2.2%
Ciprofloxacin	1	0.1%
Ceftriaxone	0	0.0%
Amikacin	0	0.0%

*

[*] Where % R = (n / N).

Figure 18a. MIC Distribution among *E. coli* from Chicken Breast

E. coli from **Chicken Breast (N=396)**		Distribution (%) of MICs (in µg/ml)																
Antimicrobial Agent	**%R**	**0.015**	**0.03**	**0.06**	**0.125**	**0.25**	**0.5**	**1**	**2**	**4**	**8**	**16**	**32**	**64**	**128**	**256**	**512**	**>512**
Ampicillin	**25.3%**							1.5	24.5	43.9	4.5	0.3	**0.5**	**24.7**				
Amoxicillin/Clavulanic Acid	**13.6%**							2.3	21.2	45.7	15.7	1.5	**4.3**	**9.3**				
Cefoxitin	**9.3%**								10.6	50.5	25.8	3.8	**9.3**					
Ceftiofur	**7.6%**				4.0	43.2	39.4	3.3	1.0	1.5	**4.8**	**2.8**						
Ceftriaxone	**0.0%**					87.1	1.0	2.5	0.3	1.5	3.5	3.5	0.5					
Cephalothin	**22.0%**								0.5	6.1	31.8	39.6	**6.8**	**15.2**				
Nalidixic Acid	**4.0%**							4.0	47.5	43.2	1.3		**0.3**	**3.8**				
Ciprofloxacin	**0.0%**	92.9	3.0		2.3	1.5	0.3											
Sulfamethoxazole	**38.4%**											59.8	1.3	0.5				**38.4**
Trimethoprim/Sulfamethoxazole	**7.1%**				83.6	5.3	2.3	1.3	0.5		**7.1**							
Amikacin	**0.0%**						0.8	20.2	63.4	12.4	3.3							
Gentamicin	**29.3%**					3.5	43.9	20.2	1.5	0.3	1.3	**10.6**	**18.7**					
Kanamycin	**6.8%**										84.1	7.8	1.3	**0.5**	**6.3**			
Streptomycin*	**56.1%**												44.0	**15.2**	**40.9**			
Chloramphenicol	**0.0%**								1.5	25.5	69.4	3.5						
Tetracycline	**42.9%**									55.6	1.5	**0.8**	**1.0**	**41.2**				

Vertical bars show the CLSI/NCCLS Susceptible/Resistant breakpoints for each drug where appropriate.

*Currently no CLSI/NCCLS breakpoints have been established for this organism/antimicrobial combination.

†Discrepancies between %R and sums of distribution %s are due to rounding.

Unshaded areas indicate the dilution ranges of the Sensititre plate used to test the 2003 isolates.

Figure 18b. MIC Distribution among *E. coli* from Ground Turkey

E. coli from **Ground Turkey (N=333)**		**Distribution (%) of MICs (in µg/ml)**																
Antimicrobial Agent	**%R**	**0.015**	**0.03**	**0.06**	**0.125**	**0.25**	**0.5**	**1**	**2**	**4**	**8**	**16**	**32**	**64**	**128**	**256**	**512**	**>512**
Ampicillin	**35.7%**							3.0	19.2	40.5	1.5		**0.3**	**35.4**				
Amoxicillin/Clavulanic Acid	**3.0%**							3.0	15.3	45.6	27.0	6.0	**1.5**	**1.5**				
Cefoxitin	**1.2%**							0.3	12.6	60.4	22.2	3.3	**1.2**					
Ceftiofur	**0.3%**				4.2	55.3	38.7	1.2	0.3		**0.3**							
Ceftriaxone	**0.0%**					97.9	0.3	1.2	0.3			0.3						
Cephalothin	**18.9%**								0.3	6.0	28.2	46.5	**14.7**	**4.2**				
Nalidixic Acid	**11.7%**						0.3	3.0	41.7	41.4	1.5	0.3		**11.7**				
Ciprofloxacin	**0.3%**	83.5	3.9	0.6	4.2	6.3	1.2				0.3							
Sulfamethoxazole	**51.7%**											45.9	2.1			0.3		**51.7**
Trimethoprim/Sulfamethoxazole	**6.9%**				81.7	7.5	3.0	0.6	0.3		**6.9**							
Amikacin	**0.0%**						0.6	24.9	58.6	14.1	1.8							
Gentamicin	**29.7%**					5.1	42.3	18.3	2.1	0.9	1.5	**10.5**	**19.2**					
Kanamycin	**16.8%**										74.2	7.5	1.5	**0.3**	**16.5**			
Streptomycin*	**54.7%**												45.3	**17.7**	**36.9**			
Chloramphenicol	**3.6%**								1.2	24.0	68.8	2.4	**0.6**	**3.0**				
Tetracycline	**77.8%**									21.3	0.9	**0.3**	**0.9**	**76.6**				

Vertical bars show the CLSI/NCCLS Susceptible/Resistant breakpoints for each drug where appropriate.

*Currently no CLSI/NCCLS breakpoints have been established for this organism/antimicrobial combination.

†Discrepancies between %R and sums of distribution %s are due to rounding.

Unshaded areas indicate the dilution ranges of the Sensititre plate used to test the 2003 isolates.

Figure 18c. MIC Distribution among *E. coli* from Ground Beef

E coli **from Ground Beef (N=311)**		**Distribution (%) of MICs (in µg/ml)**																
Antimicrobial Agent	**%R**	**0.015**	**0.03**	**0.06**	**0.125**	**0.25**	**0.5**	**1**	**2**	**4**	**8**	**16**	**32**	**64**	**128**	**256**	**512**	**>512**
Ampicillin	**5.1%**							8.4	28.3	52.4	5.5	0.3		**5.1**				
Amoxicillin/Clavulanic Acid	**2.3%**							7.4	19.6	62.4	7.7	0.6	**1.6**	**0.6**				
Cefoxitin	**0.3%**							1.6	21.2	56.3	18.0	2.6	**0.3**					
Ceftiofur	**0.3%**				11.3	55.3	31.5	1.6			**0.3**							
Ceftriaxone	**0.0%**					98.4	0.6	0.3	0.3		0.3							
Cephalothin	**8.0%**								2.6	9.0	44.1	36.3	**4.5**	**3.5**				
Nalidixic Acid	**1.0%**							1.6	44.1	51.1	2.3			**1.0**				
Ciprofloxacin	**0.0%**	95.5	3.5		0.6	0.3												
Sulfamethoxazole	**10.3%**											89.1	0.6				**0.3**	**10.0**
Trimethoprim/Sulfamethoxazole	**0.3%**				97.4	1.3	1.0				**0.3**							
Amikacin	**0.0%**							18.6	68.8	11.6	1.0							
Gentamicin	**1.0%**					4.2	62.7	28.0	3.5		0.6	**0.6**	**0.3**					
Kanamycin	**2.9%**										93.2	3.9			**2.9**			
Streptomycin*	**9.0%**												91.0	**3.5**	**5.5**			
Chloramphenicol	**2.3%**								1.0	15.4	76.2	5.1	**1.3**	**1.0**				
Tetracycline	**25.1%**									71.4	3.5	**2.6**	**1.0**	**21.5**				

Vertical bars show the CLSI/NCCLS Susceptible/Resistant breakpoints for each drug where appropriate.

*Currently no CLSI/NCCLS breakpoints have been established for this organism/antimicrobial combination.

†Discrepancies between %R and sums of distribution %s are due to rounding.

Unshaded areas indicate the dilution ranges of the Sensititre plate used to test the 2003 isolates.

Figure 18d. MIC Distribution among *E. coli* from Pork Chop

***E. coli* from Pork Chop (N=218)**		**Distribution (%) of MICs (in µg/ml)**																
Antimicrobial Agent	**%R**	0.015	0.03	0.06	0.125	0.25	0.5	1	2	4	8	16	32	64	128	256	512	>512
Ampicillin	**13.3%**							1.8	25.7	52.8	5.0	1.4		**13.3**				
Amoxicillin/Clavulanic Acid	**5.1%**							3.2	17.9	54.1	19.3	0.5	**2.8**	**2.3**				
Cefoxitin	**2.35**								12.4	54.1	28.0	3.2	**2.3**					
Ceftiofur	**0.9%**				5.5	53.7	38.1	1.8			**0.9**							
Ceftriaxone	**0.0%**					97.7	0.9	0.5			0.5	0.5						
Cephalothin	**11.9%**								0.5	6.0	42.7	39.0	**6.9**	**5.0**				
Nalidixic Acid	**0.5%**							2.8	44.5	50.0	2.3			**0.5**				
Ciprofloxacin	**0.0%**	96.3	3.2			0.5												
Sulfamethoxazole	**15.1%**											83.5	0.9	0.5				**15.1**
Trimethoprim/Sulfamethoxazole	**2.8%**				92.2	3.2	1.4	0.5			**2.8**							
Amikacin	**0.0%**						0.5	16.5	61.5	15.6	6.0							
Gentamicin	**1.4%**					3.7	53.2	36.2	5.0	0.5		**0.5**	**0.9**					
Kanamycin	**8.7%**										89.9	1.4			**8.7**			
Streptomycin*	**19.7%**												80.3	**6.9**	**12.8**			
Chloramphenicol	**4.1%**								0.9	15.1	72.9	6.9	**2.3**	**1.8**				
Tetracycline	**46.3%**									52.8	0.9	**1.8**	**0.9**	**43.6**				

Vertical bars show the CLSI/NCCLS Susceptible/Resistant breakpoints for each drug where appropriate.

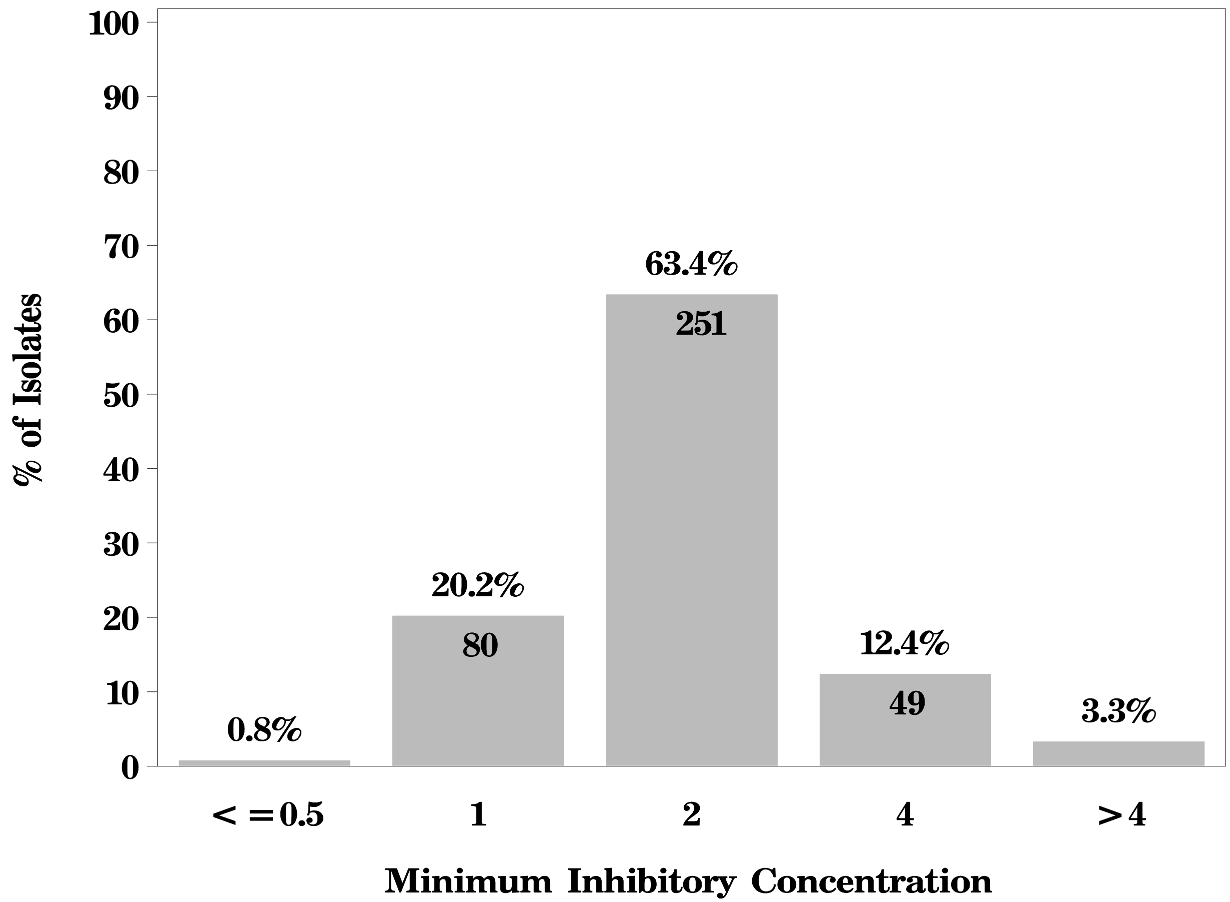
*Currently no CLSI/NCCLS breakpoints have been established for this organism/antimicrobial combination.

†Discrepancies between %R and sums of distribution %s are due to rounding.

Unshaded areas indicate the dilution ranges of the Sensititre plate used to test the 2003 isolates.

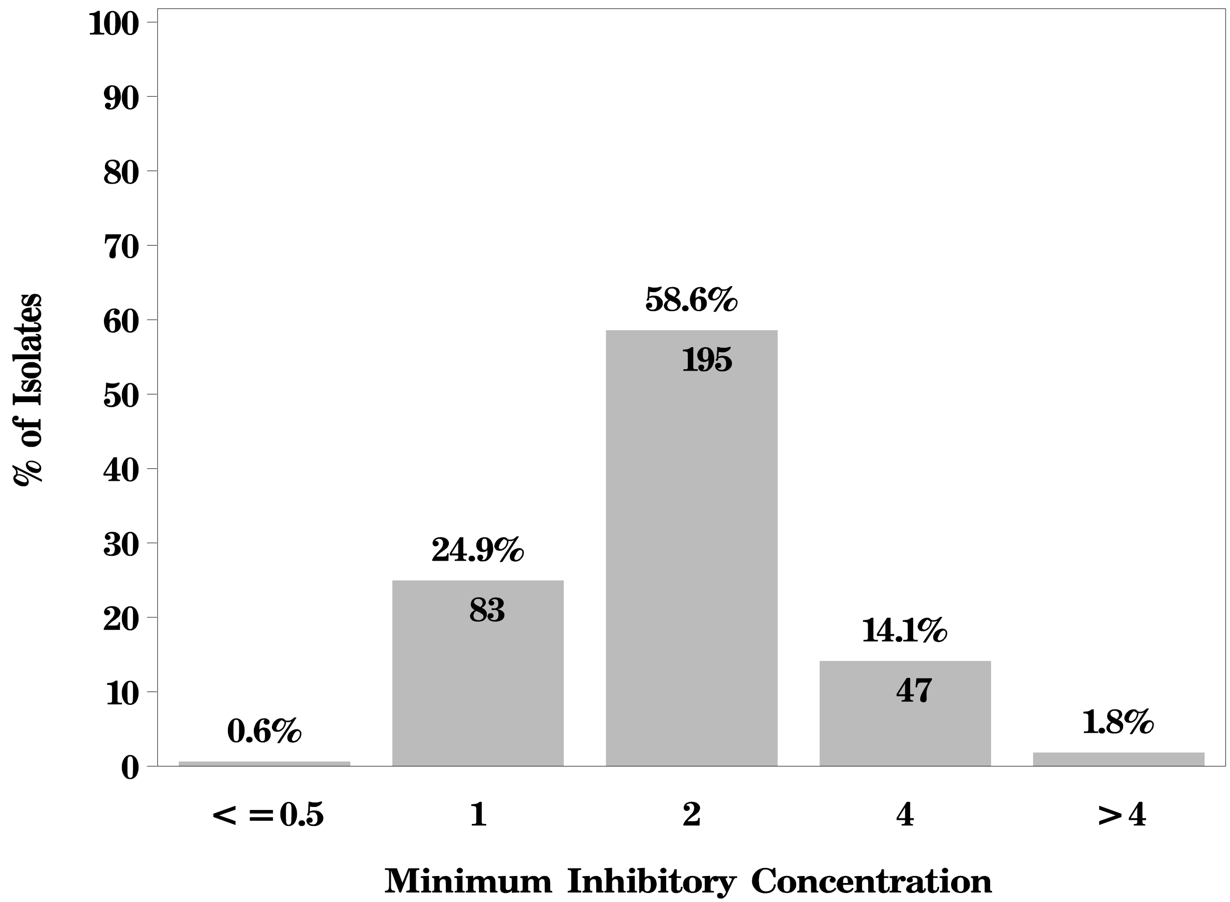
NARMS

Figure 19a: Minimum Inhibitory Concentration of Amikacin for *Escherichia coli* in Chicken Breast (N=396 Isolates)
Breakpoints: Susceptible<=16 μg/mL Resistant>=64 μg/mL



NARMS

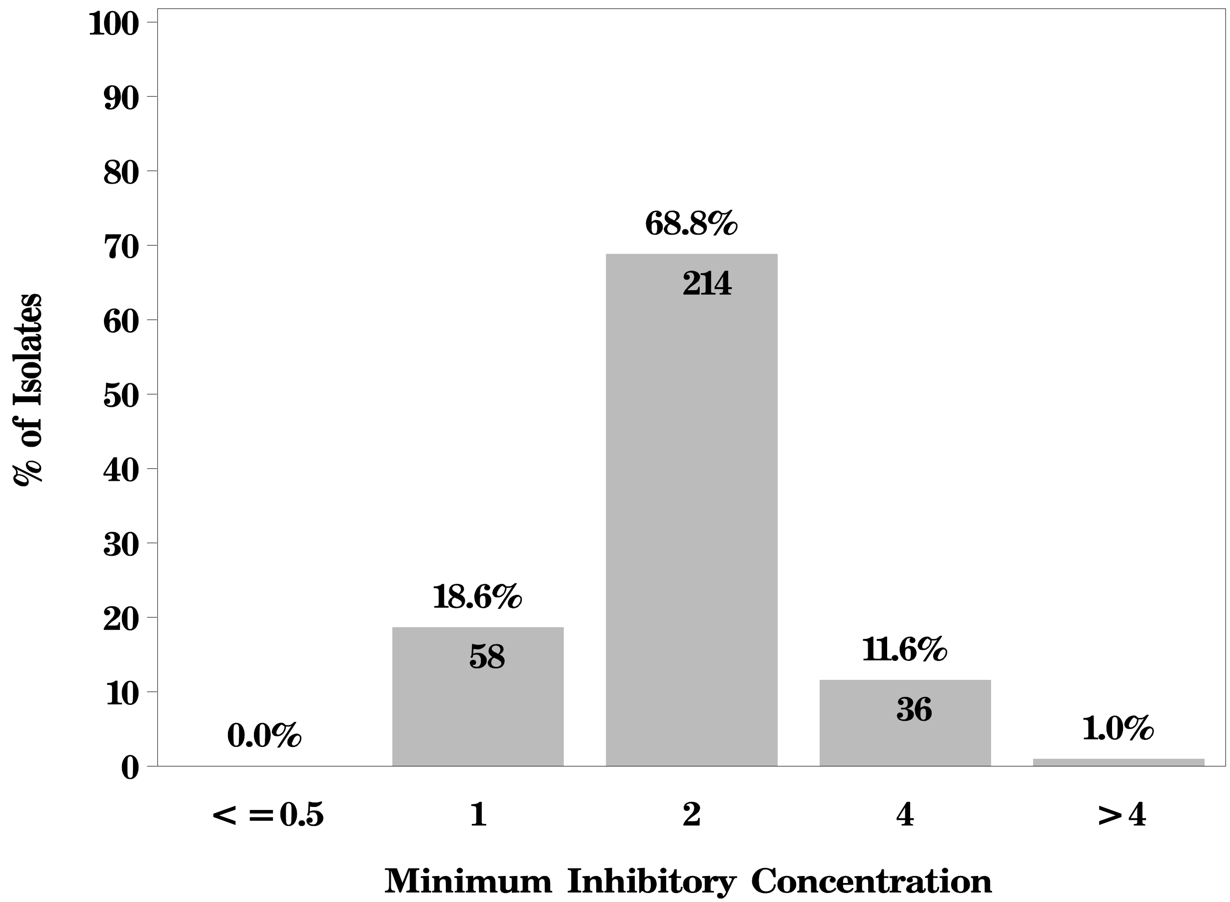
Figure 19a: Minimum Inhibitory Concentration of Amikacin for *Escherichia coli* in Ground Turkey (N=333 Isolates)
Breakpoints: Susceptible <=16 μg/mL Resistant >=64 μg/mL



NARMS

Figure 19a: Minimum Inhibitory Concentration of Amikacin for *Escherichia coli* in Ground Beef (N=311 Isolates)

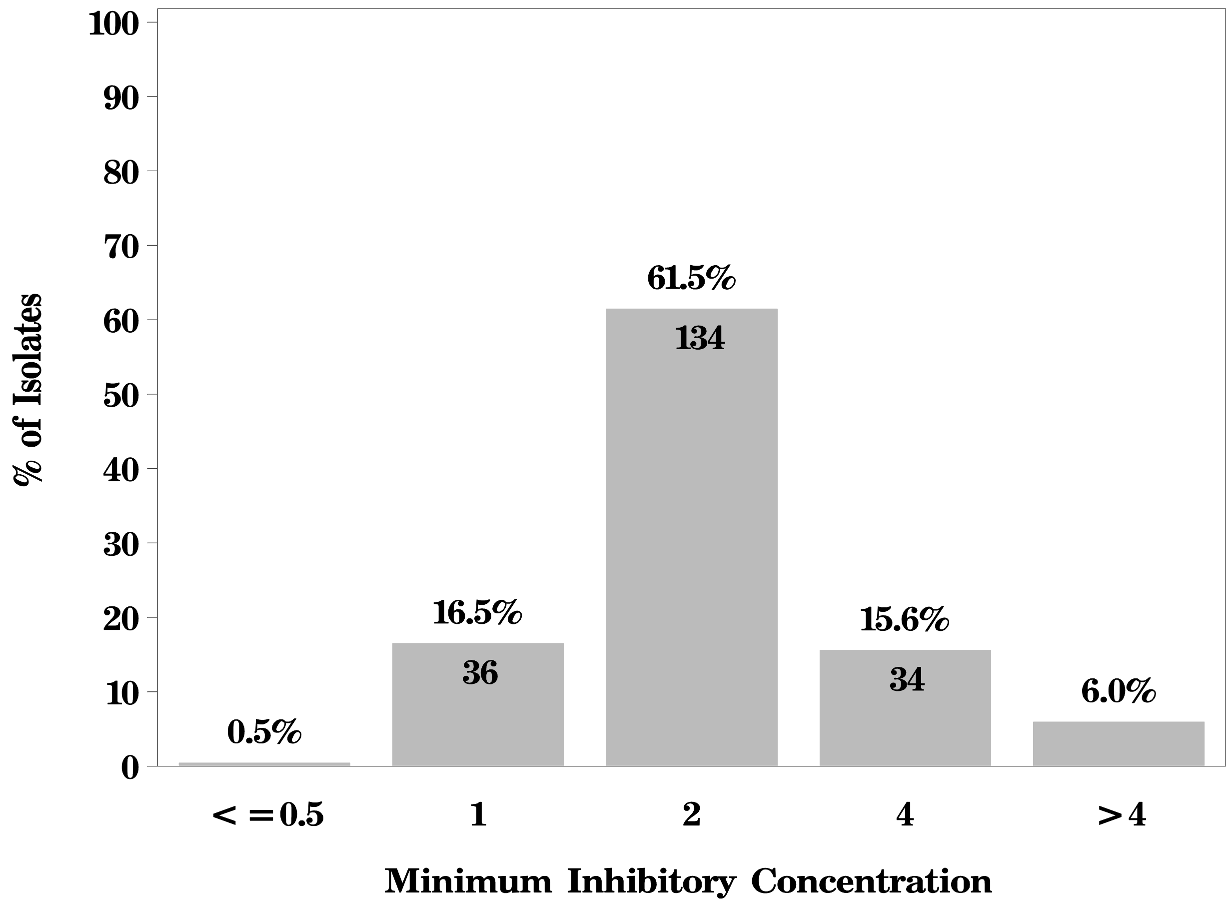
Breakpoints: Susceptible<=16 µg/mL Resistant>=64 µg/mL



NARMS

Figure 19a: Minimum Inhibitory Concentration of Amikacin for *Escherichia coli* in Pork Chop (N=218 Isolates)

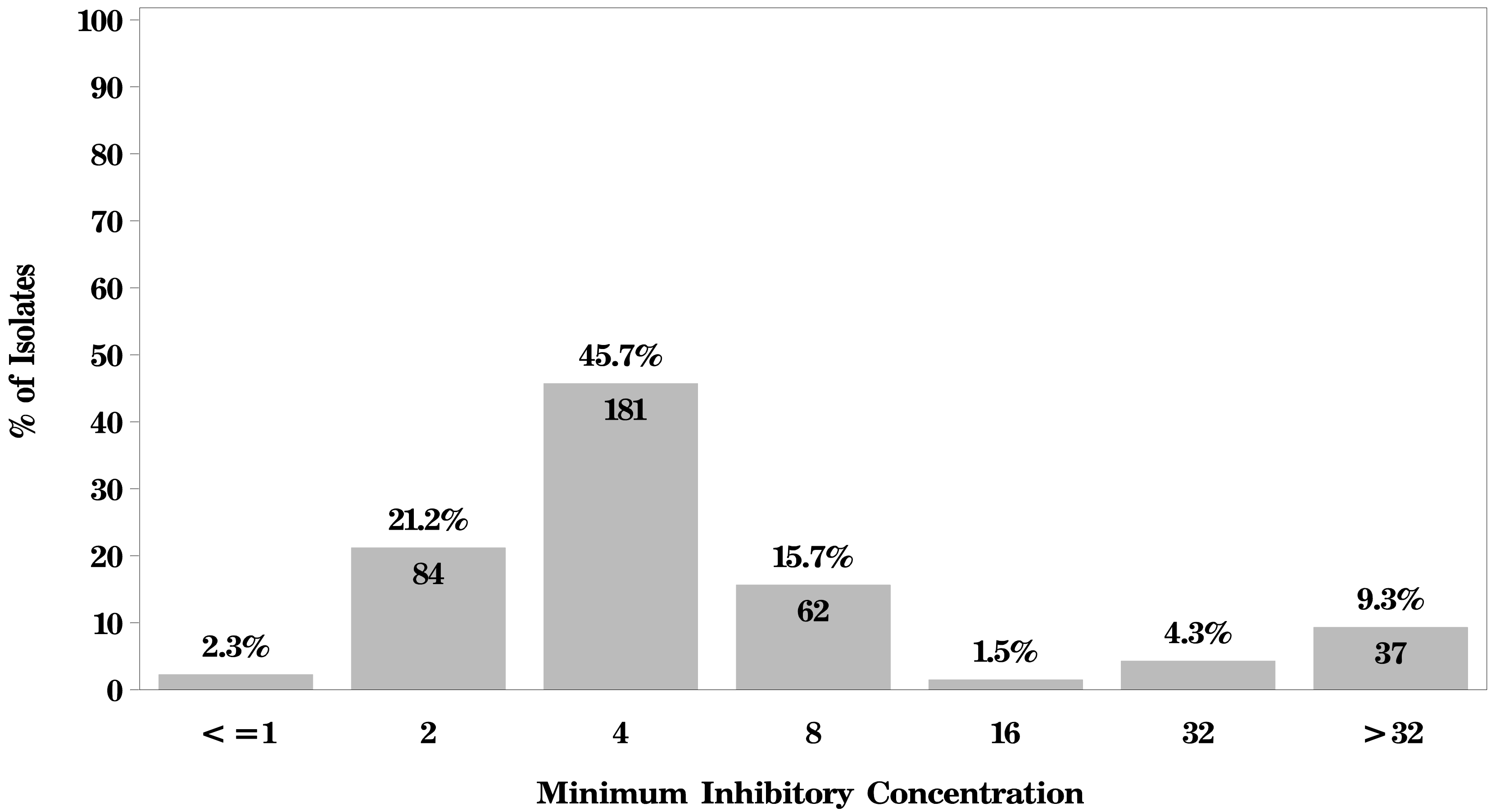
Breakpoints: Susceptible<=16 μg/mL Resistant>=64 μg/mL



NARMS

Figure 19b: Minimum Inhibitory Concentration of Amoxicillin/Clavulanic acid for *Escherichia coli* in Chicken Breast (N=396 Isolates)

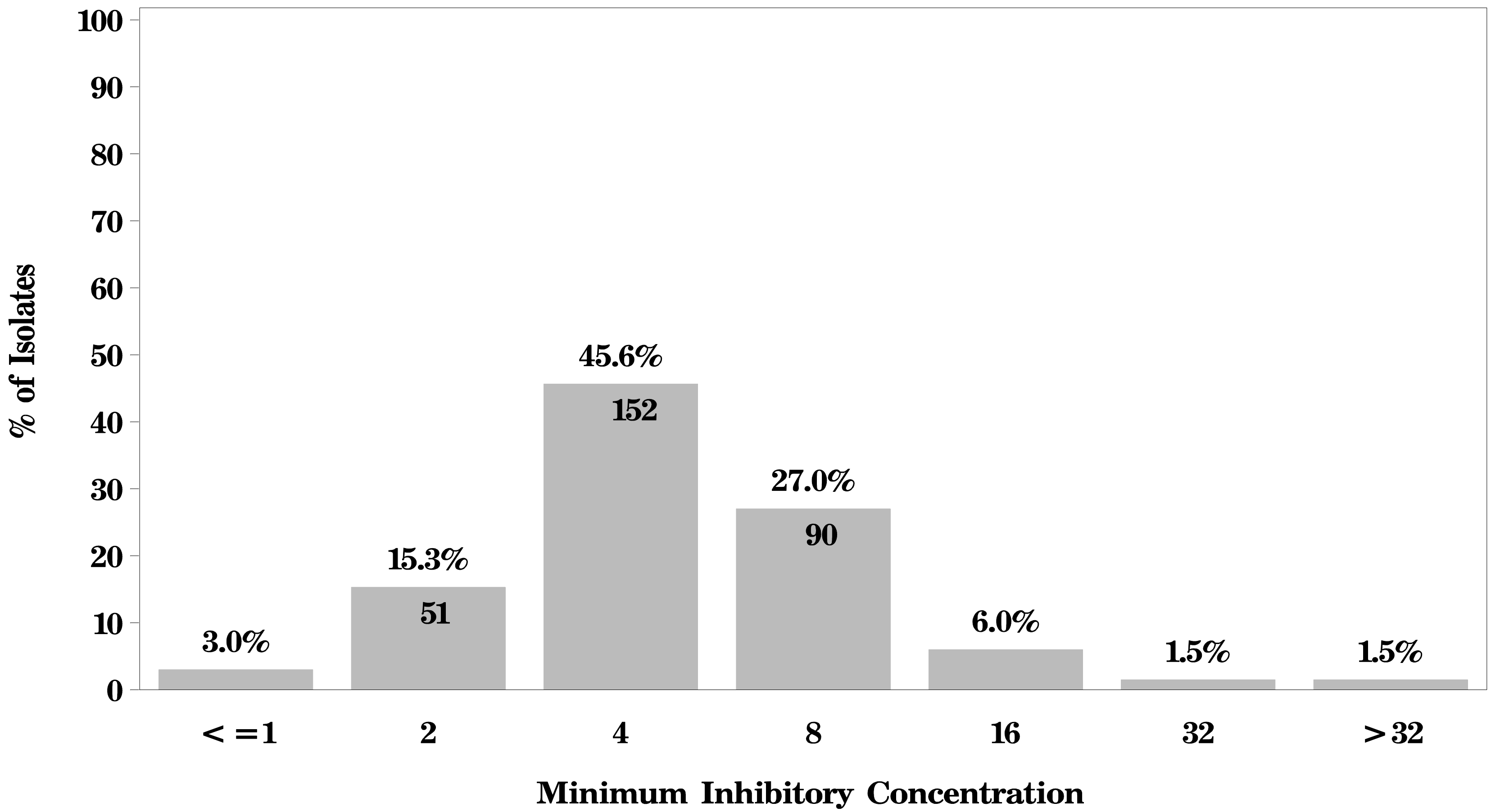
Breakpoints: Susceptible<=8 µg/mL Resistant>=32 µg/mL



NARMS

Figure 19b: Minimum Inhibitory Concentration of Amoxicillin/Clavulanic acid for *Escherichia coli* in Ground Turkey (N=333 Isolates)

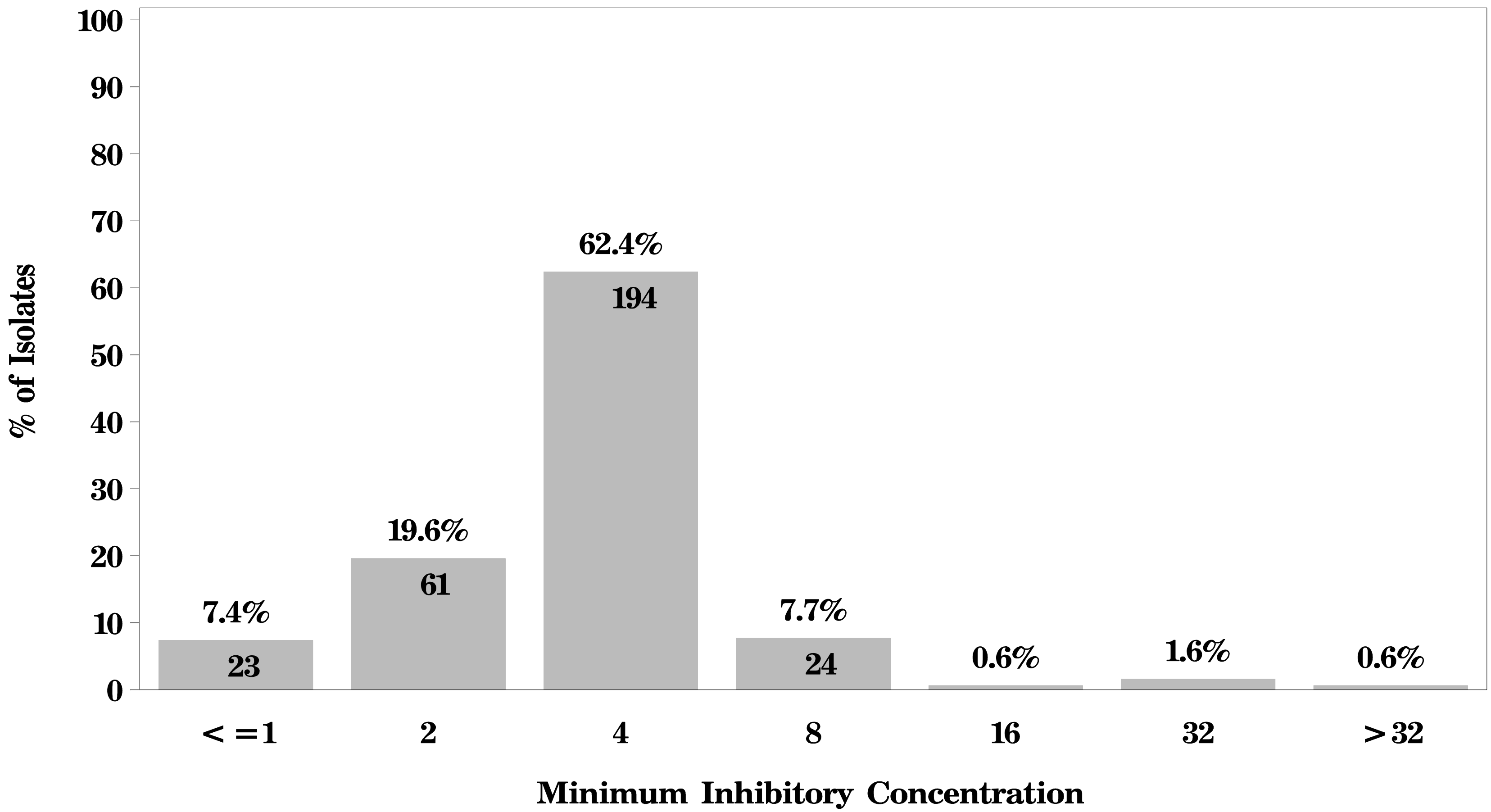
Breakpoints: Susceptible <=8 µg/mL Resistant >=32 µg/mL



NARMS

Figure 19b: Minimum Inhibitory Concentration of Amoxicillin/Clavulanic acid for *Escherichia coli* in Ground Beef (N=311 Isolates)

Breakpoints: Susceptible<=8 µg/mL Resistant>=32 µg/mL



NARMS

Figure 19b: Minimum Inhibitory Concentration of Amoxicillin/Clavulanic acid for *Escherichia coli* in Pork Chop (N=218 Isolates)

Breakpoints: Susceptible<=8 μg/mL Resistant>=32 μg/mL

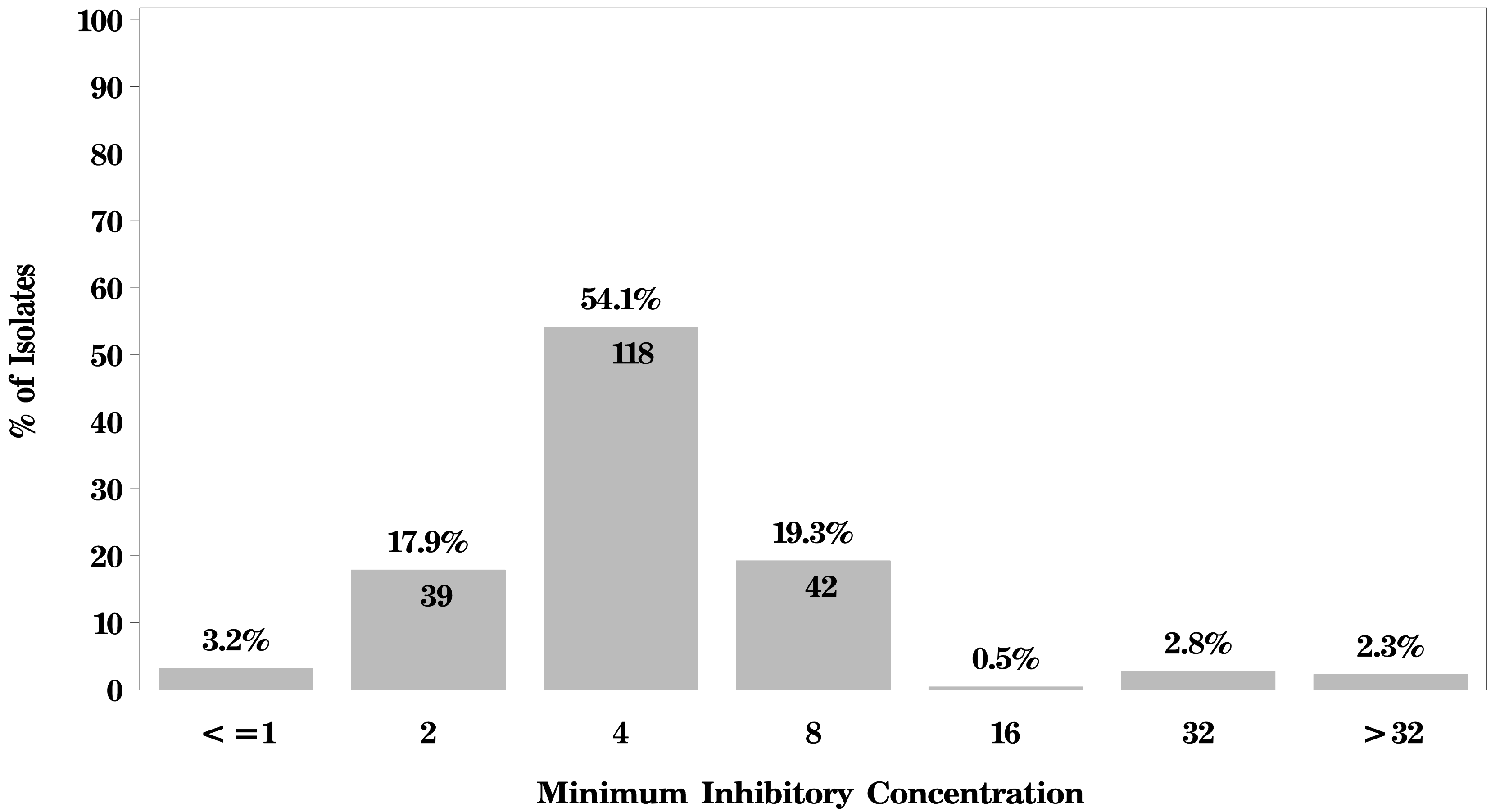


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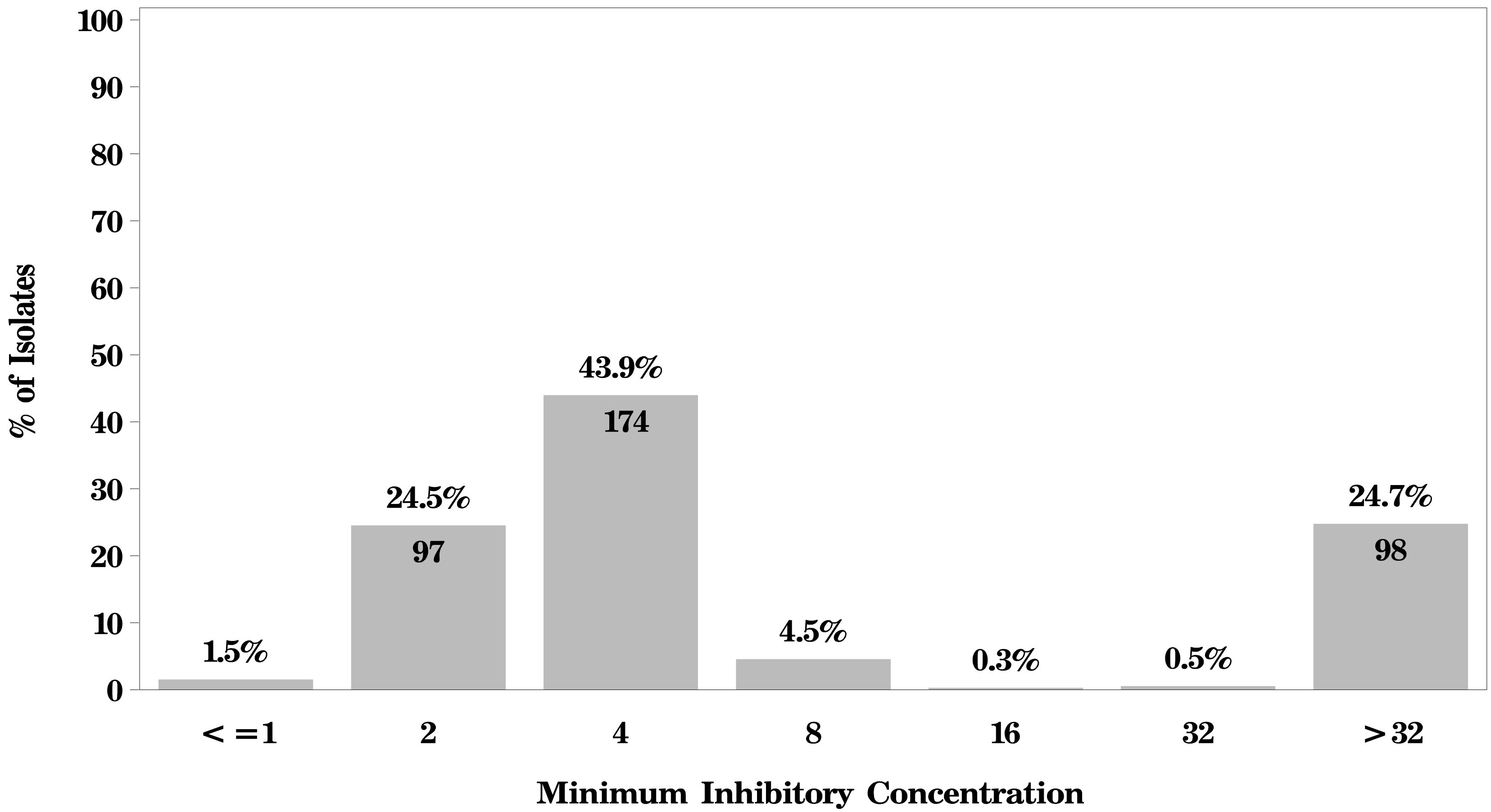
Figure 19c: Minimum Inhibitory Concentration of Ampicillin for *Escherichia coli* in Chicken Breast (N=396 Isolates)

Breakpoints: Susceptible<=8 μg/mL Resistant>=32 μg/mL



NARMS

Figure 19c: Minimum Inhibitory Concentration of Ampicillin for *Escherichia coli* in Ground Turkey (N=333 Isolates)

Breakpoints: Susceptible <=8 μg/mL Resistant >=32 μg/mL

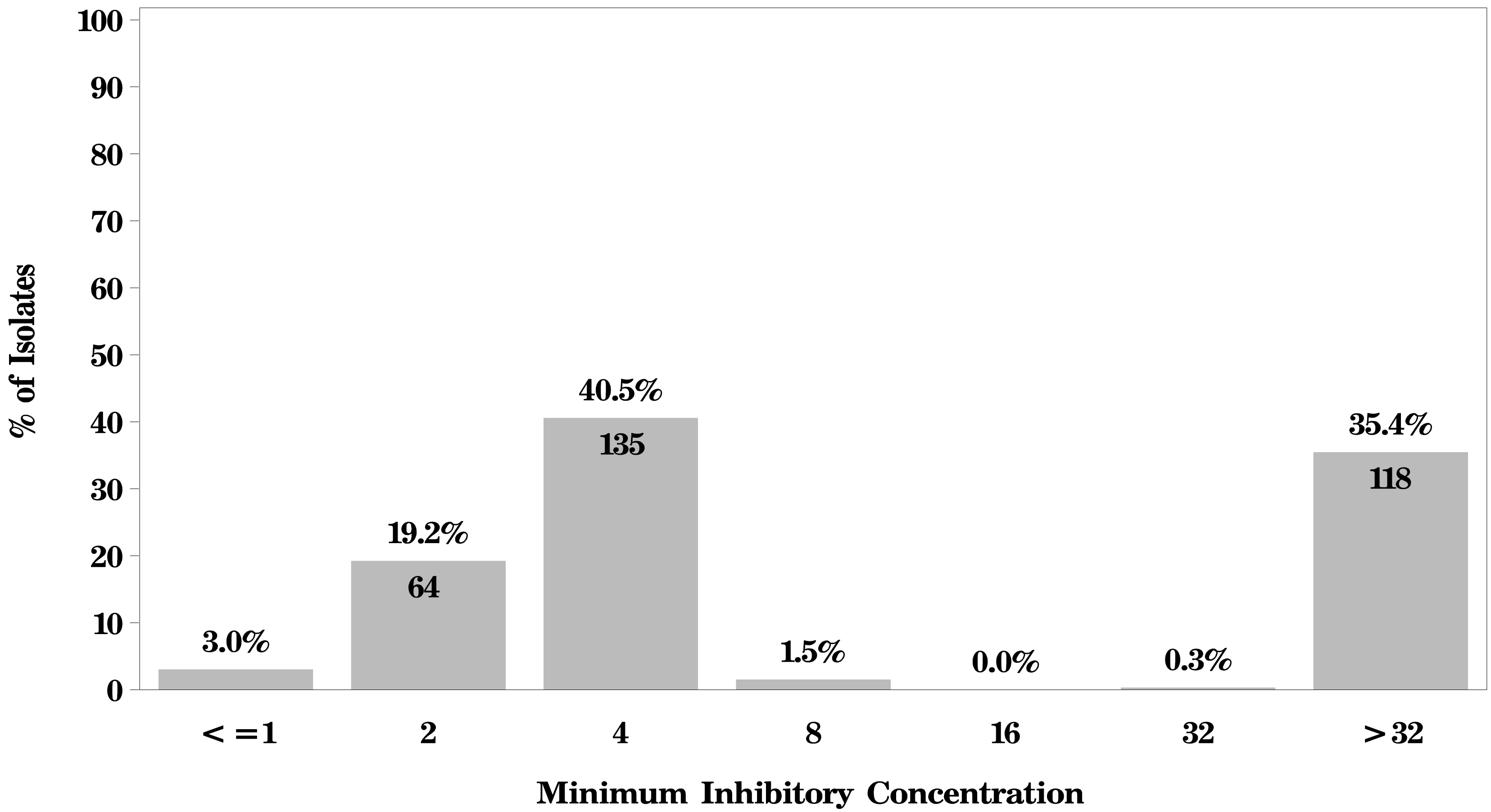


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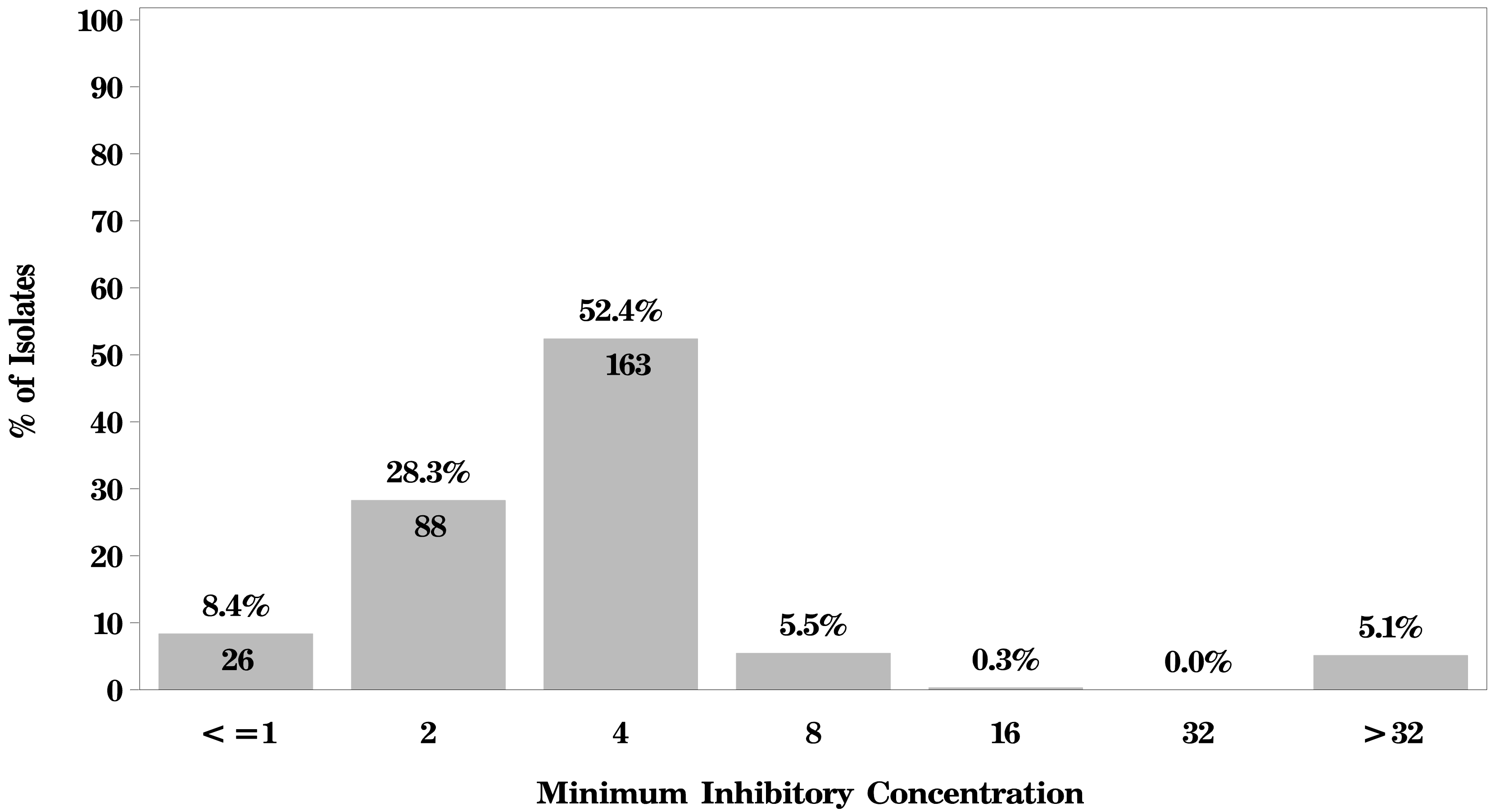
Figure 19c: Minimum Inhibitory Concentration of Ampicillin for *Escherichia coli* in Ground Beef (N=311 Isolates)

Breakpoints: Susceptible<=8 μg/mL Resistant>=32 μg/mL



NARMS

Figure 19c: Minimum Inhibitory Concentration of Ampicillin for *Escherichia coli* in Pork Chop (N=218 Isolates)
Breakpoints: Susceptible <=8 µg/mL Resistant >=32 µg/mL

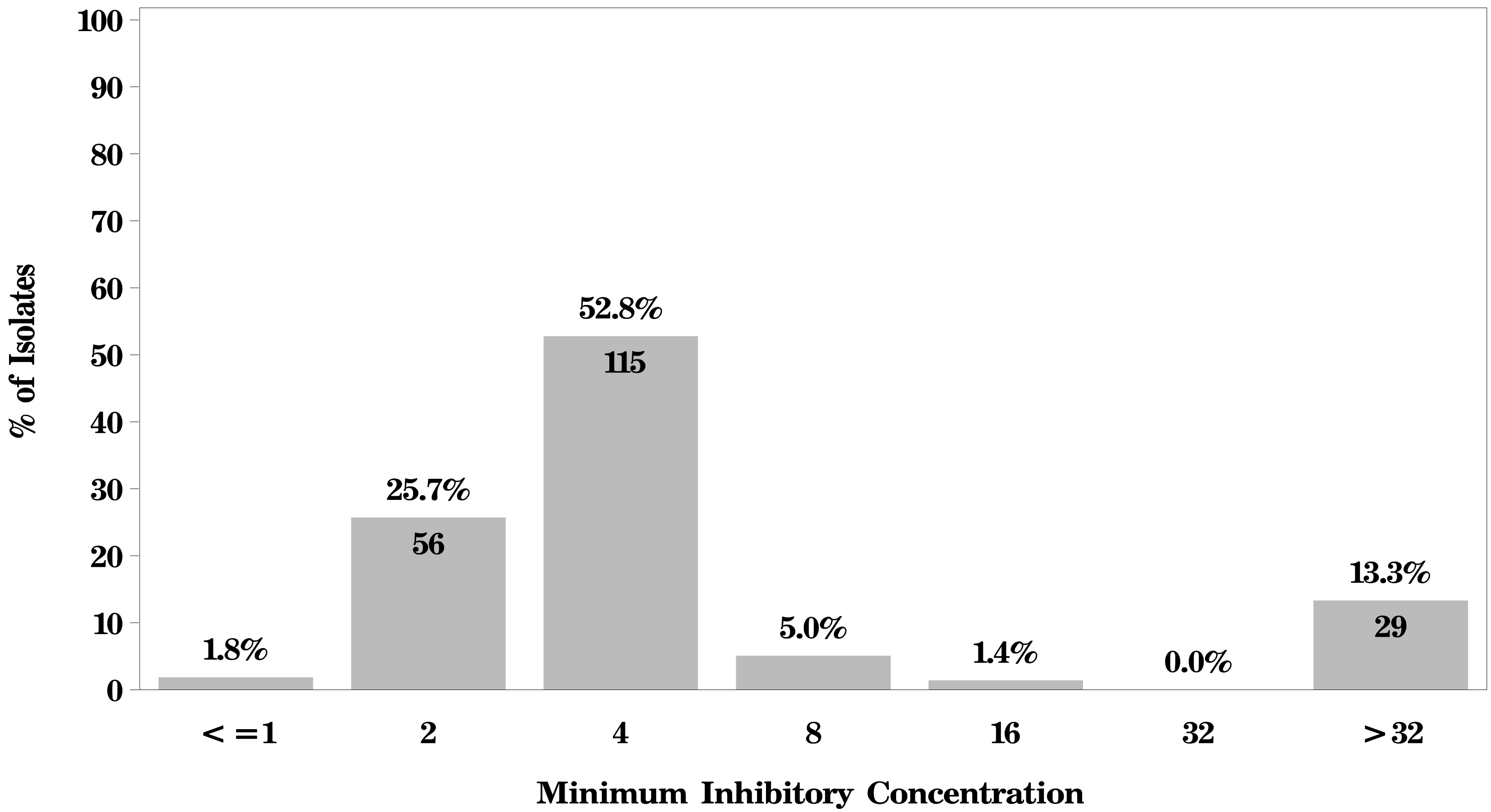


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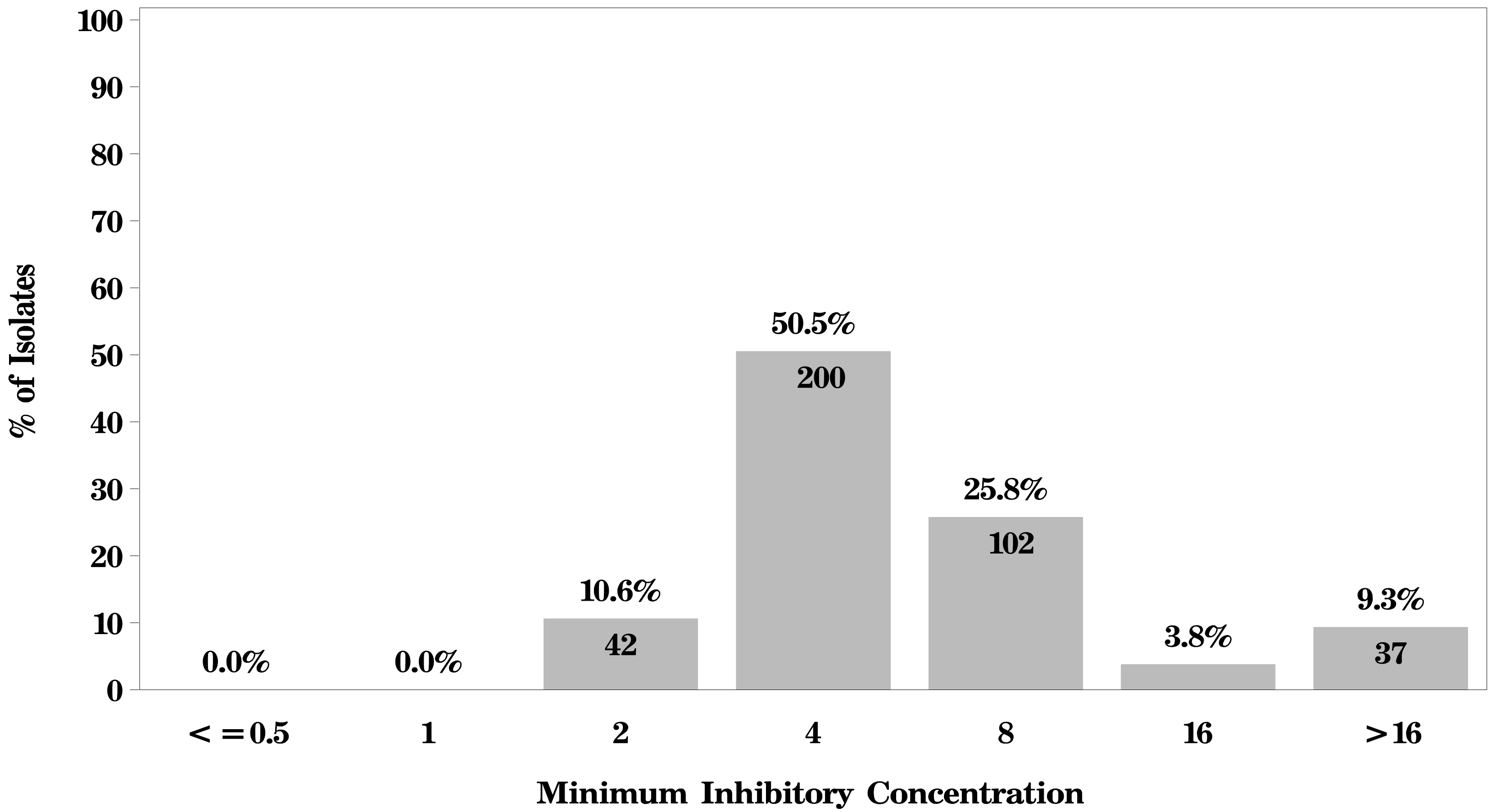
Figure 19d: Minimum Inhibitory Concentration of Cefoxitin for *Escherichia coli* in Chicken Breast (N=396 Isolates)

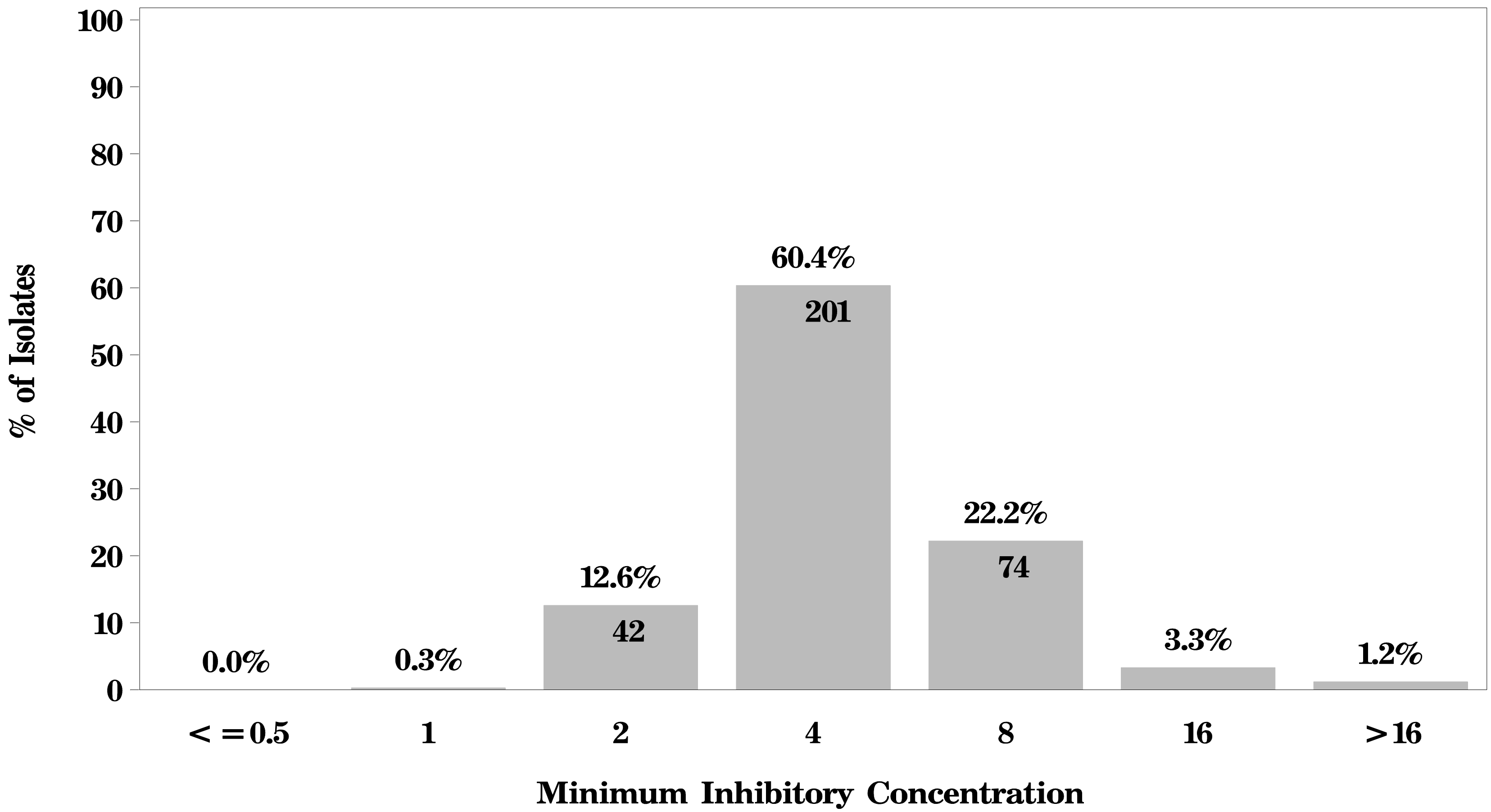
Breakpoints: Susceptible<=8 μg/mL Resistant>=32 μg/mL



NARMS

Figure 19d: Minimum Inhibitory Concentration of Cefoxitin for *Escherichia coli* in Ground Turkey (N=333 Isolates)

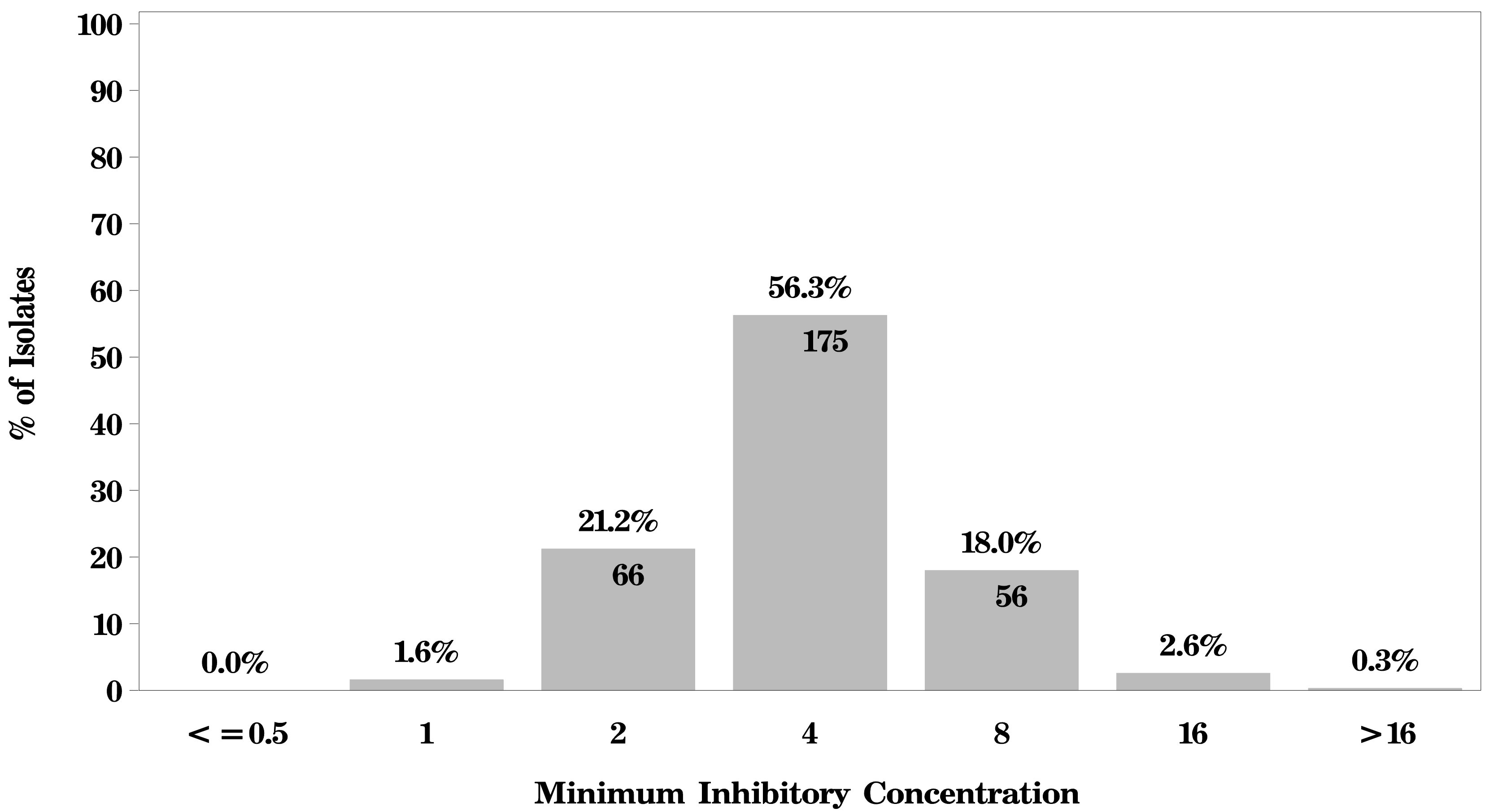
Breakpoints: Susceptible<=8 μg/mL Resistant>=32 μg/mL



NARMS

Figure 19d: Minimum Inhibitory Concentration of Cefoxitin for *Escherichia coli* in Ground Beef (N=311 Isolates)

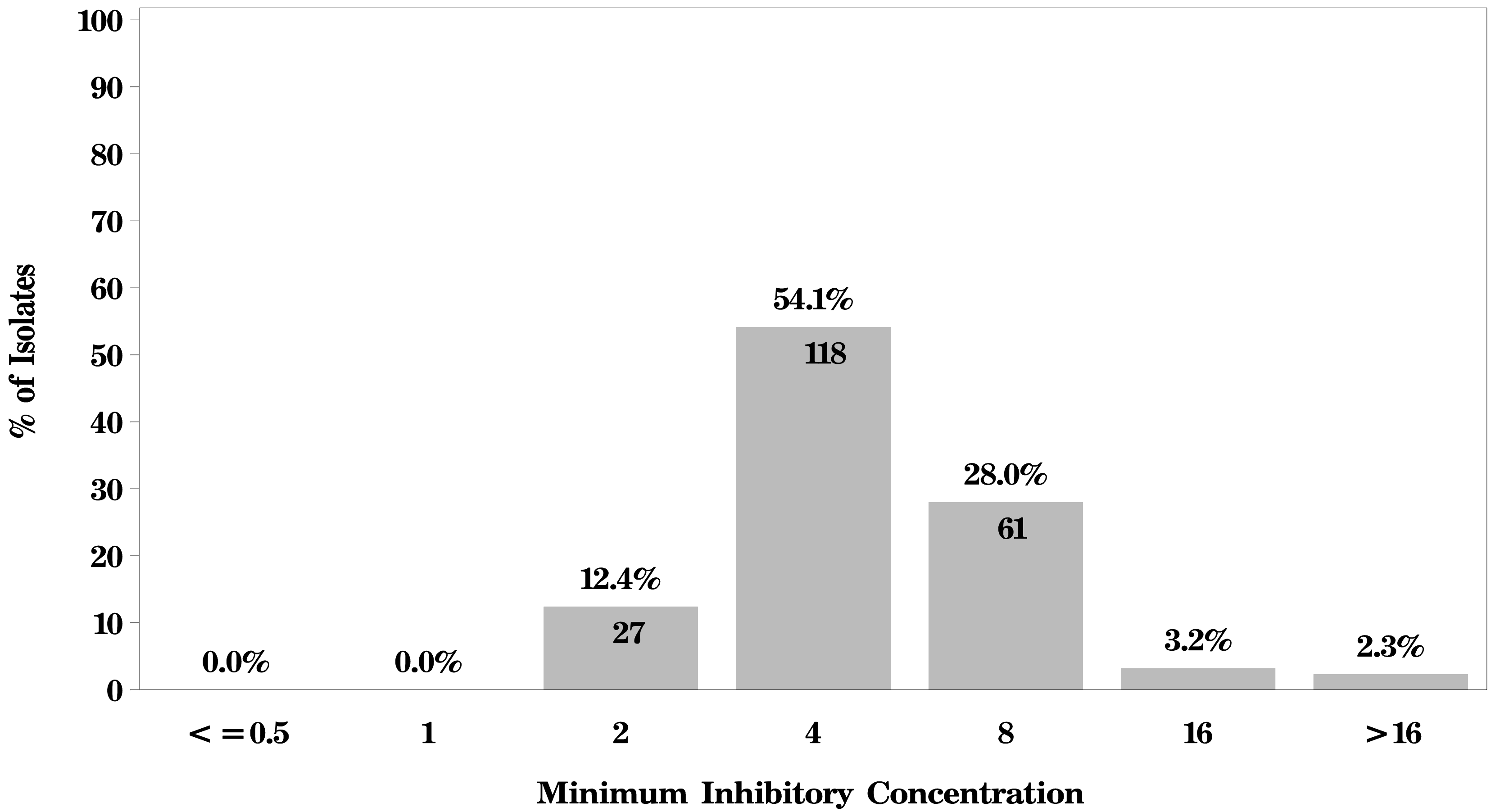
Breakpoints: Susceptible<=8 μg/mL Resistant>=32 μg/mL



NARMS

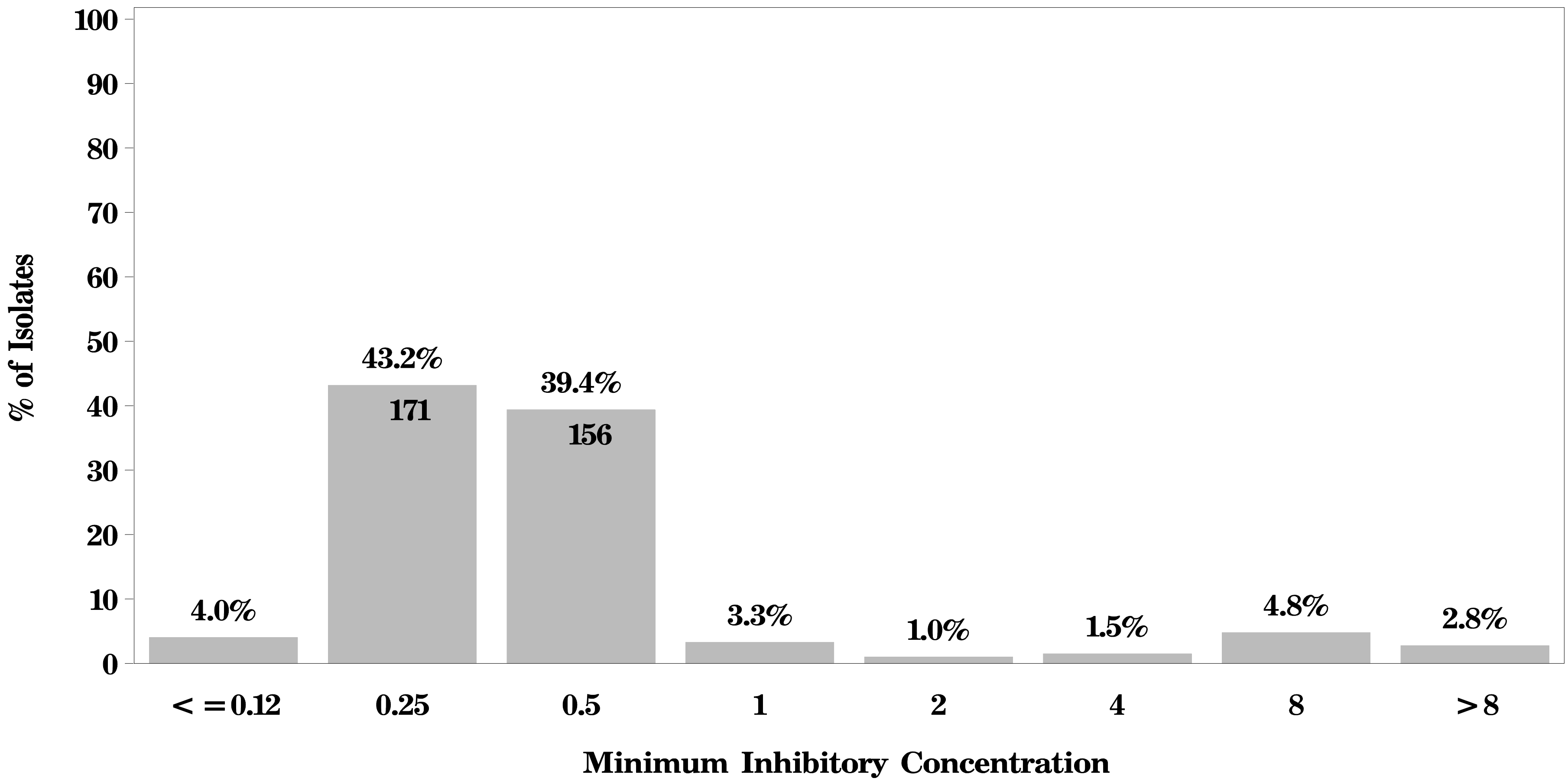
Figure 19d: Minimum Inhibitory Concentration of Cefoxitin for *Escherichia coli* in Pork Chop (N=218 Isolates)

Breakpoints: Susceptible<=8 μg/mL Resistant>=32 μg/mL



NARMS

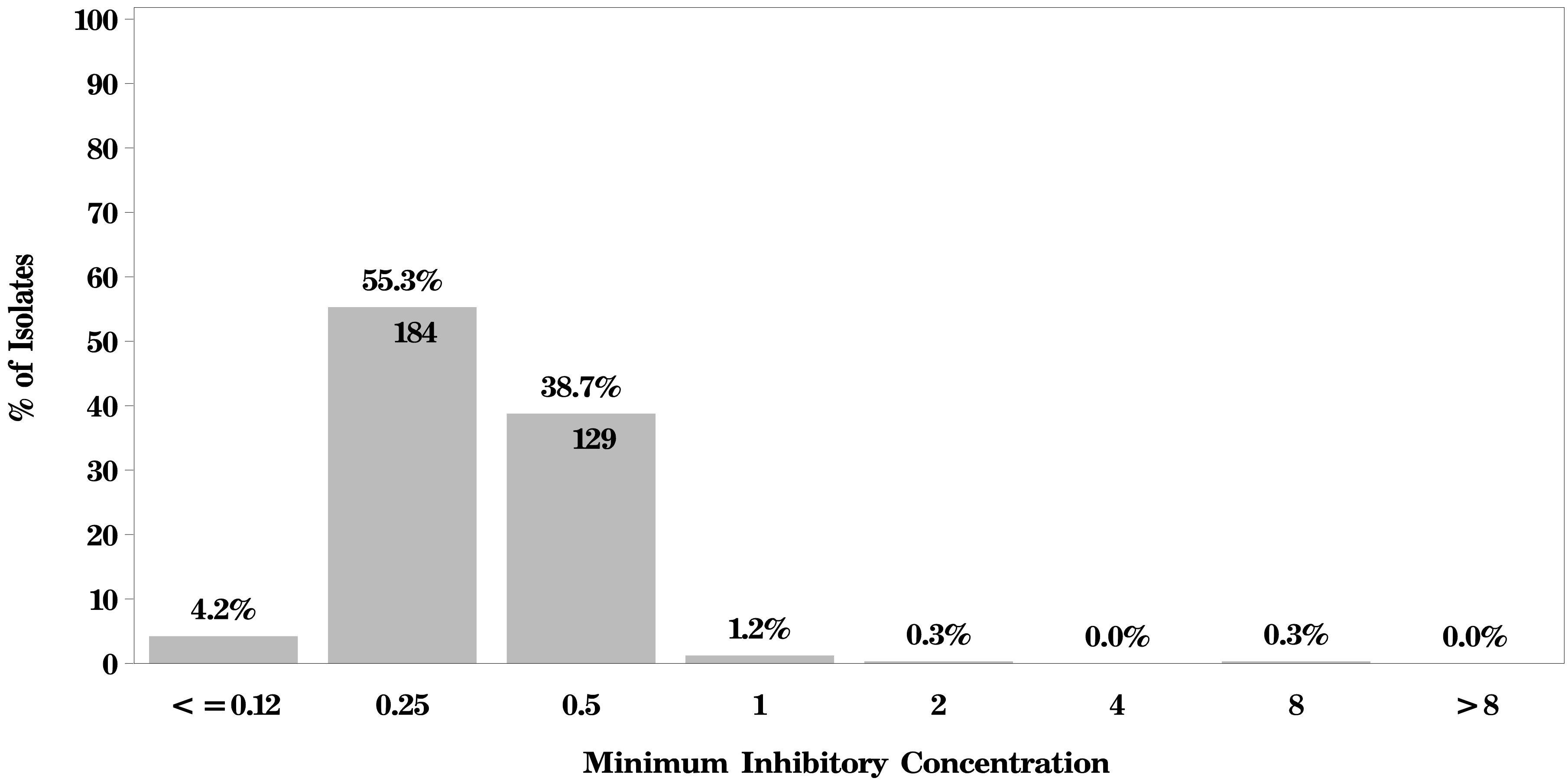
Figure 19e: Minimum Inhibitory Concentration of Ceftiofur for *Escherichia coli* in Chicken Breast (N=396 Isolates)
Breakpoints: Susceptible<=2 µg/mL Resistant>=8 µg/mL



NARMS

Figure 19e: Minimum Inhibitory Concentration of Ceftiofur for *Escherichia coli* in Ground Turkey (N=333 Isolates)

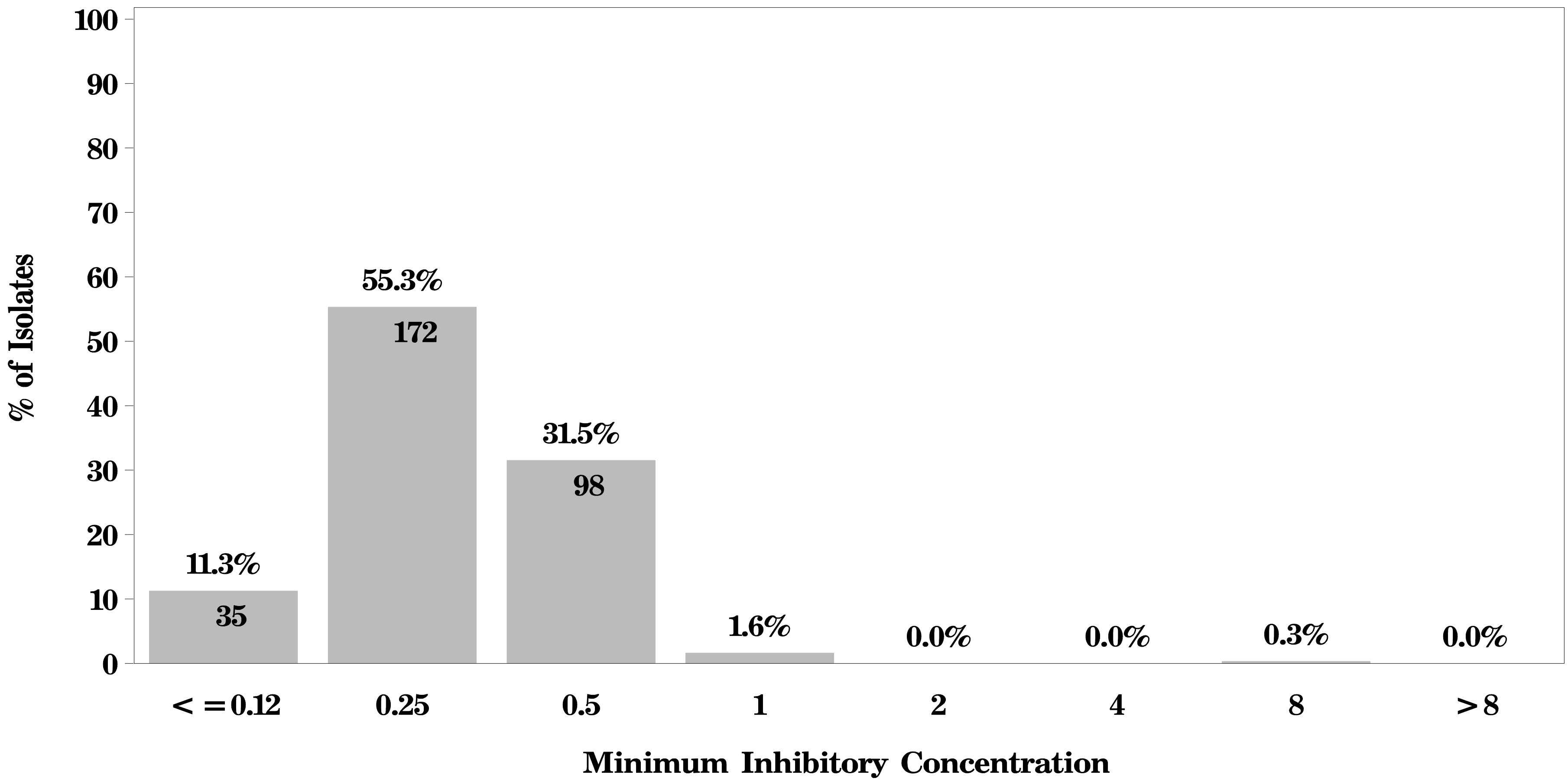
Breakpoints: Susceptible <=2 μg/mL Resistant >=8 μg/mL



NARMS

Figure 19e: Minimum Inhibitory Concentration of Ceftiofur for *Escherichia coli* in Ground Beef (N=311 Isolates)

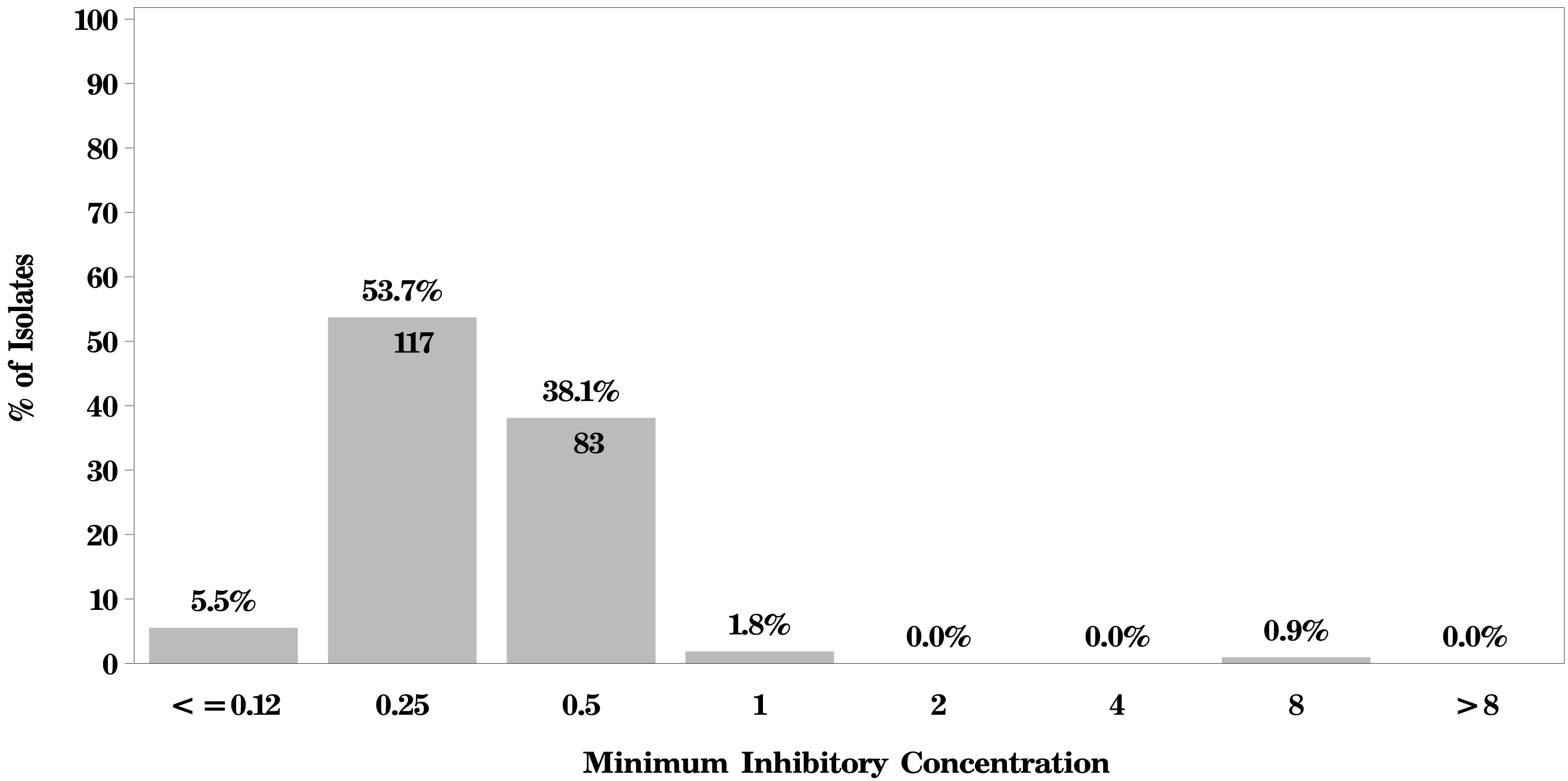
Breakpoints: Susceptible <=2 μg/mL Resistant >=8 μg/mL



NARMS

Figure 19e: Minimum Inhibitory Concentration of Ceftiofur for *Escherichia coli* in Pork Chop (N=218 Isolates)

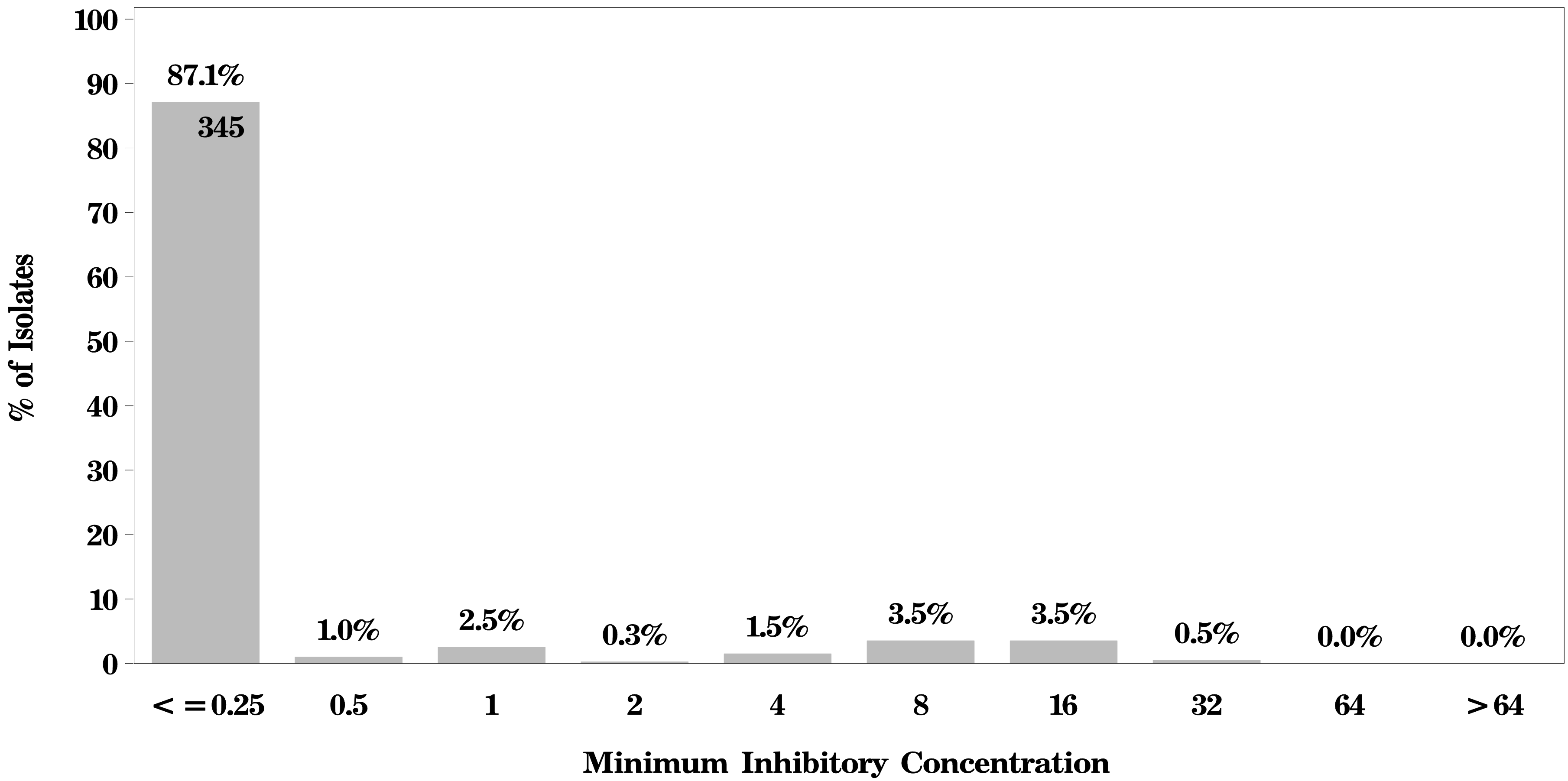
Breakpoints: Susceptible <=2 µg/mL Resistant >=8 µg/mL



NARMS

Figure 19f: Minimum Inhibitory Concentration of Ceftriaxone for *Escherichia coli* in Chicken Breast (N=396 Isolates)

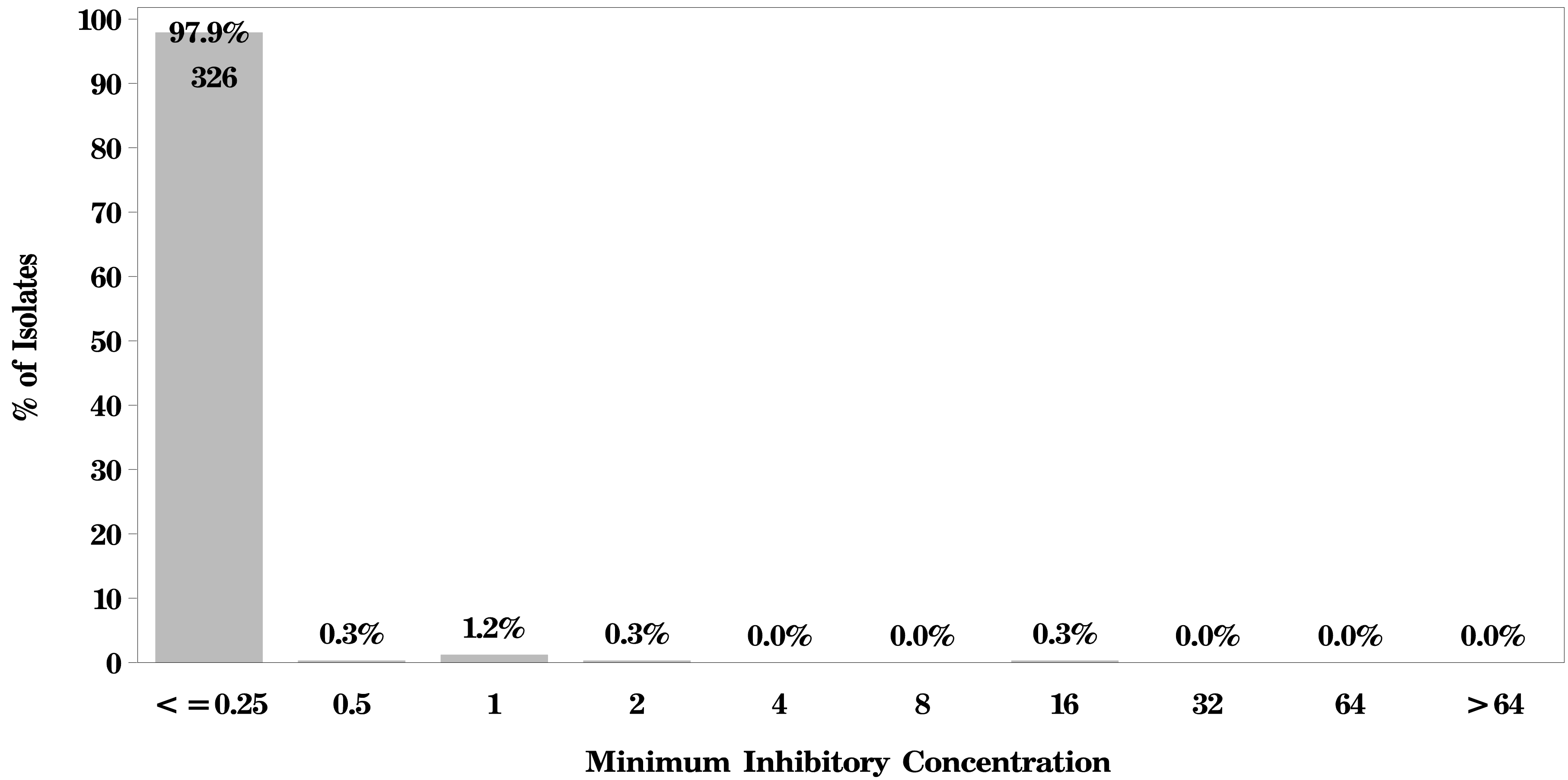
Breakpoints: Susceptible<=8 μg/mL Resistant>=64 μg/mL



NARMS

Figure 19f: Minimum Inhibitory Concentration of Ceftriaxone for *Escherichia coli* in Ground Turkey (N=333 Isolates)

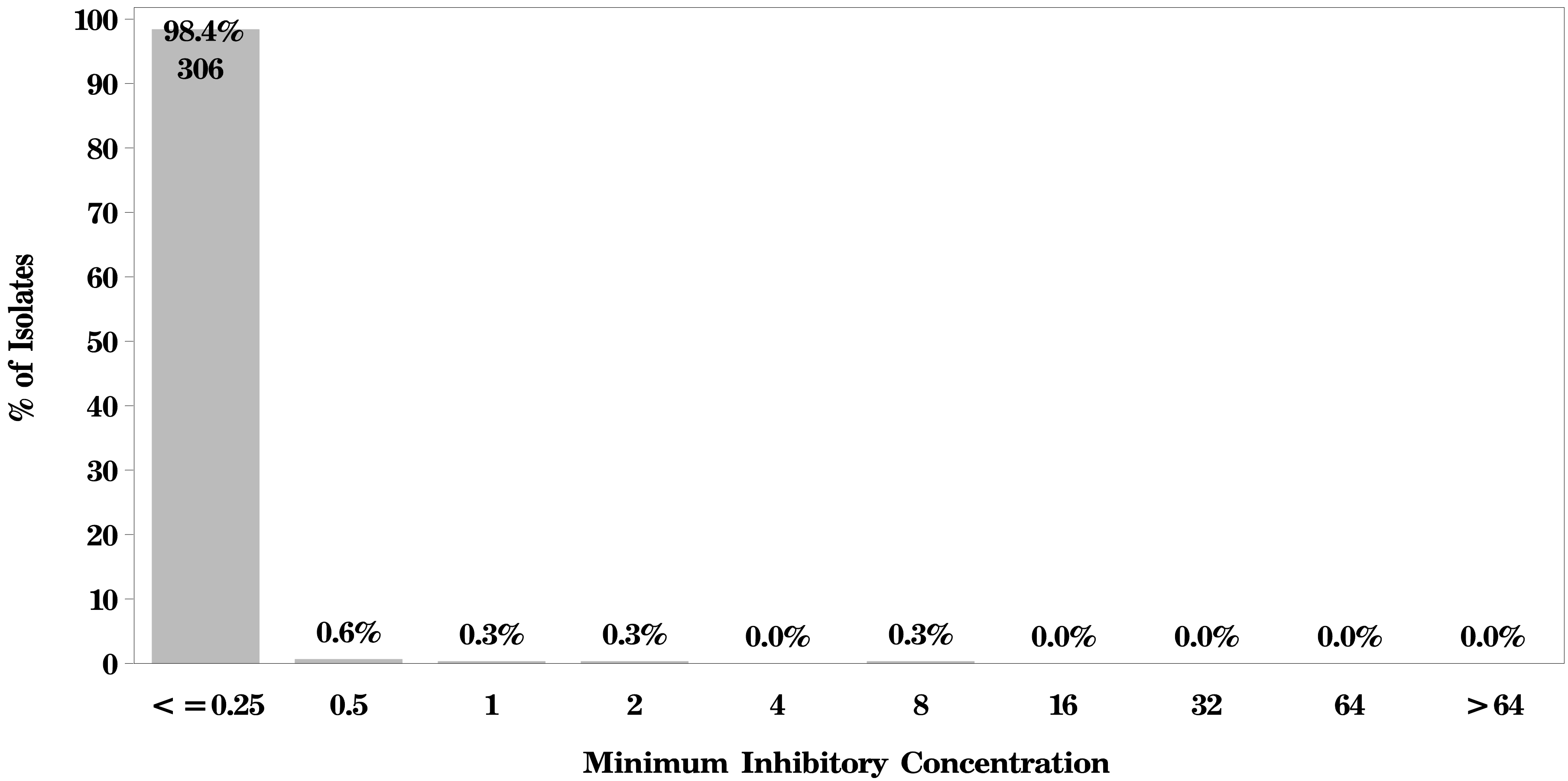
Breakpoints: Susceptible <=8 µg/mL Resistant >=64 µg/mL



NARMS

Figure 19f: Minimum Inhibitory Concentration of Ceftriaxone for *Escherichia coli* in Ground Beef (N=311 Isolates)

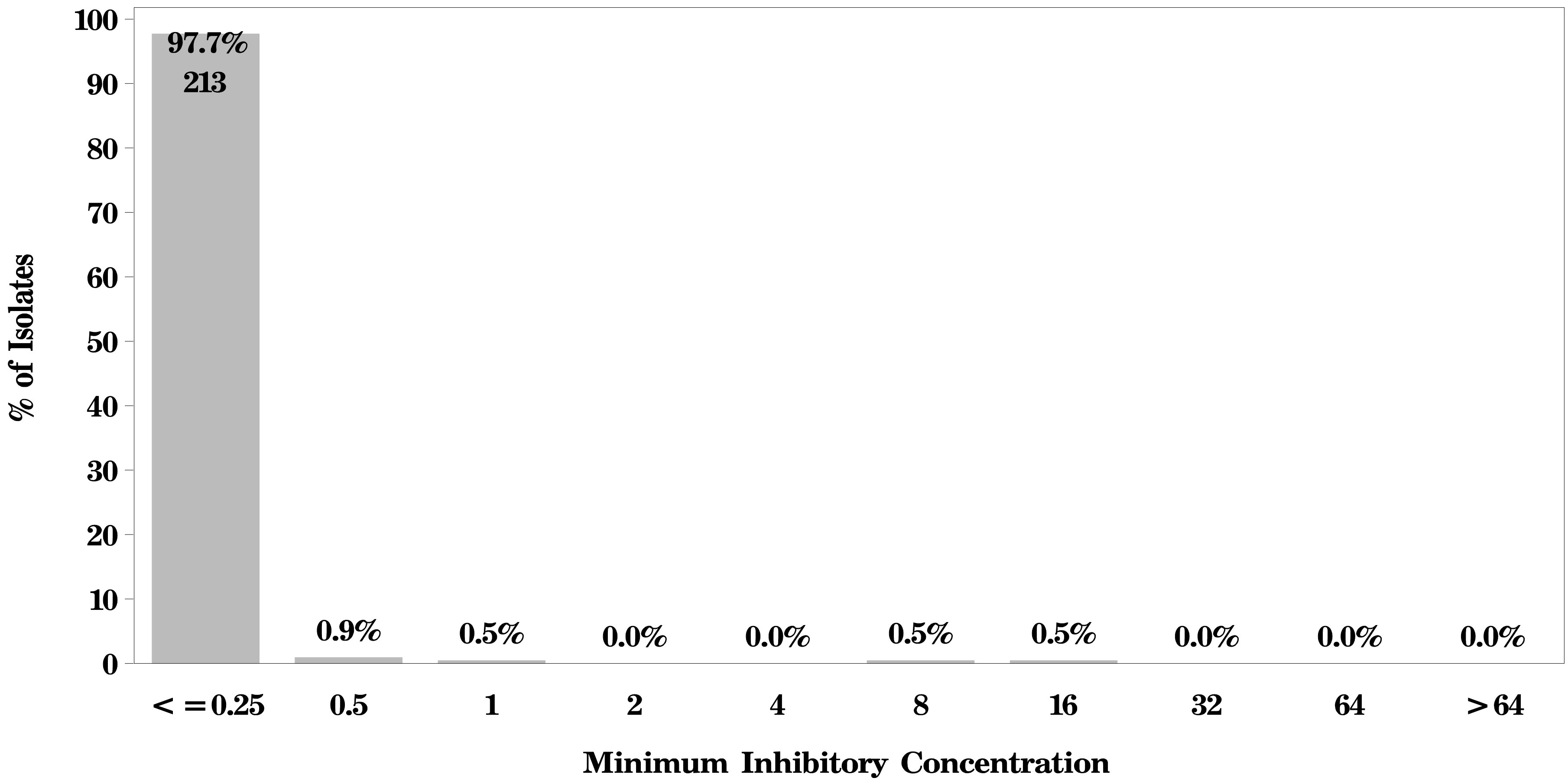
Breakpoints: Susceptible <=8 μg/mL Resistant >=64 μg/mL



NARMS

Figure 19f: Minimum Inhibitory Concentration of Ceftriaxone for *Escherichia coli* in Pork Chop (N=218 Isolates)

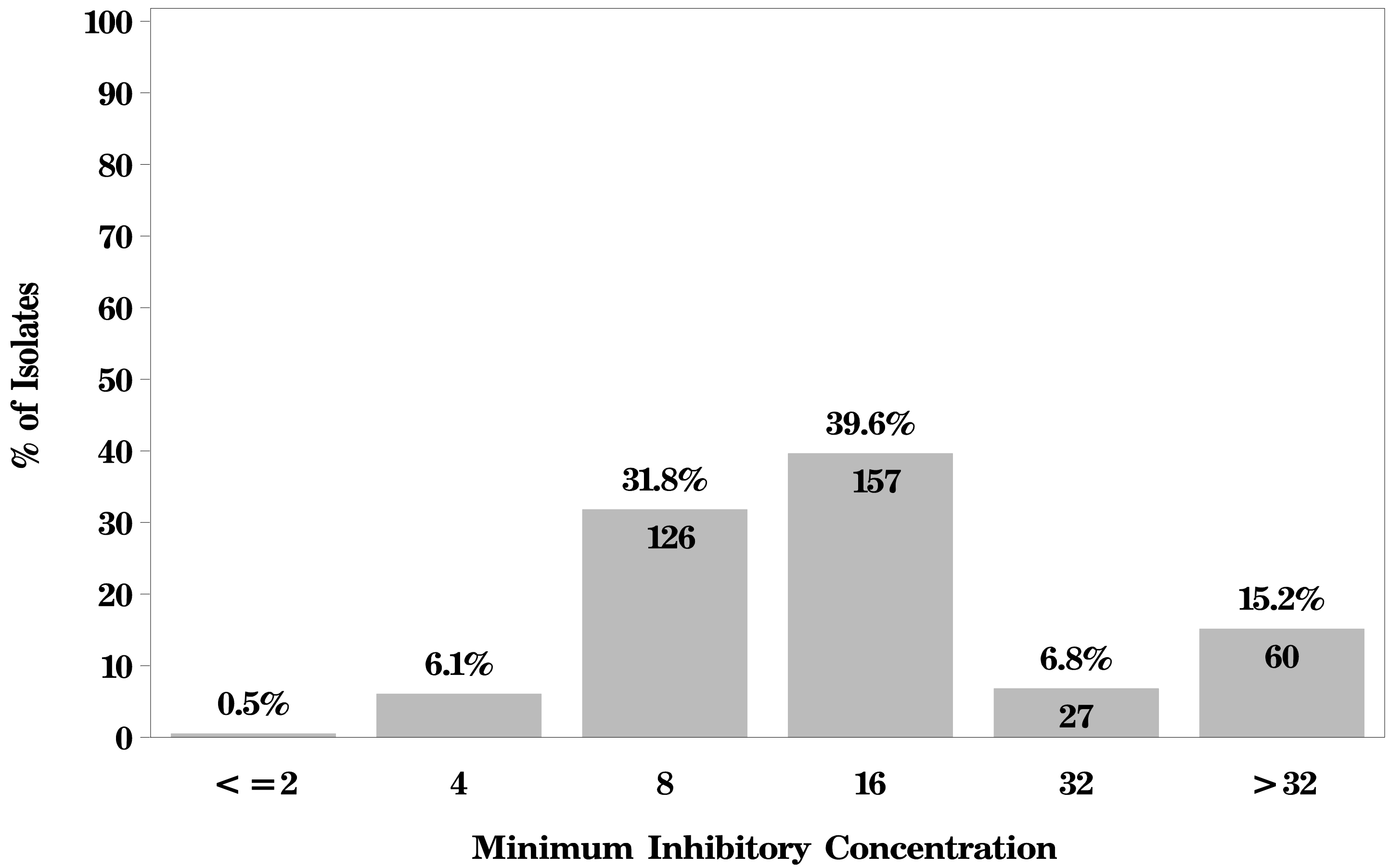
Breakpoints: Susceptible <=8 μg/mL Resistant >=64 μg/mL



NARMS

Figure 19g: Minimum Inhibitory Concentration of Cephalothin for *Escherichia coli* in Chicken Breast (N=396 Isolates)

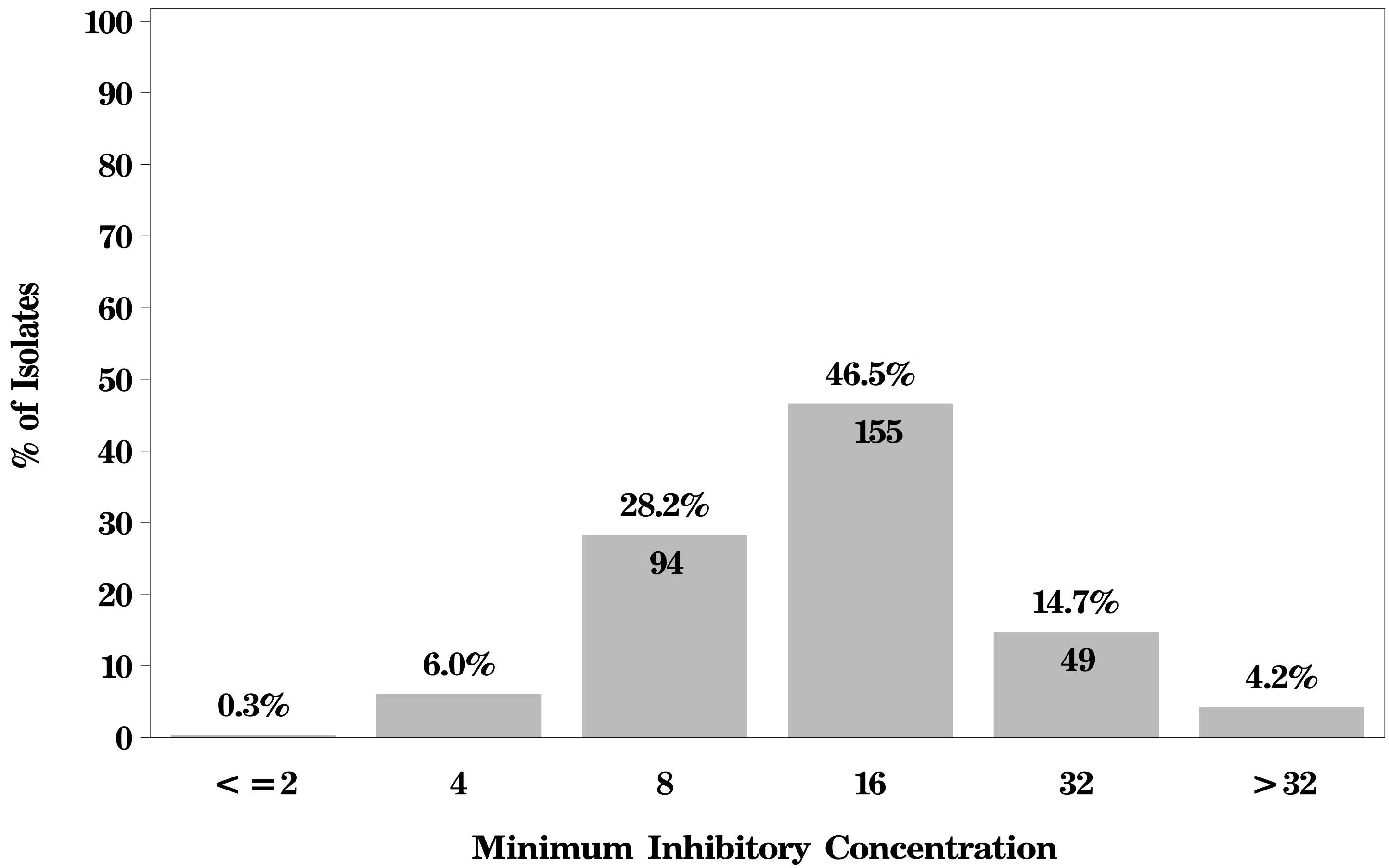
Breakpoints: Susceptible <=8 µg/mL Resistant >=32 µg/mL



NARMS

Figure 19g: Minimum Inhibitory Concentration of Cephalothin for *Escherichia coli* in Ground Turkey (N=333 Isolates)

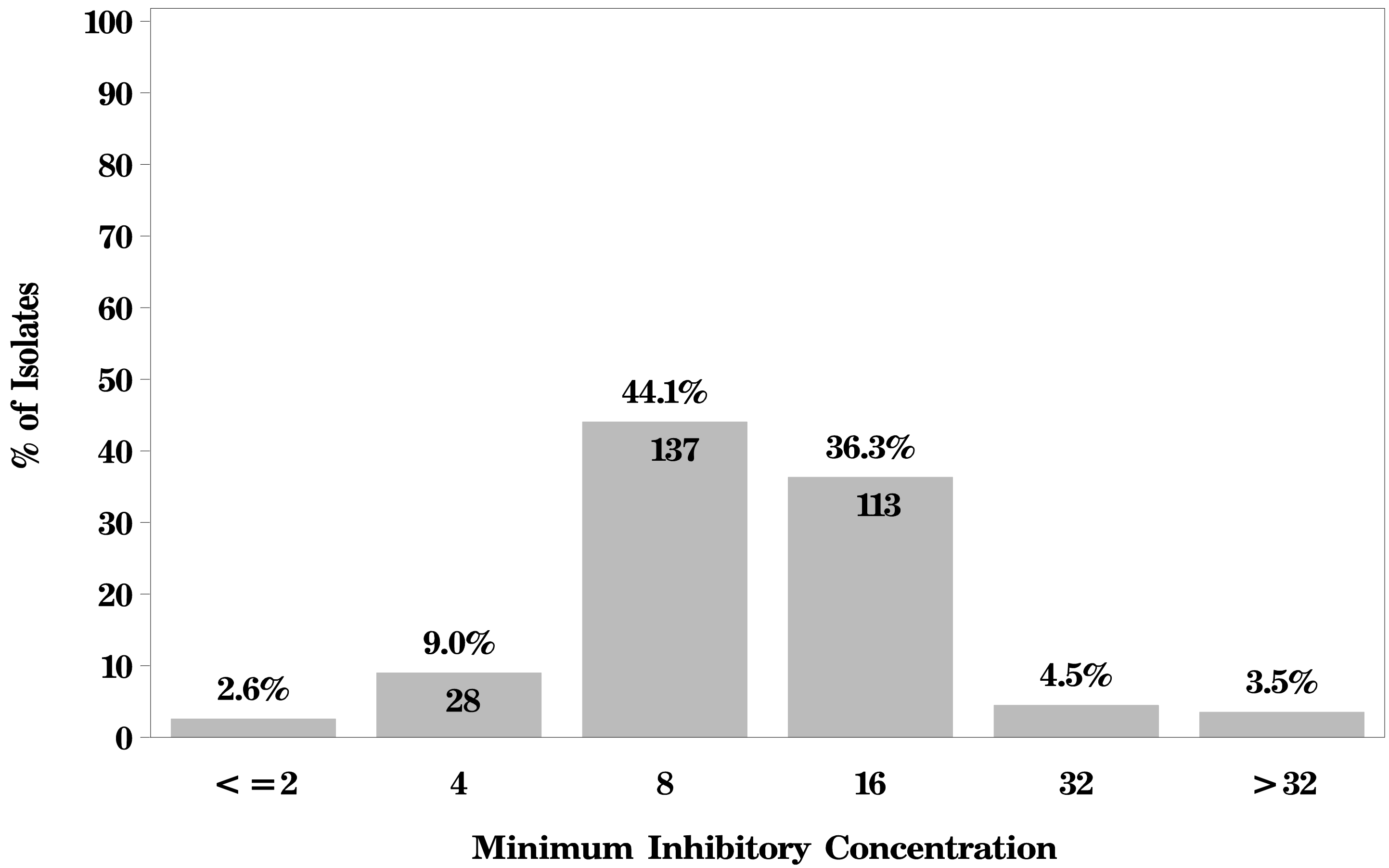
Breakpoints: Susceptible<=8 µg/mL Resistant>=32 µg/mL



NARMS

Figure 19g: Minimum Inhibitory Concentration of Cephalothin for *Escherichia coli* in Ground Beef (N=311 Isolates)

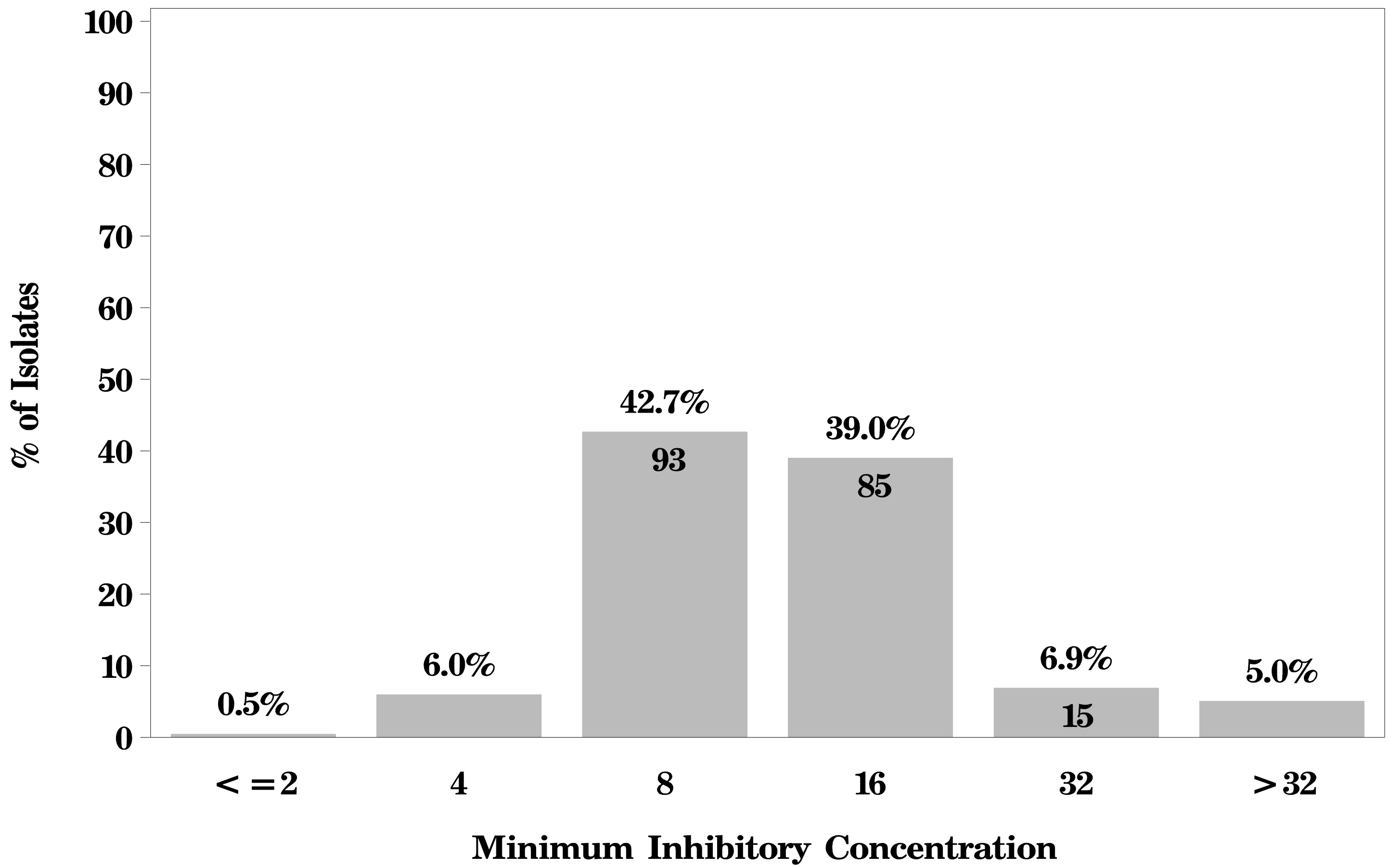
Breakpoints: Susceptible <=8 µg/mL Resistant >=32 µg/mL



NARMS

Figure 19g: Minimum Inhibitory Concentration of Cephalothin for *Escherichia coli* in Pork Chop (N=218 Isolates)

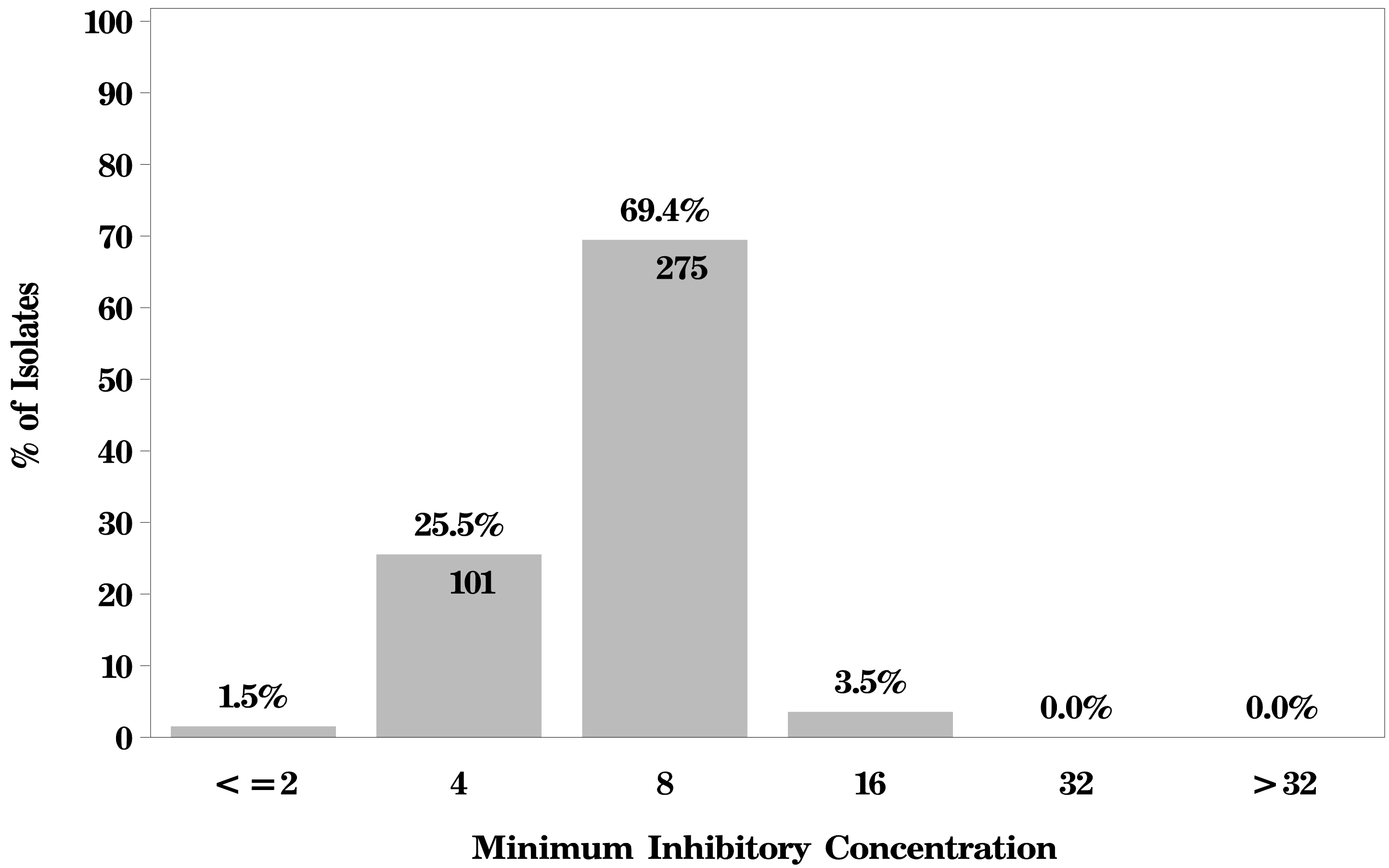
Breakpoints: Susceptible <=8 μg/mL Resistant >=32 μg/mL



NARMS

Figure 19h: Minimum Inhibitory Concentration of Chloramphenicol for *Escherichia coli* in Chicken Breast (N=396 Isolates)

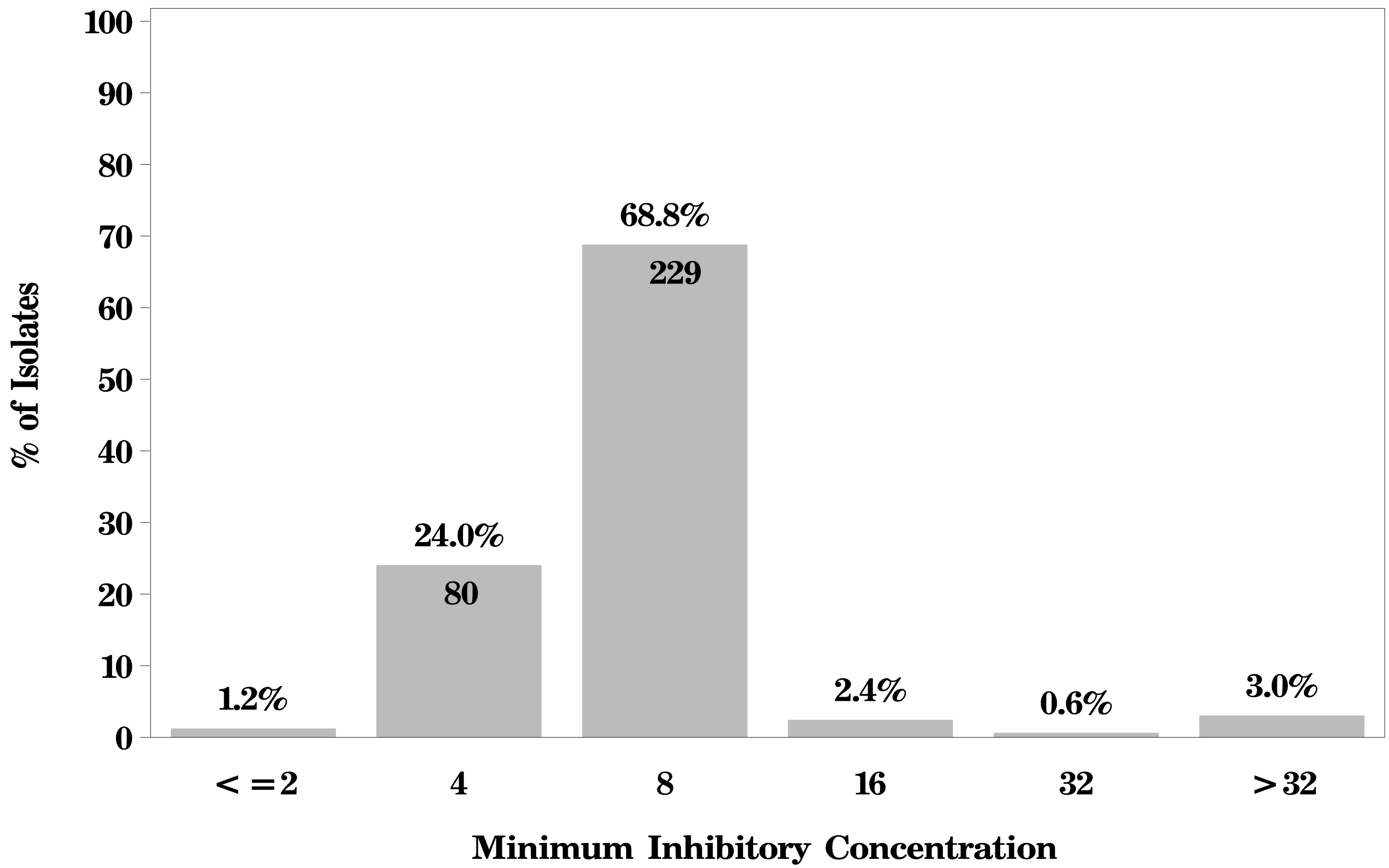
Breakpoints: Susceptible <=8 µg/mL Resistant >=32 µg/mL



NARMS

Figure 19h: Minimum Inhibitory Concentration of Chloramphenicol for *Escherichia coli* in Ground Turkey (N=333 Isolates)

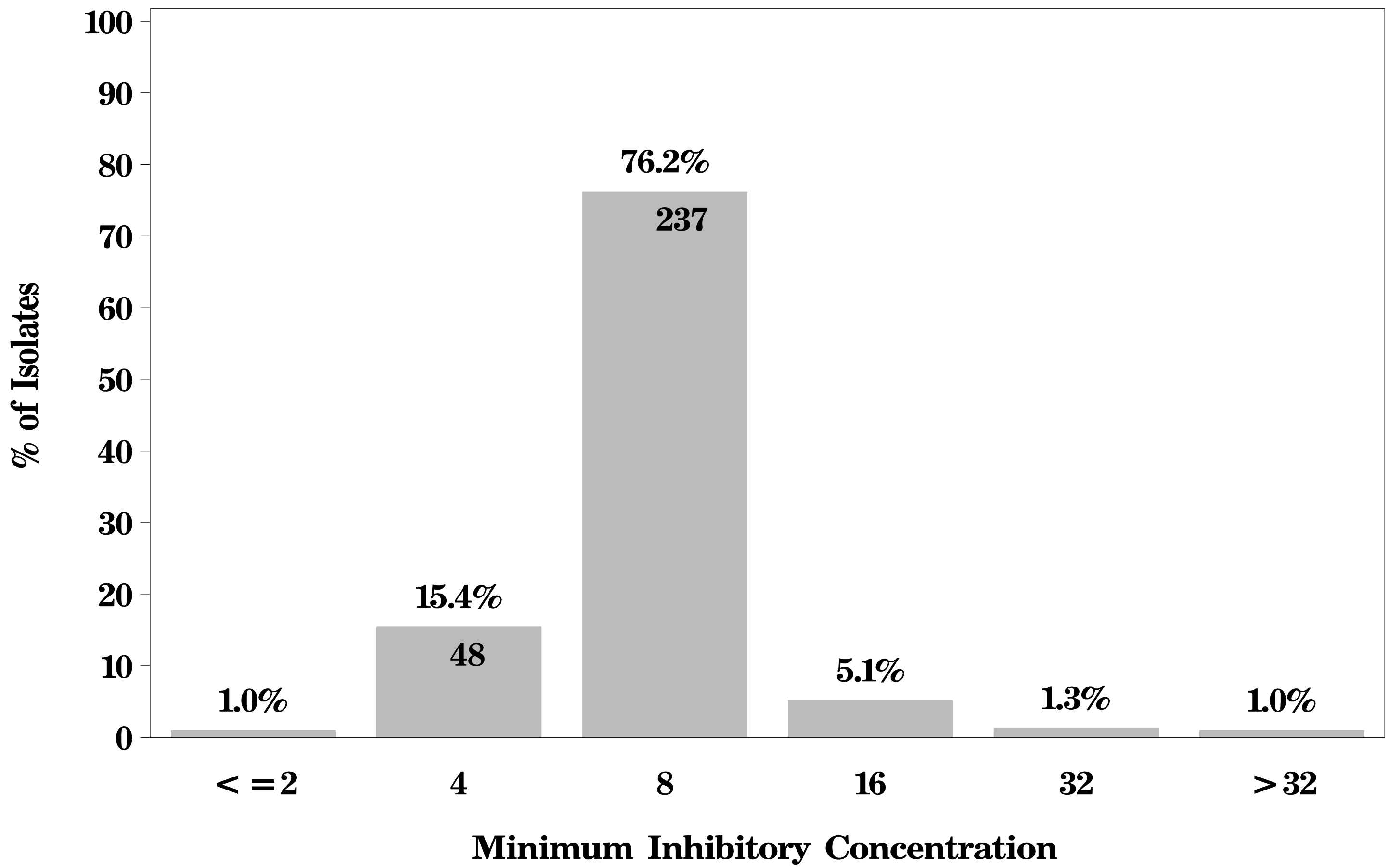
Breakpoints: Susceptible <=8 µg/mL Resistant >=32 µg/mL



NARMS

Figure 19h: Minimum Inhibitory Concentration of Chloramphenicol for *Escherichia coli* in Ground Beef (N=311 Isolates)

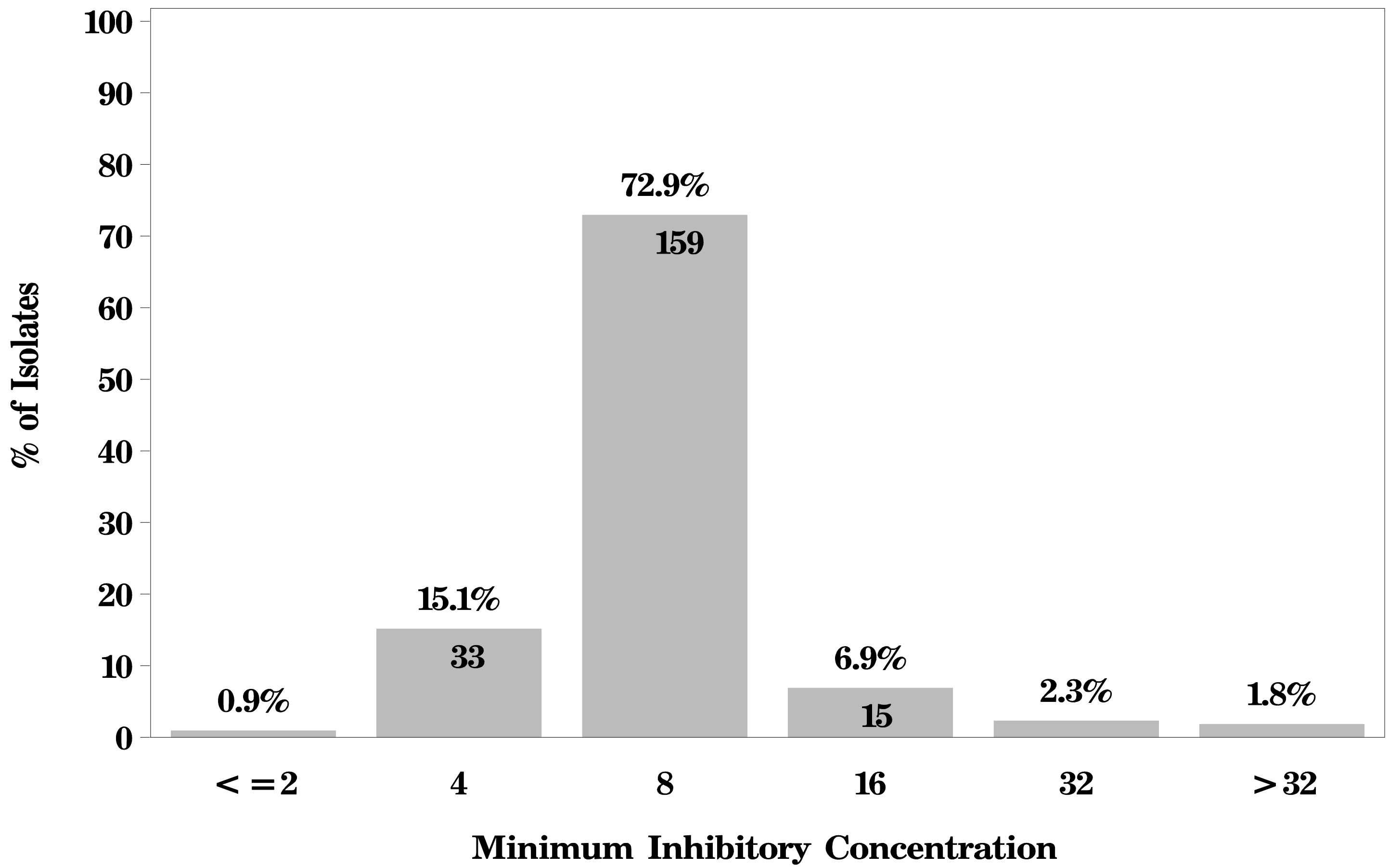
Breakpoints: Susceptible <=8 μg/mL Resistant >=32 μg/mL



NARMS

Figure 19h: Minimum Inhibitory Concentration of Chloramphenicol for *Escherichia coli* in Pork Chop (N=218 Isolates)

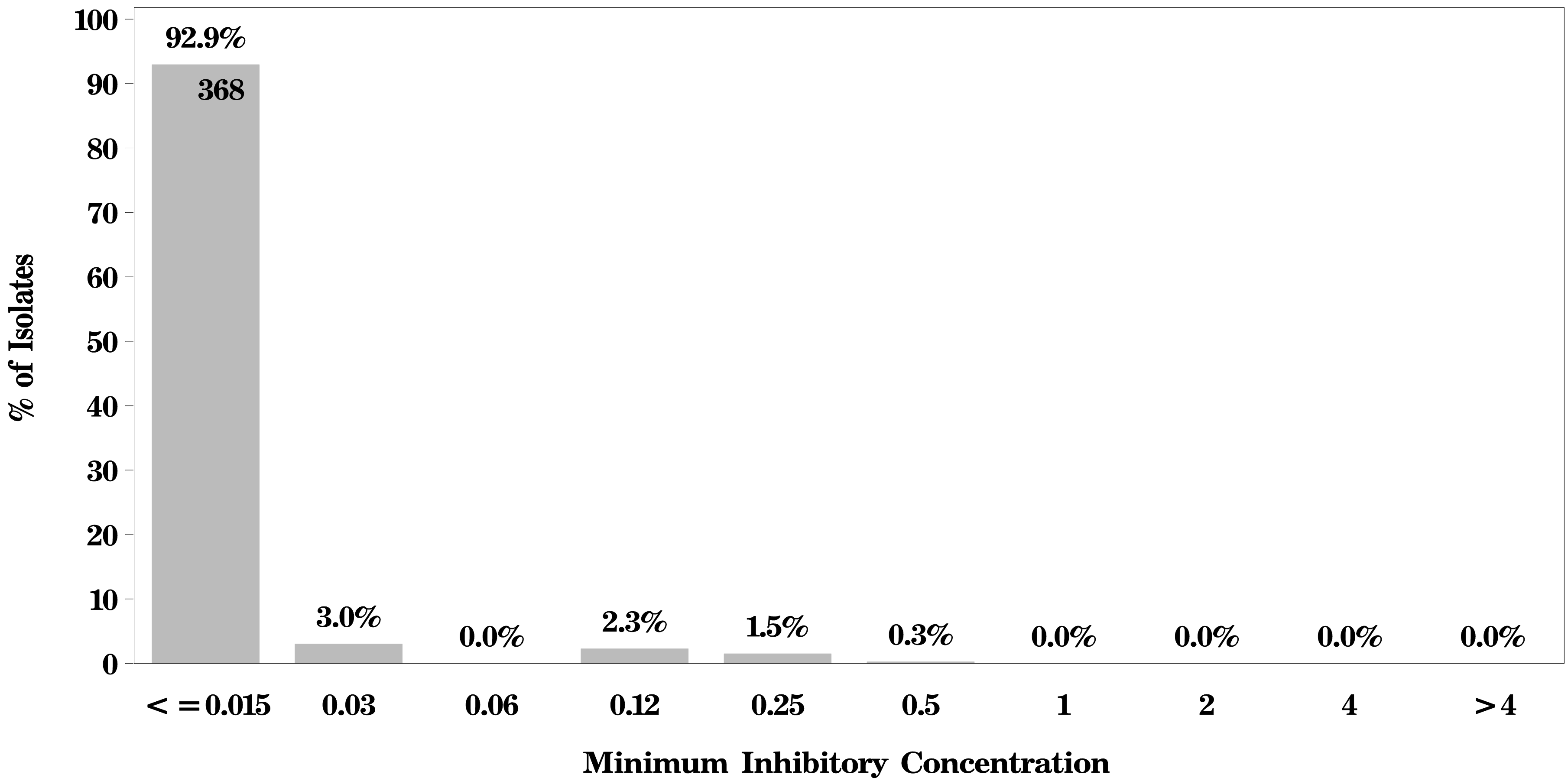
Breakpoints: Susceptible <=8 μg/mL Resistant >=32 μg/mL



NARMS

Figure 19i: Minimum Inhibitory Concentration of Ciprofloxacin for *Escherichia coli* in Chicken Breast (N=396 Isolates)

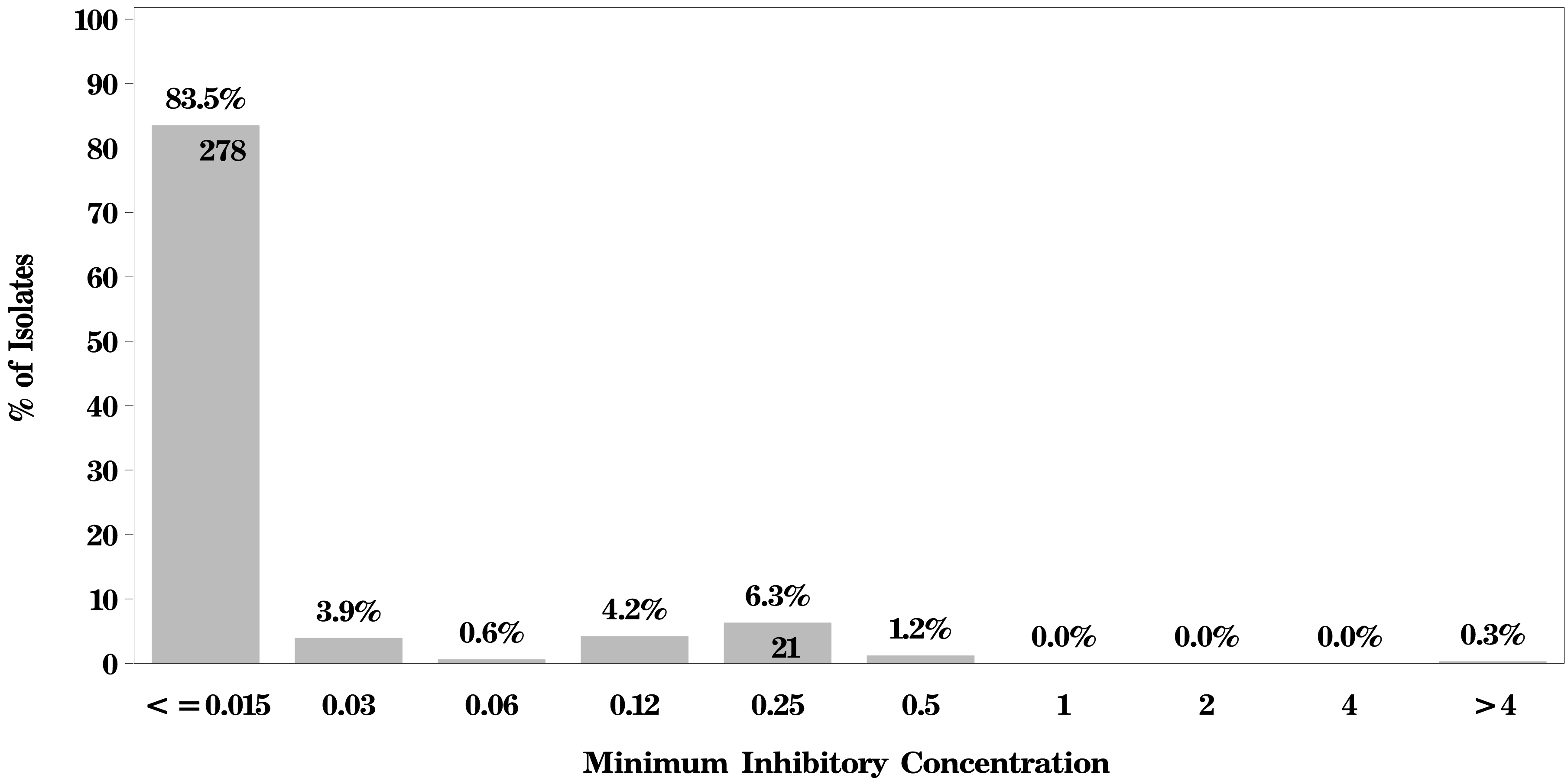
Breakpoints: Susceptible <=1 µg/mL Resistant >=4 µg/mL



NARMS

Figure 19i: Minimum Inhibitory Concentration of Ciprofloxacin for *Escherichia coli* in Ground Turkey (N=333 Isolates)

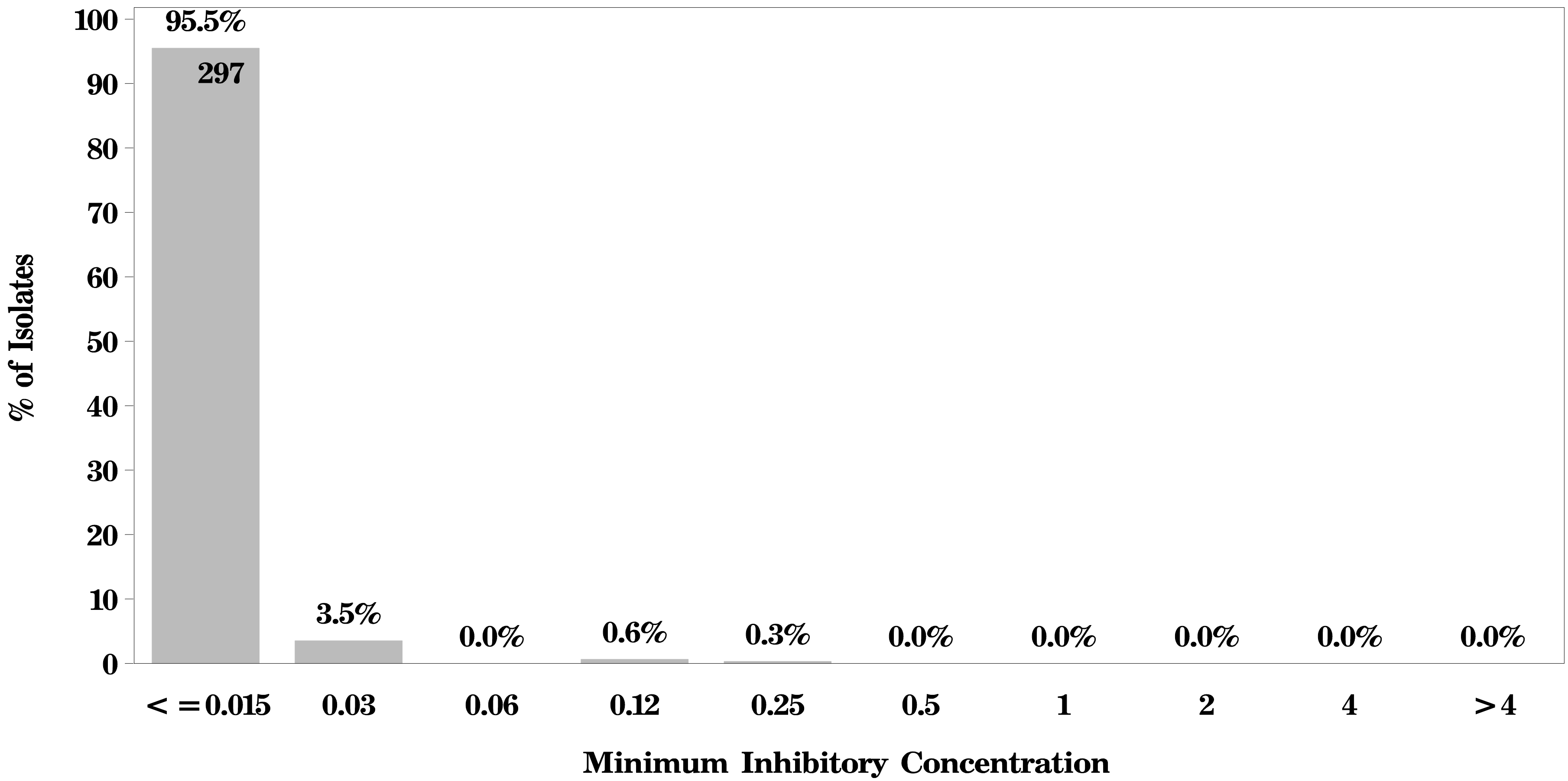
Breakpoints: Susceptible <=1 μg/mL Resistant >=4 μg/mL



NARMS

Figure 19i: Minimum Inhibitory Concentration of Ciprofloxacin for *Escherichia coli* in Ground Beef (N=311 Isolates)

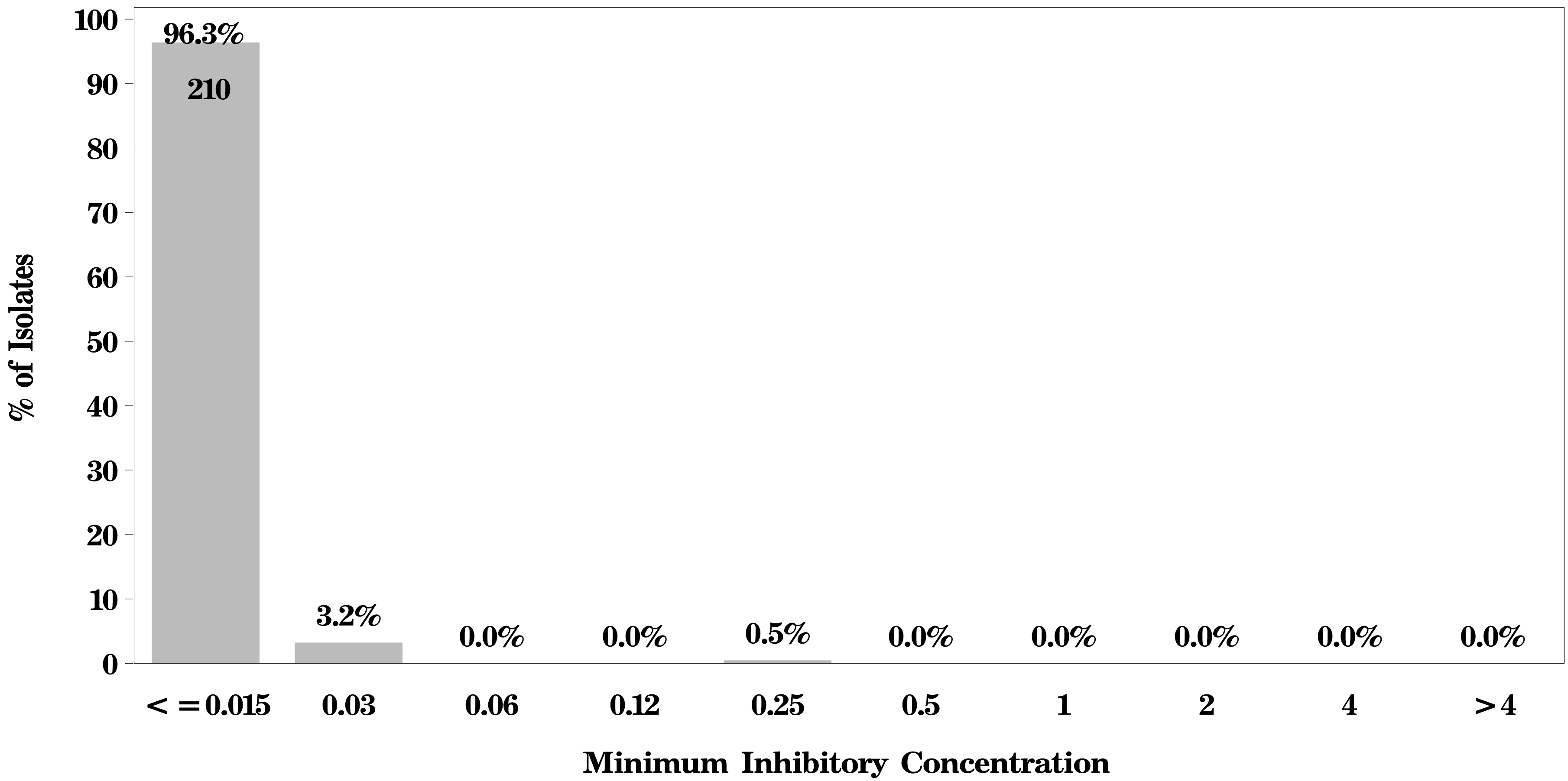
Breakpoints: Susceptible <=1 μg/mL Resistant >=4 μg/mL



NARMS

Figure 19i: Minimum Inhibitory Concentration of Ciprofloxacin for *Escherichia coli* in Pork Chop (N=218 Isolates)

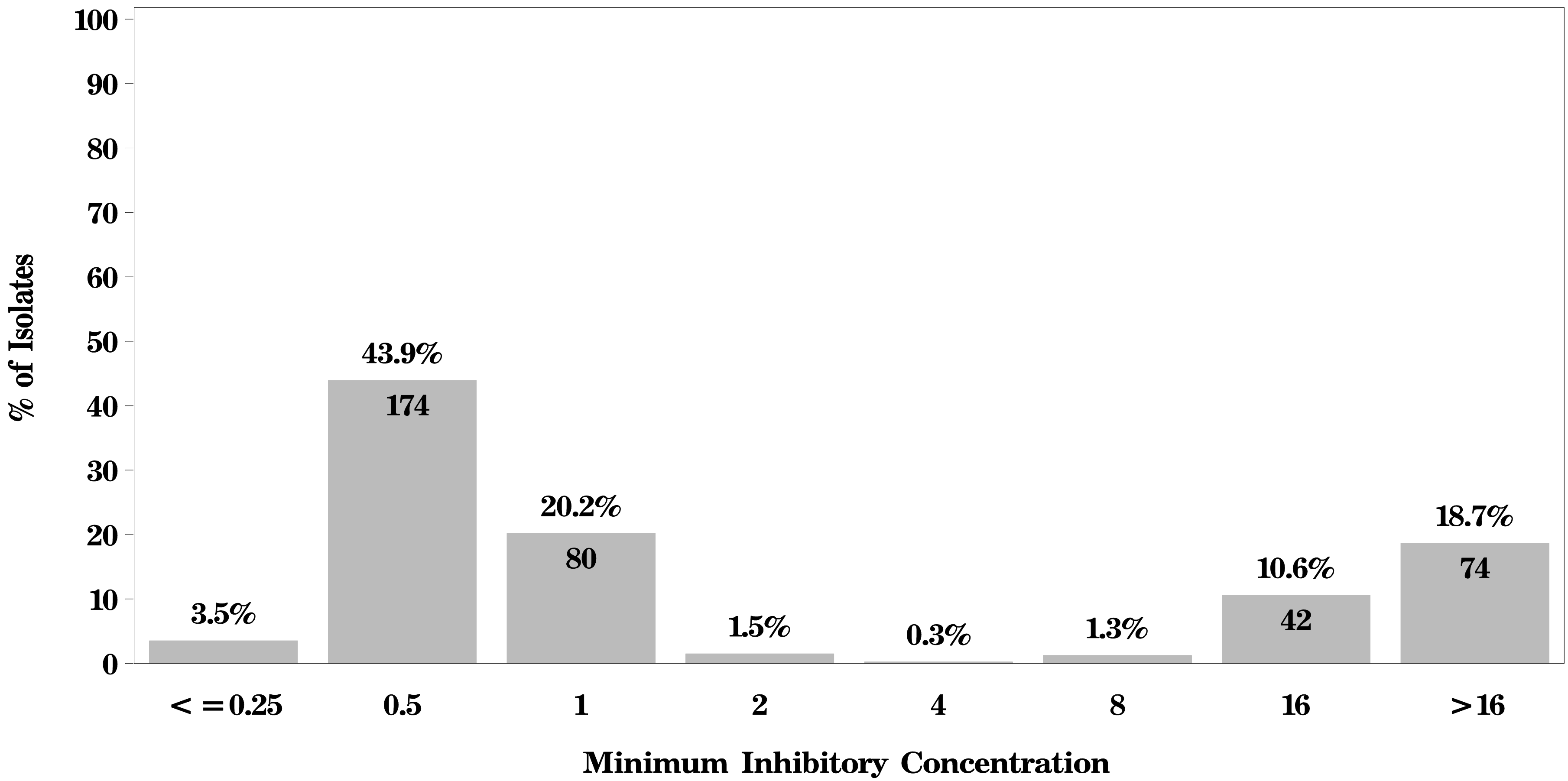
Breakpoints: Susceptible <=1 μg/mL Resistant >=4 μg/mL



NARMS

Figure 19j: Minimum Inhibitory Concentration of Gentamicin for *Escherichia coli* in Chicken Breast (N=396 Isolates)

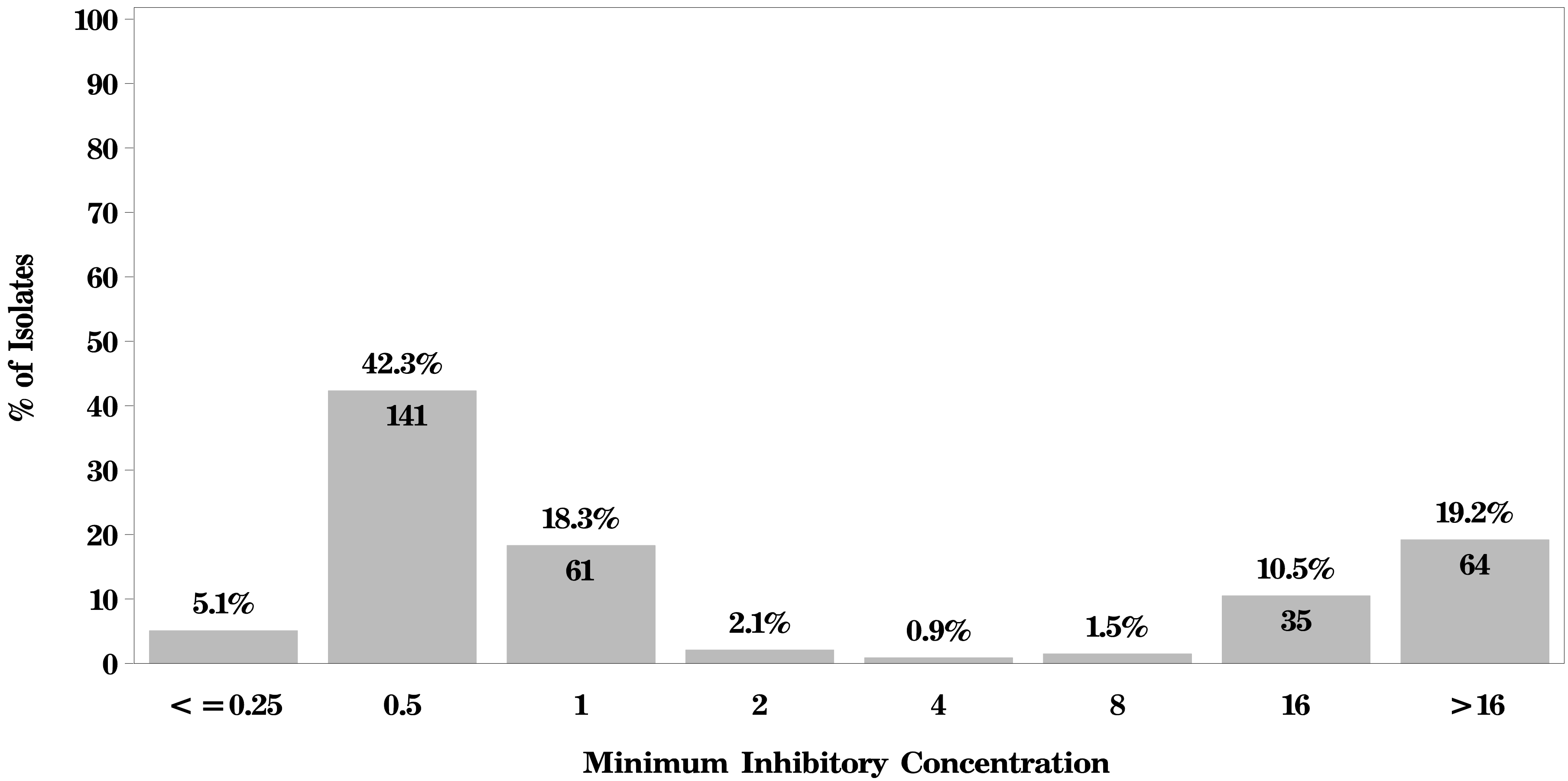
Breakpoints: Susceptible <=4 µg/mL Resistant >=16 µg/mL



NARMS

Figure 19j: Minimum Inhibitory Concentration of Gentamicin for *Escherichia coli* in Ground Turkey (N=333 Isolates)

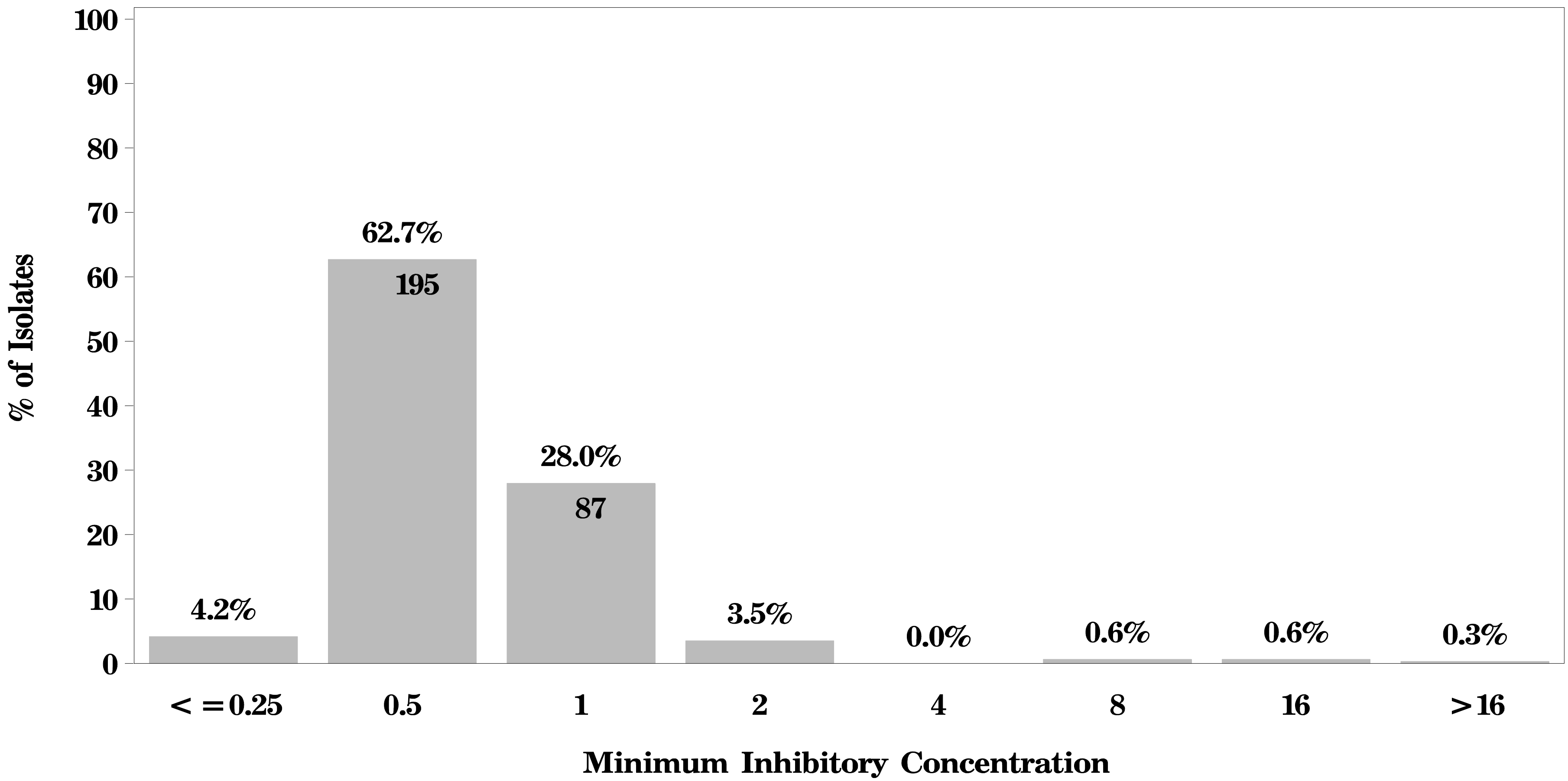
Breakpoints: Susceptible <=4 μg/mL Resistant >=16 μg/mL



NARMS

Figure 19j: Minimum Inhibitory Concentration of Gentamicin for *Escherichia coli* in Ground Beef (N=311 Isolates)

Breakpoints: Susceptible <=4 μg/mL Resistant >=16 μg/mL



NARMS

Figure 19j: Minimum Inhibitory Concentration of Gentamicin for *Escherichia coli* in Pork Chop (N=218 Isolates)

Breakpoints: Susceptible <=4 μg/mL Resistant >=16 μg/mL

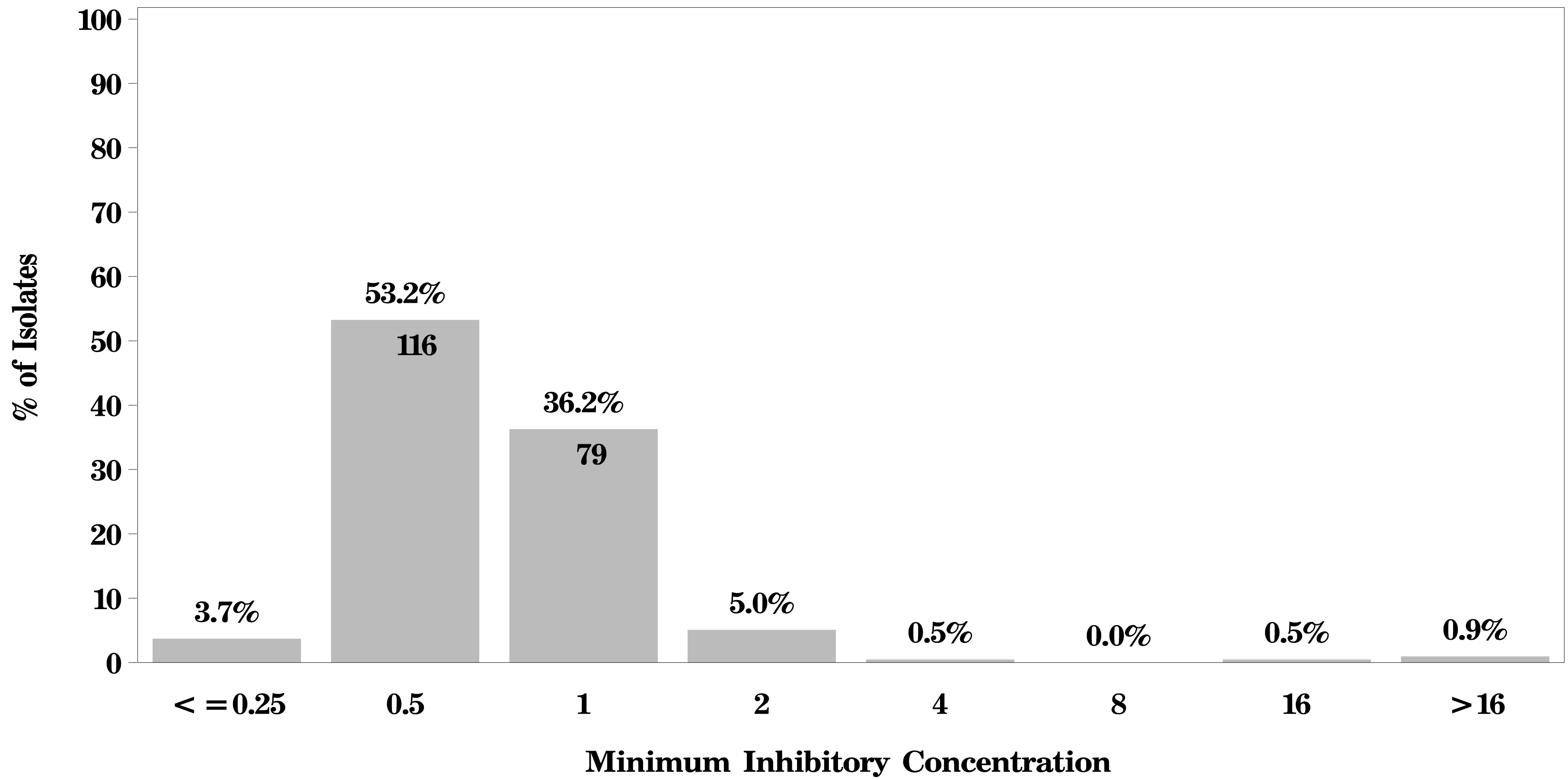


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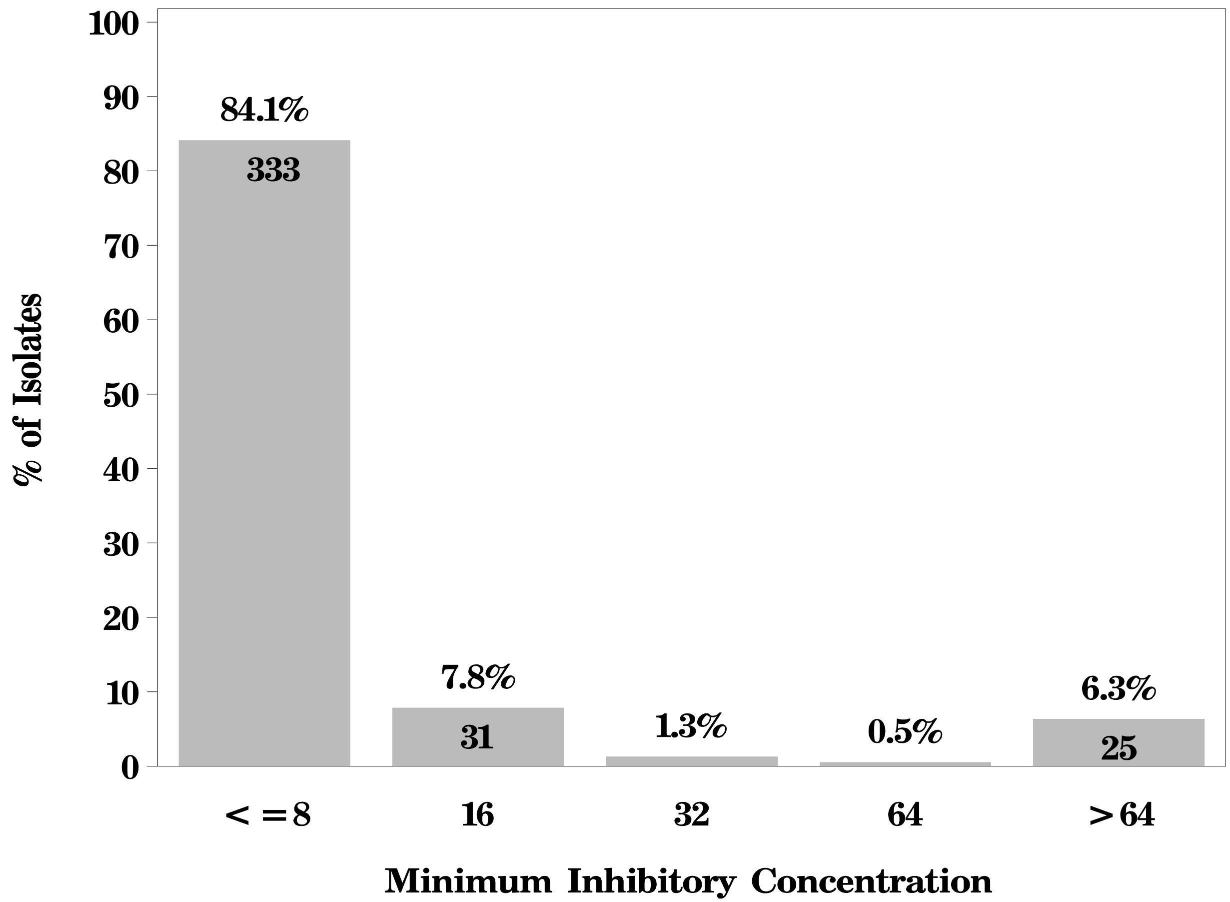
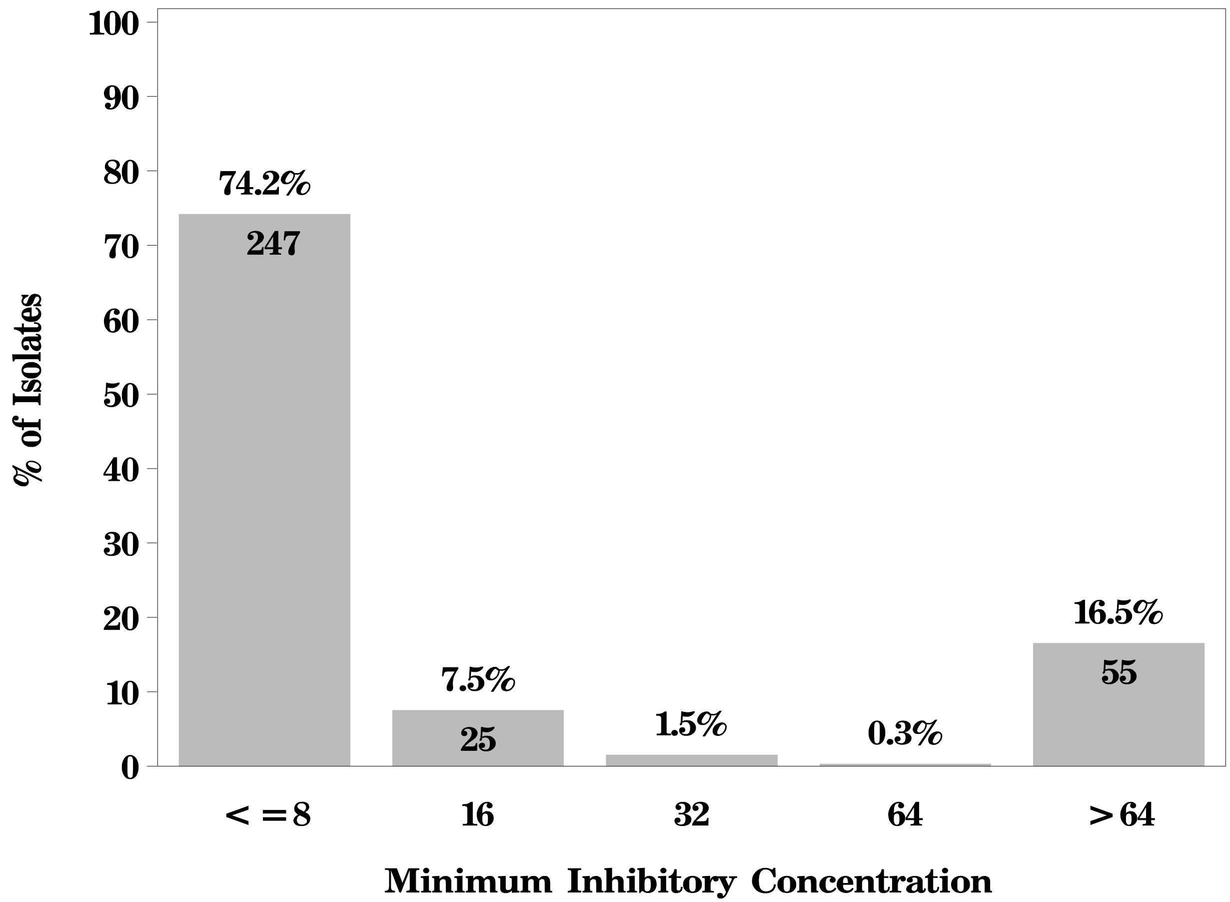
Figure 19k: Minimum Inhibitory Concentration of Kanamycin for *Escherichia coli* in Chicken Breast (N=396 Isolates)
Breakpoints: Susceptible <=16 µg/mL Resistant >=64 µg/mL



NARMS

Figure 19k: Minimum Inhibitory Concentration of Kanamycin for *Escherichia coli* in Ground Turkey (N=333 Isolates)

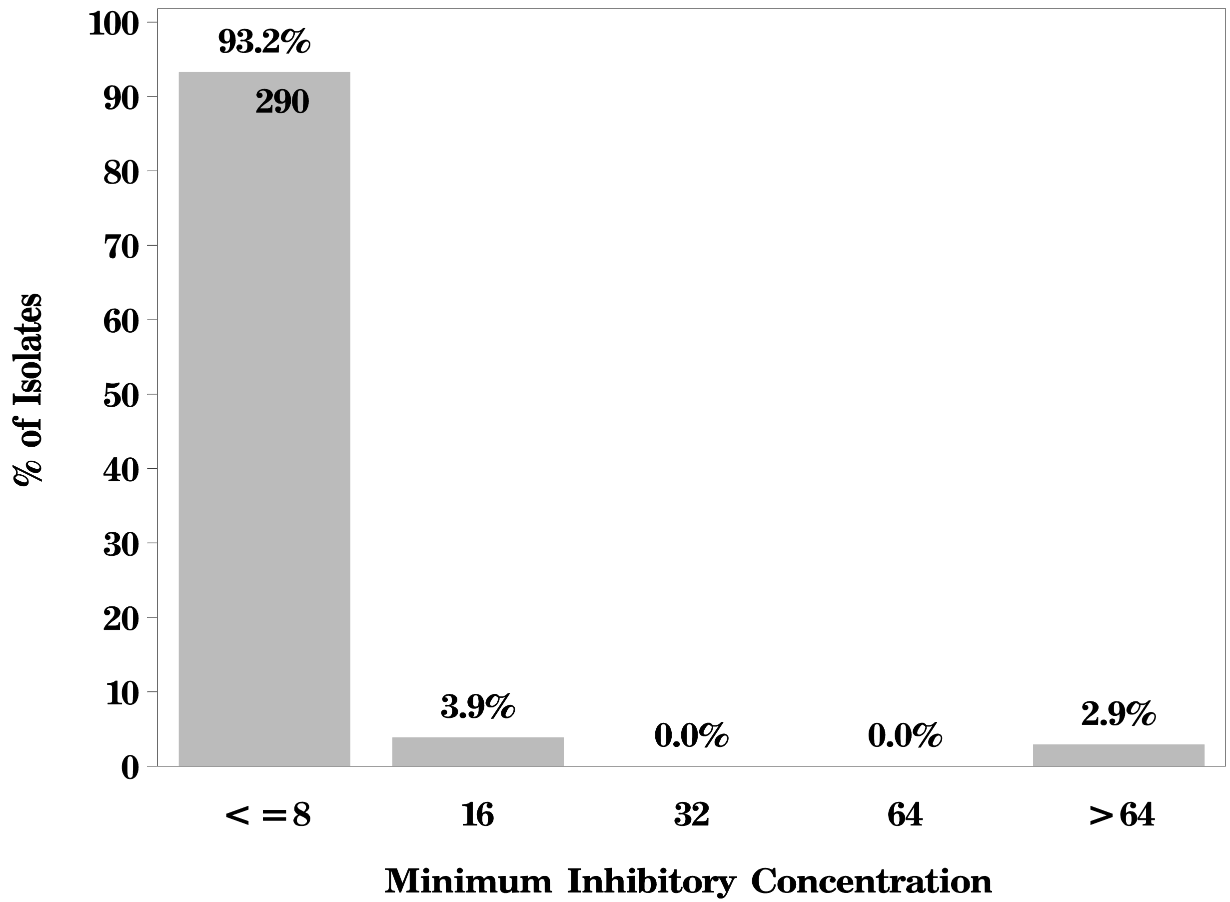
Breakpoints: Susceptible <=16 μg/mL Resistant >=64 μg/mL



NARMS

Figure 19k: Minimum Inhibitory Concentration of Kanamycin for *Escherichia coli* in Ground Beef (N=311 Isolates)

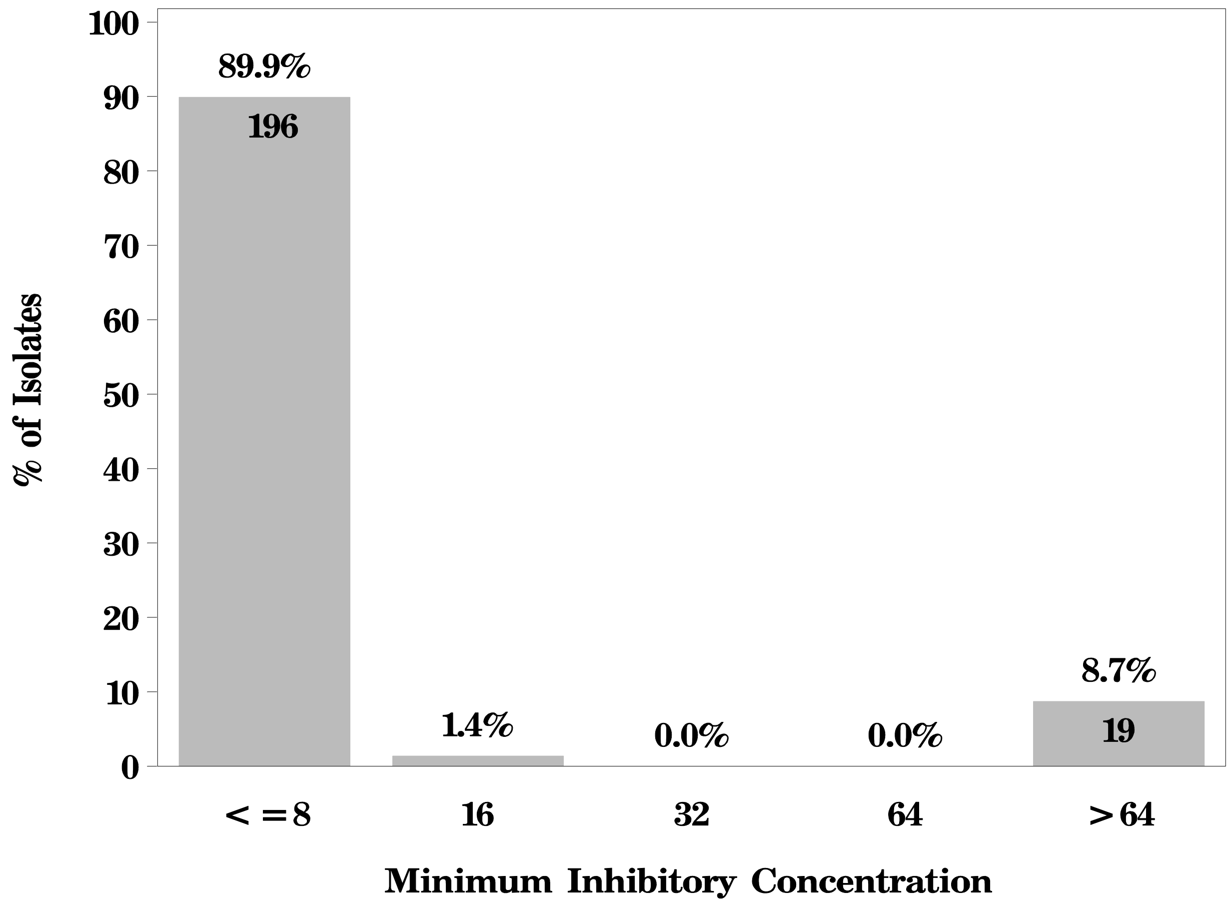
Breakpoints: Susceptible<=16 µg/mL Resistant>=64 µg/mL



NARMS

Figure 19k: Minimum Inhibitory Concentration of Kanamycin for *Escherichia coli* in Pork Chop (N=218 Isolates)

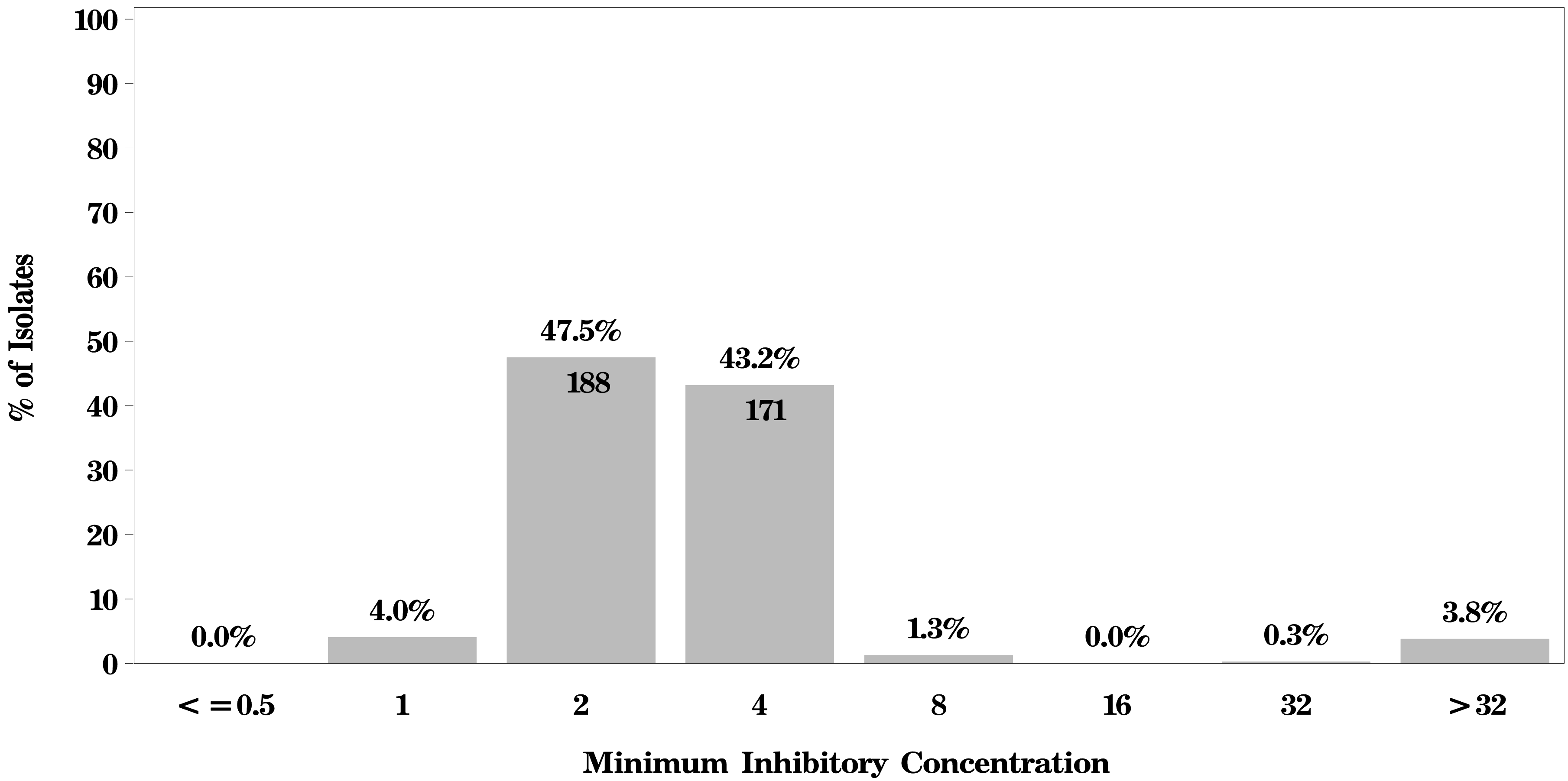
Breakpoints: Susceptible <=16 µg/mL Resistant >=64 µg/mL



NARMS

Figure 19l: Minimum Inhibitory Concentration of Nalidixic acid for *Escherichia coli* in Chicken Breast (N=396 Isolates)

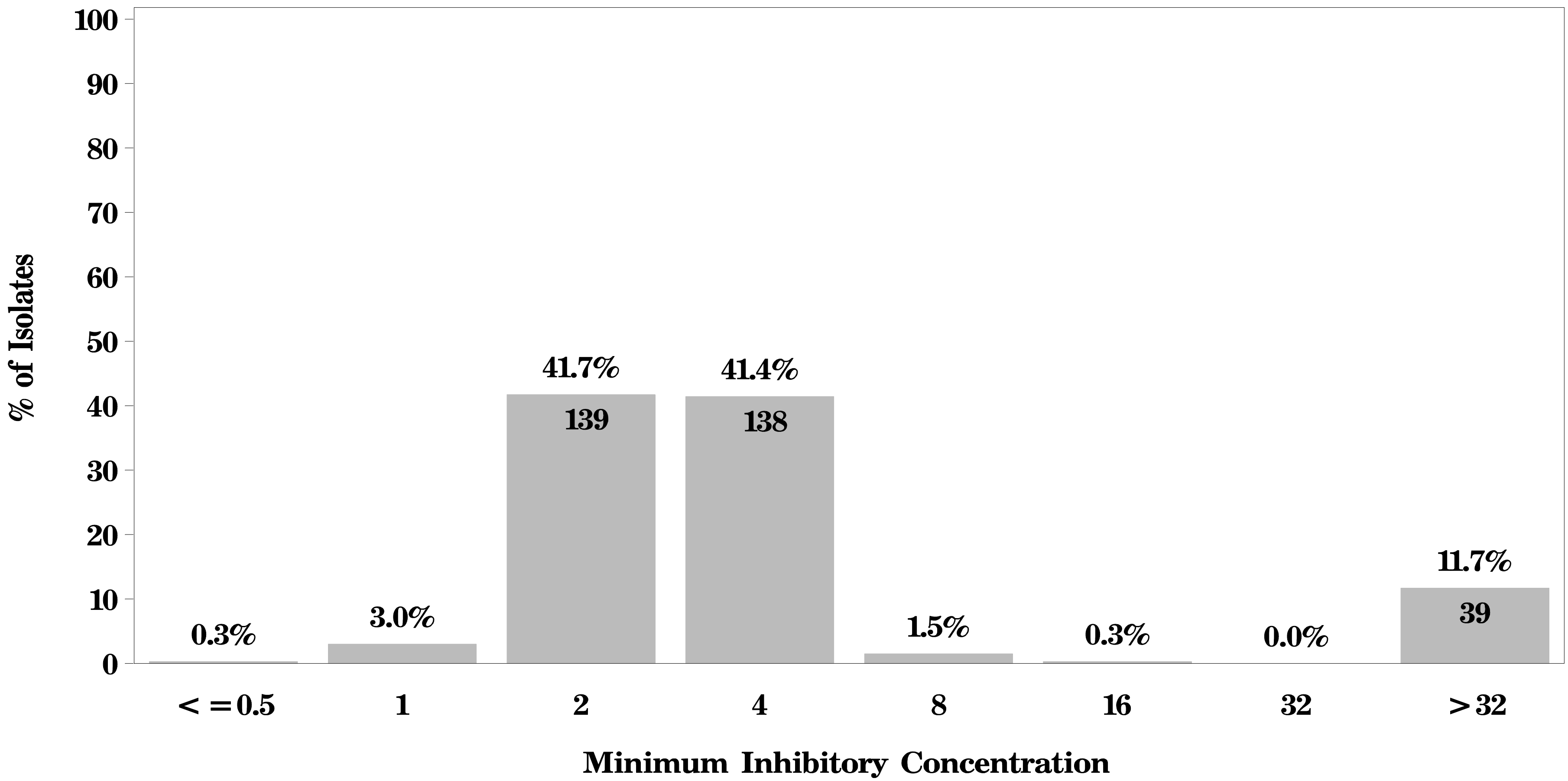
Breakpoints: Susceptible <=16 μg/mL Resistant >=32 μg/mL



NARMS

Figure 19l: Minimum Inhibitory Concentration of Nalidixic acid for *Escherichia coli* in Ground Turkey (N=333 Isolates)

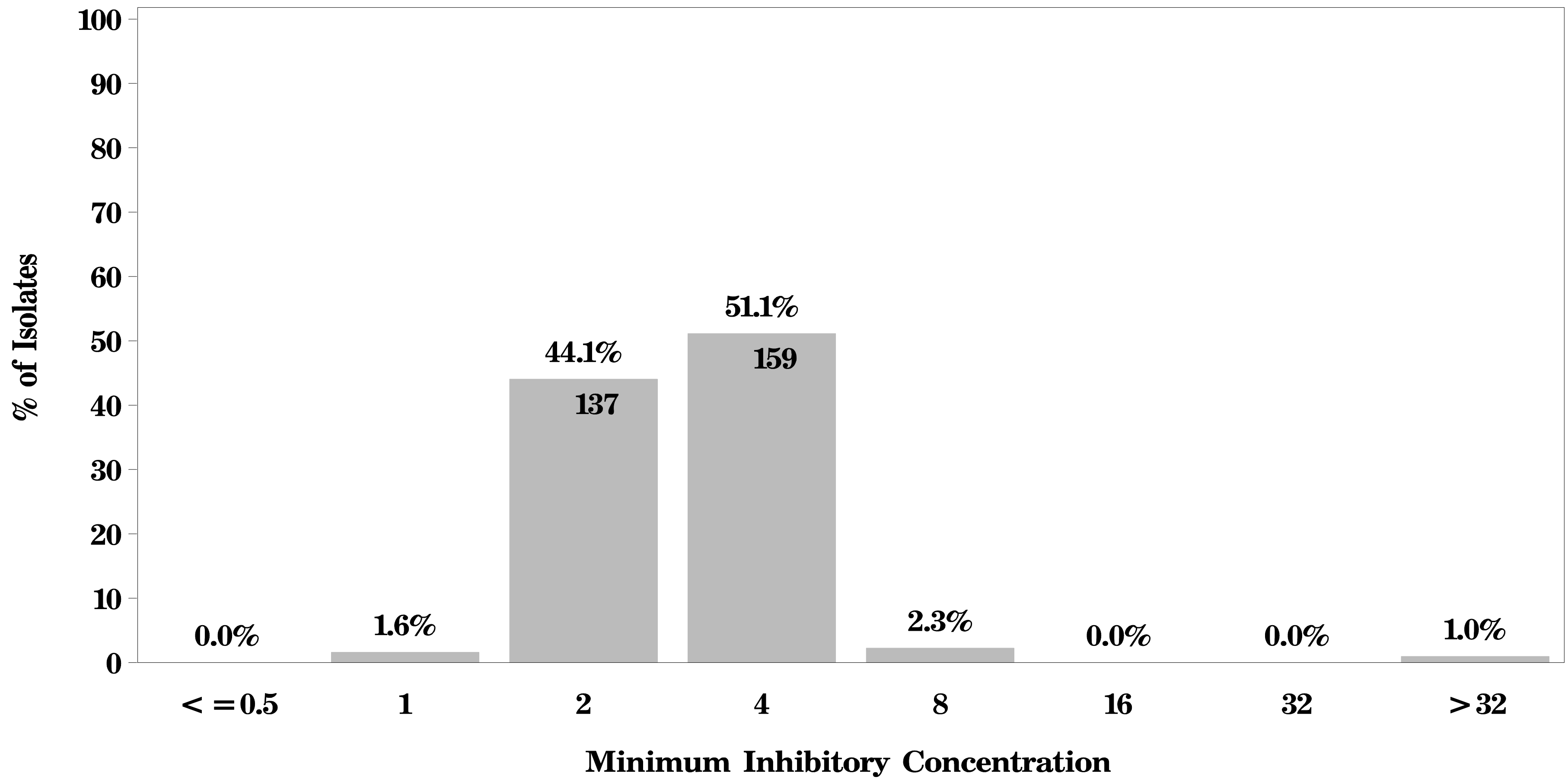
Breakpoints: Susceptible <=16 μg/mL Resistant >=32 μg/mL



NARMS

Figure 19l: Minimum Inhibitory Concentration of Nalidixic acid for *Escherichia coli* in Ground Beef (N=311 Isolates)

Breakpoints: Susceptible <=16 µg/mL Resistant >=32 µg/mL



NARMS

Figure 19l: Minimum Inhibitory Concentration of Nalidixic acid for *Escherichia coli* in Pork Chop (N=218 Isolates)

Breakpoints: Susceptible <=16 µg/mL Resistant >=32 µg/mL

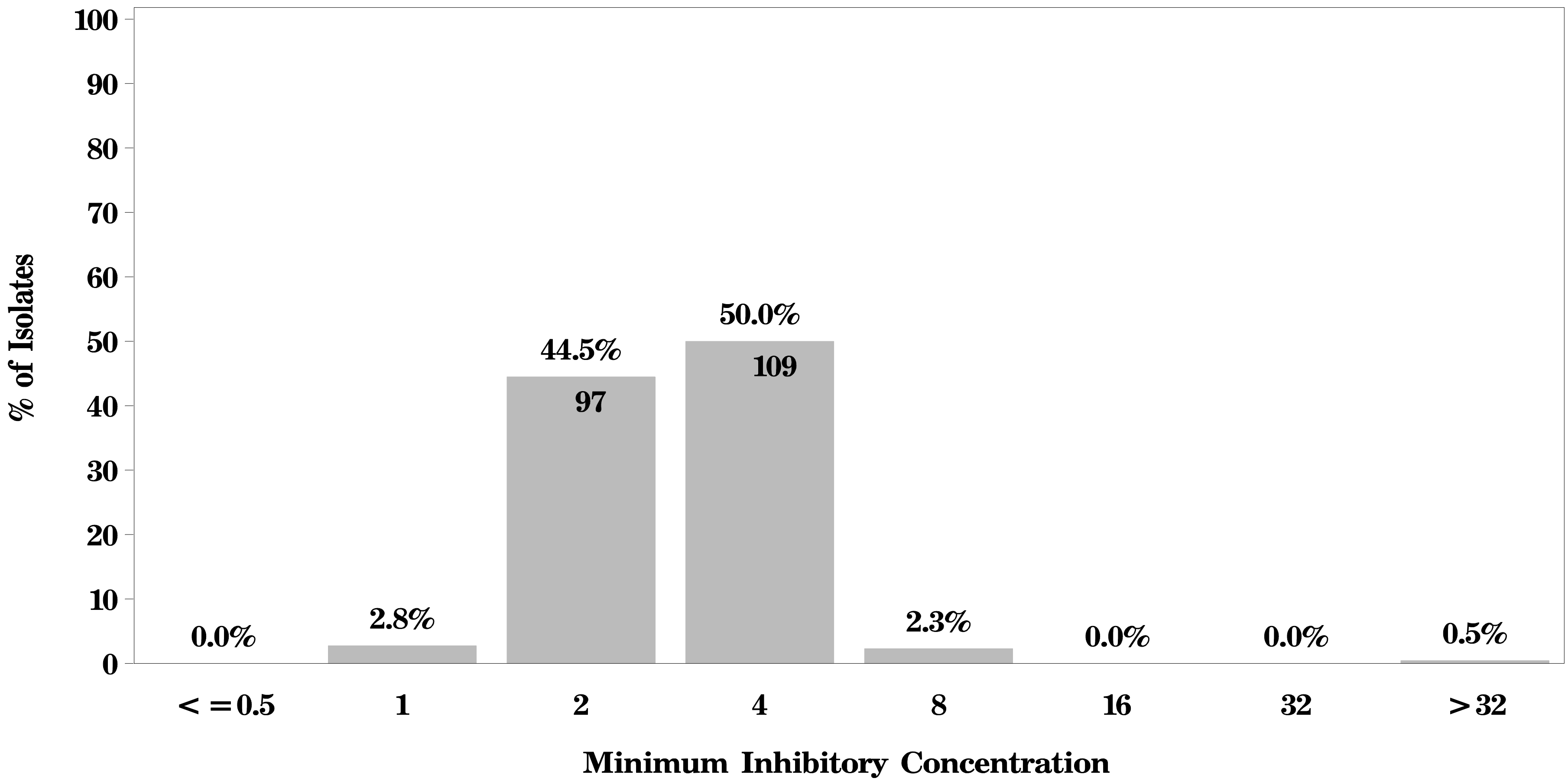


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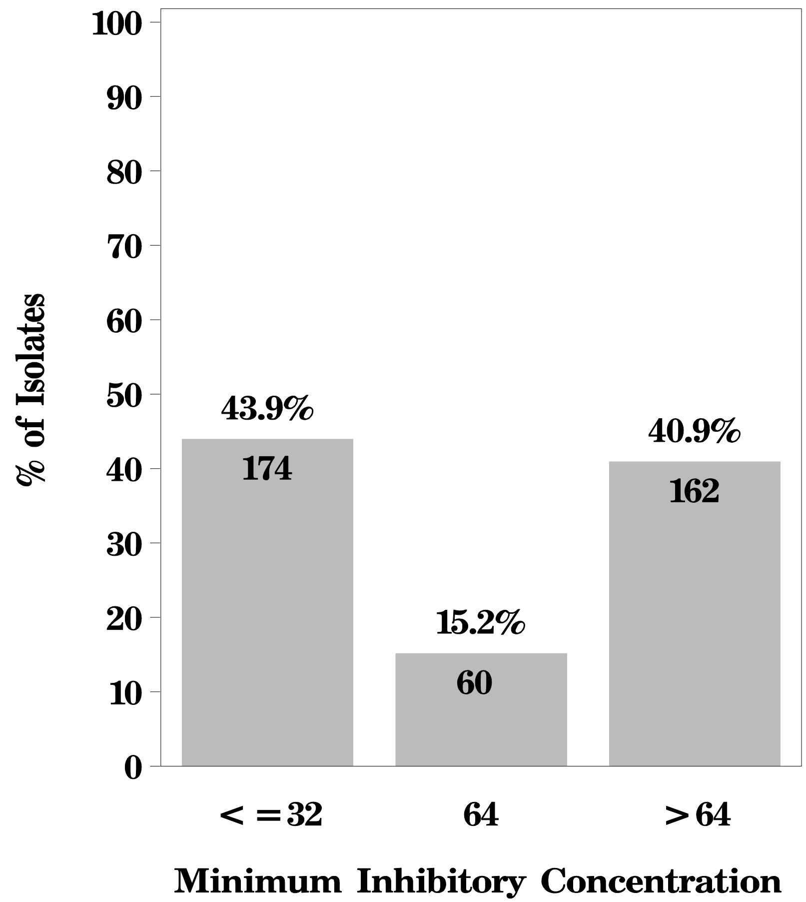
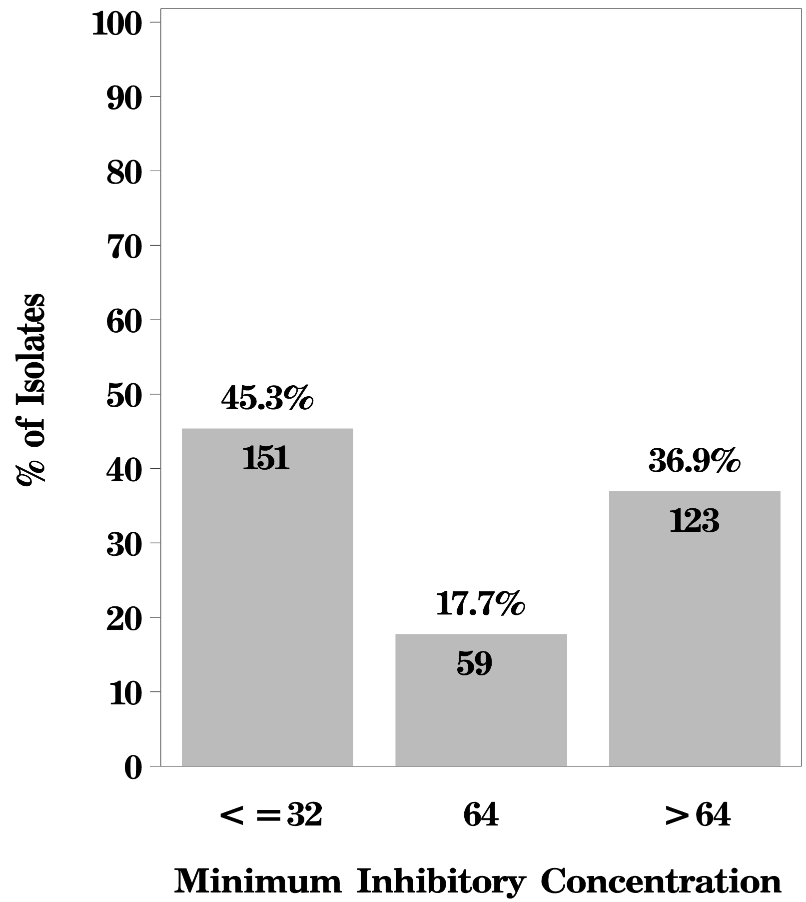
Figure 19m: Minimum Inhibitory Concentration of Streptomycin for *Escherichia coli* in Chicken Breast (N=396 Isolates)
Breakpoints: Susceptible <=32 μg/mL Resistant >=64 μg/mL



NARMS

Figure 19m: Minimum Inhibitory Concentration of Streptomycin for *Escherichia coli* in Ground Turkey (N=333 Isolates)
Breakpoints: Susceptible<=32 µg/mL Resistant>=64 µg/mL



NARMS

Figure 19m: Minimum Inhibitory Concentration of Streptomycin for *Escherichia coli* in Ground Beef (N=311 Isolates)

Breakpoints: Susceptible<=32 μg/mL Resistant>=64 μg/mL

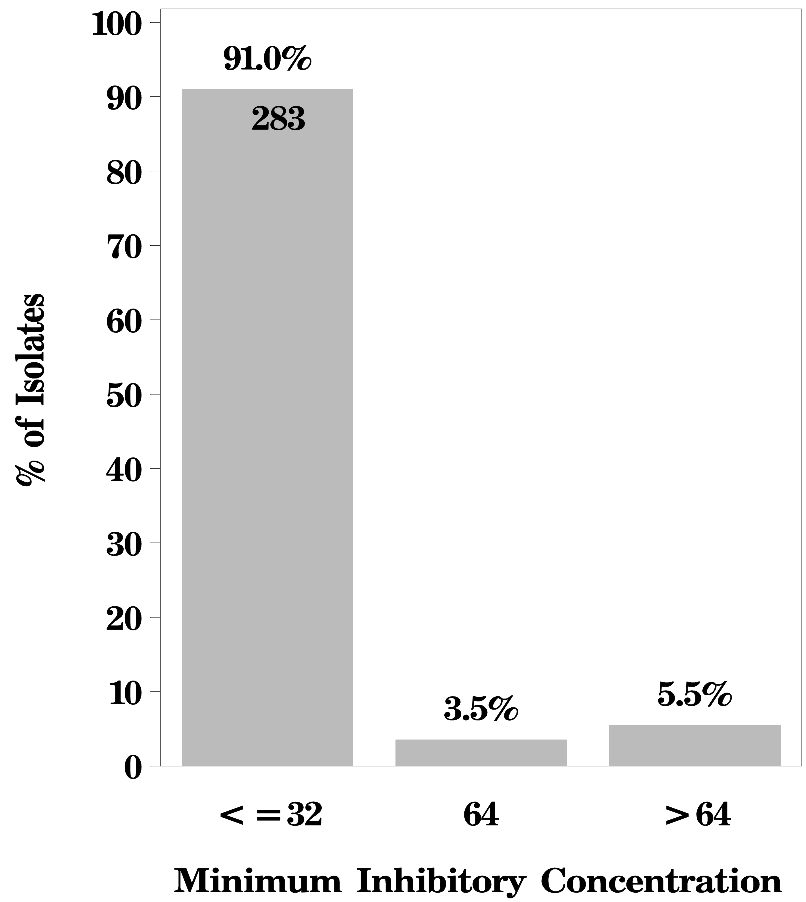


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Figure 19m: Minimum Inhibitory Concentration of Streptomycin for *Escherichia coli* in Pork Chop (N=218 Isolates)

Breakpoints: Susceptible <=32 µg/mL Resistant >=64 µg/mL

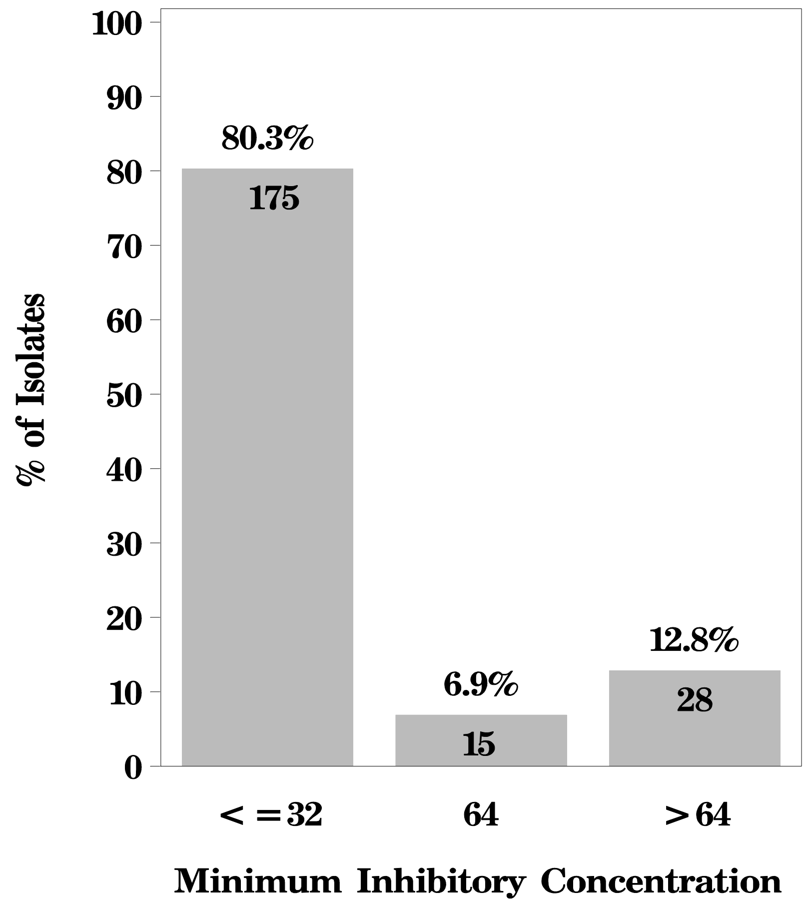

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Figure 19n: Minimum Inhibitory Concentration of Sulfamethoxazole for *Escherichia coli* in Chicken Breast (N=396 Isolates)

Breakpoints: Susceptible <=256 μg/mL Resistant >=512 μg/mL

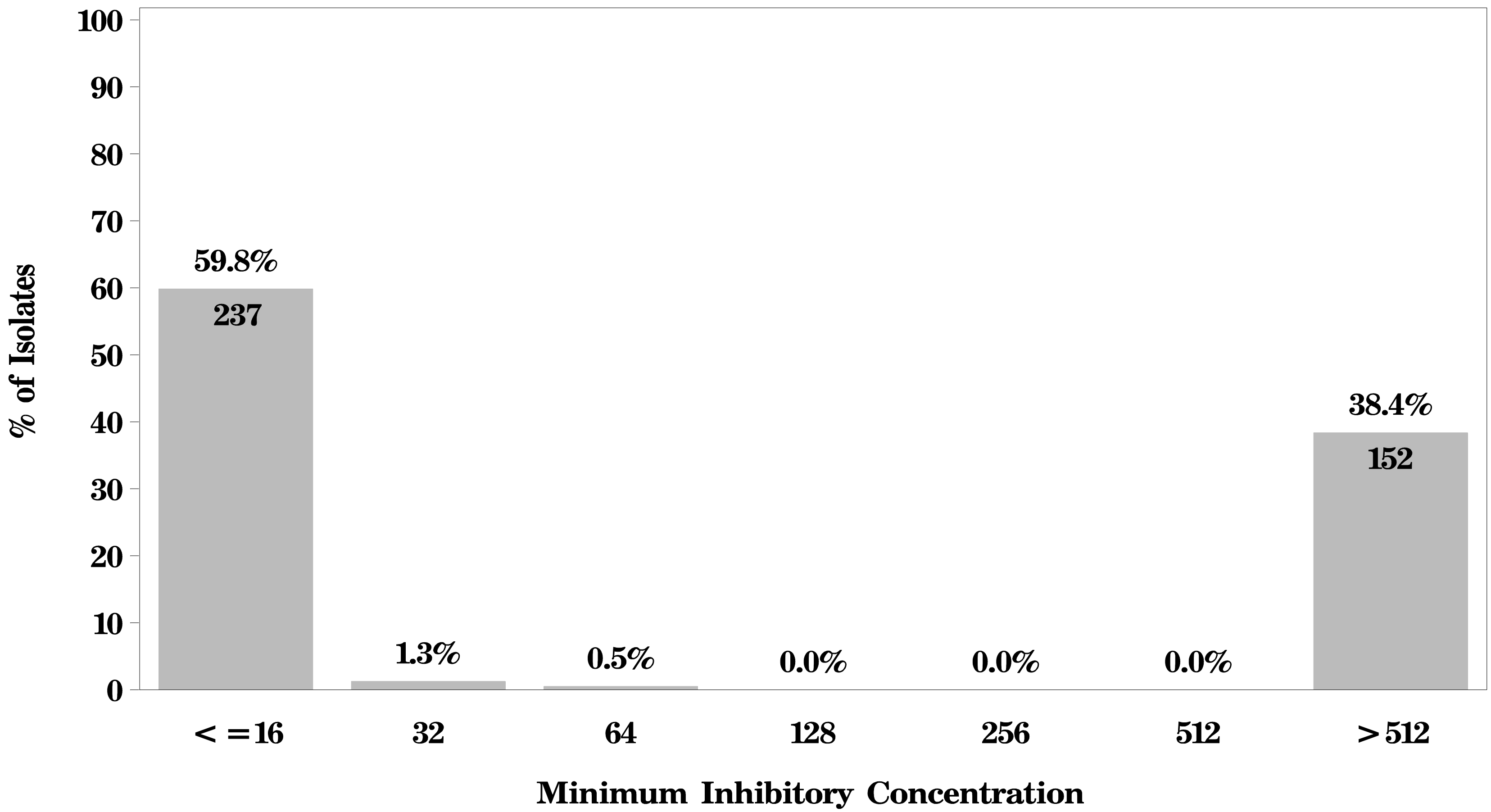

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Figure 19n: Minimum Inhibitory Concentration of Sulfamethoxazole for *Escherichia coli* in Ground Turkey (N=333 Isolates)

Breakpoints: Susceptible <=256 μg/mL Resistant >=512 μg/mL

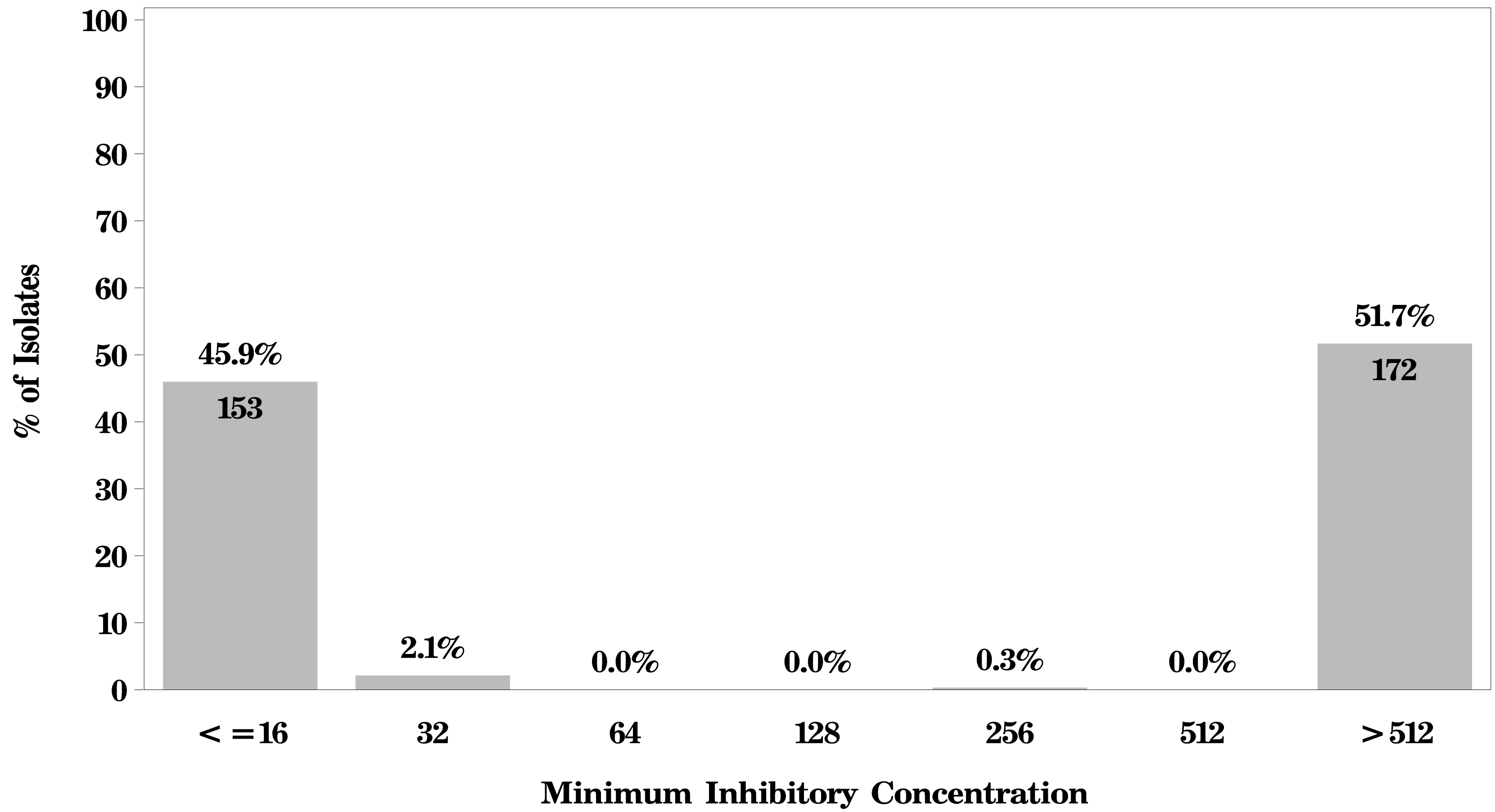

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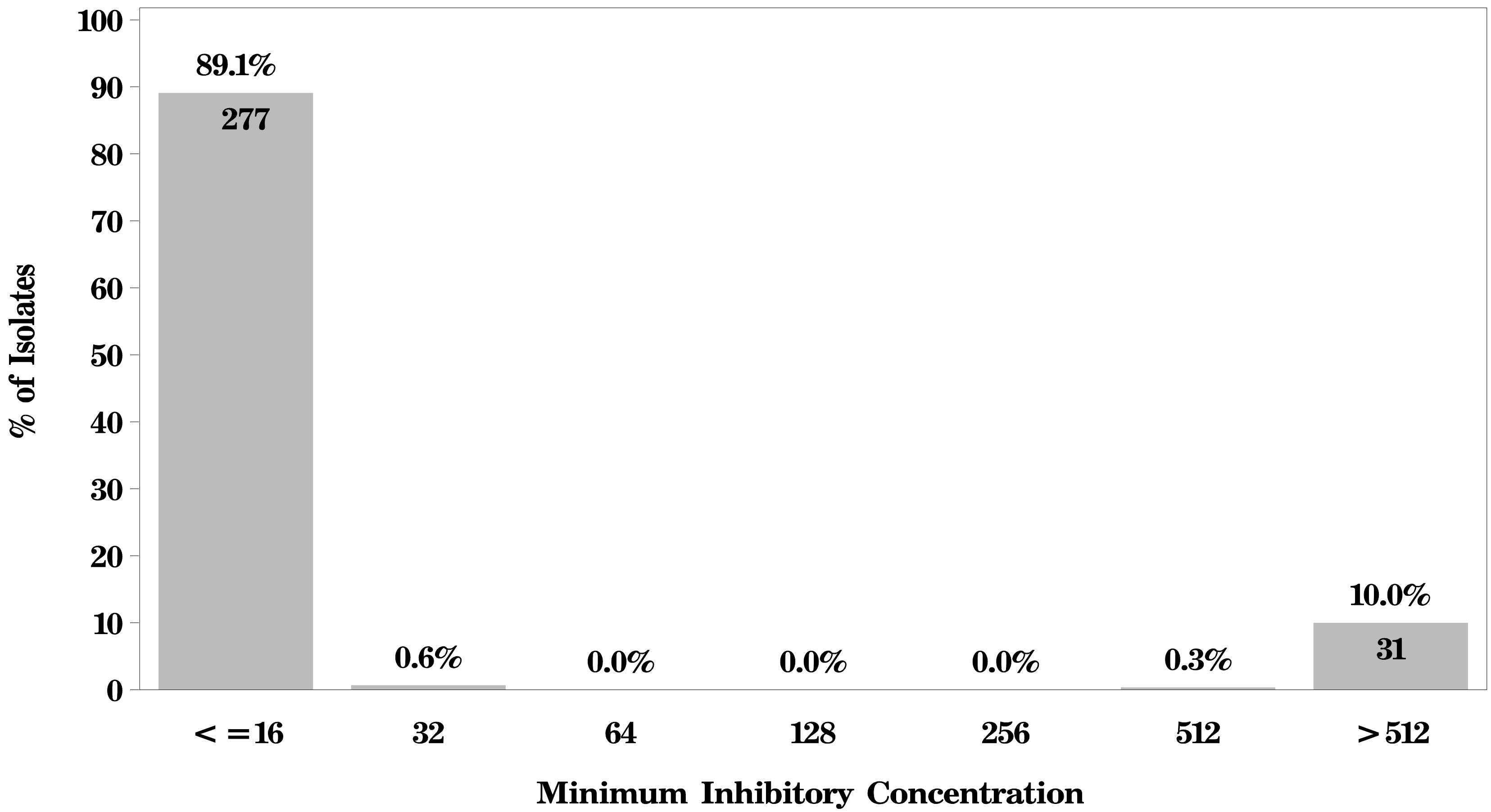
Figure 19n: Minimum Inhibitory Concentration of Sulfamethoxazole for *Escherichia coli* in Ground Beef (N=311 Isolates)

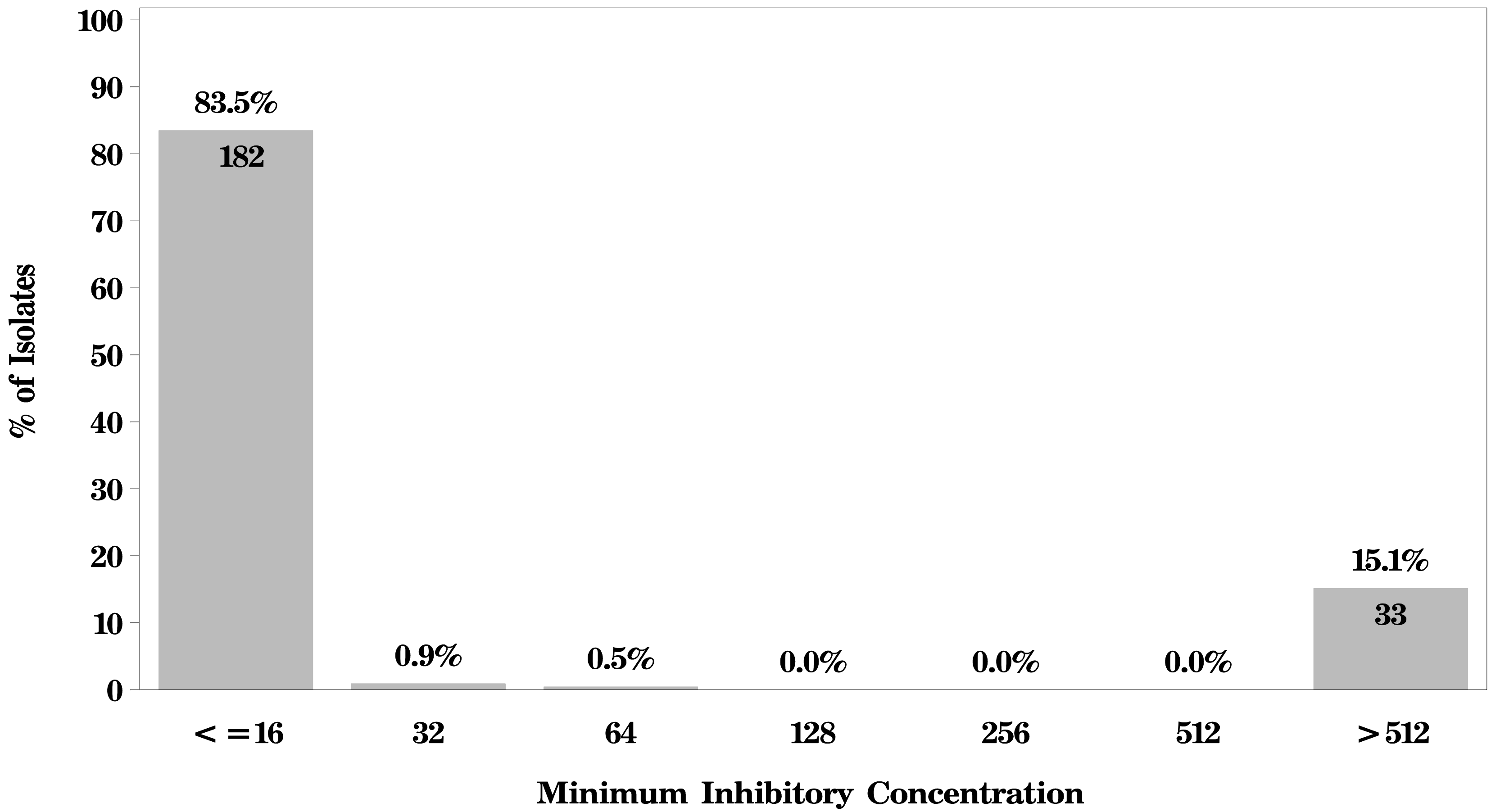
Breakpoints: Susceptible <=256 µg/mL Resistant >=512 µg/mL



NARMS

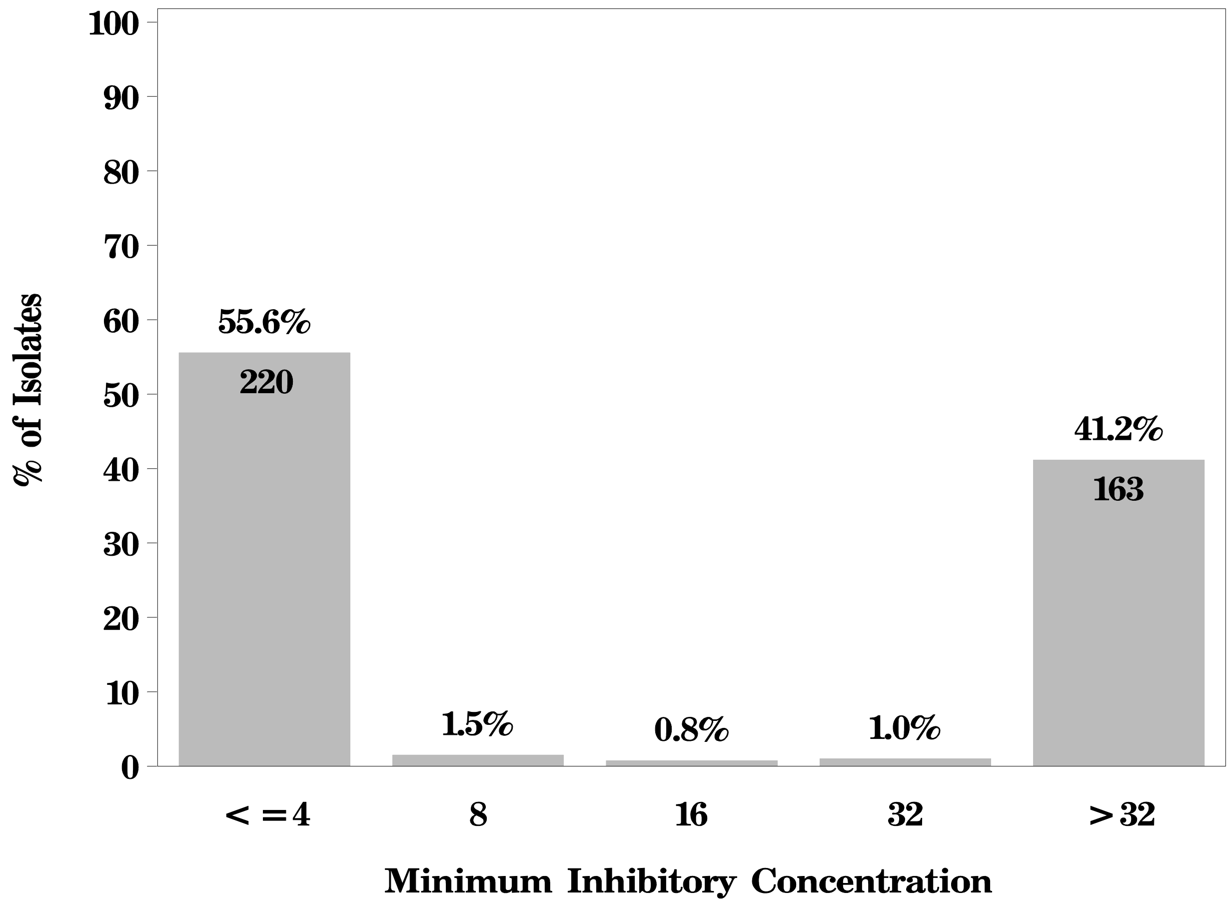
Figure 19n: Minimum Inhibitory Concentration of Sulfamethoxazole for *Escherichia coli* in Pork Chop (N=218 Isolates)

Breakpoints: Susceptible<=256 μg/mL Resistant>=512 μg/mL



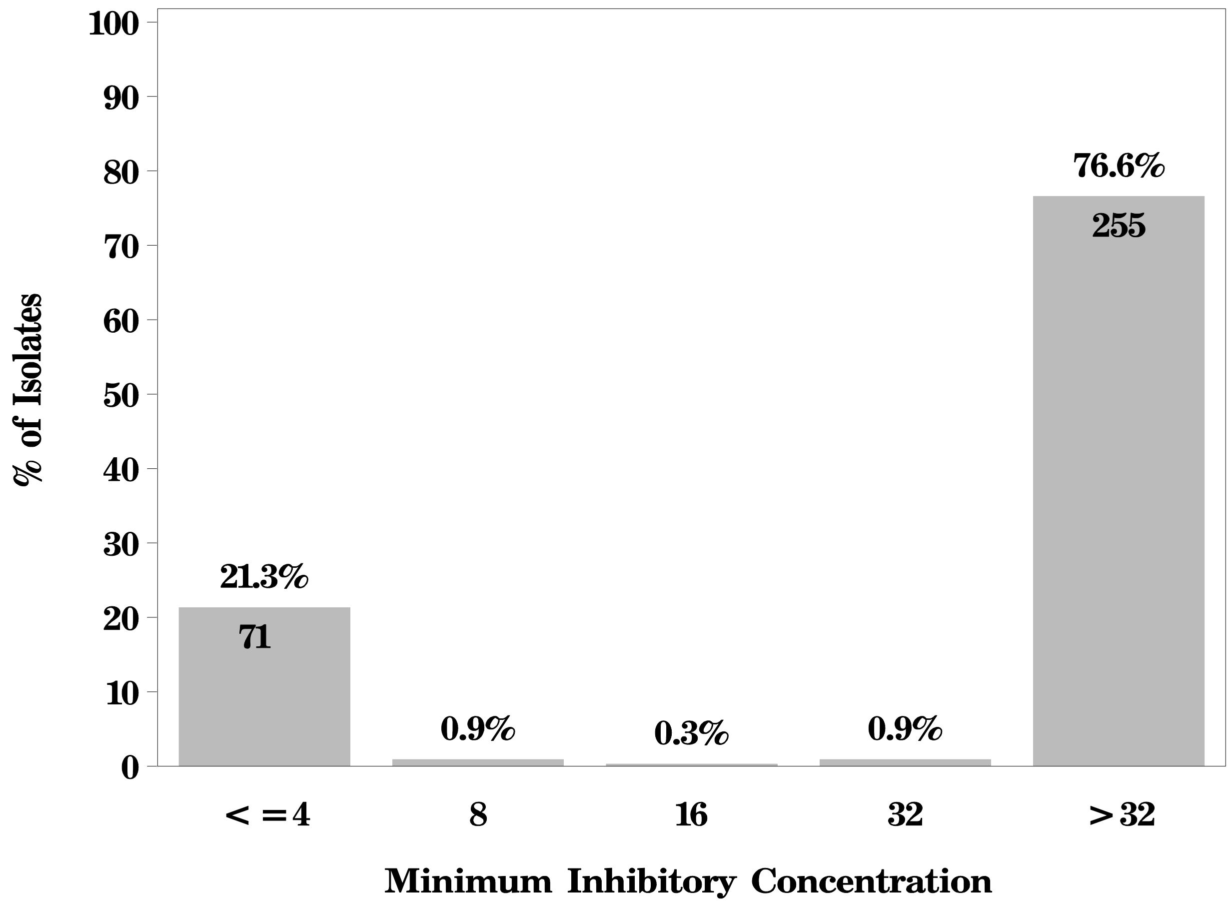
NARMS

Figure 19o: Minimum Inhibitory Concentration of Tetracycline for *Escherichia coli* in Chicken Breast (N=396 Isolates)
Breakpoints: Susceptible <=4 μg/mL Resistant >=16 μg/mL



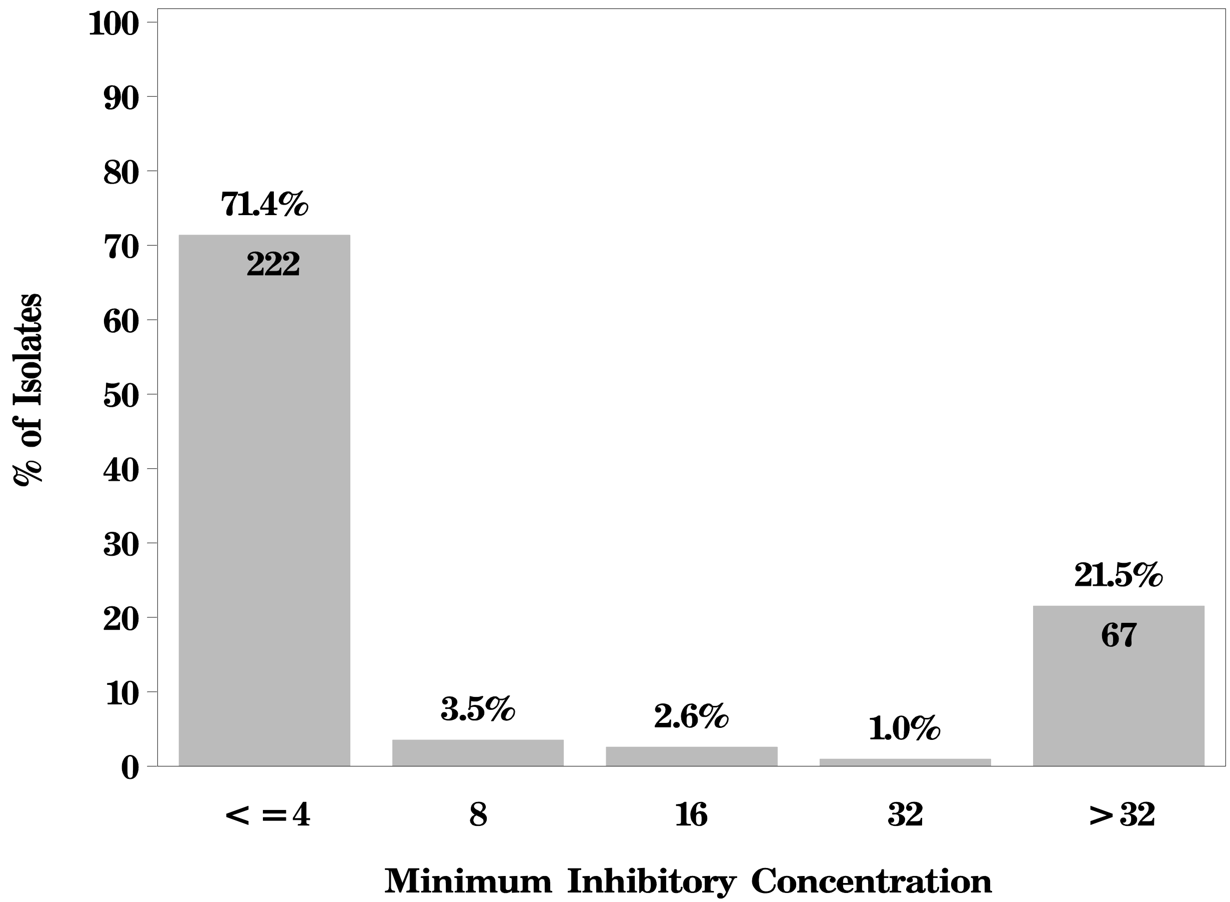
NARMS

Figure 19o: Minimum Inhibitory Concentration of Tetracycline for *Escherichia coli* in Ground Turkey (N=333 Isolates)
Breakpoints: Susceptible< =4 µg/mL Resistant> =16 µg/mL



NARMS

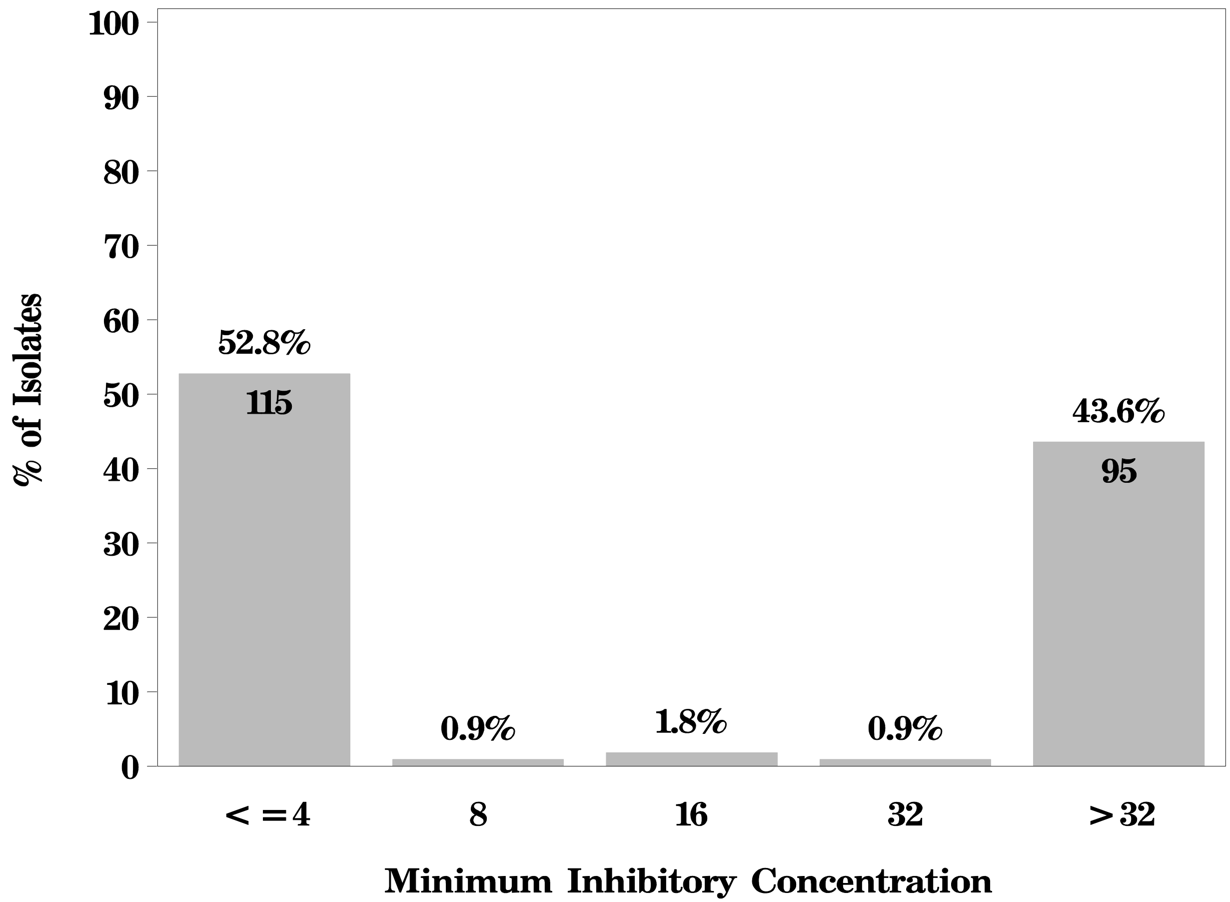
Figure 19o: Minimum Inhibitory Concentration of Tetracycline for *Escherichia coli* in Ground Beef (N=311 Isolates)
Breakpoints: Susceptible <=4 µg/mL Resistant >=16 µg/mL



NARMS

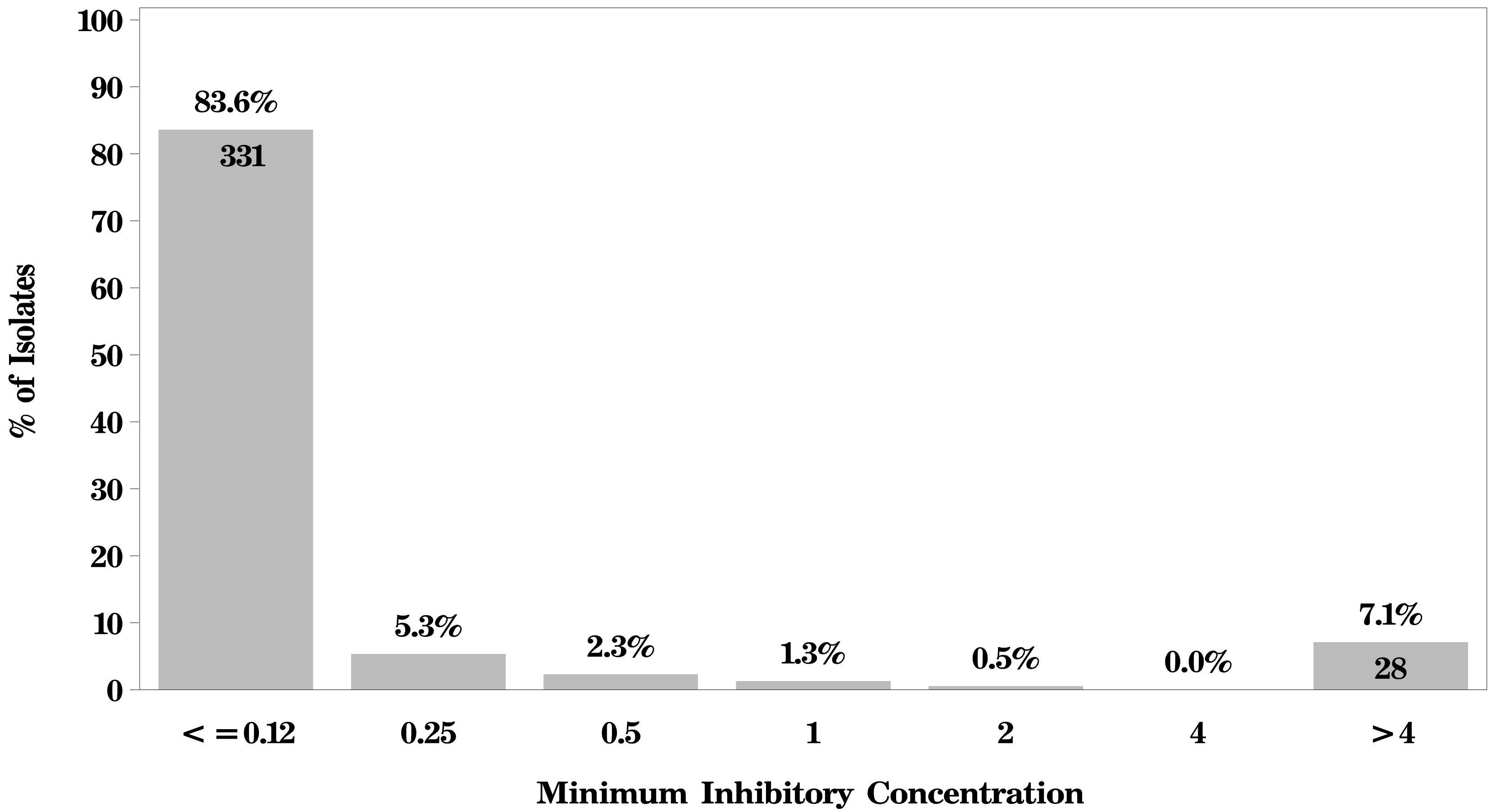
Figure 19o: Minimum Inhibitory Concentration of Tetracycline for *Escherichia coli* in Pork Chop (N=218 Isolates)

Breakpoints: Susceptible <=4 μg/mL Resistant >=16 μg/mL



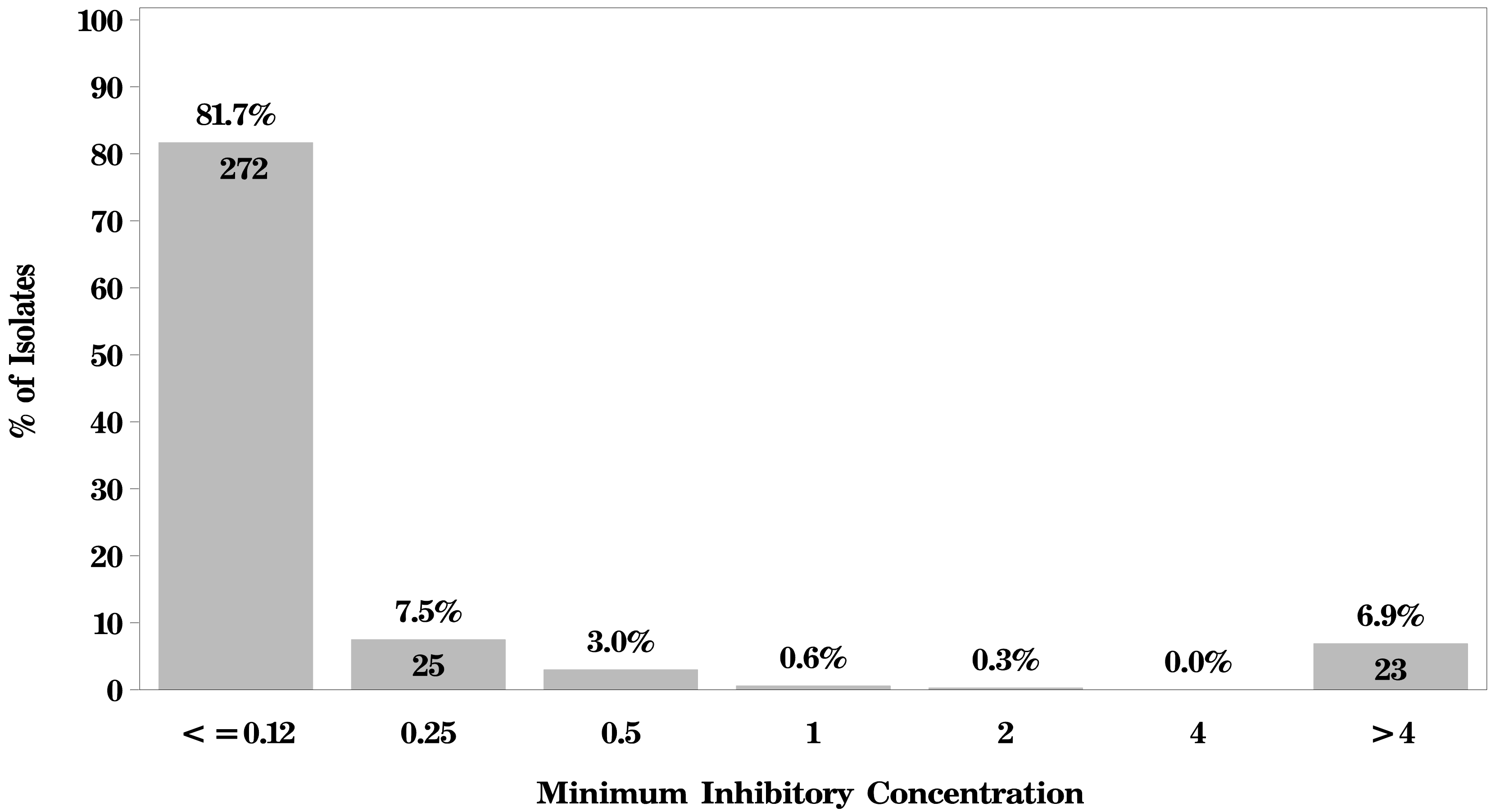
NARMS

Figure 19p: Minimum Inhibitory Concentration of Trimethoprim/sulfamethoxazole for *Escherichia coli* in Chicken Breast (N=396 Isolates)
Breakpoints: Susceptible <=2 µg/mL Resistant >=4 µg/mL



NARMS

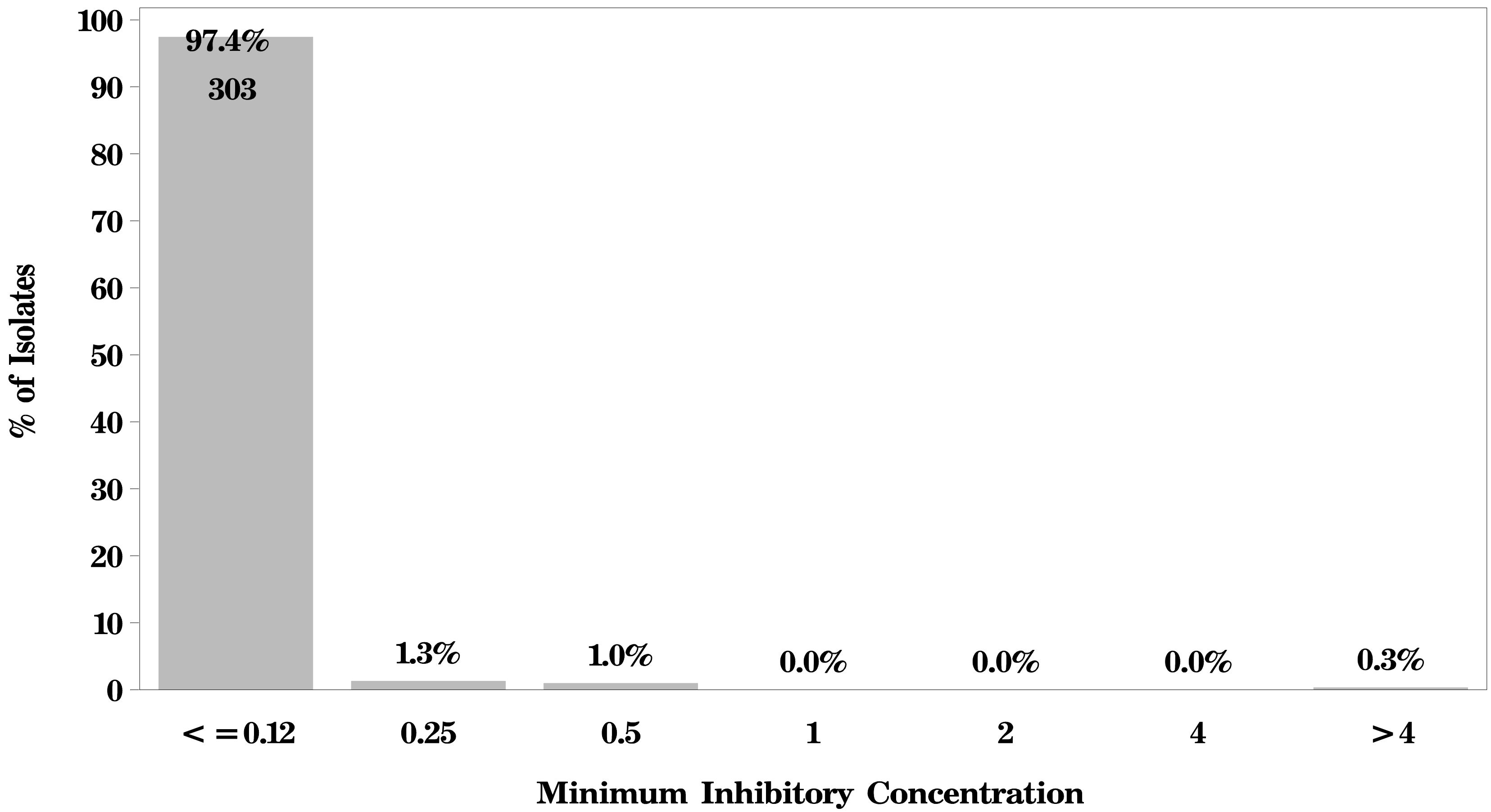
Figure 19p: Minimum Inhibitory Concentration of Trimethoprim/sulfamethoxazole for *Escherichia coli* in Ground Turkey (N=333 Isolates)
Breakpoints: Susceptible <=2 μg/mL Resistant >=4 μg/mL



NARMS

Figure 19p: Minimum Inhibitory Concentration of Trimethoprim/sulfamethoxazole for *Escherichia coli* in Ground Beef (N=311 Isolates)

Breakpoints: Susceptible <=2 μg/mL Resistant >=4 μg/mL



NARMS

Figure 19p: Minimum Inhibitory Concentration of Trimethoprim/sulfamethoxazole for *Escherichia coli* in Pork Chop (N=218 Isolates)

Breakpoints: Susceptible <=2 µg/mL Resistant >=4 µg/mL

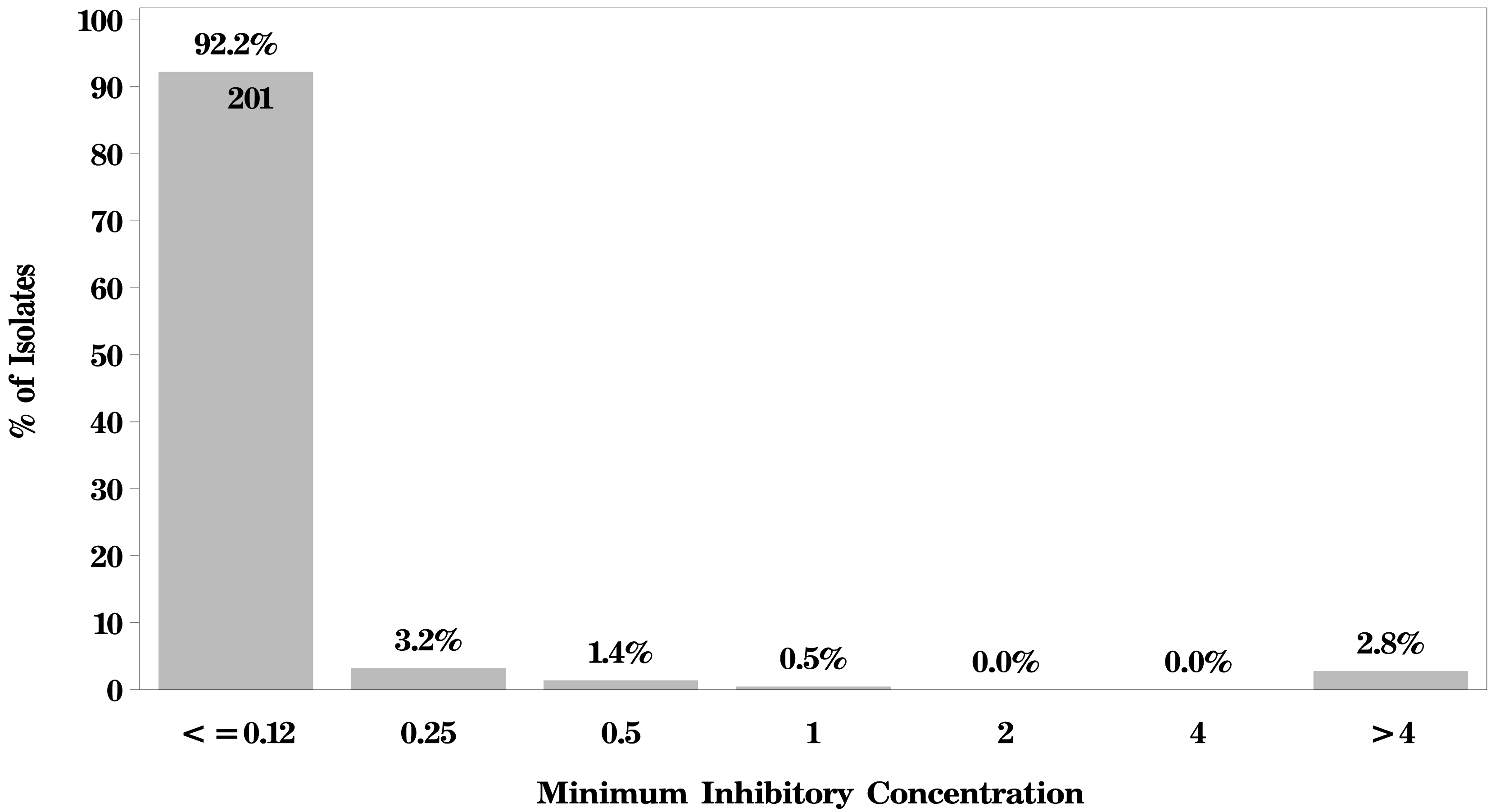


Table 41. Antimicrobial Resistance* among *Escherichia coli* by Meat Type, 2003

Meat Type	Antimicrobial Agent														
	TET	**STR**	**SMX**	**AMP**	**GEN**	**CEP**	**AMC**	**NAL**	**COT**	**FOX**	**TIO**	**CHL**	**CIP**	**AMI**	**AXO**
***Chicken Breast* (n=396)**	42.9%	56.1%	38.4%	25.3%	29.3%	22.0%	13.6%	4.0%	7.1%	9.3%	7.6%	-†	-	-	-
***Ground Turkey* (n=333)**	77.8%	54.7%	51.7%	35.7%	29.7%	18.9%	3.0%	11.7%	6.9%	1.2%	0.3%	3.6%	0.3%	-	-
***Ground Beef* (n=311)**	25.1%	9.0%	10.3%	5.1%	1.0%	8.0%	2.3%	1.0%	0.3%	0.3%	0.3%	2.3%	-	-	-
***Pork Chop* (n=218)**	46.3%	19.7%	15.1%	13.3%	1.4%	11.9%	5.0%	0.5%	2.8%	2.3%	0.9%	4.1%	-	-	-
Total (N=1258)	48.3%	37.8%	30.9%	21.0%	17.6%	16.0%	6.5%	4.7%	4.6%	3.7%	2.7%	2.2%	0.1%	-	-

* Where % Resistance = (# *E. coli* isolates resistant to antimicrobial) / (total # *E. coli* isolates).
† Dashes indicate 0.0% resistance to antimicrobial.

Table 42. Antimicrobial Resistance[*] among *Escherichia coli* by Site, Meat Type, and Antimicrobial Agent, 2003

		Antimicrobial Agent														
Site	***Meat Type***	**TET**	**STR**	**SMX**	**AMP**	**GEN**	**CEP**	**AMC**	**NAL**	**COT**	**FOX**	**TIO**	**CHL**	**CIP**	**AMI**	**AXO**
GA	CB (n=120)	49.2%	59.2%	50.8%	19.2%	50.0%	17.5%	7.5%	2.5%	10.8%	5.8%	5.0%	-[†]	-	-	-
	GT (n=117)	77.8%	48.7%	41.9%	35.0%	24.8%	22.2%	3.4%	3.4%	3.4%	2.6%	0.9%	1.7%	-	-	-
	GB (n=90)	25.6%	7.8%	7.8%	1.1%	1.1%	4.4%	1.1%	-	-	1.1%	1.1%	1.1%	-	-	-
	PC (n=68)	50.0%	19.1%	13.2%	19.1%	1.5%	14.7%	2.9%	-	2.9%	2.9%	2.9%	5.9%	-	-	-
	Total (n=395)	**52.4%**	**37.5%**	**31.9%**	**19.7%**	**23.0%**	**15.4%**	**4.1%**	**1.8%**	**4.8%**	**3.3%**	**2.5%**	**1.8%**	**-**	**-**	**-**
MD	CB (n=113)	42.5%	50.4%	27.4%	39.8%	12.4%	32.7%	18.6%	8.8%	5.3%	15.0%	14.2%	-	-	-	-
	GT (n=103)	73.8%	64.1%	60.2%	40.8%	35.9%	25.2%	1.0%	20.4%	4.9%	-	-	1.0%	-	-	-
	GB (n=87)	29.9%	6.9%	10.3%	4.6%	2.3%	6.9%	2.3%	3.4%	-	-	-	2.3%	-	-	-
	PC (n=71)	22.5%	9.9%	5.6%	7.0%	2.8%	14.1%	11.3%	1.4%	2.8%	4.2%	-	-	-	-	-
	Total (n=374)	**44.4%**	**36.4%**	**28.3%**	**25.7%**	**14.7%**	**21.1%**	**8.6%**	**9.4%**	**3.5%**	**5.3%**	**4.3%**	**0.8%**	**-**	**-**	**-**
OR	CB (n=78)	43.6%	65.4%	28.2%	20.5%	16.7%	11.5%	9.0%	1.3%	3.8%	3.8%	1.3%	-	-	-	-
	GT (n=49)	85.7%	42.9%	44.9%	32.7%	32.7%	10.2%	2.0%	16.3%	12.2%	-	-	4.1%	-	-	-
	GB (n=57)	21.1%	14.0%	14.0%	8.8%	-	12.3%	3.5%	-	-	-	-	1.8%	-	-	-
	PC (n=28)	50.0%	28.6%	28.6%	3.6%	-	-	-	-	7.1%	-	-	7.1%	-	-	-
	Total (n=212)	**48.1%**	**41.5%**	**28.3%**	**17.9%**	**13.7%**	**9.9%**	**4.7%**	**4.2%**	**5.2%**	**1.4%**	**0.5%**	**2.4%**	**-**	**-**	**-**
TN	CB (n=85)	34.1%	50.6%	44.7%	18.8%	34.1%	23.5%	20.0%	2.4%	7.1%	11.8%	8.2%	-	-	-	-
	GT (n=64)	78.1%	59.4%	60.9%	31.3%	26.6%	9.4%	6.3%	9.4%	12.5%	1.6%	-	10.9%	1.6%	-	-
	GB (n=77)	22.1%	9.1%	10.4%	7.8%	-	10.4%	2.6%	-	1.3%	-	-	3.9%	-	-	-
	PC (n=51)	72.5%	29.4%	23.5%	19.6%	-	11.8%	2.0%	-	-	-	-	5.9%	-	-	-
	Total (n=277)	**48.0%**	**37.2%**	**35.0%**	**18.8%**	**16.6%**	**14.4%**	**8.7%**	**2.9%**	**5.4%**	**4.0%**	**2.5%**	**4.7%**	**0.4%**	**-**	**-**
Total (N=1258)		**48.3%**	**37.8%**	**30.9%**	**21.0%**	**17.6%**	**16.0%**	**6.5%**	**4.7%**	**4.6%**	**3.7%**	**2.7%**	**2.2%**	**0.1%**	**-**	**-**

[*] Where % Resistance = (# isolates resistant to antimicrobial per meat type per site) / (total # isolates per meat type per site).
[†] Dashes indicate 0.0% resistance to antimicrobial.

Table 43. Number of *Escherichia coli* Resistant to Multiple Antimicrobial Agents, 2003

Meat Type	***Number of Antimicrobials***				
	0	**1**	**2-4**	**5-7**	**≥8**
CB	85	75	170	52	14
GT	51	44	157	74	7
GB	218	45	39	8	1
PC	102	40	64	8	4
Total	**456**	**204**	**430**	**142**	**26**

Appendix A-1. Number of Samples Tested by Site, Meat Type, and Month, 2003

Site: CA

Meat Type	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Chicken Breast	10	10	10	10	10	10	10	10	10	10	10	10	120
Ground Turkey	10	10	10	10	10	10	10	10	10	10	10	10	120
Ground Beef	10	10	10	10	10	10	10	10	10	10	10	10	120
Pork Chop	10	10	10	10	10	10	10	10	10	10	10	10	120
Total	**40**	**40**	**40**	**40**	**40**	**40**	**40**	**40**	**40**	**40**	**40**	**40**	**480**

Site: CT

Meat Type	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Chicken Breast	5	5	5	5	5	5	5	5	5	5	5	5	60
Ground Turkey	5	5	5	5	5	5	5	5	5	5	5	5	60
Ground Beef	5	5	5	5	5	5	5	5	5	5	5	5	60
Pork Chop	5	5	5	5	5	5	5	5	5	5	5	5	60
Total	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**240**

Site: GA

Meat Type	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Chicken Breast	10	10	10	10	10	10	10	10	10	10	10	10	120
Ground Turkey	10	10	10	10	10	10	10	10	10	10	10	10	120
Ground Beef	10	10	10	10	10	10	10	10	10	10	10	10	120
Pork Chop	10	10	10	10	10	10	10	10	10	10	10	10	120
Total	**40**	**40**	**40**	**40**	**40**	**40**	**40**	**40**	**40**	**40**	**40**	**40**	**480**

Site: MD

Meat Type	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Chicken Breast	10	5	5	5	5	5	10	10	10	10	10	10	120
Ground Turkey	10	10	10	10	10	10	10	10	10	10	10	10	120
Ground Beef	10	10	10	10	10	10	10	10	10	10	10	10	120
Pork Chop	10	10	10	10	10	10	10	10	10	10	10	10	120
Total	**40**	**40**	**40**	**40**	**40**	**40**	**40**	**40**	**40**	**40**	**40**	**40**	**480**

* Samples not collected

Site: MN

Meat Type	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Chicken Breast	10	10	10	10	10	10	10	10	10	10	10	10	120
Ground Turkey	*	10	10	10	10	10	10	10	10	10	10	10	110
Ground Beef	*	10	10	10	10	10	10	10	10	10	10	10	110
Pork Chop	10	10	10	10	10	10	10	10	10	10	10	10	120
Total:	**20**	**40**	**40**	**40**	**40**	**40**	**40**	**40**	**40**	**40**	**40**	**40**	**460**

Site: NY

Meat Type	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Chicken Breast	10	10	10	10	10	10	10	10	10	10	10	10	120
Ground Turkey	10	10	10	10	10	10	10	10	10	10	10	10	120
Ground Beef	10	10	10	10	10	10	10	10	10	10	10	10	120
Pork Chop	10	10	10	10	10	10	10	10	10	10	10	10	120
Total	**40**	**40**	**40**	**40**	**40**	**40**	**40**	**40**	**40**	**40**	**40**	**40**	**480**

Site: OR

Meat Type	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Chicken Breast	10	10	10	10	10	10	10	10	10	10	10	10	120
Ground Turkey	10	10	10	10	10	10	10	10	10	10	10	10	120
Ground Beef	10	10	10	10	10	10	10	10	10	10	10	10	120
Pork Chop	10	10	10	10	10	10	10	10	10	10	10	10	120
Total:	**40**	**40**	**40**	**40**	**40**	**40**	**40**	**40**	**40**	**40**	**40**	**40**	**480**

Site: TN

Meat Type	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Chicken Breast	10	10	10	10	10	10	10	10	10	10	10	8	117
Ground Turkey	10	5	8	10	10	4	*	10	*	10	10	10	87
Ground Beef	10	10	10	10	10	10	10	10	*	10	10	10	110
Pork Chop	10	10	10	10	10	10	10	10	9	10	10	10	119
Total:	**40**	**40**	**35**	**40**	**40**	**40**	**40**	**40**	**39**	**40**	**40**	**20**	**433**
Total Year:													**3533**

* Samples not collected

Appendix A-2. Percent Positive* Samples by Month, Meat Type, and Bacterium, 2003

Month: **January**

Meat Type: Chicken Breast

Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	75	32	42.7%
Salmonella	75	9	12.0%
Enterococcus	40	40	100.0%
Escherichia	40	31	77.5%

Meat Type: Ground Beef

Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	65	0	0.0%
Enterococcus	40	39	97.5%
Escherichia	40	31	77.5%
Salmonella	65	2	3.1%

Meat Type: Ground Turkey

Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	65	0	0.0%
Salmonella	65	9	13.8%
Enterococcus	40	38	95.0%
Escherichia	40	36	90.0%

Meat Type: Pork Chop

Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	75	2	2.7%
Salmonella	75	2	2.7%
Enterococcus	40	37	92.5%
Escherichia	40	12	30.0%

** Where % Positive= (# isolates of isolates / # of samples).

Month: February

Meat Type: Chicken Breast

Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	75	31	41.3%
Salmonella	75	6	8.0%
Enterococcus	40	40	100.0%
Escherichia	40	33	82.5%

Meat Type: Ground Beef

Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	75	1	1.3%
Salmonella	75	2	2.7%
Enterococcus	40	38	95.0%
Escherichia	40	32	80.0%

Meat Type: Ground Turkey

Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	70	0	0.0%
Salmonella	70	7	10.0%
Enterococcus	35	29	82.9%
Escherichia	35	19	54.3%

Meat Type: Pork Chop

Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	75	0	0.0%
Salmonella	75	0	0.0%
Enterococcus	40	39	97.5%
Escherichia	40	17	42.5%

Month: March

Meat Type: Chicken Breast

Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	75	27	36.0%
Salmonella	75	12	16.0%
Enterococcus	40	40	100.0%
Escherichia	40	40	100.0%

Meat Type: Ground Beef

Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	75	0	0.0%
Salmonella	75	2	2.7%
Enterococcus	40	35	87.5%
Escherichia	40	28	70.0%

Meat Type: Ground Turkey

Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	73	1	1.4%
Salmonella	73	8	11.0%
Enterococcus	38	34	89.5%
Escherichia	38	28	73.7%

Meat Type: Pork Chop

Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	75	0	0.0%
Salmonella	75	1	1.3%
Enterococcus	40	30	75.0%
Escherichia	40	30	75.0%

Month: April

Meat Type: Chicken Breast

Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	75	30	40.0%
Salmonella	75	4	5.3%
Enterococcus	40	38	95.0%
Escherichia	40	36	90.0%

Meat Type: Ground Beef

Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	75	0	0.0%
Salmonella	75	1	1.3%
Enterococcus	40	34	85.0%
Escherichia	40	22	55.0%

Meat Type: Ground Turkey

Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	75	0	0.0%
Salmonella	75	9	12.0%
Enterococcus	40	34	85.0%
Escherichia	40	30	75.0%

Meat Type: Pork Chop

Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	75	0	0.0%
Salmonella	75	0	0.0%
Enterococcus	40	39	97.5%
Escherichia	40	24	60.0%

Month: May

Meat Type: Chicken Breast

Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	75	40	53.3%
Salmonella	75	9	12.0%
Enterococcus	40	36	90.0%
Escherichia	40	37	92.5%

Meat Type: Ground Beef

Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	75	0	0.0%
Salmonella	75	0	0.0%
Enterococcus	40	38	95.0%
Escherichia	40	30	75.0%

Meat Type: Ground Turkey

Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	75	1	1.3%
Salmonella	75	17	22.7%
Enterococcus	40	37	92.5%
Escherichia	40	30	75.0%

Meat Type: Pork Chop

Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	75	1	1.3%
Salmonella	75	0	0.0%
Enterococcus	40	33	82.5%
Escherichia	40	21	52.5%

Month: June

Meat Type: Chicken Breast

Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	75	41	54.7%
Salmonella	75	9	12.0%
Enterococcus	40	39	97.5%
Escherichia	40	33	82.5%

Meat Type: Ground Beef

Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	75	0	0.0%
Salmonella	75	1	1.3%
Enterococcus	40	40	100.0%
Escherichia	40	30	75.0%

Meat Type: Ground Turkey

Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	69	0	0.0%
Salmonella	69	13	18.8%
Enterococcus	34	33	97.1%
Escherichia	34	27	79.4%

Meat Type: Pork Chop

Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	75	1	1.3%
Salmonella	75	0	0.0%
Enterococcus	40	35	87.5%
Escherichia	40	14	35.0%

Month: July

Meat Type: Chicken Breast

Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	74	53	71.6%
Salmonella	74	6	8.1%
Enterococcus	39	39	100.0%
Escherichia	39	29	74.4%

Meat Type: Ground Beef

Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	75	0	0.0%
Salmonella	75	0	0.0%
Enterococcus	40	34	85.0%
Escherichia	40	17	42.5%

Meat Type: Ground Turkey

Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	65	0	0.0%
Salmonella	65	11	16.9%
Enterococcus	30	30	100.0%
Escherichia	30	29	96.7%

Meat Type: Pork Chop

Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	75	0	0.0%
Salmonella	75	2	2.7%
Enterococcus	40	36	90.0%
Escherichia	40	17	42.5%

Month: August

Meat Type: Chicken Breast

Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	75	29	38.7%
Salmonella	75	9	12.0%
Enterococcus	40	39	97.5%
Escherichia	40	31	77.5%

Meat Type: Ground Beef

Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	75	0	0.0%
Salmonella	75	0	0.0%
Enterococcus	40	37	92.5%
Escherichia	40	28	70.0%

Meat Type: Ground Turkey

Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	75	0	0.0%
Enterococcus	40	39	97.5%
Escherichia	40	30	75.0%
Salmonella	75	13	17.3%

Meat Type: Pork Chop

Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	75	0	0.0%
Salmonella	75	0	0.0%
Enterococcus	40	39	97.5%
Escherichia	40	22	55.0%

Month: September

Meat Type: Chicken Breast

Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	75	50	66.7%
Salmonella	75	3	4.0%
Enterococcus	40	39	97.5%
Escherichia	40	32	80.0%

Meat Type: Ground Beef

Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	65	0	0.0%
Salmonella	65	2	3.1%
Enterococcus	30	26	86.7%
Escherichia	30	18	60.0%

Meat Type: Ground Turkey

Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	65	0	0.0%
Salmonella	65	11	16.9%
Enterococcus	30	30	100.0%
Escherichia	30	19	63.3%

Meat Type: Pork Chop

Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	74	0	0.0%
Salmonella	74	0	0.0%
Enterococcus	39	34	87.2%
Escherichia	39	17	43.6%

Month: October

Meat Type: Chicken Breast

Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	75	58	77.3%
Salmonella	75	2	2.7%
Enterococcus	40	39	97.5%
Escherichia	40	26	65.0%

Meat Type: Ground Beef

Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	75	0	0.0%
Salmonella	75	0	0.0%
Enterococcus	40	39	97.5%
Escherichia	40	24	60.0%

Meat Type: Ground Turkey

Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	75	3	4.0%
Salmonella	75	5	6.7%
Enterococcus	40	40	100.0%
Escherichia	40	28	70.0%

Meat Type: Pork Chop

Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	75	0	0.0%
Salmonella	75	0	0.0%
Enterococcus	40	37	92.5%
Escherichia	40	8	20.0%

Month: November

Meat Type: Chicken Breast

Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	75	26	34.7%
Salmonella	75	10	13.3%
Enterococcus	40	39	97.5%
Escherichia	40	31	77.5%

Meat Type: Ground Beef

Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	75	0	0.0%
Salmonella	75	0	0.0%
Enterococcus	40	36	90.0%
Escherichia	40	28	70.0%

Meat Type: Ground Turkey

Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	75	0	0.0%
Salmonella	75	3	4.0%
Enterococcus	40	38	95.0%
Escherichia	40	28	70.0%

Meat Type: Pork Chop

Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	75	0	0.0%
Salmonella	75	0	0.0%
Enterococcus	40	35	87.5%
Escherichia	40	18	45.0%

Month: December

Meat Type: Chicken Breast

Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	73	52	71.2%
Salmonella	73	4	5.5%
Enterococcus	38	38	100.0%
Escherichia	38	37	97.4%

Meat Type: Ground Beef

Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	75	0	0.0%
Salmonella	75	0	0.0%
Enterococcus	40	36	90.0%
Escherichia	40	23	57.5%

Meat Type: Ground Turkey

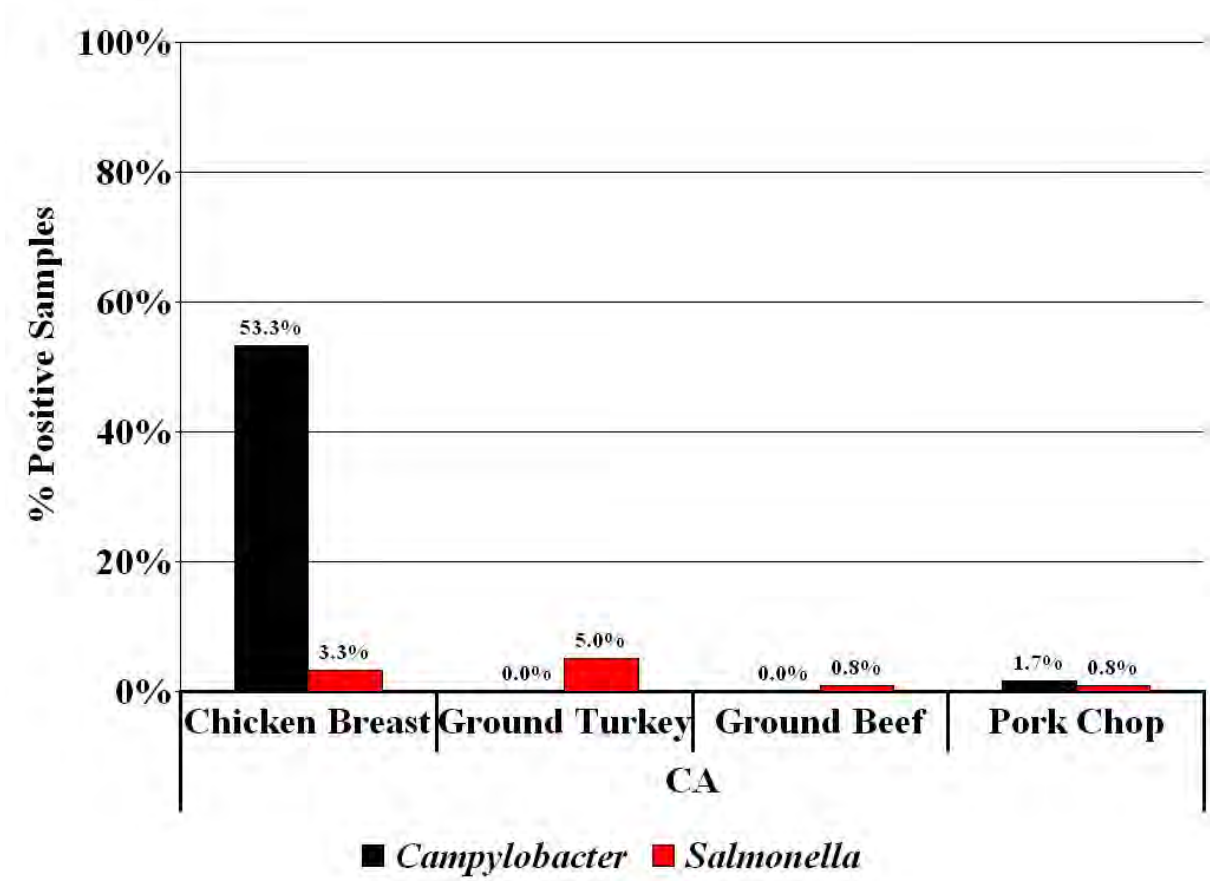
Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	75	0	0.0%
Salmonella	75	8	10.7%
Enterococcus	40	36	90.0%
Escherichia	40	29	72.5%

Meat Type: Pork Chop

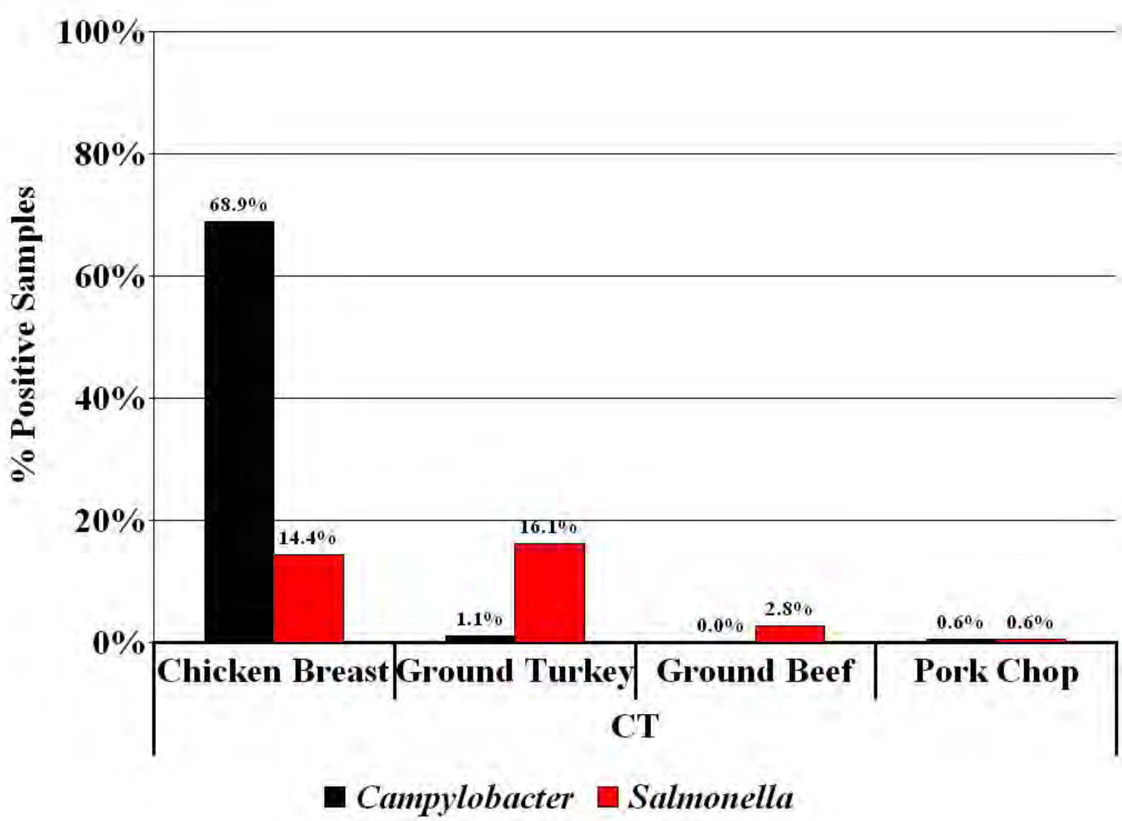
Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	75	0	0.0%
Salmonella	75	0	0.0%
Enterococcus	40	32	80.0%
Escherichia	40	18	45.0%

Meat Type	Site	Campylobacter N	Campylobacter Isolate	Campylobacter %Positive	Salmonella N	Salmonella Isolate	Salmonella %Positive	Enterococcus N	Enterococcus Isolate	Enterococcus %Positive	Escherichia N	Escherichia Isolate	Escherichia %Positive
Appendix A-3. Percent Positive Samples by Meat Type, Bacterium, and Site													
Chicken Breast	CA	120	64	53.3%	120	4	3.3%						
	CT	60	50	83.3%	60	9	15.0%						
	GA	120	76	63.3%	120	8	6.7%	120	119	99.2%	120	120	100.0%
	MD	120	38	31.7%	120	18	15.0%	120	113	94.2%	120	113	94.2%
	MN	120	62	51.7%	120	13	10.8%						
	NY	120	75	62.5%	120	11	9.2%						
	OR	120	45	37.5%	120	17	14.2%	120	119	99.2%	120	78	65.0%
	TN	117	59	50.4%	117	3	2.6%	117	115	98.3%	117	85	72.6%
	Total	**897**	**469**	**52.3%**	**897**	**83**	**9.3%**	**477**	**466**	**97.7%**	**477**	**396**	**83.0%**
Ground Turkey	CA	120	0	-	120	6	5.0%						
	CT	60	0	-	60	8	13.3%						
	GA	120	2	1.7%	120	27	22.5%	120	120	100.0%	120	117	97.5%
	MD	120	0	-	120	25	20.8%	120	103	85.8%	120	103	85.8%
	MN	110	3	2.7%	110	11	10.0%						
	NY	120	0	-	120	20	16.7%						
	OR	120	0	-	120	5	4.2%	120	108	90.0%	120	49	40.8%
	TN	87	0	-	87	12	13.8%	87	87	100.0%	87	64	73.6%
	Total	**857**	**5**	**0.6%**	**857**	**114**	**13.3%**	**447**	**418**	**93.5%**	**447**	**333**	**74.5%**
Ground Beef	CA	120	0	-	120	1	0.8%						
	CT	60	0	-	60	0	-						
	GA	120	0	-	120	2	1.7%	120	119	99.2%	120	90	75.0%
	MD	120	1	0.8%	120	3	2.5%	120	92	76.7%	120	87	72.5%
	MN	110	0	-	110	1	0.9%						
	NY	120	0	-	120	0	-						
	OR	120	0	-	120	2	1.7%	120	112	93.3%	120	57	47.5%
	TN	110	0	-	110	1	0.9%	110	109	99.1%	110	77	70.0%
	Total	**880**	**1**	**0.1%**	**880**	**10**	**1.1%**	**470**	**432**	**91.9%**	**470**	**311**	**66.2%**
Pork Chop	CA	120	2	1.7%	120	1	0.8%						
	CT	60	0	-	60	0	-						
	GA	120	0	-	120	0	-	120	116	96.7%	120	68	56.7%
	MD	120	0	-	120	1	0.8%	120	90	75.0%	120	71	59.2%
	MN	120	1	0.8%	120	0	-						
	NY	120	0	-	120	2	1.7%						
	OR	120	1	0.8%	120	1	0.8%	120	103	85.8%	120	28	23.3%
	TN	119	0	-	119	0	-	119	117	98.3%	119	51	42.9%
	Total	**899**	**4**	**0.4%**	**889**	**5**	**0.6%**	**479**	**426**	**88.9%**	**479**	**218**	**45.5%**
Total		**3533**	**479**	**13.6%**	**3533**	**212**	**6.0%**	**1873**	**1742**	**93.0%**	**1873**	**1258**	**67.2%**

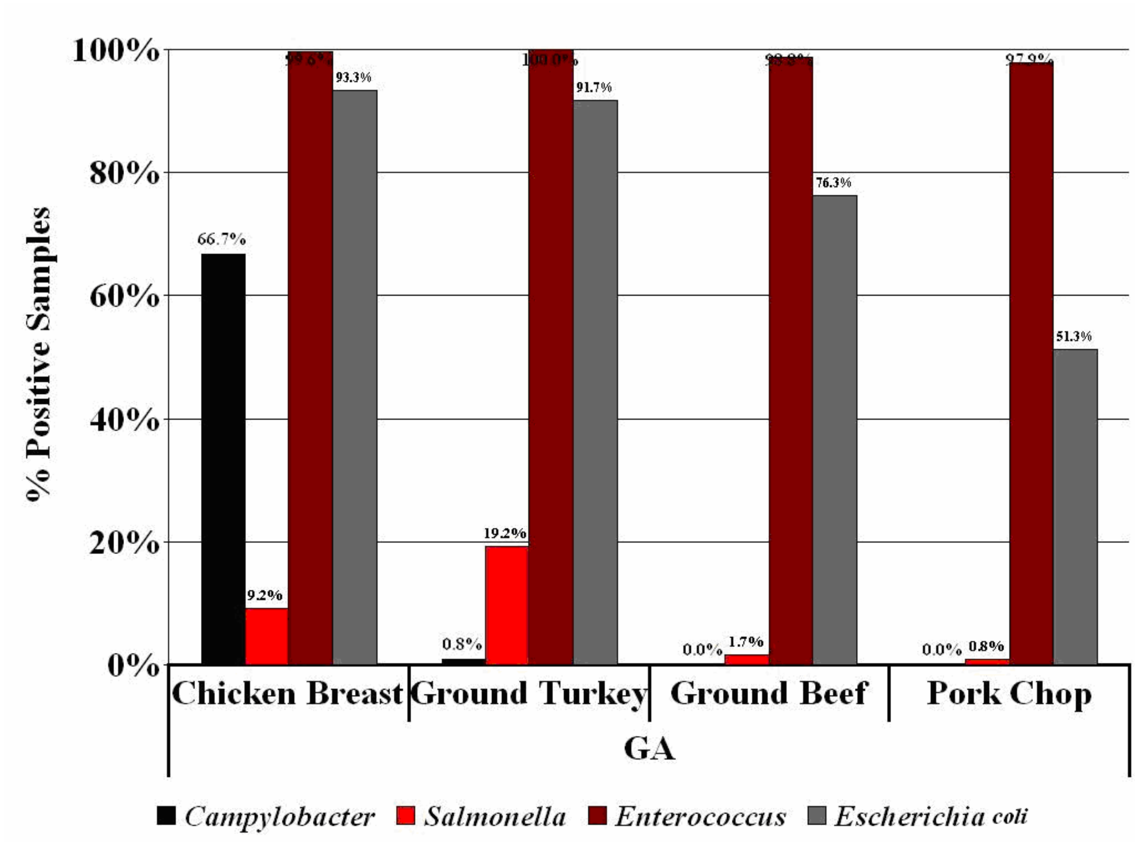
Appendix 3a. Percent Positive Samples by Meat Type, Bacterium in California, 2003



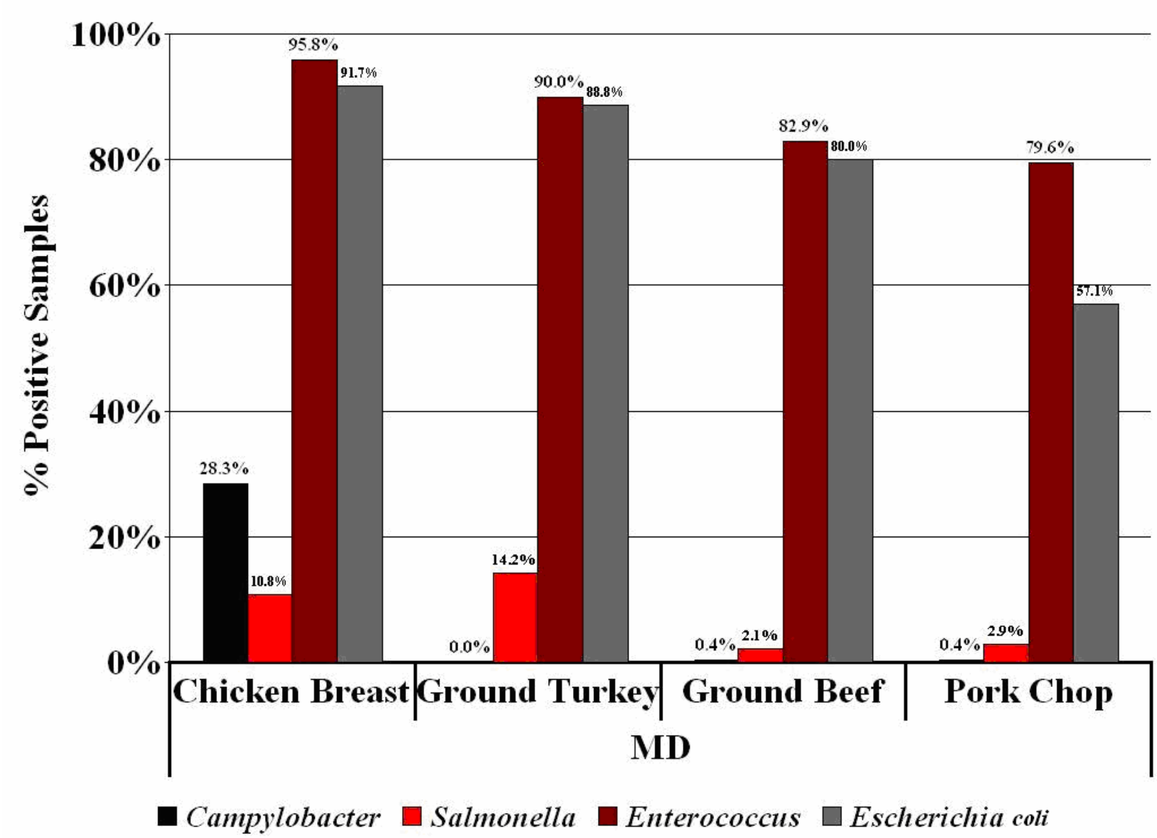
Appendix 3b. . Percent Positive Samples by Meat Type, Bacterium in Connecticut, 2003



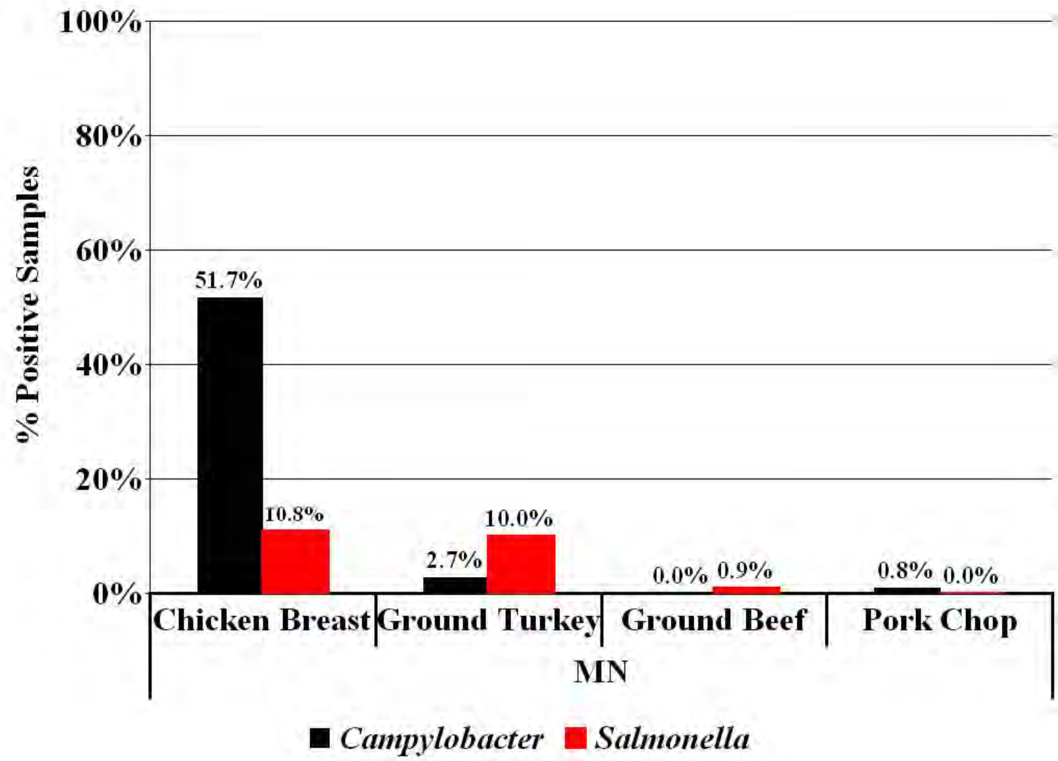
Appendix 3c. Percent Positive Samples by Meat Type, Bacterium in Georgia, 2003



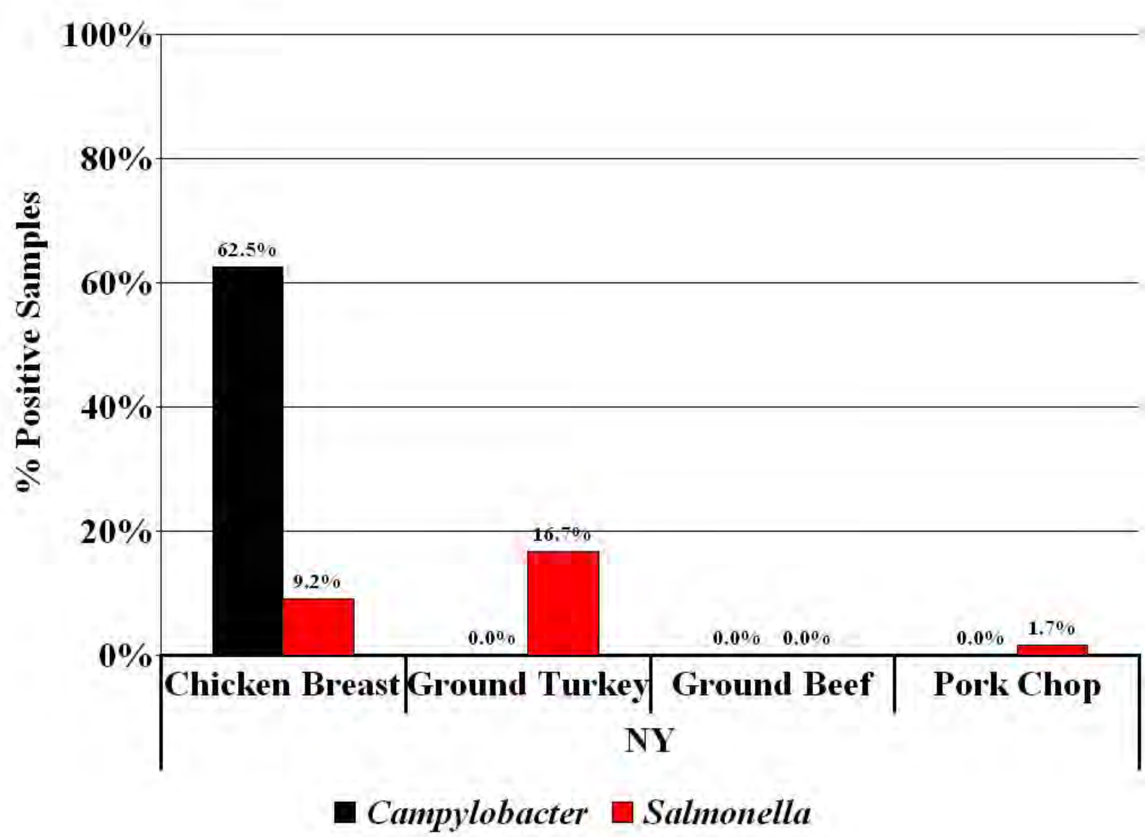
Appendix 3d. Percent Positive Samples by Meat Type, Bacterium in Maryland, 2003



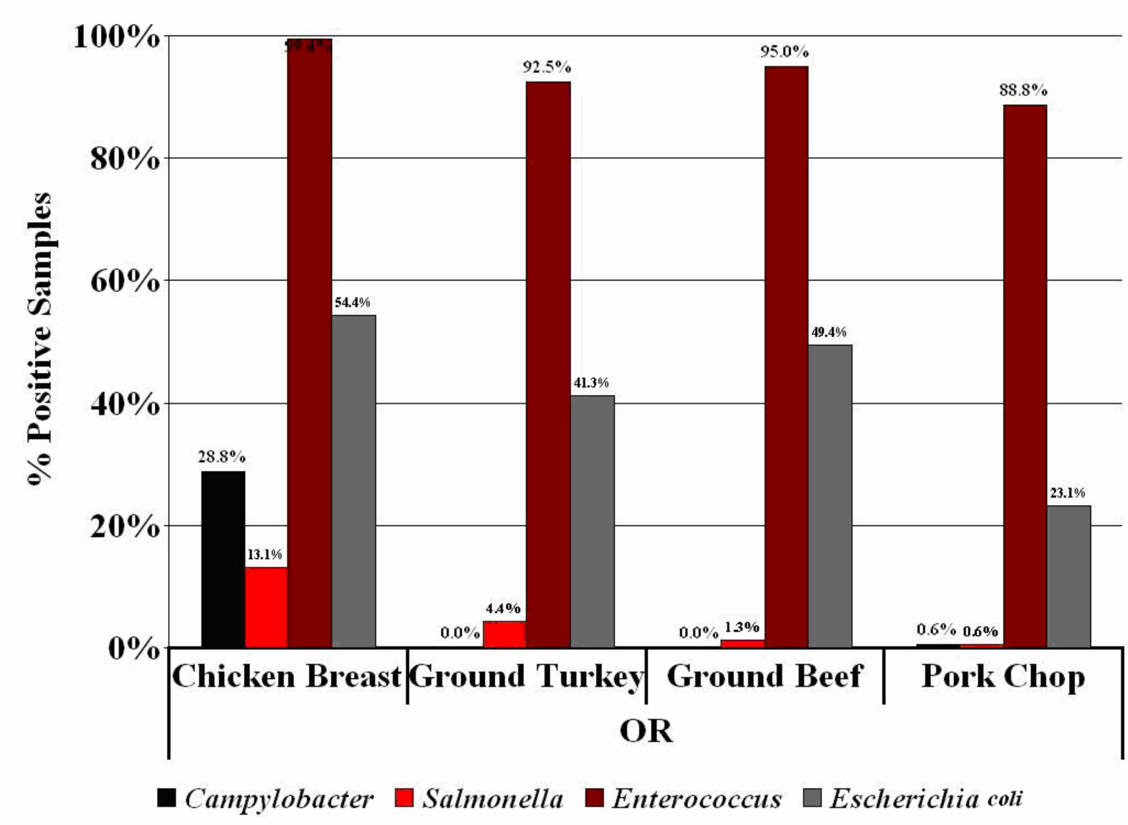
Appendix 3e. Percent Positive Samples by Meat Type, Bacterium in Minnesota, 2003



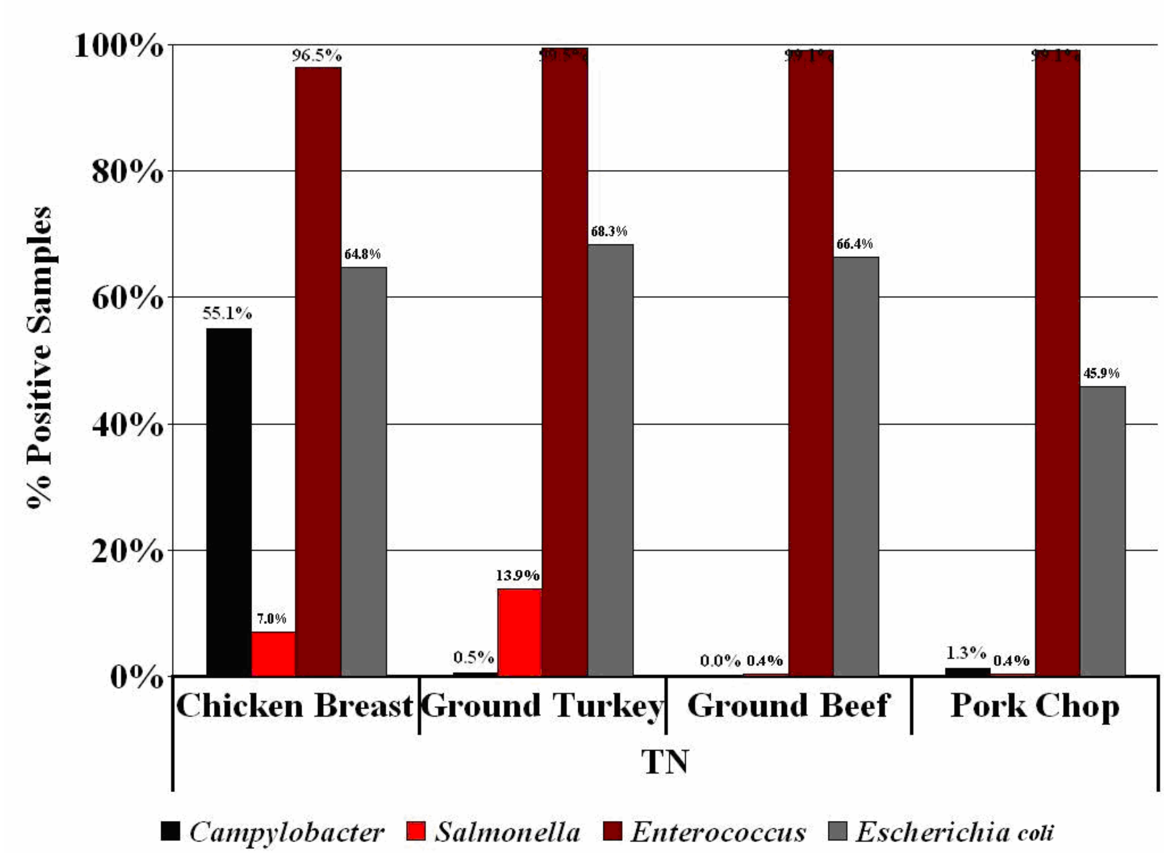
Appendix 3f. Percent Positive Samples by Meat Type, Bacterium in New York, 2003



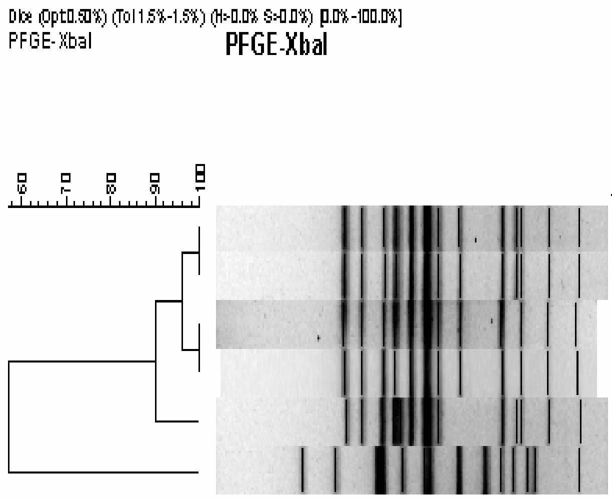
Appendix 3g. Percent Positive Samples by Meat Type, Bacterium in Oregon, 2003



Appendix 3h Percent Positive Samples by Meat Type, Bacterium in Tennessee, 2003



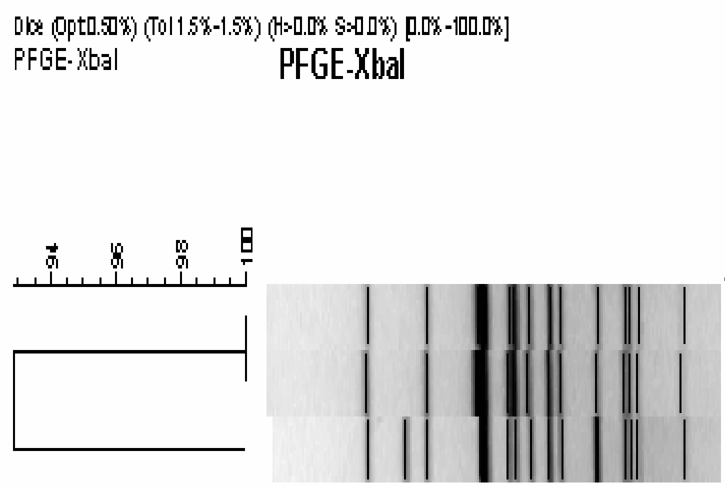
A-4a. PFGE Profiles for *Salmonella* Agona



Antibiogram

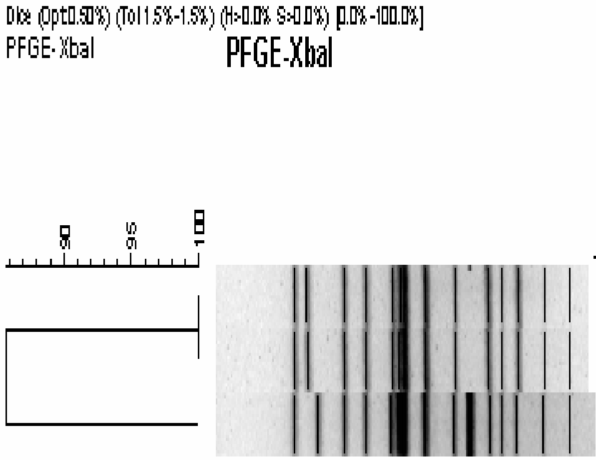
AMC	AMP	FOX	CEP	GEN	STR	SMX	TET	TIO	CVM #	State	Source	Date Isolated	Serotype
						■	■		32458	NY	Ground Turkey	10/03	Agona
						■	■		32459	NY	Ground Turkey	10/03	Agona
				■	■	■	■		28944	MD	Ground Turkey	02/03	Agona
	■		■	■	■	■	■		29983	NY	Ground Turkey	05/03	Agona
						■	■		32419	CT	Ground Turkey	09/03	Agona
■	■	■	■			■	■	■	30654	MD	Ground Turkey	05/03	Agona

A-4b. PFGE Profiles for *Salmonella* Brandenburg



CVM #	State	Source	Date Isolated	Serotype
29189	GA	Chicken Breast	02/03	Brandenburg
29190	GA	Chicken Breast	02/03	Brandenburg
29459	CA	Pork Chop	01/03	Brandenburg

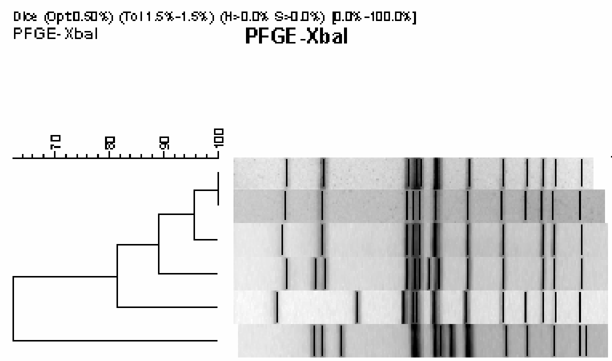
A-4c. PFGE Profiles for *Salmonella* Dublin



Antibiogram

AMC	AMP	FOX	AXO	CEP	CHL	STR	SMX	TET	TIO	CVM #	State	Source	Date Isolated	Serotype
■	■	■		■	■	■	■	■	■	23742	OR	Ground Beef	01/03	Dublin
■	■	■		■	■	■	■	■	■	23743	OR	Ground Beef	01/03	Dublin
■	■	■	■	■	■	■	■	■	■	29440	MN	Ground Beef	04/03	Dublin

A-4d. PFGE Profiles for *Salmonella* Enteritidis

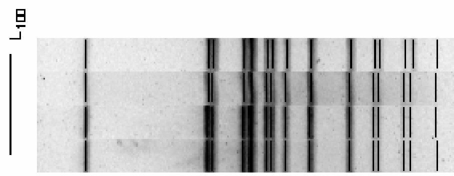


Antibiogram

AMC	AMP	FOX	CEP	TIO	CVM #	State	Source	Date Isolated	Serotype
					28947	MD	Ground Beef	03/03	Enteritidis
	■		■		30658	MD	Chicken Breast	06/03	Enteritidis
■	■	■	■	■	30661	MD	Chicken Breast	06/03	Enteritidis
					30663	MD	Ground Turkey	06/03	Enteritidis
					33944	MD	Chicken Breast	08/03	Enteritidis
					32393	MN	Chicken Breast	12/03	Enteritidis

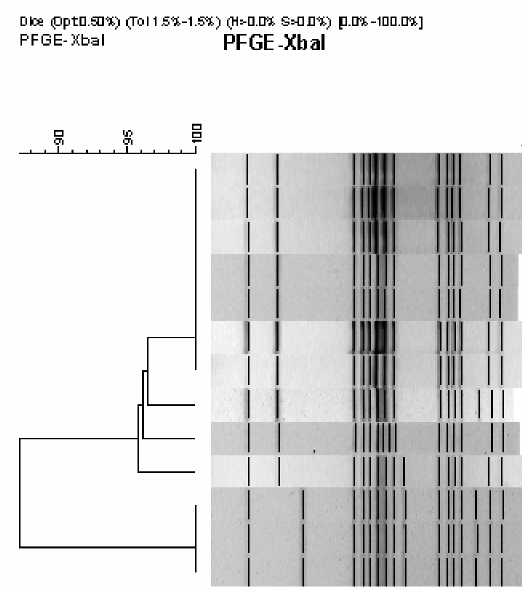
A-4e. PFGE Profiles for *Salmonella* Haardt

Dice (Opt:0.50%) (Tol 1.5%-1.5%) (H>0.0% S>0.0%) [0.0%-100.0%]
PFGE-XbaI **PFGE-XbaI**



CVM #	State	Source	Date Isolated	Serotype
23741	OR	Chicken Breast	01/03	Haardt
23744	OR	Chicken Breast	02/03	Haardt
23745	OR	Chicken Breast	02/03	Haardt
23746	OR	Chicken Breast	02/03	Haardt

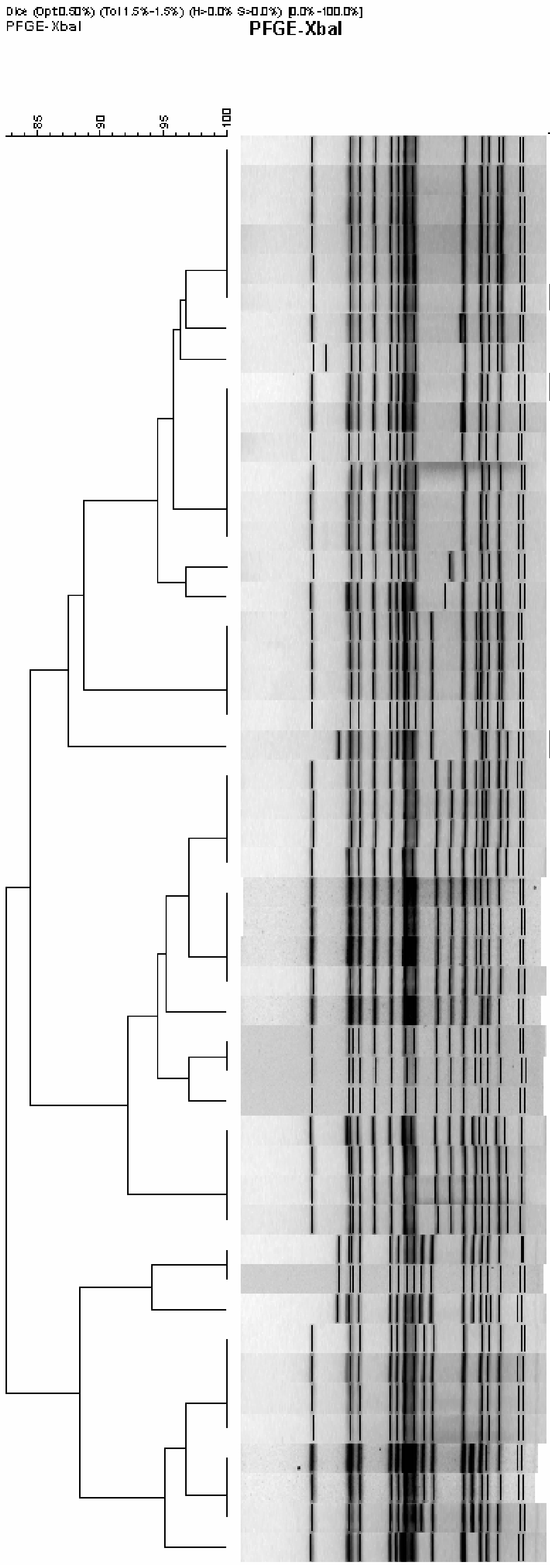
A-4f. PFGE Profiles for *Salmonella* Hadar



Antibiogram

AMP	CEP	GEN	KAN	STR	SMX	TET	CVM #	State	Source	Date Isolated	Serotype
				■		■	29477	TN	Ground Turkey	04/03	Hadar
				■		■	29478	TN	Ground Turkey	04/03	Hadar
				■		■	29479	TN	Ground Turkey	04/03	Hadar
■	■			■		■	30492	OR	Ground Turkey	07/03	Hadar
■	■			■		■	30493	OR	Ground Turkey	07/03	Hadar
				■		■	32106	OR	Chicken Breast	11/03	Hadar
		■	■	■	■	■	32998	CA	Ground Turkey	07/03	Hadar
■						■	23740	OR	Chicken Breast	01/03	Hadar
■	■			■		■	30491	OR	Ground Turkey	07/03	Hadar
				■		■	33002	CA	Ground Turkey	12/03	Hadar
				■		■	30652	MD	Ground Turkey	05/03	Hadar
				■		■	30653	MD	Ground Turkey	05/03	Hadar
						■	30655	MD	Ground Turkey	05/03	Hadar

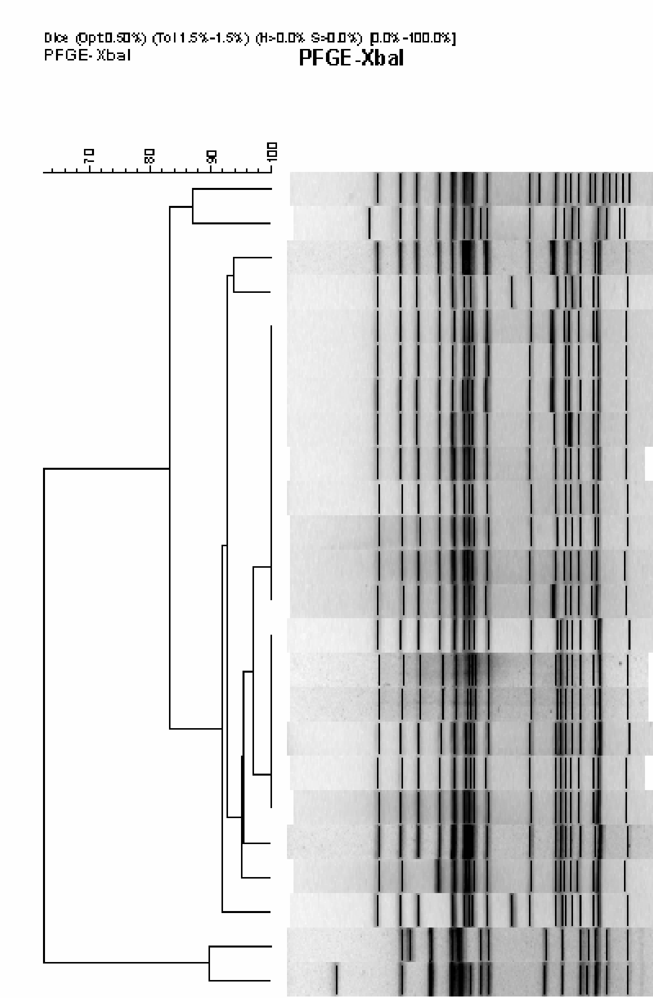
A-4g. PFGE Profiles for *Salmonella* Heidelberg



Antibiogram

AMC	AMP	FOX	CEP	GEN	KAN	STR	SMX	TET	TIO	CVM #	State	Source	Date Isolated	Serotype
										29473	TN	Chicken Breast	03/03	Heidelberg
										29475	TN	Chicken Breast	03/03	Heidelberg
										29762	OR	Chicken Breast	03/03	Heidelberg
				■		■	■			29763	OR	Chicken Breast	03/03	Heidelberg
										29767	OR	Chicken Breast	03/03	Heidelberg
■	■	■	■						■	32452	NY	Chicken Breast	09/03	Heidelberg
				■						29460	CA	Chicken Breast	03/03	Heidelberg
				■		■	■			29764	OR	Chicken Breast	03/03	Heidelberg
■			■							29989	NY	Ground Turkey	06/03	Heidelberg
										29990	NY	Ground Turkey	06/03	Heidelberg
										32505	GA	Ground Turkey	08/03	Heidelberg
										32506	GA	Ground Turkey	08/03	Heidelberg
										32509	GA	Ground Turkey	08/03	Heidelberg
										32510	GA	Ground Turkey	08/03	Heidelberg
	■									29441	MN	Chicken Breast	05/03	Heidelberg
	■		■							30032	CA	Chicken Breast	06/03	Heidelberg
										32102	OR	Chicken Breast	11/03	Heidelberg
										32103	OR	Chicken Breast	11/03	Heidelberg
										32104	OR	Chicken Breast	11/03	Heidelberg
										32105	OR	Chicken Breast	11/03	Heidelberg
■	■		■	■	■	■	■	■		29192	GA	Ground Turkey	02/03	Heidelberg
				■	■	■	■	■		32515	GA	Ground Turkey	10/03	Heidelberg
					■	■		■		33045	TN	Ground Turkey	12/03	Heidelberg
					■	■		■		33046	TN	Ground Turkey	12/03	Heidelberg
					■	■		■		33047	TN	Ground Turkey	12/03	Heidelberg
										29169	CT	Ground Turkey	01/03	Heidelberg
										29170	CT	Ground Turkey	01/03	Heidelberg
										29171	CT	Ground Turkey	01/03	Heidelberg
						■	■			33044	TN	Ground Turkey	06/03	Heidelberg
										29184	GA	Chicken Breast	01/03	Heidelberg
										30489	OR	Ground Turkey	07/03	Heidelberg
										30490	OR	Ground Turkey	07/03	Heidelberg
										30488	OR	Chicken Breast	07/03	Heidelberg
					■	■		■		30276	GA	Ground Turkey	04/03	Heidelberg
					■	■		■		30277	GA	Ground Turkey	04/03	Heidelberg
					■	■		■		32507	GA	Ground Turkey	08/03	Heidelberg
					■	■		■		33048	TN	Ground Turkey	12/03	Heidelberg
	■		■	■	■	■	■	■		30484	MN	Ground Turkey	06/03	Heidelberg
■	■		■	■	■	■	■	■		30485	MN	Ground Turkey	06/03	Heidelberg
										33940	MD	Ground Turkey	07/03	Heidelberg
										29195	GA	Ground Turkey	03/03	Heidelberg
										32517	GA	Ground Turkey	11/03	Heidelberg
										33952	MD	Ground Turkey	12/03	Heidelberg
										33954	MD	Ground Turkey	12/03	Heidelberg
								■		29186	GA	Ground Turkey	01/03	Heidelberg
								■		29187	GA	Ground Turkey	01/03	Heidelberg
								■		32420	CT	Ground Turkey	09/03	Heidelberg
										29988	NY	Ground Turkey	06/03	Heidelberg

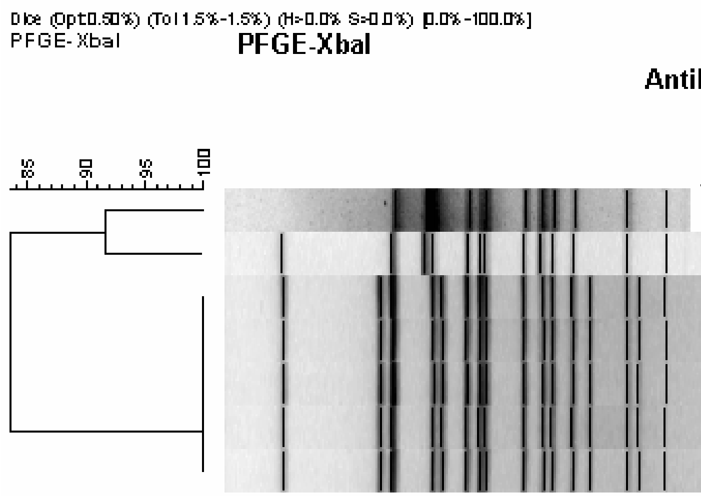
A-4h. PFGE Profiles for *Salmonella* Kentucky



Antibiogram

AMC	AMP	FOX	CEP	GEN	STR	SMX	TET	TIO	CVM #	State	Source	Date Isolated	Serotype
■	■	■	■		■			■	32413	CT	Chicken Breast	08/03	Kentucky
					■		■		33001	CA	Chicken Breast	10/03	Kentucky
									29442	MN	Chicken Breast	05/03	Kentucky
									30033	CA	Chicken Breast	06/03	Kentucky
									29437	MN	Chicken Breast	04/03	Kentucky
									29438	MN	Chicken Breast	04/03	Kentucky
									29439	MN	Chicken Breast	04/03	Kentucky
					■		■		29766	OR	Chicken Breast	03/03	Kentucky
				■	■	■	■		29981	NY	Chicken Breast	05/03	Kentucky
									32387	MN	Chicken Breast	10/03	Kentucky
									32388	MN	Ground Turkey	10/03	Kentucky
									32390	MN	Ground Turkey	10/03	Kentucky
									32392	MN	Chicken Breast	11/03	Kentucky
					■		■		28915	NY	Chicken Breast	03/03	Kentucky
■	■	■	■		■		■	■	29166	CT	Chicken Breast	01/03	Kentucky
					■		■		29167	CT	Chicken Breast	01/03	Kentucky
■	■	■	■		■		■	■	29188	GA	Chicken Breast	02/03	Kentucky
■	■	■	■		■		■	■	29980	NY	Chicken Breast	05/03	Kentucky
					■		■		32453	NY	Chicken Breast	09/03	Kentucky
					■		■		29474	TN	Chicken Breast	03/03	Kentucky
■	■	■	■		■		■	■	32460	NY	Chicken Breast	11/03	Kentucky
					■		■		29978	NY	Chicken Breast	04/03	Kentucky
				■	■	■	■		29471	TN	Ground Turkey	01/03	Kentucky
					■		■		30440	GA	Ground Turkey	06/03	Kentucky

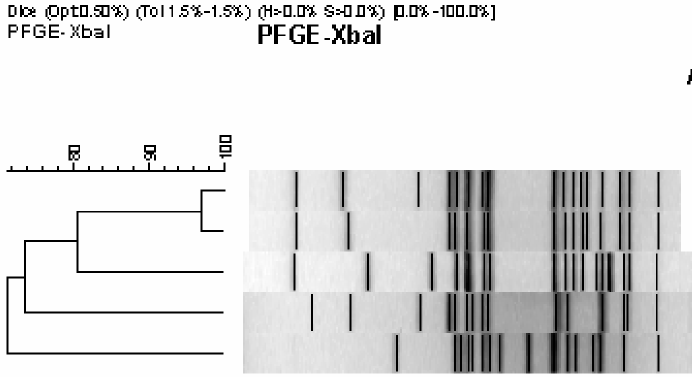
A-4i. PFGE Profiles for *Salmonella* Mbandaka



Antibiogram

TET	CVM #	State	Source	Date Isolated	Serotype
■	29185	GA	Chicken Breast	01/03	Mbandaka
■	32511	GA	Chicken Breast	09/03	Mbandaka
	30479	MN	Chicken Breast	07/03	Mbandaka
	30480	MN	Chicken Breast	07/03	Mbandaka
	30481	MN	Chicken Breast	07/03	Mbandaka
	30482	MN	Chicken Breast	07/03	Mbandaka
	30483	MN	Chicken Breast	07/03	Mbandaka

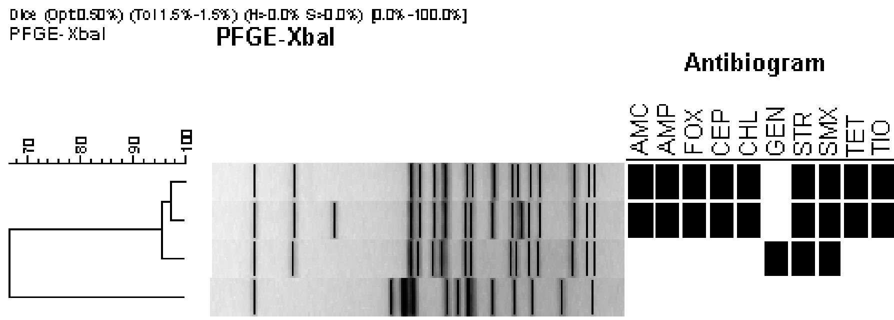
A-4j. PFGE Profiles for *Salmonella* Montevideo



Antibiogram

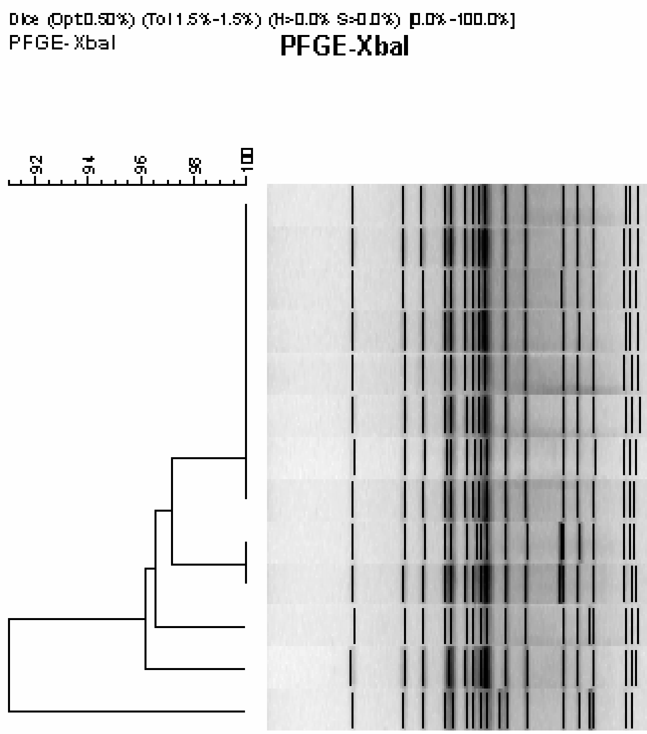
GEN	KAN	STR	SMX	CVM #	State	Source	Date Isolated	Serotype
	■	■		29984	NY	Ground Turkey	05/03	Montevideo
	■	■		29985	NY	Ground Turkey	05/03	Montevideo
■		■	■	29765	OR	Chicken Breast	03/03	Montevideo
				32513	GA	Ground Beef	09/03	Montevideo
				32514	GA	Ground Beef	09/03	Montevideo

A-4k. PFGE Profiles for *Salmonella* Newport



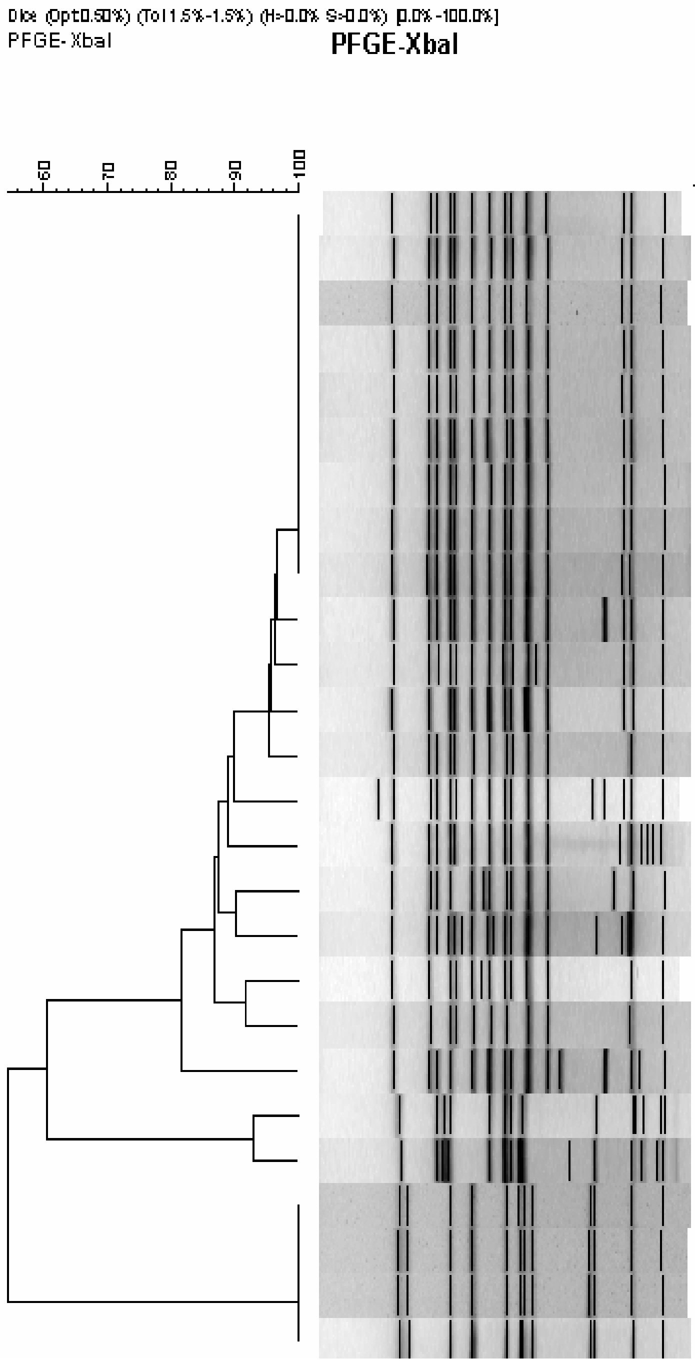
CVM #	State	Source	Date Isolated	Serotype
29461	CA	Ground Beef	03/03	Newport
29768	OR	Pork Chop	03/03	Newport
33000	CA	Ground Turkey	09/03	Newport
33953	MD	Ground Turkey	12/03	Newport

A-4l. PFGE Profiles for *Salmonella* Reading



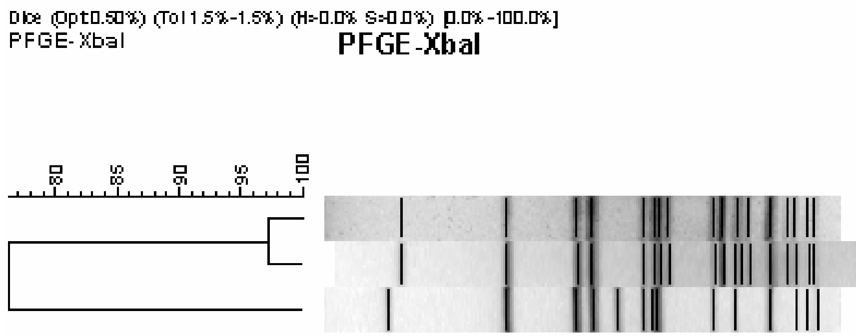
Antibiogram										
AMP	CEP	GEN	STR	SMX	TET	CVM #	State	Source	Date Isolated	Serotype
						29443	MN	Ground Turkey	05/03	Reading
						29444	MN	Ground Turkey	05/03	Reading
						29445	MN	Ground Turkey	05/03	Reading
						29446	MN	Ground Turkey	05/03	Reading
						29447	MN	Ground Turkey	05/03	Reading
						29480	TN	Ground Turkey	04/03	Reading
		■	■	■		32451	NY	Ground Turkey	08/03	Reading
						32997	CA	Ground Turkey	07/03	Reading
					■	29436	MN	Ground Turkey	03/03	Reading
					■	32999	CA	Ground Turkey	08/03	Reading
						29476	TN	Ground Turkey	04/03	Reading
		■		■		32386	MN	Ground Turkey	08/03	Reading
■	■				■	32508	GA	Ground Turkey	08/03	Reading

A-4m. PFGE Profiles for *Salmonella* Saintpaul



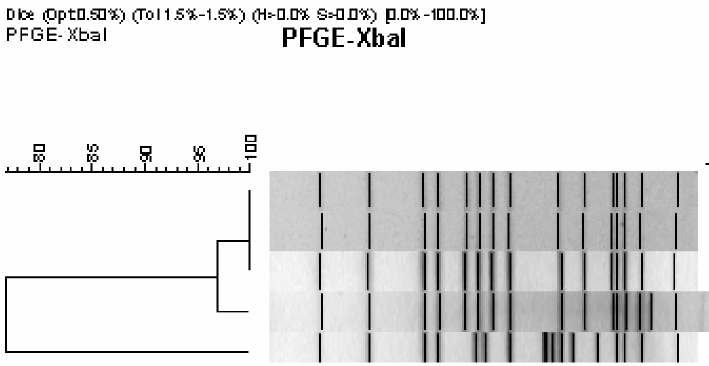
AMC	AMP	CEP	GEN	KAN	NAL	STR	SMX	TET	CVM #	State	Source	Date Isolated	Serotype
■	■	■		■		■	■		29982	NY	Ground Turkey	05/03	Saintpaul
	■	■		■			■		30357	GA	Ground Turkey	05/03	Saintpaul
	■	■			■	■	■		30659	MD	Chicken Breast	06/03	Saintpaul
	■	■		■	■	■	■		32455	NY	Ground Turkey	09/03	Saintpaul
	■	■	■	■		■	■		32456	NY	Ground Turkey	09/03	Saintpaul
■	■	■	■	■		■	■		32461	NY	Ground Turkey	11/03	Saintpaul
	■	■	■	■		■	■		33941	MD	Ground Turkey	07/03	Saintpaul
■	■	■	■	■		■	■		33946	MD	Ground Turkey	09/03	Saintpaul
	■	■	■	■		■	■		33947	MD	Ground Turkey	09/03	Saintpaul
■	■	■	■	■		■	■	■	28939	MD	Ground Turkey	01/03	Saintpaul
■	■	■	■	■		■	■		33948	MD	Ground Turkey	09/03	Saintpaul
	■	■		■		■	■		29193	GA	Ground Turkey	03/03	Saintpaul
					■		■		32418	CT	Ground Turkey	08/03	Saintpaul
■	■	■	■	■		■	■		29194	GA	Ground Turkey	03/03	Saintpaul
					■				32417	CT	Ground Turkey	08/03	Saintpaul
■	■	■	■	■		■	■		28916	NY	Ground Turkey	03/03	Saintpaul
	■	■	■	■		■	■	■	29196	GA	Ground Turkey	03/03	Saintpaul
	■	■				■	■		28943	MD	Ground Turkey	02/03	Saintpaul
					■				32416	CT	Ground Turkey	08/03	Saintpaul
	■	■	■			■	■	■	28940	MD	Ground Turkey	01/03	Saintpaul
								■	29191	GA	Ground Turkey	02/03	Saintpaul
								■	33043	TN	Ground Turkey	06/03	Saintpaul
									30656	MD	Ground Turkey	05/03	Saintpaul
									30657	MD	Ground Turkey	05/03	Saintpaul
									30660	MD	Chicken Breast	06/03	Saintpaul
									30664	MD	Ground Turkey	06/03	Saintpaul

A-4n. PFGE Profiles for *Salmonella* Schwarzengrund



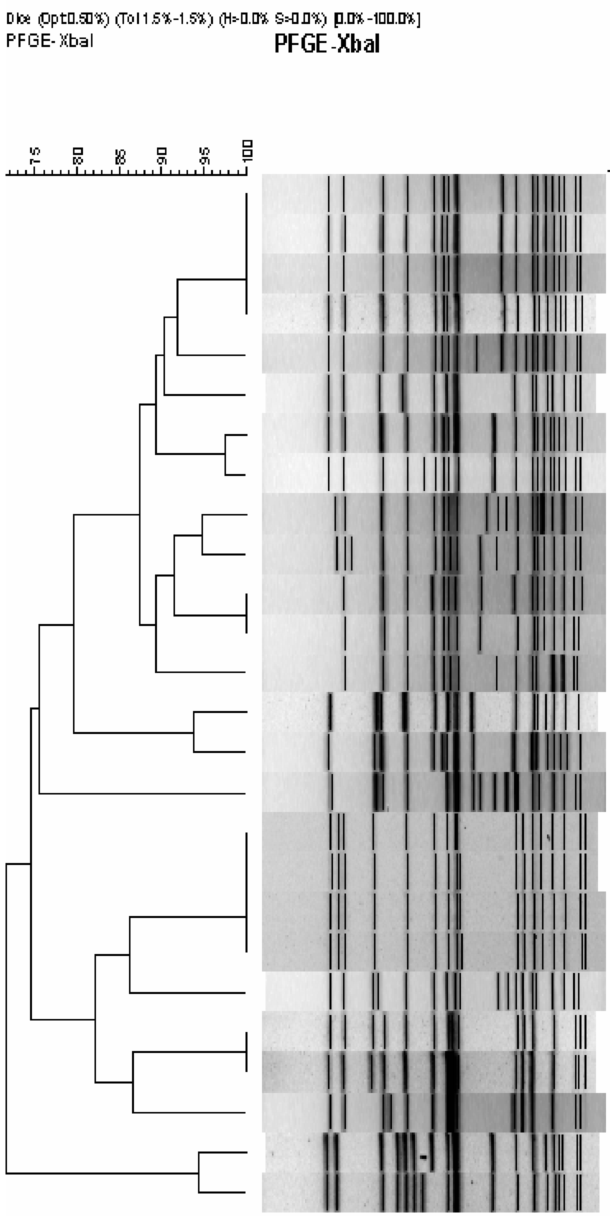
CVM #	State	Source	Date Isolated	Serotype
28945	MD	Ground Turkey	02/03	Schwarzengrund
29197	GA	Ground Turkey	03/03	Schwarzengrund
32516	GA	Chicken Breast	11/03	Schwarzengrund

A-4o. PFGE Profiles for *Salmonella* Senftenberg



Antibiogram									
AMP	CEP	GEN	KAN	STR	CVM #	State	Source	Date Isolated	Serotype
■	■				30646	MD	Ground Turkey	04/03	Senftenberg
■	■		■	■	30647	MD	Ground Turkey	04/03	Senftenberg
					32454	NY	Ground Turkey	09/03	Senftenberg
■	■	■	■	■	32462	NY	Ground Turkey	11/03	Senftenberg
					32512	GA	Ground Turkey	09/03	Senftenberg

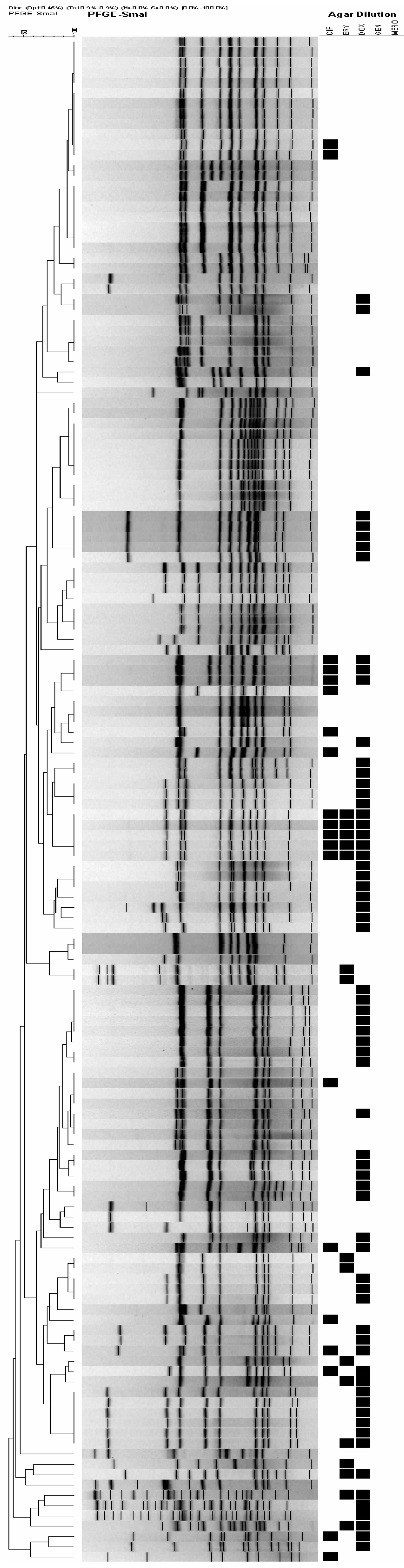
A-4p. PFGE Profiles for *Salmonella* Typhimurium



Antibiogram

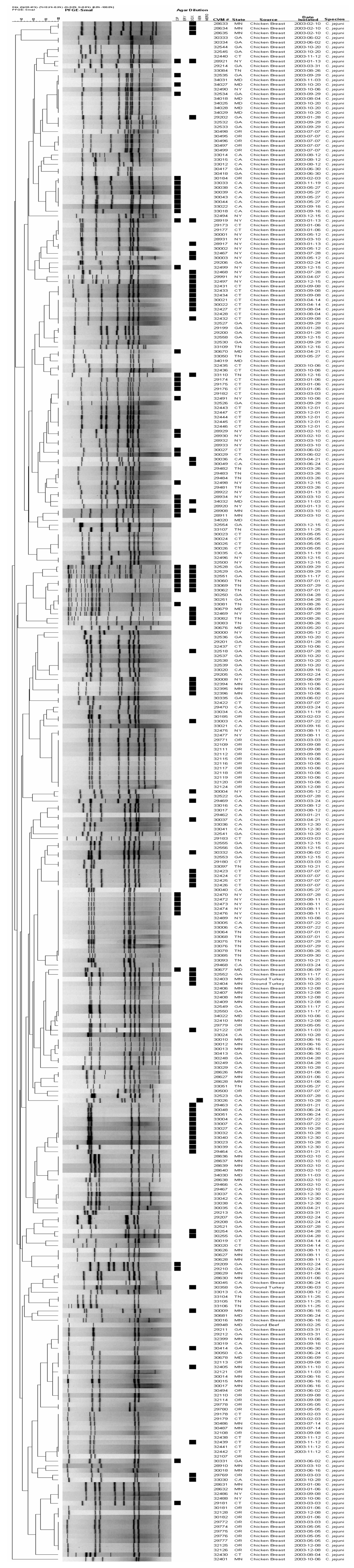
AMC	AMP	FOX	CEP	CHL	KAN	NAL	STR	SMX	TET	TIO	CVM #	State	Source	Date Isolated	Serotype
■	■	■	■							■	32504	GA	Chicken Breast	08/03	Typhimurium var. O 5 - (Copenhagen)
■	■	■	■							■	33949	MD	Chicken Breast	11/03	Typhimurium var. O 5 - (Copenhagen)
■	■	■	■							■	33950	MD	Chicken Breast	11/03	Typhimurium var. O 5 - (Copenhagen)
■	■	■	■							■	28937	MD	Chicken Breast	01/03	Typhimurium var. O 5 - (Copenhagen)
■	■	■	■							■	33951	MD	Chicken Breast	11/03	Typhimurium var. O 5 - (Copenhagen)
											29979	NY	Chicken Breast	05/03	Typhimurium
■	■	■	■							■	33942	MD	Chicken Breast	08/03	Typhimurium var. O 5 - (Copenhagen)
■	■	■	■				■			■	33943	MD	Chicken Breast	08/03	Typhimurium var. O 5 - (Copenhagen)
■	■	■	■		■			■	■	■	32412	CT	Chicken Breast	08/03	Typhimurium var. O 5 - (Copenhagen)
■	■	■	■		■			■	■	■	32414	CT	Chicken Breast	08/03	Typhimurium var. O 5 - (Copenhagen)
								■	■		32415	CT	Chicken Breast	08/03	Typhimurium var. O 5 - (Copenhagen)
■	■	■	■		■			■	■	■	32463	NY	Chicken Breast	12/03	Typhimurium var. O 5 - (Copenhagen)
■	■	■	■		■			■	■	■	32421	CT	Chicken Breast	12/03	Typhimurium var. O 5 - (Copenhagen)
■	■	■	■							■	28914	NY	Ground Turkey	02/03	Typhimurium
■	■	■	■				■			■	33945	MD	Chicken Breast	08/03	Typhimurium var. O 5 - (Copenhagen)
■	■	■	■	■	■	■	■	■	■	■	30034	CA	Ground Turkey	06/03	Typhimurium var. O 5 - (Copenhagen)
											30648	MD	Chicken Breast	05/03	Typhimurium
											30649	MD	Chicken Breast	05/03	Typhimurium
											30650	MD	Chicken Breast	05/03	Typhimurium
											30651	MD	Chicken Breast	05/03	Typhimurium
											30666	MD	Ground Beef	06/03	Typhimurium var. O 5 - (Copenhagen)
	■			■			■	■	■		28938	MD	Chicken Breast	01/03	Typhimurium var. O 5 - (Copenhagen)
	■		■	■			■	■	■		28941	MD	Pork Chop	01/03	Typhimurium var. O 5 - (Copenhagen)
	■			■			■	■	■		30662	MD	Chicken Breast	06/03	Typhimurium var. O 5 - (Copenhagen)
■	■	■	■							■	29168	CT	Chicken Breast	01/03	Typhimurium
■	■	■	■							■	29172	CT	Chicken Breast	03/03	Typhimurium var. O 5 - (Copenhagen)

A-4q. PFGE Profiles for *Campylobacter coli*

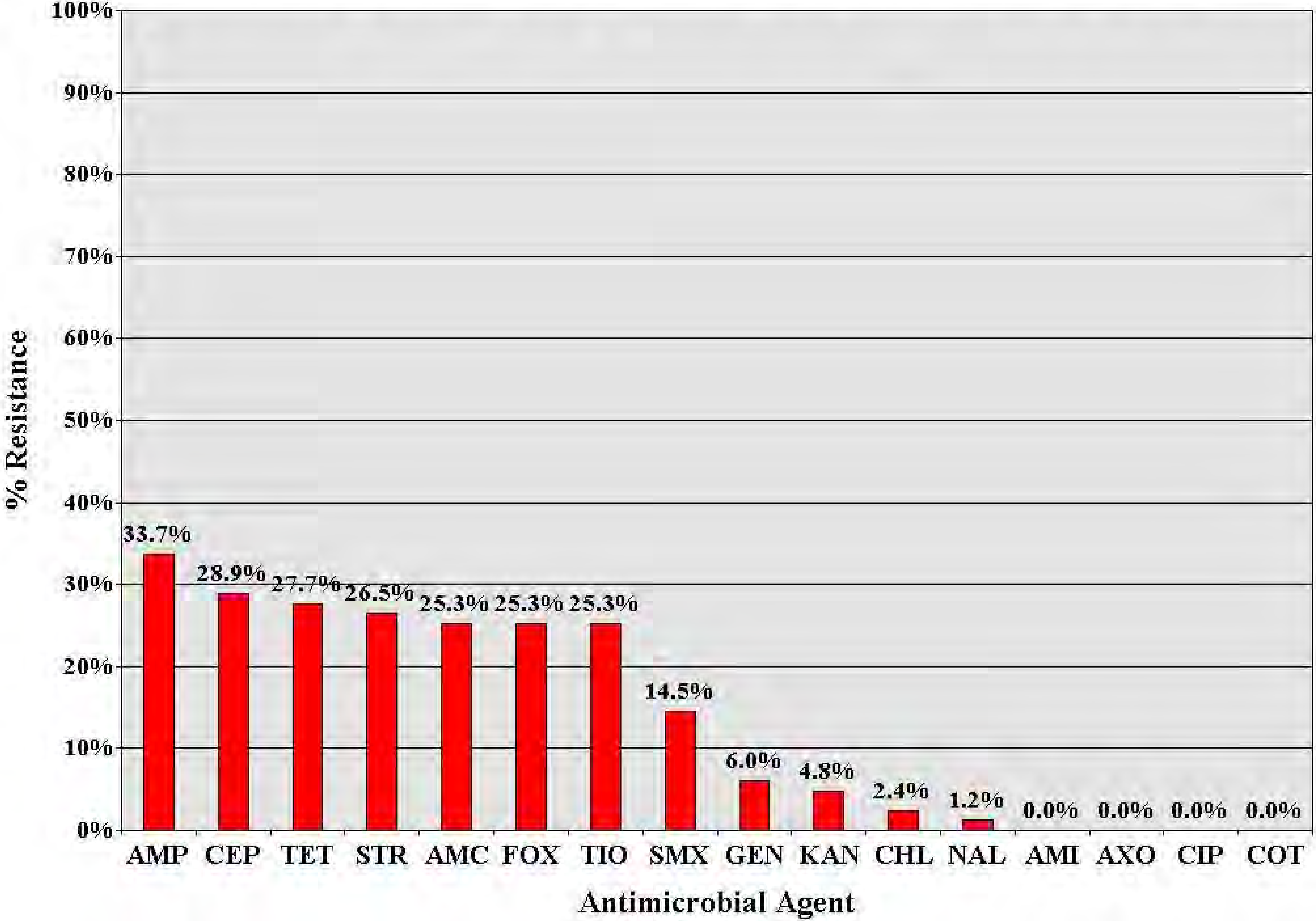


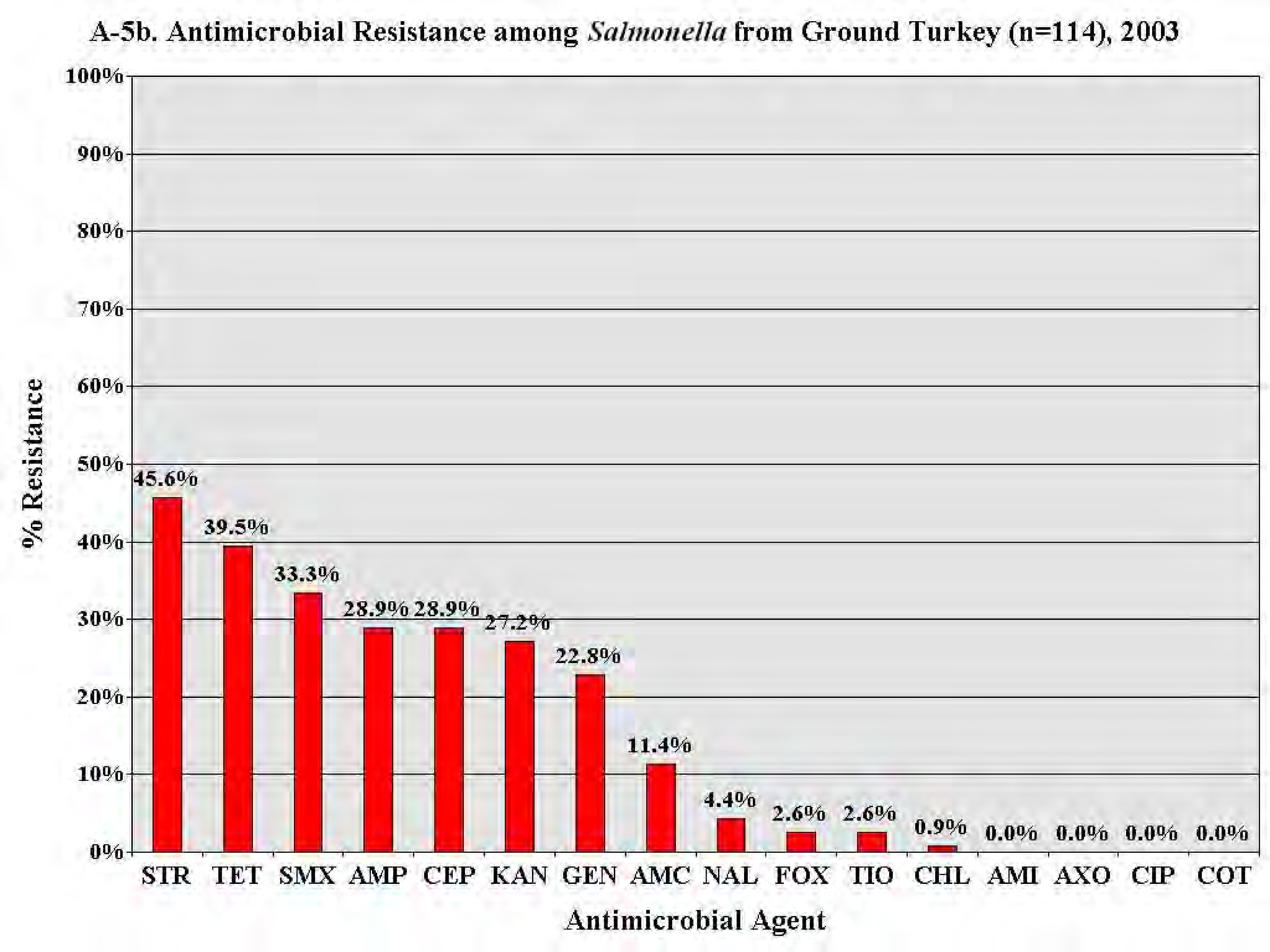
CVM #	State	Source	Date Isolated	Species
34014	MD	Chicken Breast	2003-07-21	C. coli
34037	MD	Chicken Breast	2003-12-15	C. coli
34021	MD	Chicken Breast	2003-10-06	C. coli
34023	MD	Chicken Breast	2003-10-06	C. coli
34035	MD	Chicken Breast	2003-12-15	C. coli
34009	MD	Chicken Breast	2003-07-21	C. coli
34010	MD	Chicken Breast	2003-07-21	C. coli
34011	MD	Chicken Breast	2003-07-21	C. coli
34012	MD	Chicken Breast	2003-07-21	C. coli
34016	MD	Chicken Breast	2003-07-21	C. coli
34033	MD	Chicken Breast	2003-12-15	C. coli
34036	MD	Chicken Breast	2003-12-15	C. coli
33009	CA	Chicken Breast	2003-07-22	C. coli
33010	CA	Chicken Breast	2003-07-22	C. coli
32520	GA	Chicken Breast	2003-07-28	C. coli
33061	TN	Chicken Breast	2003-07-01	C. coli
33070	TN	Chicken Breast	2003-07-29	C. coli
33071	TN	Chicken Breast	2003-07-29	C. coli
33072	TN	Chicken Breast	2003-07-29	C. coli
33073	TN	Chicken Breast	2003-07-29	C. coli
33077	TN	Chicken Breast	2003-07-29	C. coli
32546	GA	Chicken Breast	2003-11-17	C. coli
32547	GA	Chicken Breast	2003-11-17	C. coli
33028	CA	Chicken Breast	2003-10-28	C. coli
33031	CA	Chicken Breast	2003-10-28	C. coli
29997	NY	Chicken Breast	2003-04-07	C. coli
29998	NY	Chicken Breast	2003-04-07	C. coli
29453	MN	Chicken Breast	2003-05-05	C. coli
29454	MN	Chicken Breast	2003-05-05	C. coli
29455	MN	Chicken Breast	2003-05-05	C. coli
29457	MN	Chicken Breast	2003-05-05	C. coli
29456	MN	Chicken Breast	2003-05-05	C. coli
32429	CT	Chicken Breast	2003-08-04	C. coli
32557	GA	Chicken Breast	2003-12-15	C. coli
33008	CA	Chicken Breast	2003-07-22	C. coli
32542	GA	Chicken Breast	2003-10-20	C. coli
32543	GA	Chicken Breast	2003-10-20	C. coli
30041	CA	Chicken Breast	2003-05-27	C. coli
30042	CA	Chicken Breast	2003-05-27	C. coli
30642	MN	Chicken Breast	2003-09-15	C. coli
30643	MN	Chicken Breast	2003-09-15	C. coli
30644	MN	Chicken Breast	2003-09-15	C. coli
30645	MN	Chicken Breast	2003-09-15	C. coli
32397	MN	Chicken Breast	2003-10-06	C. coli
32398	MN	Chicken Breast	2003-10-06	C. coli
32400	MN	Chicken Breast	2003-10-06	C. coli
29448	MN	Chicken Breast	2003-04-07	C. coli
29449	MN	Chicken Breast	2003-04-07	C. coli
29450	MN	Chicken Breast	2003-04-07	C. coli
29451	MN	Chicken Breast	2003-04-07	C. coli
29452	MN	Chicken Breast	2003-04-07	C. coli
33074	TN	Chicken Breast	2003-07-29	C. coli
34038	MD	Chicken Breast	2003-12-15	C. coli
34039	MD	Chicken Breast	2003-12-15	C. coli
34042	MD	Chicken Breast	2003-12-15	C. coli
30028	CT	Chicken Breast	2003-06-02	C. coli
30030	CT	Chicken Breast	2003-06-02	C. coli
30031	CT	Chicken Breast	2003-06-02	C. coli
33065	TN	Chicken Breast	2003-07-01	C. coli
30046	CA	Chicken Breast	2003-06-24	C. coli
32483	NY	Chicken Breast	2003-09-08	C. coli
32485	NY	Chicken Breast	2003-09-08	C. coli
32487	NY	Chicken Breast	2003-09-08	C. coli
33095	TN	Chicken Breast	2003-10-21	C. coli
29770	OR	Chicken Breast	2003-03-03	C. coli
29773	OR	Chicken Breast	2003-05-05	C. coli
30047	CA	Chicken Breast	2003-06-24	C. coli
34024	MD	Chicken Breast	2003-10-06	C. coli
29999	NY	Chicken Breast	2003-04-07	C. coli
33080	TN	Chicken Breast	2003-08-26	C. coli
34034	MD	Chicken Breast	2003-12-15	C. coli
34040	MD	Chicken Breast	2003-12-15	C. coli
32464	NY	Chicken Breast	2003-07-28	C. coli
32465	NY	Chicken Breast	2003-07-28	C. coli
32466	NY	Chicken Breast	2003-07-28	C. coli
33098	TN	Chicken Breast	2003-10-25	C. coli
33099	TN	Chicken Breast	2003-10-25	C. coli
33100	TN	Chicken Breast	2003-10-25	C. coli
33101	TN	Chicken Breast	2003-10-25	C. coli
33102	TN	Chicken Breast	2003-10-25	C. coli
30252	GA	Chicken Breast	2003-04-28	C. coli
30253	GA	Chicken Breast	2003-04-28	C. coli
32525	GA	Chicken Breast	2003-08-25	C. coli
32524	GA	Chicken Breast	2003-07-28	C. coli
32519	GA	Chicken Breast	2003-07-28	C. coli
33090	TN	Chicken Breast	2003-09-30	C. coli
33089	TN	Chicken Breast	2003-09-30	C. coli
28909	MN	Chicken Breast	2003-03-10	C. coli
28912	MN	Chicken Breast	2003-03-10	C. coli
30011	MN	Chicken Breast	2003-06-16	C. coli
29203	GA	Chicken Breast	2003-01-28	C. coli
29204	GA	Chicken Breast	2003-01-28	C. coli
28924	NY	Chicken Breast	2003-02-10	C. coli
28925	NY	Chicken Breast	2003-02-10	C. coli
28926	NY	Chicken Breast	2003-02-10	C. coli
28927	NY	Chicken Breast	2003-02-10	C. coli
28928	NY	Chicken Breast	2003-02-10	C. coli
28936	NY	Chicken Breast	2003-03-10	C. coli
28935	NY	Chicken Breast	2003-03-10	C. coli
32481	NY	Chicken Breast	2003-09-08	C. coli
32478	NY	Chicken Breast	2003-09-08	C. coli
32501	NY	Chicken Breast	2003-12-15	C. coli
32480	NY	Chicken Breast	2003-09-08	C. coli
32482	NY	Chicken Breast	2003-09-08	C. coli
28918	NY	Chicken Breast	2003-01-13	C. coli
32479	NY	Chicken Breast	2003-09-08	C. coli
32495	NY	Chicken Breast	2003-12-15	C. coli
29993	NY	Chicken Breast	2003-04-07	C. coli
32484	NY	Chicken Breast	2003-09-08	C. coli
34008	MD	Chicken Breast	2003-07-21	C. coli
34013	MD	Chicken Breast	2003-07-21	C. coli
29994	NY	Chicken Breast	2003-04-07	C. coli
29995	NY	Chicken Breast	2003-04-07	C. coli
33063	TN	Chicken Breast	2003-07-01	C. coli
33088	TN	Chicken Breast	2003-09-30	C. coli
33092	TN	Chicken Breast	2003-09-30	C. coli
29992	NY	Chicken Breast	2003-04-07	C. coli
28923	NY	Chicken Breast	2003-01-13	C. coli
33086	TN	Chicken Breast	2003-09-30	C. coli
33091	TN	Chicken Breast	2003-09-30	C. coli
30415	GA	Chicken Breast	2003-06-30	C. coli
30416	GA	Chicken Breast	2003-06-30	C. coli
33066	TN	Chicken Breast	2003-07-01	C. coli
33096	TN	Chicken Breast	2003-10-21	C. coli
32531	GA	Chicken Breast	2003-09-29	C. coli
30006	NY	Chicken Breast	2003-05-12	C. coli
30007	NY	Chicken Breast	2003-05-12	C. coli
30005	NY	Chicken Breast	2003-05-12	C. coli
29996	NY	Chicken Breast	2003-04-07	C. coli
34017	MD	Chicken Breast	2003-07-21	C. coli
29486	TN	Chicken Breast	2003-03-25	C. coli
33079	TN	Chicken Breast	2003-08-26	C. coli
33111	TN	Chicken Breast	2003-12-30	C. coli
33112	TN	Chicken Breast	2003-12-30	C. coli
33113	TN	Chicken Breast	2003-12-30	C. coli
33114	TN	Chicken Breast	2003-12-30	C. coli
33115	TN	Chicken Breast	2003-12-30	C. coli
30183	OR	Pork Chop	2003-01-06	C. coli
29465	CA	Pork Chop	2003-01-21	C. coli
30052	CA	Pork Chop	2003-06-24	C. coli
32548	GA	Chicken Breast	2003-11-17	C. coli
29458	MN	Pork Chop	2003-05-05	C. coli
33108	TN	Chicken Breast	2003-11-25	C. coli
33011	CA	Chicken Breast	2003-08-12	C. coli
32540	GA	Chicken Breast	2003-10-20	C. coli
32492	NY	Chicken Breast	2003-10-06	C. coli
32493	NY	Chicken Breast	2003-12-15	C. coli
29215	GA	Ground Turkey	2003-04-01	C. coli

A-4r. PFGE Profiles for *Campylobacter jejuni*

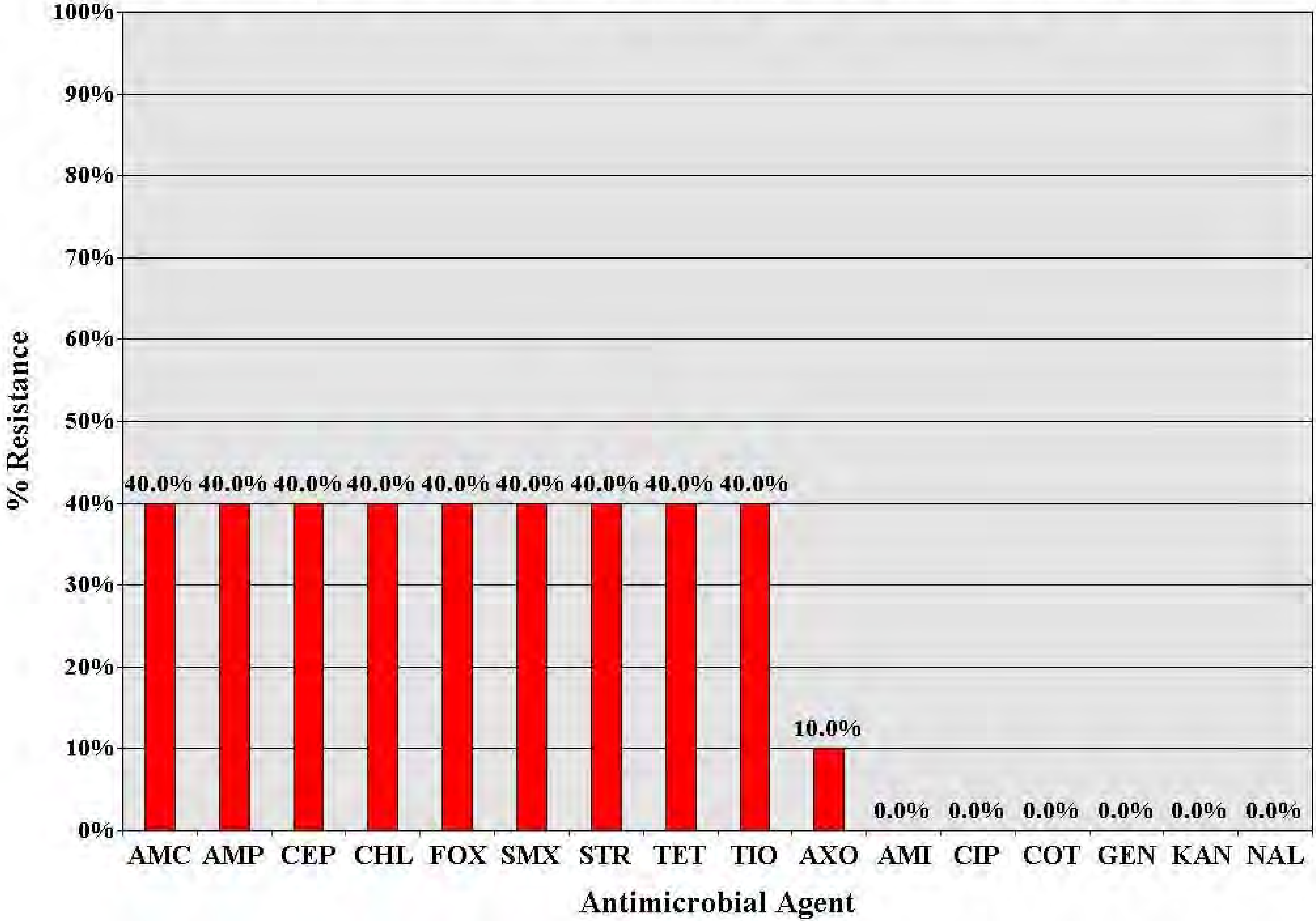


A-5a. Antimicrobial Resistance among *Salmonella* from Chicken Breast (n=83), 2003

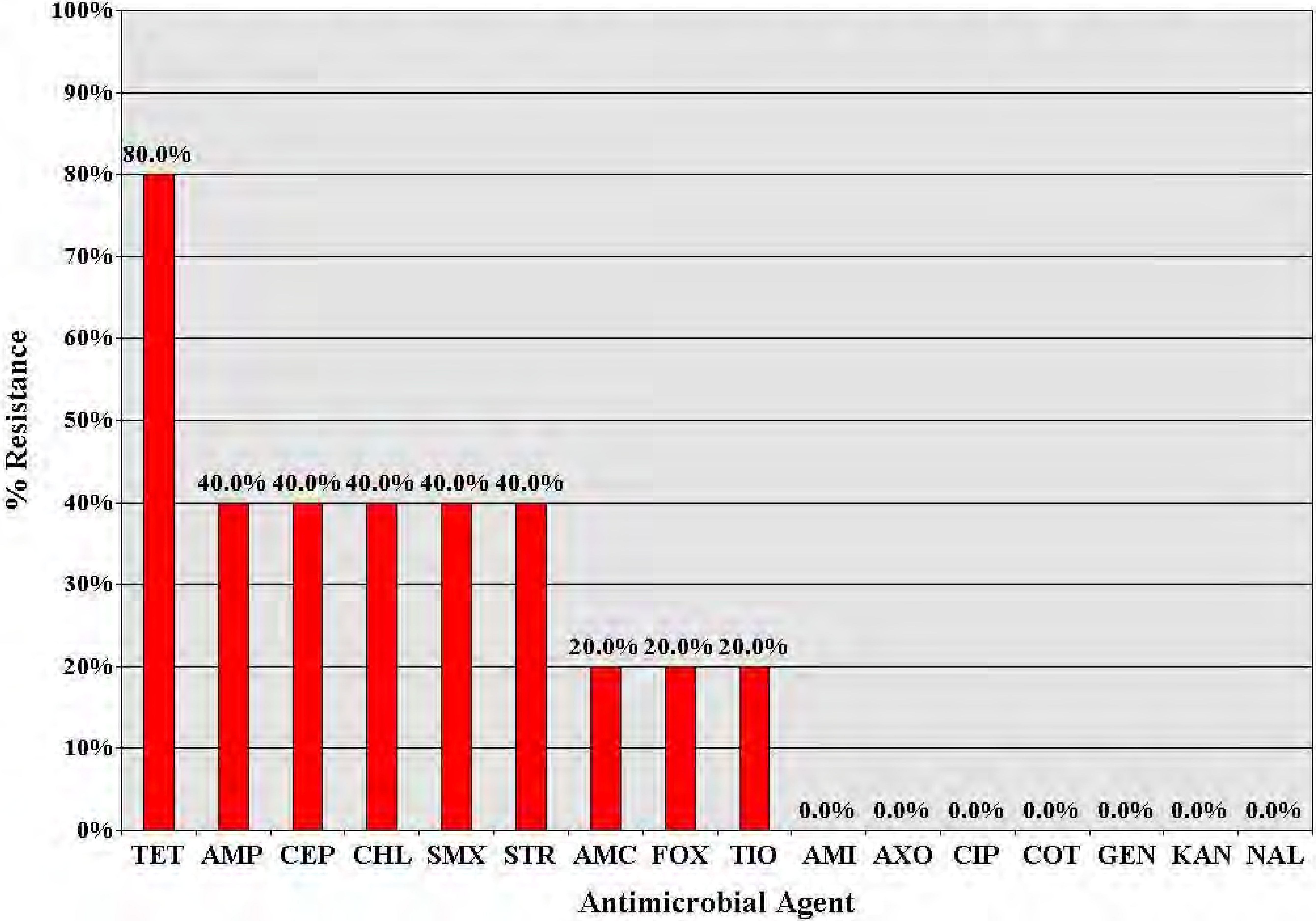



A-5b. Antimicrobial Resistance among *Salmonella* from Ground Turkey (n=114), 2003
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
% Resistance
45.6%
39.5%
33.3%
28.9%
28.9%
27.2%
22.8%
11.4%
4.4%
2.6%
2.6%
0.9%
0.0%
0.0%
0.0%
0.0%
STR
TET
SMX
AMP
CEP
KAN
GEN
AMC
NAL
FOX
TIO
CHL
AMI
AXO
CIP
COT
Antimicrobial Agent

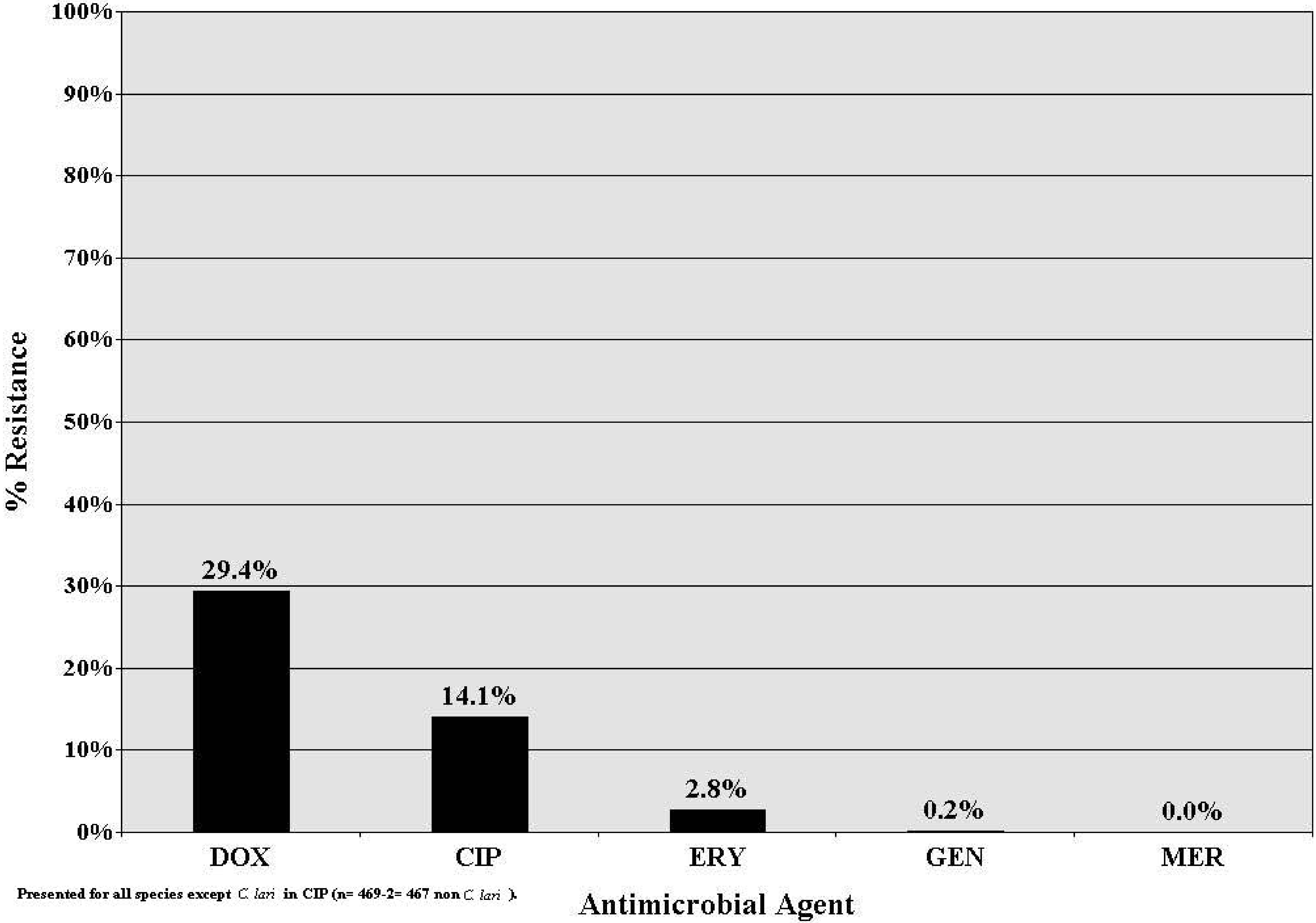
A-5c. Antimicrobial Resistance among *Salmonella* from Ground Beef (n=10), 2003



A-5d. Antimicrobial Resistance among *Salmonella* from Pork Chops (n=5), 2003

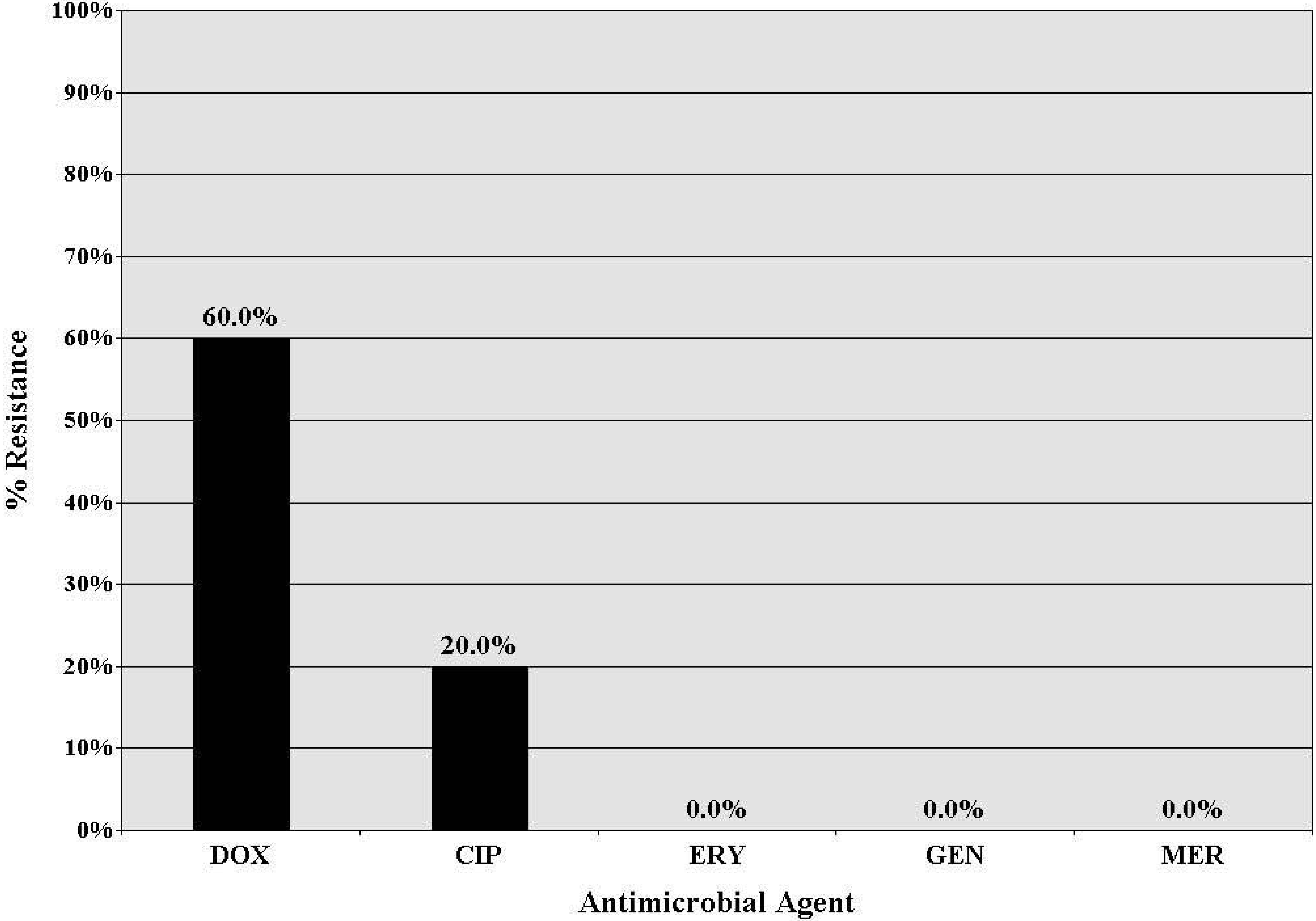


A-6a. Antimicrobial Resistance among *Campylobacter* from Chicken Breast (n=469), 2003



Presented for all species except *C. lari* in CIP (n= 469-2= 467 non *C. lari*).

A-6b. Antimicrobial Resistance among *Campylobacter* from Ground Turkey (n=5), 2003



A-6c. Antimicrobial Resistance among *Campylobacter* from Pork Chops (n=4), 2003

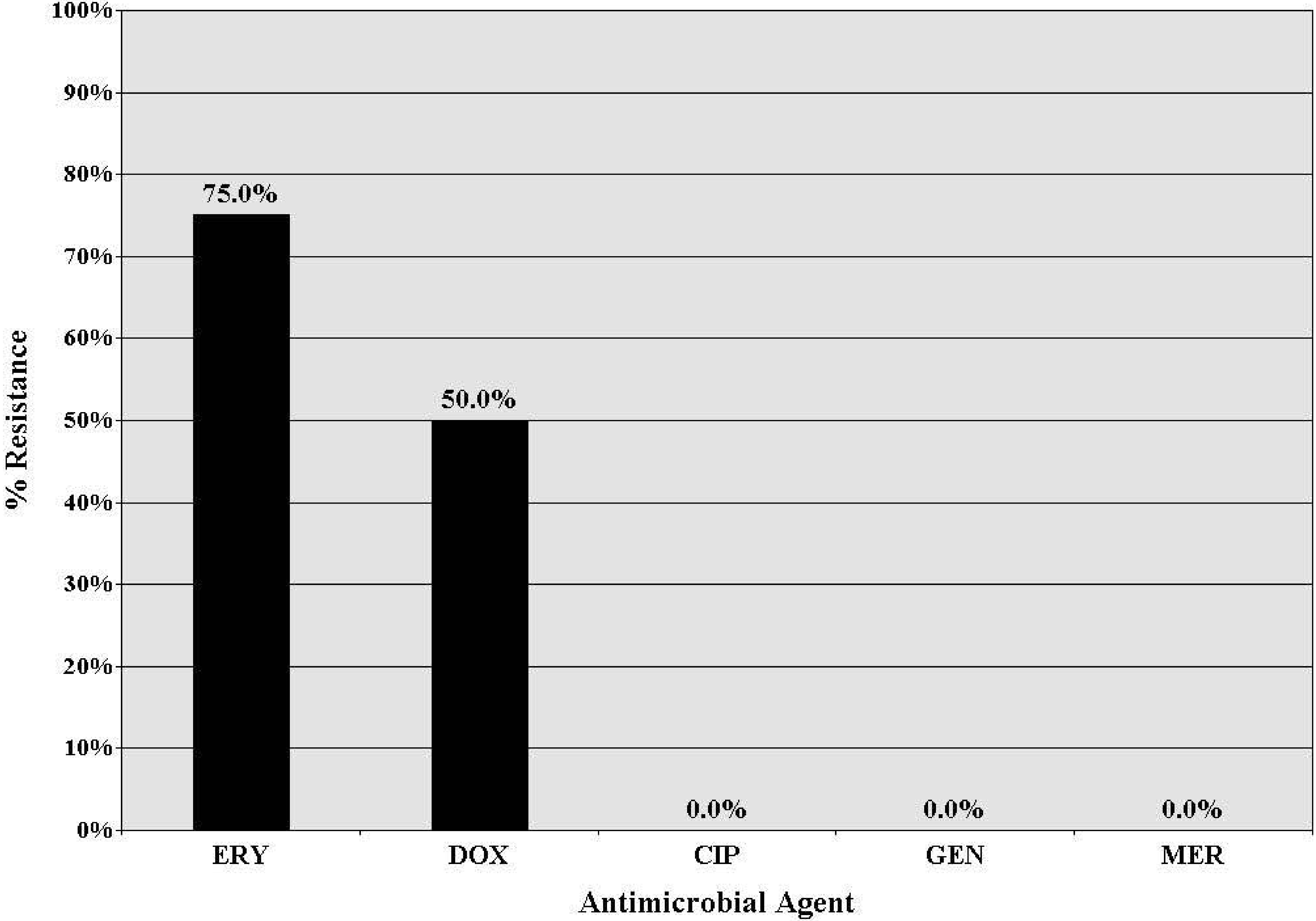
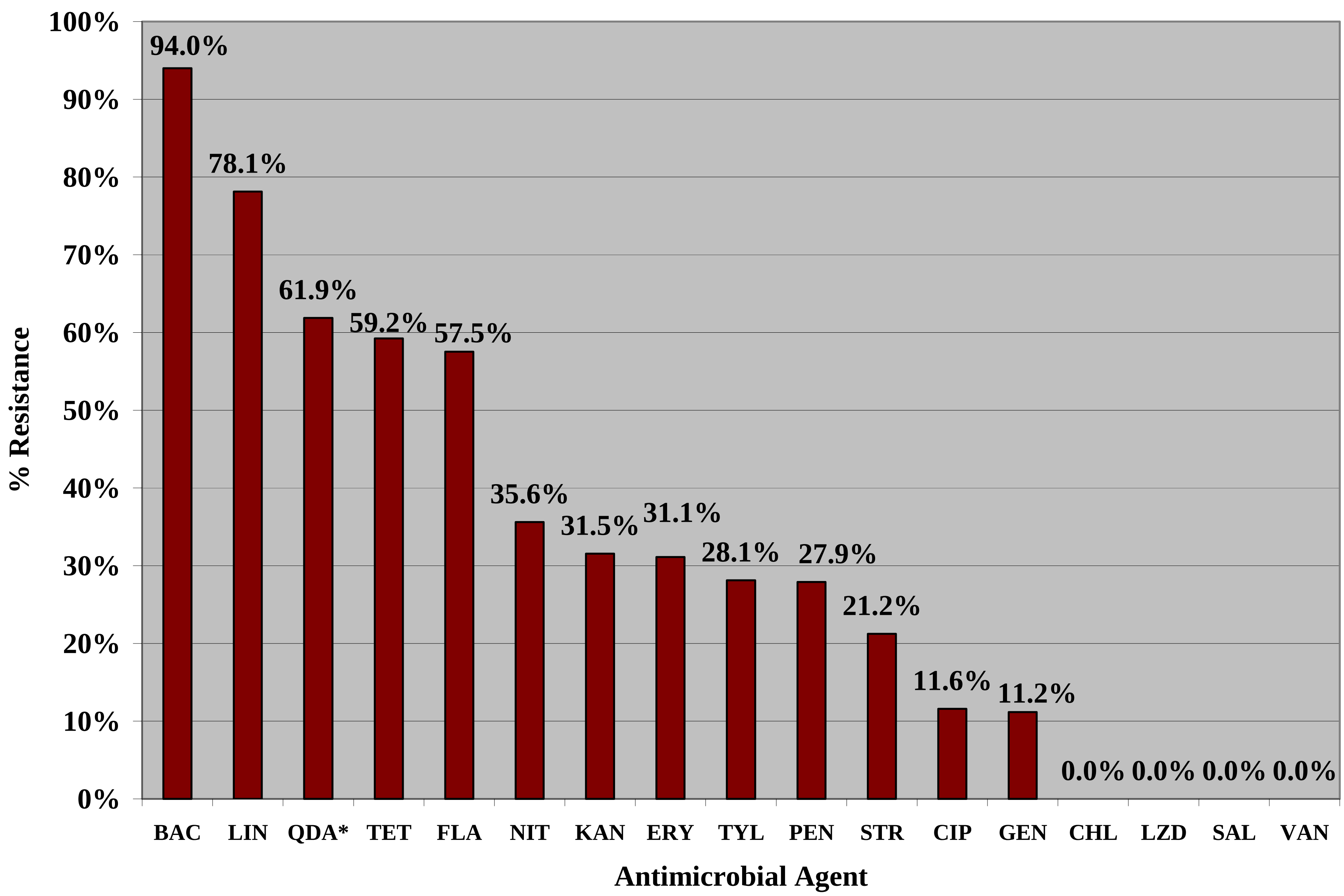
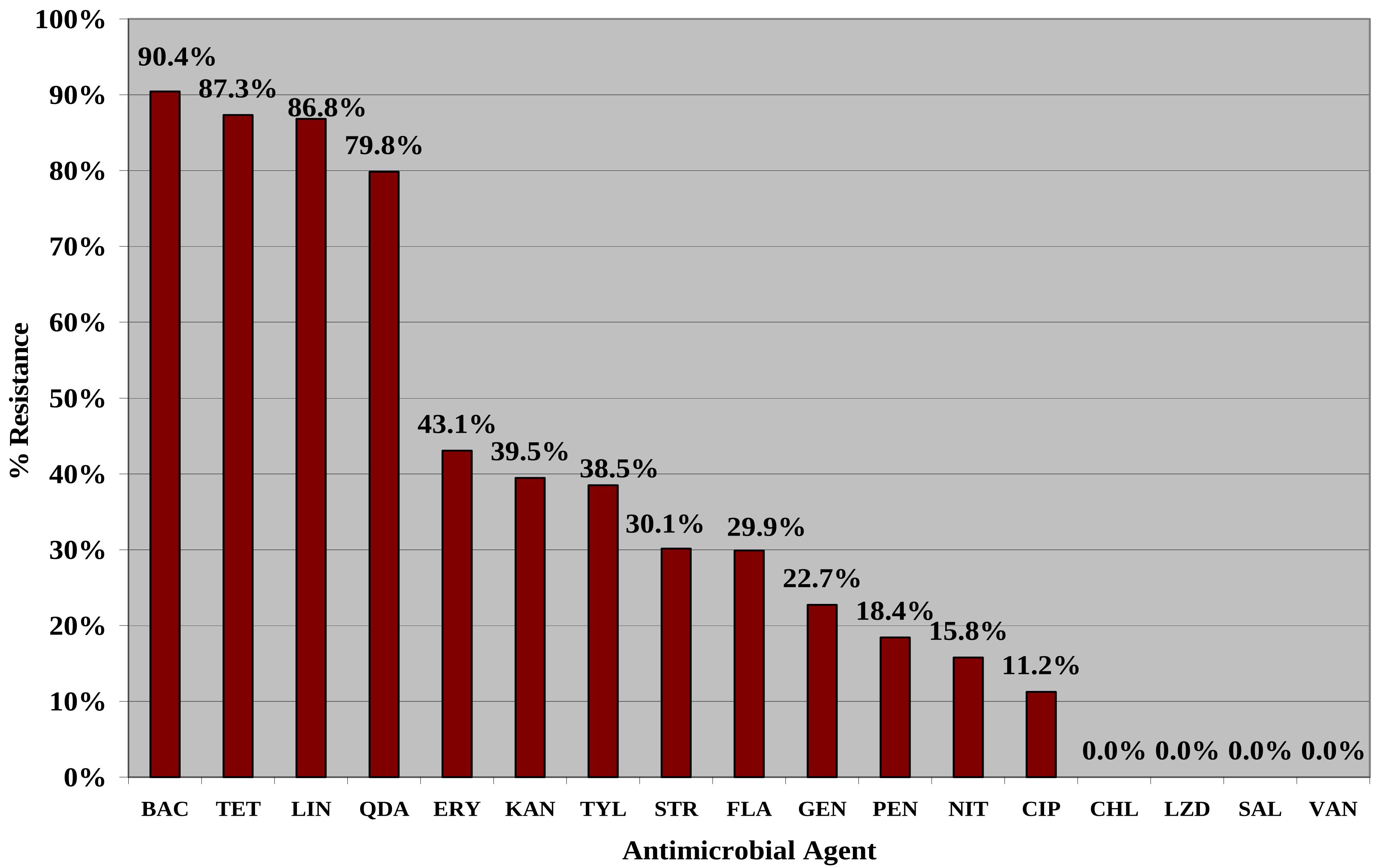


Figure A-7a. Antimicrobial Resistance among *Enterococcus* from Chicken Breast (n=466), 2003



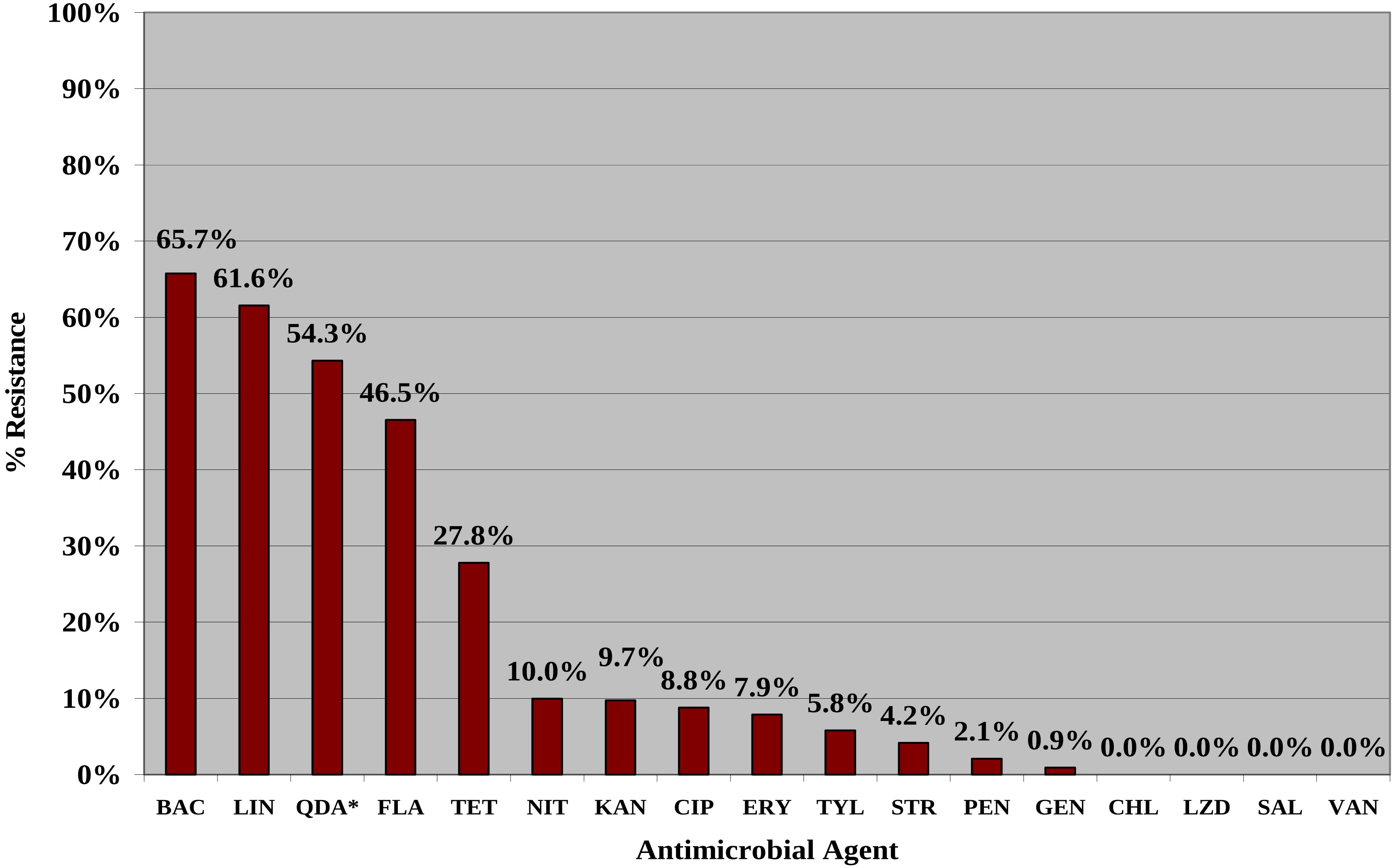
* Presented for all species except *E. faecalis* in QDA (n=466-188= 278 non *E. faecalis*)

Figure A-7b. Antimicrobial Resistance among *Enterococcus* from Ground Turkey (n=418), 2003



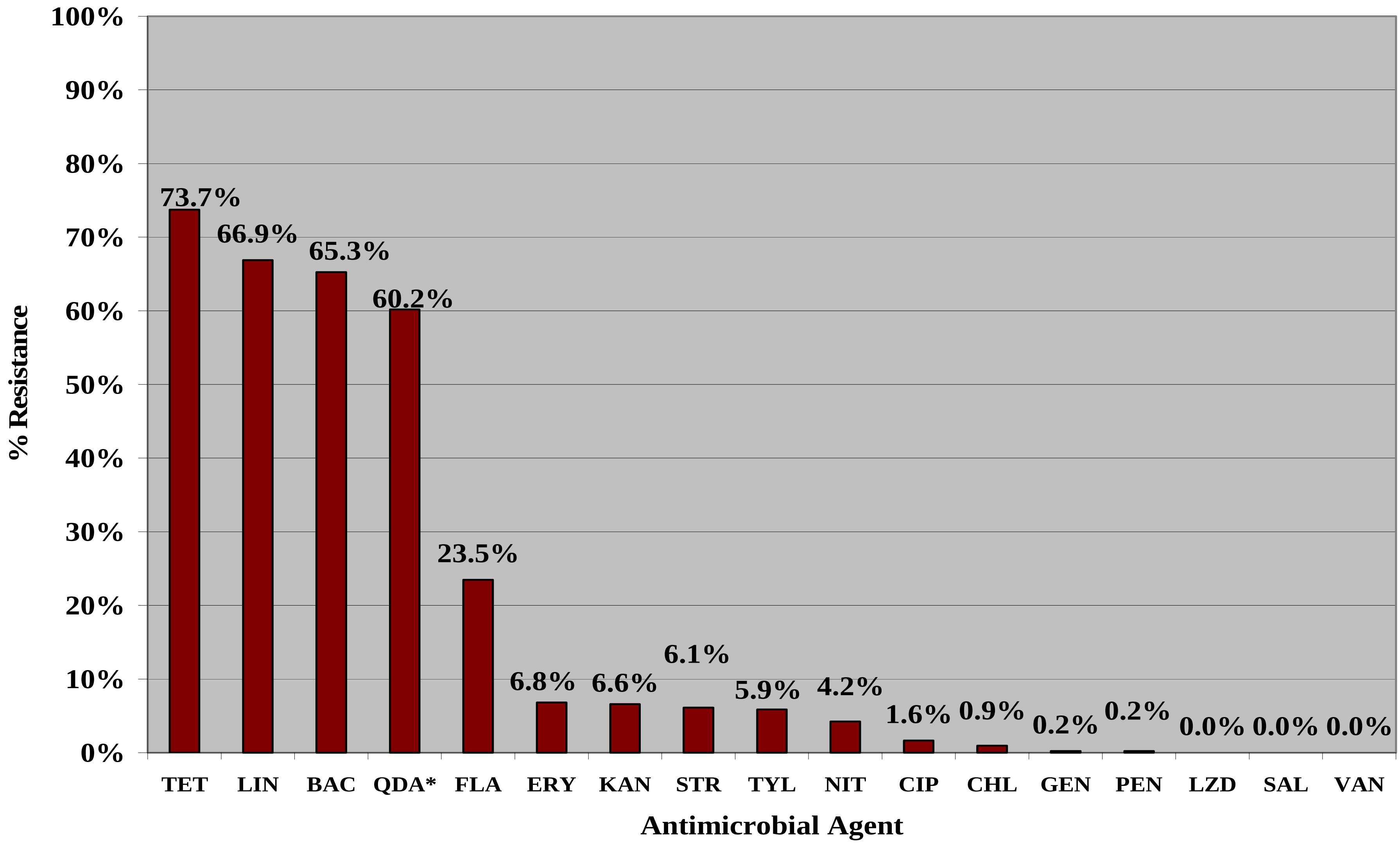
* Presented for all species except *E. faecalis* in QDA (n=418-289= 129 non *E. faecalis*)

Figure A-7c. Antimicrobial Resistance among *Enterococcus* from Ground Beef (n=432), 2003



* Presented for all species except *E. faecalis* in QDA (n=432-224= 208 non *E. faecalis*)

Figure A-7d. Antimicrobial Resistance among *Enterococcus* from Pork Chop (n=426), 2003



* Presented for all species except *E. faecalis* in QDA (n=426- 313= 113 non *E. faecalis*)

Figure A-8a. Antimicrobial Resistance among *E. coli* from Chicken Breast (n=396), 2003.

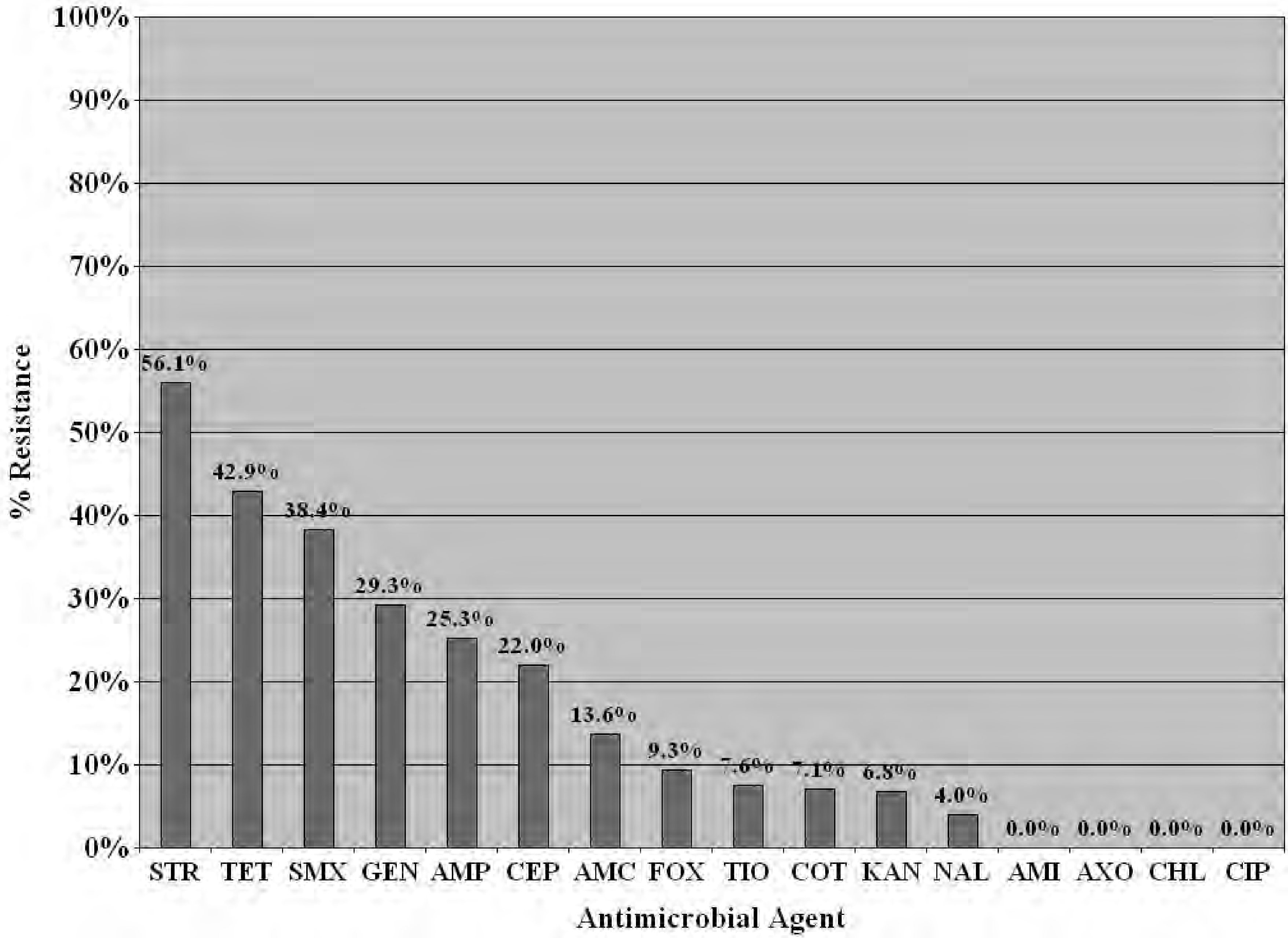


Figure A-8b. Antimicrobial Resistance among *E. coli* from Ground Turkey (n=333), 2003

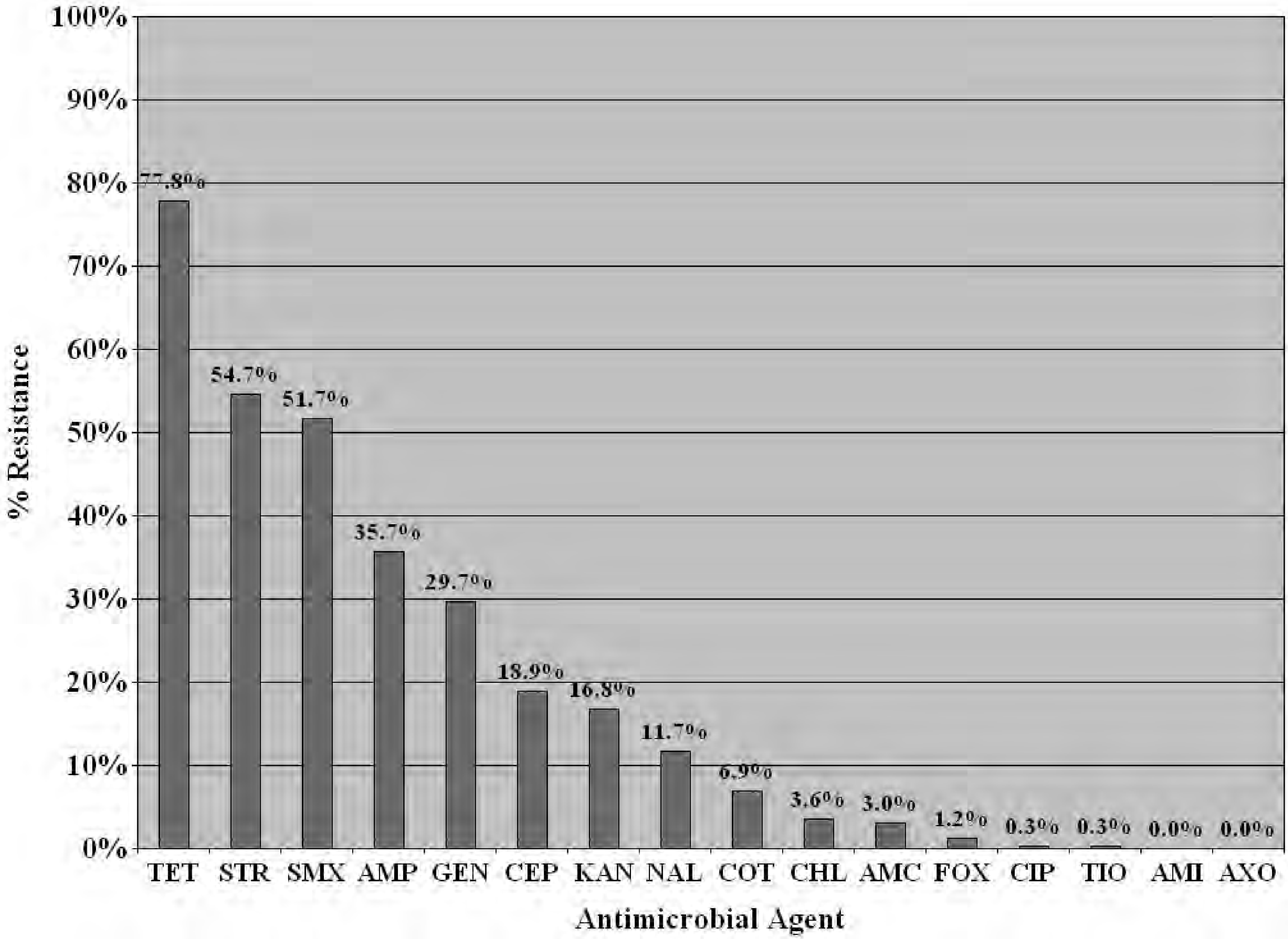


Figure A-8c. Antimicrobial Resistance among *E. coli* from Ground Beef (n=311), 2003.

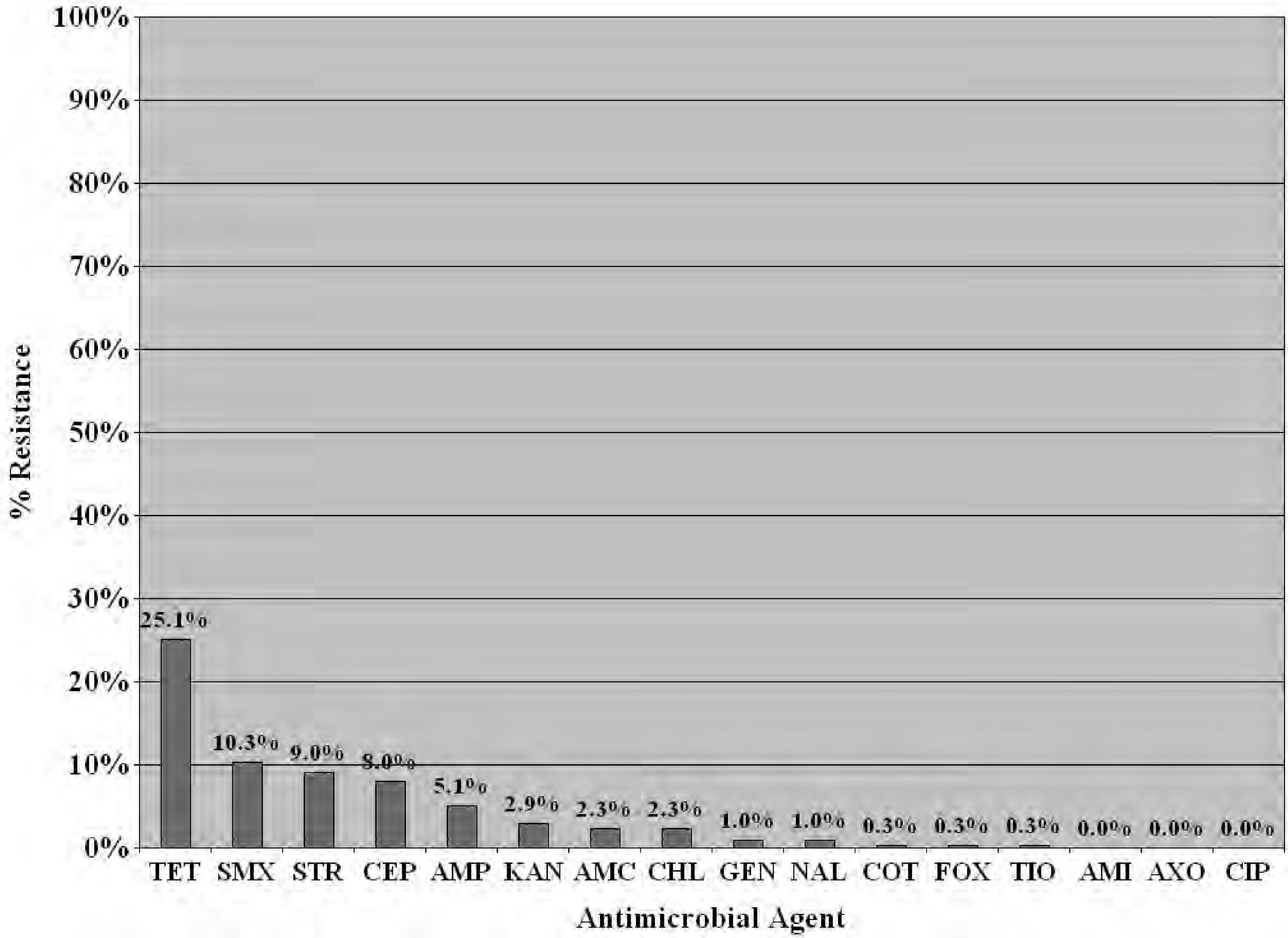
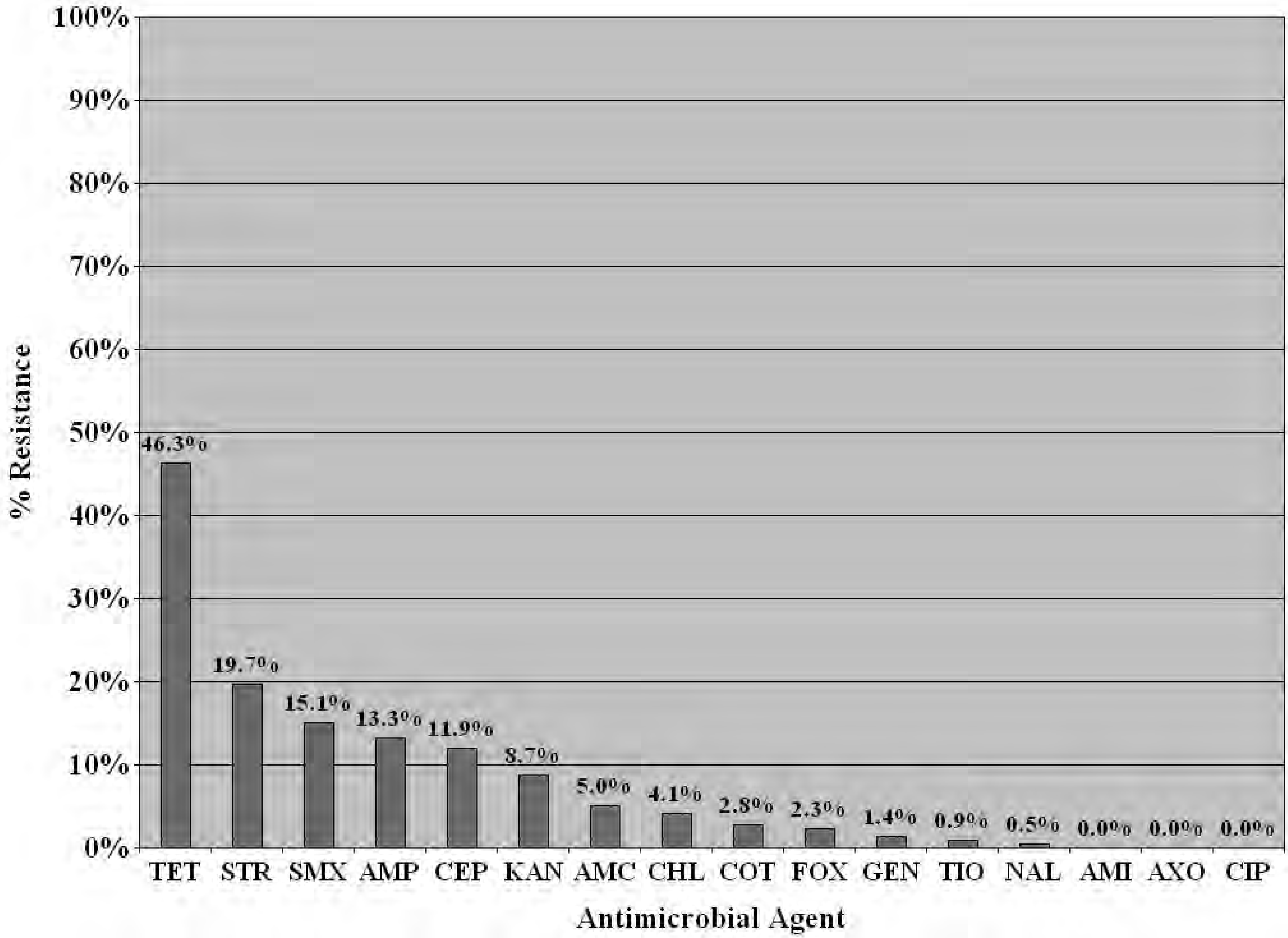


Figure A-8d. Antimicrobial Resistance among *E. coli* from Pork Chop (n=218), 2003



Appendix A

NATIONAL ANTIMICROBIAL RESISTANCE MONITORING SYSTEM – RETAIL FOOD STUDY ISOLATES MONTHLY LOG SHEET

STATE__________ MONTH__________ YEAR___________

Completed By (Initials): ___________

Circle One → CHICKEN BREAST GROUND TURKEY GROUND BEEF PORK CHOP

PART I

	Sample ID Number	Store Name, City	Brand Name	Lot Number	Cut/Ground IN-STORE (√ One) Y	N	Sell-by Date (M / D / Y)			Purchase Date (M / D / Y)			Lab Process Date (M / D / Y)		
1															
2															
3															
4															
5															
6															
7															
8															
9															
10															

PART II

CONT. ↓	*Salmonella* Growth (√ One) Y	N	*Salmonella* IF GROWTH Serotype	Isolate ID Number	*Campylobacter* Growth (√ One) Y	N	*Campylobacter* IF GROWTH Species	Isolate ID Number	*E. coli* (GA, MD, TN, OR) Growth (√ One) Y	N	*E. coli* IF GROWTH Isolate ID Number	Enterococci (GA,MD,TN, OR) Growth (√ One) Y	N	Enterococci IF GROWTH Isolate ID Number
1														
2														
3														
4														
5														
6														
7														
8														
9														
10														

Fax log sheet to CDC at 404-371-5444; send original log sheet with specimens to FDA-CVM and keep a copy for your records. Thank you.

NARMS Retail Meat, 2003

Experimental Design and Procedures:

<u>*Microbiological analysis*</u>:

In the laboratory, samples were refrigerated at 4°C and processed no later than 96 hours after purchase. After microbiological examination, recordings were made on the log sheets whether or not the meat and poultry samples were presumptively positive for *Salmonella*, *Campylobacter*, *E. coli*, and *Enterococcus*. Each laboratory used essentially the same procedure for sample collection. Retail meat and poultry packages were kept intact until they were aseptically opened in the laboratory at the start of examination. For chicken and pork samples, one piece of meat was examined, whereas, 25 g of ground product was examined for ground beef and ground turkey samples. The analytical portions from each sample were placed in separate sterile plastic bags, 250 mL of buffered peptone water was added to each bag, and the bags were vigorously shaken. Fifty mL of the rinsate from each sample was transferred to separate sterile flasks (or other suitable sterile containers) for isolation and identification of *Salmonella*, *Campylobacter*, *E. coli*, or *Enterococcus* using standard microbiological procedures. Once isolated and identified, bacterial isolates were sent to FDA's CVM Office of Research for further characterization including species confirmation, antimicrobial susceptibility testing and PFGE analysis (S*almonella* and *Campylobacter* only).

<u>*Salmonella* isolation:</u>

Fifty mL of double strength lactose broth was added to each flask containing the 50 mL of rinsate to be used for *Salmonella* isolation. The contents were mixed thoroughly and incubated at 35°C for 24 hours. From each flask, 0.1 ml was then transferred to 9.9 mL tubes of RVR10 medium. The tubes of RVR10 medium were incubated in a water bath at 42°C for 16-20 hours before transferring one ml to pre-warmed (35-37°C) 10 mL tubes of M Broth. The inoculated M Broth tubes were incubated in a water bath at 35-37°C for 6-8 hours. From each M Broth culture, one ml was heated at 100°C for 15 minutes, and the remaining portion was refrigerated. The heated portion from each culture was cooled to room temperature and tested using the TECRA *Salmonella* Visual Immunoassay kit (International BioProducts, Bothell, WA) or the VIDAS® *Salmonella* Immunoassay kit (bioMerieux, Hazelwood, MO) according to the manufacturers' instructions. If the TECRA or VIDAS assay was negative, the sample was considered negative for *Salmonella*. If the TECRA or VIDAS assay was positive, a loopful of the corresponding, unheated M Broth culture was streaked for isolation onto a XLD agar plate. The inoculated plate was incubated at 35°C for 24 hours. Each XLD agar plate was examined for typical *Salmonella* colonies (pink colonies with or without black centers). If no *Salmonella* like growth was observed on a XLD agar, the sample was considered negative and the appropriate documentation was made on the log sheet accompanying the sample. When *Salmonella* like growth was observed, one well-isolated colony was streaked for isolation onto a trypticase soy agar plate supplemented with 5% defribrinated sheep blood (BAP). The BAP(s) were incubated at 35°C for 18-24 hours before sub-culturing an isolated colony for further biochemical identification and serotyping using the FoodNet laboratory's standard procedures. *Salmonella* isolates were subsequently frozen at -60 to -80°C in Brucella broth with 20% glycerol and shipped in cryo-vials on dry ice to FDA-CVM. Upon arrival at CVM, every isolate was streaked for purity on a BAP before being confirmed as *Salmonella* using the Vitek microbial identification system (bioMérieux, Hazelwood, MO). These isolates were further serotyped for O and H antigens using either commercially available (Difco-Becton Dickinson, Sparks, MD) or CDC antisera.

Campylobacter isolation:

Fifty mL of double strength Bolton broth was added to each flask containing the 50 mL of rinsate to be used for *Campylobacter* isolation. The broth and rinsate were mixed thoroughly, but gently to avoid aeration, and incubated at 42°C for 24 hours in a reduced oxygen atmosphere that was obtained using a Campy Pak (BBL-Becton Dickinson, Sparks, MD) or a gas mixture containing 85% nitrogen, 10% carbon dioxide, and 5% oxygen. Using a swab, the first quadrant of a CCA Plate was inoculated with the incubated Bolton broth culture. The remainder of each plate was then streaked with a loop to obtain isolated colonies, and the CCA plates were incubated at 42°C in the above atmosphere for 24 to 48 hours. Each CCA plate was examined for typical *Campylobacter* colonies (round to irregular with smooth edges; thick translucent white growth to spreading, film-like transparent growth). If no *Campylobacter* like growth was observed on a CCA plate, the sample was considered negative and the appropriate documentation was made on the log sheet accompanying the sample. When *Campylobacter* like growth was observed, one typical well-isolated *Campylobacter* like colony from each positive CCA plate was sub-cultured to a BAP and incubated as described for the CCA plates. Following incubation, one typical well-isolated *Campylobacter* like colony was gram stained and tested using a smear catalase, oxidase, hippurate and/or motility test. If the Gram stain showed small, Gram- negative, curved rods, and the isolate was positive with the other test(s) that were conducted, a sample was considered presumptively positive for *Campylobacter*. If the CCA plates or BAPs had no typical colonies or isolate testing was inconsistent with Campylobacter, a sample was considered negative. All isolates presumptively identified as *Campylobacter* were frozen at -60 to -80°C in Brucella broth with 20% glycerol and shipped in cryo-vials on dry ice to FDA-CVM. Upon arrival at CVM, isolates were streaked for purity on a BAP twice before being confirmed as *Campylobacter* using a repeat Gram stain and an AccuProbe *Campylobacter* Identification Test (Gen-Probe, San Diego, CA). *Campylobacter* species were determined using a multiplex PCR assay previously described (3,7).

E. coli isolation (Georgia, Maryland, Oregon and Tennessee)

Fifty mL of double strength MacConkey broth was added to each flask containing the 50 mL of rinsate to be used for *E. coli* isolation. The contents were mixed thoroughly and incubated at 35°C for 24 hours. One loopful from each flask was then transferred to an EMB agar plate and streaked for isolation. Agar plates were then incubated at 35°C for 24 hours in ambient air and examined for typical *E. coli* colonies (colonies having a dark center and usually a green metallic sheen). If no typical growth was observed on an EMB agar plate, the sample was considered negative and the appropriate documentation was made on the log sheet accompanying the sample. When *E. coli*-like growth was present, one typical, well-isolated colony was streaked for isolation onto a BAP. The BAPs were incubated at 35°C for 24 hours in ambient air and examined for purity. One typical, well-isolated colony was subcultured for indole and oxidase tests. Indole positive and oxidase negative isolates were considered presumptively positive as *E. coli*. Presumptive *E. coli* isolates were subsequently frozen at -60 to -80°C in Brucella broth with 20% glycerol and shipped in cryo-vials on dry ice to FDA-CVM. Upon arrival at CVM, every isolate was streaked for purity on a BAP before being confirmed as *E. coli* using the Vitek microbial identification system (bioMérieux, Hazelwood, MO).

Enterococcus isolation (Georgia, Maryland, Oregon and Tennessee)

Fifty mL of double strength Enterococcosel broth was added to each flask containing the 50 ml of rinsate to be used for *Enterococcus* isolation. The contents were mixed thoroughly and incubated at 45°C for 24 hours in ambient air. If no typical growth or blackening was observed in the flask, the sample was considered negative and the appropriate documentation was made on the log sheet accompanying the sample. If blackening of the broth was observed, a loopful was streaked onto an EAP for isolation. The plates were then incubated at 35°C for 24 hours in ambient air and examined for enterococci-like colonies (small colonies surrounded by a blackening of the agar). If no typical growth was observed on the EAP, the sample was considered negative and the appropriate documentation was made on the log sheet accompanying the sample. If enterococci-like growth was present, one well-isolated colony was streaked for isolation onto a BAP, and incubated at 35°C for 24 hours in ambient air. Presumptive *Enterococcus* isolates were subsequently frozen at -60 to -80°C in Brucella broth with 20% glycerol and shipped in cryo-vials on dry ice to FDA-CVM. Upon arrival at CVM, every isolate was streaked for purity on a BAP before being confirmed as *Enterococcus* using the Vitek microbial identification system (bioMérieux, Hazelwood, MO).

Antimicrobial Susceptibility Testing:

For *E. coli*, *Enterococcus*, and *Salmonella*, antimicrobial MICs were determined using a 96 well broth microdiltion method (Sensititre, Trek Diagnostic Systems, Westlake, OH) according to NCCLS standards (4,5,6). *Salmonella* and *E. coli* isolates were tested using a custom plate developed for Gram negative bacteria, catalog # CMV6CNCD; *Enterococcus* isolates were tested using a custom plate developed for Gram positive bacteria, catalog # CMV5ACDC (Table 1). CLSI/NCCLS recommended QC organisms were used each time that antimicrobial susceptibility testing was performed. The QC organisms included *Escherichia coli* ATCC 25922 and 35218, *Enterococcus faecalis* ATCC 29212, *Staphylococcus aureus* ATCC 29213, and *Pseudomonas aeruginosa* ATCC 27853 (4,5,6).

For isolates confirmed as *Campylobacter*, the CLSI/NCCLS approved agar dilution procedure was used to determine MICs to ciprofloxacin, doxycycline, erythromycin, gentamicin, and meropenem. (4,5). The CLSI/NCCLS recommended quality control organism *Campylobacter jejuni* ATCC 33560 was used each time that antimicrobial susceptibility testing was performed (5). As there are no CLSI/NCCLS-approved interpretive criteria for *Campylobacter*, tentative breakpoints used by NARMS are shown in Table 1. All of the resistant breakpoints with the exception of meropenem, have been used previously in the absence of CLSI/NCCLS approved interpretive criteria (2). All antimicrobial susceptibility testing was conducted in the laboratories of the Division of Animal and Food Microbiology, CVM-FDA, Laurel, MD.

Pulsed Field Gel Electrophoresis (PFGE):

Pulsed-field gel electrophoresis was used to assess genetic relatedness among *Salmonella* and *Campylobacter* isolates. The PFGE was performed according to protocols developed by CDC (1). Agarose-embedded DNA was digested with the enzyme *Xba*I for *Salmonella* isolates and *Smal*I for *Campylobacter* isolates DNA restriction fragments were separated by electrophoresis using a Chef Mapper electrophoresis system (Bio-Rad, Hercules, CA). Genomic-DNA profiles or “fingerprints” were analyzed using BioNumerics software (Applied-Maths, Kortrijk, Belgium), and banding patterns were compared using Dice coefficients with a 1.5% band position tolerance. PFGE analysis was conducted in the laboratories of the Division of Animal and Food Microbiology, CVM-FDA, Laurel, MD.

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