U.S. Food and Drug Administration

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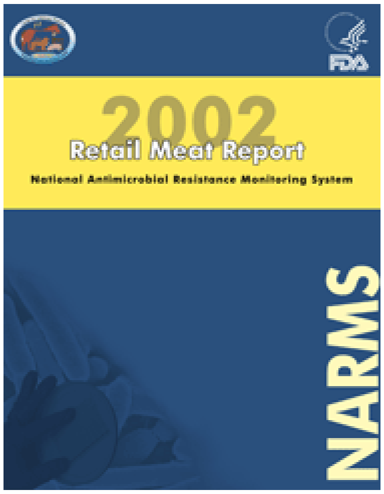


NARMS 2002 Retail Meat Annual Report

National Antimicrobial Resistance Monitoring System

ABBREVIATIONS USED IN THE REPORT

AR	Antimicrobial Resistance
BAP	Blood Agar Plate
CCA	Campy-Cefex Agar Plate
CDC	Centers 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
NCCLS	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	LIN	Lincomycin
AMI	Amikacin	LZD	Linezolid
AMP	Ampicillin	MER	Meropenem
AXO	Ceftriaxone	NAL	Nalidixic Acid
BAC	Bacitracin	NIT	Nitrofurantoin
CEP	Cephalothin	PEN	Penicillin
CHL	Chloramphenicol	QDA	Quinupristin/Dalfopristin
CIP	Ciprofloxacin	SAL	Salinomycin
COT	Trimethoprim/Sulfamethoxazole	STR	Streptomycin
DOX	Doxycycline	SMX	Sulfamethoxazole
ERY	Erythromycin	TET	Tetracycline
FLA	Flavomycin	TYL	Tylosin
FOX	Cefoxitin	TIO	Ceftiofur
GEN	Gentamicin	VAN	Vancomycin
KAN	Kanamycin		

Meat Types

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

State Abbreviations:

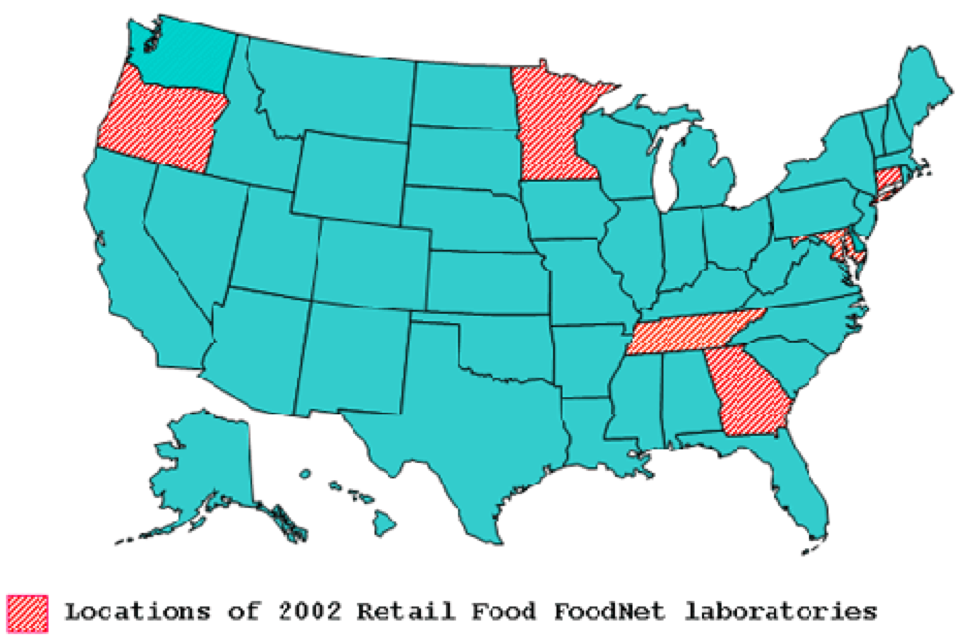
CT	Connecticut	MN	Minnesota
GA	Georgia	TN	Tennessee
MD	Maryland	OR	Oregon

2002 NARMS Retail Meat Annual Report - Introduction

Background:

Food destined for human consumption, including meat and poultry, are known to harbor enteric bacteria. Antimicrobial resistance 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 animals. To gain a better understanding of AR among enteric bacteria in the food supply, FoodNet and NARMS monitor antimicrobial susceptibility/resistance phenotypes in bacteria isolated from retail meats.

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 2002, six of the 11 current FoodNet laboratories: Connecticut , Georgia , Maryland , Minnesota , Oregon , and Tennessee. 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. Inferences concerning likelihood of human exposure to various species of bacteria should not be made on the basis of species prevalence for all meat types combined.



FoodNet is the principal foodborne disease component of CDC's. 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 2002, retail meat sampling started in January of 2002 for five of the six participating FoodNet laboratories, with the exception of Oregon . Oregon did not join the NARMS retail meat program until the last quarter (September to December) of 2002. For each of the FoodNet sites, samples were purchased monthly, with as many different stores as possible visited 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. 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 (appendix A-5). 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 (appendix A-6).

Microbiological analysis :

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 (appendix A-6). 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 (appendix A-6). 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).

Meat and poultry rinsates were cultured for the presence of *Salmonella* and *Campylobacter* at all six FoodNet sites. Additionally, at four of the six FoodNet laboratories (Georgia , Maryland , Oregon , and Tennessee), meat and poultry rinsates were cultured for the presence of *E. coli* and *Enterococcus.*

NARMS retail meat working group, 2002

U.S. Food and Drug Administration

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Table 1. Antimicrobial Susceptibility Test Methods and Interpretive Criteria: NARMS Retail Meat, 2002

Genus: *Campylobacter*

Susceptibility Testing Method: Agar dilution

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

Drug	Susceptible (µg/ml)	Intermediate (µg/ml)	Resistant (µg/ml)
Bacitracin*	≤ 32	64	≥ 128
Chloramphenicol	≤ 8	16	≥ 32
Ciprofloxacin	≤ 1	2	≥ 4
Erythromycin	≤ .5	1,2,4	≥ 8
Flavomycin*	≤ 8	16	≥ 3
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 NCCLS interpretative criteria for this bacterium / antimicrobial combination currently available**

Genus: *Escherichia coli* and *Salmonella*

Susceptibility Testing Method: Broth microdilution   Sensititre Plate: CMV7CNCD

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 NCCLS interpretative criteria for this bacterium / antimicrobial combination currently available**

Table 2. Number of Retail Meat Samples Tested by Site and Meat Type, 2002

	Meat Type				
Site	**Chicken Breast**	**Ground Turkey**	**Ground Beef**	**Pork Chop**	**Total**
CT	120	120	120	120	480
GA	120	120	120	120	480
MD	120	120	120	120	480
MN	106	127	123	103	459
OR*	40	40	40	40	160
TN	110	115	119	110	454
Total	616	642	642	613	2513

*Oregon samples reflect September through December 2002 only.

Table 3. Percent Positive Samples by Bacterium and Meat Type, 2002

	Chicken Breast		Ground Turkey		Ground Beef		Pork Chop	
Bacterium	**N**	**(%)**	**N**	**(%)**	**N**	**(%)**	**N**	**(%)**
Campylobacter	288	(46.8)	4	(0.6)	0	(0.0)	5	(0.8)
*Enterococcus**	381	(97.7)	387	(98.0)	383	(96.0)	369	(94.6)
*Escherichia coli**	282	(72.3)	304	(77.0)	295	(74.2)	184	(47.2)
Salmonella	60	(9.7)	74	(11.5)	9	(1.4)	10	(1.6)

2513 = Total number of retail meats tested for *Salmonella* and *Campylobacter*
616 = Total Chicken Breast tested
642 =Total Ground Turkey tested
642 = Total Ground Beef tested
613 = Total Pork Chop tested

1574 = Total number of retail meats tested for *Enterococcus* and *Escherichia*
390 = Total Chicken Breast tested
395 =Total Ground Turkey tested
399 = Total Ground Beef tested
390 = Total Pork Chop tested

Table 4. Number of Isolates by Site, Bacterium, and Meat Type, 2002

	Chicken Breast	Ground Beef	Ground Turkey	Pork Chops
Site: CT				
Campylobacter	74	0	2	1
Salmonella	17	5	21	1
Site: GA				
Campylobacter	84	0	0	0
Enterococcus	120	118	120	119
Escherichia coli	104	93	103	55
Salmonella	14	2	19	2
Site: MD				
Campylobacter	30	0	0	1
Enterococcus	117	107	113	101
Escherichia coli	107	105	110	66
Salmonella	8	2	9	6
Site: MN				
Campylobacter	33	0	1	0
Salmonella	4	0	7	0
Site: OR *				
Campylobacter	1	0	0	0
Enterococcus	40	40	0	39
Escherichia coli	9	22	17	9
Salmonella	4	0	2	0
Site: TN				
Campylobacter	66	0	1	3
Enterococcus	104	118	114	110
Escherichia coli	62	75	74	54
Salmonella	13	0	16	1

*Oregon samples reflect September through December 2002 only.

Figure 1a. Percent Positive Samples for *Campylobacter* & *Salmonella* by Meat Type and Site, 2002

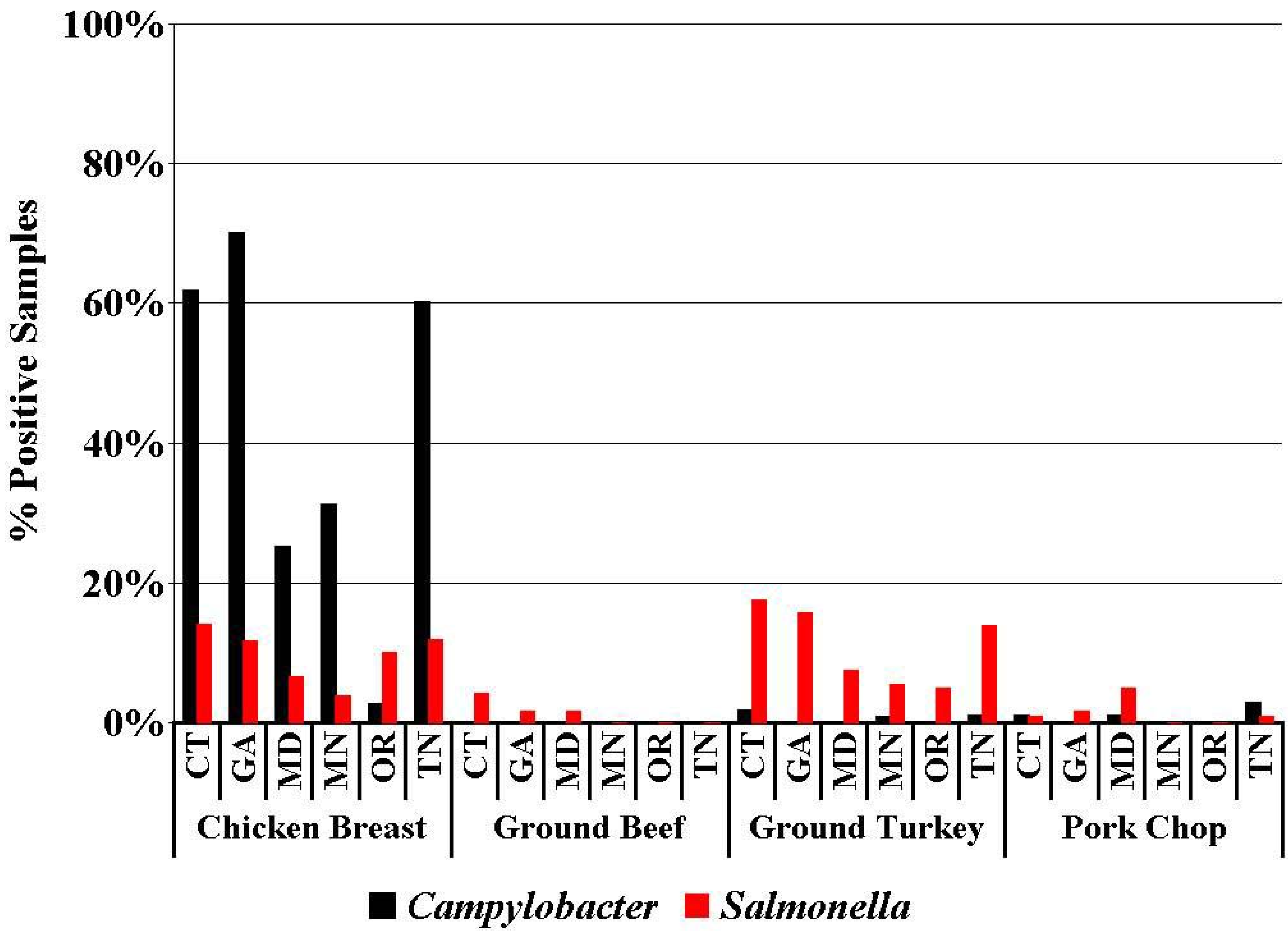


Figure 1b. Percent Positive Samples for *Enterococcus* & *E. coli* by Meat Type and Site, 2002

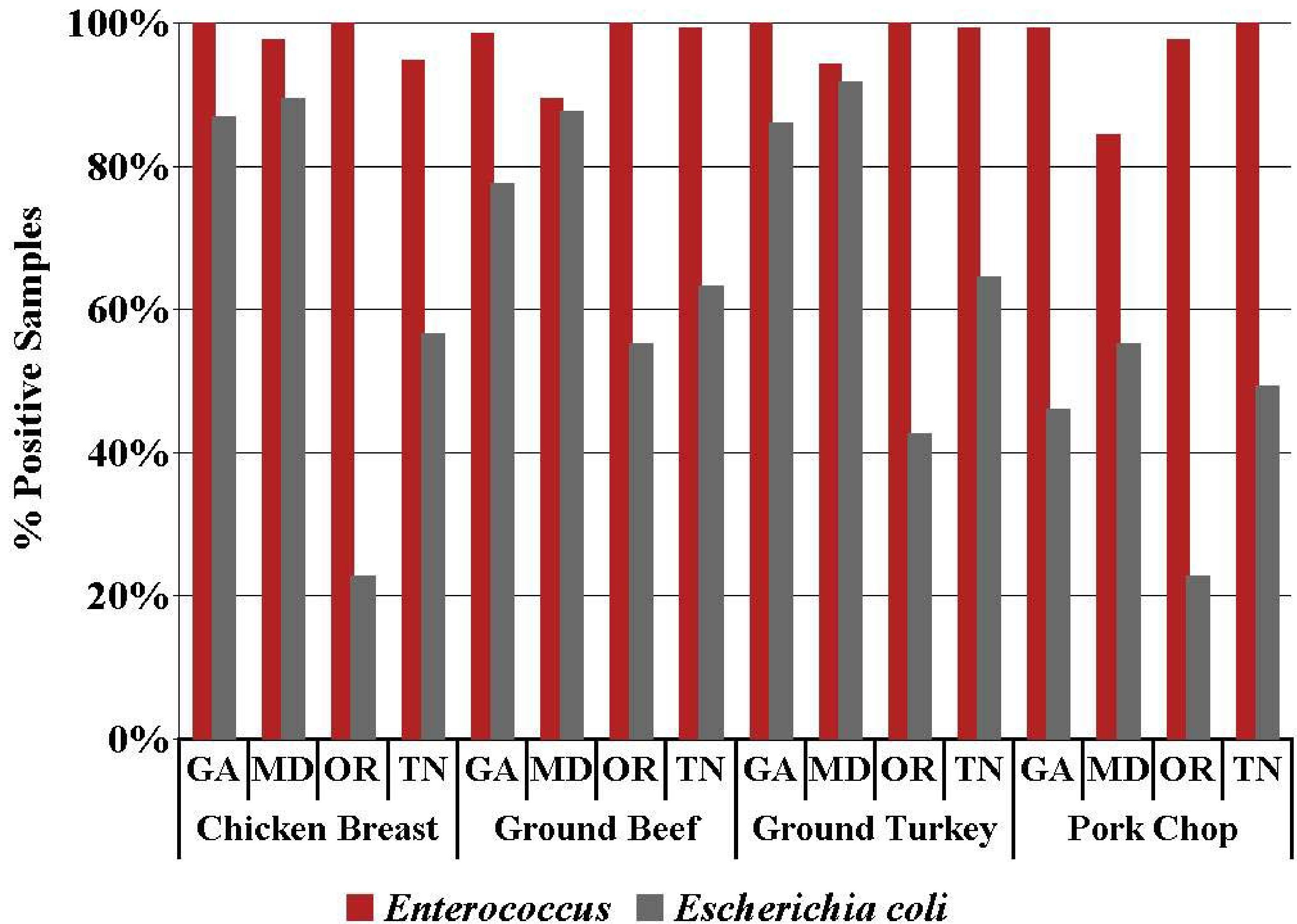


Figure 2a. Percent Positive Samples for *Campylobacter* & *Salmonella* by Meat Type for All Sites, 2002

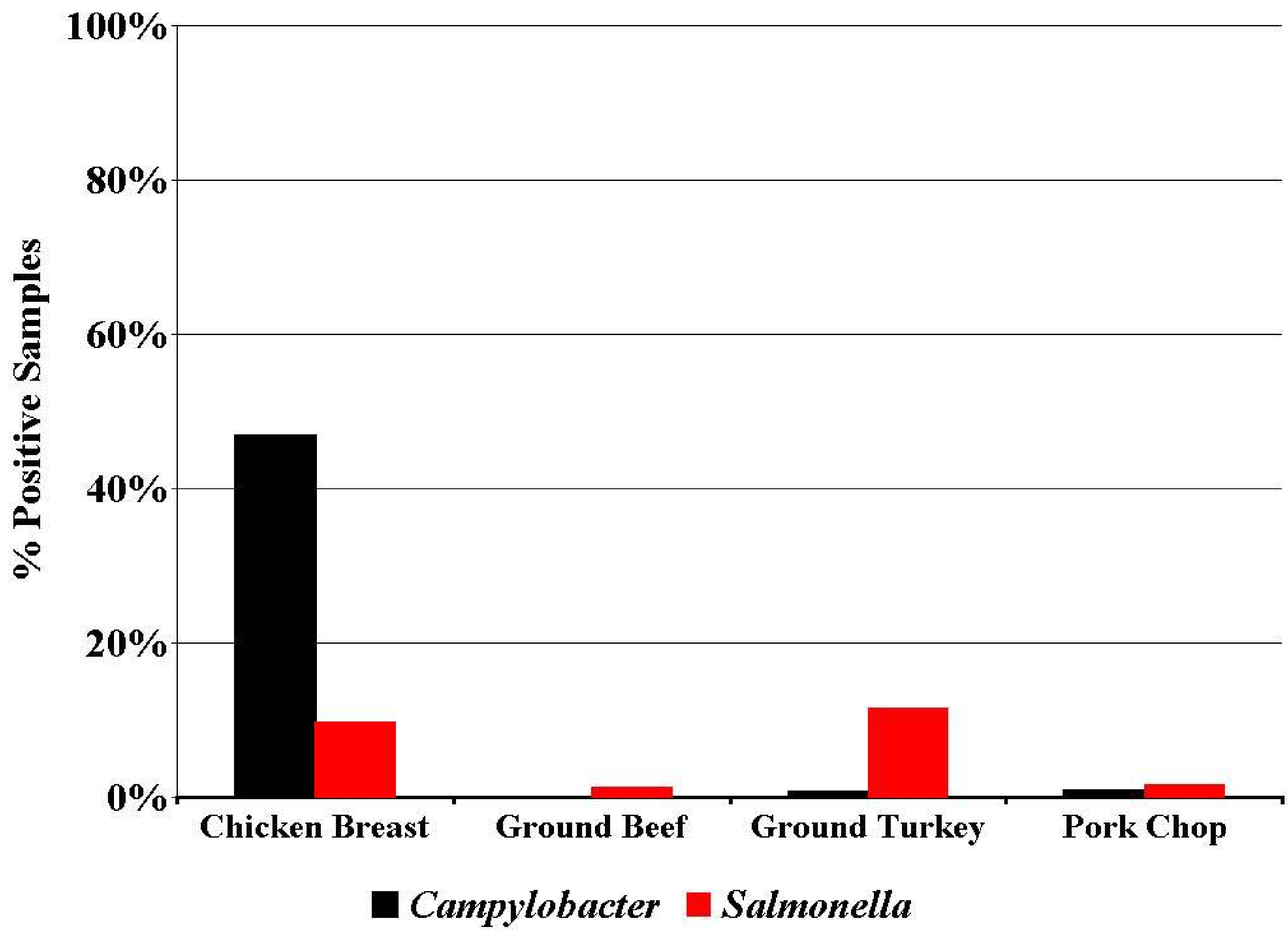


Figure 2b. Percent Positive Samples for *Enterococcus* & *E. coli* by Meat Type for All Sites, 2002

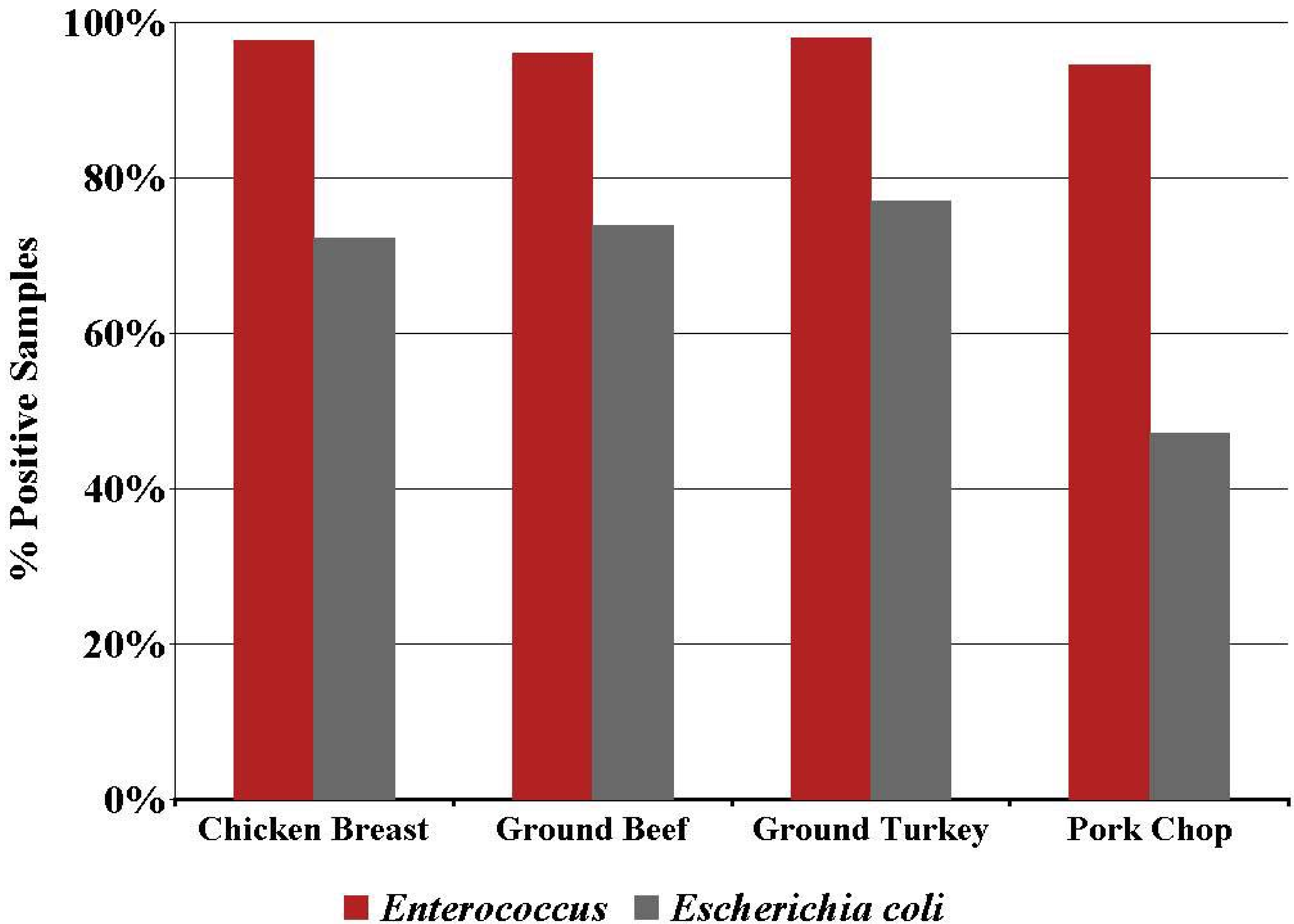


Figure 3a. Percent Positive Samples for *Campylobacter* & *Salmonella* by Month and Meat Type for All Sites, 2002

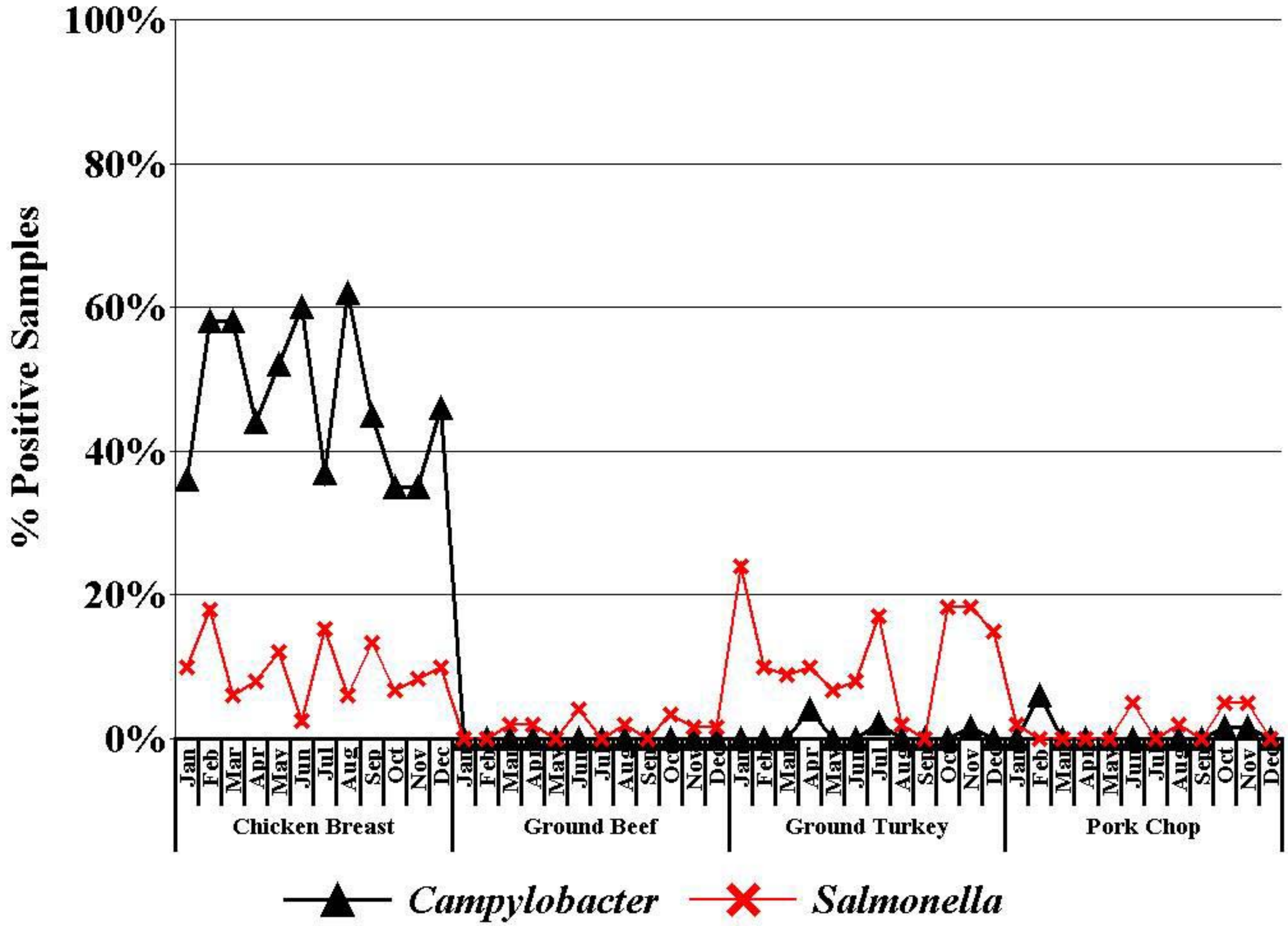


Figure 3b. Percent Positive Samples for *Enterococcus* & *E. coli* by Month and Meat Type for All Sites, 2002

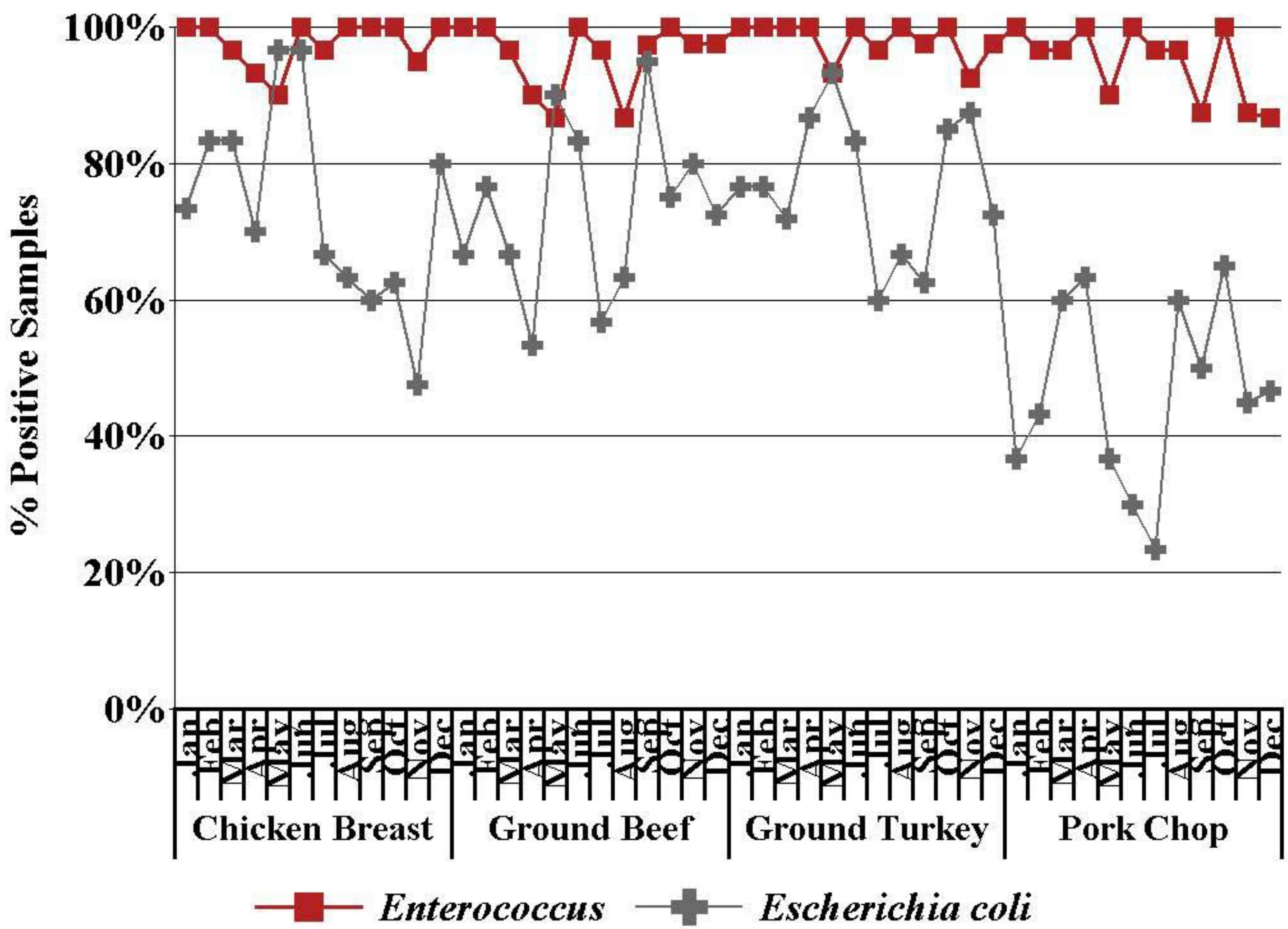


Figure 3c. Percent Positive Samples for *Campylobacter* & *Salmonella* by Month and Meat Type in Connecticut, 2002

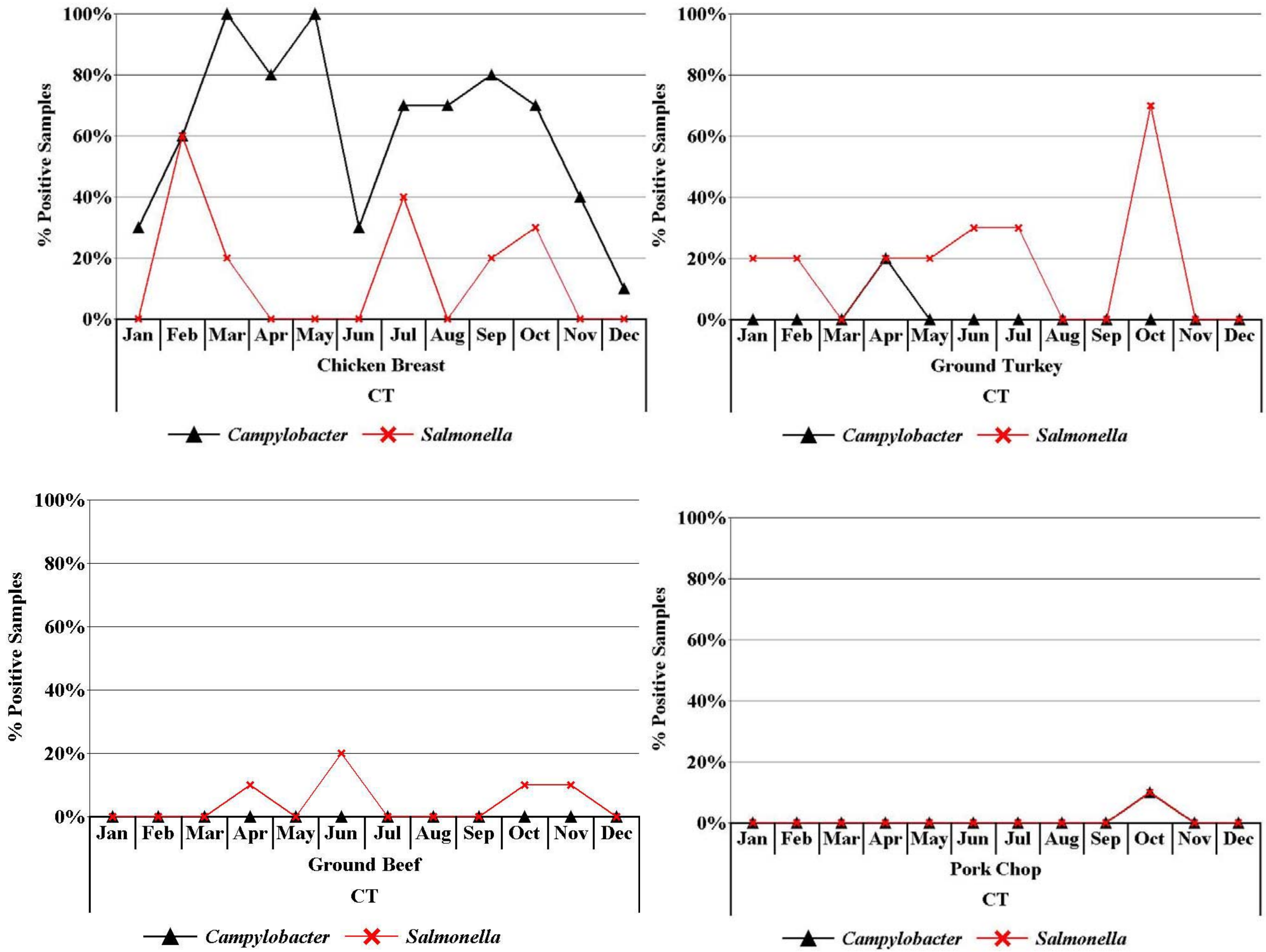


Figure 3d. Percent Positive Samples for *Campylobacter* & *Salmonella* by Month and Meat Type in Georgia, 2002

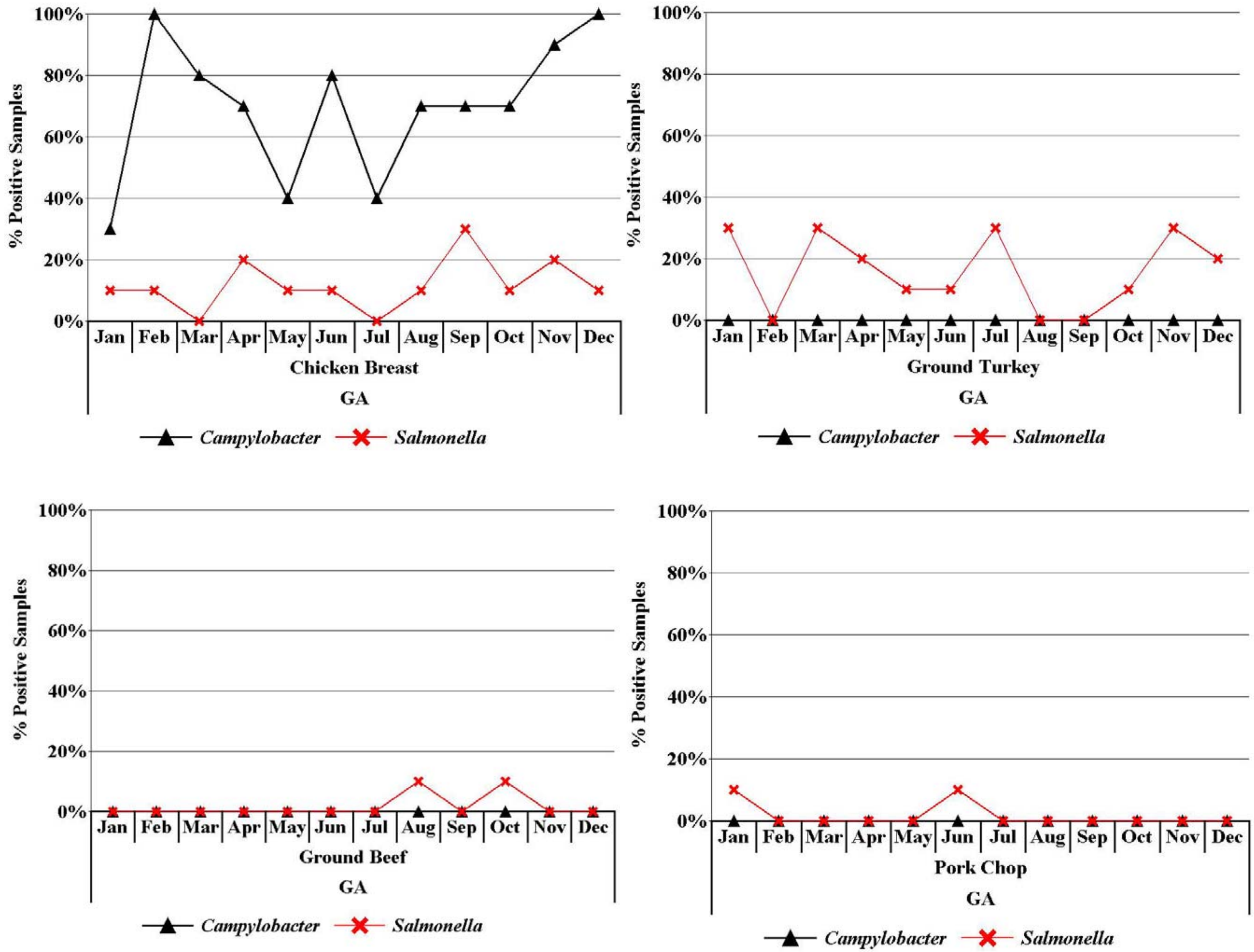


Figure 3e. Percent Positive Samples for *Enterococcus* & *E. coli* by Month and Meat Type in Georgia, 2002

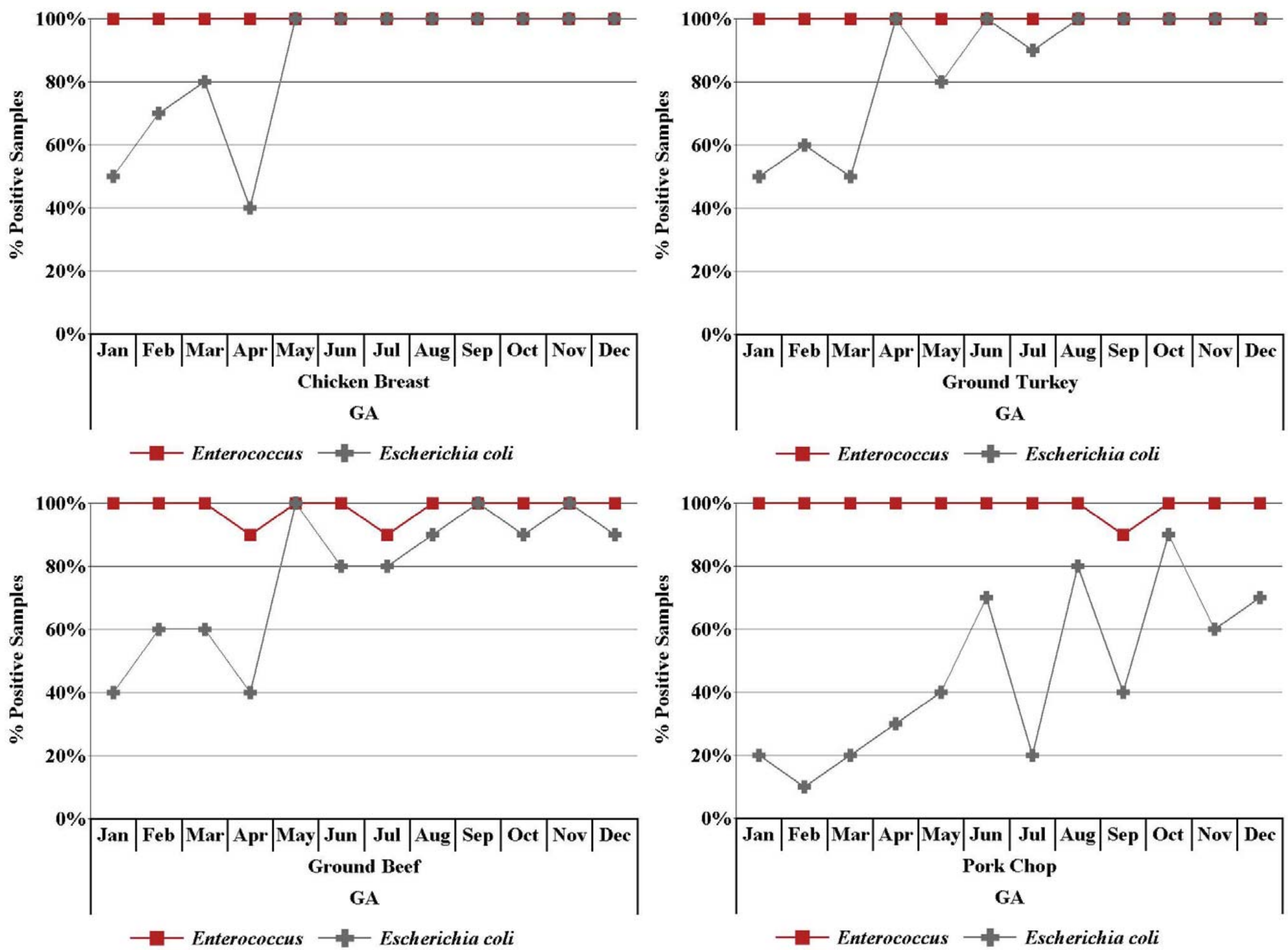


Figure 3f. Percent Positive Samples for *Campylobacter* & *Salmonella* by Month and Meat Type in Maryland, 2002

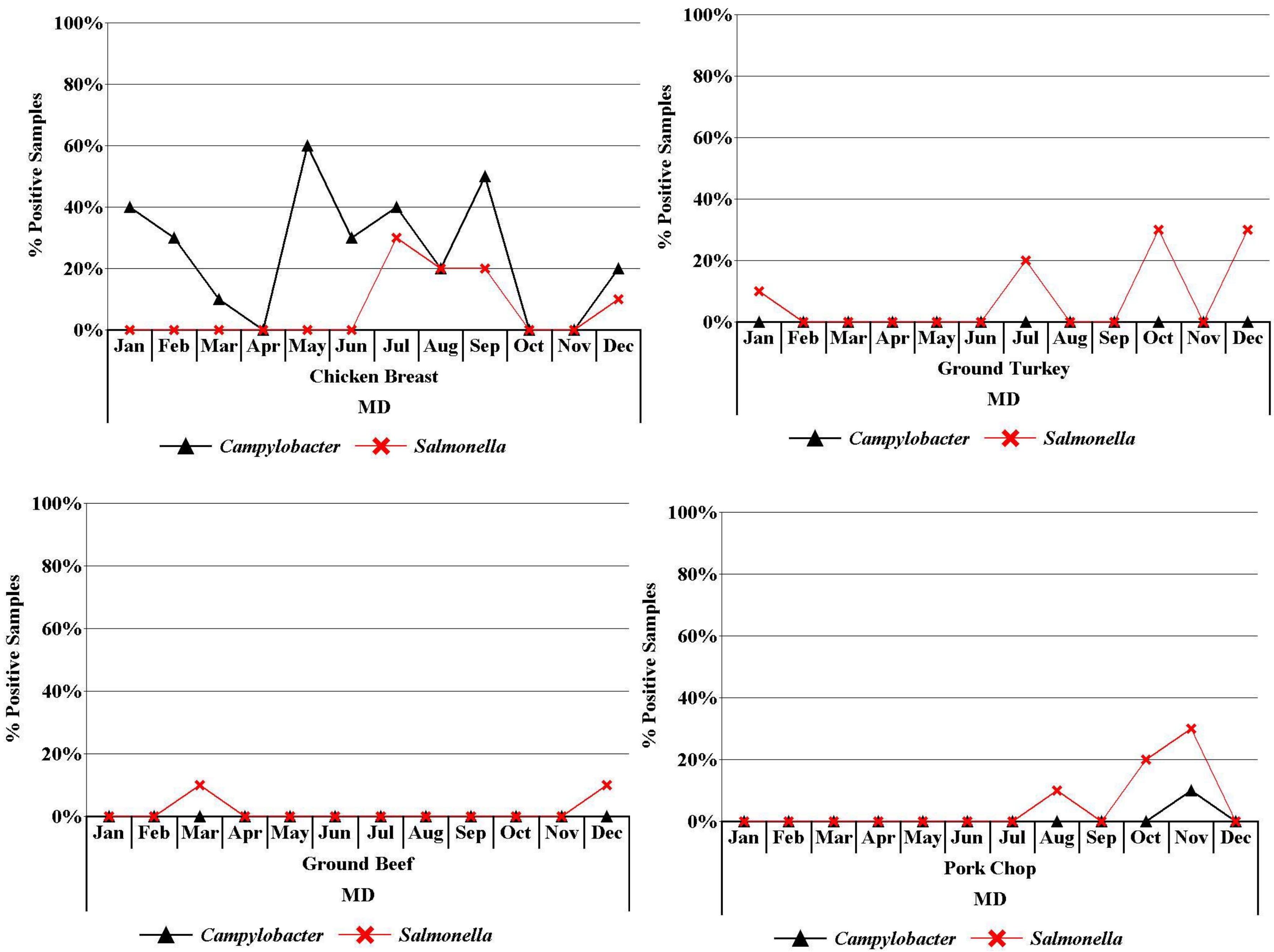


Figure 3g. Percent Positive Samples for *Enterococcus* & *E. coli* by Month and Meat Type in Maryland, 2002

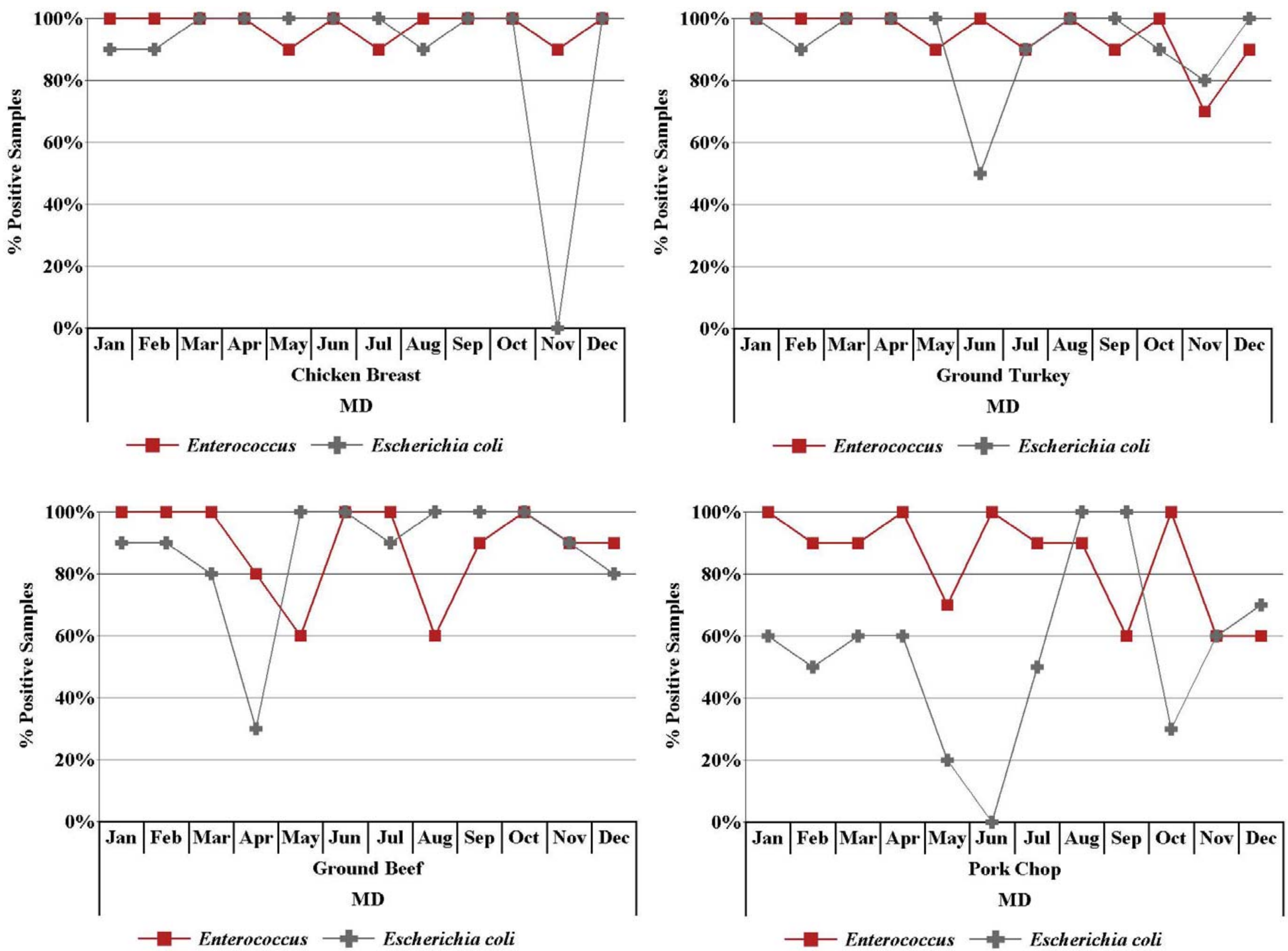


Figure 3h. Percent Positive Samples for *Campylobacter* & *Salmonella* by Month and Meat Type in Minnesota, 2002

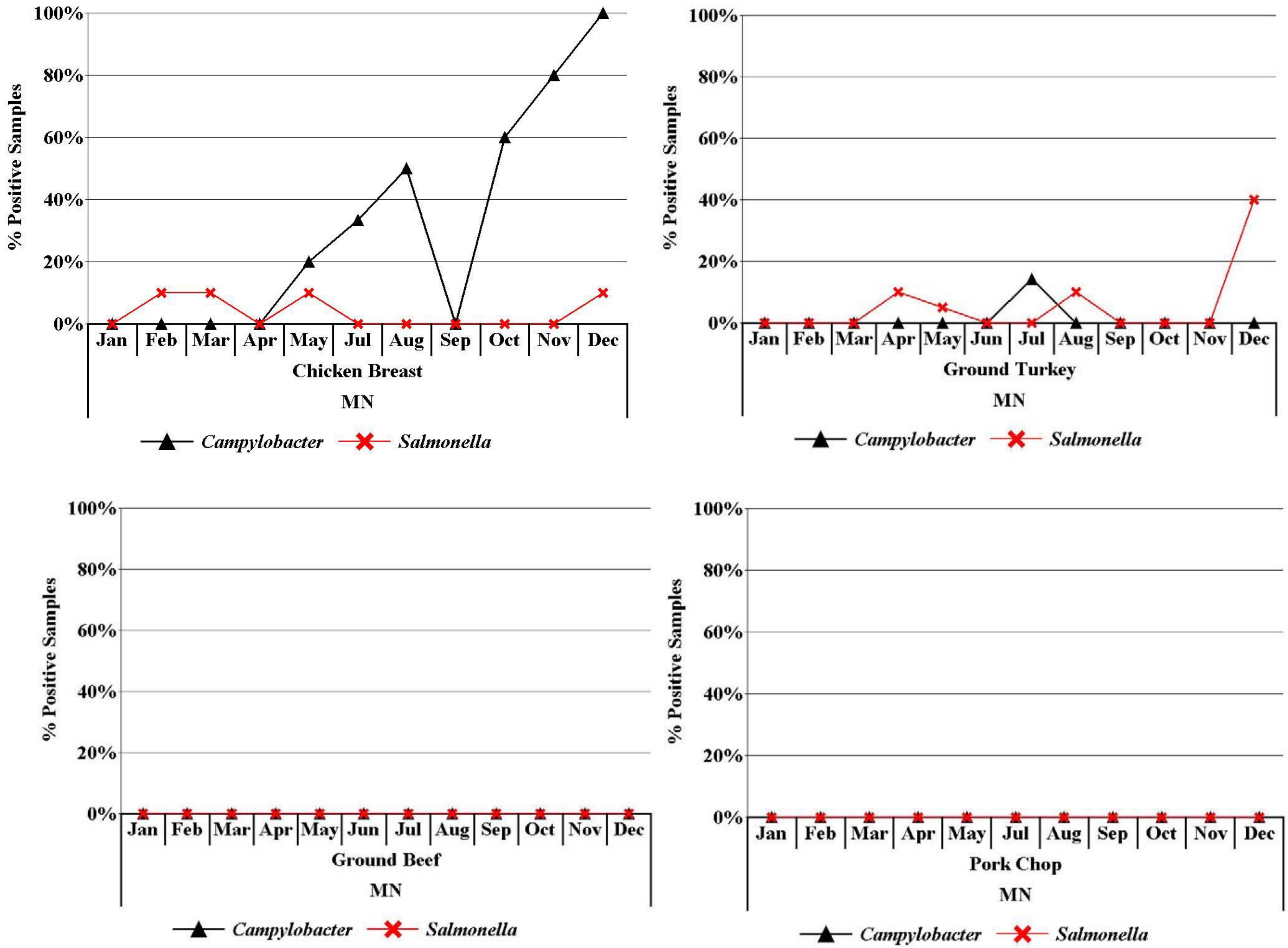
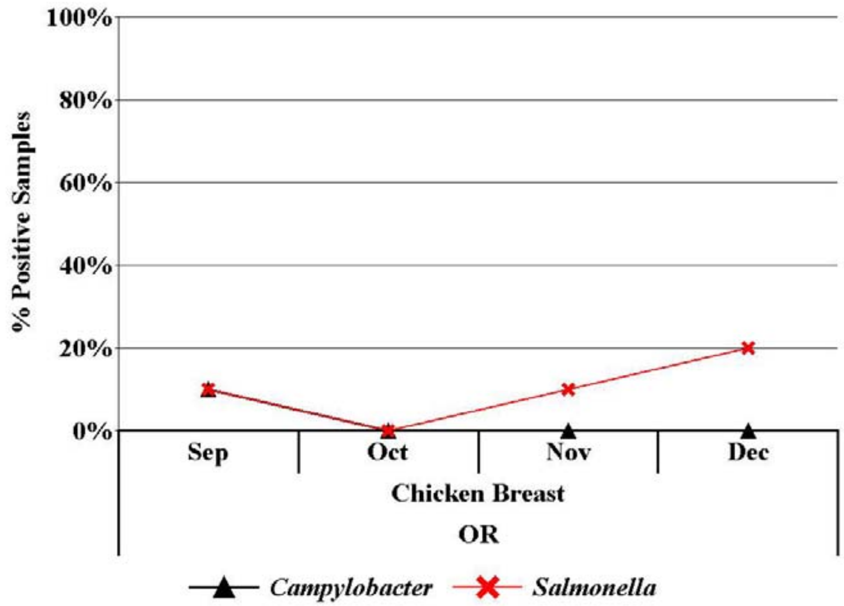
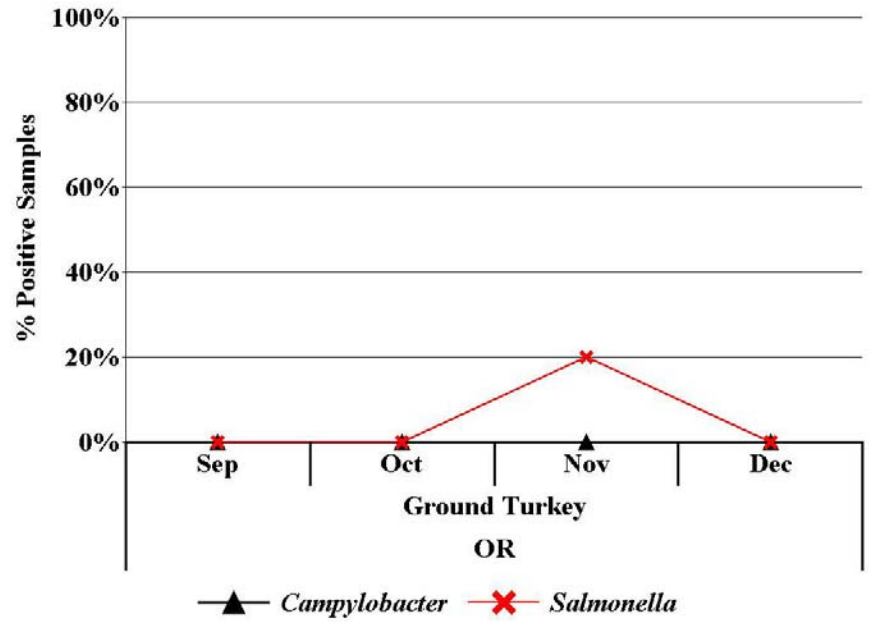
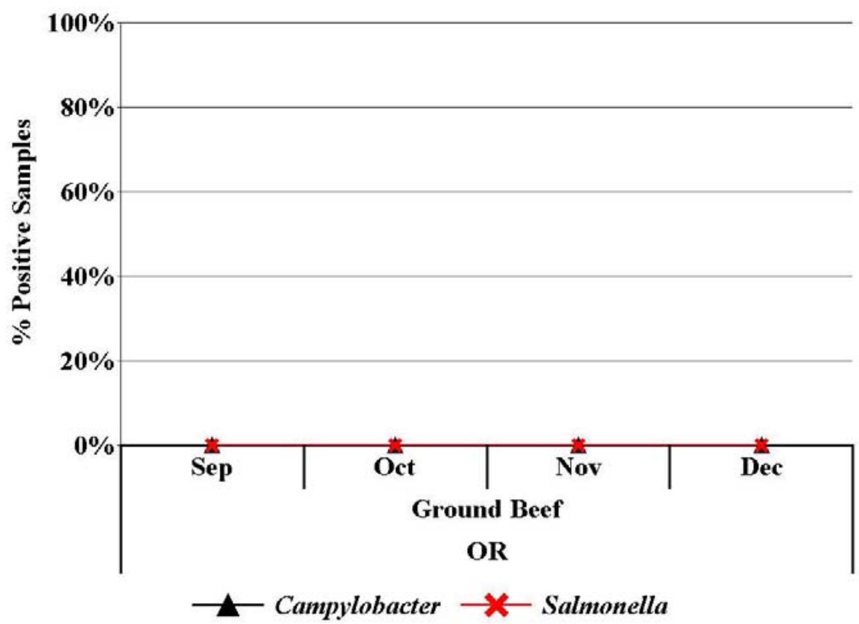


Figure 3i. Percent Positive Samples for *Campylobacter* & *Salmonella* by Month and Meat Type in Oregon, 2002







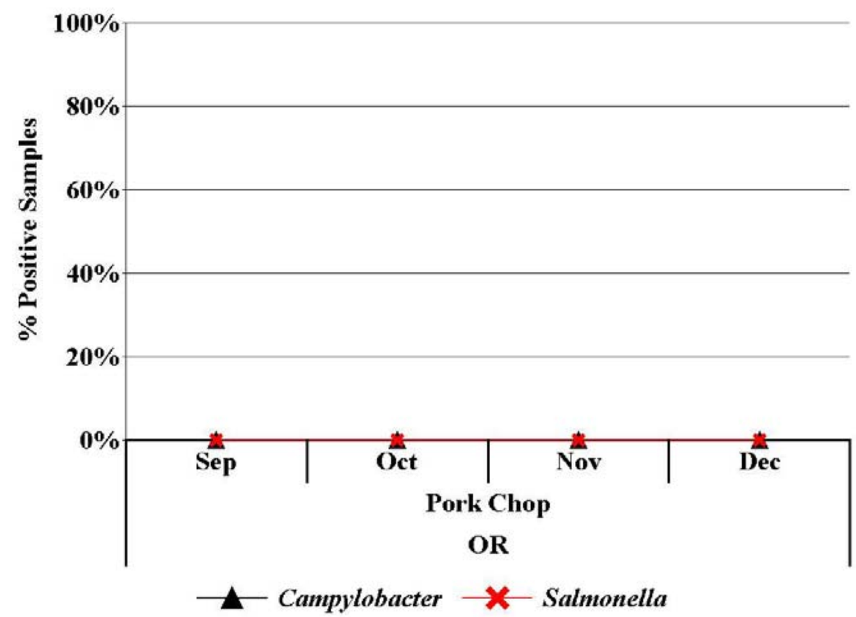


Figure 3j. Percent Positive Samples for *Enterococcus* & *E. coli* by Month and Meat Type in Oregon, 2002

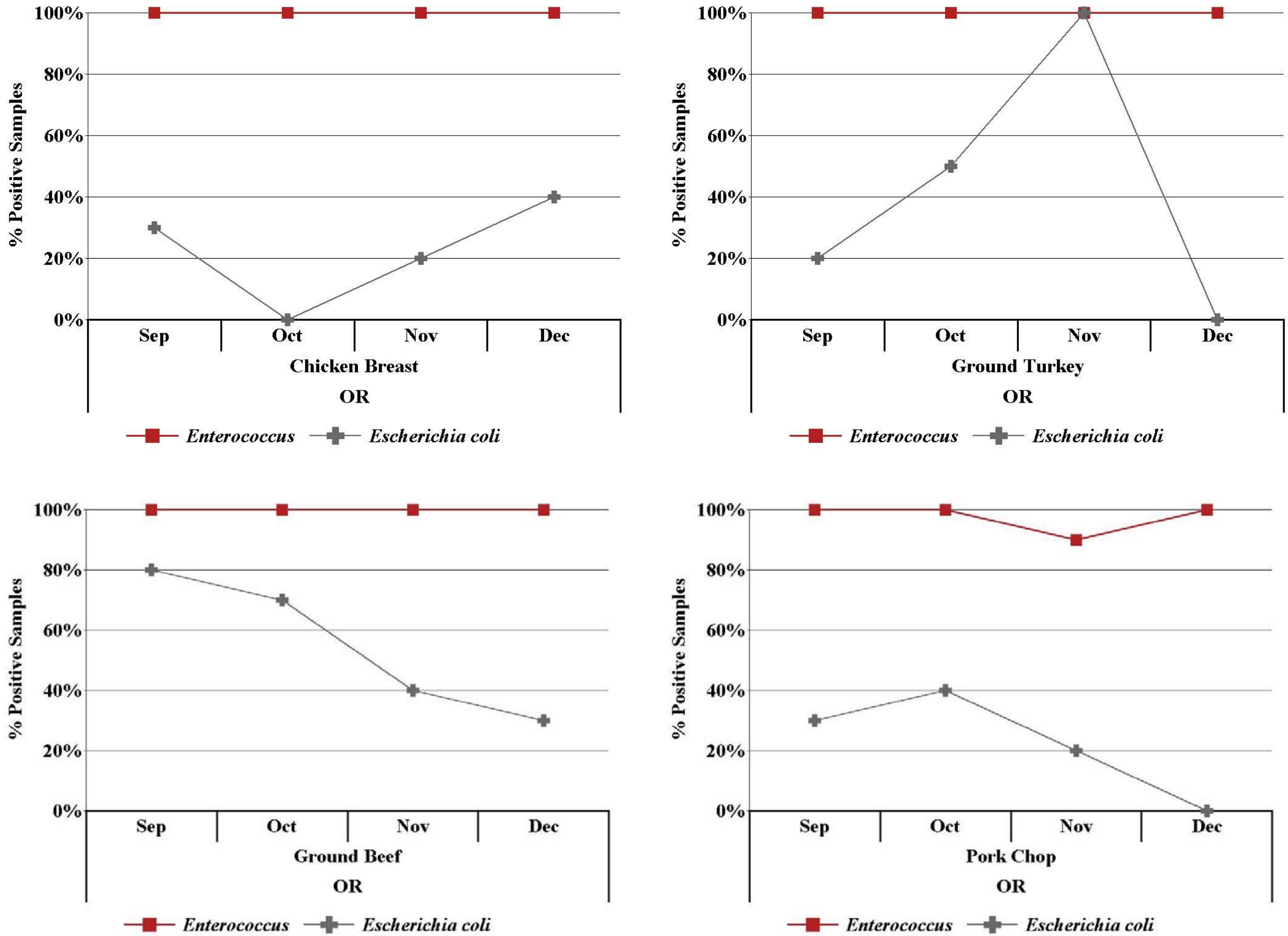


Figure 3k. Percent Positive Samples for *Campylobacter* & *Salmonella* by Month and Meat Type in Tennessee, 2002

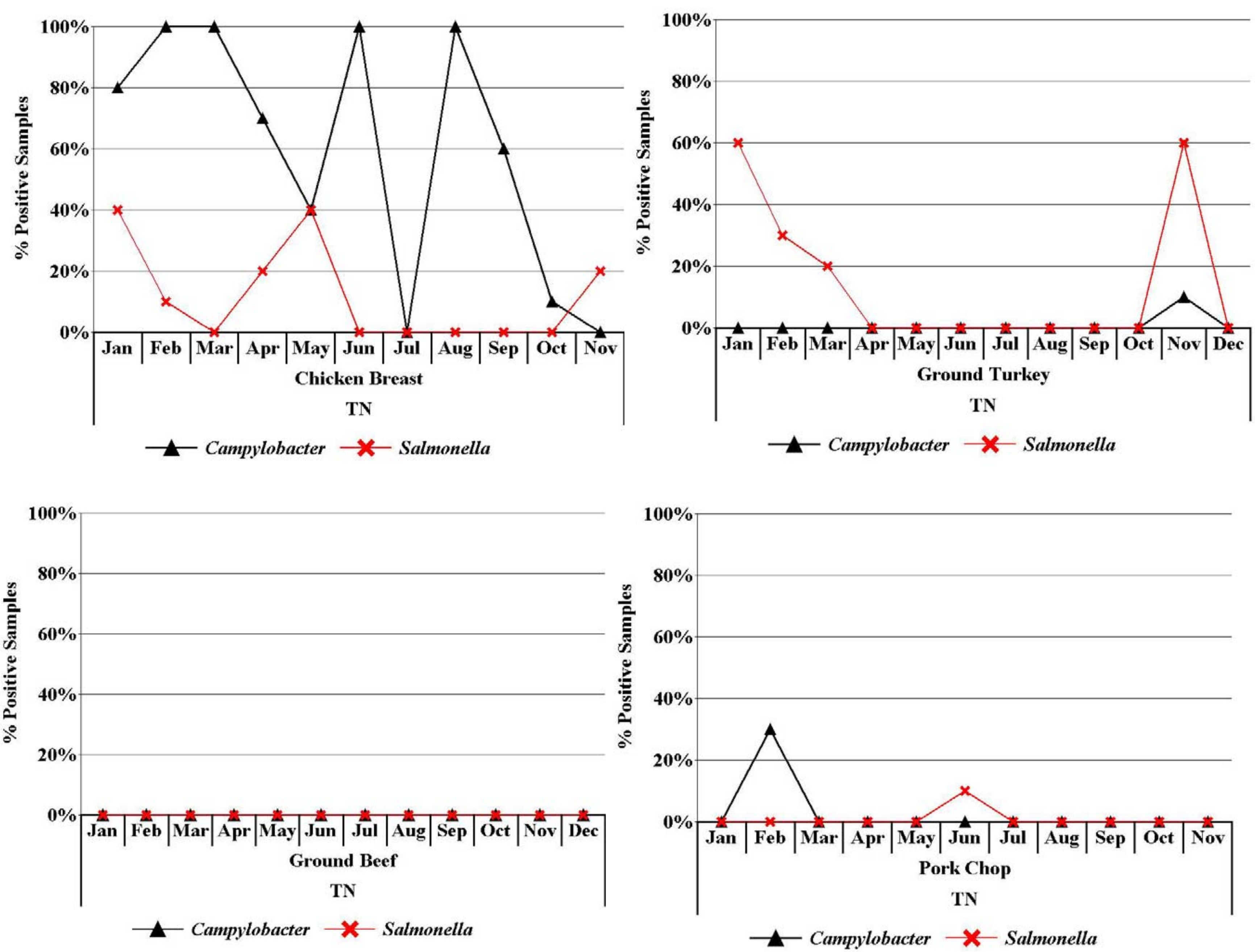
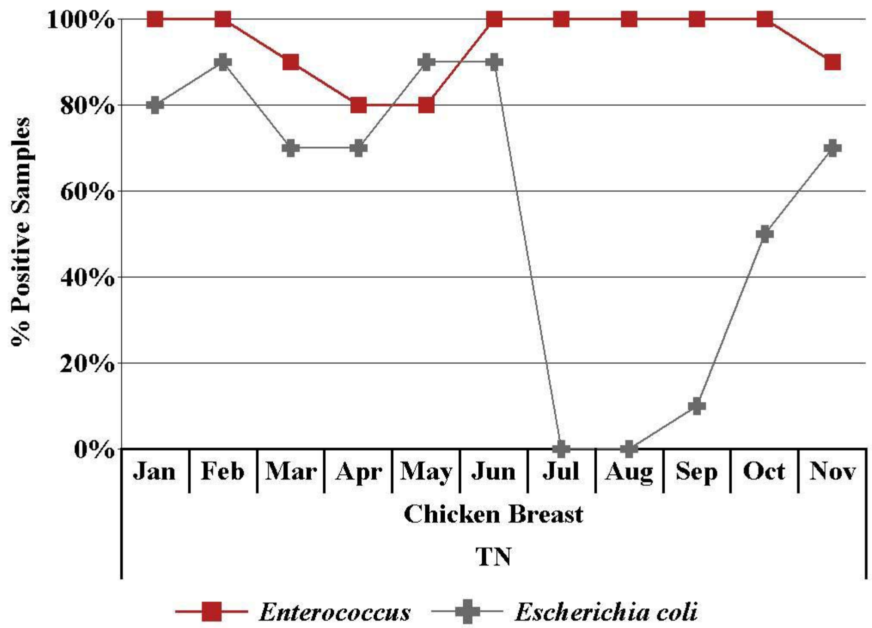
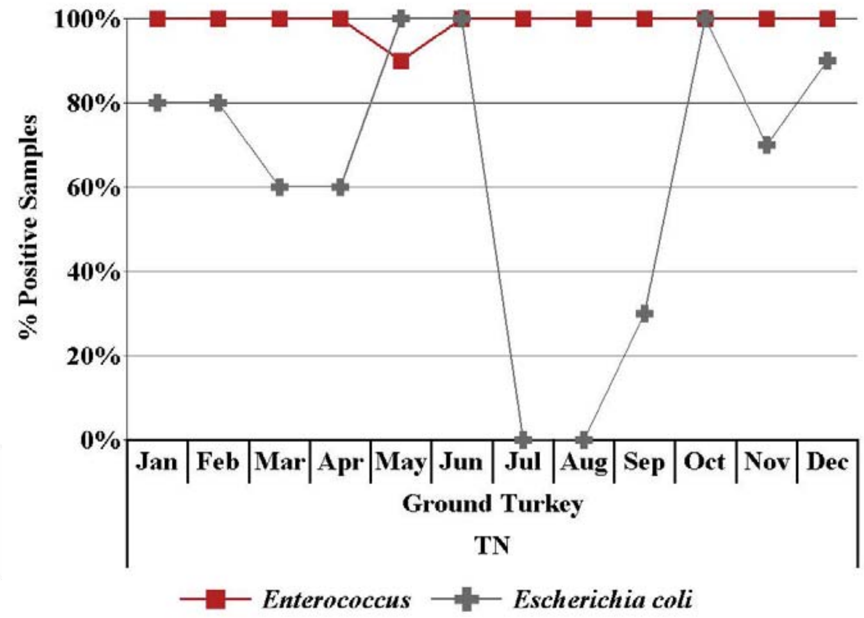
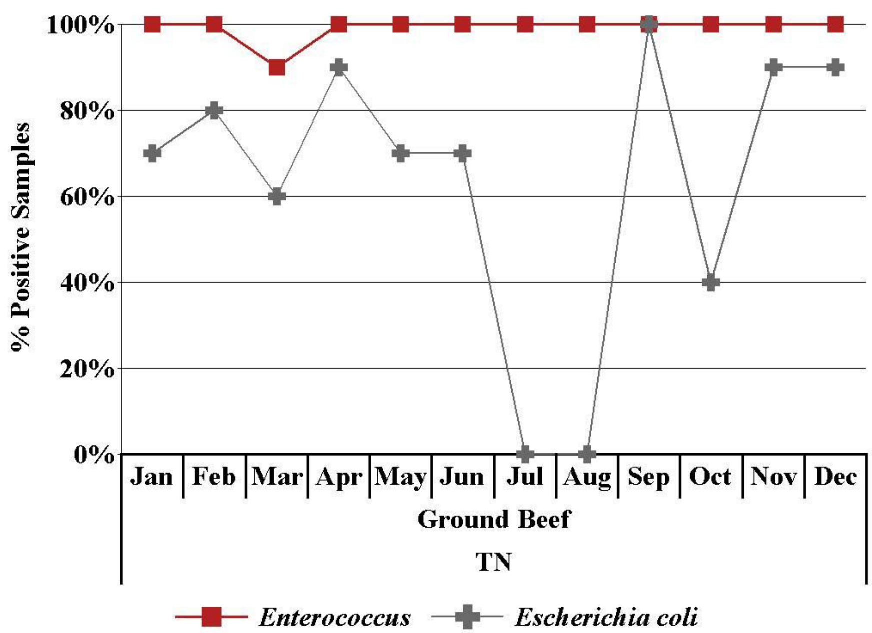


Figure 3l. Percent Positive Samples for *Enterococcus* & *E. coli* by Month and Meat Type in Tennessee, 2002







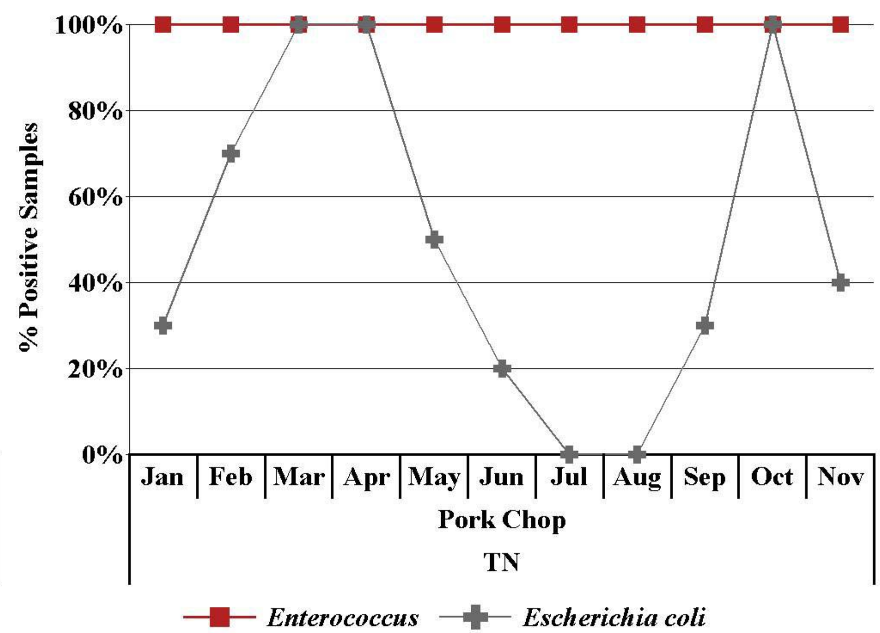


Table 5. Overall *Salmonella* Serotypes Identified 2002.

	Serotype	*n*
1.	Heidelberg	35
2.	Saintpaul	17
3.	Typhimurium*	15
4.	Enteritidis	14
5.	Kentucky	13
6.	Hadar	11
7.	Newport	8
8.	Reading	7
9.	SI 4,5,12:i:-	5
10.	Muenster	4
11.	Brandenburg	3
12.	Anatum	2
13.	Bredeney	2
14.	SI 4,12:i:-	2
15.	SI 6,7:k:-	2
16.	Agona	1
17.	Blockley	1
18.	Hvittingfoss	1
19.	Infantis	1
20.	Mbandaka	1
21.	Montevideo	1
22.	Muenchen	1
23.	S IIIa 18:z4:z32:-	1
24.	S rough "o"s: i: 1,2	1
25.	Schwarzengrund	1
26.	Senftenberg	1
27.	SI 4,12:r:-	1
28.	Thompson	1
	Total	**153**

* Includes Typhimurium var. Copenhagen (n=9).

Table 6. *Salmonella* by Serotype and Meat Type, 2002.

Serotype	*Chicken Breast*		*Ground Turkey*		*Ground Beef*		*Pork Chop*	
	n	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Heidelberg (n=35)	11	31.4%	21	60.0%			3	8.6%
Saintpaul (n=17)			17	100.0%				
Typhimurium (n=15)	9	60.0%	2	13.3%	2	13.3%	2	13.3%
Enteritidis (n=14)	8	57.1%	5	35.7%	1	7.1%		
Kentucky (n=13)	12	92.3%	1	7.7%				
Hadar (n=11)	4	36.4%	7	63.6%				
Newport (n=8)			3	37.5%	3	37.5%	2	25.0%
Reading (n=7)			6	85.7%			1	14.3%
SI 4,5,12:i:- (n=5)	4	80.0%	1	20.0%				
Muenster (n=4)			2	50.0%			2	50.0%
Brandenburg (n=3)	2	66.7%	1	33.3%				
Anatum (n=2)					2	100.0%		
Bredeney (n=2)			2	100.0%				
SI 4,12:i:- (n=2)	1	50.0%	1	50.0%				
SI 6,7:k:- (n=2)	2	100.0%						
Agona (n=1)			1	100.0%				
Blockley (n=1)	1	100.0%						
Hvittingfoss (n=1)	1	100.0%						
Infantis (n=1)	1	100.0%						
Mbandaka (n=1)	1	100.0%						
Montevideo (n=1)					1	100.0%		
Muenchen (n=1)			1	100.0%				
S IIIa 18:z4:z32:- (n=1)			1	100.0%				
S rough "o"s: i: 1,2 (n=1)	1	100.0%						
Schwarzengrund (n=1)			1	100.0%				
Senftenberg (n=1)			1	100.0%				
SI 4,12:r:- (n=1)	1	100.0%						
Thompson (n=1)	1	100.0%						
Total (N=153)	**60**	**39.2%**	**74**	**48.4%**	**9**	**5.9%**	**10**	**6.5%**

Table 7. *Salmonella* Serotype by Site and Meat Type, 2002.

Site	Serotype	Chicken Breast		Ground Turkey		Ground Beef		Pork Chop	
		n	%	n	%	n	%	n	%
CT	Heidelberg (n=8)	2	25.0%	6	75.0%				
	Typhimurium (n=8)	4	50.0%	2	25.0%	2	25.0%		
	Kentucky (n=5)	5	100.0%						
	Saintpaul (n=4)			4	100.0%				
	Enteritidis (n=3)	2	66.7%	1	33.3%				
	Anatum (n=2)					2	100.0%		
	Muenster (n=2)			1	50.0%			1	50.00%
	Reading (n=2)			2	100.0%				
	SI 4,12:i:- (n=2)	1	50.0%	1	50.0%				
	SI 4,5,12:i:- (n=2)	1	50.0%	1	50.0%				
	SI 6,7:k:- (n=2)	2	100.0%						
	Muenchen (n=1)			1	100.0%				
	Newport (n=1)					1	100.0%		
	S IIIa 18:z4:z32:- (n=1)			1	100.0%				
	Senftenberg (n=1)			1	100.0%				
	Total (n=44)	**17**	**38.6%**	**21**	**47.7%**	**5**	**11.4%**	**1**	**2.3%**
GA	Hadar (n=7)	1	14.3%	6	85.7%				
	Heidelberg (n=7)	2	28.6%	5	71.4%				
	Reading (n=4)			3	75.0%			1	25.0%
	Saintpaul (n=4)			4	100.0%				
	SI 4,5,12:i:- (n=3)	3	100.0%						
	Brandenburg (n=2)	2	100.0%						
	Hvittingfoss (n=1)	1	100.0%						
	Infantis (n=1)	1	100.0%						
	Kentucky (n=1)	1	100.0%						
	Mbandaka (n=1)	1	100.0%						
	Montevideo (n=1)					1	100.0%		
	Newport (n=1)					1	100.0%		
	Schwarzengrund (n=1)			1	100.0%				
	SI 4,12:r:- (n=1)	1	100.0%						
	Thompson (n=1)	1	100.0%						
	Typhimurium (n=1)							1	100.0%
	Total (n=37)	**14**	**37.8%**	**19**	**51.4%**	**2**	**5.4%**	**2**	**5.4%**
MD	Enteritidis (n=7)	2	28.6%	4	57.1%	1	14.3%		
	Heidelberg (n=5)			2	40.0%			3	60.0%
	Newport (n=4)			1	25.0%	1	25.0%	2	50.0%
	Typhimurium (n=4)	3	75.0%					1	25.0%
	Brandenburg (n=1)			1	100.0%				
	Hadar (n=1)	1	100.0%						
	Kentucky (n=1)	1	100.0%						
	Muenster (n=1)			1	100.0%				
	S rough "o"s: i: 1,2 (n=1)	1	100.0%						
	Total (n=25)	**8**	**32.0%**	**9**	**36.0%**	**2**	**8.0%**	**6**	**24.0%**

Table 7 (cont'd). *Salmonella* Serotype by Site and Meat Type, 2002.

Site	***Serotype***	***Chicken Breast***		***Ground Turkey***		***Ground Beef***		***Pork Chop***	
		n	**%**	**n**	**%**	**n**	**%**	**n**	**%**
MN	Heidelberg (n=5)	1	20.0%	4	80.0%				
	Kentucky (n=2)	1	50.0%	1	50.0%				
	Blockley (n=1)	1	100.0%						
	Hadar (n=1)			1	100.0%				
	Reading (n=1)			1	100.0%				
	Typhimurium (n=1)	1	100.0%						
	Total (n=11)	**4**	**36.4%**	**7**	**63.6%**	**0**	**0.0%**	**0**	**0.0%**
OR	Hadar (n=2)	2	100.0%						
	Heidelberg (n=2)	2	100.0%						
	Saintpaul (n=2)			2	100.0%				
	Total (n=6)	**4**	**66.7%**	**2**	**53.3%**	**0**	**0.0%**	**0**	**0.0%**
TN	Heidelberg (n=8)	4	50.0%	4	50.0%				
	Saintpaul (n=7)			7	100.0%				
	Enteritidis (n=4)	4	100.0%						
	Kentucky (n=4)	4	100.0%						
	Bredeney (n=2)			2	100.0%				
	Newport (n=2)			2	100.0%				
	Agona (n=1)			1	100.0%				
	Muenster (n=1)							1	100.0%
	Typhimurium (n=1)	1	100.0%						
	Total (n=30)	**13**	**43.3%**	**16**	**53.3%**	**0**	**0.0%**	**1**	**3.3%**

Table 8. *Salmonella* Isolates by Month for All Sites, 2002.

Month	***n***	**%**
January	18	11.8%
February	14	9.2%
March	8	5.2%
April	10	6.5%
May	10	6.5%
June	9	5.9%
July	15	9.8%
August	6	3.9%
September	8	5.2%
October	20	13.1%
November	20	13.1%
December	15	9.8%
Total	**153**	**100.0%**

Table 9. *Salmonella* Serotypes by Meat Type and Month for All Sites, 2002.

Meat Type	Serotype*	Jan.		Feb.		Mar.		Apr.		May		Jun.		Jul.		Aug.		Sept.		Oct.		Nov.		Dec.	
		n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Chicken Breast	Kentucky (n=12)			5	41.7%			1	8.3%			1	8.33%					2	16.7%			2	16.7%	1	8.3%
	Heidelberg (n=11)					1	9.1%	1	9.1%	5	45.5%							2	18.2%	1	9.1%			1	9.1%
	Typhimurium (n=9)							1	11.1%	1	11.1%			6	66.7%									1	11.1%
	Enteritidis (n=8)	4	50.0%	1	12.5%	1	12.5%									2	25.0%								
	Hadar (n=4)	1	25.0%															1	25.0%	1	25.0%	1	25.0%		
	SI 4,5,12:i:- (n=4)			1	25.0%													2	50.0%					1	25.0%
	Brandenburg (n=2)			1	50.0%																	1	50.0%		
	SI 6,7:k:- (n=2)																			2	100.0%				
	Blockley (n=1)			1	100.0%																				
	Hvittingfoss (n=1)							1	100.0%																
	Infantis (n=1)																							1	100.0%
	Mbandaka (n=1)																					1	100.0%		
	S rough "o"s:i: 1,2 (n=1)													1	100.0%										
	SI 4,12:i:- (n=1)					1	100.0%																		
	SI 4,12:r:- (n=1)																	1	100.0%						
	Thompson (n=1)															1	100.0%								
	Total (n=60)	**5**	**8.3%**	**9**	**15.0%**	**3**	**5.0%**	**4**	**6.7%**	**6**	**10.0%**	**1**	**1.7%**	**7**	**11.7%**	**3**	**5.0%**	**8**	**13.3%**	**4**	**6.7%**	**5**	**8.3%**	**5**	**8.3%**

Meat Type	*Serotype*[*]	*Jan.*		*Feb.*		*Mar.*		*Apr.*		*May*		*Jun.*		*Jul.*		*Aug.*		*Sept.*		*Oct.*		*Nov.*		*Dec.*	
		n	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Ground Turkey	Heidelberg (n=21)	5	23.8%			1	4.8%					1	4.8%	4	19.1%					4	19.1%	2	9.5%	4	19.1%
	Saintpaul (n=17)	2	11.8%	3	17.7%			1	5.9%					1	5.9%					3	17.7%	6	35.3%	1	5.9%
	Hadar (n=7)					1	14.3%	3	42.9%					2	28.6%									1	14.3%
	Reading (n=6)					1	16.7%			3	50.0%	1	16.7%			1	16.7%								
	Enteritidis (n=5)			1	20.0%															1	20.0%			3	60.0%
	Newport (n=3)																			1	33.3%	2	66.7%		
	Bredeney (n=2)	2	100.0%																						
	Muenster (n=2)	2	100.0%																						
	Typhimurium (n=2)																			2	100.0%				
	Agona (n=1)					1	100.0%																		
	Brandenburg (n=1)													1	100.0%										
	Kentucky (n=1)									1	100.0%														
	Muenchen (n=1)			1	100.0%																				
	S IIIa 18:z4:z32:- (n=1)							1	100.0%																
	Schwarzengrund (n=1)																					1	100.0%		
	Senftenberg (n=1)	1	100.0%																						
	SI 4,12:i:- (n=1)											1	100.0%												
	SI 4,5,12:i:- (n=1)											1	100.0%												
	Total (n=74)	**12**	**16.2%**	**5**	**6.8%**	**4**	**5.4%**	**5**	**6.8%**	**4**	**5.4%**	**4**	**5.4%**	**8**	**10.8%**	**1**	**1.4%**	**0**	**0.0%**	**11**	**14.9%**	**11**	**14.9%**	**9**	**12.2%**

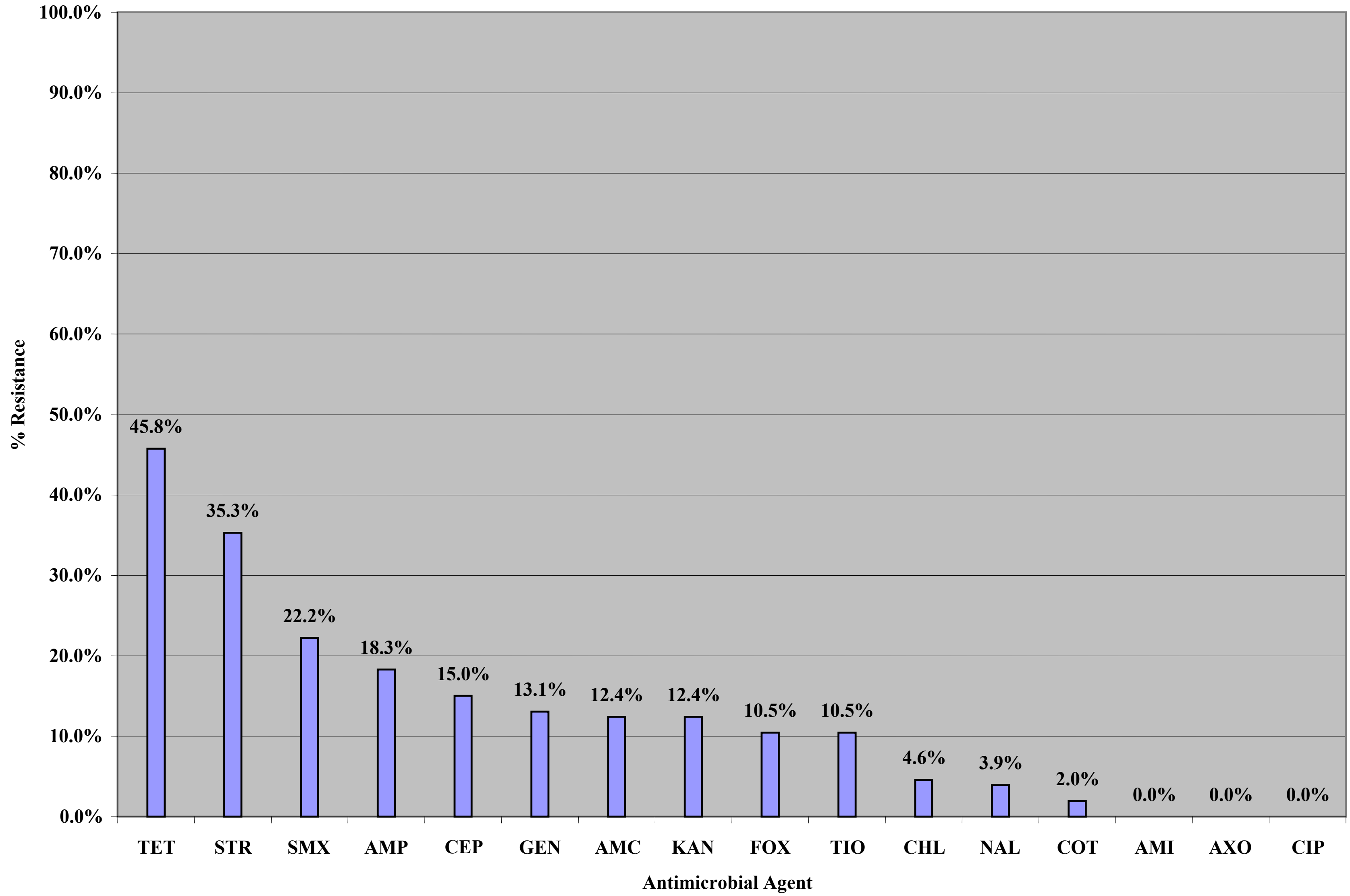
Meat Type	***Serotype****	***Jan.***		***Feb.***		***Mar.***		***Apr.***		***May***		***Jun.***		***Jul.***		***Aug.***		***Sept.***		***Oct.***		***Nov.***		***Dec.***	
		n	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Ground Beef	Newport (n=3)															1	33.3%					1	33.3%	1	33.3%
	Anatum (n=2)											2	100.0%												
	Typhimurium (n=2)							1	50.0%											1	50.0%				
	Enteritidis (n=1)					1	100.0%																		
	Montevideo (n=1)																			1	100.0%				
	Total (n=9)	**0**	**0.0%**	**0**	**0.0%**	**1**	**11.1%**	**1**	**11.1%**	**0**	**0.0%**	**2**	**22.2%**	**0**	**0.0%**	**1**	**11.1%**	**0**	**0.0%**	**2**	**22.2%**	**1**	**11.1%**	**1**	**11.1%**
Pork Chop	Heidelberg (n=3)																					3	100.0%		
	Muenster (n=2)											1	50.0%							1	50.0%				
	Newport (n=2)																			2	100.0%				
	Typhimurium (n=2)	1	50.0%													1	50.0%								
	Reading (n=1)											1	100.0												
	Total (n=10)	**1**	**10.0%**	**0**	**0.0%**	**0**	**0.0%**	**0**	**0.0%**	**0**	**0.0%**	**2**	**20.0%**	**0**	**0.0%**	**1**	**10.0%**	**0**	**0.0%**	**3**	**30.0%**	**3**	**30.0%**	**0**	**0.0%**

[*] Serotypes listed by prevalence within meat type.

Table 10. Antimicrobial Resistance (%R) among *Salmonella* Isolates (N=153), 2002.

Antimicrobial Agent	*n*	*%R*
Tetracycline	70	45.8%
Streptomycin	54	35.3%
Sulfamethoxazole	34	22.2%
Ampicillin	28	18.3%
Cephalothin	23	15.0%
Gentamicin	20	13.1%
Amoxicillin/Clavulanic Acid	19	12.4%
Kanamycin	19	12.4%
Cefoxitin	16	10.5%
Ceftiofur	16	10.5%
Chlorampenicol	7	4.6%
Nalidixic Acid	6	3.9%
Trimethoprim/Sulfamethoxazole	3	2.0%
Amikacin	0	0.0%
Ciprofloxacin	0	0.0%
Ceftriaxone	0	0.0%

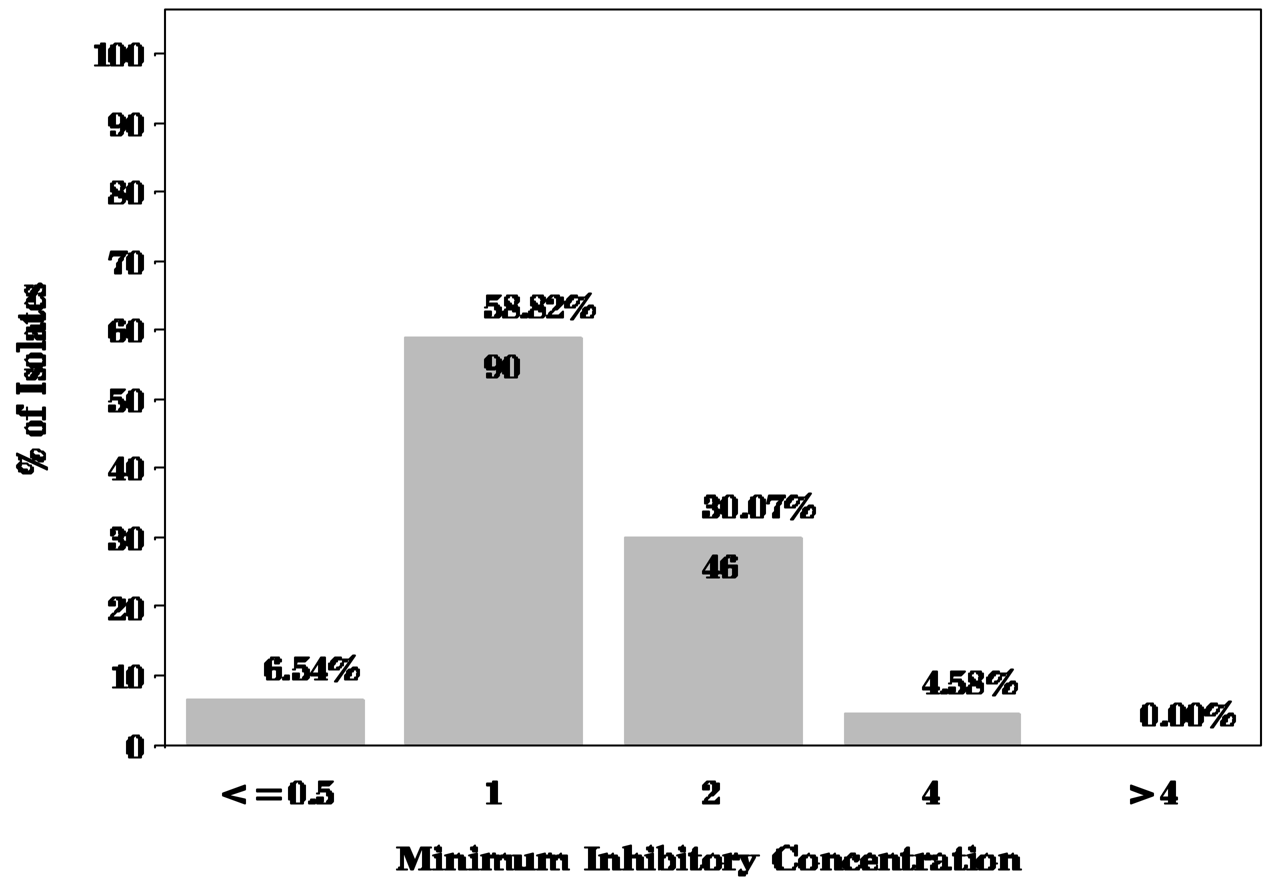
Figure 4. Antimicrobial Resistance among *Salmonella* Isolates (N=153), 2002.



NARMS

Figure 5: Minimum Inhibitory Concentration of Amikacin for *Salmonella* (N=153 Isolates)

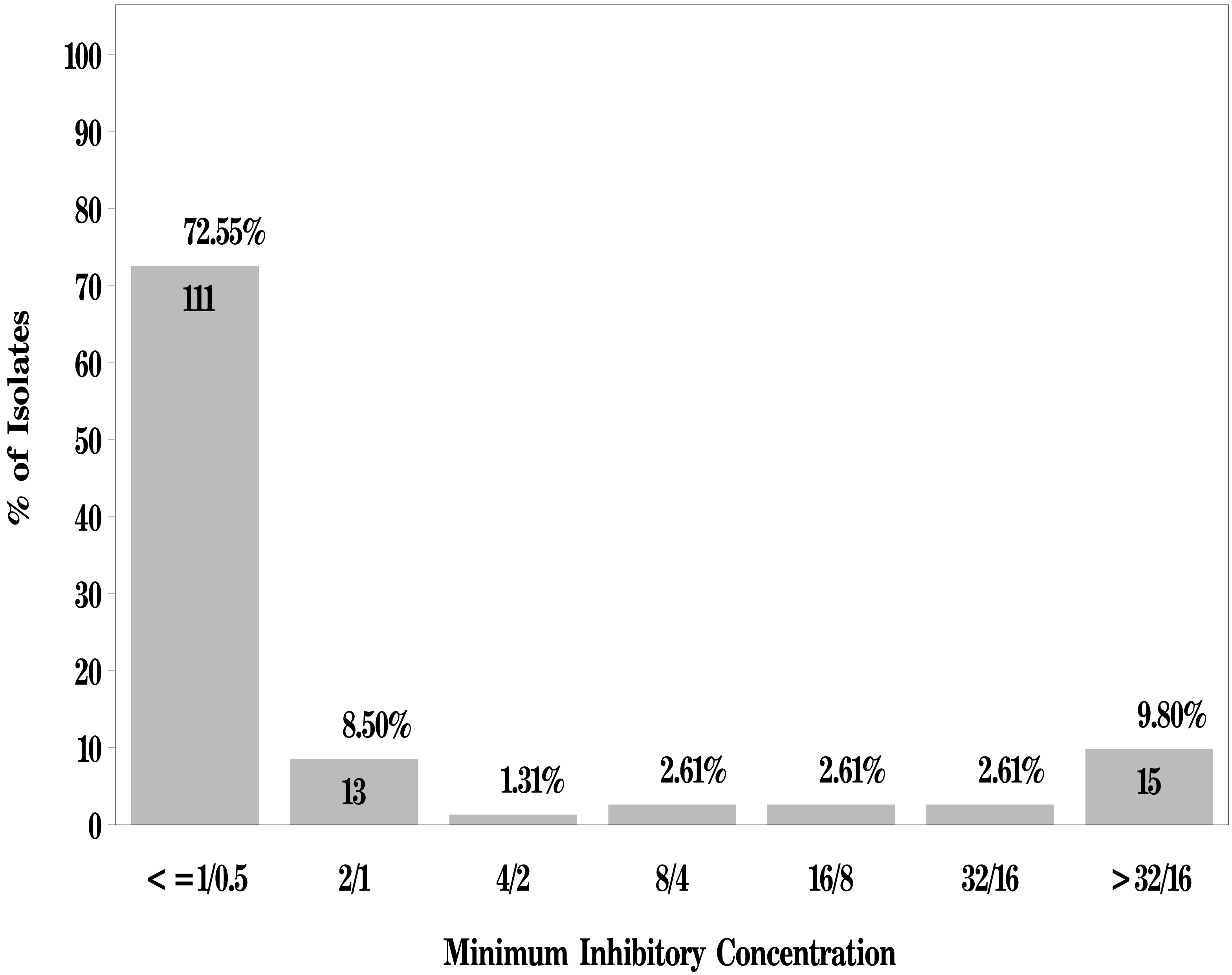
Breakpoints: Susceptible <=16 µg/mL Resistant >=64 µg/mL



NARMS

Figure 5: Minimum Inhibitory Concentration of Amoxicillin/Clavulanic acid for *Salmonella* (N=153 Isolates)

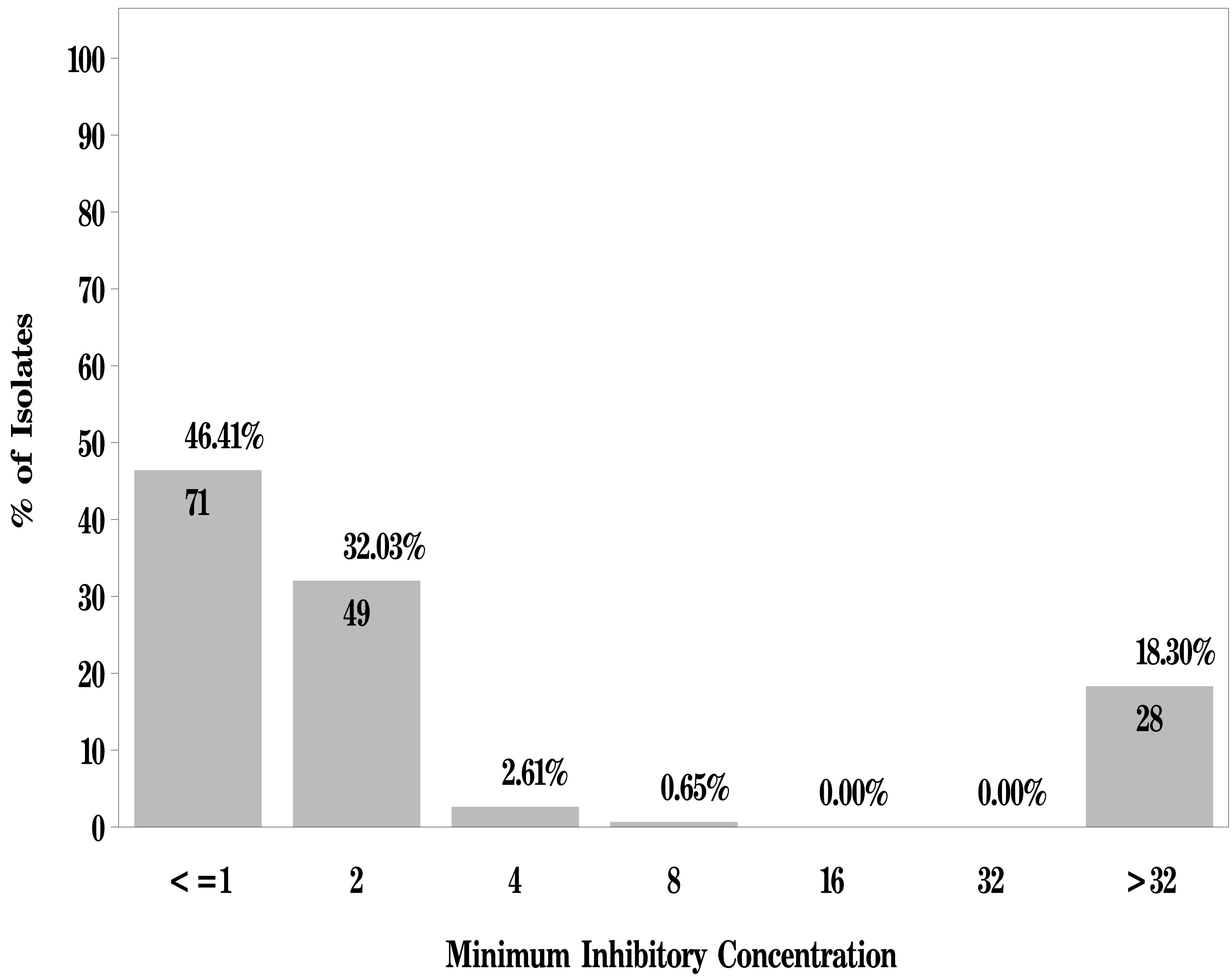
Breakpoints: Susceptible <=8/4 µg/mL Resistant >=32/16 µg/mL



NARMS

Figure 5: Minimum Inhibitory Concentration of Ampicillin for *Salmonella* (N=153 Isolates)

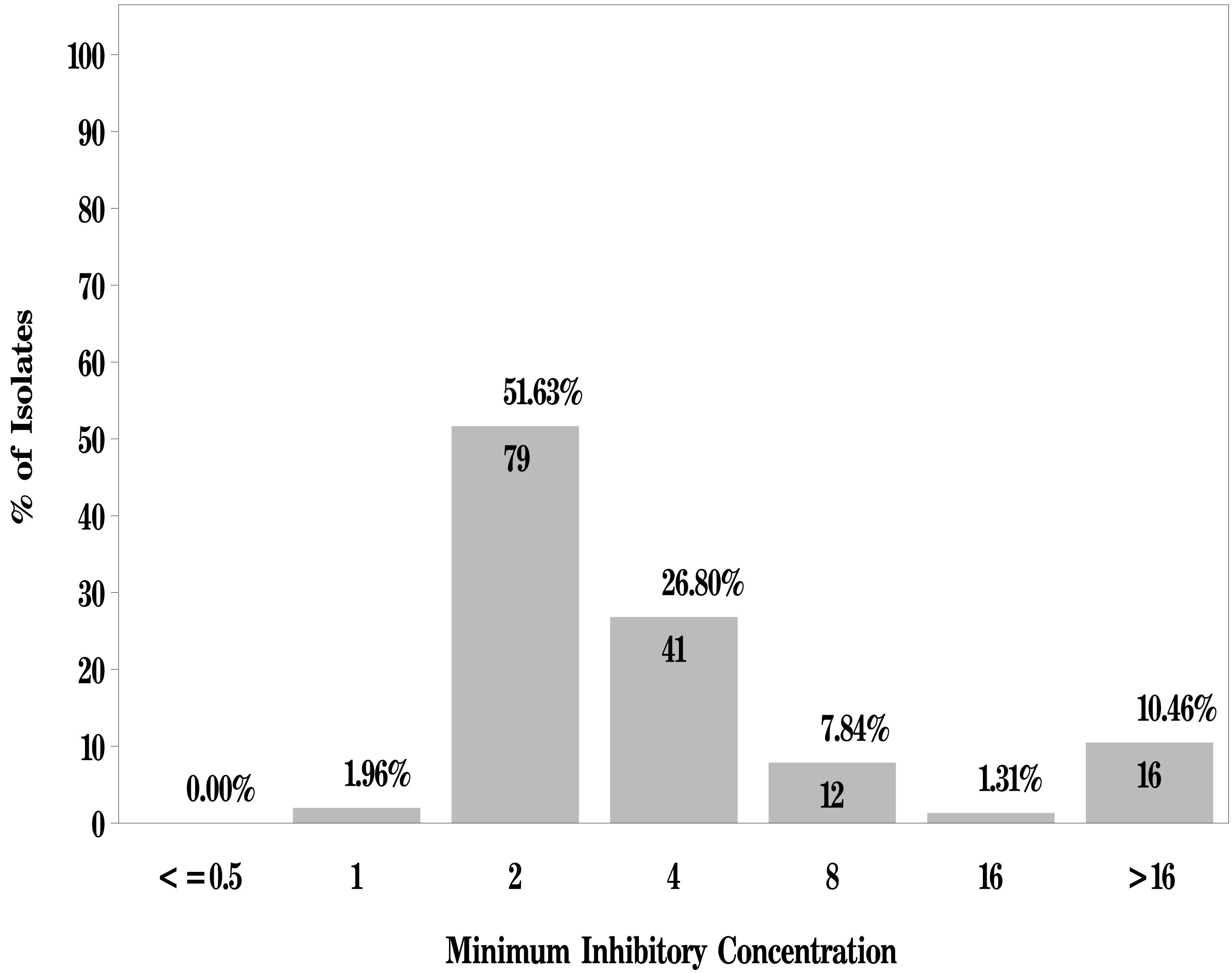
Breakpoints: Susceptible<=8 µg/mL Resistant>=32 µg/mL



NARMS

Figure 5: Minimum Inhibitory Concentration of Cefoxitin for *Salmonella* (N=153 Isolates)

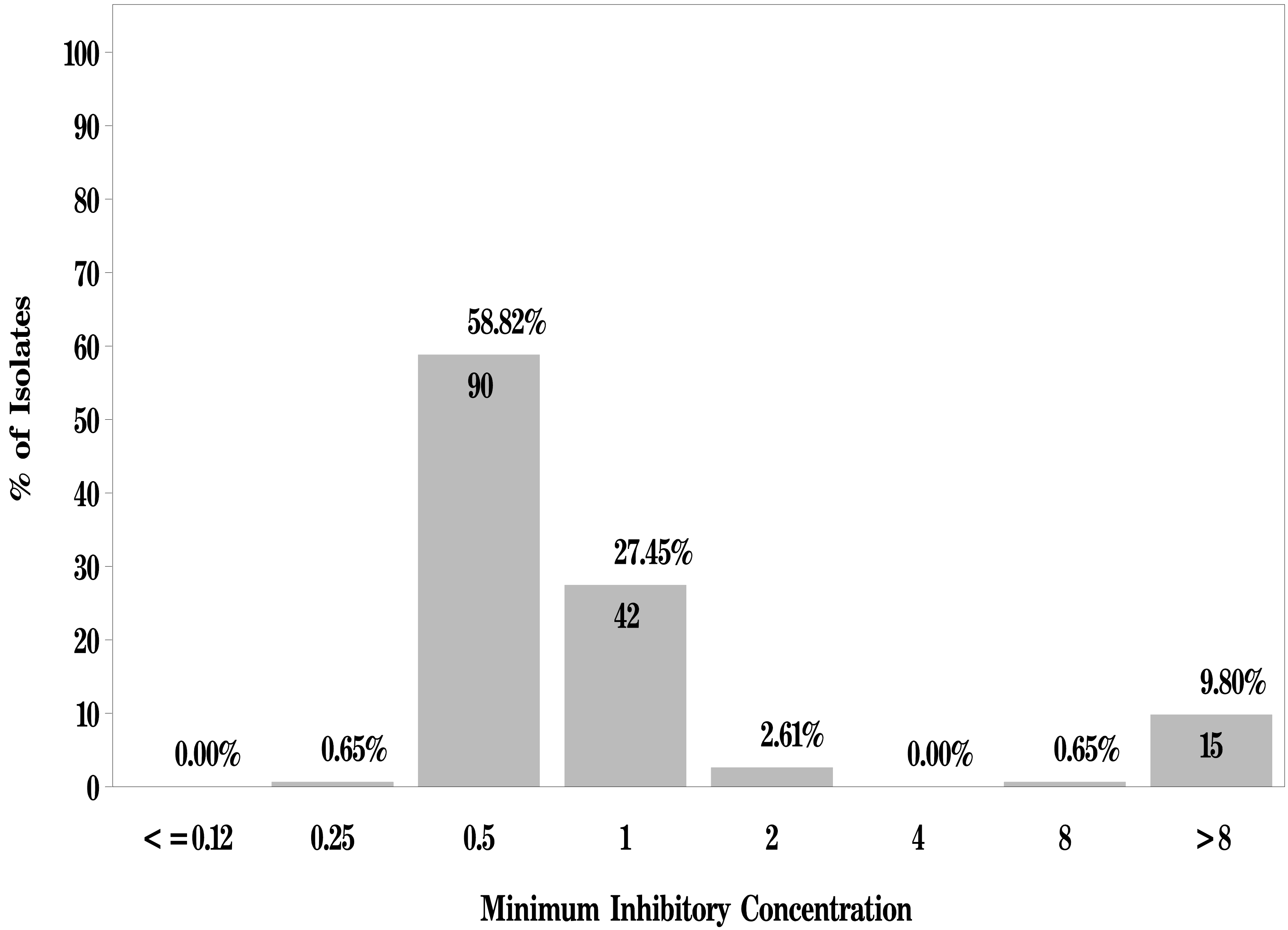
Breakpoints: Susceptible<=8 μg/mL Resistant>=32 μg/mL



NARMS

Figure 5: Minimum Inhibitory Concentration of Ceftiofur for *Salmonella* (N=153 Isolates)

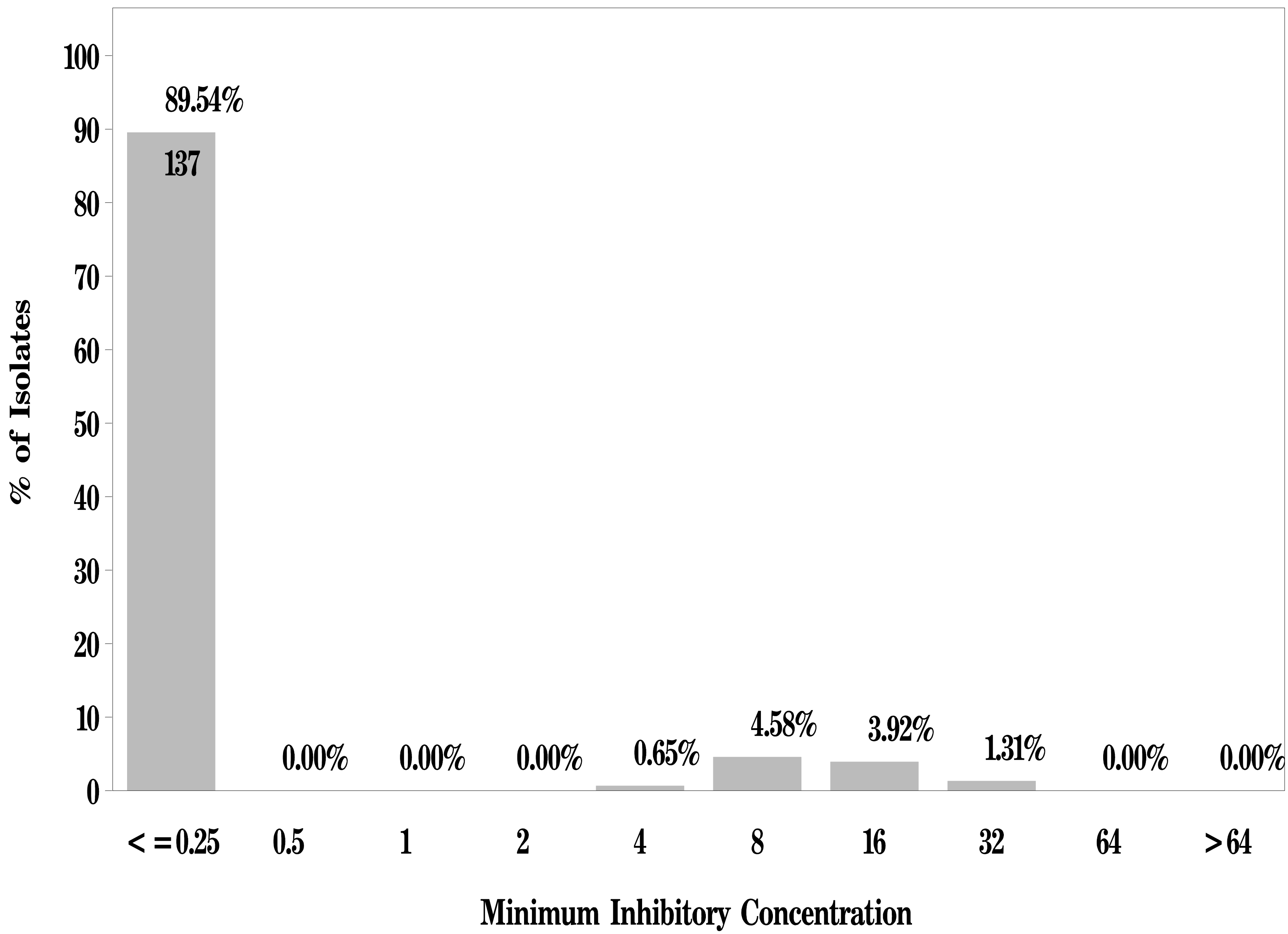
Breakpoints: Susceptible<=2 μg/mL Resistant>=8 μg/mL



NARMS

Figure 5: Minimum Inhibitory Concentration of Ceftriaxone for *Salmonella* (N=153 Isolates)

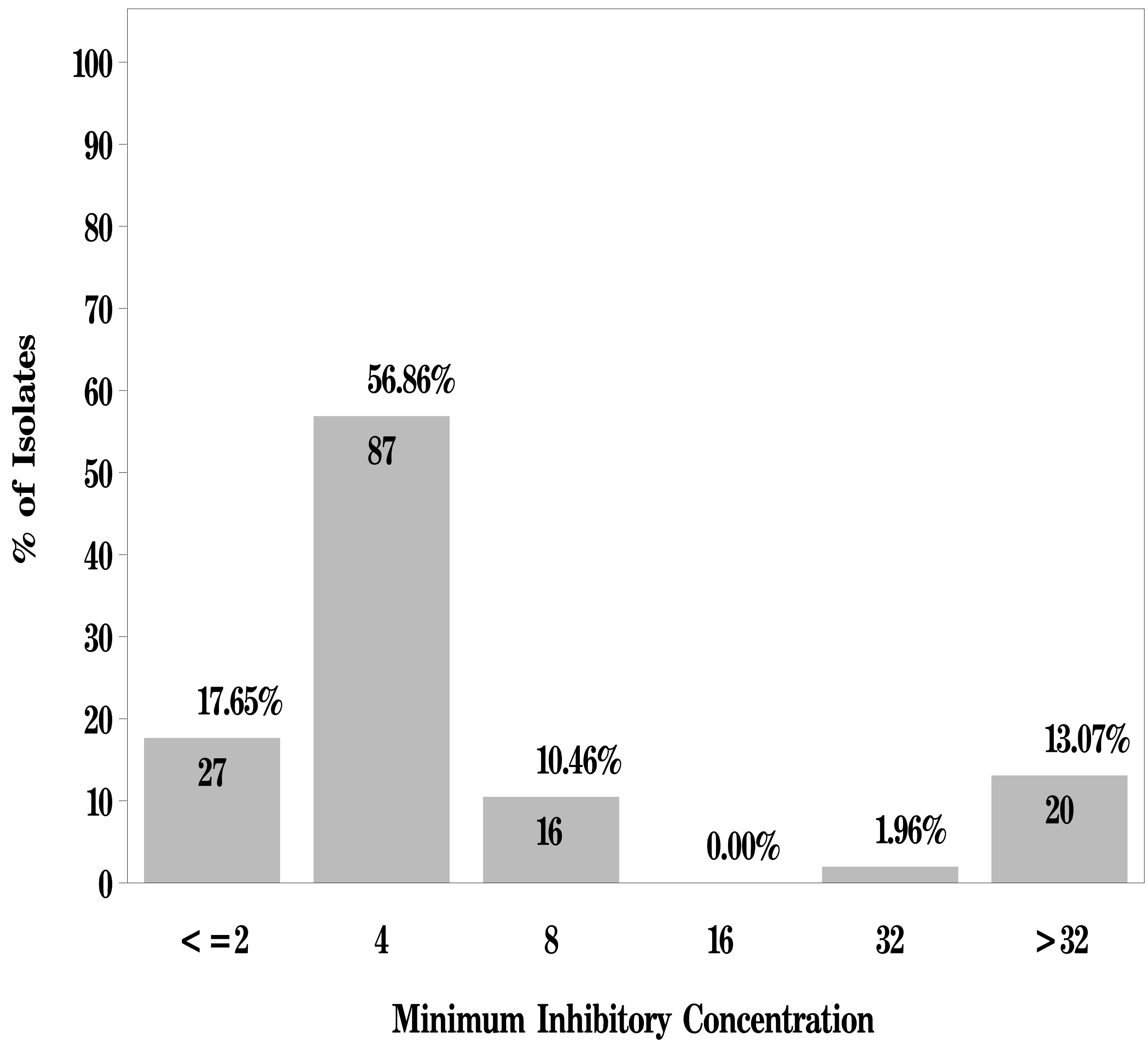
Breakpoints: Susceptible <=8 µg/mL Resistant >=64 µg/mL



NARMS

Figure 5: Minimum Inhibitory Concentration of Cephalothin for *Salmonella* (N=153 Isolates)

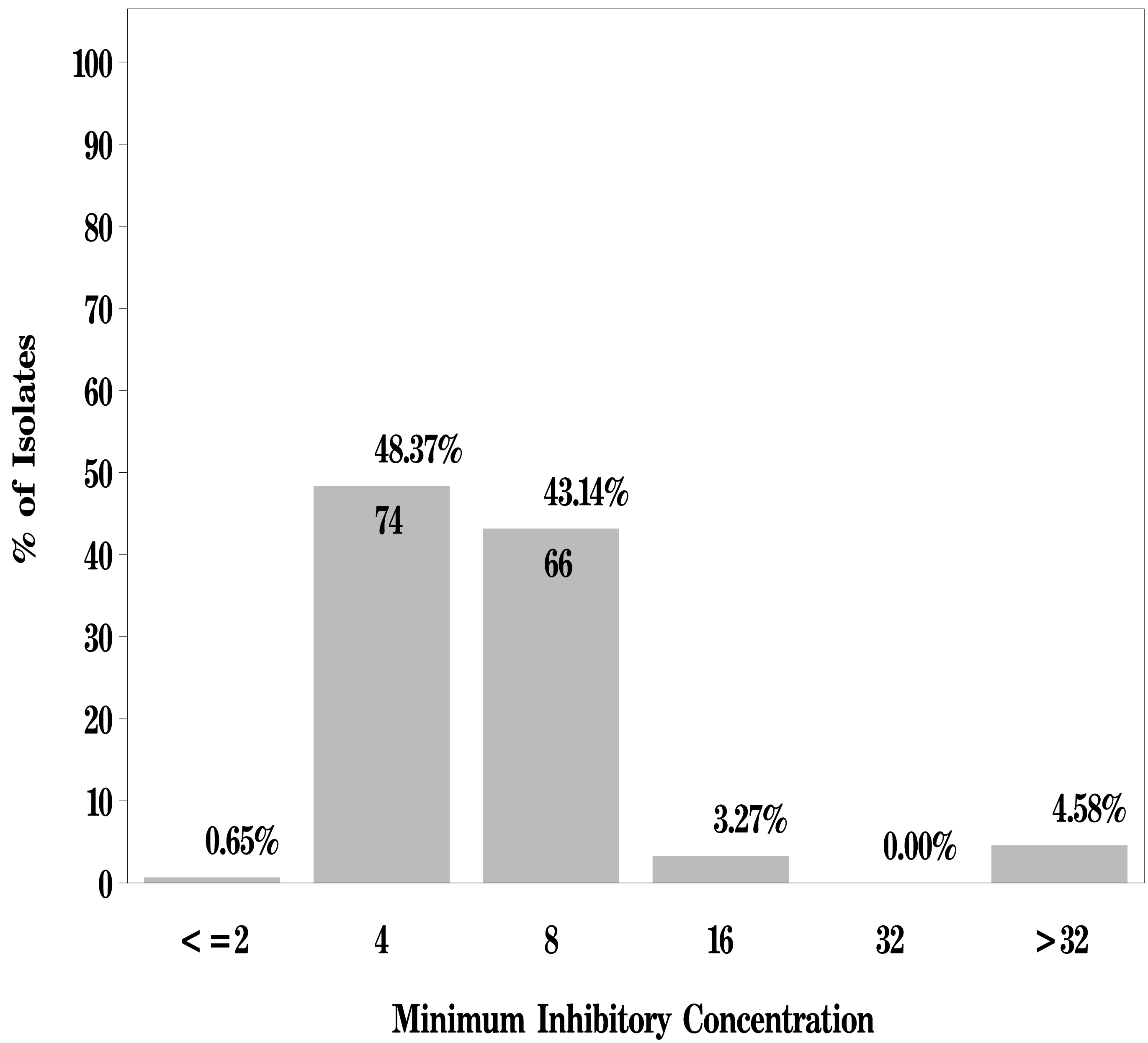
Breakpoints: Susceptible <=8 µg/mL Resistant >=32 µg/mL



NARMS

Figure 5: Minimum Inhibitory Concentration of Chloramphenicol for *Salmonella* (N=153 Isolates)

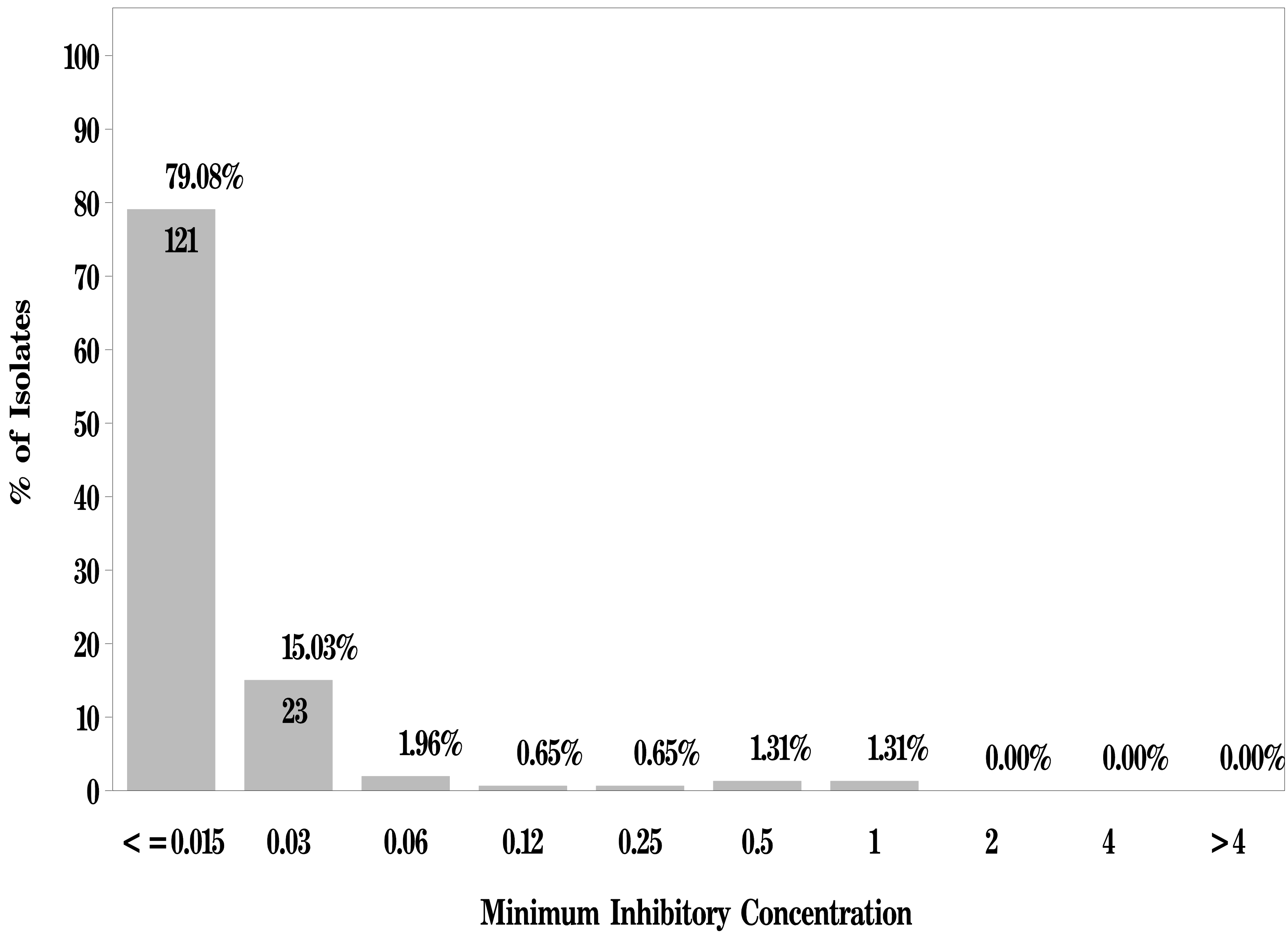
Breakpoints: Susceptible <=8 μg/mL Resistant >=32 μg/mL



NARMS

Figure 5: Minimum Inhibitory Concentration of Ciprofloxacin for *Salmonella* (N=153 Isolates)

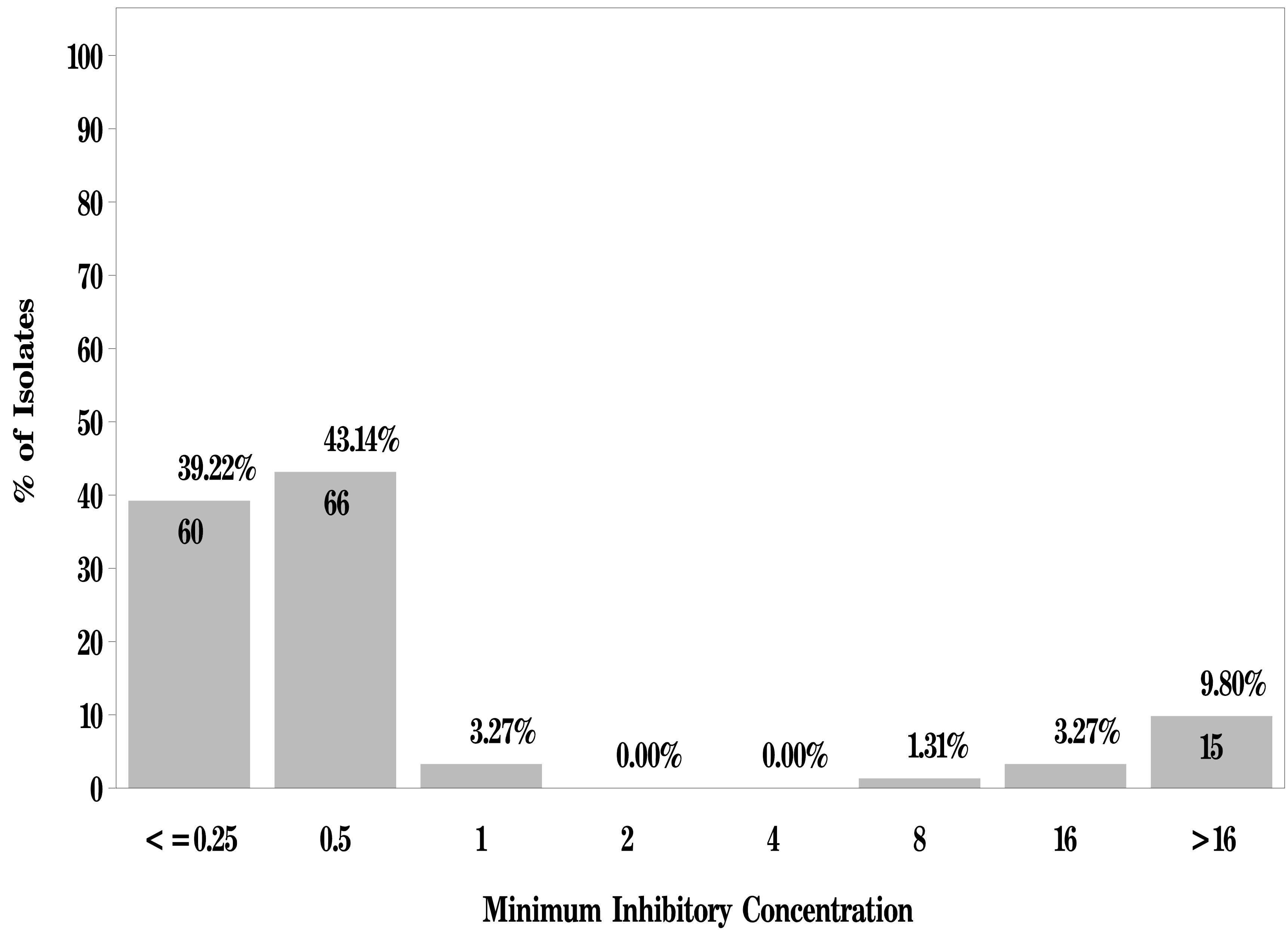
Breakpoints: Susceptible <=1 μg/mL Resistant >=4 μg/mL



NARMS

Figure 5: Minimum Inhibitory Concentration of Gentamicin for *Salmonella* (N=153 Isolates)

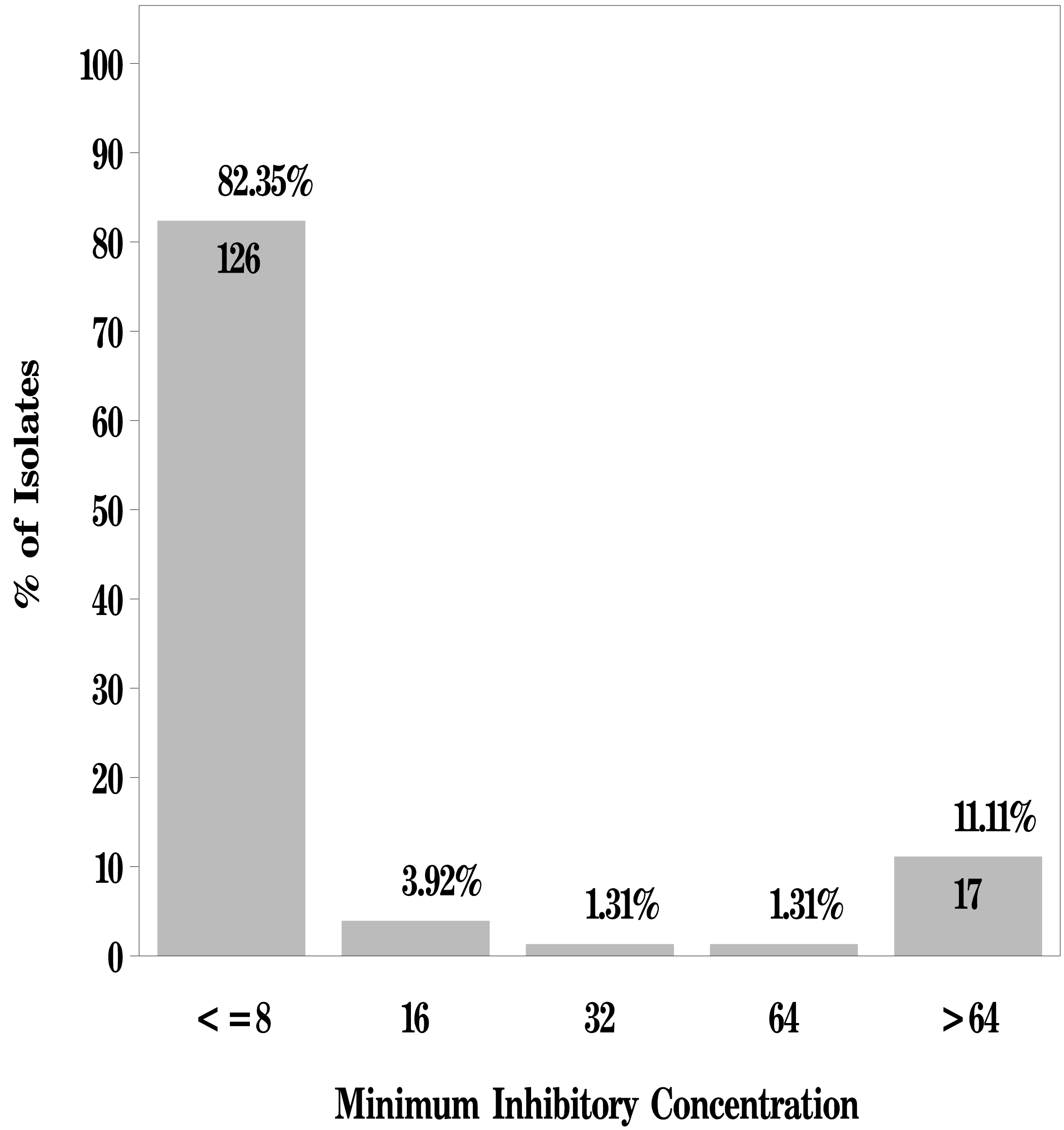
Breakpoints: Susceptible<=4 μg/mL Resistant>=16 μg/mL



NARMS

Figure 5: Minimum Inhibitory Concentration of Kanamycin for *Salmonella* (N=153 Isolates)

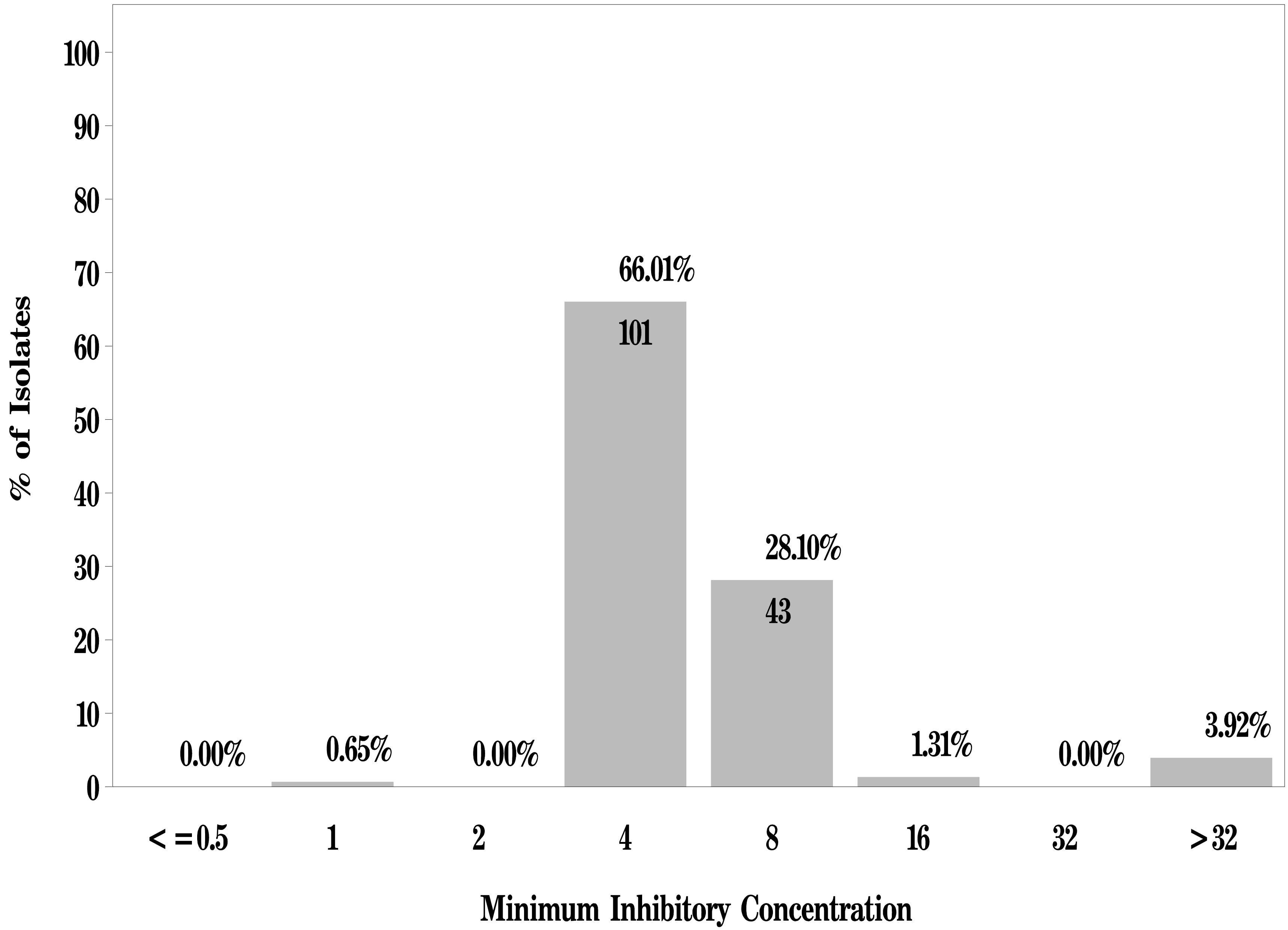
Breakpoints: Susceptible<=16 µg/mL Resistant>=64 µg/mL



NARMS

Figure 5: Minimum Inhibitory Concentration of Nalidixic acid for *Salmonella* (N=153 Isolates)

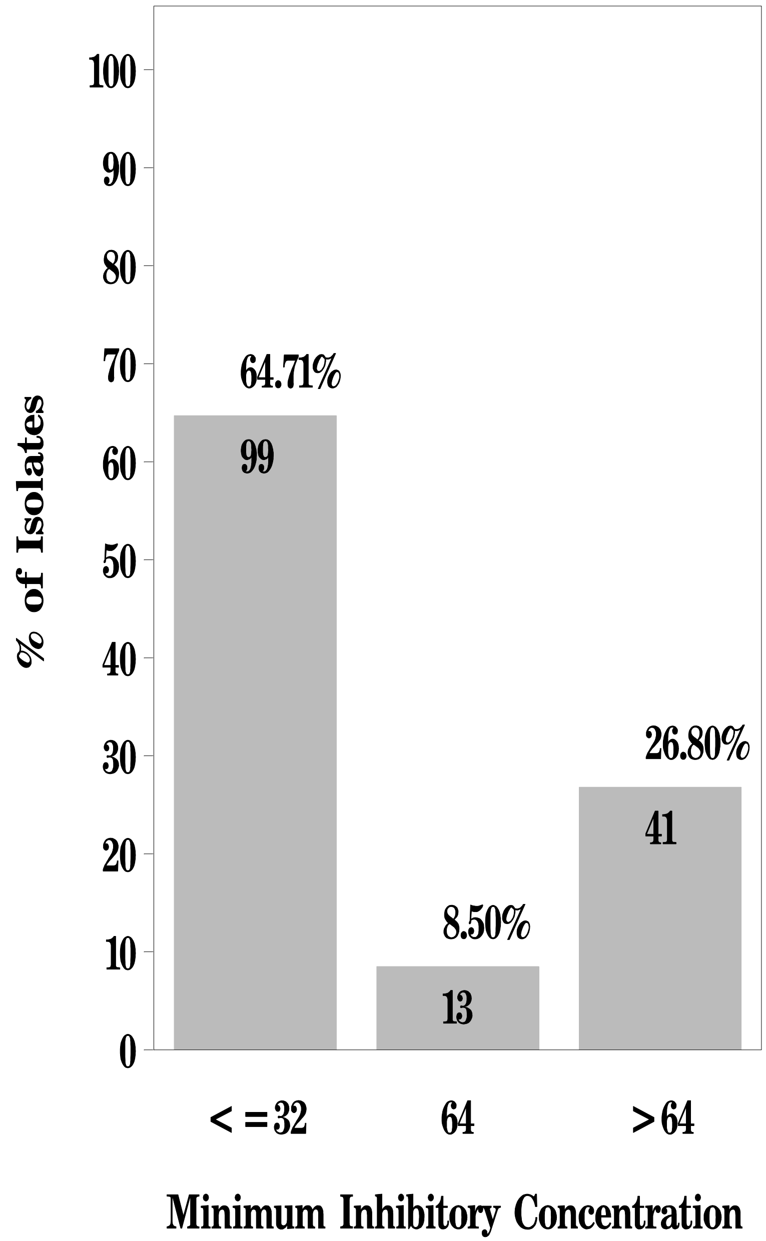
Breakpoints: Susceptible <=16 µg/mL Resistant >=32 µg/mL



NARMS

Figure 5: Minimum Inhibitory Concentration of Streptomycin for *Salmonella* (N=153 Isolates)

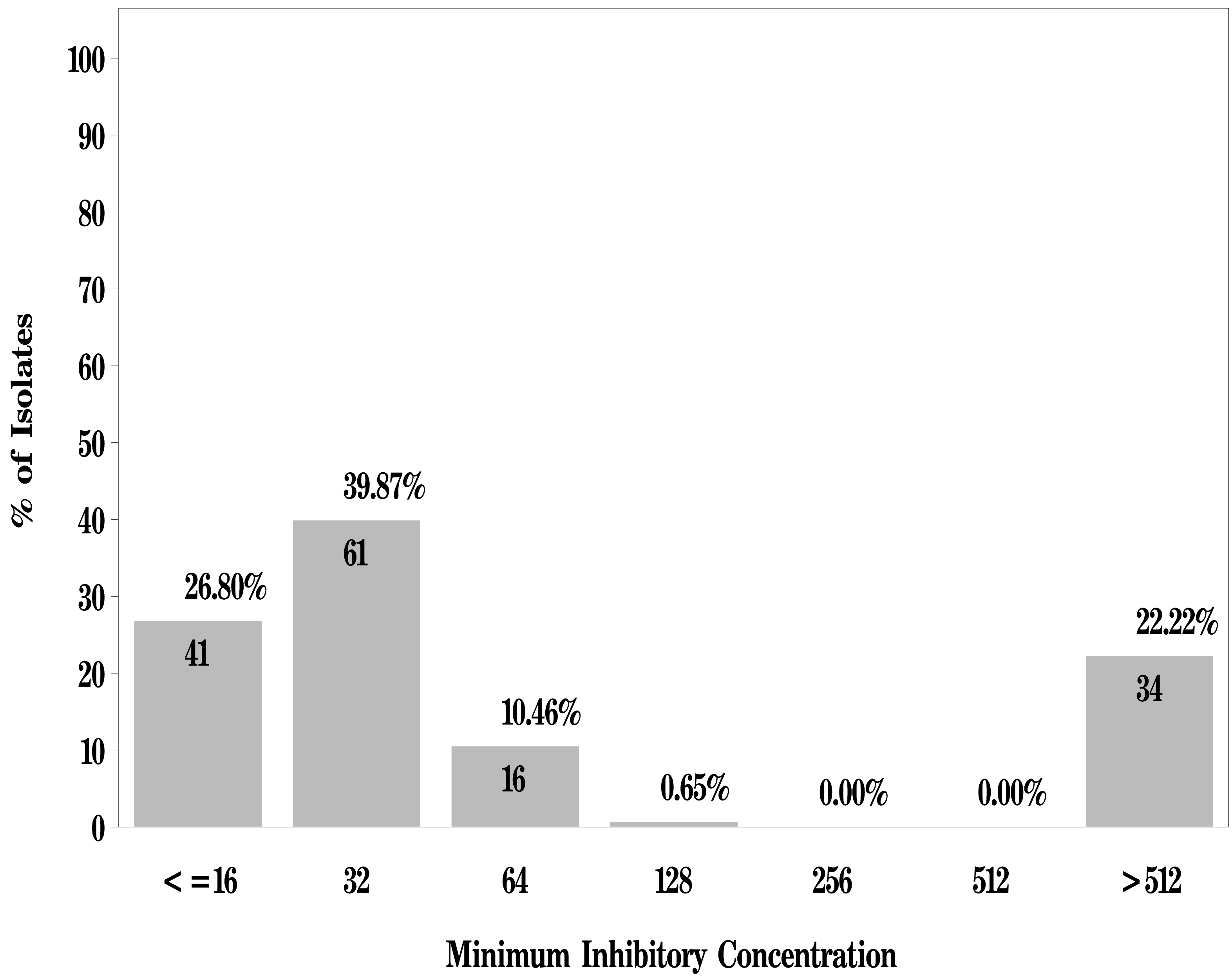
Breakpoints: Susceptible<=32 μg/mL Resistant>=64 μg/mL



NARMS

Figure 5: Minimum Inhibitory Concentration of Sulfamethoxazole for *Salmonella* (N=153 Isolates)

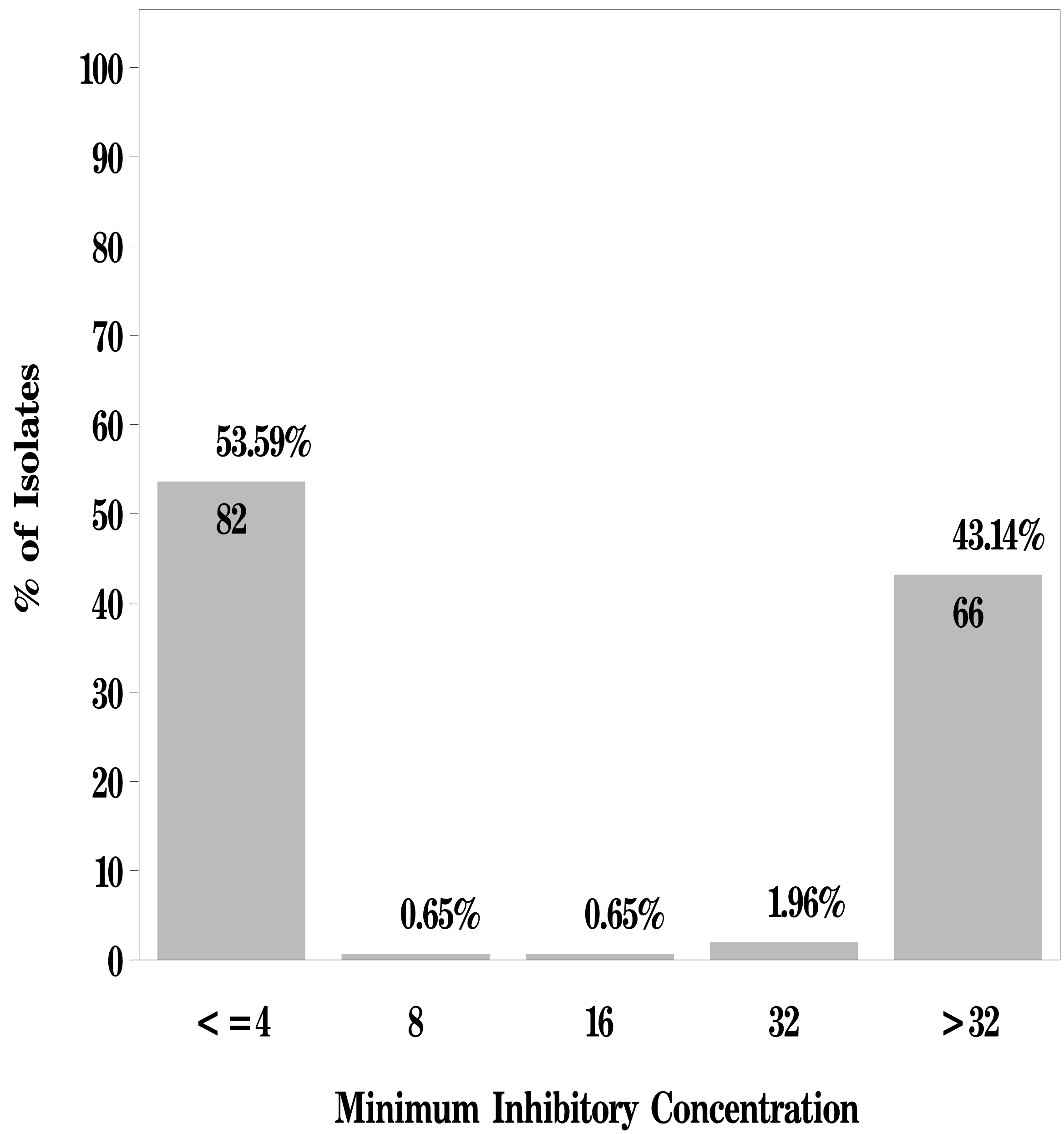
Breakpoints: Susceptible <=256 μg/mL Resistant >=512 μg/mL



NARMS

Figure 5: Minimum Inhibitory Concentration of Tetracycline for *Salmonella* (N=153 Isolates)

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



NARMS

Figure 5: Minimum Inhibitory Concentration of Trimethoprim/sulfamethoxazole for *Salmonella* (N=153 Isolates)

Breakpoints: Susceptible <=2/38 μg/mL Resistant >=4/76 μg/mL

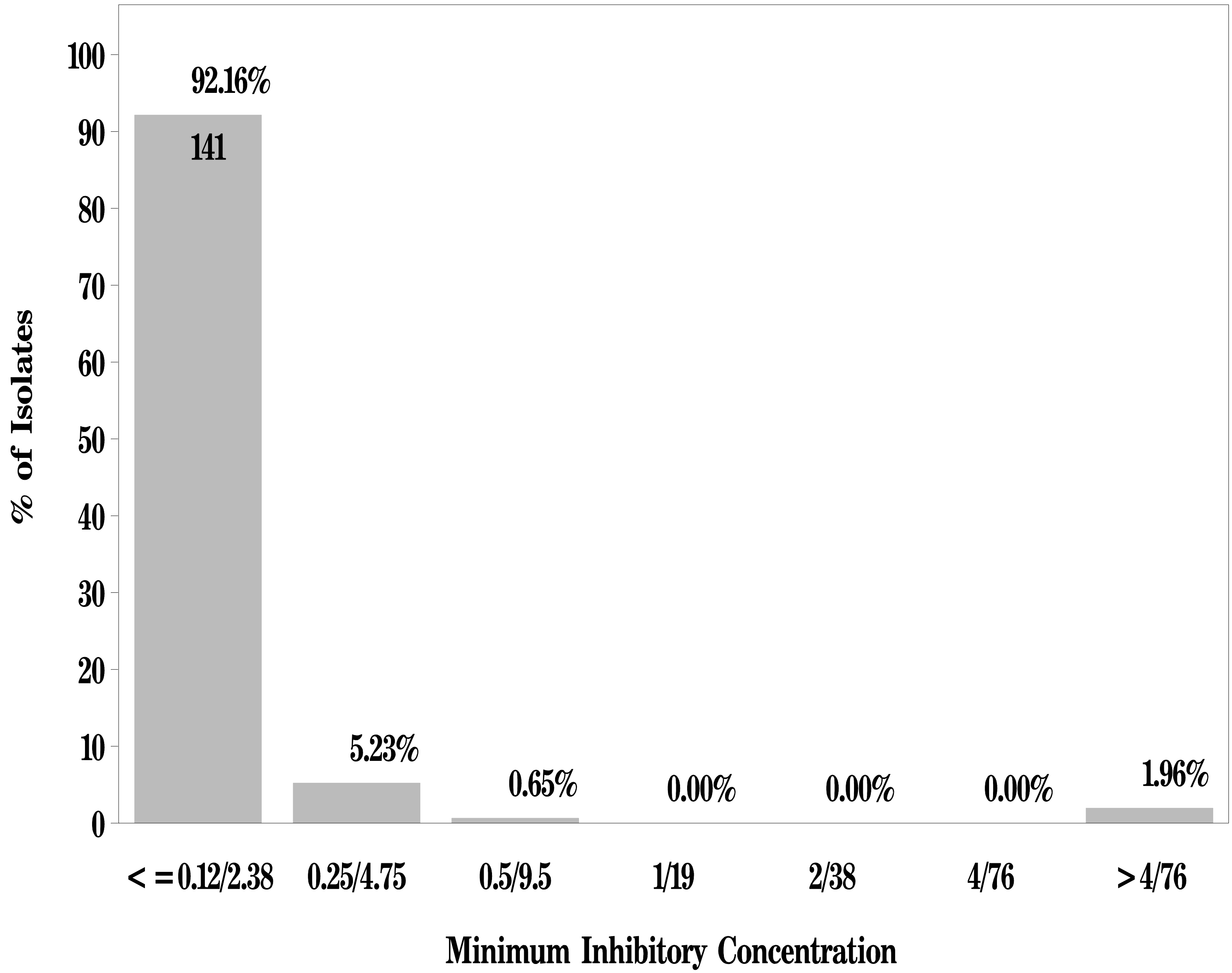


Table 11. Antimicrobial Resistance among *Salmonella* Isolates by Meat Type,[*] 2002.

Antimicrobial Agent	*Chicken Breast (n=60)*	*Ground Turkey (n=74)*	*Ground Beef (n=9)*	*Pork Chop (n=10)*
Tetracycline	33.3%	55.4%	22.2%	70.0%
Streptomycin	28.3%	37.8%	22.2%	70.0%
Sulfamethoxazole	16.7%	20.3%	22.2%	70.0%
Ampicillin	16.7%	16.2%	22.2%	40.0%
Cephalothin	13.3%	14.9%	22.2%	20.0%
Gentamicin	10.0%	14.9%		30.0%
Amoxicillin/Clavulanic Acid	10.0%	12.2%	22.2%	20.0%
Kanamycin	6.7%	18.9%		10.0%
Cefoxitin	10.0%	8.1%	22.2%	20.0%
Ceftiofur	10.0%	8.1%	22.2%	20.0%
Chlorampenicol		1.4%	22.2%	40.0%
Nalidixic Acid		8.1%		
Trimethoprim/Sulfamethoxazole		1.4%		20.0%

[*] No resistance seen to Amikacin, Ciprofloxacin or Ceftriaxone for these isolates.

Figure 6a. Antimicrobial Resistance Among *Salmonella* from Chicken Breast (n=60), 2002.

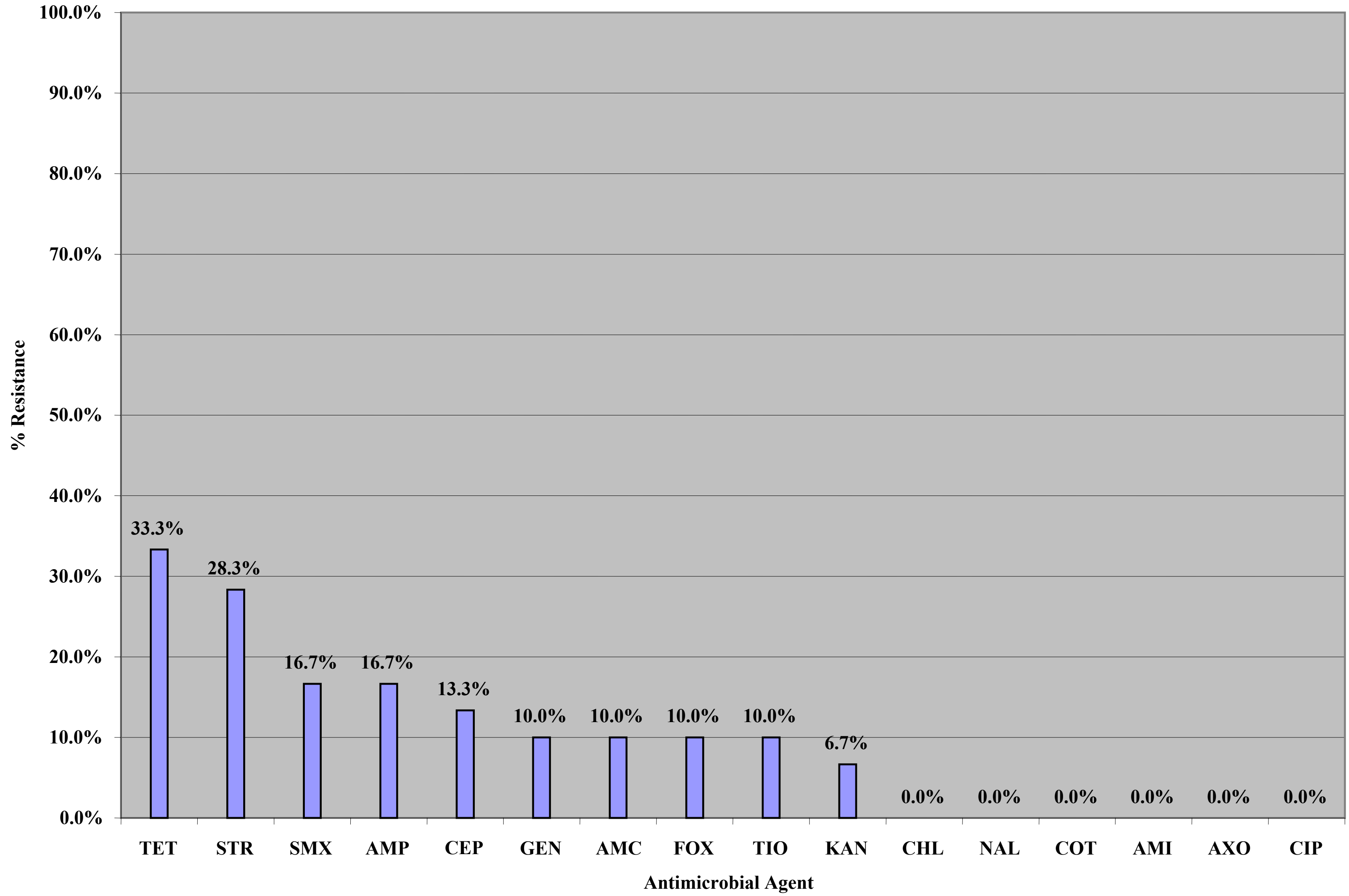


Figure 6b. Antimicrobial Resistance among *Salmonella* from Ground Turkey (n=74), 2002.

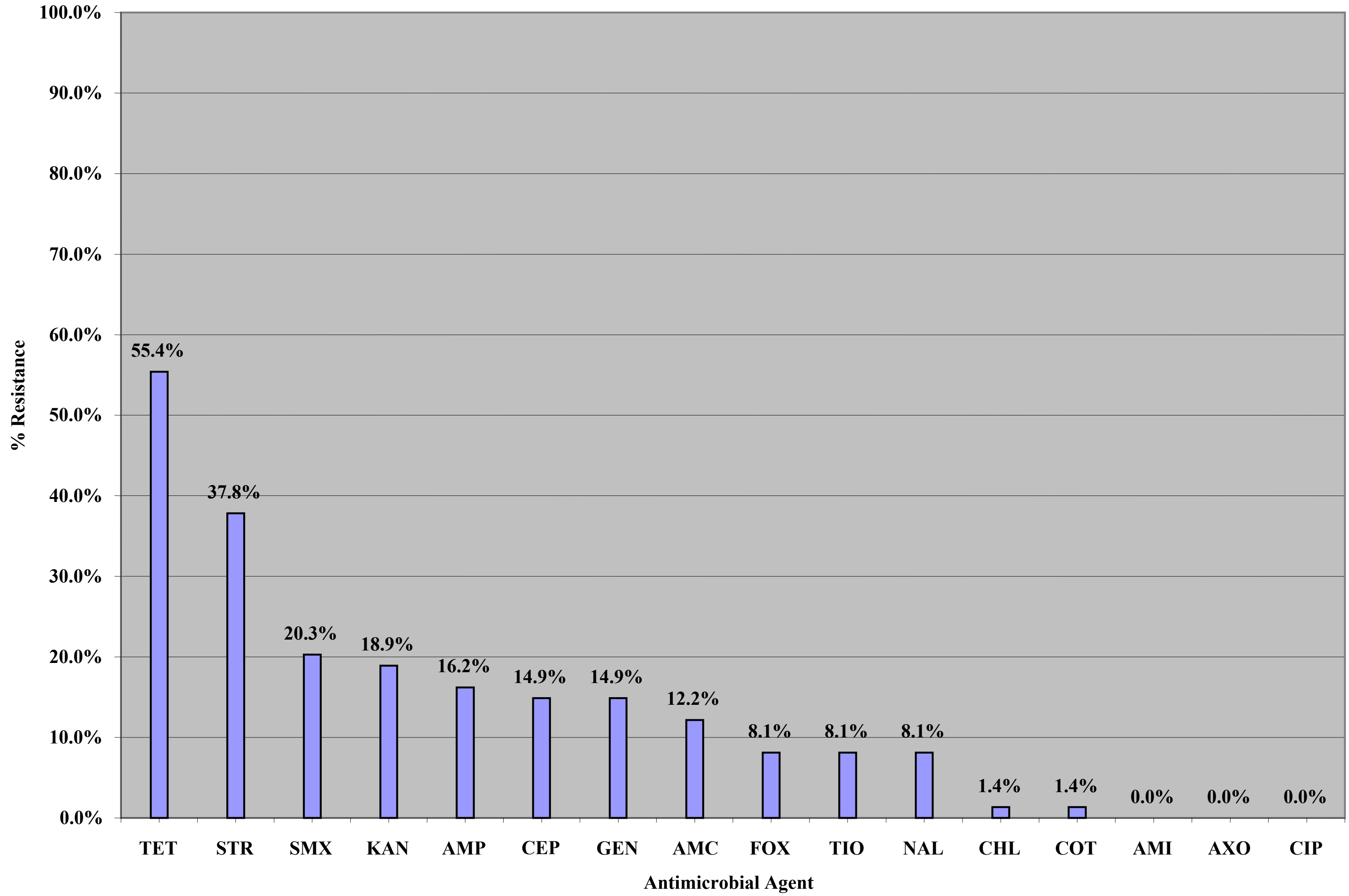


Figure 6c. Antimicrobial Resistance among *Salmonella* from Ground Beef (n=9), 2002.

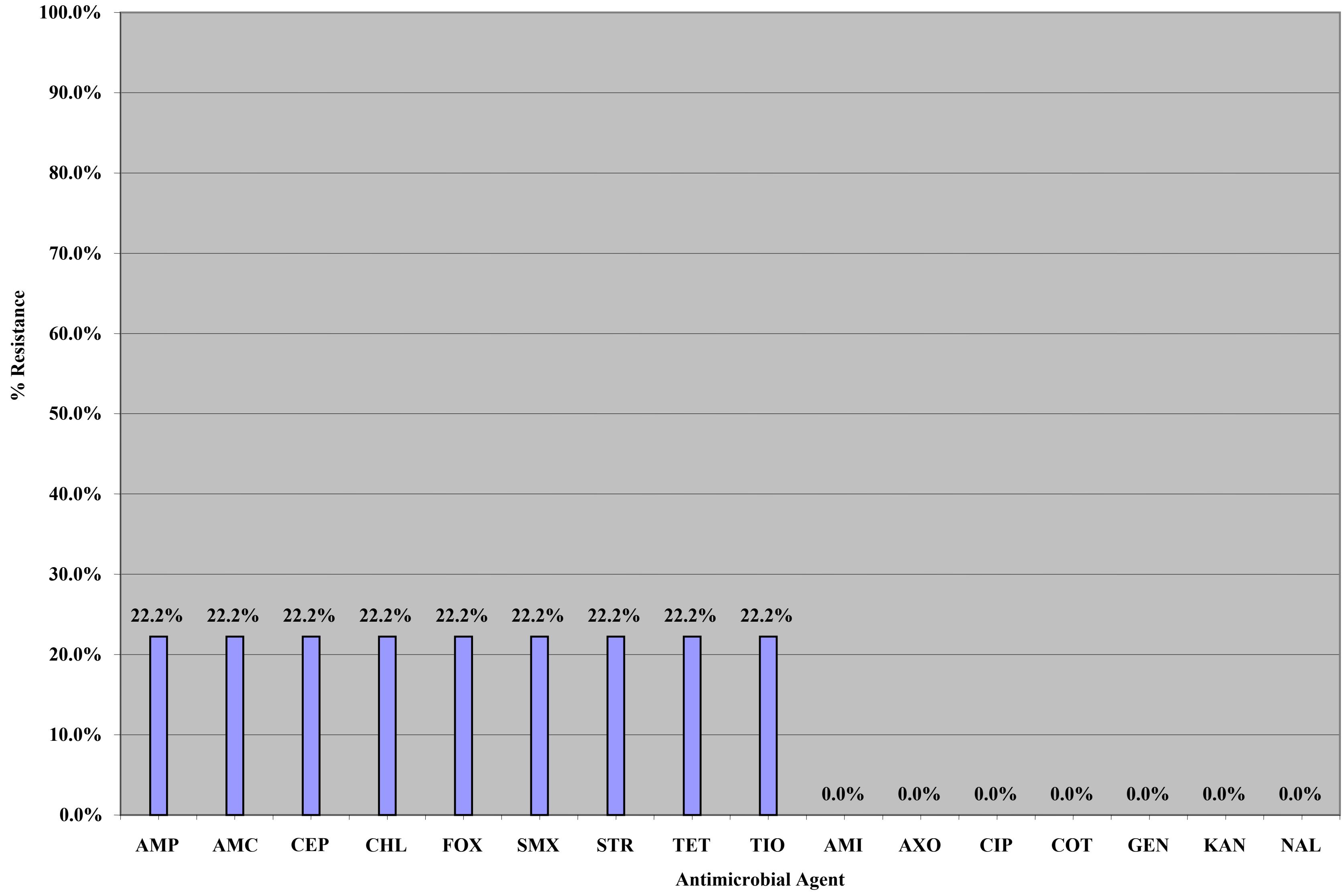
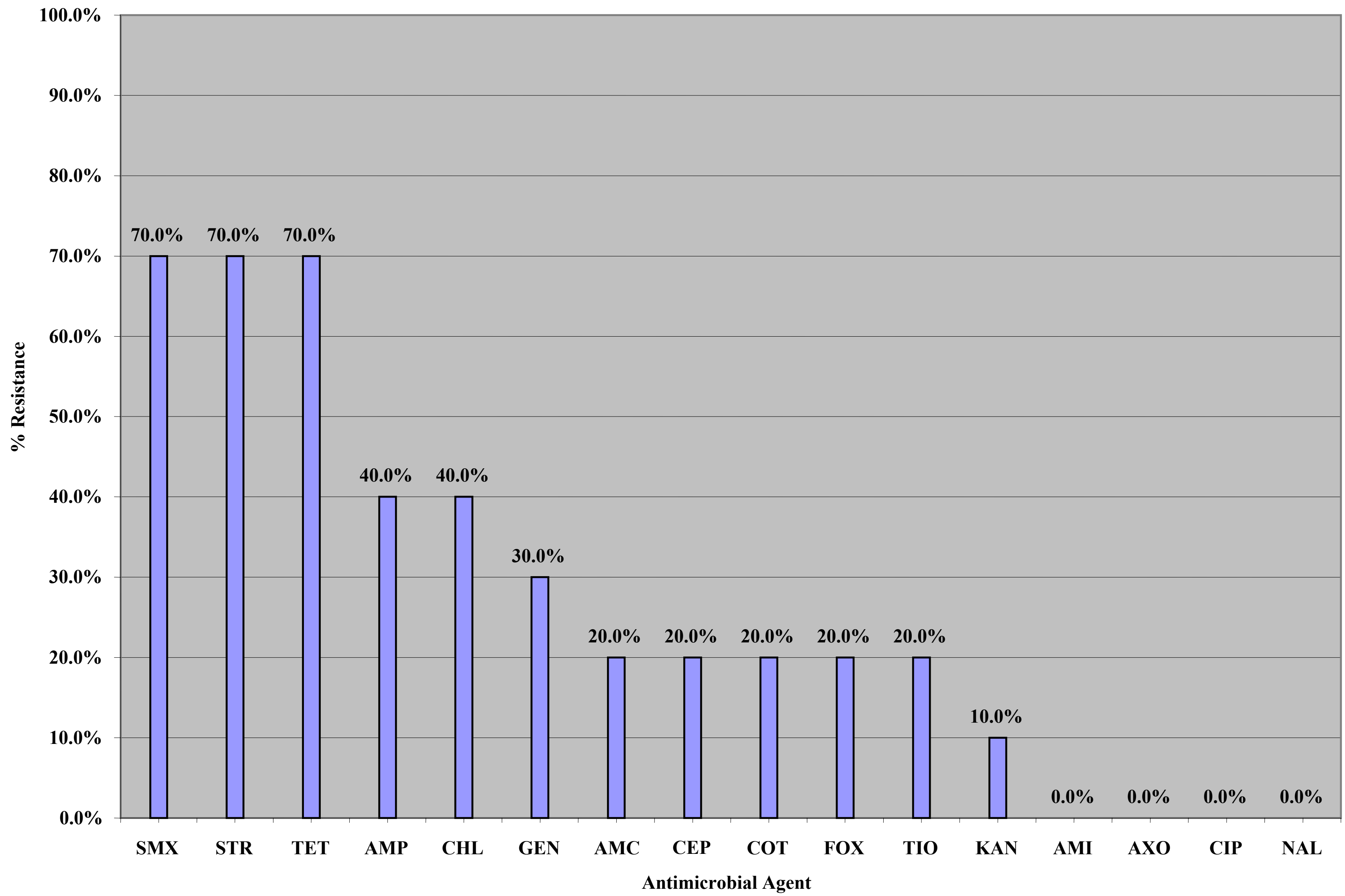


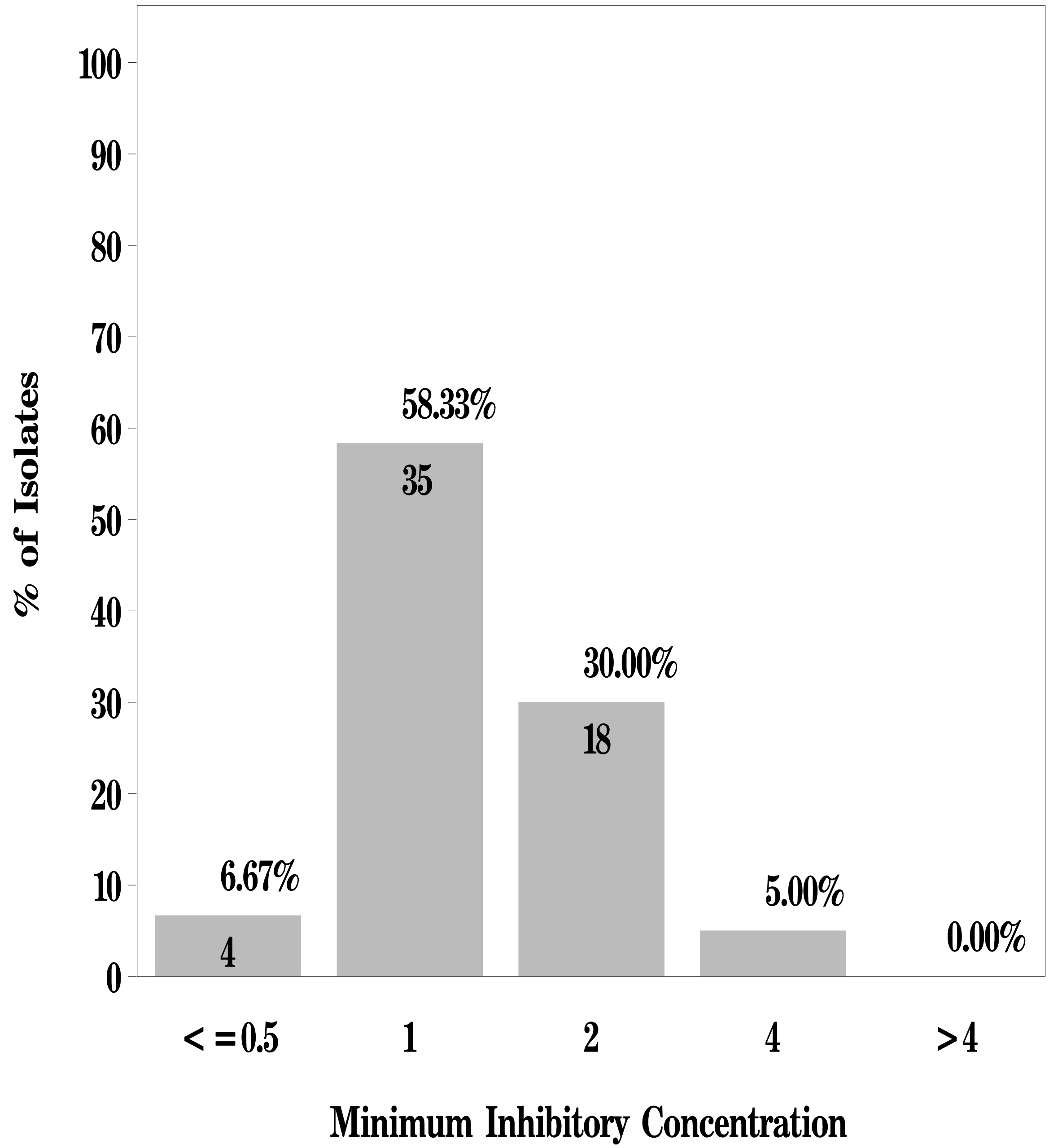
Figure 6d. Antimicrobial Resistance among *Salmonella* from Pork Chops (n=10), 2002.



NARMS

Figure 7: Minimum Inhibitory Concentration of Amikacin for *Salmonella* in Chicken Breast (N=60 Isolates)

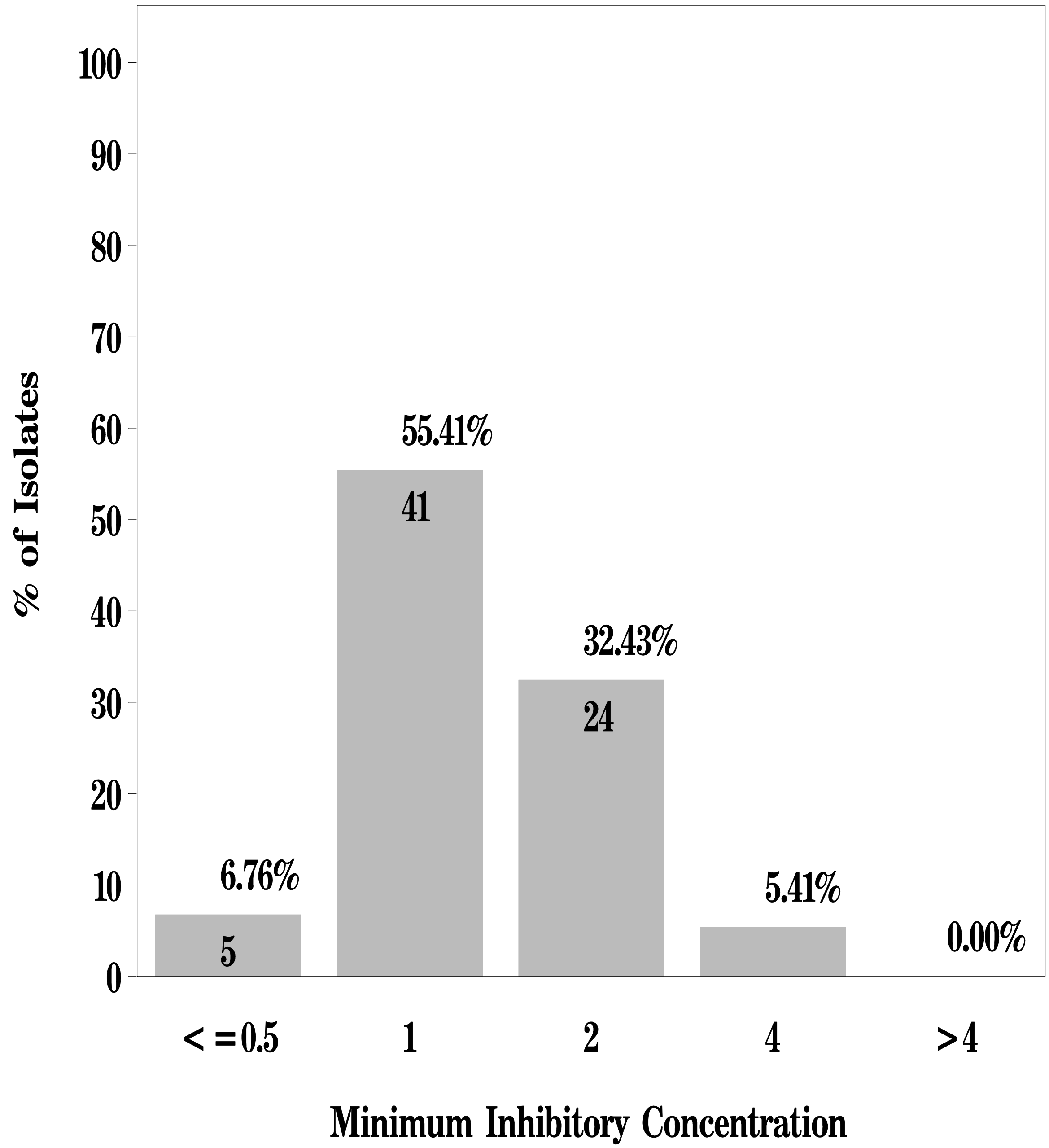
Breakpoints: Susceptible <=16 µg/mL Resistant >=64 µg/mL



NARMS

Figure 7: Minimum Inhibitory Concentration of Amikacin for *Salmonella* in Ground Turkey (N=74 Isolates)

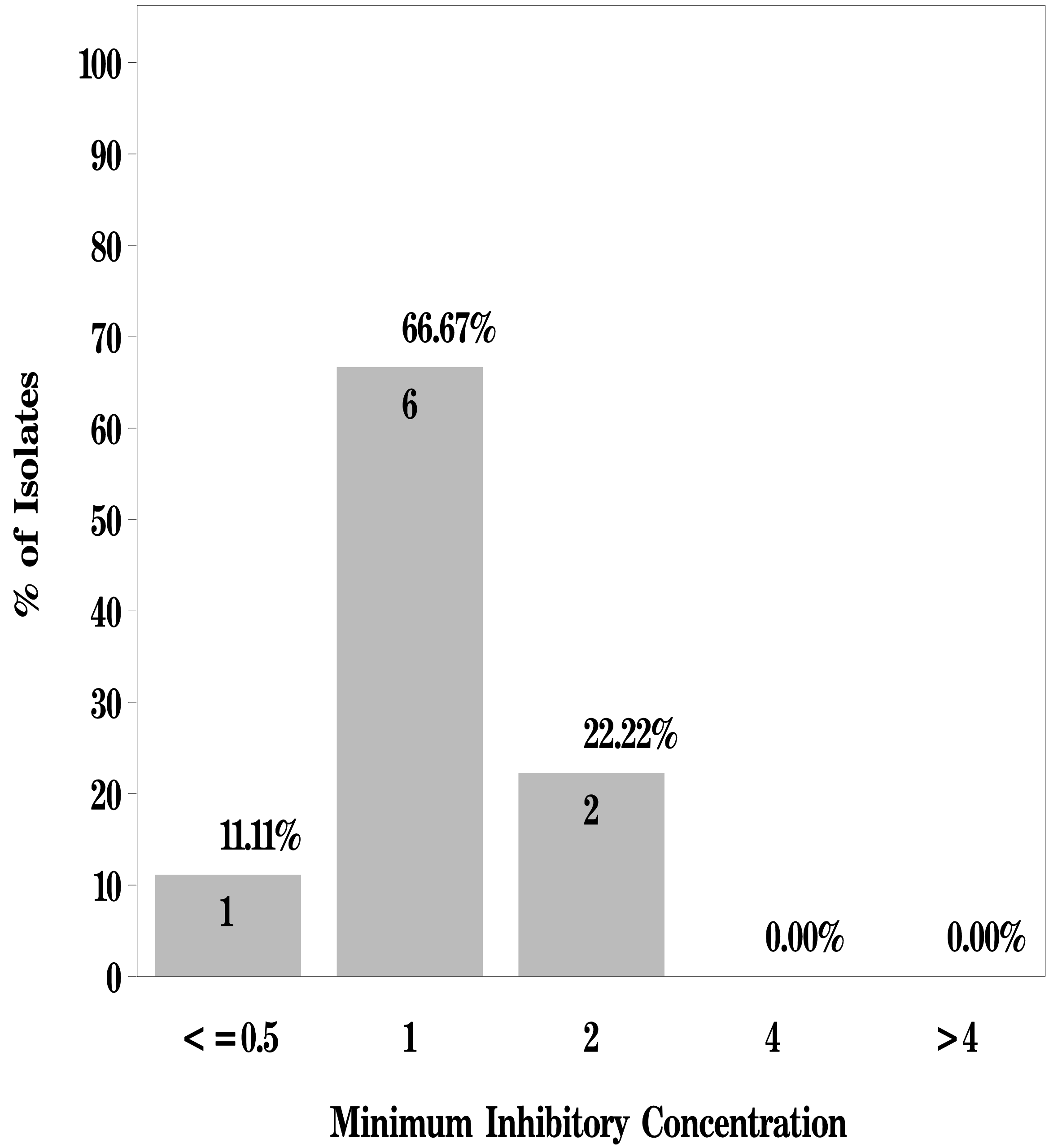
Breakpoints: Susceptible <=16 µg/mL Resistant >=64 µg/mL



NARMS

Figure 7: Minimum Inhibitory Concentration of Amikacin for *Salmonella* in Ground Beef (N=9 Isolates)

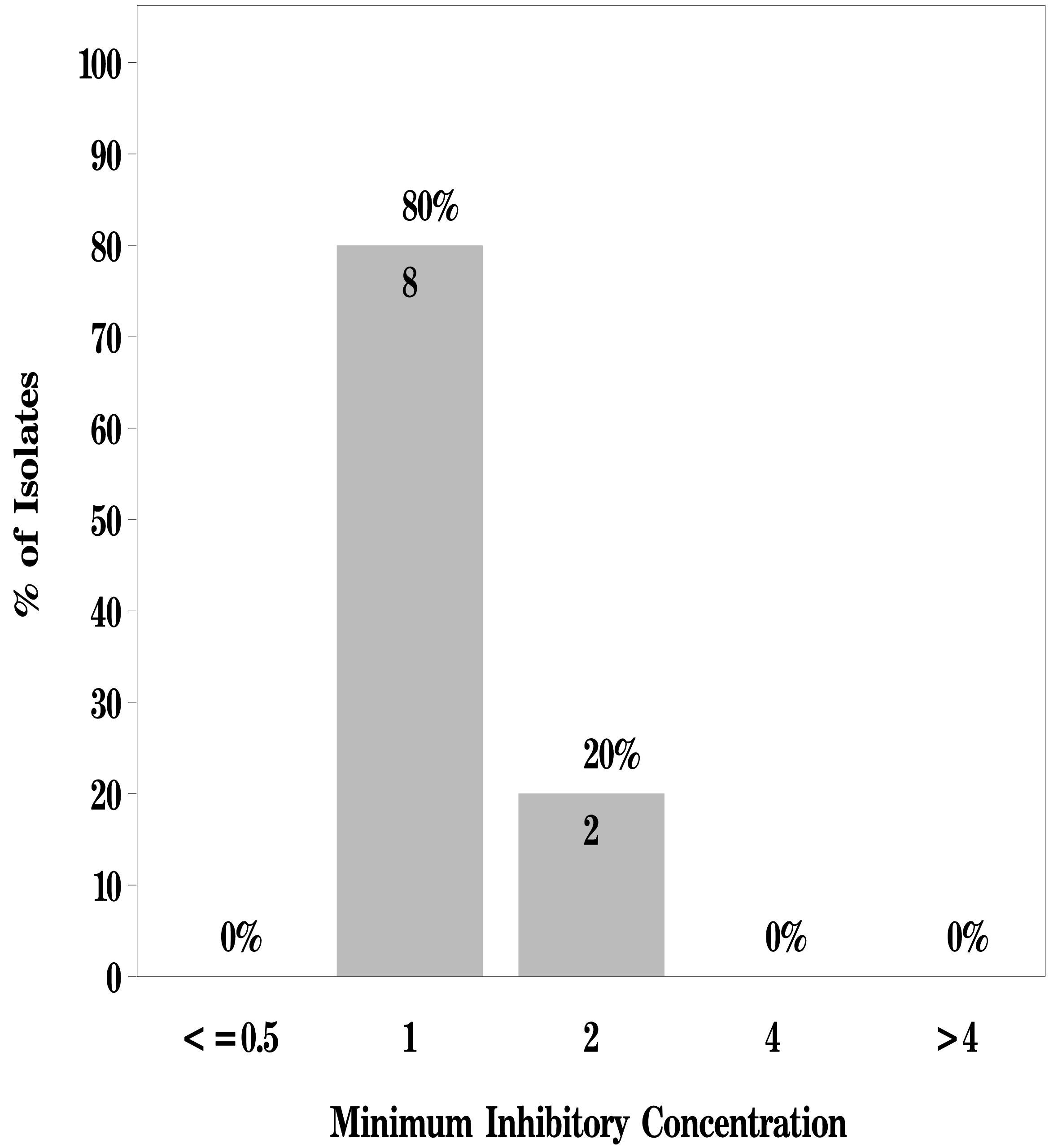
Breakpoints: Susceptible <=16 μg/mL Resistant >=64 μg/mL



NARMS

Figure 7: Minimum Inhibitory Concentration of Amikacin for *Salmonella* in Pork Chop (N=10 Isolates)

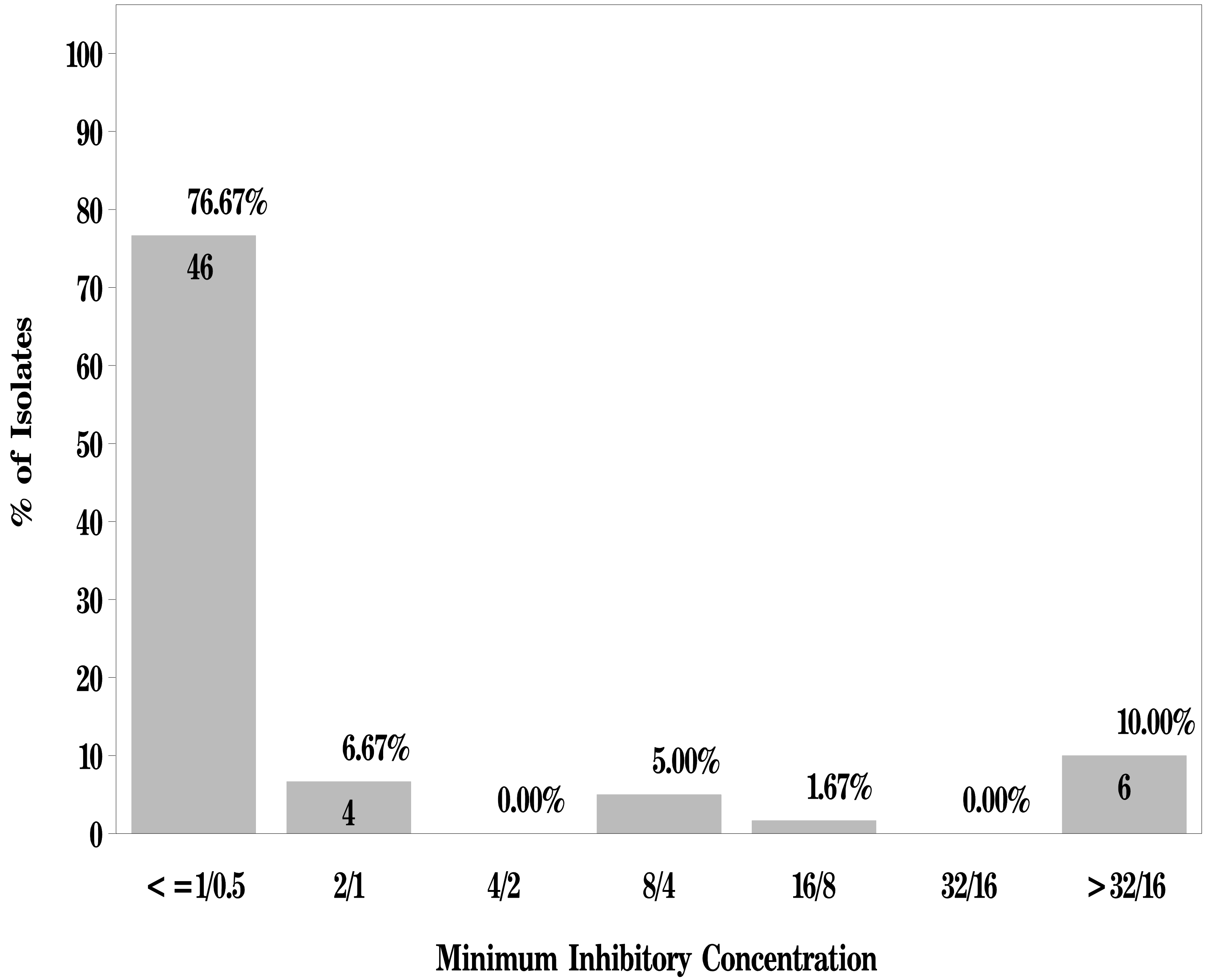
Breakpoints: Susceptible<=16 μg/mL Resistant>=64 μg/mL



NARMS

Figure 7: Minimum Inhibitory Concentration of Amoxicillin/Clavulanic acid for *Salmonella* in Chicken Breast (N=60 Isolates)

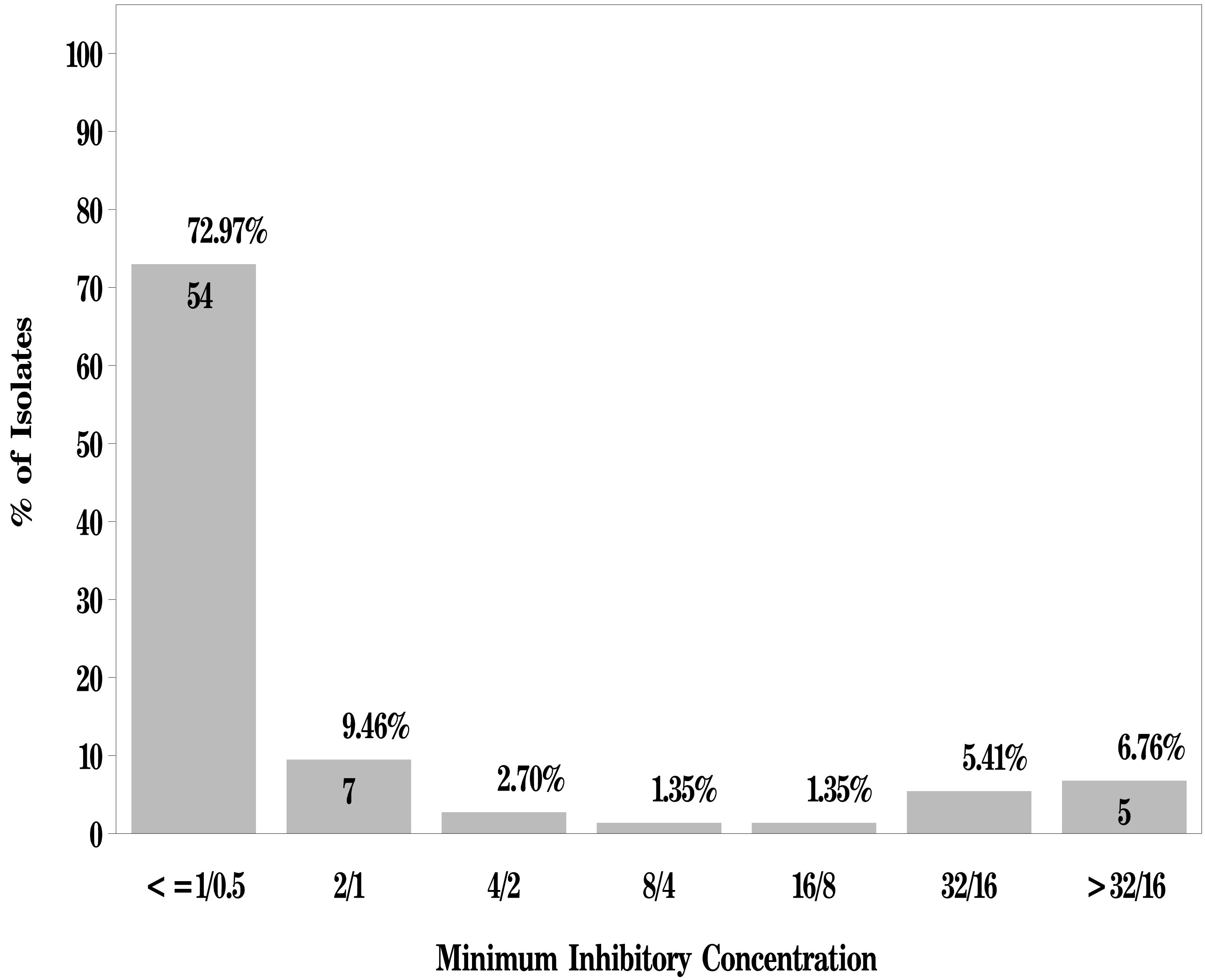
Breakpoints: Susceptible<=8/4 µg/mL Resistant>=32/16 µg/mL



NARMS

Figure 7: Minimum Inhibitory Concentration of Amoxicillin/Clavulanic acid for *Salmonella* in Ground Turkey (N=74 Isolates)

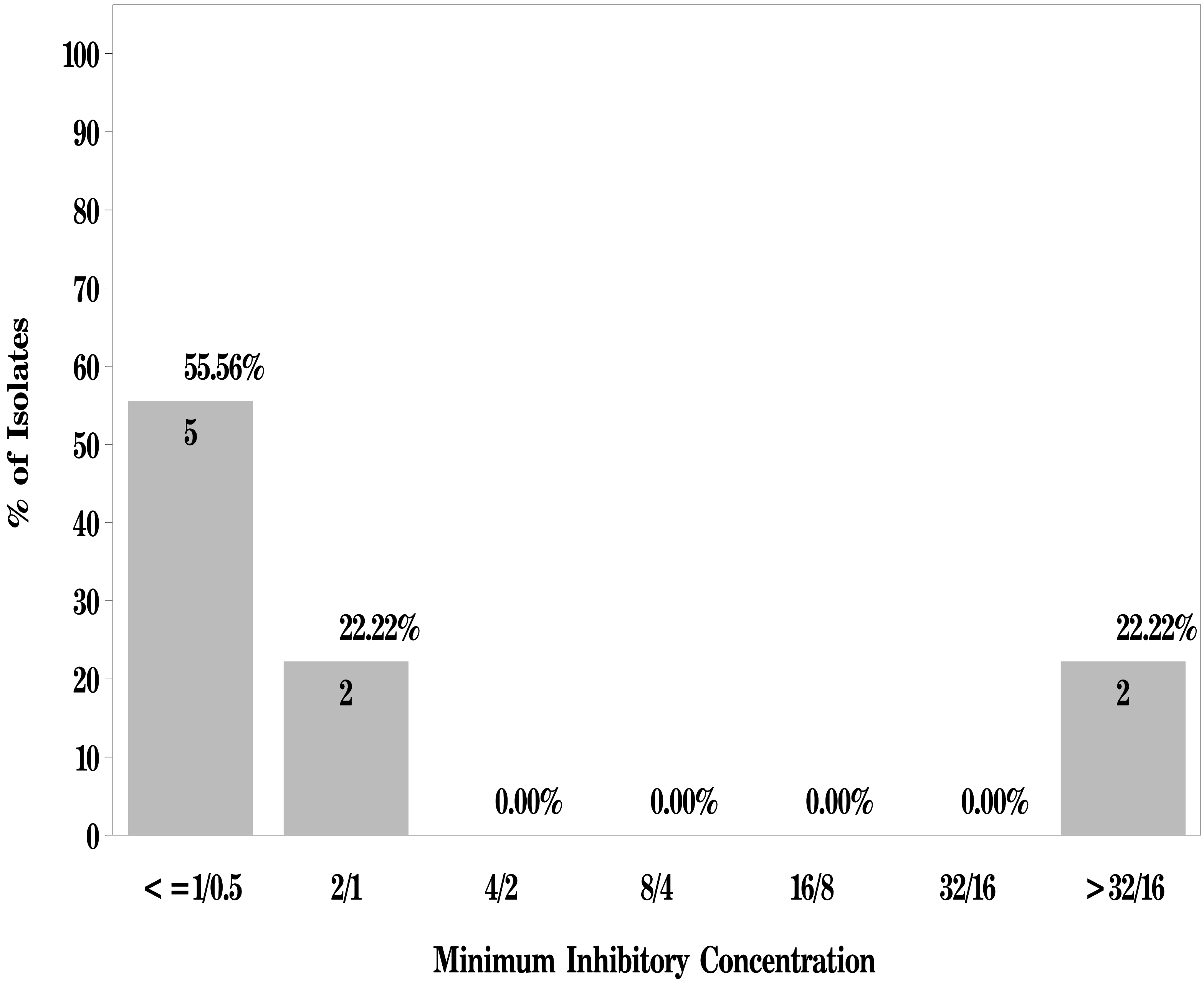
Breakpoints: Susceptible <=8/4 μg/mL Resistant >=32/16 μg/mL



NARMS

Figure 7: Minimum Inhibitory Concentration of Amoxicillin/Clavulanic acid for *Salmonella* in Ground Beef (N=9 Isolates)

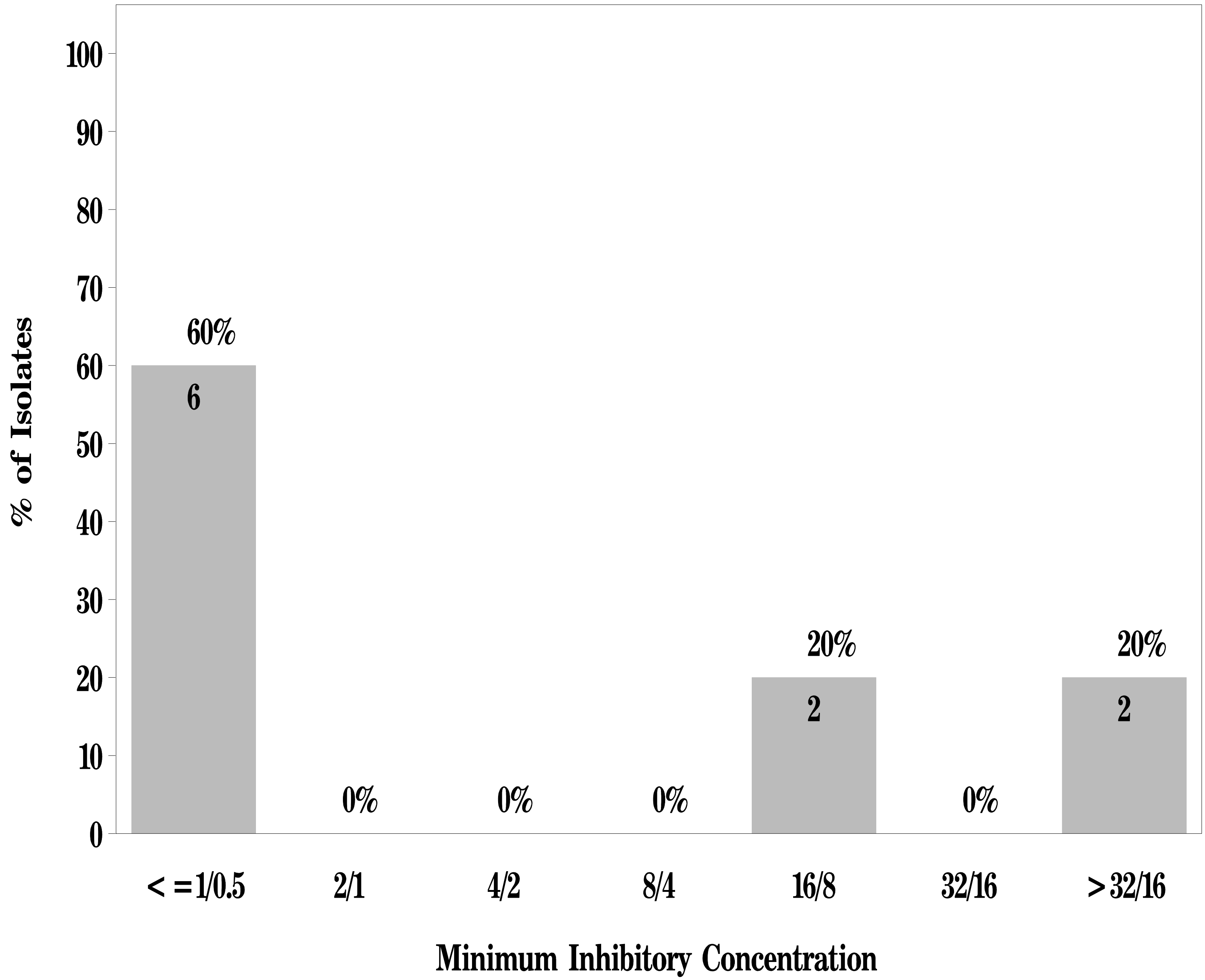
Breakpoints: Susceptible <=8/4 μg/mL Resistant >=32/16 μg/mL



NARMS

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

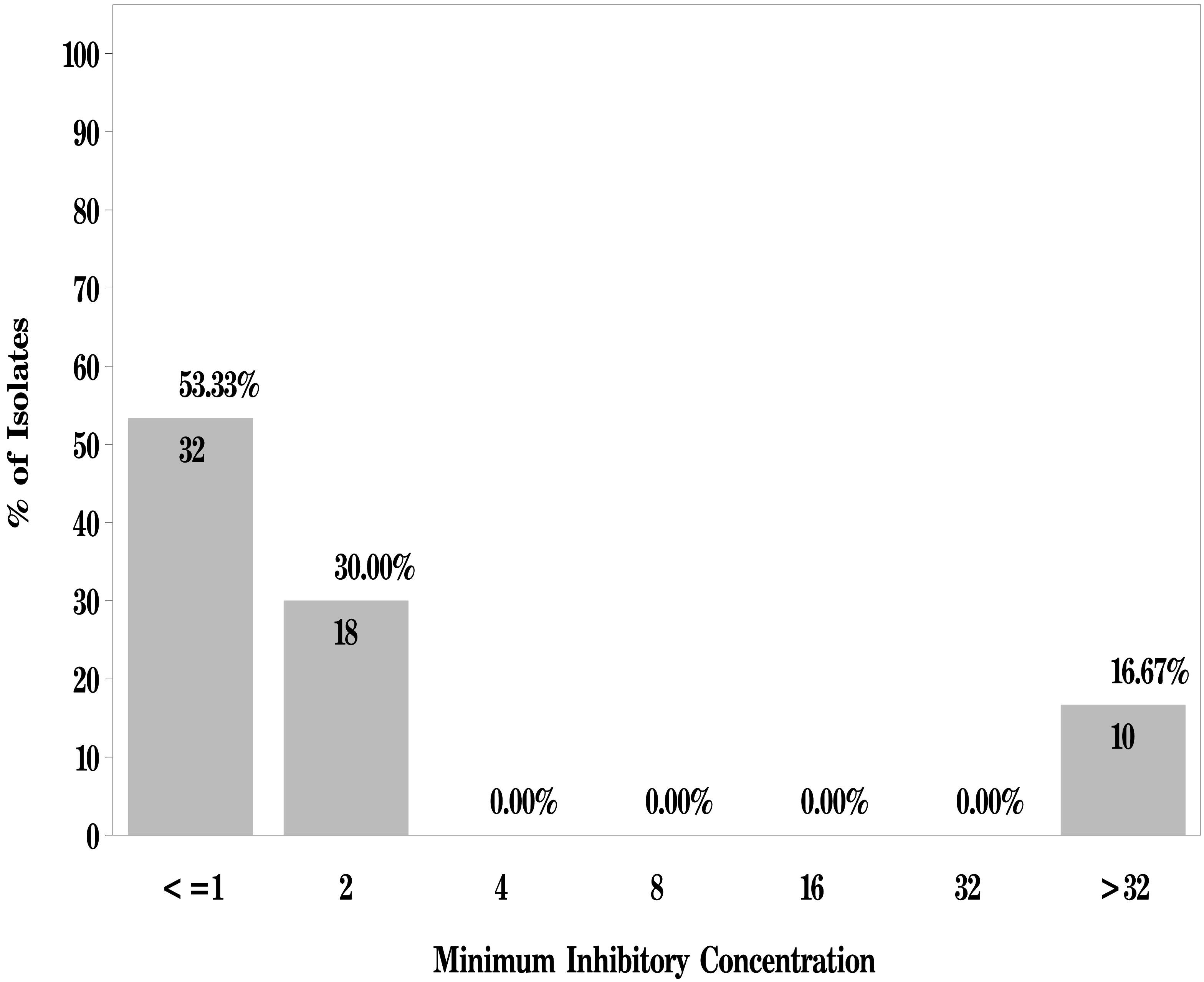
Breakpoints: Susceptible <=8/4 μg/mL Resistant >=32/16 μg/mL



NARMS

Figure 7: Minimum Inhibitory Concentration of Ampicillin for *Salmonella* in Chicken Breast (N=60 Isolates)

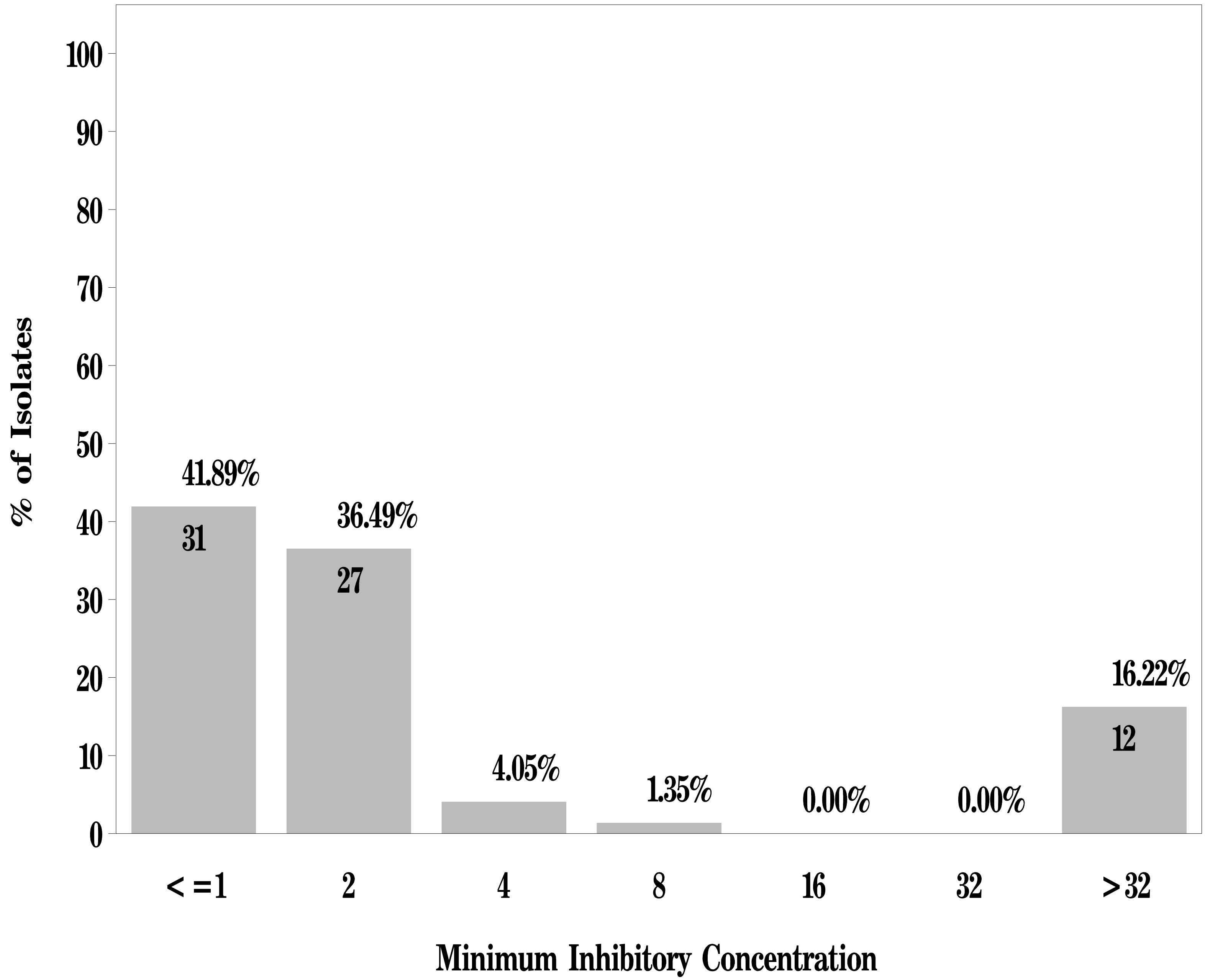
Breakpoints: Susceptible <=8 μg/mL Resistant >=32 μg/mL



NARMS

Figure 7: Minimum Inhibitory Concentration of Ampicillin for *Salmonella* in Ground Turkey (N=74 Isolates)

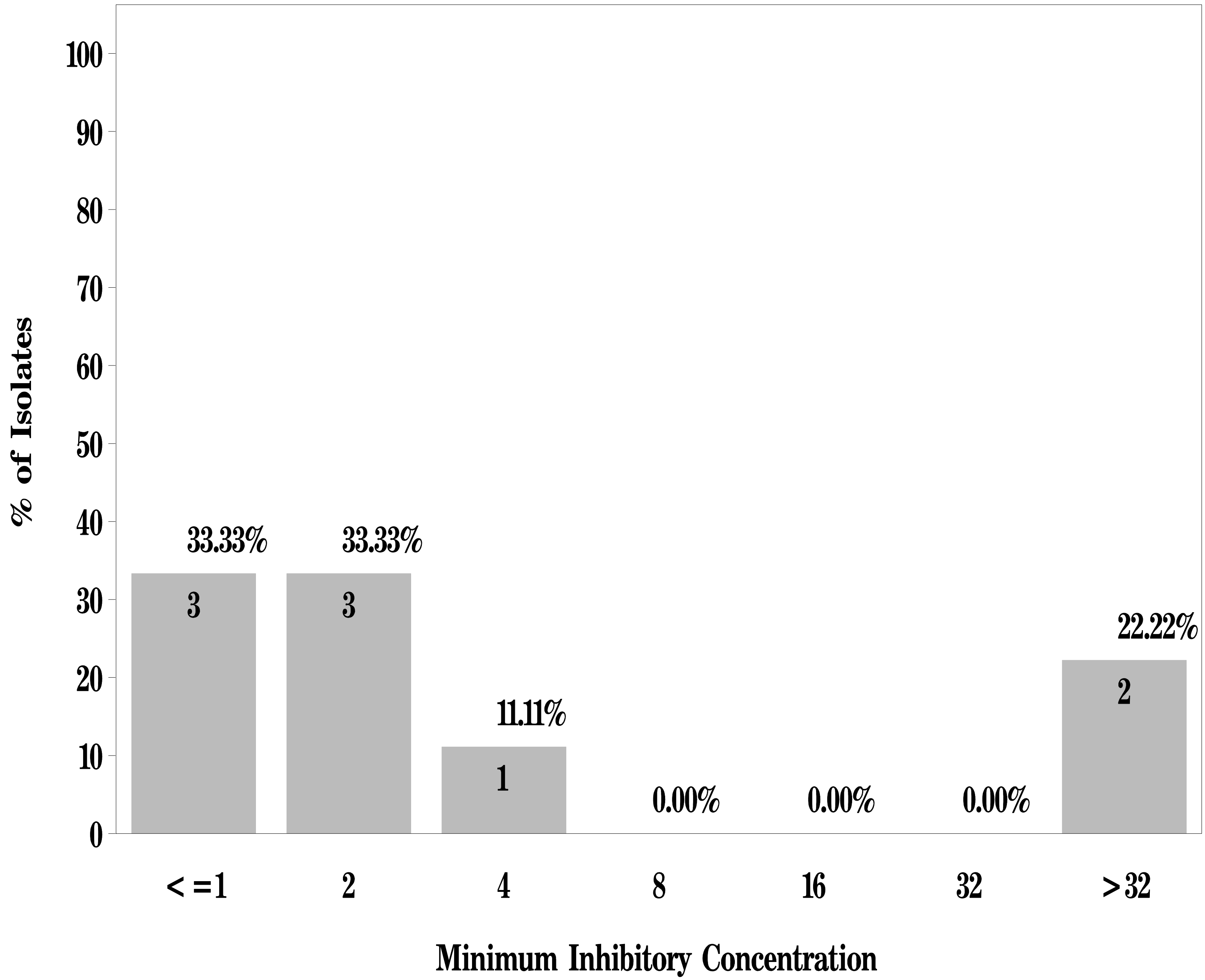
Breakpoints: Susceptible<=8 μg/mL Resistant>=32 μg/mL



NARMS

Figure 7: Minimum Inhibitory Concentration of Ampicillin for *Salmonella* in Ground Beef (N=9 Isolates)

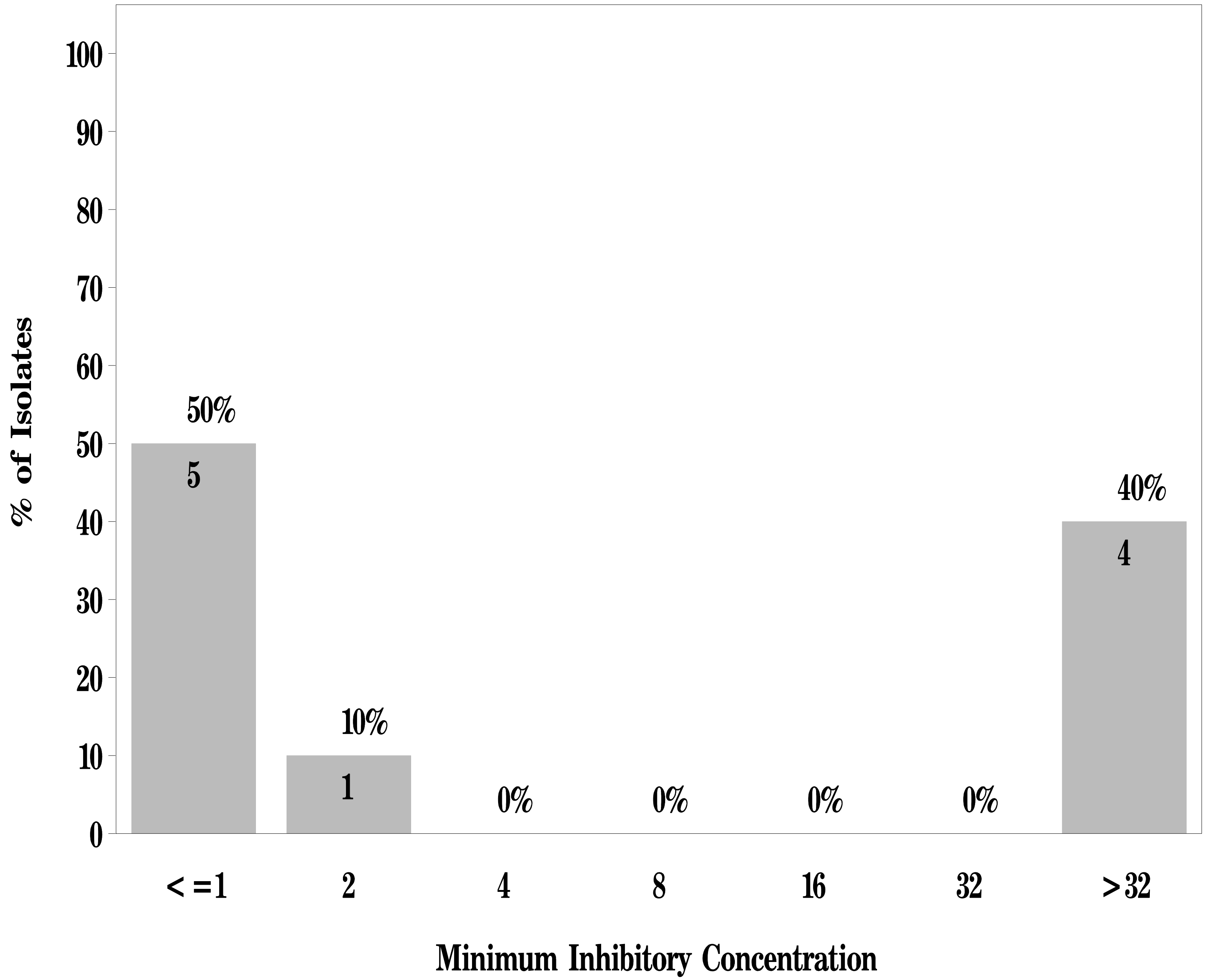
Breakpoints: Susceptible <=8 μg/mL Resistant >=32 μg/mL



NARMS

Figure 7: Minimum Inhibitory Concentration of Ampicillin for *Salmonella* in Pork Chop (N=10 Isolates)

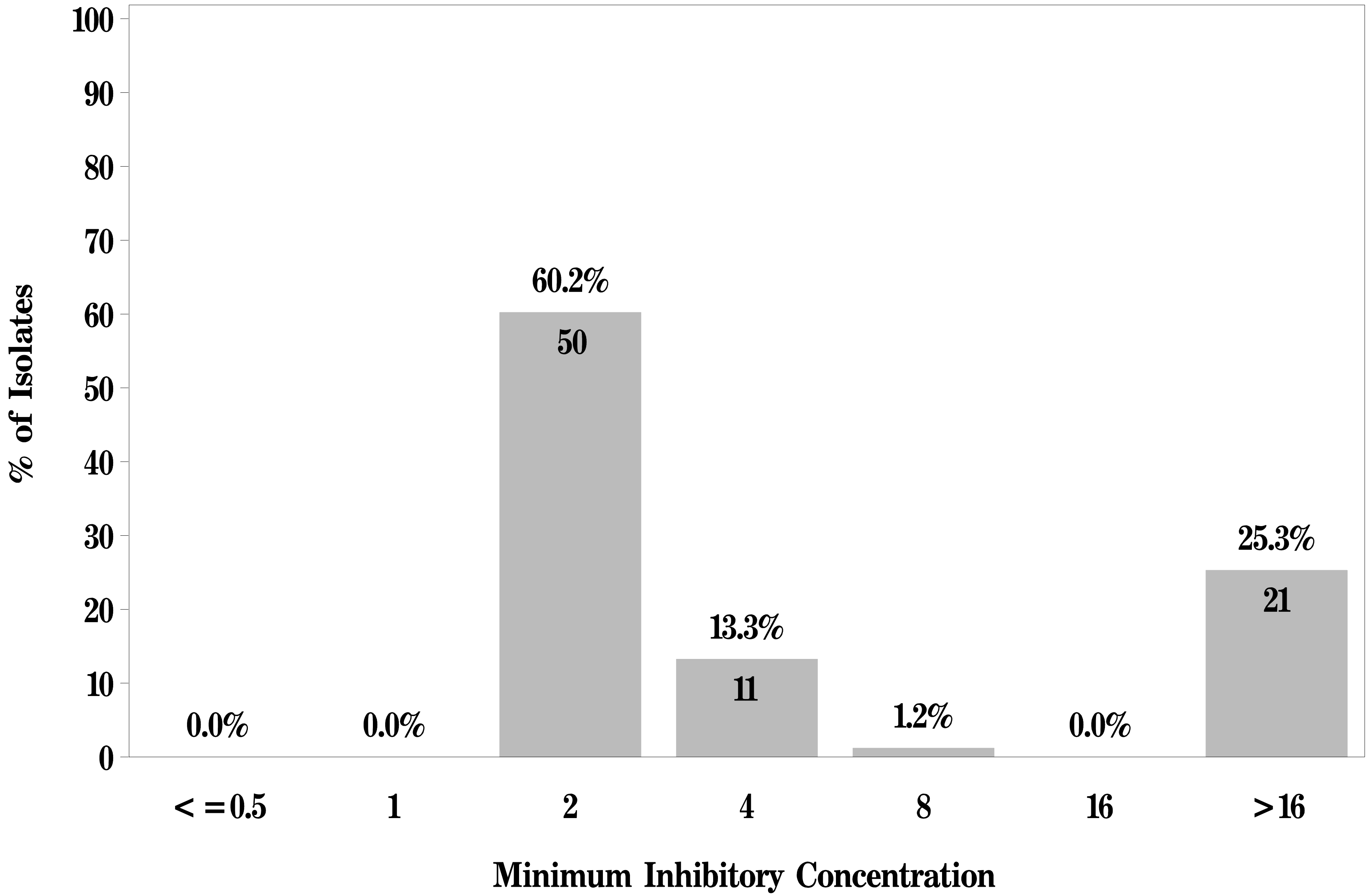
Breakpoints: Susceptible <=8 μg/mL Resistant >=32 μg/mL



NARMS

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

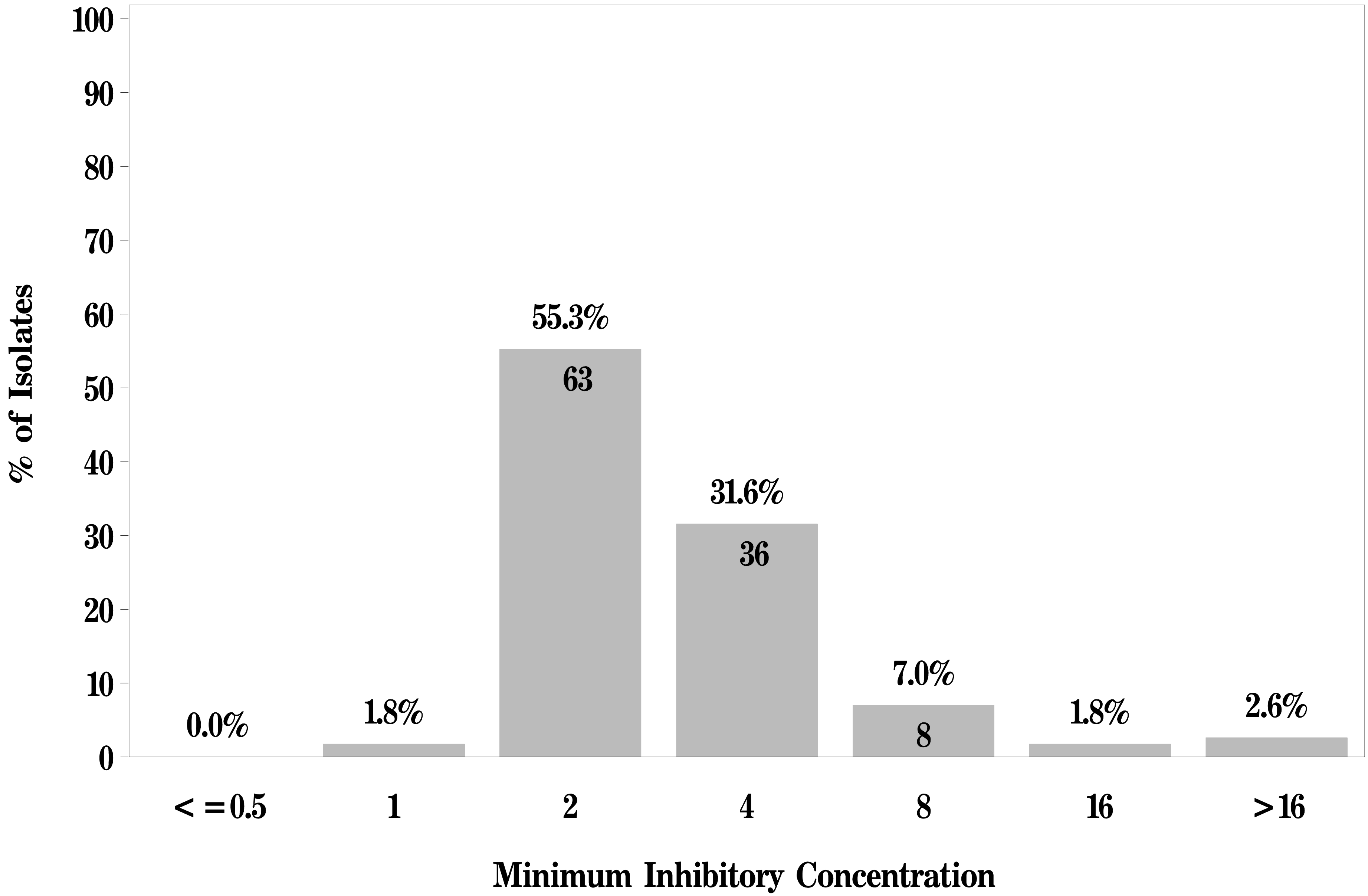
Breakpoints: Susceptible <=8 μg/mL Resistant >=32 μg/mL



NARMS

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

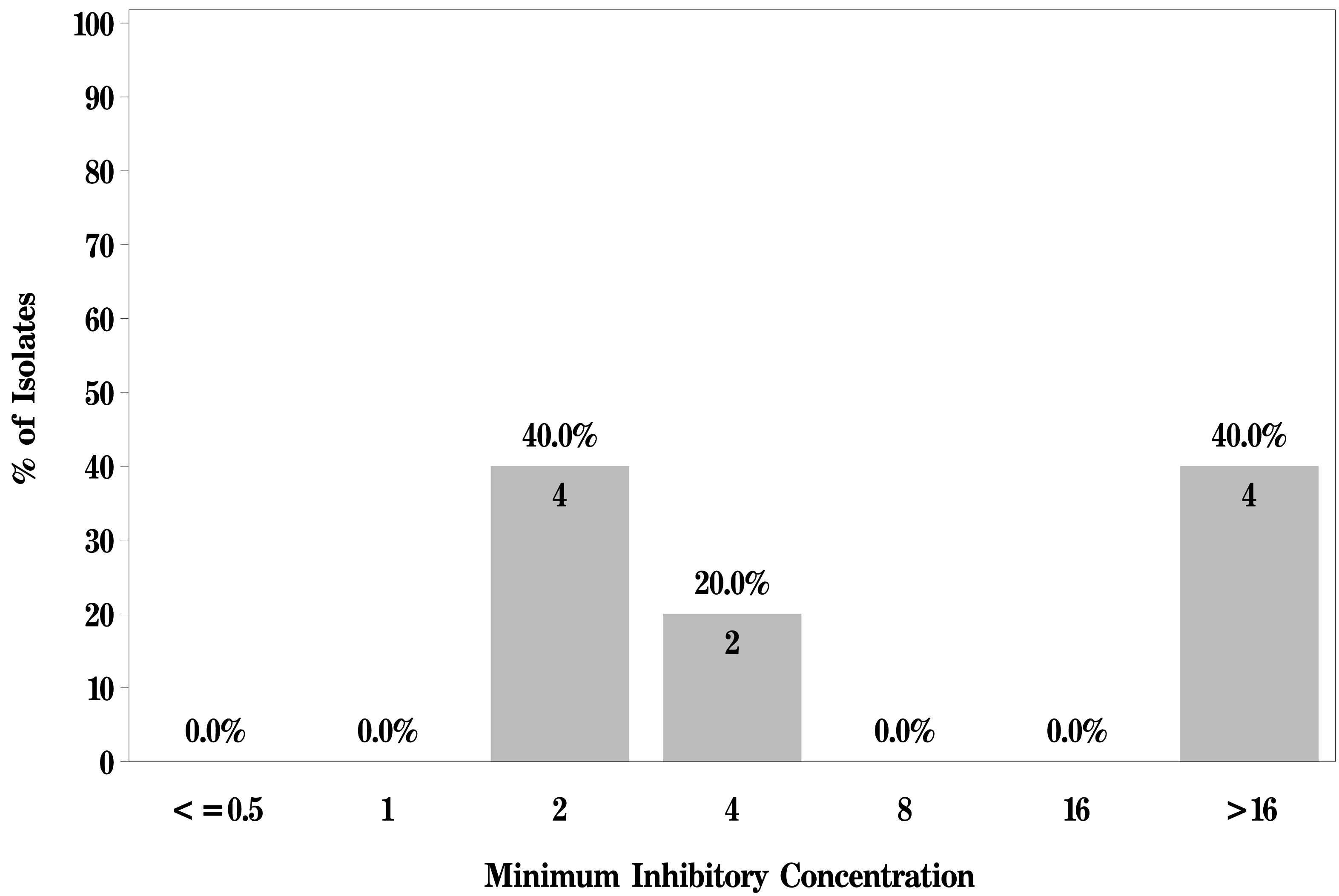
Breakpoints: Susceptible <=8 µg/mL Resistant >=32 µg/mL



NARMS

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

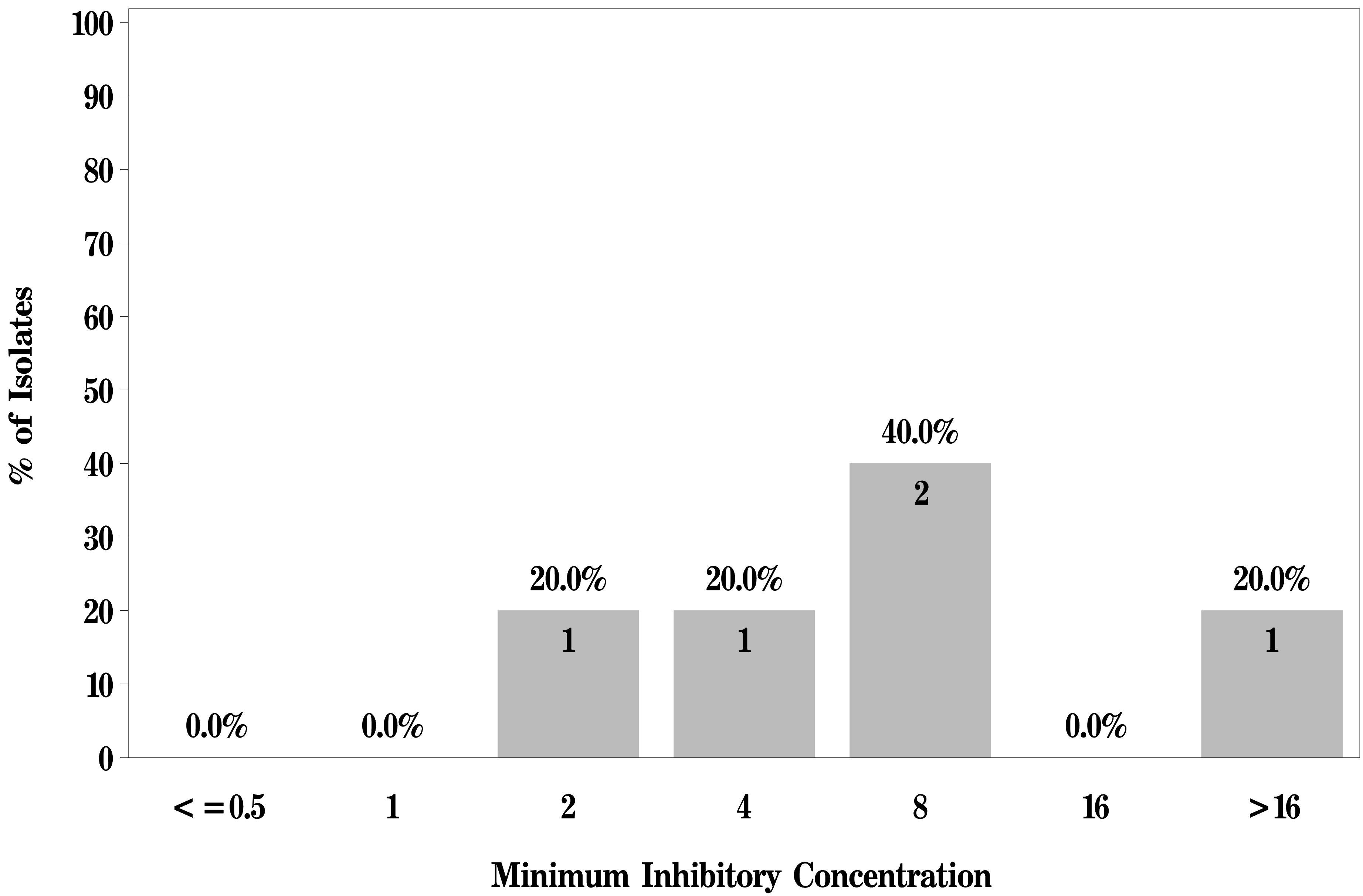
Breakpoints: Susceptible <=8 µg/mL Resistant >=32 µg/mL



NARMS

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

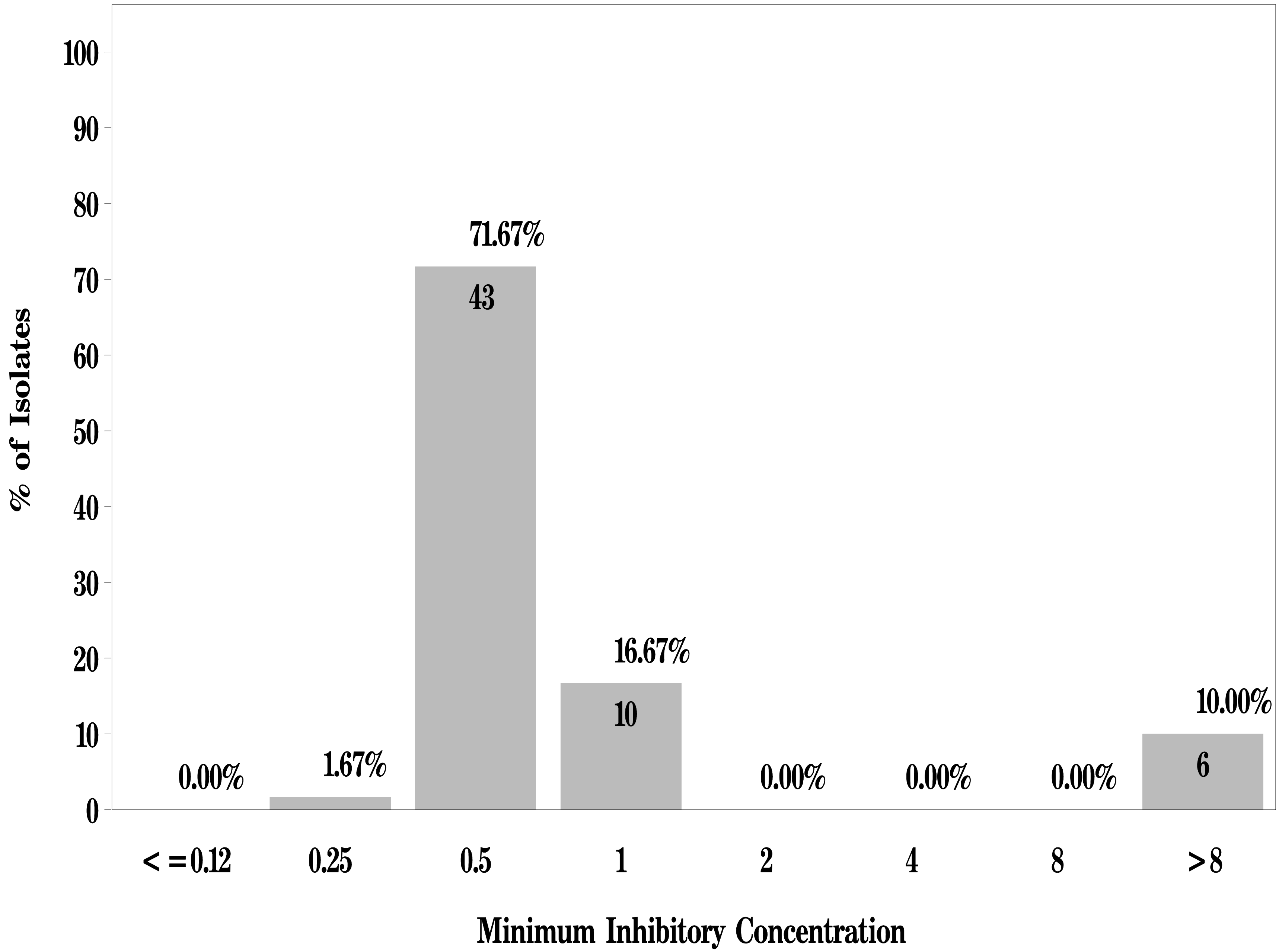
Breakpoints: Susceptible <=8 μg/mL Resistant >=32 μg/mL



NARMS

Figure 7: Minimum Inhibitory Concentration of Ceftiofur for *Salmonella* in Chicken Breast (N=60 Isolates)

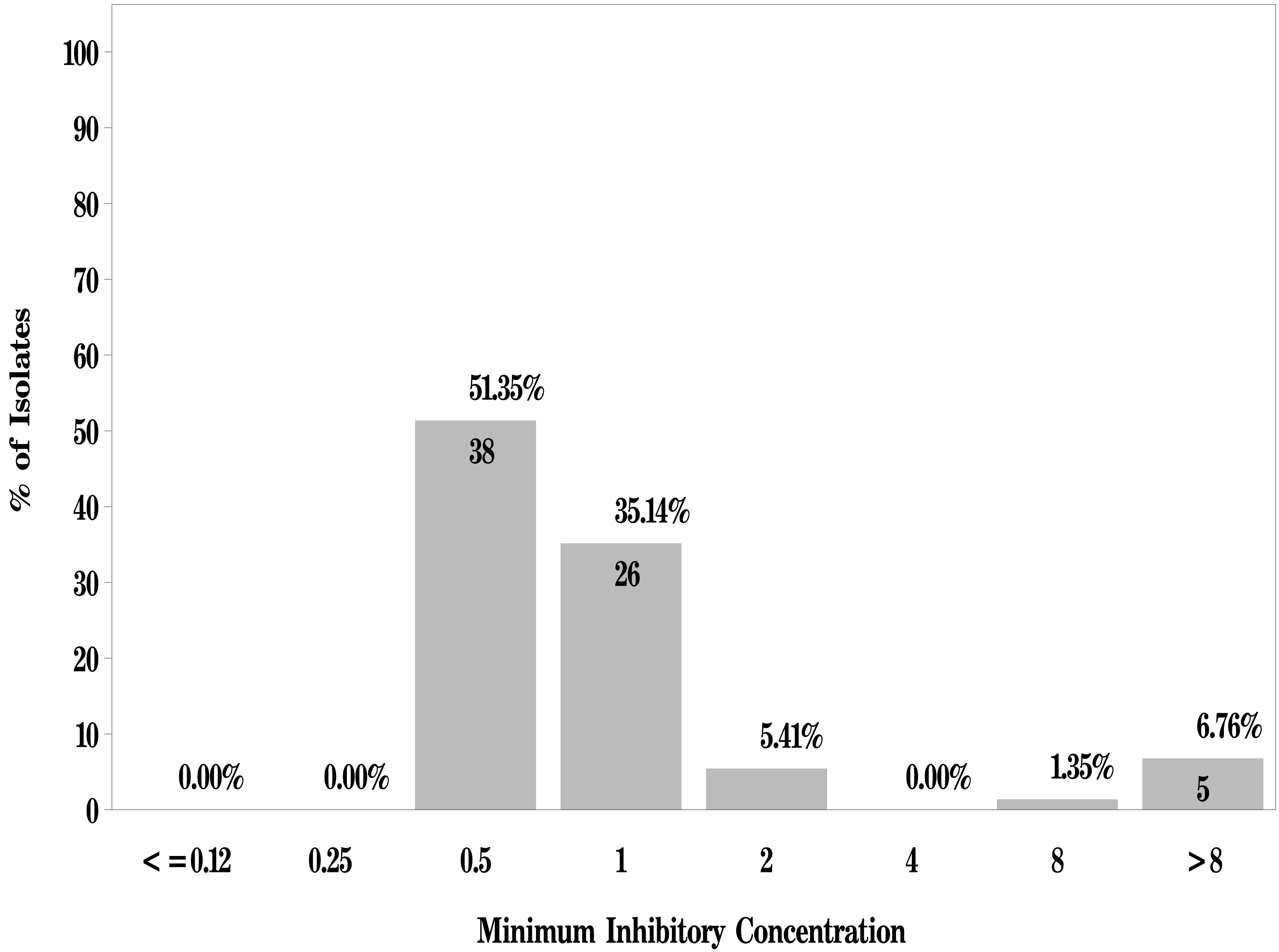
Breakpoints: Susceptible<=2 µg/mL Resistant>=8 µg/mL



NARMS

Figure 7: Minimum Inhibitory Concentration of Ceftiofur for *Salmonella* in Ground Turkey (N=74 Isolates)

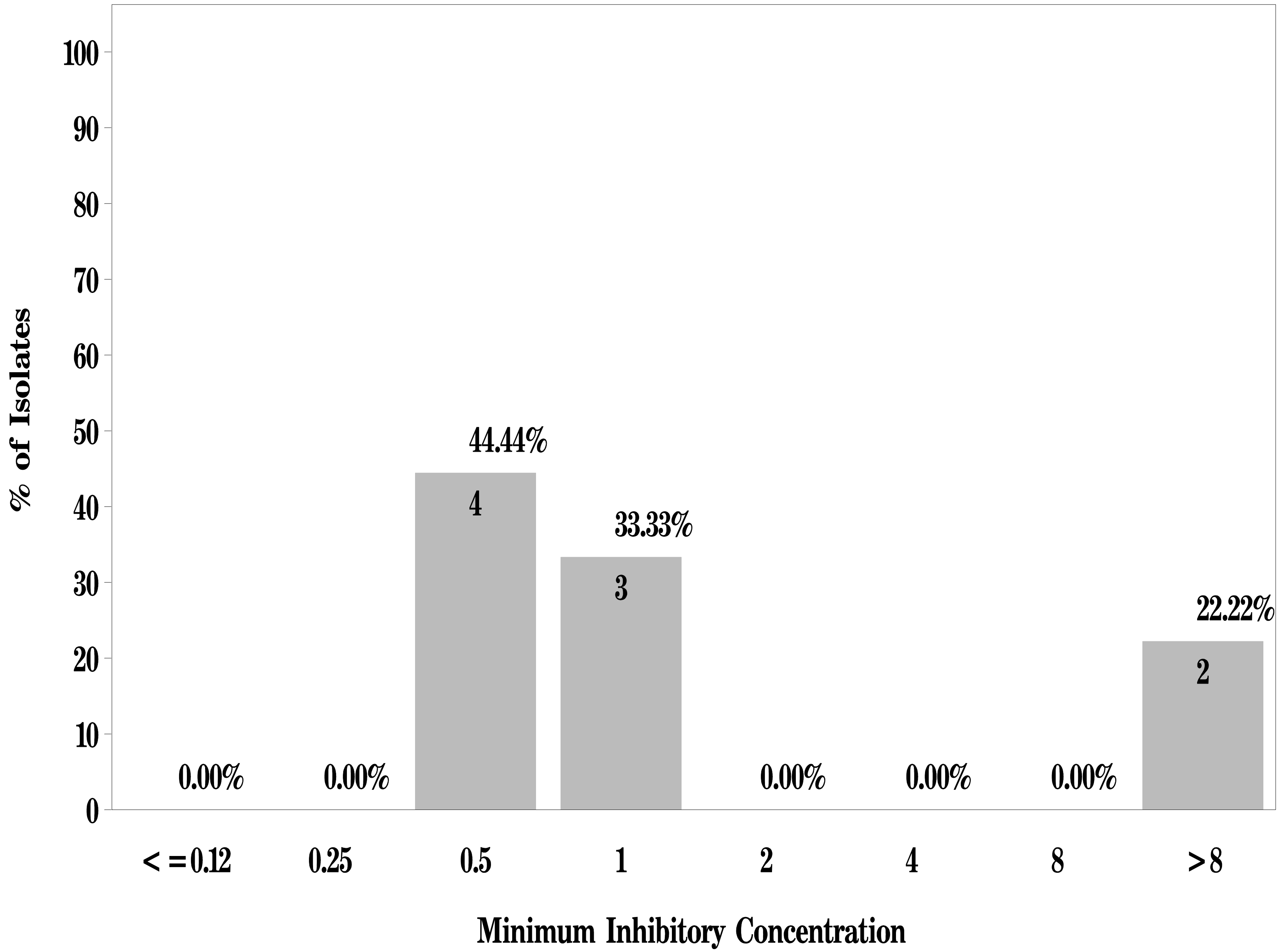
Breakpoints: Susceptible <=2 μg/mL Resistant >=8 μg/mL



NARMS

Figure 7: Minimum Inhibitory Concentration of Ceftiofur for *Salmonella* in Ground Beef (N=9 Isolates)

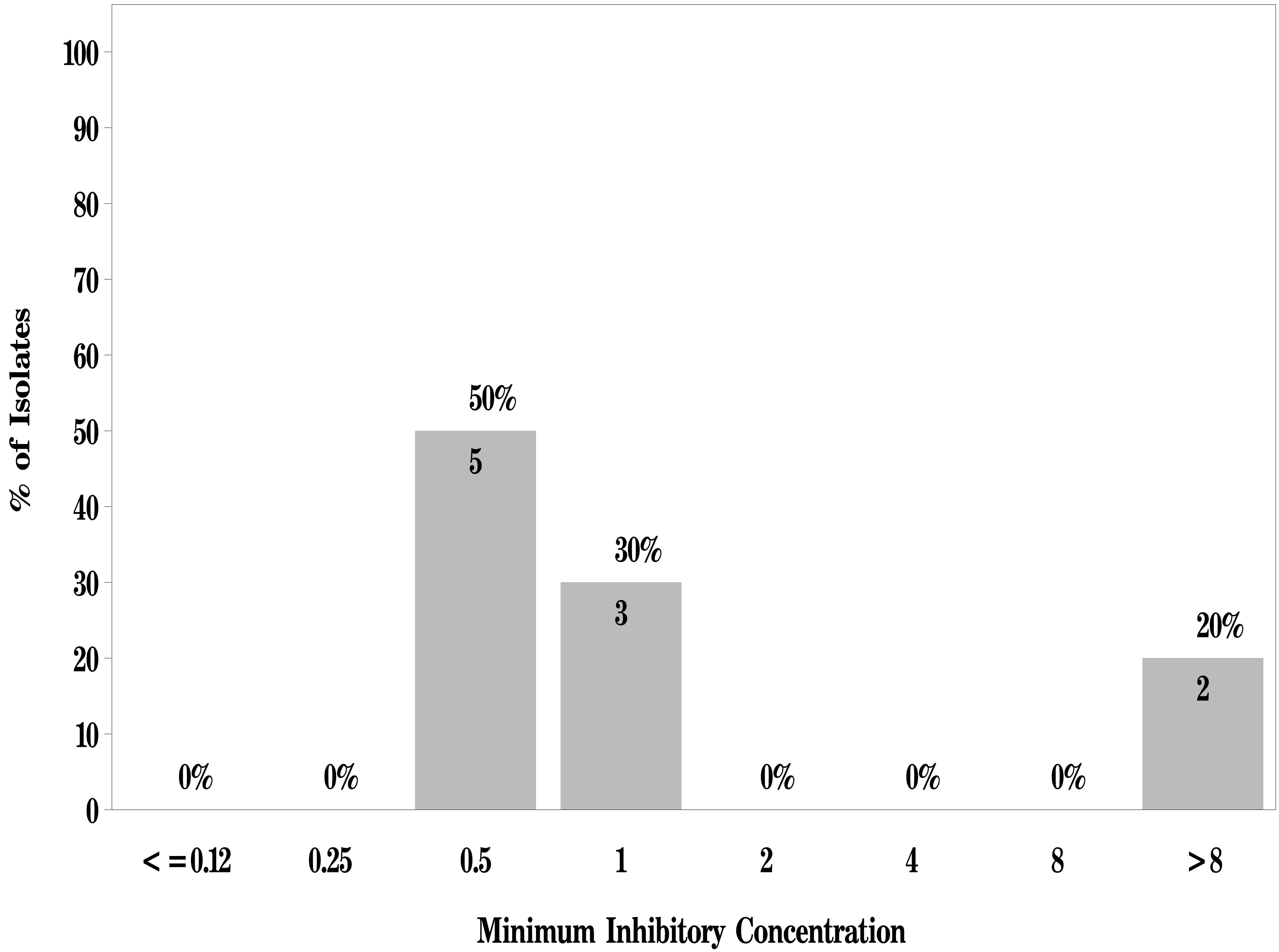
Breakpoints: Susceptible<=2 μg/mL Resistant>=8 μg/mL



NARMS

Figure 7: Minimum Inhibitory Concentration of Ceftiofur for *Salmonella* in Pork Chop (N=10 Isolates)

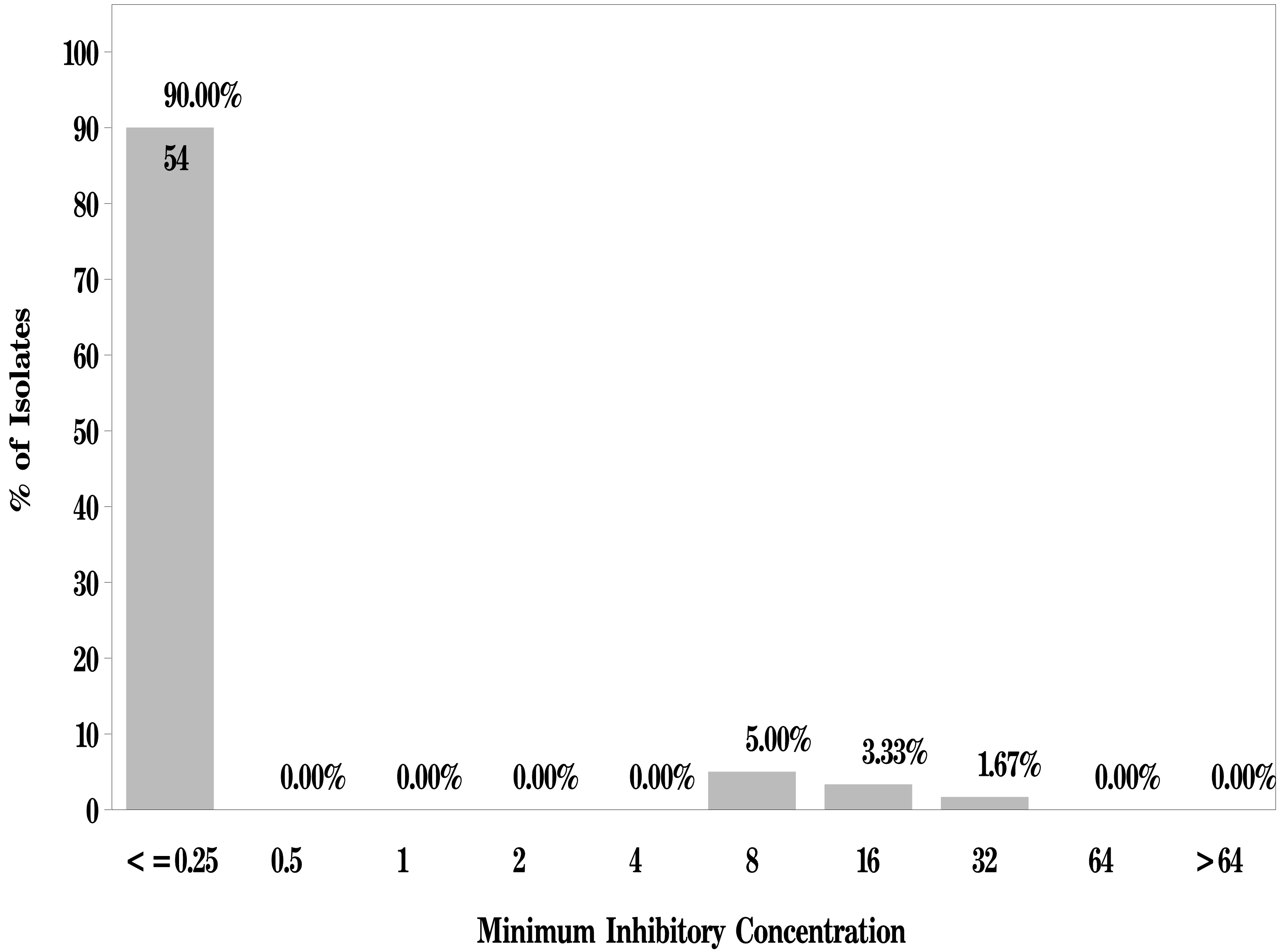
Breakpoints: Susceptible<=2 μg/mL Resistant>=8 μg/mL



NARMS

Figure 7: Minimum Inhibitory Concentration of Ceftriaxone for *Salmonella* in Chicken Breast (N=60 Isolates)

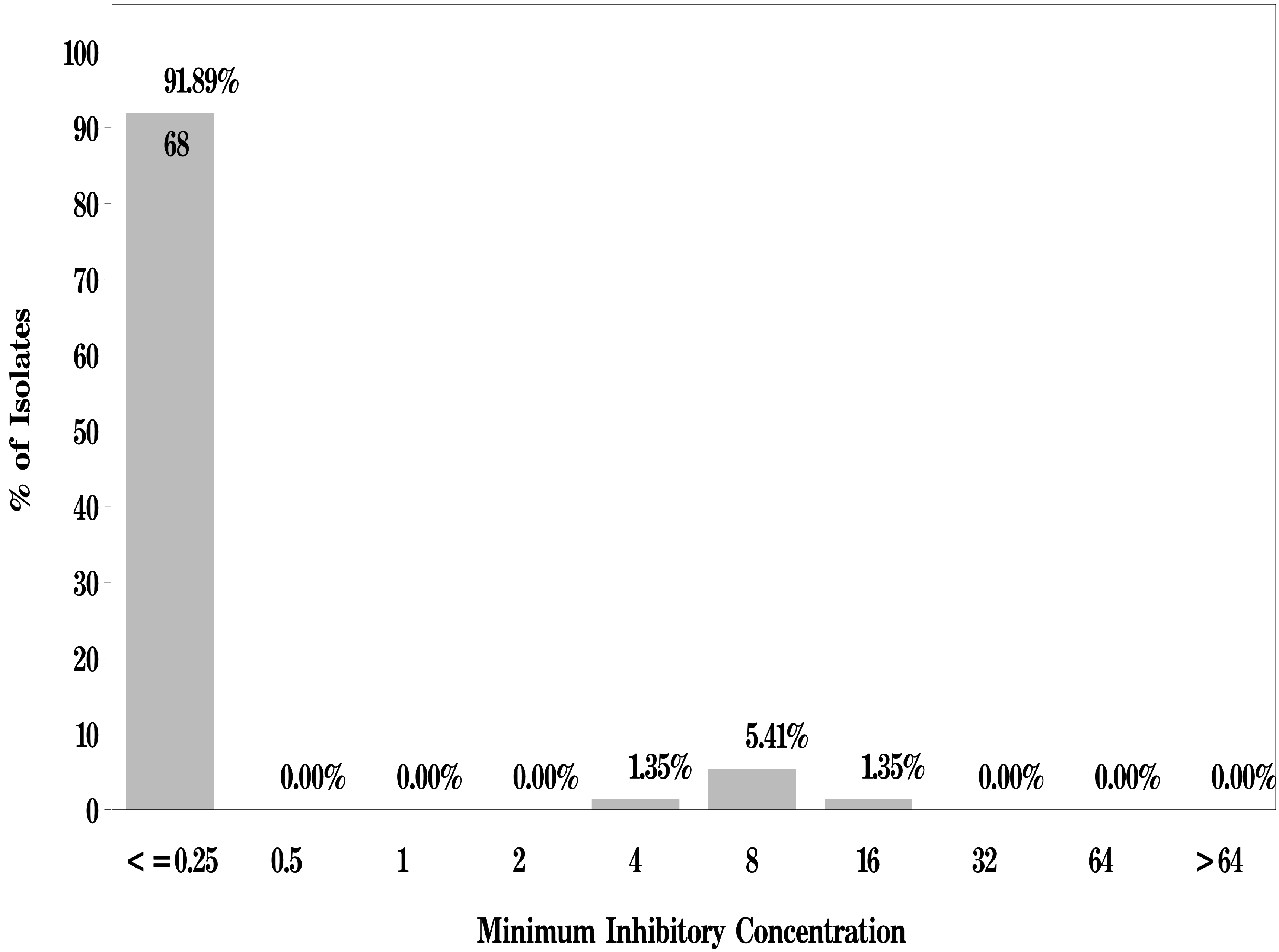
Breakpoints: Susceptible <=8 μg/mL Resistant >=64 μg/mL



NARMS

Figure 7: Minimum Inhibitory Concentration of Ceftriaxone for *Salmonella* in Ground Turkey (N=74 Isolates)

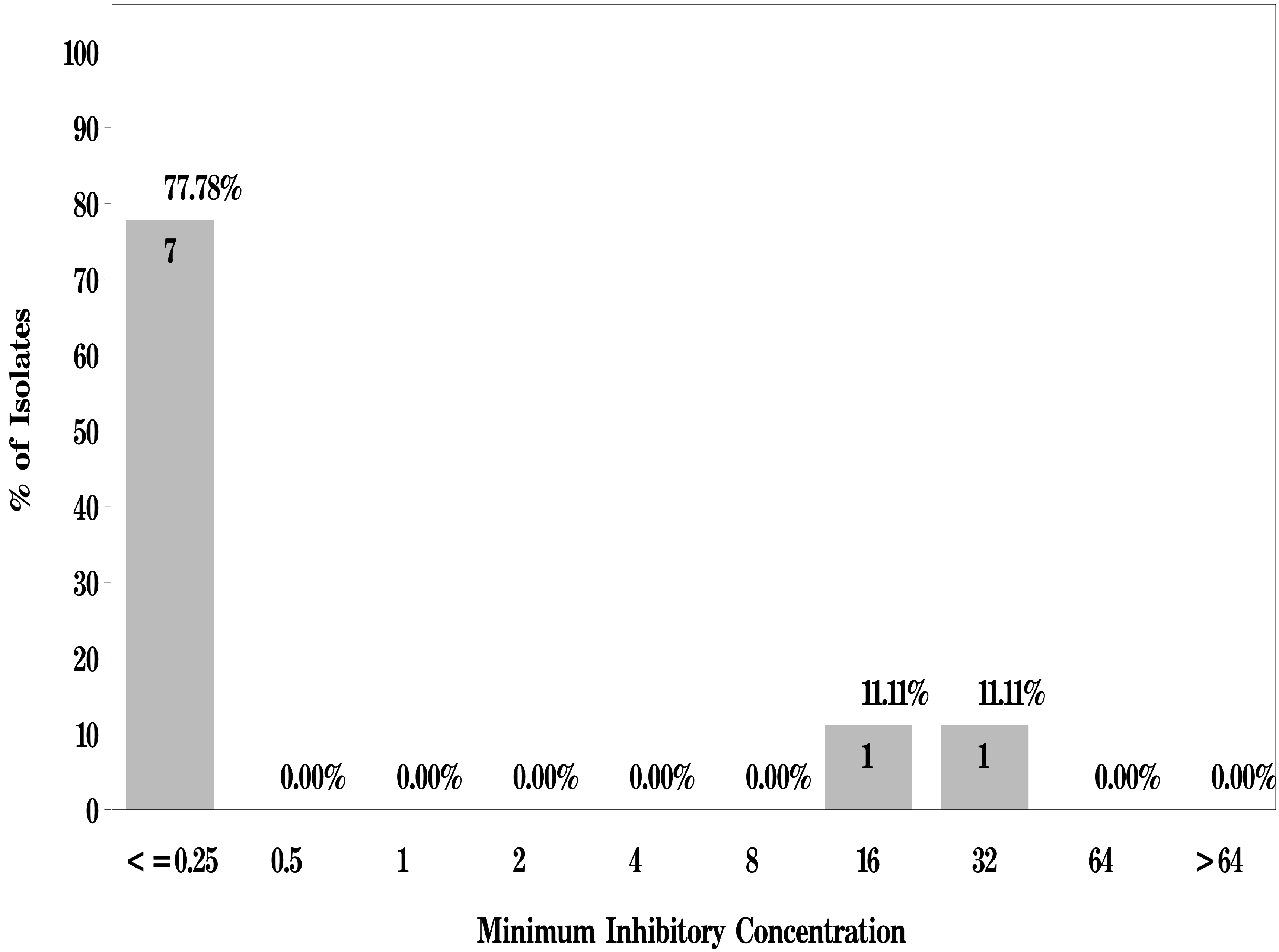
Breakpoints: Susceptible<=8 μg/mL Resistant>=64 μg/mL



NARMS

Figure 7: Minimum Inhibitory Concentration of Ceftriaxone for *Salmonella* in Ground Beef (N=9 Isolates)

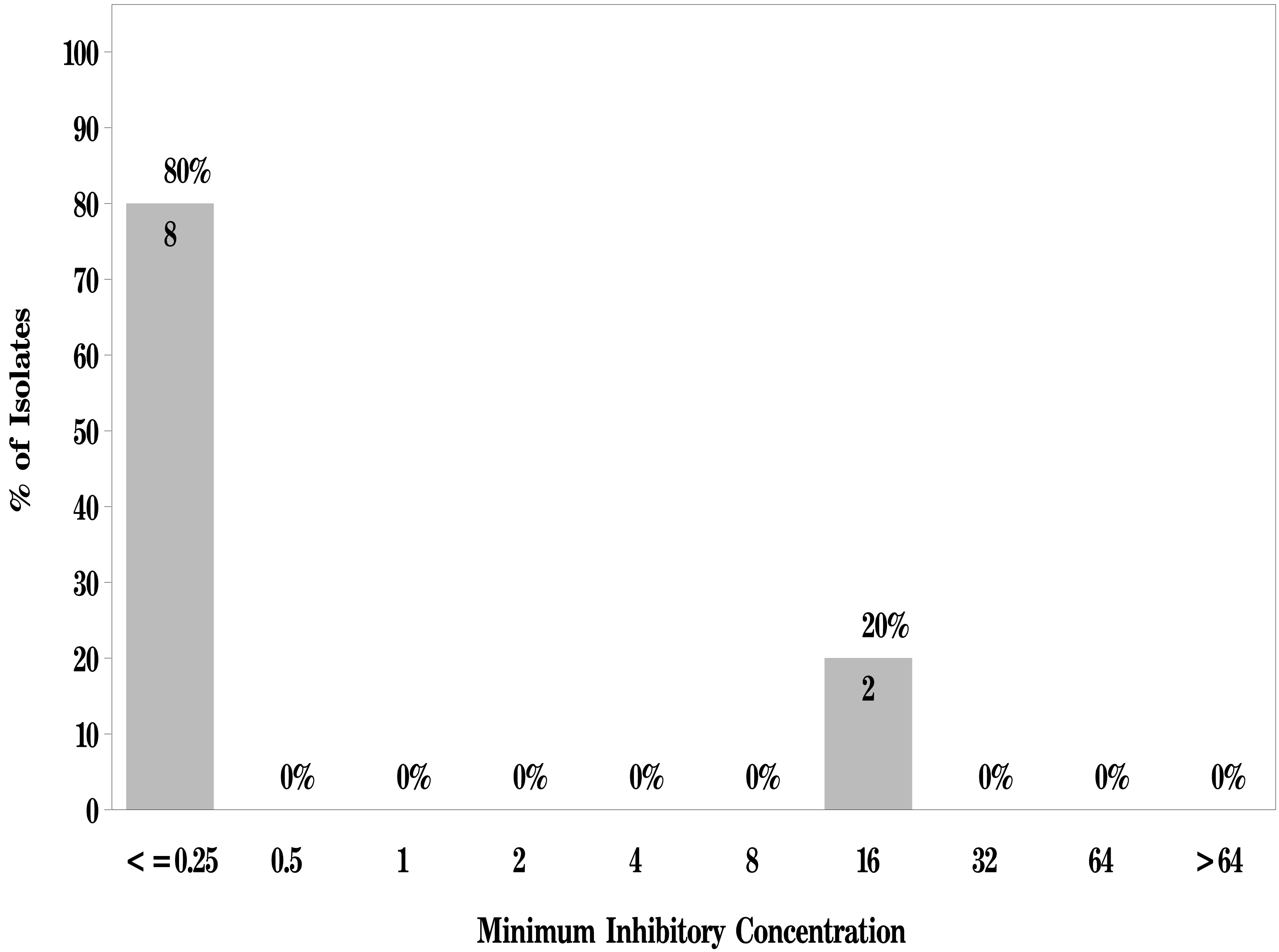
Breakpoints: Susceptible <=8 μg/mL Resistant >=64 μg/mL



NARMS

Figure 7: Minimum Inhibitory Concentration of Ceftriaxone for *Salmonella* in Pork Chop (N=10 Isolates)

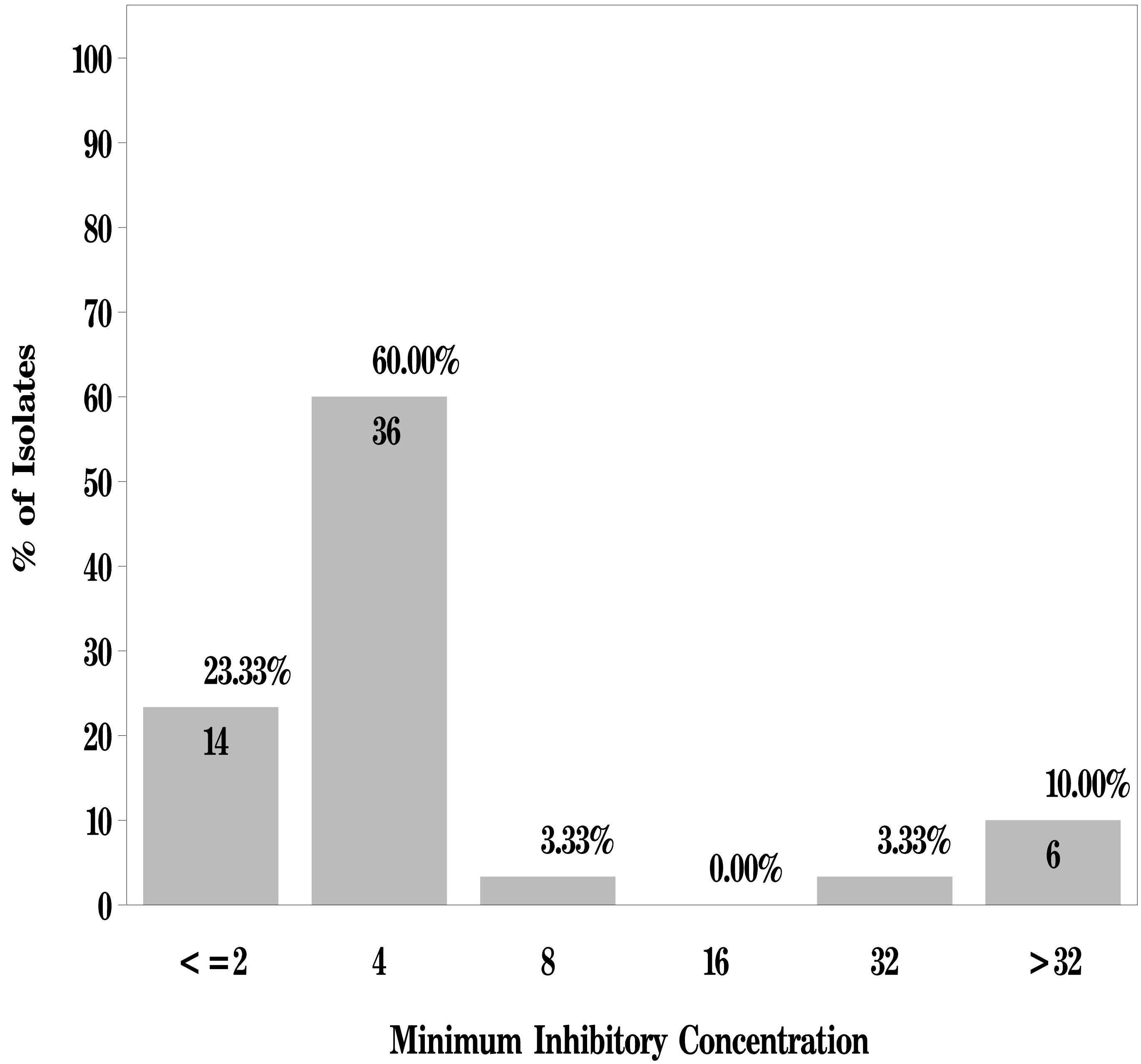
Breakpoints: Susceptible<=8 μg/mL Resistant>=64 μg/mL



NARMS

Figure 7: Minimum Inhibitory Concentration of Cephalothin for *Salmonella* in Chicken Breast (N=60 Isolates)

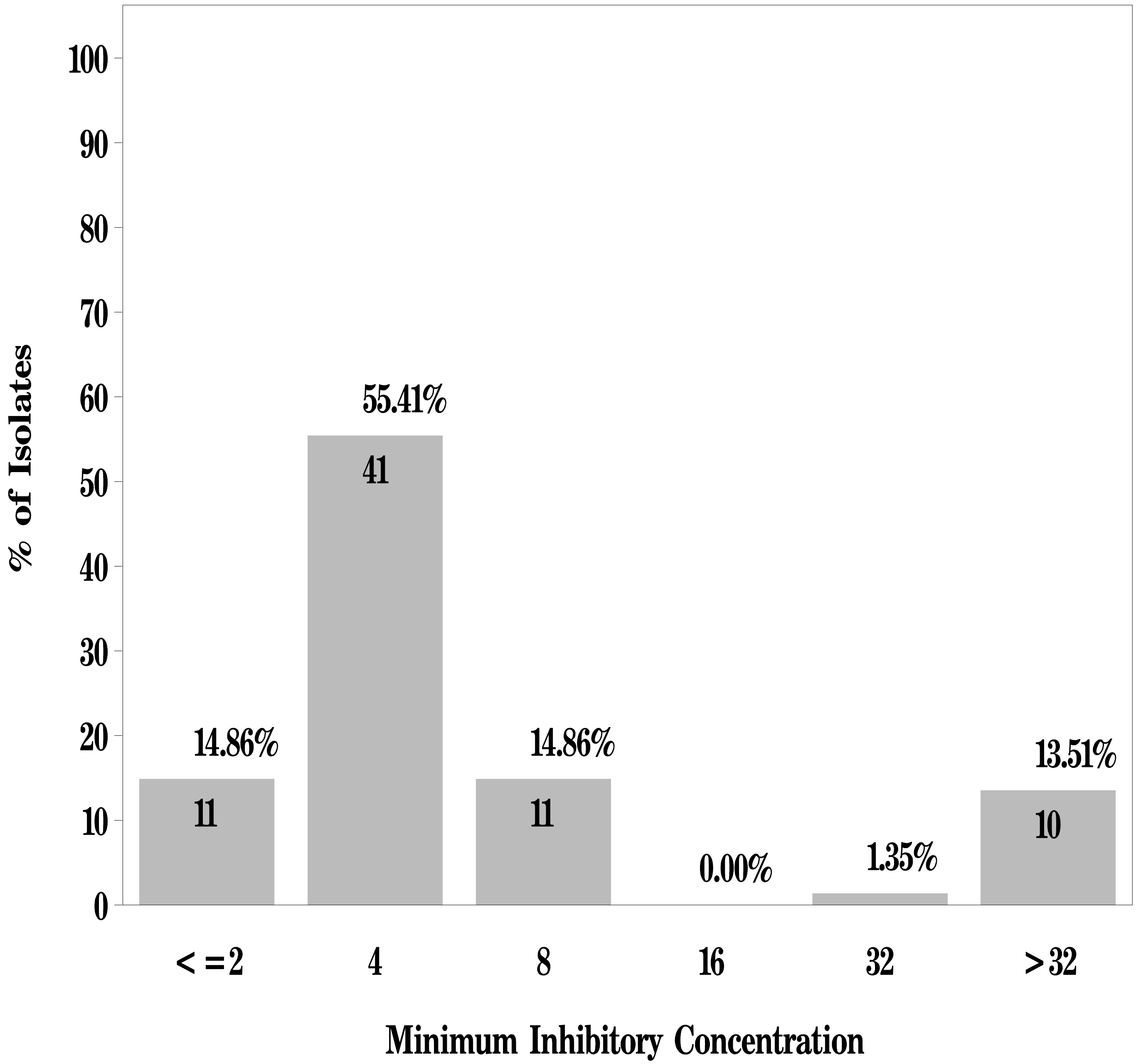
Breakpoints: Susceptible <=8 μg/mL Resistant >=32 μg/mL



NARMS

Figure 7: Minimum Inhibitory Concentration of Cephalothin for *Salmonella* in Ground Turkey (N=74 Isolates)

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



NARMS

Figure 7: Minimum Inhibitory Concentration of Cephalothin for *Salmonella* in Ground Beef (N=9 Isolates)

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

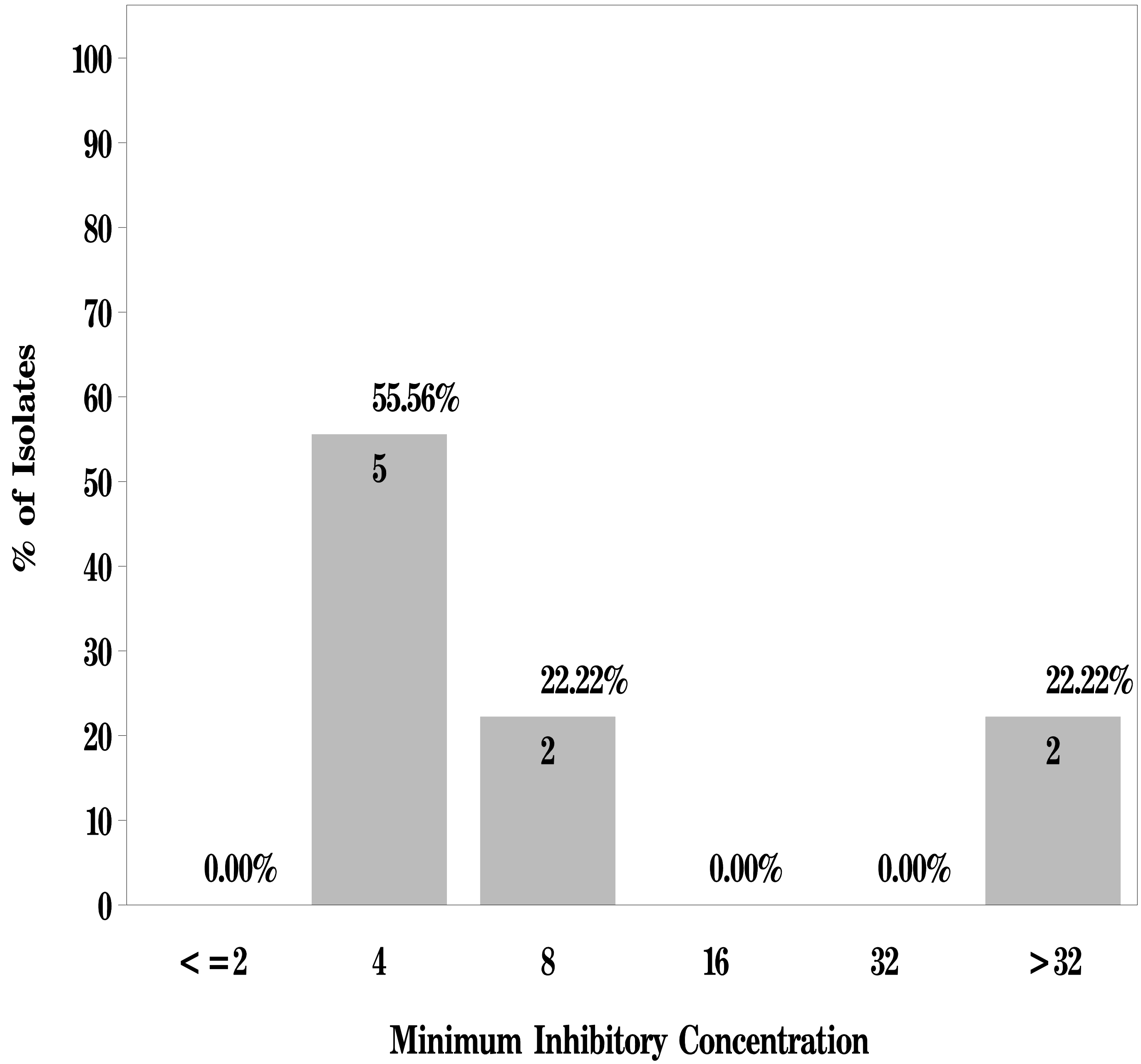


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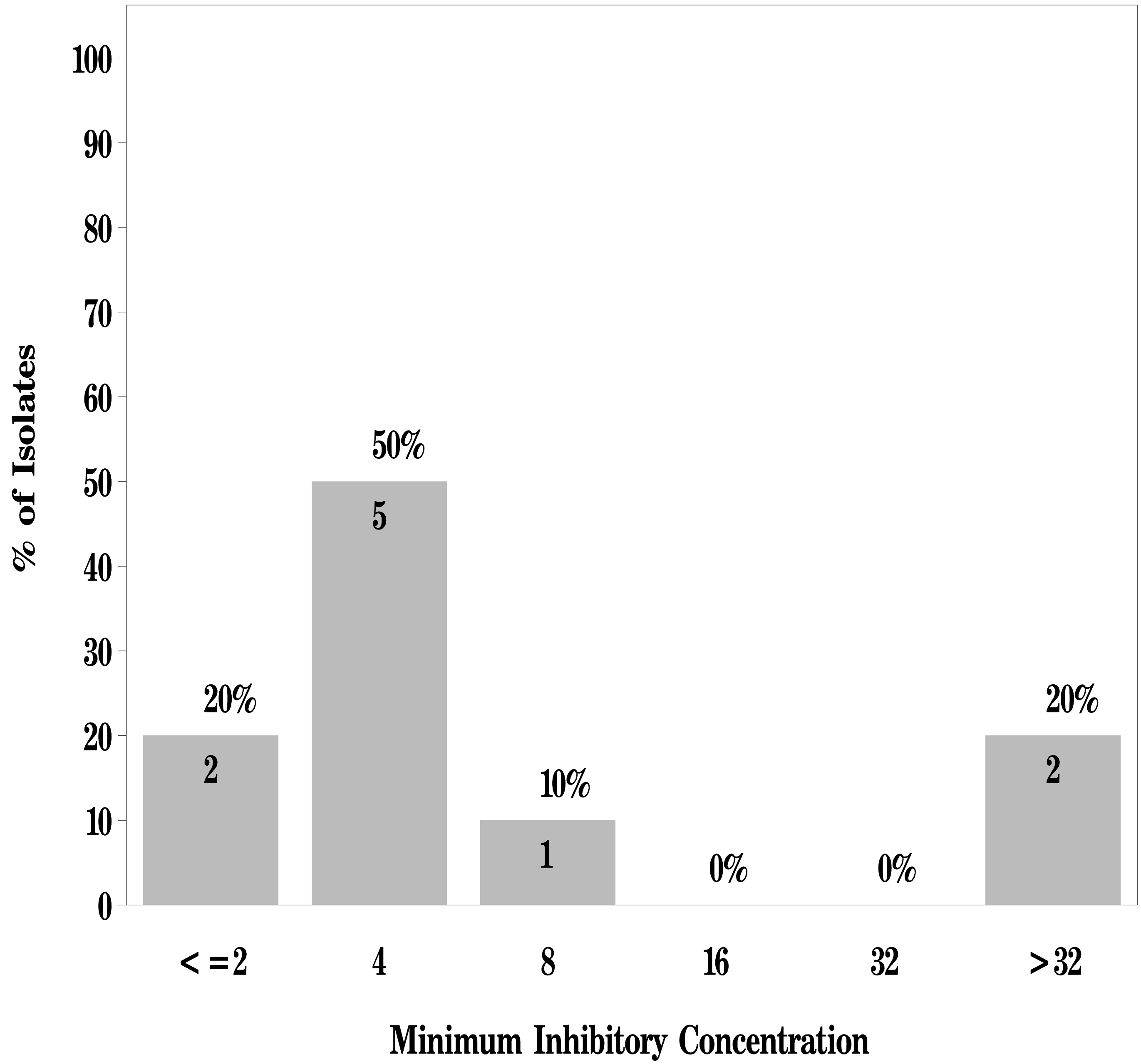
Figure 7: Minimum Inhibitory Concentration of Cephalothin for *Salmonella* in Pork Chop (N=10 Isolates)

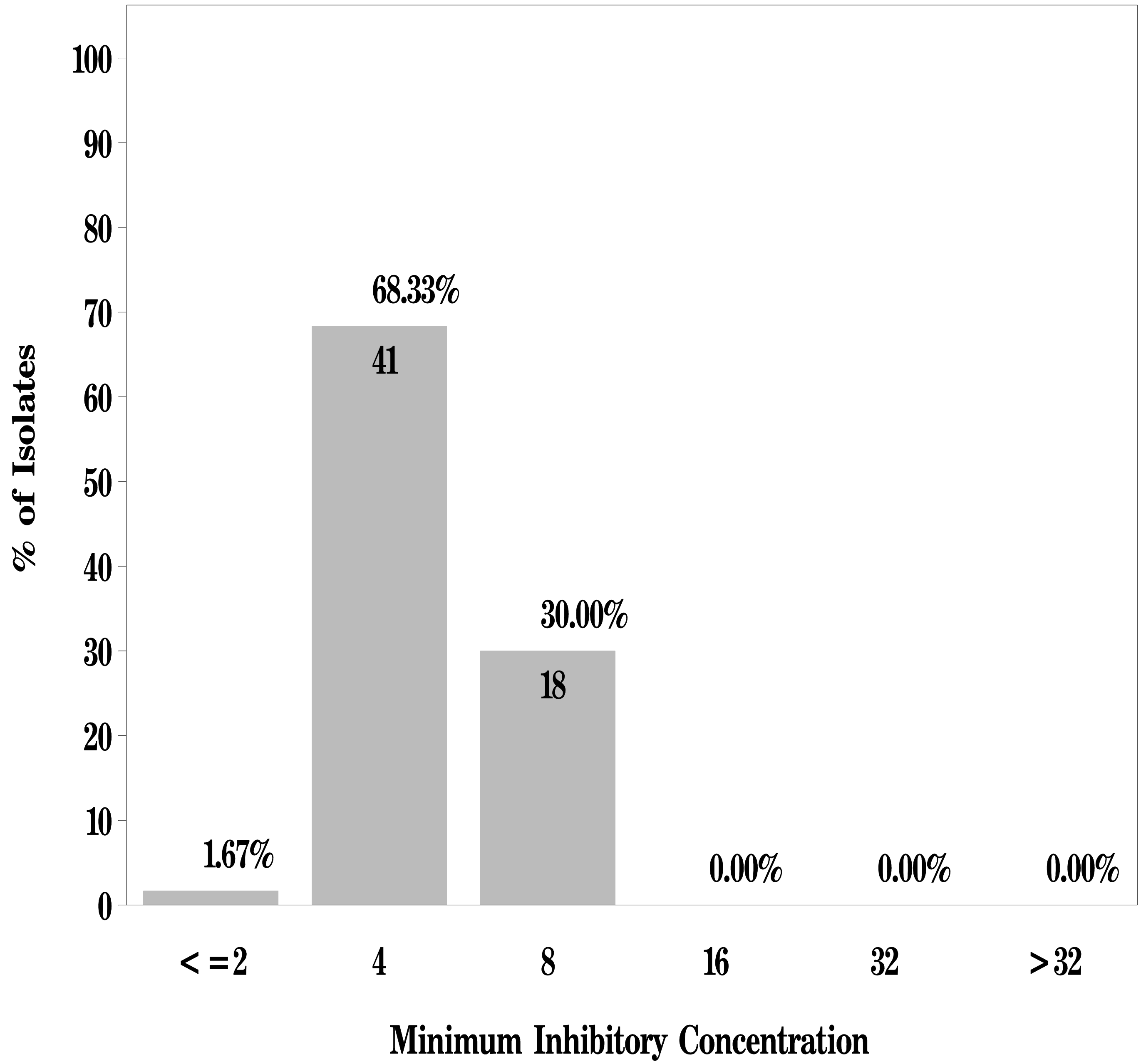
Breakpoints: Susceptible <=8 μg/mL Resistant >=32 μg/mL



NARMS

Figure 7: Minimum Inhibitory Concentration of Chloramphenicol for *Salmonella* in Chicken Breast (N=60 Isolates)

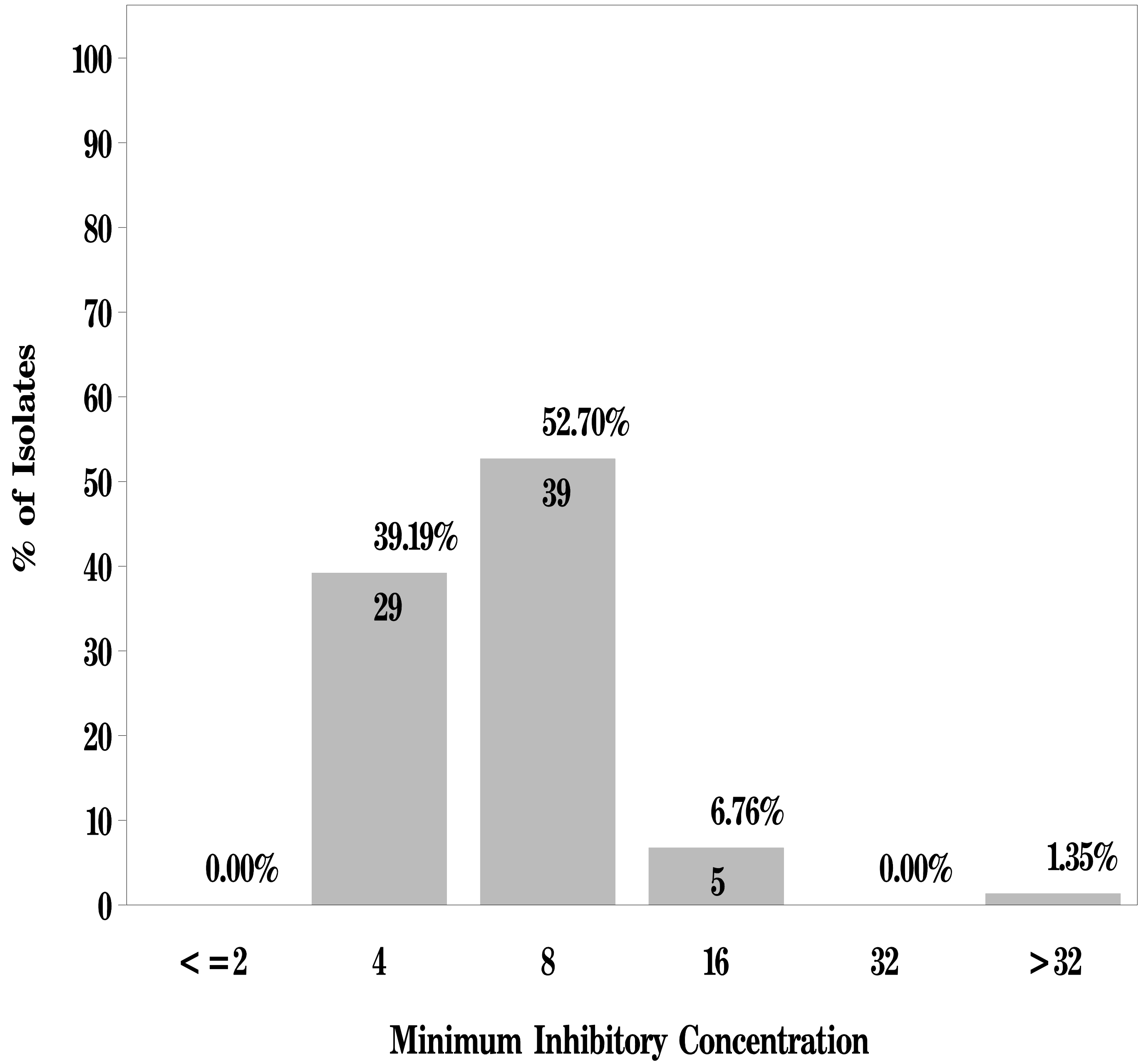
Breakpoints: Susceptible<=8 µg/mL Resistant>=32 µg/mL



NARMS

Figure 7: Minimum Inhibitory Concentration of Chloramphenicol for *Salmonella* in Ground Turkey (N=74 Isolates)

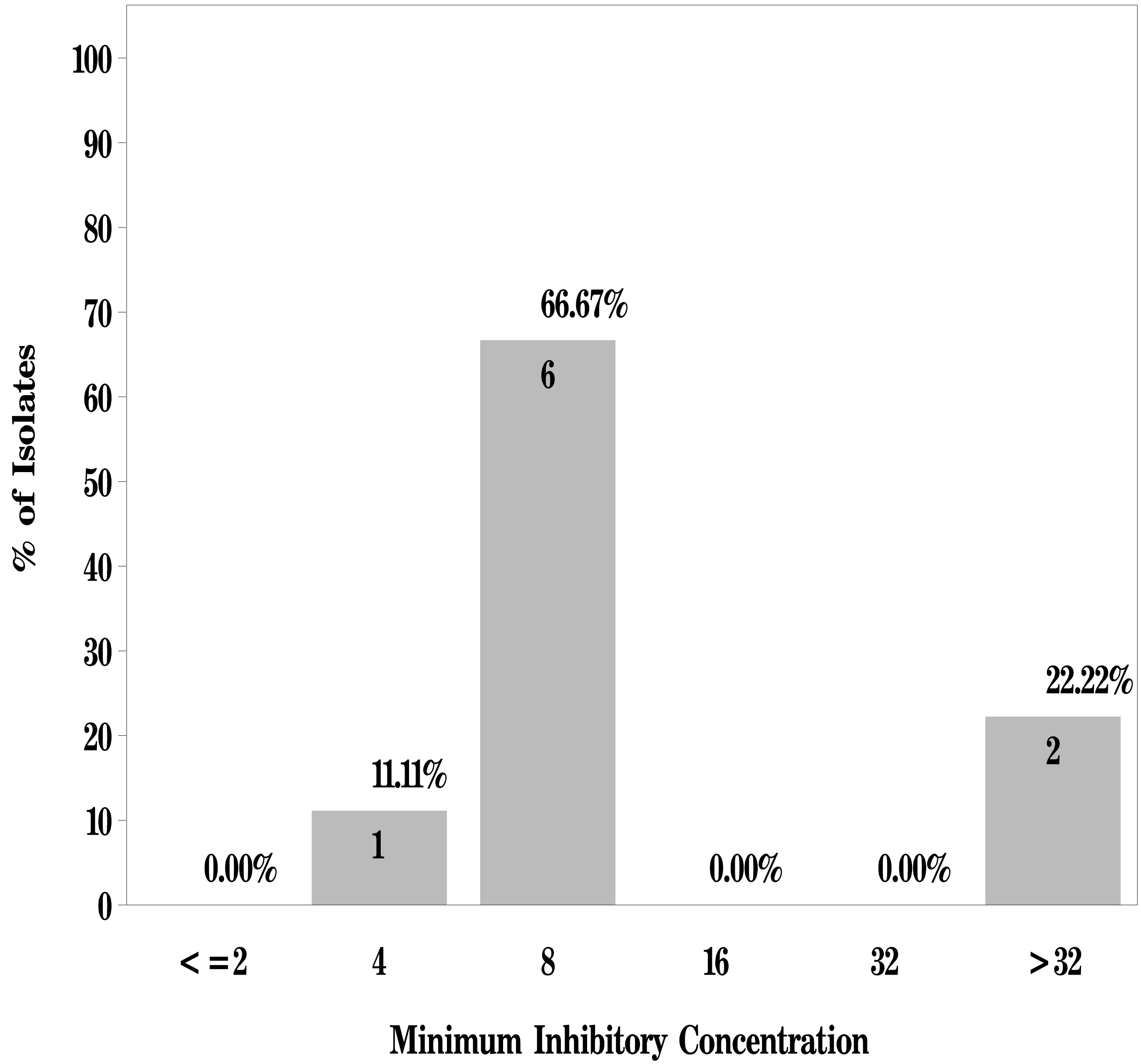
Breakpoints: Susceptible <=8 μg/mL Resistant >=32 μg/mL



NARMS

Figure 7: Minimum Inhibitory Concentration of Chloramphenicol for *Salmonella* in Ground Beef (N=9 Isolates)

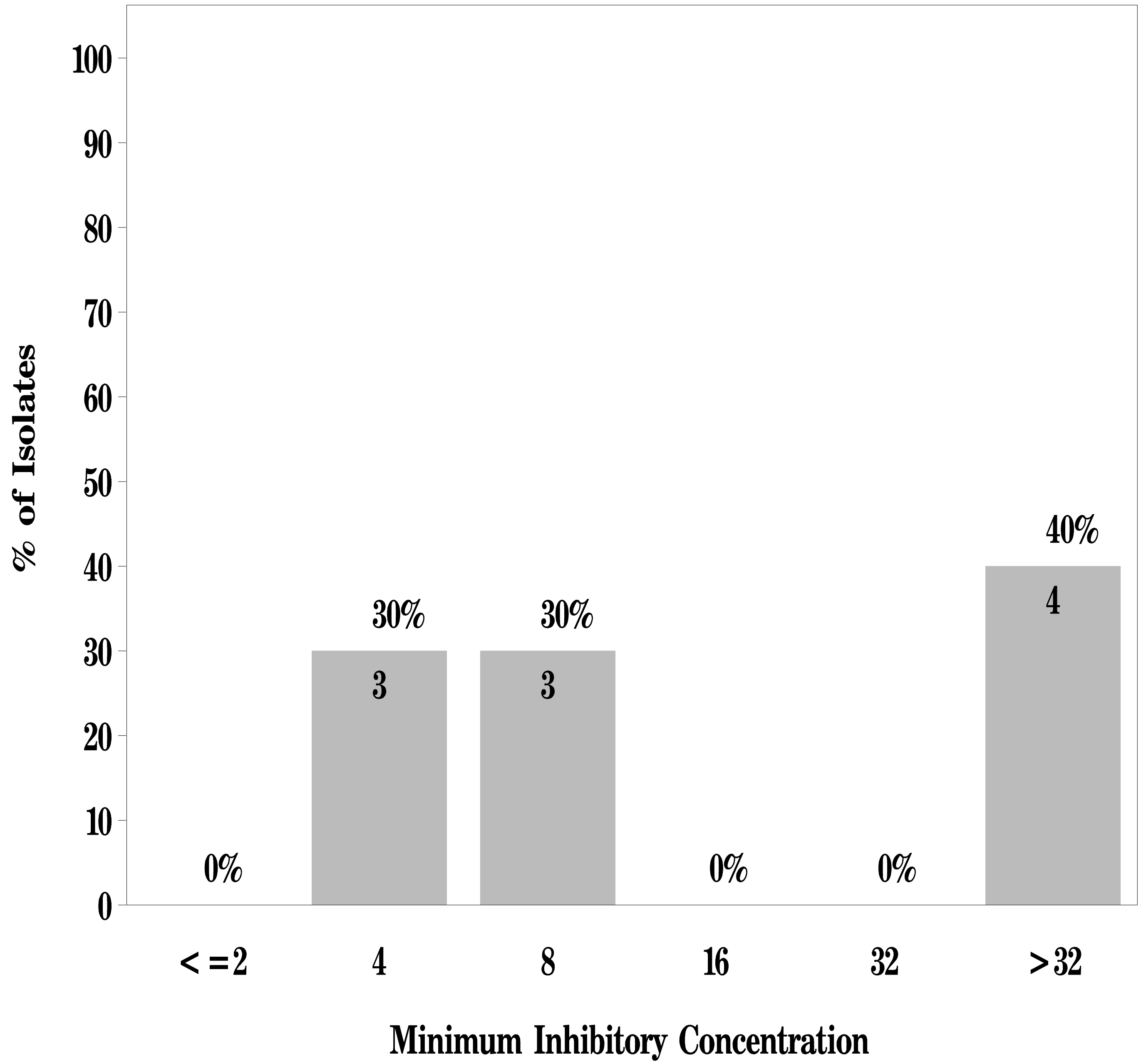
Breakpoints: Susceptible <=8 μg/mL Resistant >=32 μg/mL



NARMS

Figure 7: Minimum Inhibitory Concentration of Chloramphenicol for *Salmonella* in Pork Chop (N=10 Isolates)

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



NARMS

Figure 7: Minimum Inhibitory Concentration of Ciprofloxacin for *Salmonella* in Chicken Breast (N=60 Isolates)

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

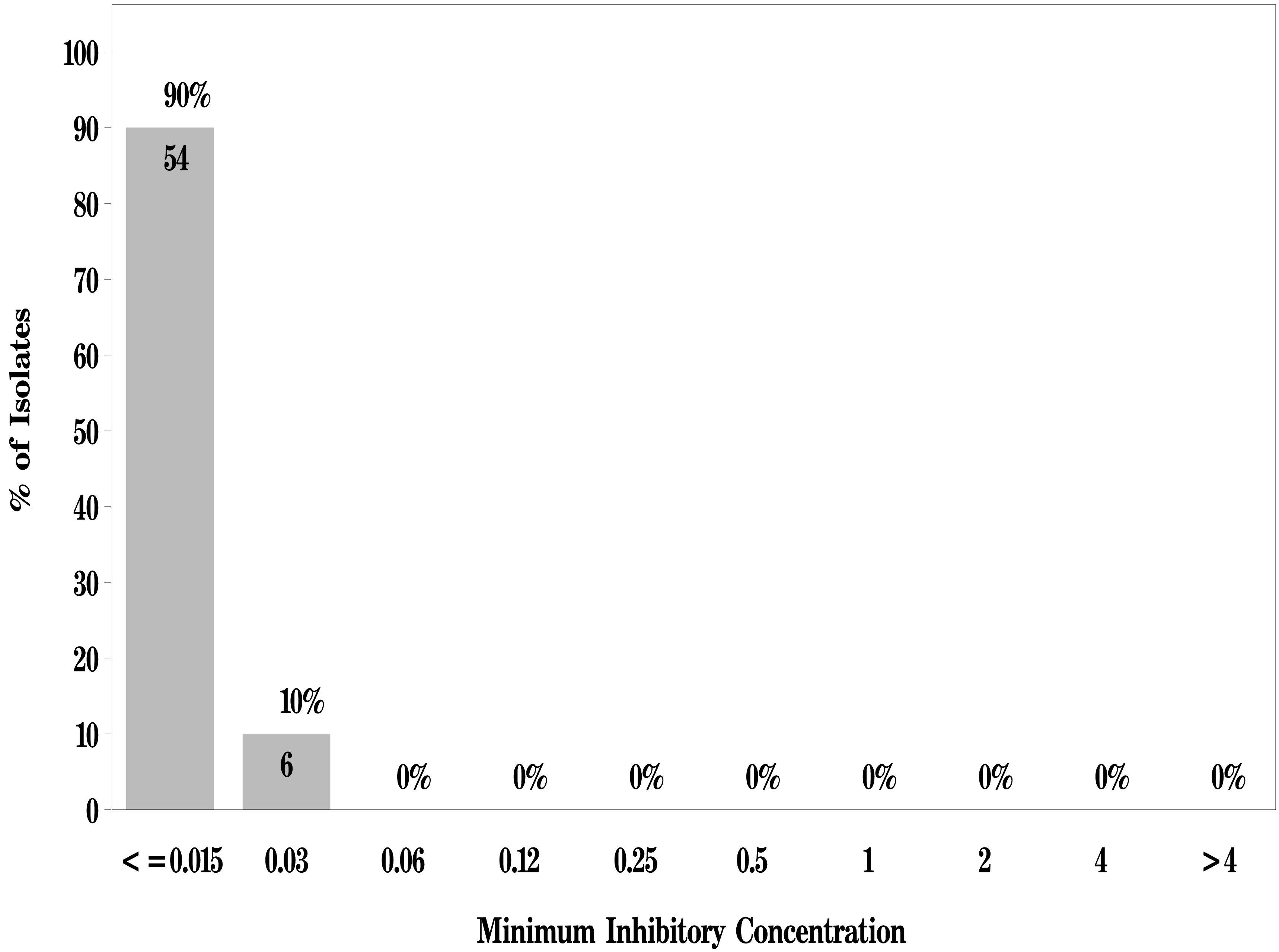


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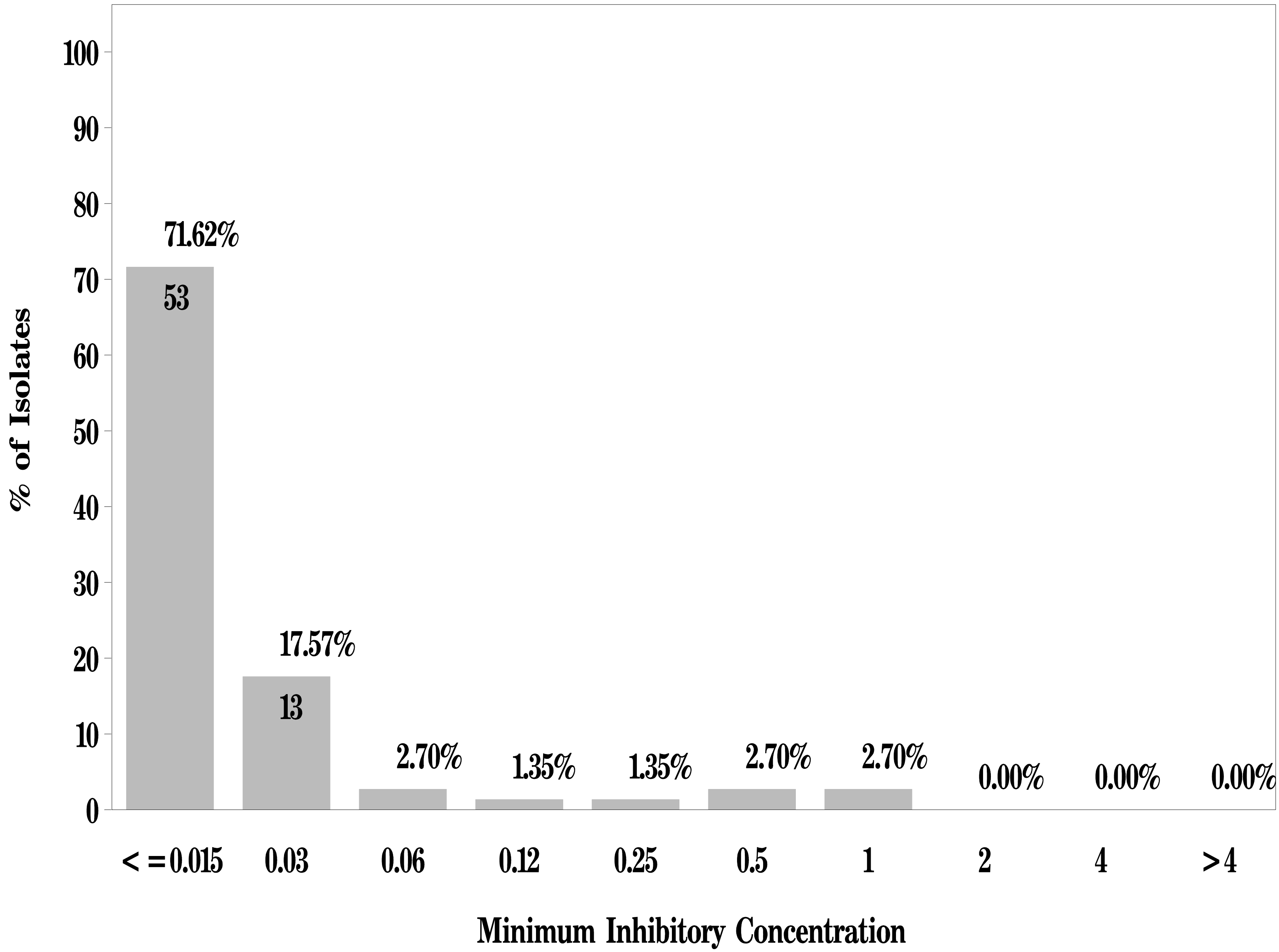
Figure 7: Minimum Inhibitory Concentration of Ciprofloxacin for *Salmonella* in Ground Turkey (N=74 Isolates)

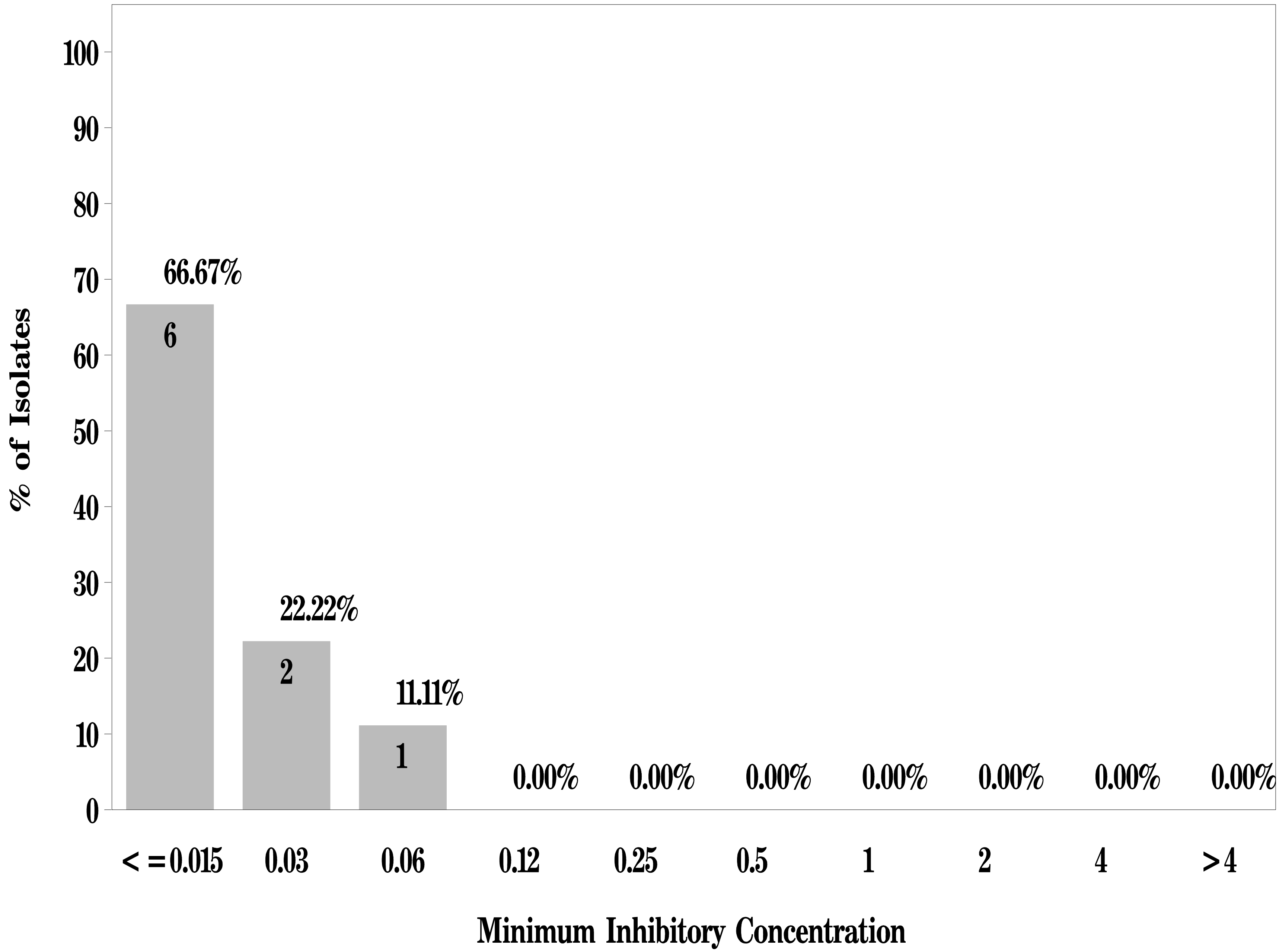
Breakpoints: Susceptible <=1 µg/mL Resistant >=4 µg/mL



NARMS

Figure 7: Minimum Inhibitory Concentration of Ciprofloxacin for *Salmonella* in Ground Beef (N=9 Isolates)

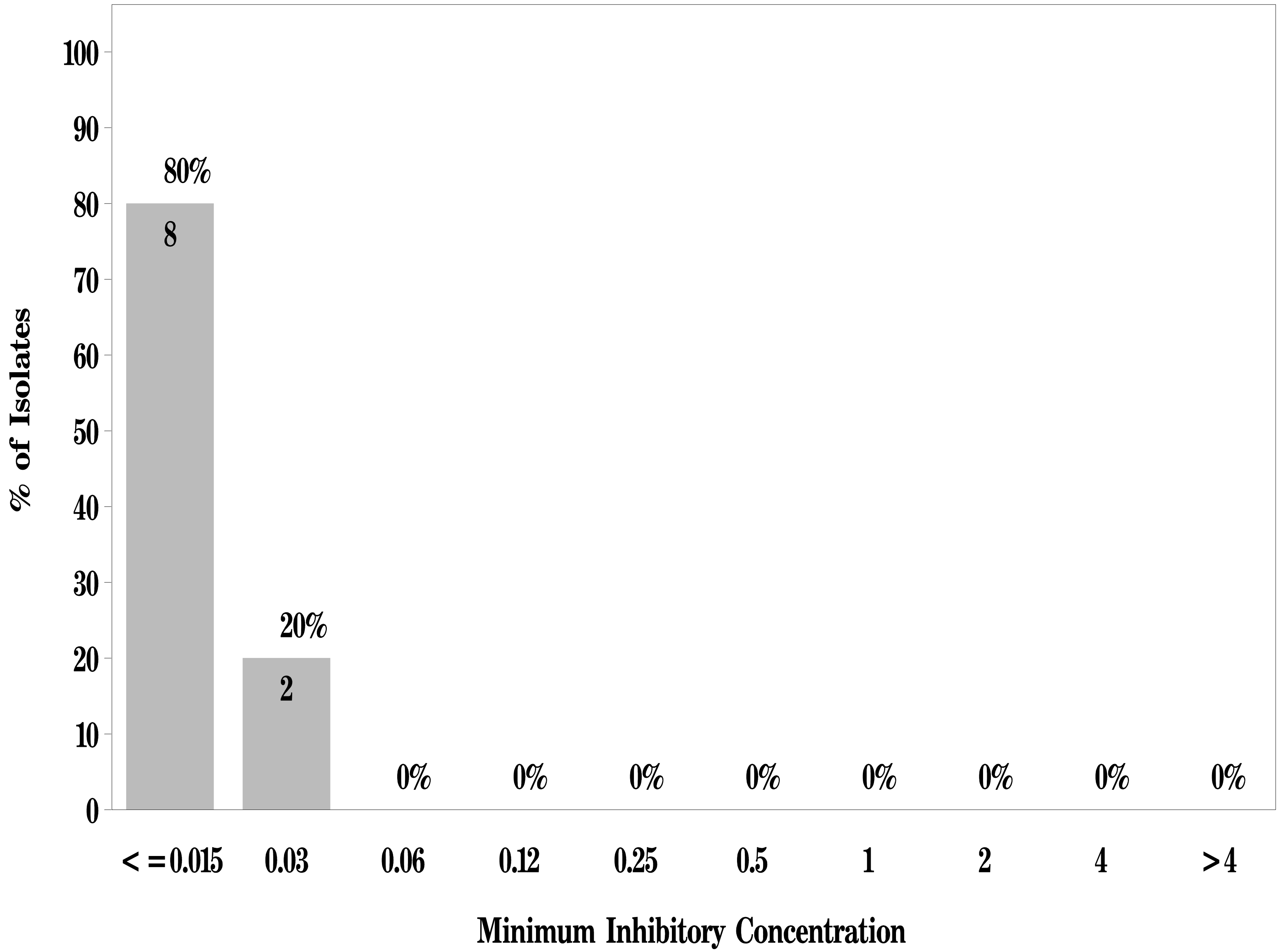
Breakpoints: Susceptible <=1 µg/mL Resistant >=4 µg/mL



NARMS

Figure 7: Minimum Inhibitory Concentration of Ciprofloxacin for *Salmonella* in Pork Chop (N=10 Isolates)

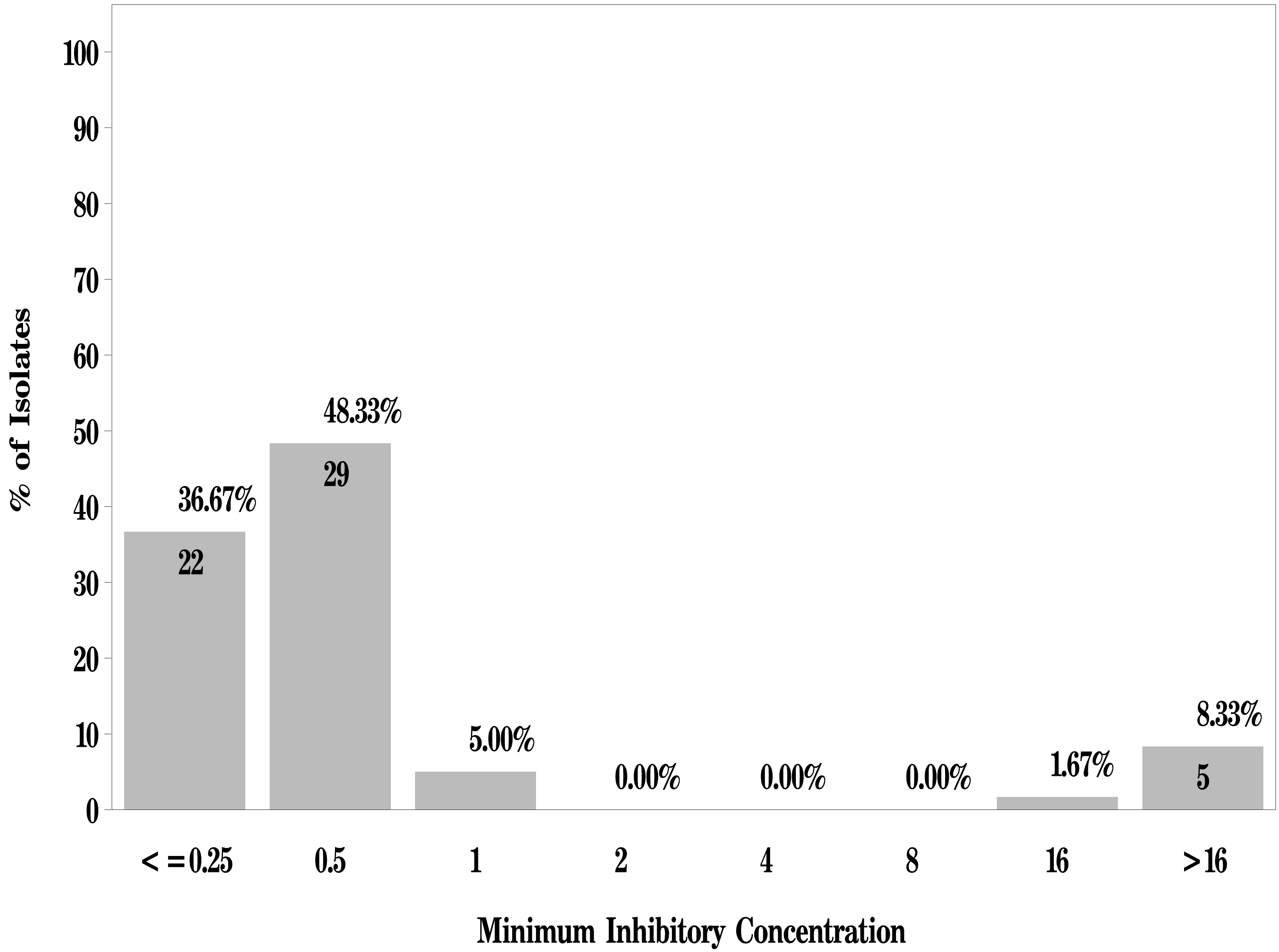
Breakpoints: Susceptible <=1 μg/mL Resistant >=4 μg/mL



NARMS

Figure 7: Minimum Inhibitory Concentration of Gentamicin for *Salmonella* in Chicken Breast (N=60 Isolates)

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



NARMS

Figure 7: Minimum Inhibitory Concentration of Gentamicin for *Salmonella* in Ground Turkey (N=74 Isolates)

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

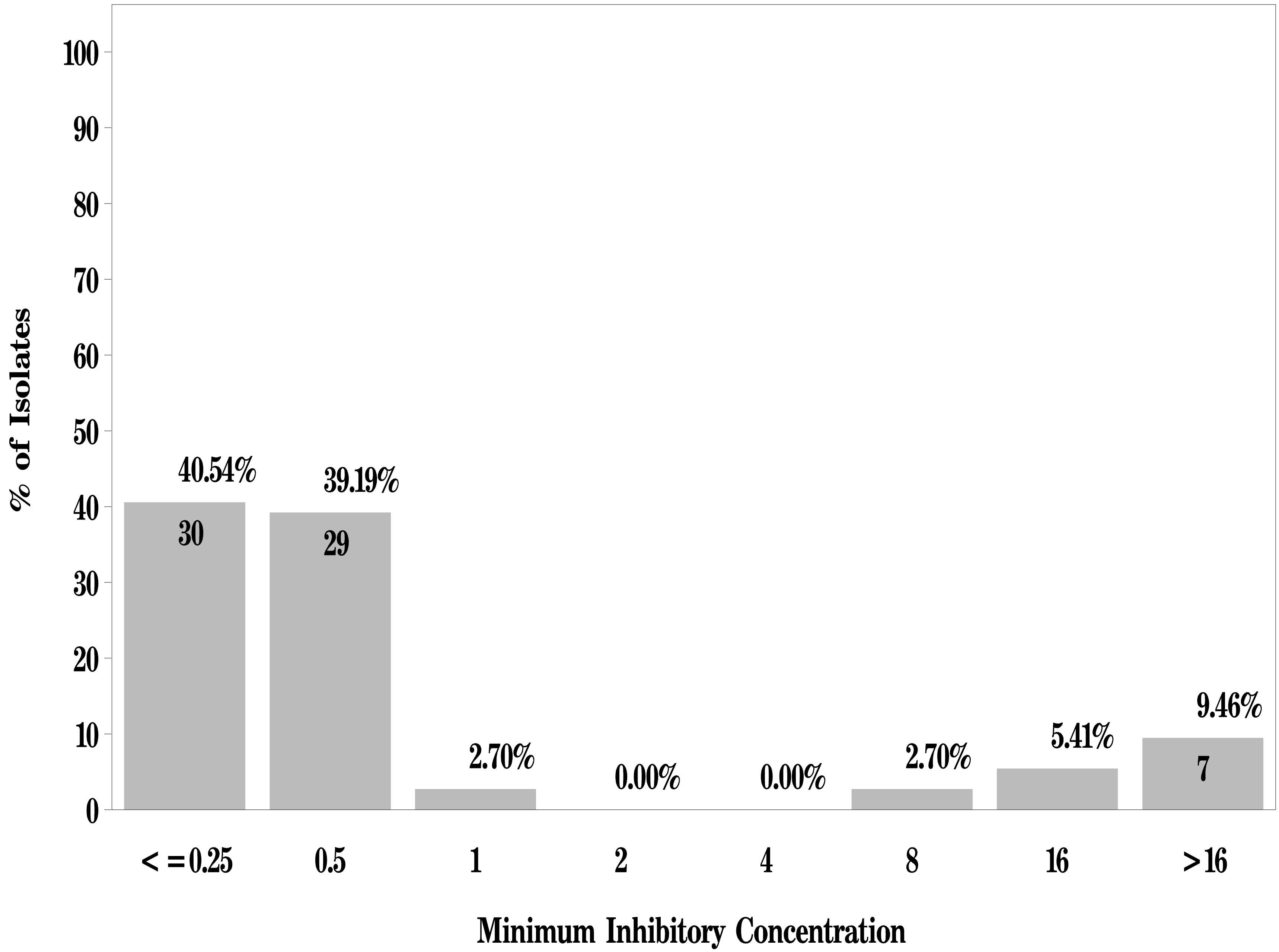


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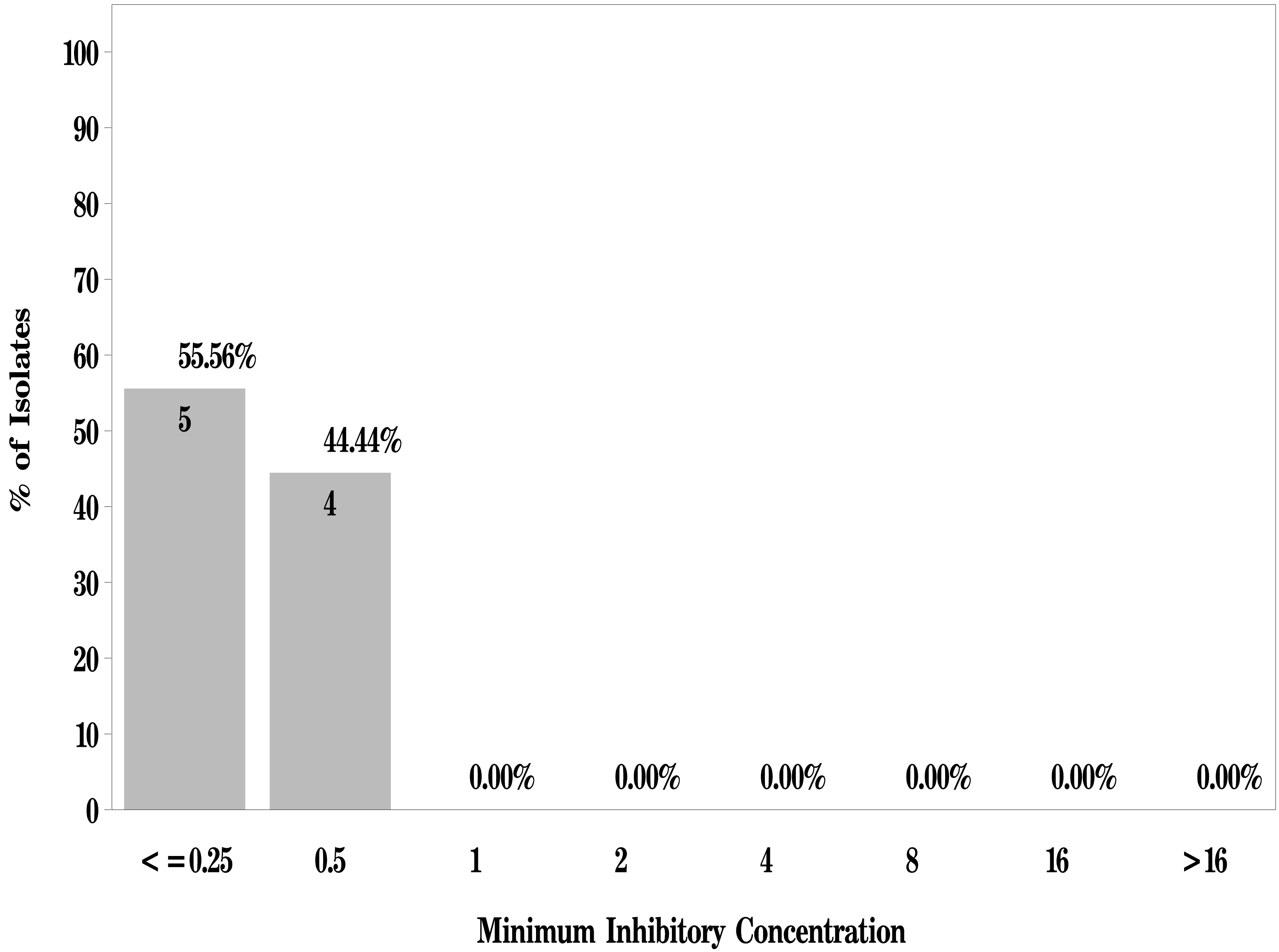
Figure 7: Minimum Inhibitory Concentration of Gentamicin for *Salmonella* in Ground Beef (N=9 Isolates)

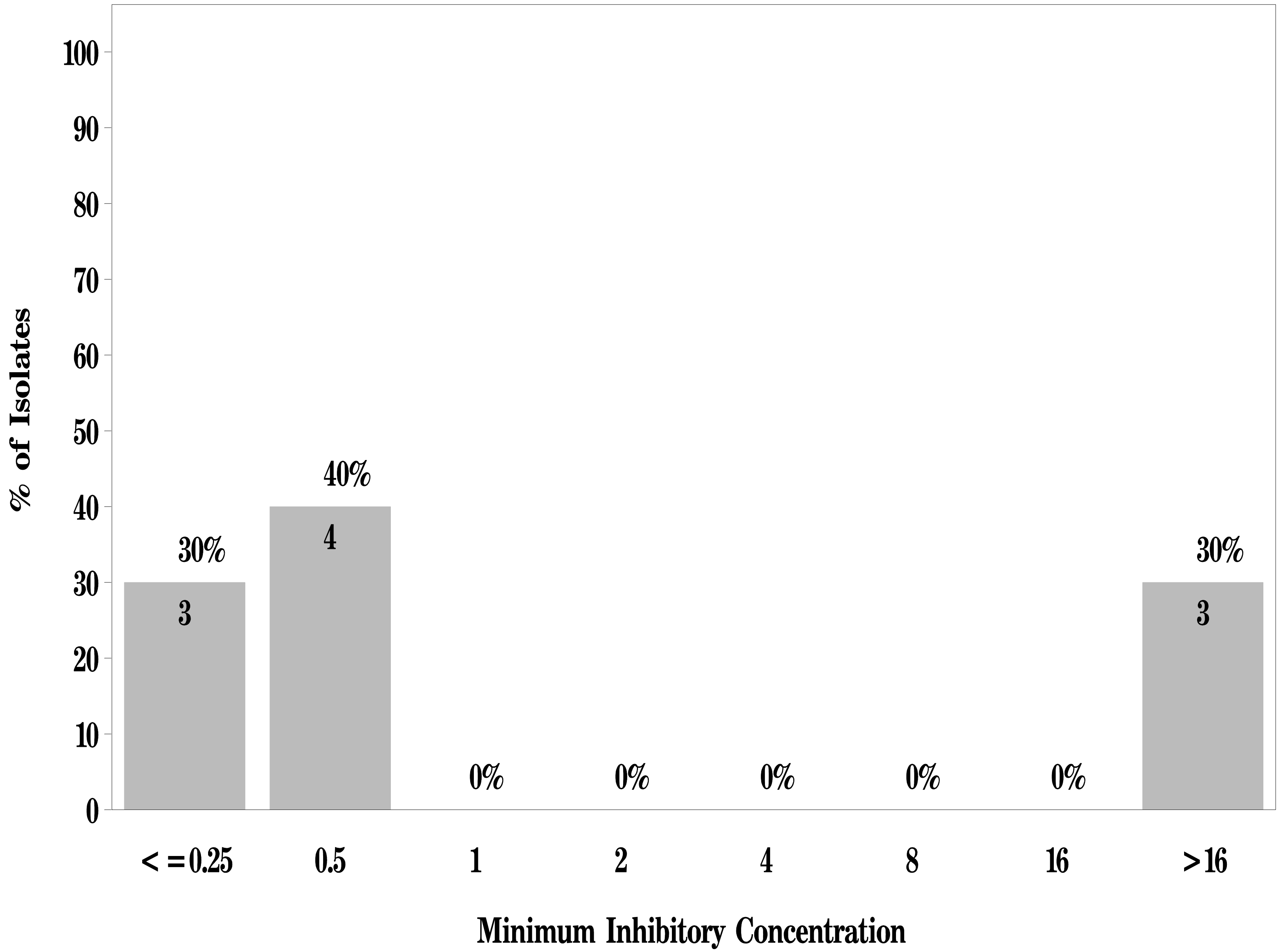
Breakpoints: Susceptible <=4 μg/mL Resistant >=16 μg/mL



NARMS

Figure 7: Minimum Inhibitory Concentration of Gentamicin for *Salmonella* in Pork Chop (N=10 Isolates)

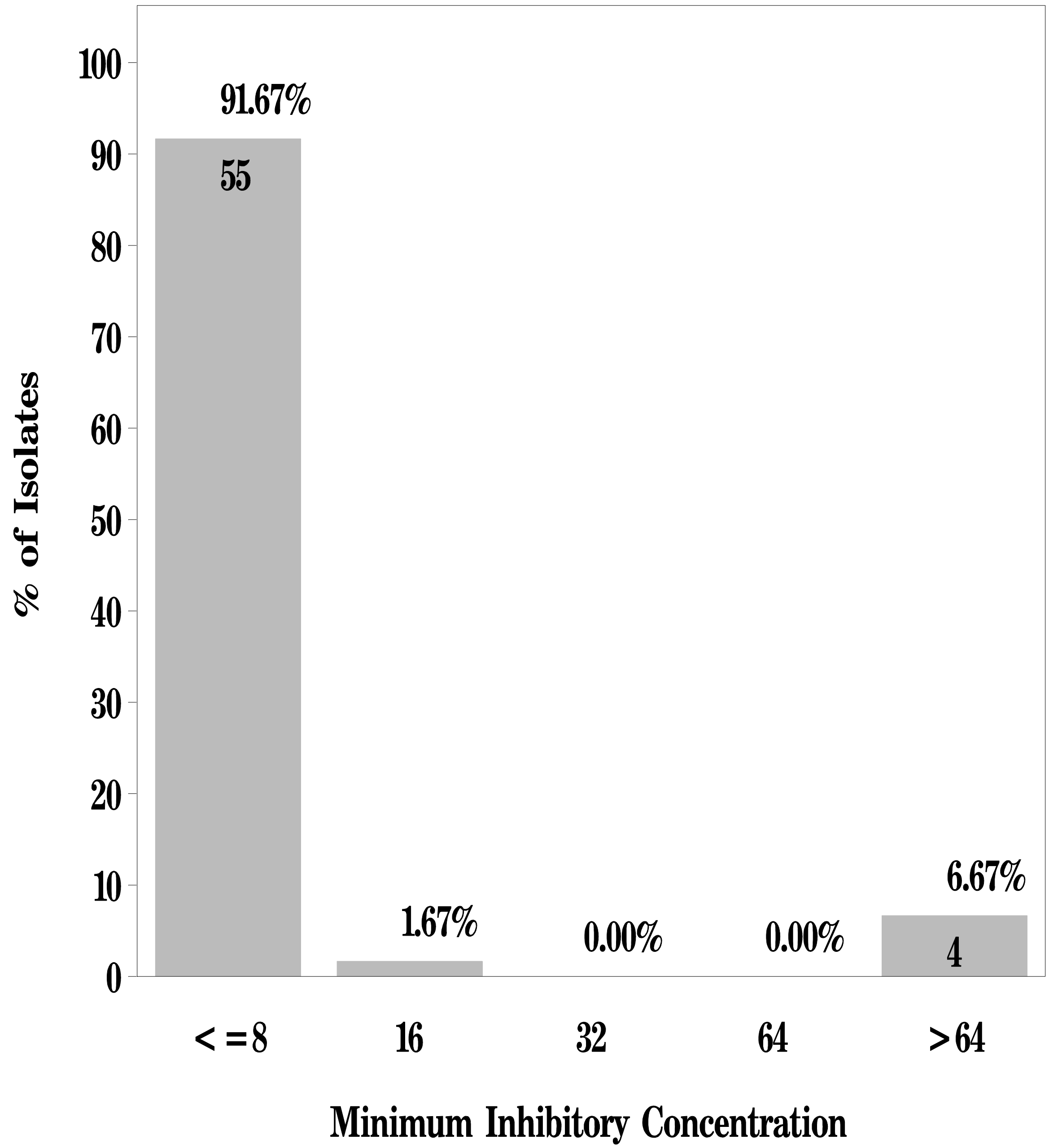
Breakpoints: Susceptible <=4 μg/mL Resistant >=16 μg/mL



NARMS

Figure 7: Minimum Inhibitory Concentration of Kanamycin for *Salmonella* in Chicken Breast (N=60 Isolates)

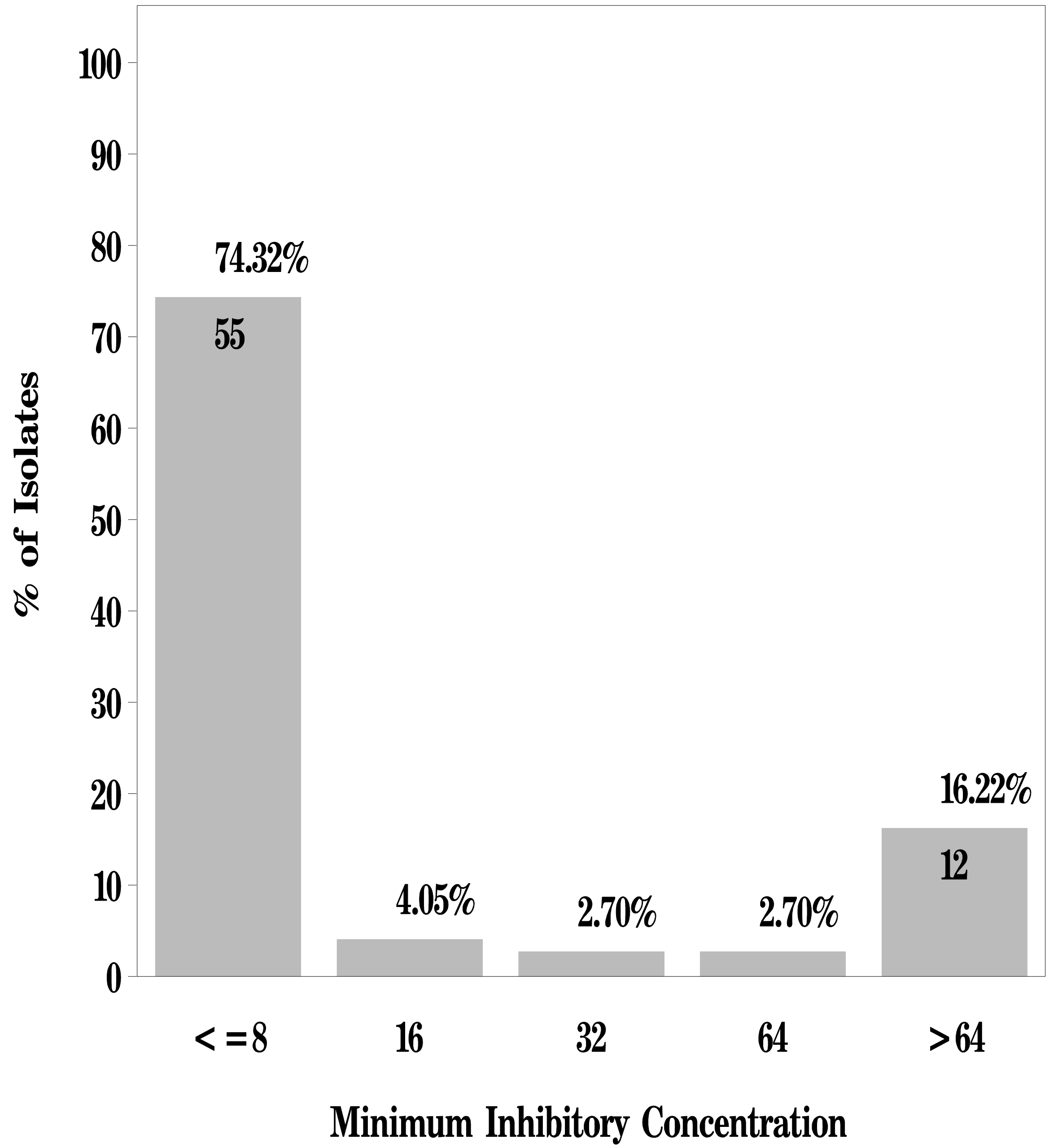
Breakpoints: Susceptible<=16 µg/mL Resistant>=64 µg/mL



NARMS

Figure 7: Minimum Inhibitory Concentration of Kanamycin for *Salmonella* in Ground Turkey (N=74 Isolates)

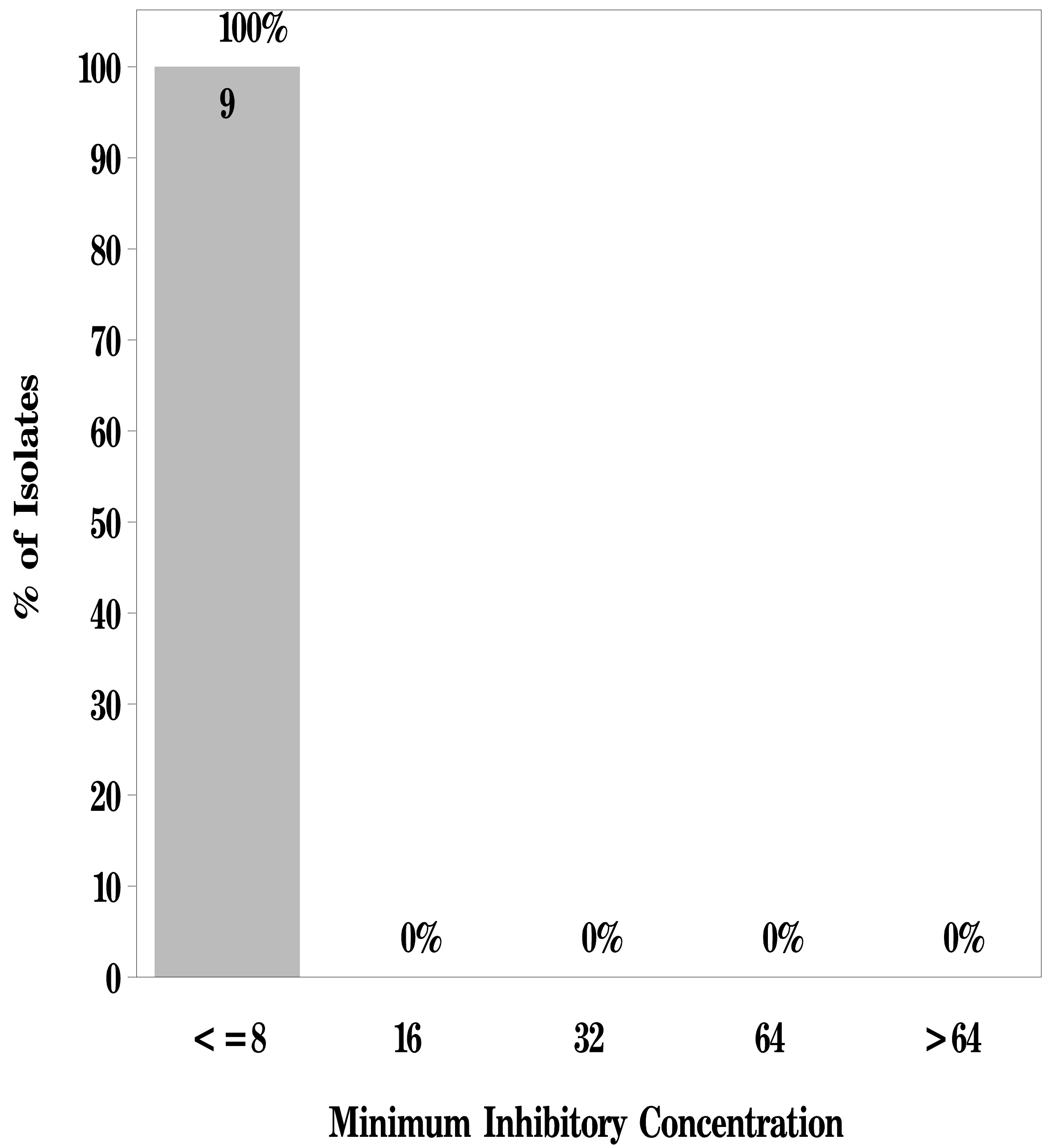
Breakpoints: Susceptible<=16 μg/mL Resistant>=64 μg/mL



NARMS

Figure 7: Minimum Inhibitory Concentration of Kanamycin for *Salmonella* in Ground Beef (N=9 Isolates)

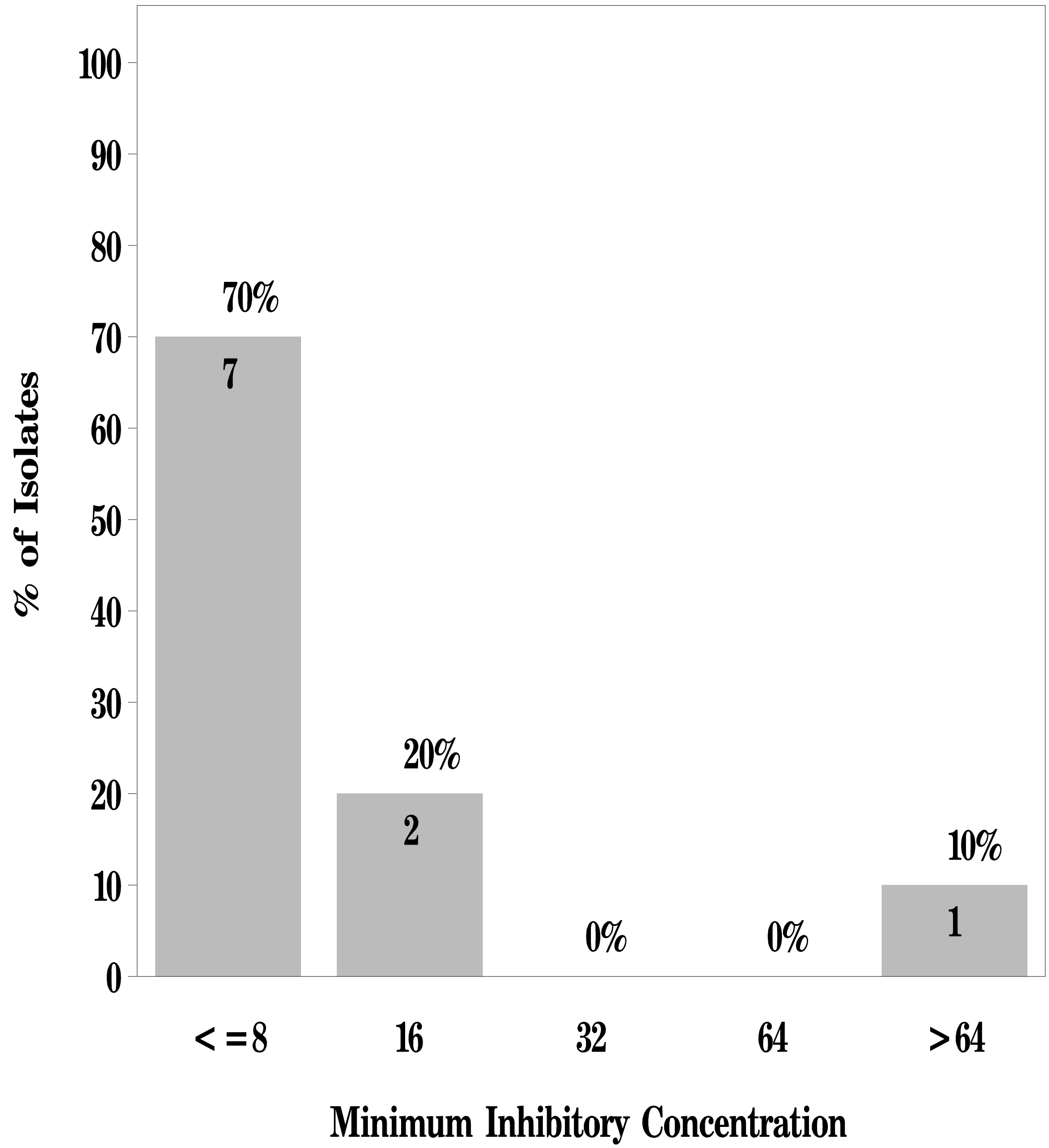
Breakpoints: Susceptible<=16 µg/mL Resistant>=64 µg/mL



NARMS

Figure 7: Minimum Inhibitory Concentration of Kanamycin for *Salmonella* in Pork Chop (N=10 Isolates)

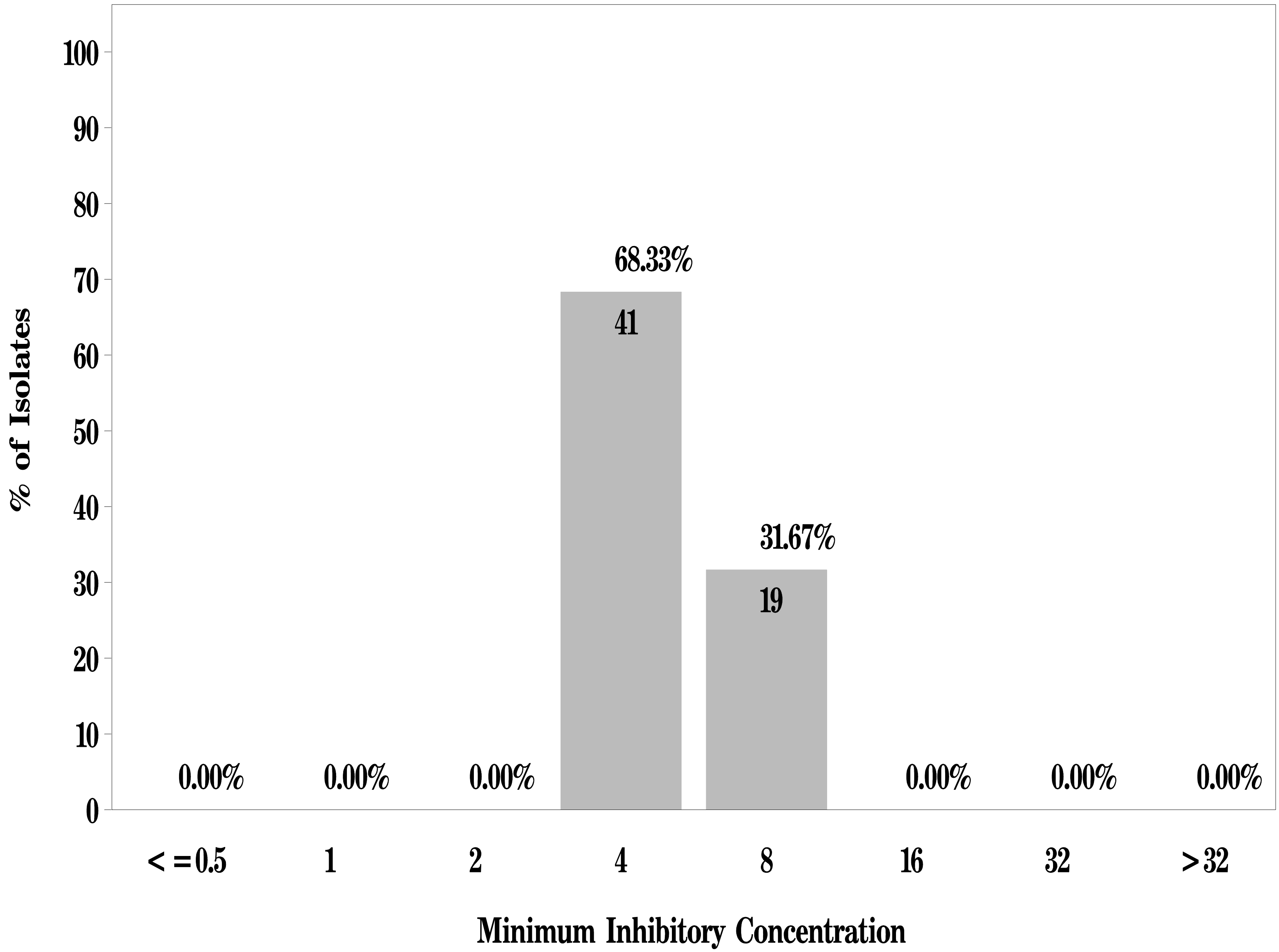
Breakpoints: Susceptible<=16 µg/mL Resistant>=64 µg/mL



NARMS

Figure 7: Minimum Inhibitory Concentration of Nalidixic acid for *Salmonella* in Chicken Breast (N=60 Isolates)

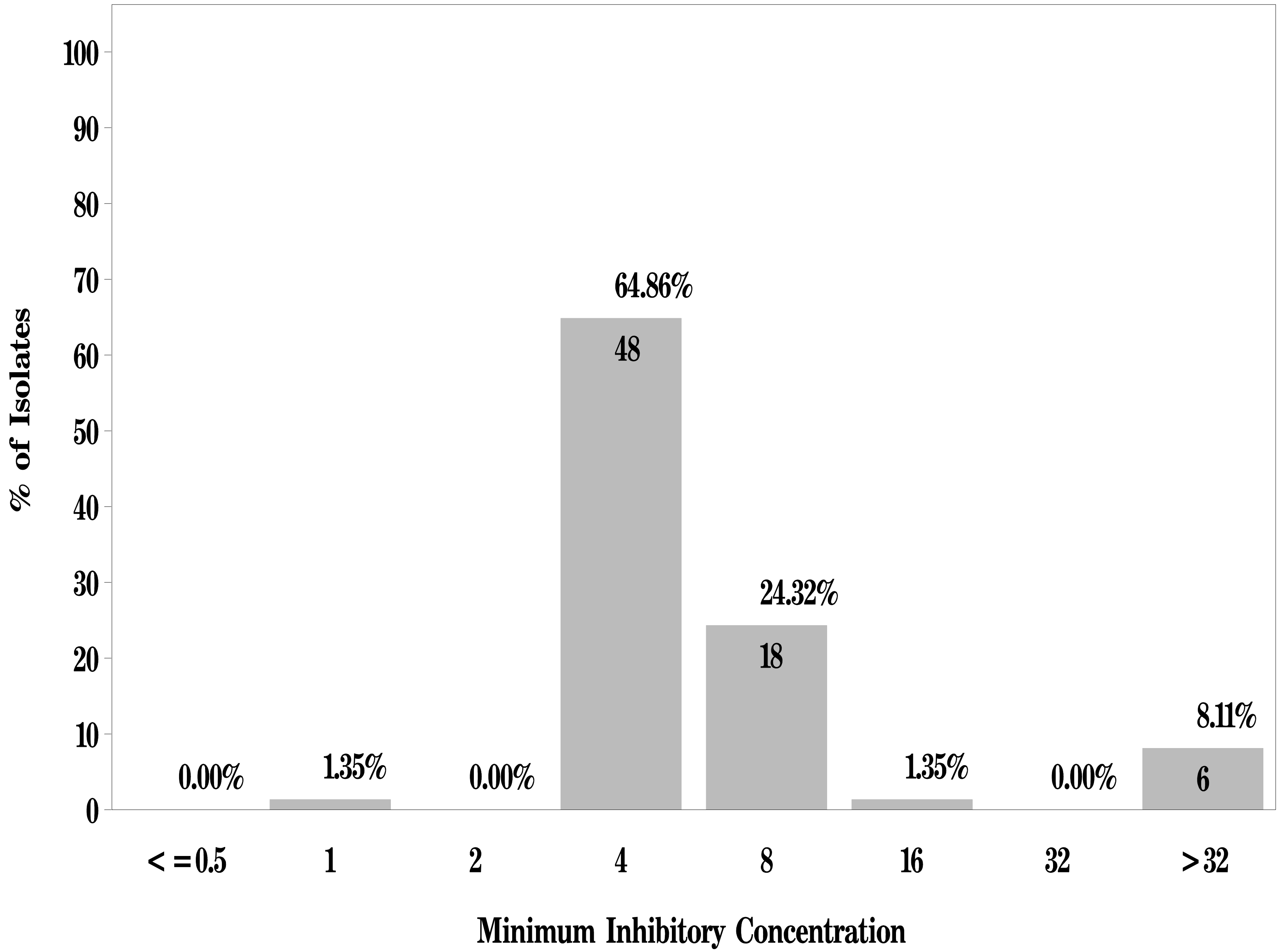
Breakpoints: Susceptible<=16 µg/mL Resistant>=32 µg/mL



NARMS

Figure 7: Minimum Inhibitory Concentration of Nalidixic acid for *Salmonella* in Ground Turkey (N=74 Isolates)

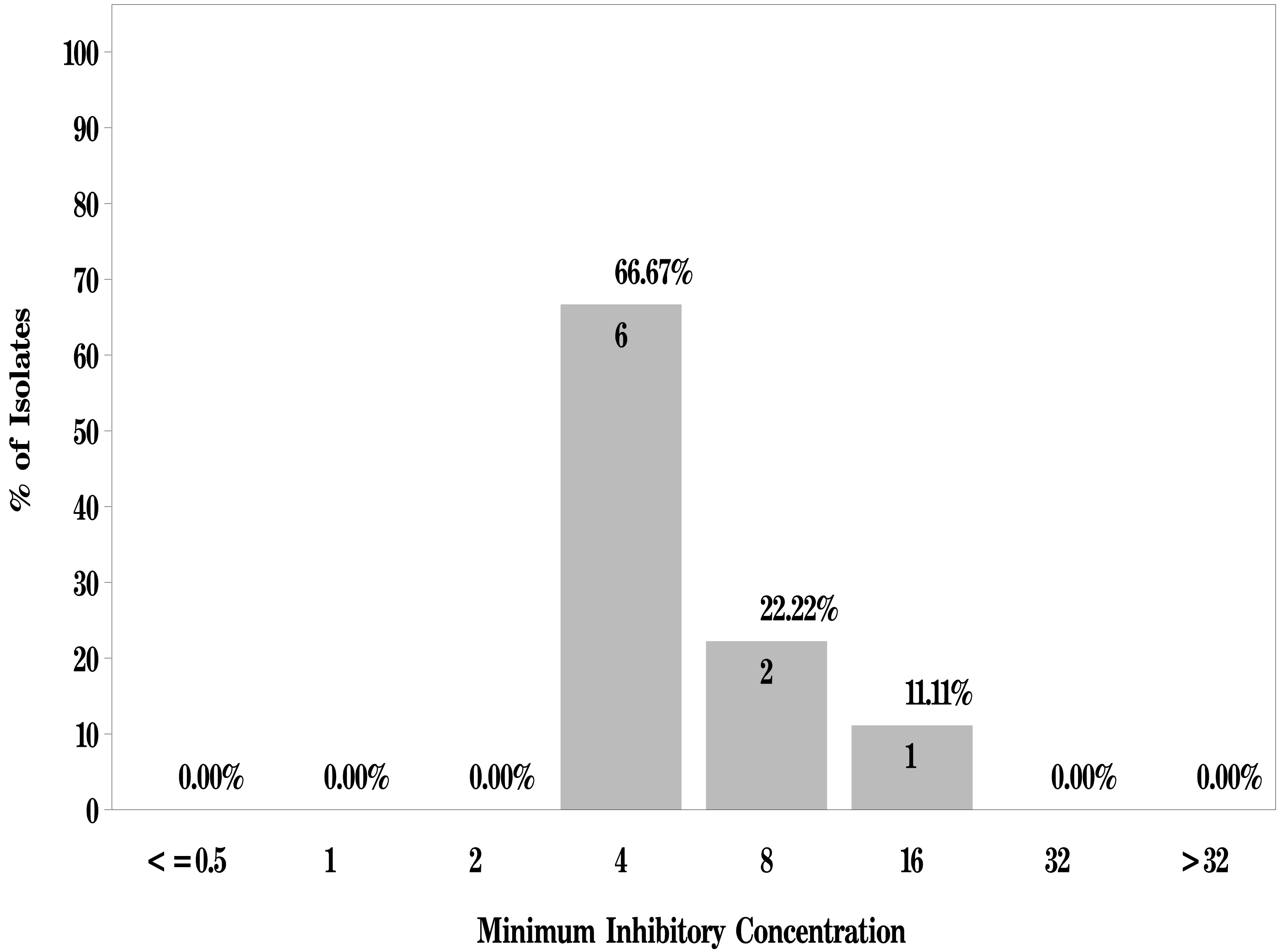
Breakpoints: Susceptible <=16 µg/mL Resistant >=32 µg/mL



NARMS

Figure 7: Minimum Inhibitory Concentration of Nalidixic acid for *Salmonella* in Ground Beef (N=9 Isolates)

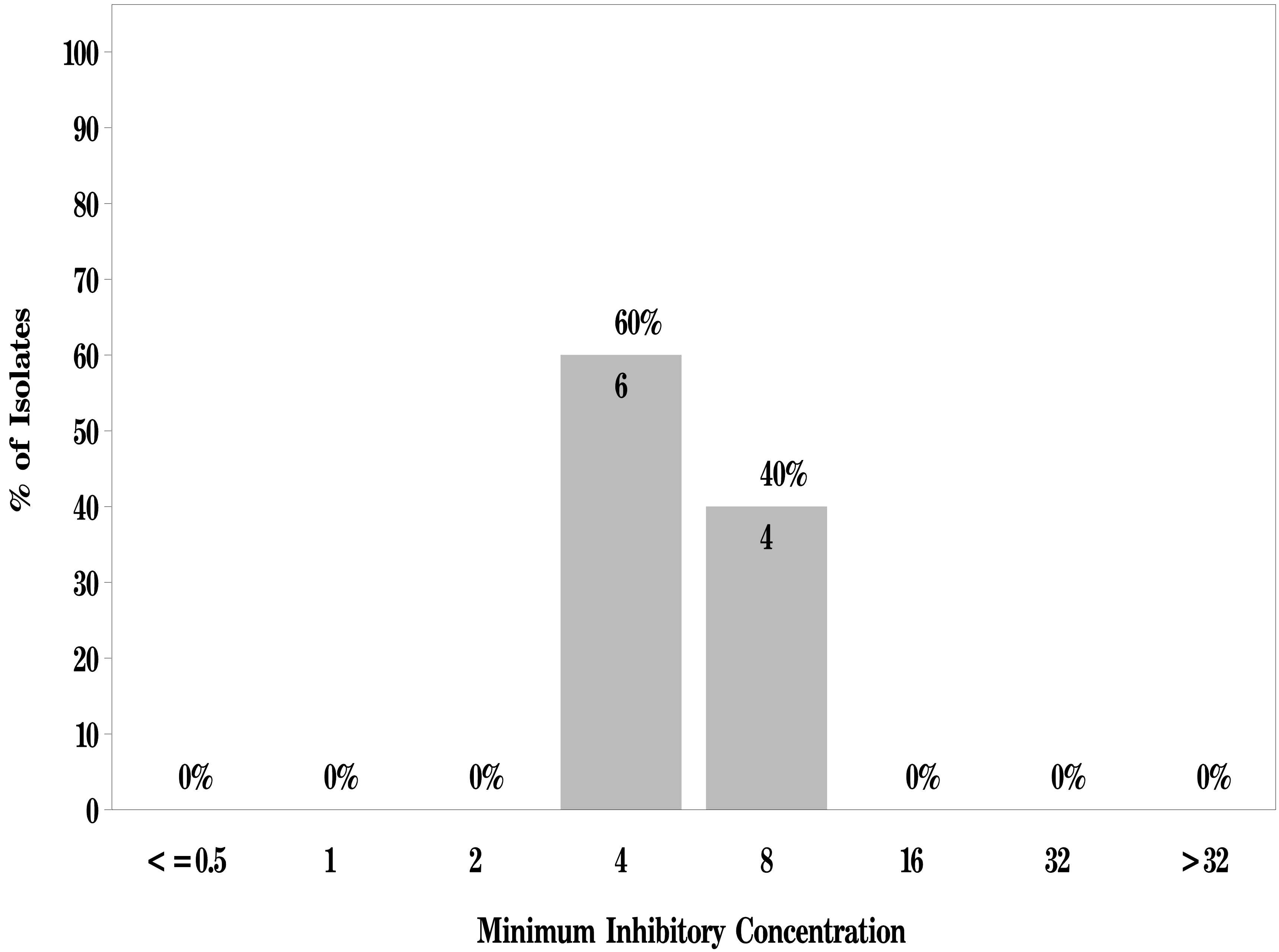
Breakpoints: Susceptible<=16 µg/mL Resistant>=32 µg/mL



NARMS

Figure 7: Minimum Inhibitory Concentration of Nalidixic acid for *Salmonella* in Pork Chop (N=10 Isolates)

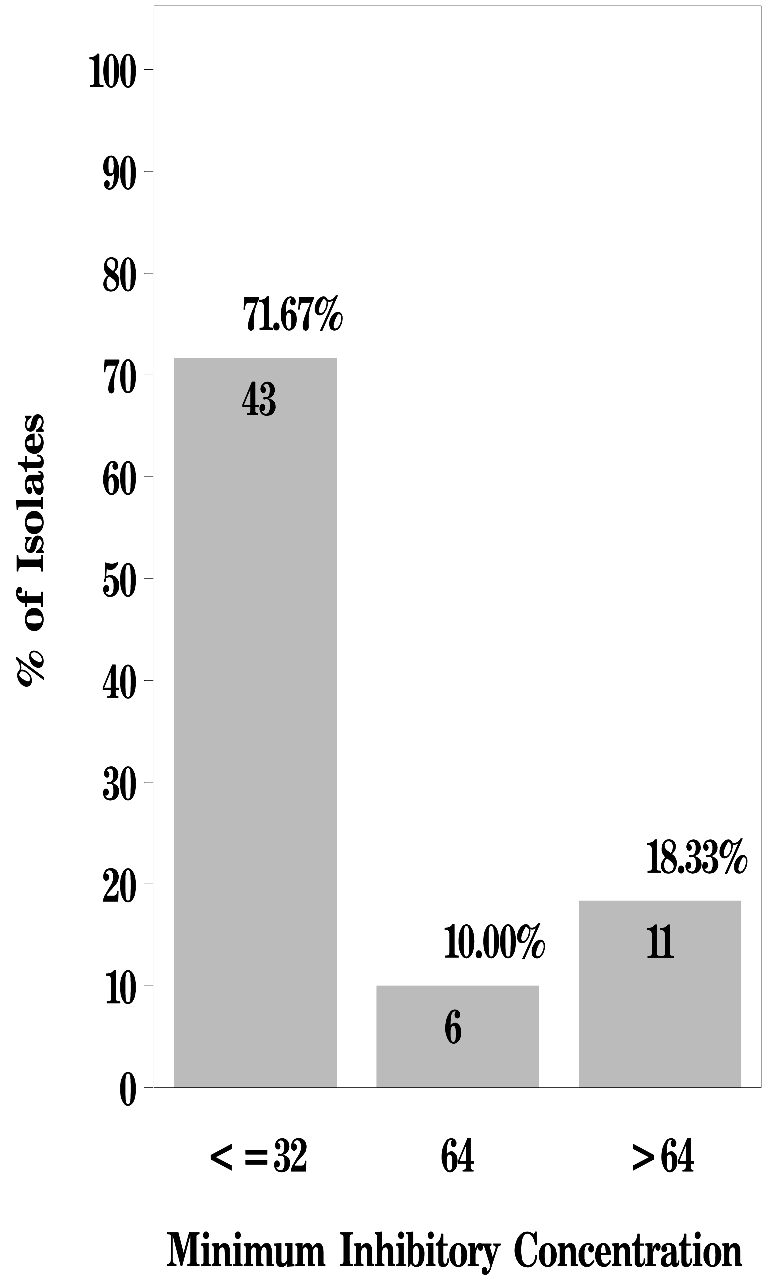
Breakpoints: Susceptible <=16 μg/mL Resistant >=32 μg/mL



NARMS

Figure 7: Minimum Inhibitory Concentration of Streptomycin for *Salmonella* in Chicken Breast (N=60 Isolates)

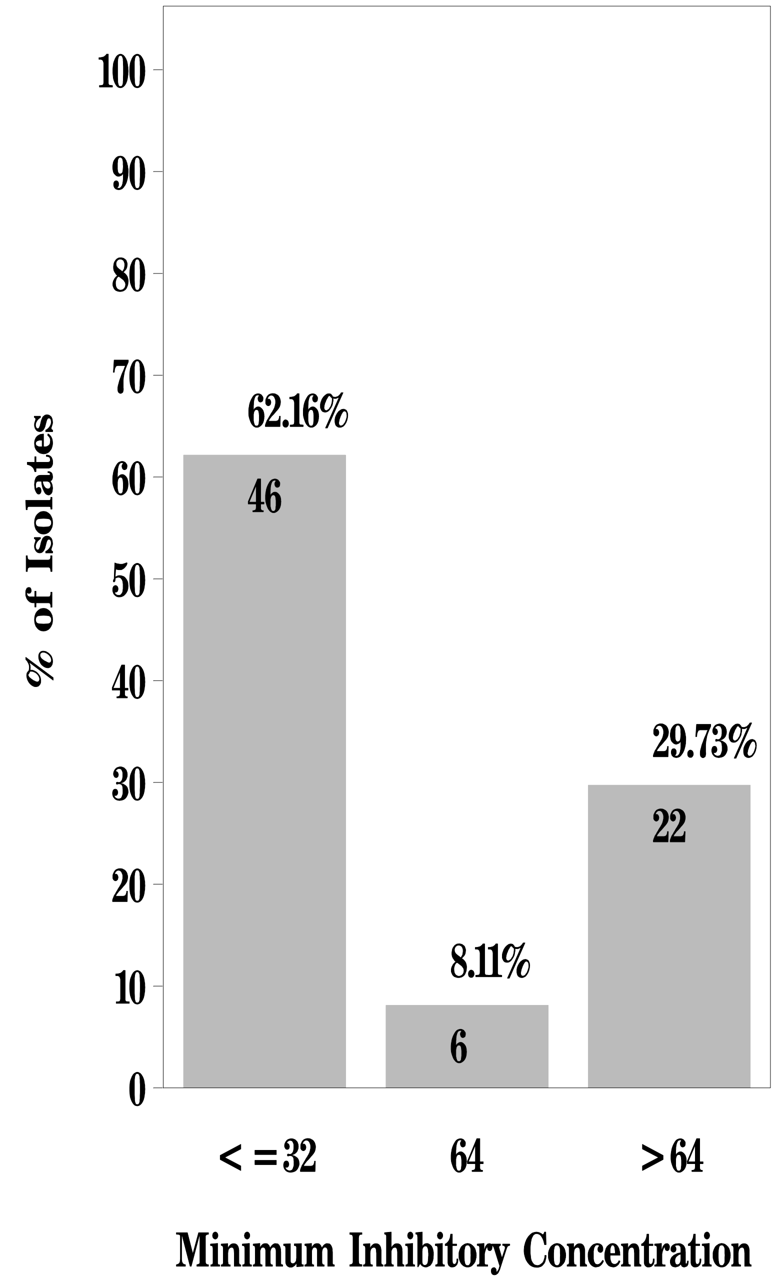
Breakpoints: Susceptible<=32 μg/mL Resistant>=64 μg/mL



NARMS

Figure 7: Minimum Inhibitory Concentration of Streptomycin for *Salmonella* in Ground Turkey (N=74 Isolates)

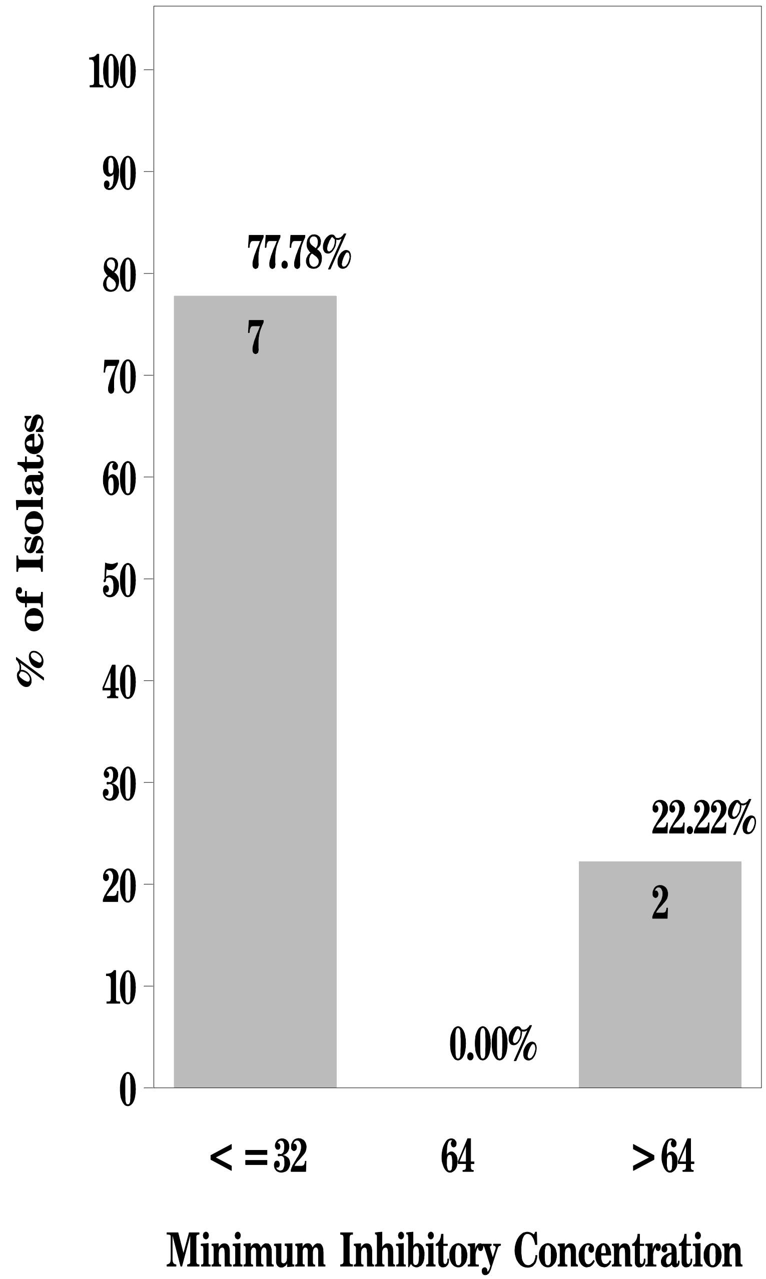
Breakpoints: Susceptible<=32 μg/mL Resistant>=64 μg/mL



NARMS

Figure 7: Minimum Inhibitory Concentration of Streptomycin for *Salmonella* in Ground Beef (N=9 Isolates)

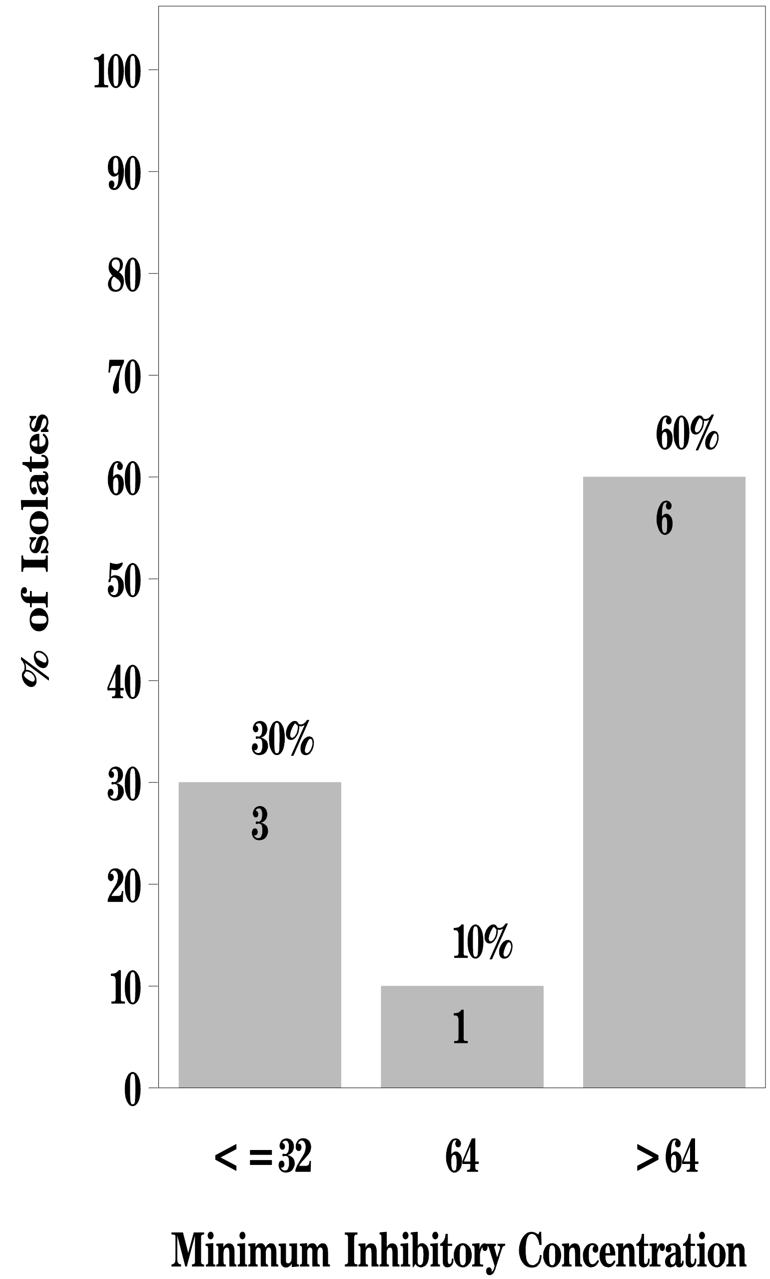
Breakpoints: Susceptible<=32 µg/mL Resistant>=64 µg/mL



NARMS

Figure 7: Minimum Inhibitory Concentration of Streptomycin for *Salmonella* in Pork Chop (N=10 Isolates)

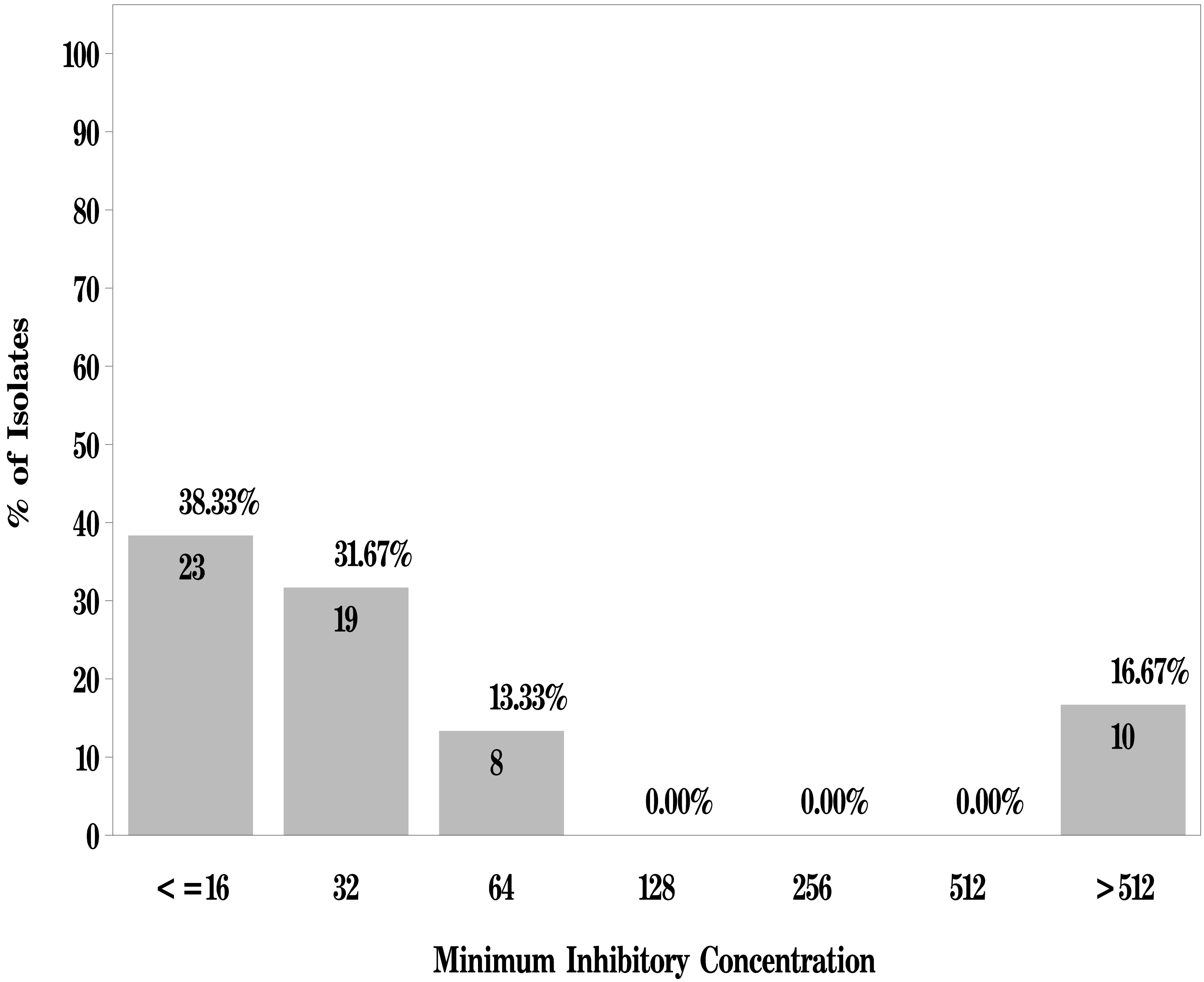
Breakpoints: Susceptible<=32 μg/mL Resistant>=64 μg/mL



NARMS

Figure 7: Minimum Inhibitory Concentration of Sulfamethoxazole for *Salmonella* in Chicken Breast (N=60 Isolates)

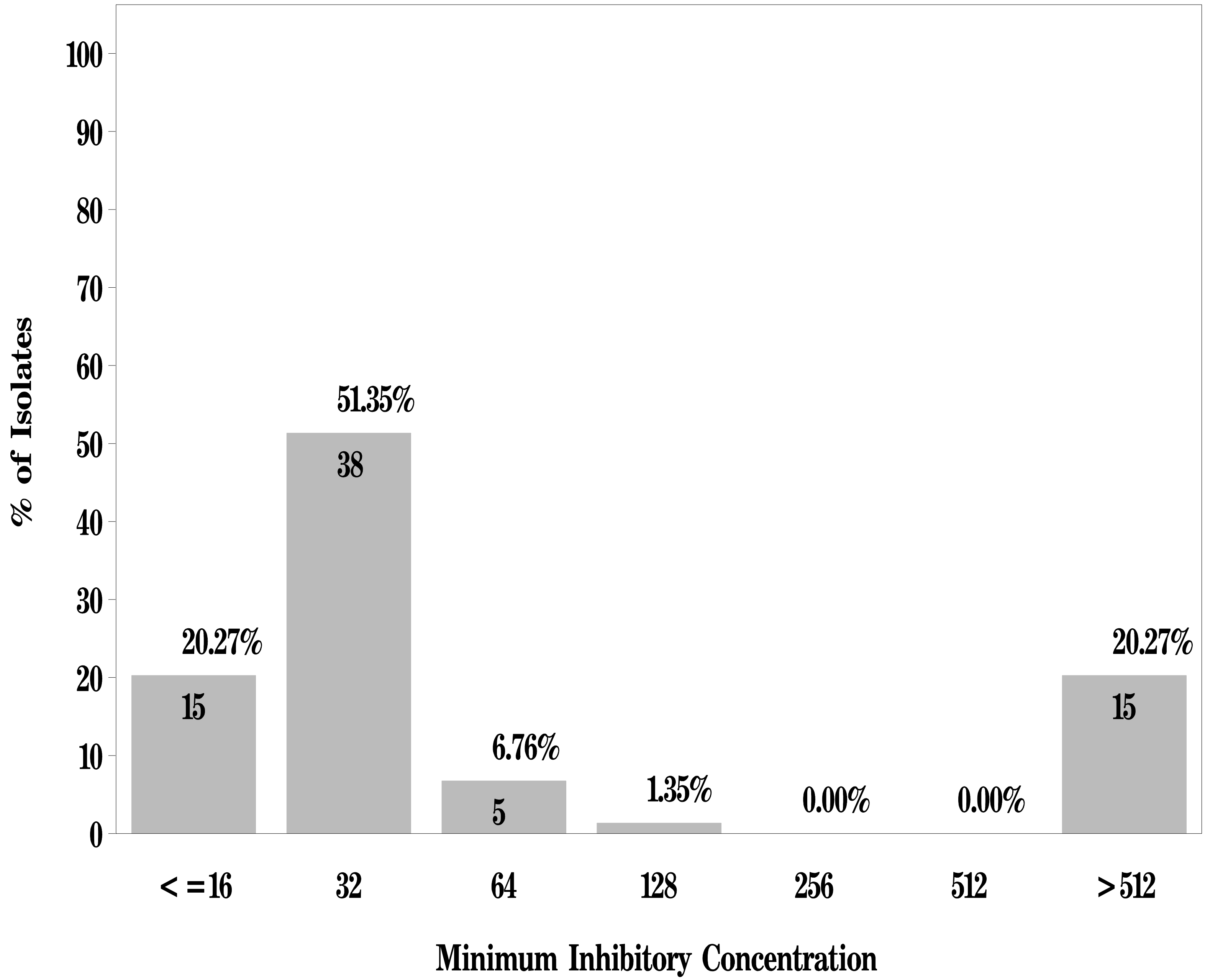
Breakpoints: Susceptible <=256 µg/mL Resistant >=512 µg/mL



NARMS

Figure 7: Minimum Inhibitory Concentration of Sulfamethoxazole for *Salmonella* in Ground Turkey (N=74 Isolates)

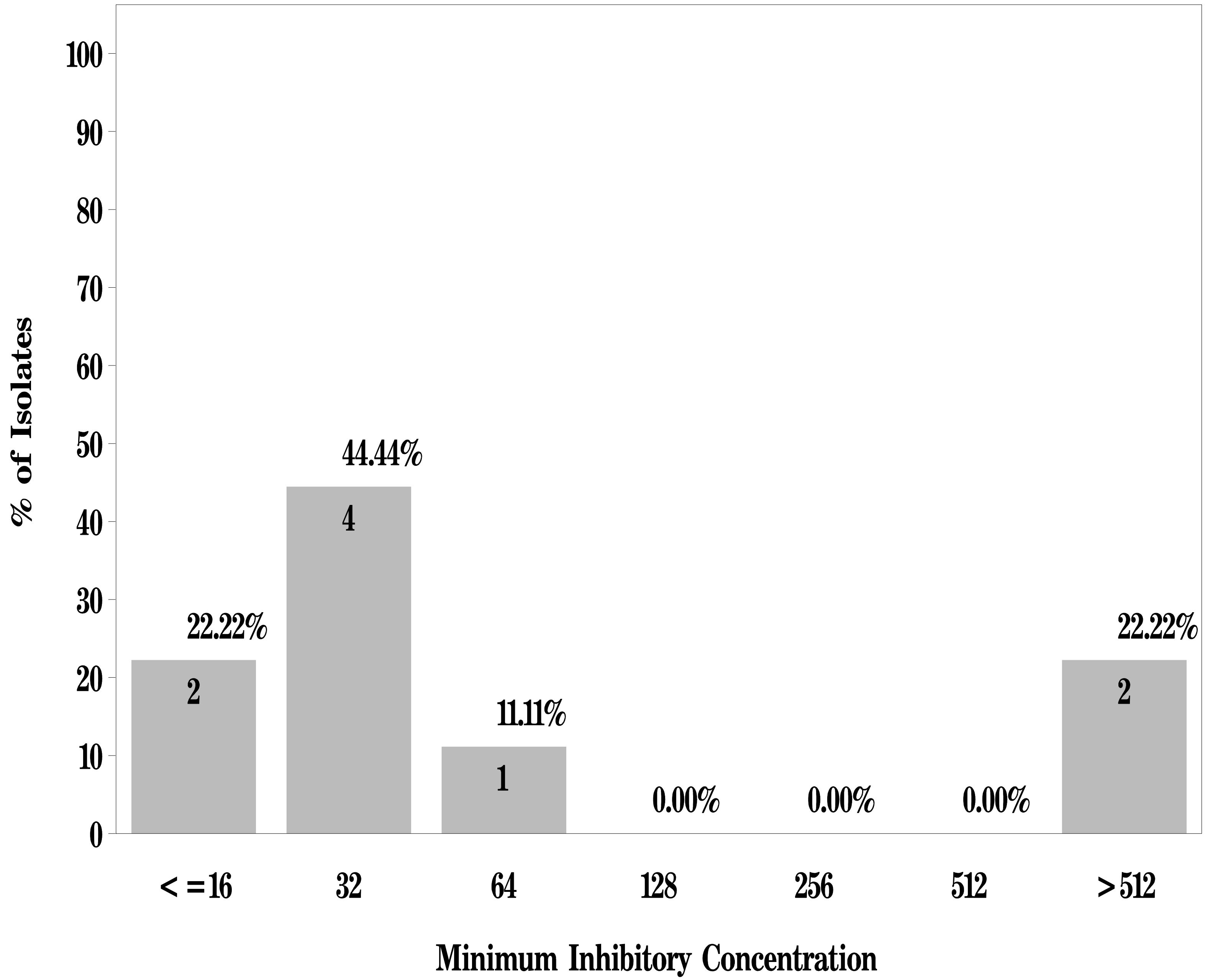
Breakpoints: Susceptible<=256 μg/mL Resistant>=512 μg/mL



NARMS

Figure 7: Minimum Inhibitory Concentration of Sulfamethoxazole for *Salmonella* in Ground Beef (N=9 Isolates)

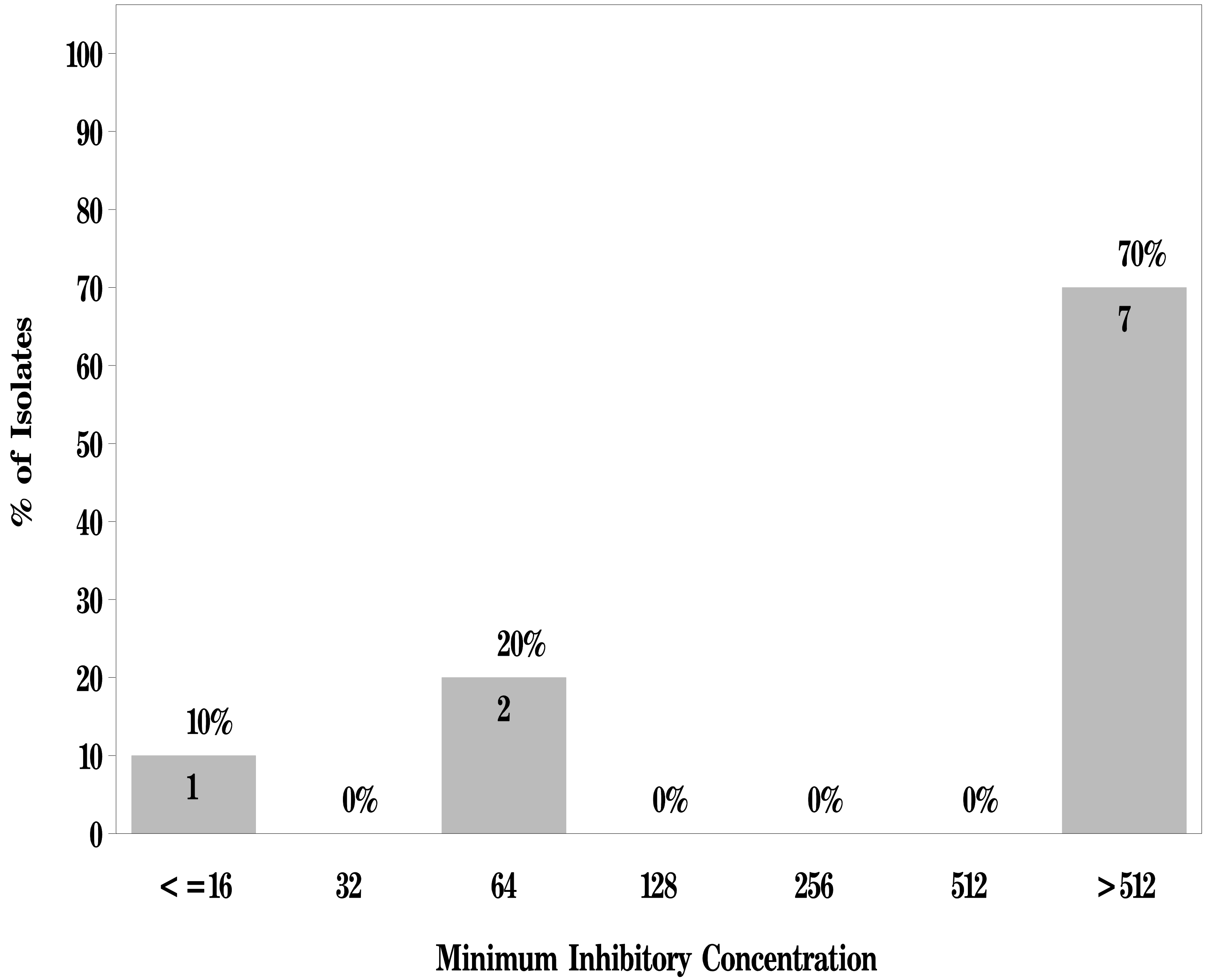
Breakpoints: Susceptible<=256 μg/mL Resistant>=512 μg/mL



NARMS

Figure 7: Minimum Inhibitory Concentration of Sulfamethoxazole for *Salmonella* in Pork Chop (N=10 Isolates)

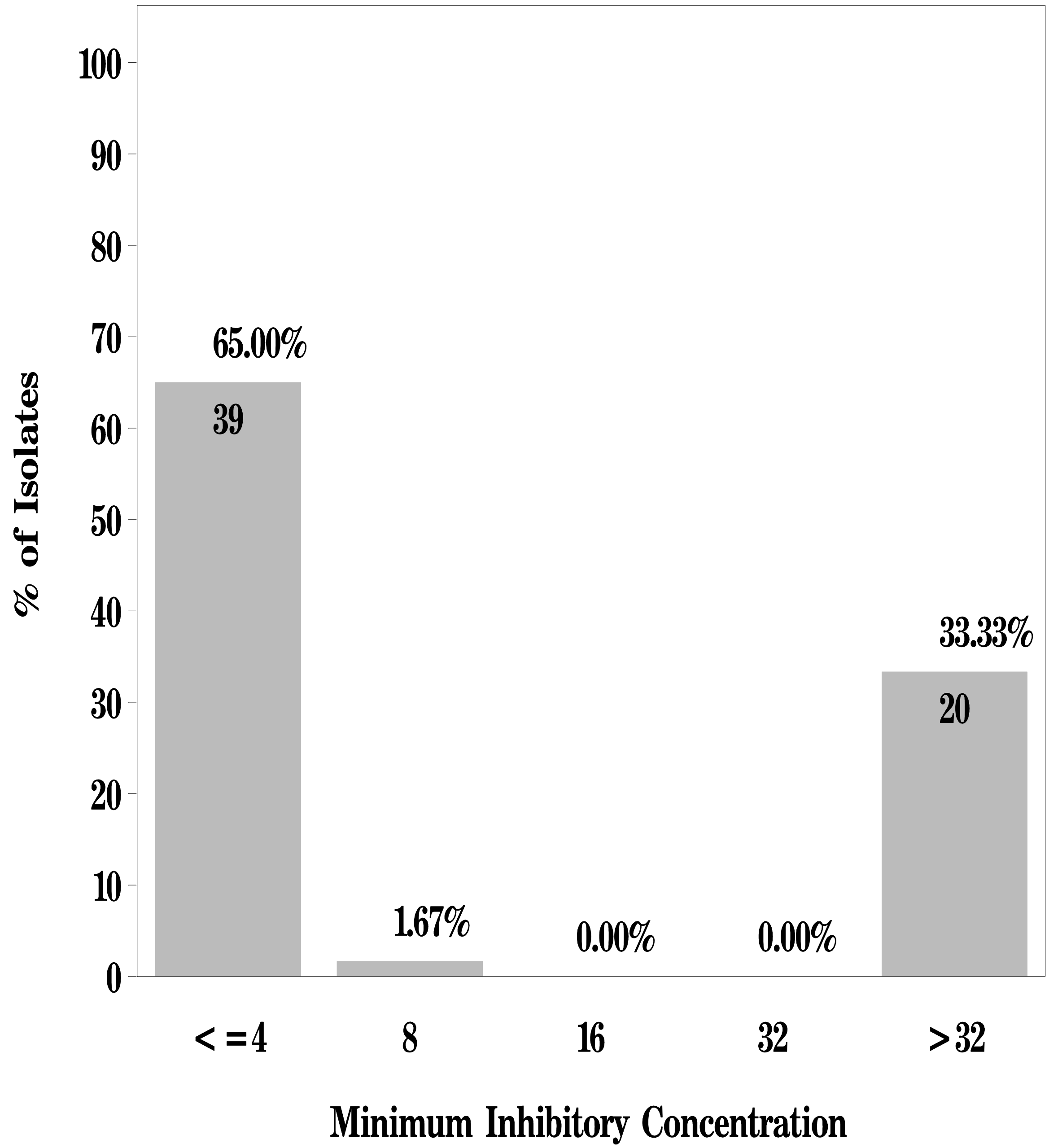
Breakpoints: Susceptible <=256 μg/mL Resistant >=512 μg/mL



NARMS

Figure 7: Minimum Inhibitory Concentration of Tetracycline for *Salmonella* in Chicken Breast (N=60 Isolates)

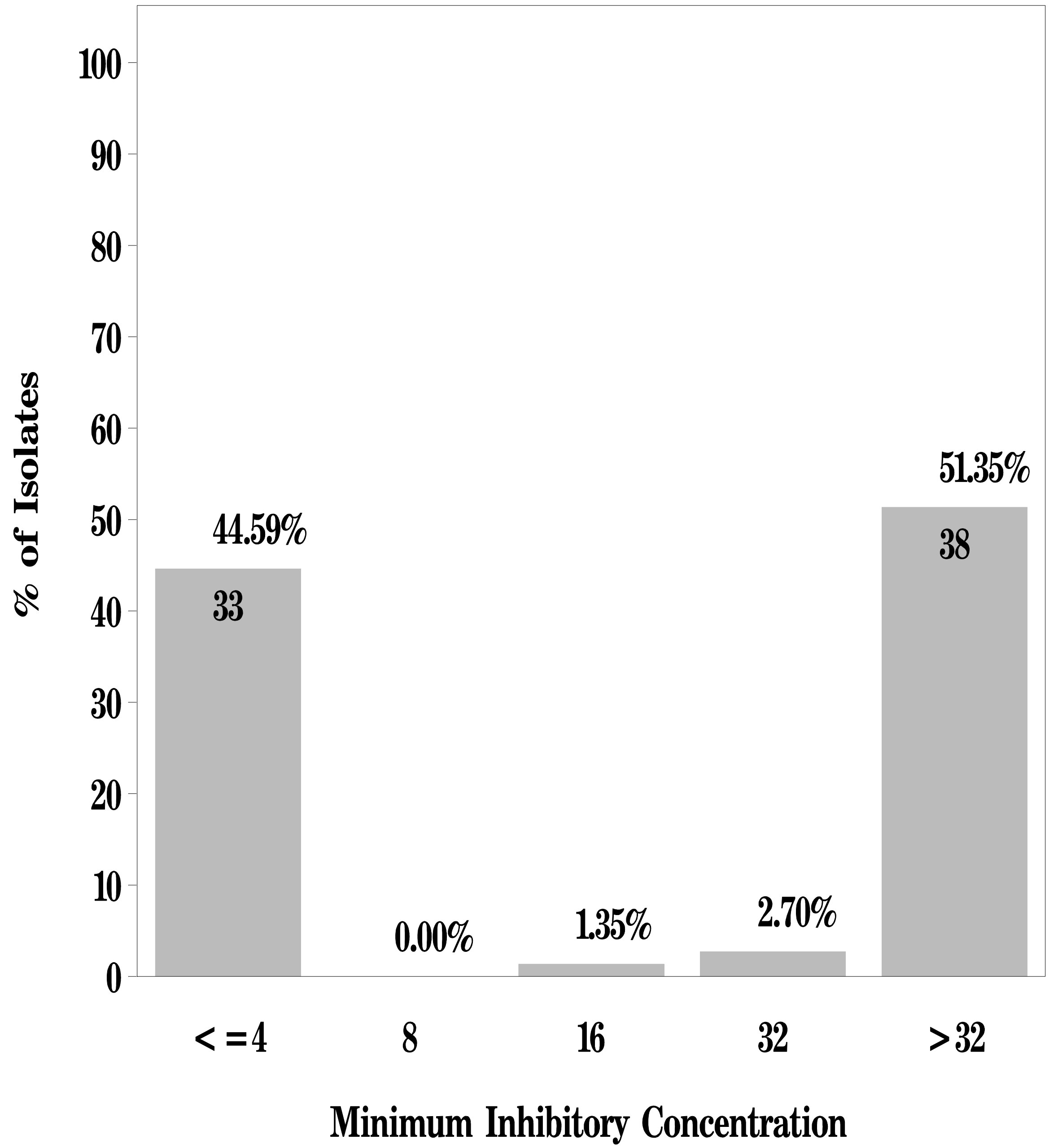
Breakpoints: Susceptible <=4 µg/mL Resistant >=16 µg/mL



NARMS

Figure 7: Minimum Inhibitory Concentration of Tetracycline for *Salmonella* in Ground Turkey (N=74 Isolates)

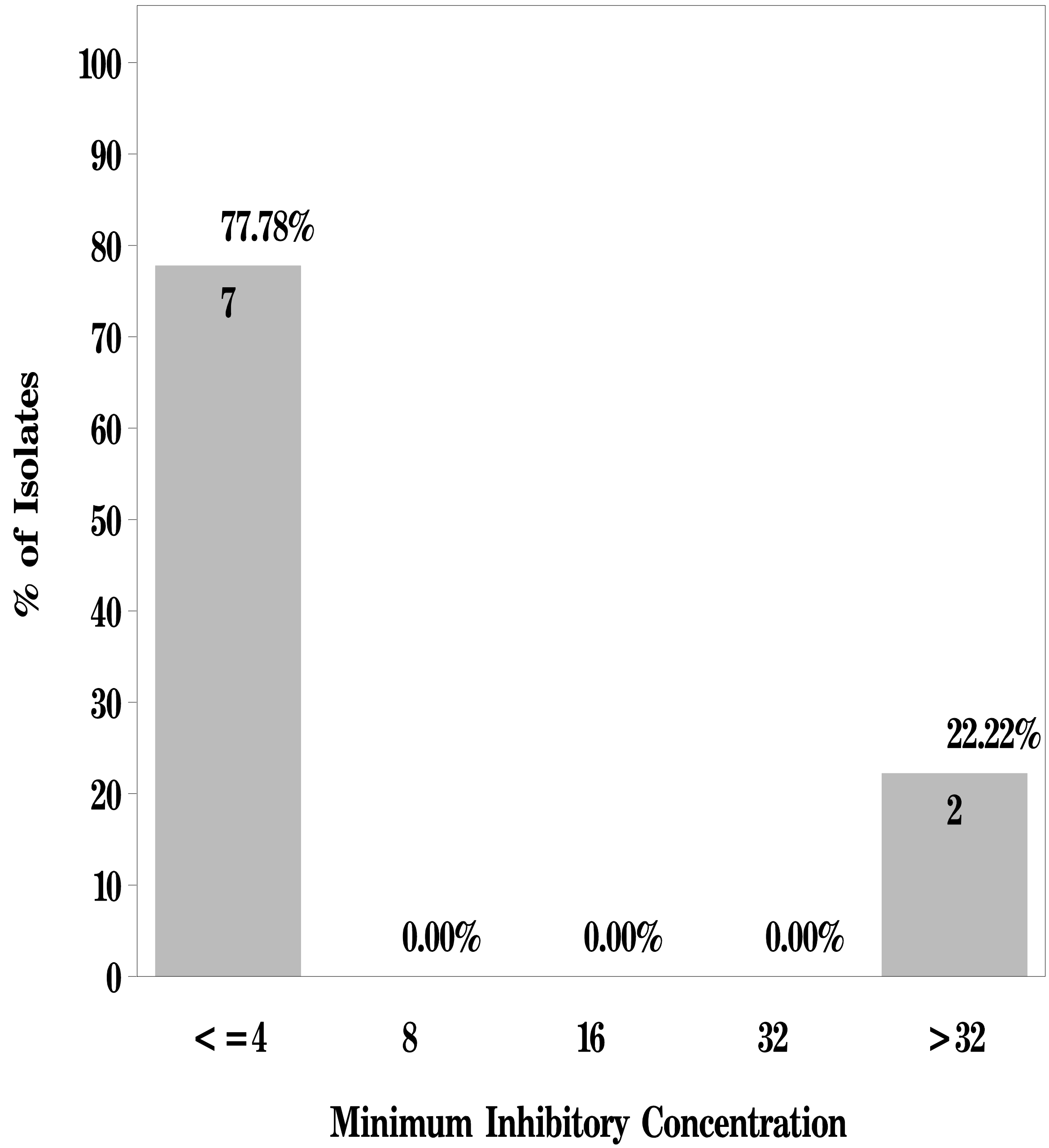
Breakpoints: Susceptible <=4 µg/mL Resistant >=16 µg/mL



NARMS

Figure 7: Minimum Inhibitory Concentration of Tetracycline for *Salmonella* in Ground Beef (N=9 Isolates)

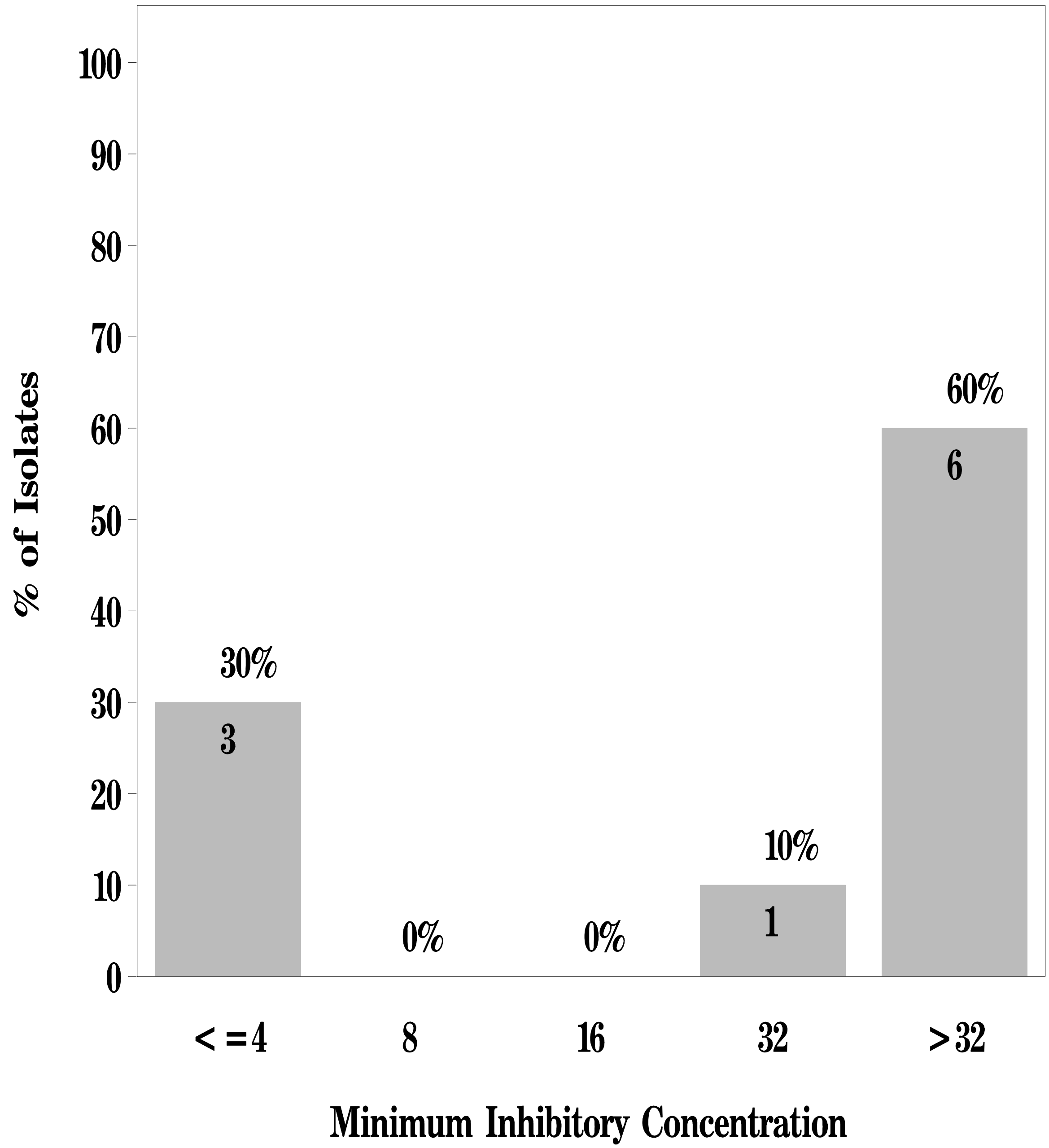
Breakpoints: Susceptible <=4 µg/mL Resistant >=16 µg/mL



NARMS

Figure 7: Minimum Inhibitory Concentration of Tetracycline for *Salmonella* in Pork Chop (N=10 Isolates)

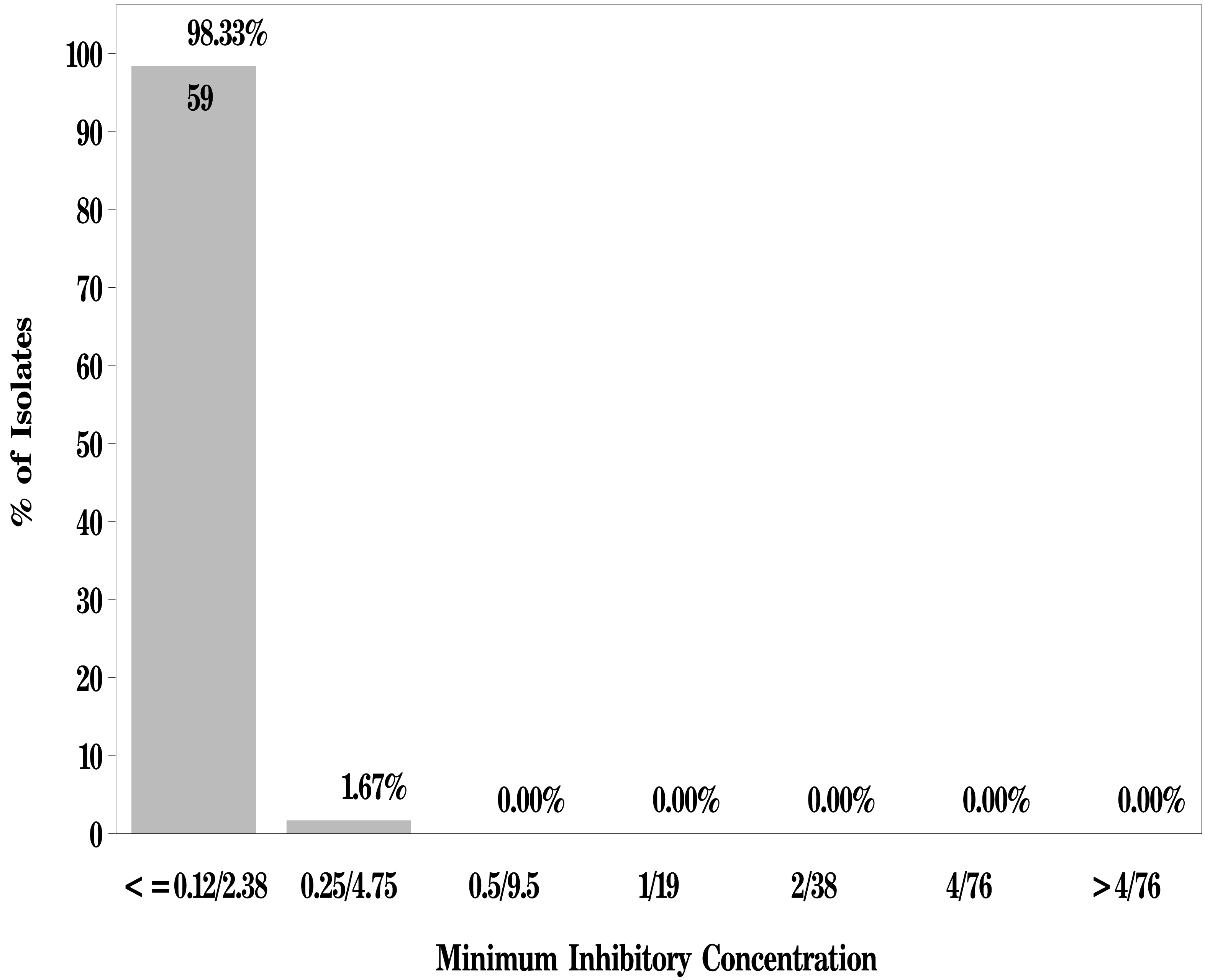
Breakpoints: Susceptible <=4 μg/mL Resistant >=16 μg/mL



NARMS

Figure 7: Minimum Inhibitory Concentration of Trimethoprim/sulfamethoxazole for *Salmonella* in Chicken Breast (N=60 Isolates)

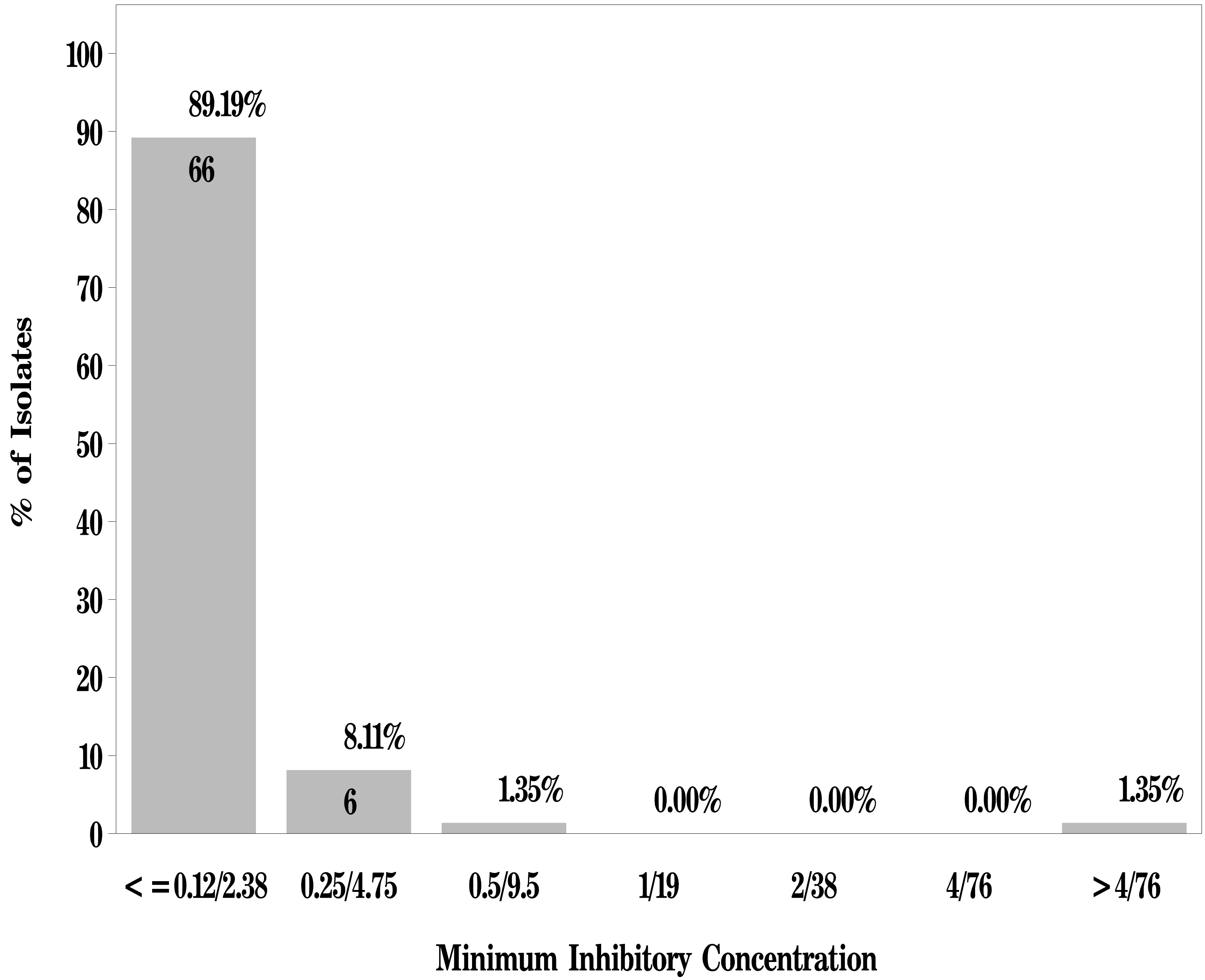
Breakpoints: Susceptible <=2/38 µg/mL Resistant >=4/76 µg/mL



NARMS

Figure 7: Minimum Inhibitory Concentration of Trimethoprim/sulfamethoxazole for *Salmonella* in Ground Turkey (N=74 Isolates)

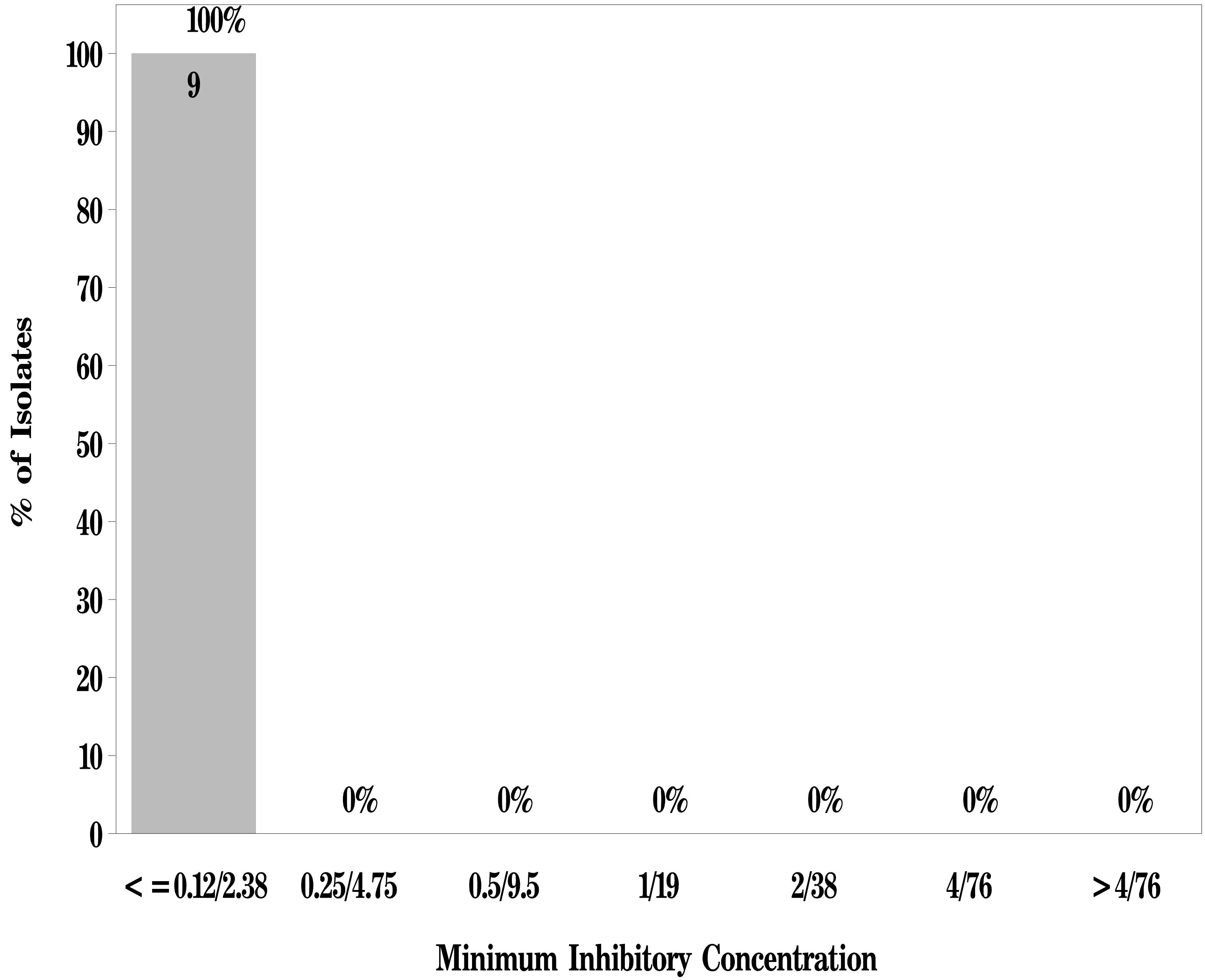
Breakpoints: Susceptible<=2/38 μg/mL Resistant>=4/76 μg/mL



NARMS

Figure 7: Minimum Inhibitory Concentration of Trimethoprim/sulfamethoxazole for *Salmonella* in Ground Beef (N=9 Isolates)

Breakpoints: Susceptible<=2/38 µg/mL Resistant>=4/76 µg/mL



NARMS

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

Breakpoints: Susceptible <=2/38 µg/mL Resistant >=4/76 µg/mL

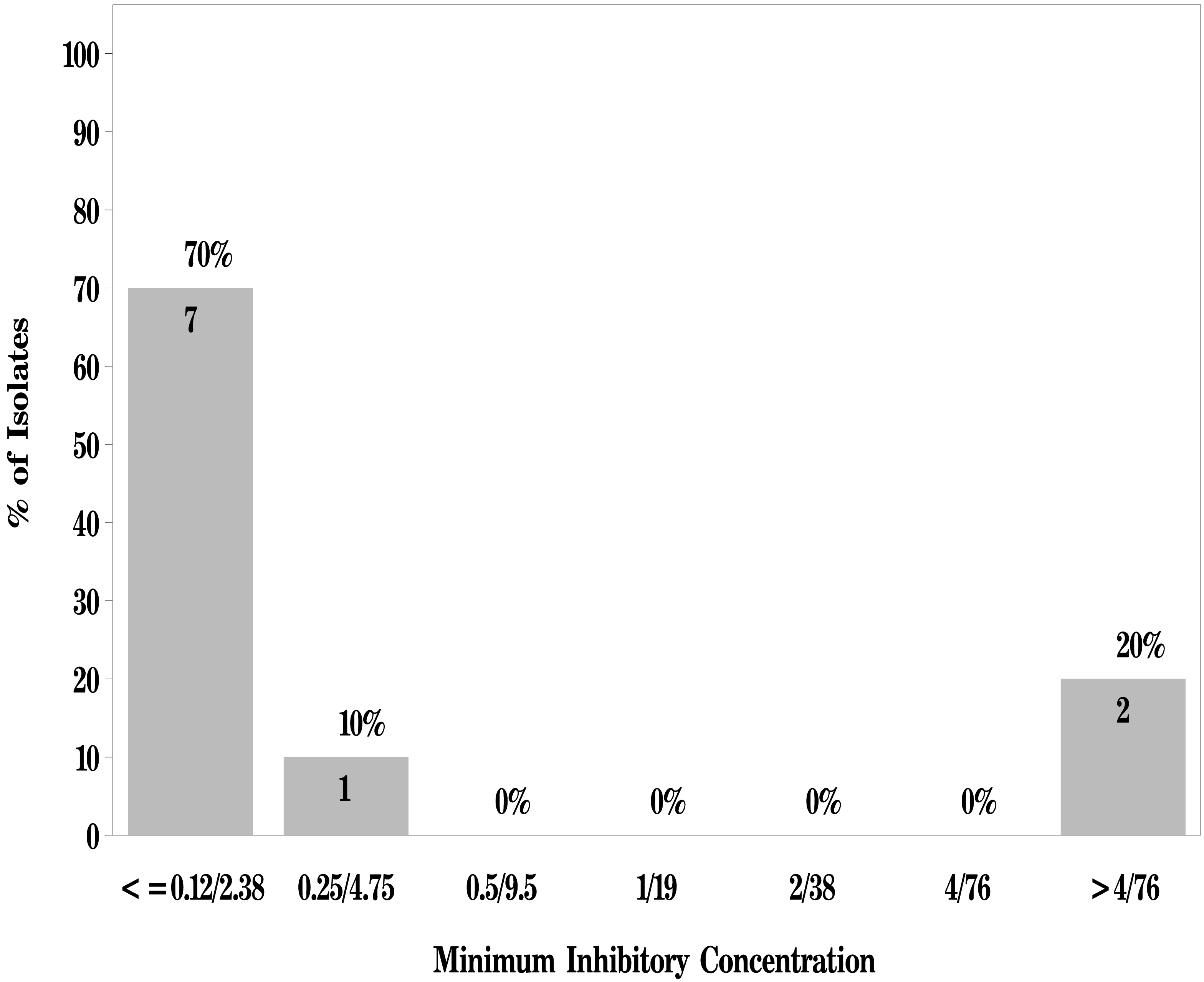


Table 12. Antimicrobial Resistance among *Salmonella* Isolates by Serotype,* 2002.

Serotype	*Antimicrobial Agent*												
	TET	**STR**	**SMX**	**AMP**	**CEP**	**GEN**	**AMC**	**KAN**	**FOX**	**TIO**	**CHL**	**NAL**	**COT**
Heidelberg (n=35)	54.3%	65.7%	42.9%	17.1%	17.1%	40.0%	37.1%	11.4%	11.4%	11.4%		2.9%	
Saintpaul (n=17)	94.1%	23.5%	23.5%	23.5%	23.5%	11.8%	11.8%	17.6%				23.5%	
Typhimurium (n=15)	40.0%	6.7%	33.3%	26.7%	20.0%			20.0%	20.0%	20.0%	6.7%		
Kentucky (n=13)	38.5%	38.5%		23.1%	23.1%			23.1%	23.1%	23.1%			
Hadar (n=11)	81.8%	81.8%											
Newport (n=8)	62.5%	62.5%	62.5%	62.5%	62.5%			62.5%	62.5%	62.5%	62.5%		37.5%
Reading (n=7)	28.6%	14.3%	14.3%	28.6%	14.3%		14.3%				14.3%		
Muenster (n=4)	50.0%	50.0%	50.0%			50.0%	50.0%					25.0%	
Bredeney (n=2)	100.0%	100.0%											
SI 6,7:k:- (n=2)				100.0%									
Agona (n=1)	100.0%												
Mbandaka (n=1)	100.0%												
S IIIa 18:z4:z32:- (n=1)	100.0%												
S rough "o"s: i: 1,2 (n=1)				100.0%	100.0%			100.0%	100.0%	100.0%			
Senftenberg (n=1)		100.0%	100.0%	100.0%		100.0%	100.0%						
SI 4,12:r:- (n=1)	100.0%	100.0%	100.0%			100.0%							
Total %R (N=153)	**45.8%**	**35.3%**	**22.2%**	**18.3%**	**15.0%**	**13.1%**	**12.4%**	**12.4%**	**10.5%**	**10.5%**	**4.6%**	**3.9%**	**2.0%**

* Includes only those serotypes in which resistance was observed; total number of *Salmonella* isolates, N=153.

Table 13. Antimicrobial Resistance among *Salmonella* by Meat Type in Overall Top 5 Serotypes,* 2002.

Meat Type	*Serotype*	*Antimicrobial Agent*												
		TET	**STR**	**SMX**	**AMP**	**CEP**	**GEN**	**AMC**	**KAN**	**FOX**	**TIO**	**CHL**	**NAL**	**COT**
Chicken Breast	Heidelberg (n=11)	45.5%	63.6%	45.6%	18.2%	18.2%	45.6%		36.4%					
	Saintpaul (n=0)													
	Typhimurium (n=9)	44.4%		44.4%	33.3%	33.3%		33.3%		33.3%	33.3%			
	Enteritidis (n=8)													
	Kentucky (n=12)	41.7%	41.7%		16.7%	16.7%		16.7%		16.7%	16.7%			
Ground Turkey	Heidelberg (n=21)	57.1%	61.9%	33.3%	19.1%	19.1%	28.6%	19.1%	42.9%	19.1%	19.1%		4.8%	
	Saintpaul (n=17)	94.1%	23.5%	23.5%	23.5%	23.5%	11.7%	17.7%	11.7%				23.5%	
	Typhimurium (n=2)													
	Enteritidis (n=5)													
	Kentucky (n=1)				100.0%	100.0%		100.0%		100.0%	100.0%			
Pork Chop	Heidelberg (n=3)	66.7%	100.0%	100.0%			100.0%							
	Saintpaul (n=0)													
	Typhimurium (n=2)	100.0%	50.0%	50.0%	50.0%							50.0%		
	Enteritidis (n=0)													
	Kentucky (n=0)													

* No resistance seen in any of the top 5 serotypes recovered from ground beef.

Table 14. Antimicrobial Resistance among *Salmonella* by Top 5 Serotypes within Meat Type, 2002.

Meat Type	*Serotype*	*Antimicrobial Agent*												
		TET	**STR**	**SMX**	**AMP**	**CEP**	**GEN**	**AMC**	**KAN**	**FOX**	**TIO**	**CHL**	**NAL**	**COT**
Chicken Breast	Kentucky (n=12)	41.7%	41.7%		16.7%	16.7%		16.7%		16.7%	16.7%			
	Heidelberg (n=11)	45.5%	63.6%	45.6%	18.2%	18.2%	45.6%		36.4%					
	Typhimurium (n=9)	44.4%		44.4%	33.3%	33.3%		33.3%		33.3%	33.3%			
	Enteritidis (n=8)													
	Hadar (n=4)	100.0%	100.0%											
Ground Turkey	Heidelberg (n=21)	57.1%	61.9%	33.3%	19.1%	19.1%	28.6%	19.1%	42.9%	19.1%	19.1%		4.8%	
	Saintpaul (n=17)	94.1%	23.5%	23.5%	23.5%	23.5%	11.7%	17.7%	11.7%				23.5%	
	Hadar (n=7)	71.4%	71.4%											
	Reading (n=6)	16.7%			16.7%	16.7%								
	Enteritidis (n=5)													
Ground Beef	Newport (n=3)	66.7%	66.7%	66.7%	66.7%	66.7%		66.7%		66.7%	66.7%	66.7%		
	Anatum (n=2)													
	Typhimurium (n=2)													
	Enteritidis (n=1)													
	Montevideo (n=1)													
Pork Chop	Heidelberg (n=3)	66.7%	100.0%	100.0%			100.0%							
	Meunster (n=2)													
	Newport (n=2)	100.0%	100.0%	100.0%	100.0%	100.0%		100.0%		100.0%	100.0%	100.0%		100.0%
	Typhimurium (n=2)	100.0%	50.0%	50.0%	50.0%							50.0%		
	Reading (n=1)	100.0%	100.0%	100.0%	100.0%				100.0%			100.0%		

Table 15. Antimicrobial Resistance among *Salmonella* by Site, Meat Type, and Antimicrobial Agent, 2002.

Site	*Meat Type*	*Antimicrobial Agent*												
		TET	**STR**	**SMX**	**AMP**	**CEP**	**GEN**	**AMC**	**KAN**	**FOX**	**TIO**	**CHL**	**NAL**	**COT**
CT	CB (n=17)	29.4%	11.8%	29.4%	23.5%	11.8%	5.9%	5.9%		5.9%	5.9%			
	GT (n=21)	52.4%	57.1%	47.6%	42.9%	38.1%	33.3%	33.3%	42.9%	19.1%	19.1%		19.1%	
	GB (n=5)	20.0%	20.0%	20.0%	20.0%	20.0%		20.0%		20.0%	20.0%	20.0%		
	PC (n=1)													
	Total (n=44)	**38.6%**	**34.1%**	**36.4%**	**31.8%**	**25.0%**	**18.2%**	**20.5%**	**20.5%**	**13.6%**	**13.6%**	**2.3%**	**9.1%**	**0.0%**
GA	CB (n=14)	28.6%	21.4%	7.1%	7.1%	7.1%	7.1%							
	GT (n=19)	52.6%	26.3%		5.3%	5.3%			5.3%					
	GB (n=2)													
	PC (n=2)	100.0%	50.0%	50.0%	50.0%				50.0%			50.0%		
	Total (n=37)	**43.2%**	**24.3%**	**5.4%**	**8.1%**	**5.4%**	**2.7%**	**0.0%**	**5.4%**	**0.0%**	**0.0%**	**2.7%**	**0.0%**	**0.0%**
MD	CB (n=8)	25.0%	25.0%		50.0%	50.0%		50.0%		50.0%	50.0%			
	GT (n=9)	33.3%	22.2%	22.2%	11.1%	11.1%	11.1%	11.1%	11.1%	11.1%	11.1%	11.1%	22.2%	11.1%
	GB (n=2)	50.0%	50.0%	50.0%	50.0%	50.0%		50.0%		50.0%	50.0%	50.0%		
	PC (n=6)	83.3%	100.0%	100.0%	50.0%	33.3%	50.0%	33.3%		33.3%	33.3%	50.0%		33.3%
	Total (n=25)	**44.0%**	**44.0%**	**36.0%**	**36.0%**	**32.0%**	**16.0%**	**32.0%**	**4.0%**	**32.0%**	**32.0%**	**20.0%**	**8.0%**	**12.0%**
MN	CB (n=4)	25.0%	25.0%		25.0%	25.0%		25.0%		25.0%	25.0%			
	GT (n=7)	28.6%	42.9%	14.3%	14.3%	14.3%	14.3%	14.3%		14.3%	14.3%			
	GB (n=0)													
	PC (n=0)													
	Total (n=11)	**27.3%**	**36.4%**	**9.1%**	**18.2%**	**18.2%**	**9.1%**	**18.2%**	**0.0%**	**18.2%**	**18.2%**	**0.0%**	**0.0%**	**0.0%**
OR	CB (n=4)	50.0%	75.0%											
	GT (n=2)	100.0%												
	GB (n=0)													
	PC (n=0)													
	Total (n=6)	**66.7%**	**50.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**
TN	CB (n=13)	46.2%	46.2%	30.8%			30.8%		30.8%					
	GT (n=16)	81.3%	37.5%	12.5%			12.5%		18.8%					
	GB (n=0)													
	PC (n=1)													
	Total (n=30)	**63.3%**	**40.0%**	**20.0%**	**0.0%**	**0.0%**	**20.0%**	**0.0%**	**23.3%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**
	Total %R (N=153)	**45.8%**	**35.3%**	**22.2%**	**18.3%**	**15.0%**	**13.1%**	**12.4%**	**12.4%**	**10.5%**	**10.5%**	**4.6%**	**3.9%**	**2.0%**

Table 16. Number of *Salmonella* (N=153) Resistant to Multiple Antimicrobial Agents, 2002.

Meat Type	*Number of Antimicrobials*				
	0	**1**	**2-4**	**5-7**	**≥8**
CB	31	5	12	12	0
GT	28	15	19	4	8
GB	7	0	0	0	2
PC	2	1	3	2	2
Total	**68**	**21**	**34**	**18**	**12**

Table 17. Overall *Campylobacter* Species Identified, 2002.

Species	***n***
C. coli	95
C. jejuni	202
Total	**297**

Table 18. *Campylobacter* Species by Meat Type, 2002.

Species	***Chicken Breast***		***Ground Turkey***		***Ground Beef***		***Pork Chop***	
	n	***%***	***n***	***%***	***n***	***%***	***n***	***%***
C. coli	90	94.7%	2	2.1%			3	3.2%
C. jejuni	198	98.0%	2	1.0%			2	1.0%
Total	**288**	**97.0%**	**4**	**1.4%**	**0**	**0.0%**	**5**	**1.7%**

Table 19. *Campylobacter* Species by Site and Meat Type*, 2002.

Site	*Species*	*Chicken Breast*		*Ground Turkey*		*Pork Chop*	
		n	**%**	***n***	**%**	***n***	**%**
CT	*C. coli* (n=22)	22	100.0%				
	C. jejuni (n=55)	52	94.6%	2	3.6%	1	1.8%
	Total (n=77)	**74**	**96.1%**	**2**	**2.6%**	**1**	**1.3%**
GA	*C. coli* (n=22)	22	100.0%				
	C. jejuni (n=62)	62	100.0%				
	Total (n=84)	**84**	**100.0%**	**0**	**0.0%**	**0**	**0.0%**
MD	*C. coli* (n=10)	10	100.0%				
	C. jejuni (n=21)	20	95.2%			1	4.8%
	Total (n=31)	**30**	**96.8%**	**0**	**0.0%**	**1**	**3.2%**
MN	*C. coli* (n=15)	14	93.3%	1	6.7%		
	C. jejuni (n=19)	19	100.0%				
	Total (n=34)	**33**	**97.1%**	**1**	**2.9%**	**0**	**0.0%**
OR	*C. coli* (n=0)						
	C. jejuni (n=1)	1	100.0%				
	Total (n=1)	**1**	**100.0%**	**0**	**0.0%**	**0**	**0.0%**
TN	*C. coli* (n=26)	22	84.6%	1	3.9%	3	11.5%
	C. jejuni (n=44)	44	100.0%				
	Total (n=70)	**66**	**94.3%**	**1**	**1.4%**	**3**	**4.3%**

* No *Campylobacter* recovered from ground beef.

Table 20. *Campylobacter* Isolates by Month for All Sites, 2002.

Month	*n*	%
January	18	6.1%
February	32	10.8%
March	29	9.8%
April	24	8.1%
May	26	8.8%
June	24	8.1%
July	18	6.1%
August	31	10.4%
September	27	9.1%
October	22	7.4%
November	23	7.7%
December	23	7.7%
Total	**297**	**100.0%**

Table 21. *Campylobacter* Species by Meat Type and Month for All Sites,* 2002.

Meat Type	*Species*	*Jan.*		*Feb.*		*Mar.*		*Apr.*		*May*		*Jun.*		*Jul.*		*Aug.*		*Sept.*		*Oct.*		*Nov.*		*Dec.*	
		n	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Chicken Breast	***C .coli*** (n=90)	5	5.6%	4	4.4%	6	6.7%	6	6.7%	11	12.2%	17	18.9%			7	7.8%	8	8.9%	10	11.1%	2	2.2%	14	15.6%
	C. jejuni (n=198)	13	6.6%	25	12.6%	23	11.6%	16	8.1%	15	7.6%	7	3.5%	17	8.6%	24	12.1%	19	9.6%	11	5.6%	19	9.6%	9	4.6%
	Total (n=288)	**18**	**6.3%**	**29**	**10.1%**	**29**	**10.1%**	**22**	**7.6%**	**26**	**9.0%**	**24**	**8.3%**	**17**	**5.9%**	**31**	**10.8%**	**27**	**9.4%**	**21**	**7.3%**	**21**	**7.3%**	**23**	**8.0%**
Ground Turkey	***C .coli*** (n=2)													1	50.0%							1	50.0%		
	C. jejuni (n=2)							2	100.0%																
	Total (n=4)							**2**	**50.0%**					**1**	**25.0%**							**1**	**25.0%**		
Pork Chop	***C .coli*** (n=3)			3	100.0%																				
	C. jejuni (n=2)																			1	50.0%	1	50.0%		
	Total (n=5)			**3**	**60.0%**															**1**	**20.0%**	**1**	**20.0%**		
	Total (N=297)	**18**	**6.1%**	**32**	**10.8%**	**29**	**9.8%**	**24**	**8.1%**	**26**	**8.8%**	**24**	**8.1%**	**18**	**6.1%**	**31**	**10.4%**	**27**	**9.1%**	**22**	**7.4%**	**23**	**7.7%**	**23**	**7.7%**

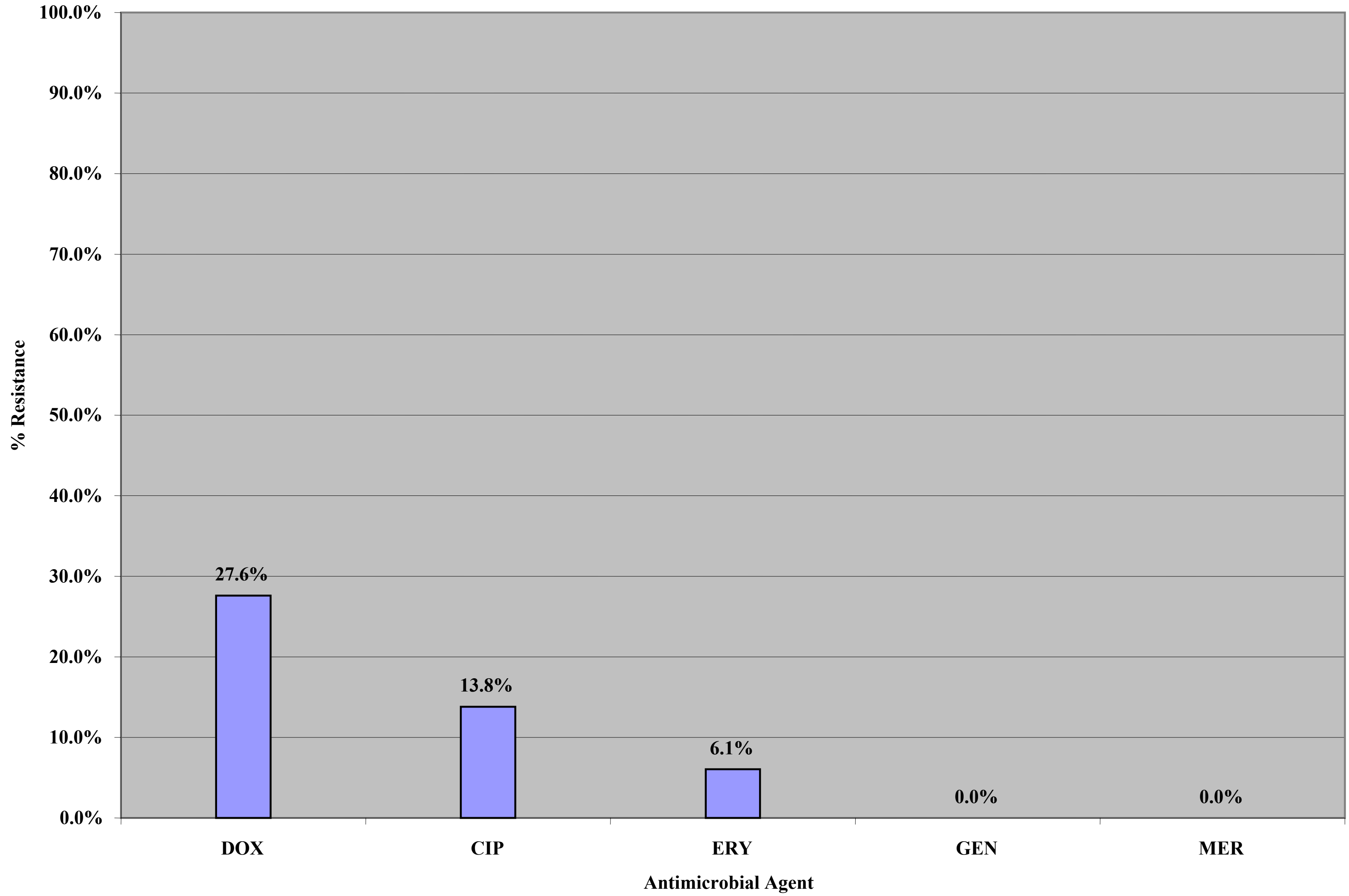
* No *Campylobacter* recovered from ground beef.

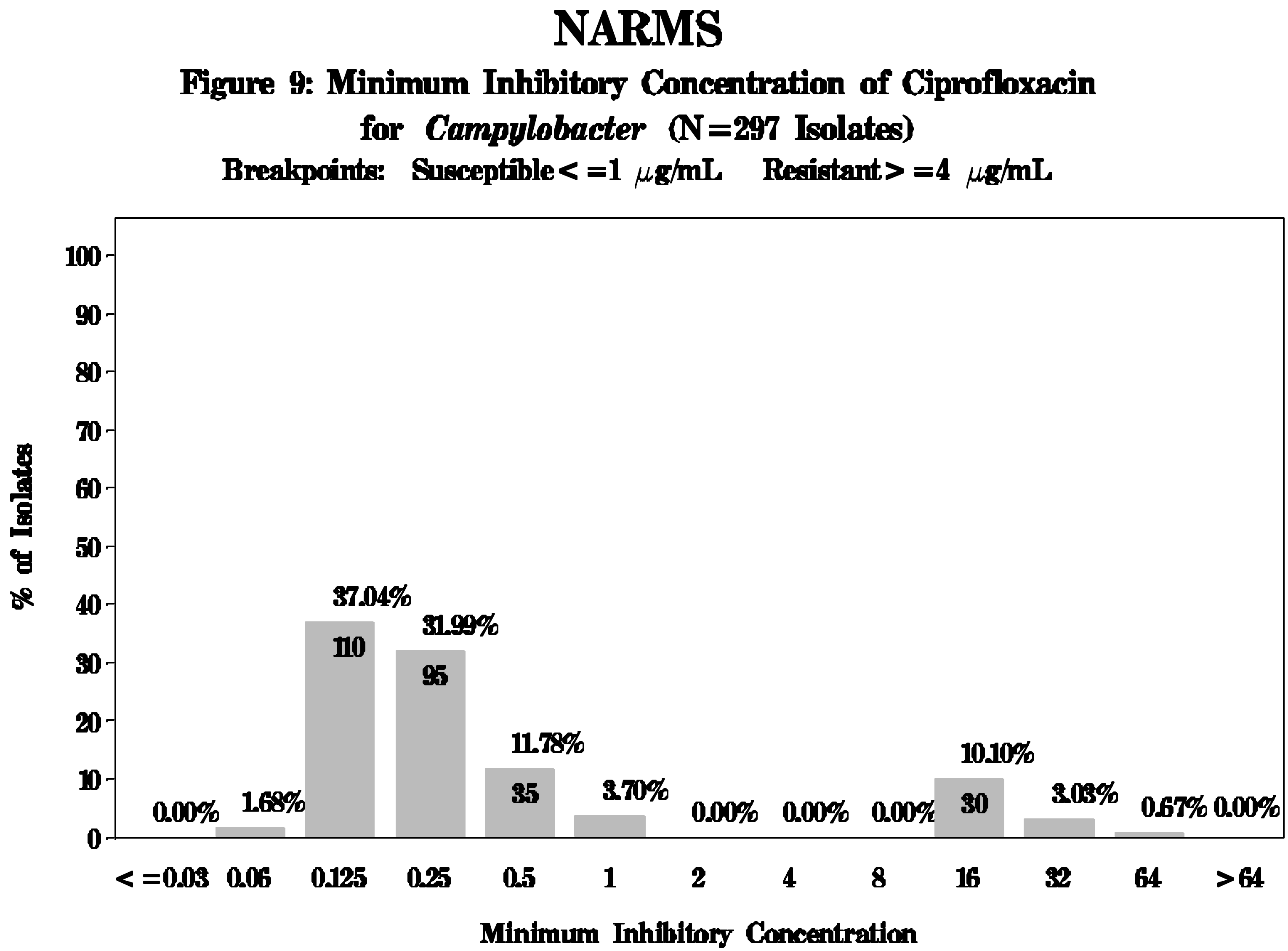
Table 22. Antimicrobial Resistance (%R) among *Campylobacter* Isolates (N=297), 2002.

Antimicrobial Agent	*n*	*%R*
Doxycycline	82	27.6%
Ciprofloxacin	41	13.8%
Erythromycin	18	6.1%
Gentamicin	0	0.0%
Meropenem*	0	0.0%

* One *C. coli* from ground turkey had MER MIC=2 μg/ml.

Figure 8. Antimicrobial Resistance among *Campylobacter* Isolates (N=297), 2002.

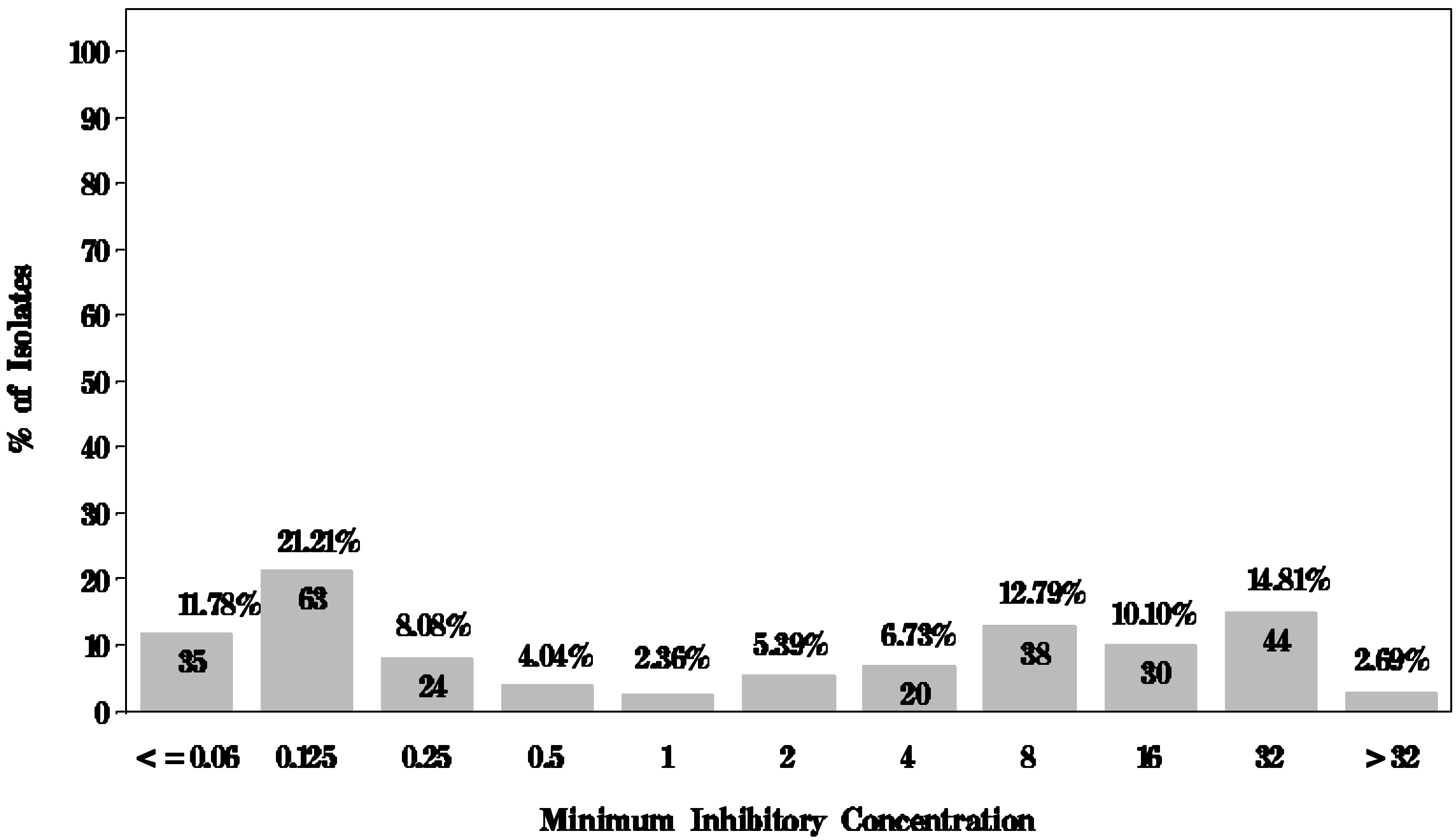



NARMS
Figure 9: Minimum Inhibitory Concentration of Ciprofloxacin
for Campylobacter (N=297 Isolates)
Breakpoints: Susceptible<=1 μg/mL Resistant>=4 μg/mL
% of Isolates
100
90
80
70
60
50
40
30
20
10
0
0.00%
1.68%
37.04%
110
31.99%
95
11.78%
35
3.70%
0.00%
0.00%
0.00%
10.10%
30
3.03%
0.67%
0.00%
<=0.03
0.06
0.125
0.25
0.5
1
2
4
8
16
32
64
>64
Minimum Inhibitory Concentration

NARMS

Figure 9: Minimum Inhibitory Concentration of Doxycycline for *Campylobacter* (N=297 Isolates)

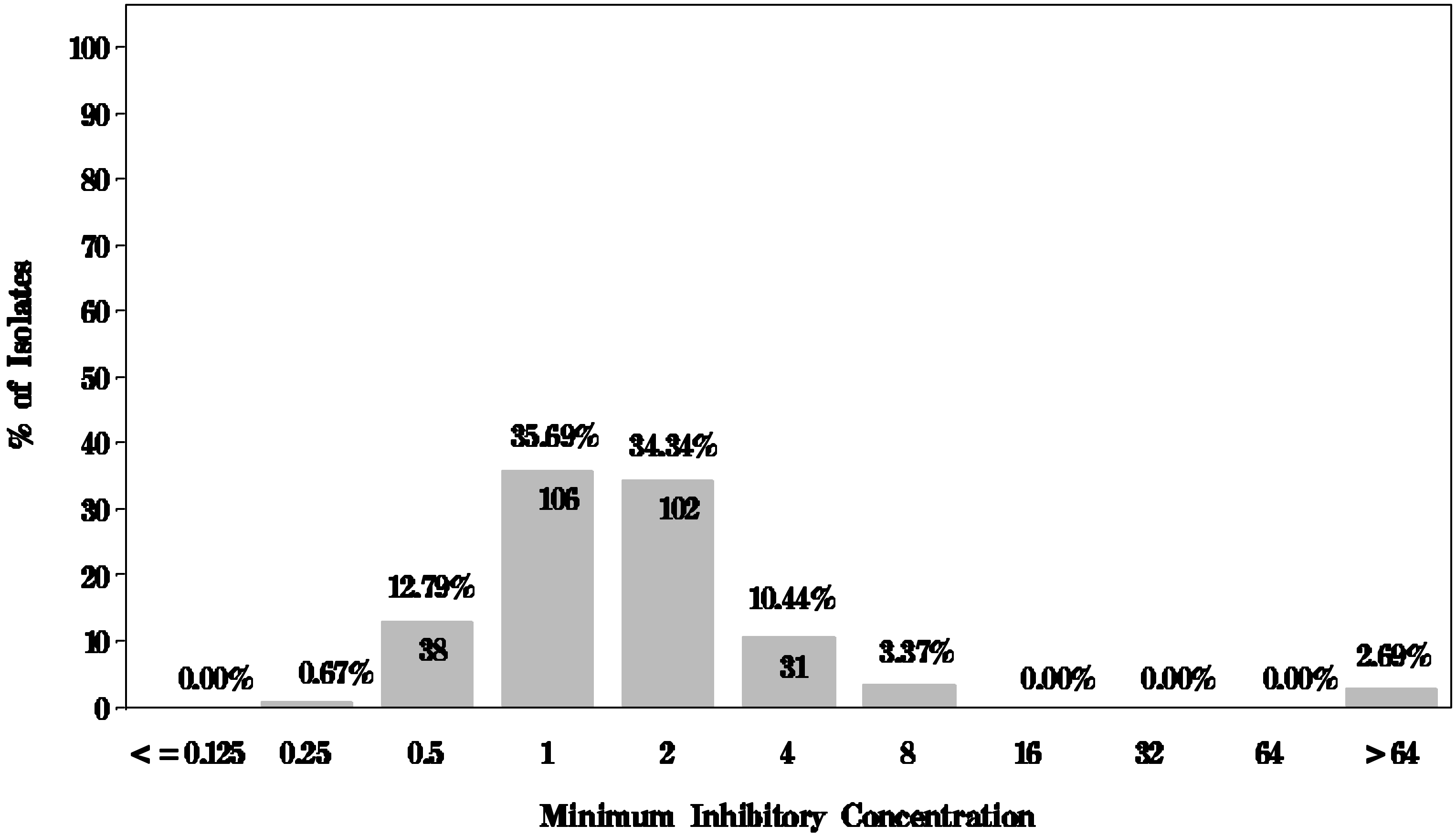
Breakpoints: Susceptible<=4 μg/mL Resistant>=16 μg/mL



NARMS

Figure 9: Minimum Inhibitory Concentration of Erythromycin for *Campylobacter* (N=297 Isolates)

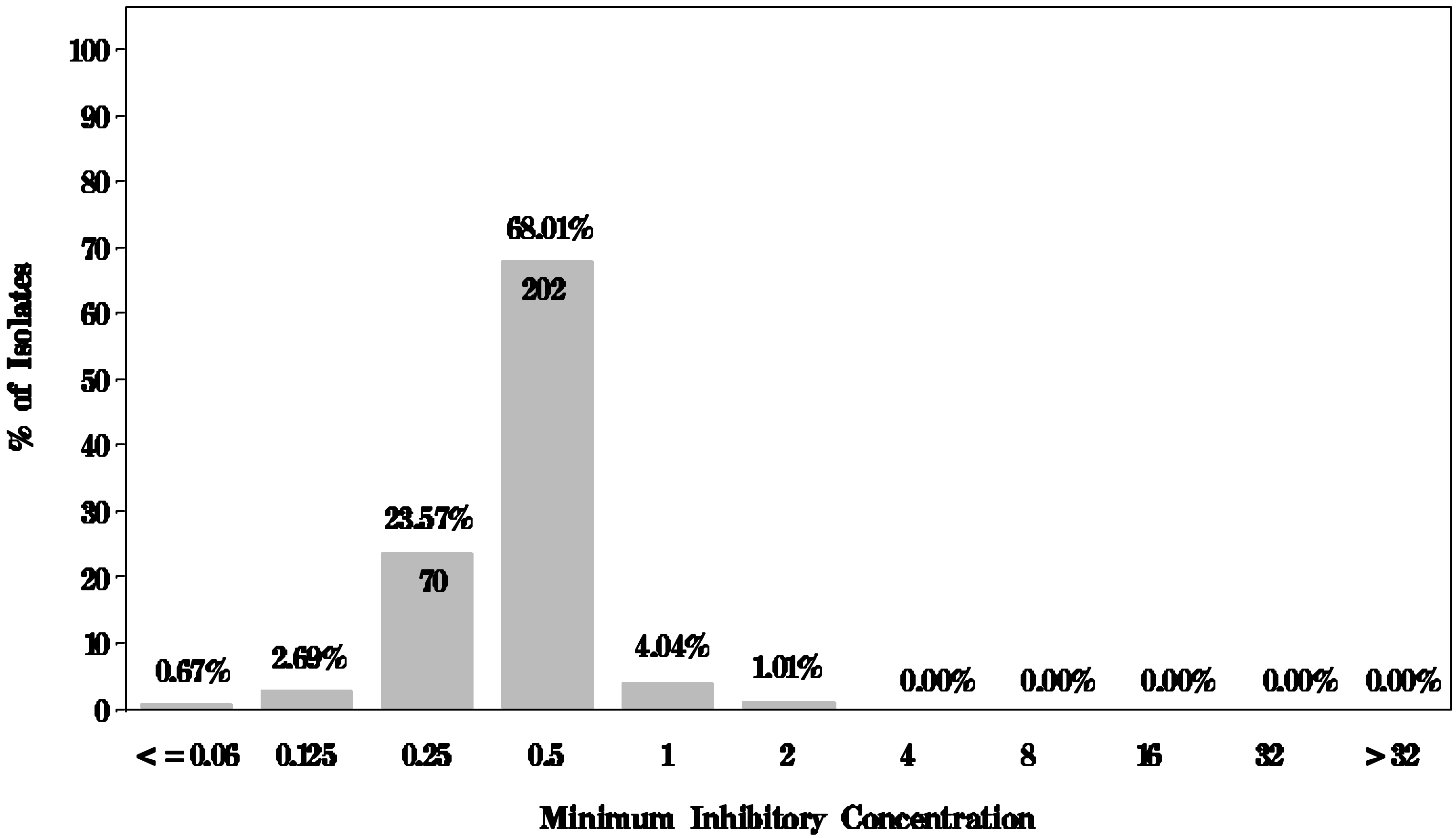
Breakpoints: Susceptible<=0.5 μg/mL Resistant>=8 μg/mL



NARMS

Figure 9: Minimum Inhibitory Concentration of Gentamicin for *Campylobacter* (N=297 Isolates)

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



NARMS

Figure 9: Minimum Inhibitory Concentration of Meropenem for *Campylobacter* (N=297 Isolates)

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

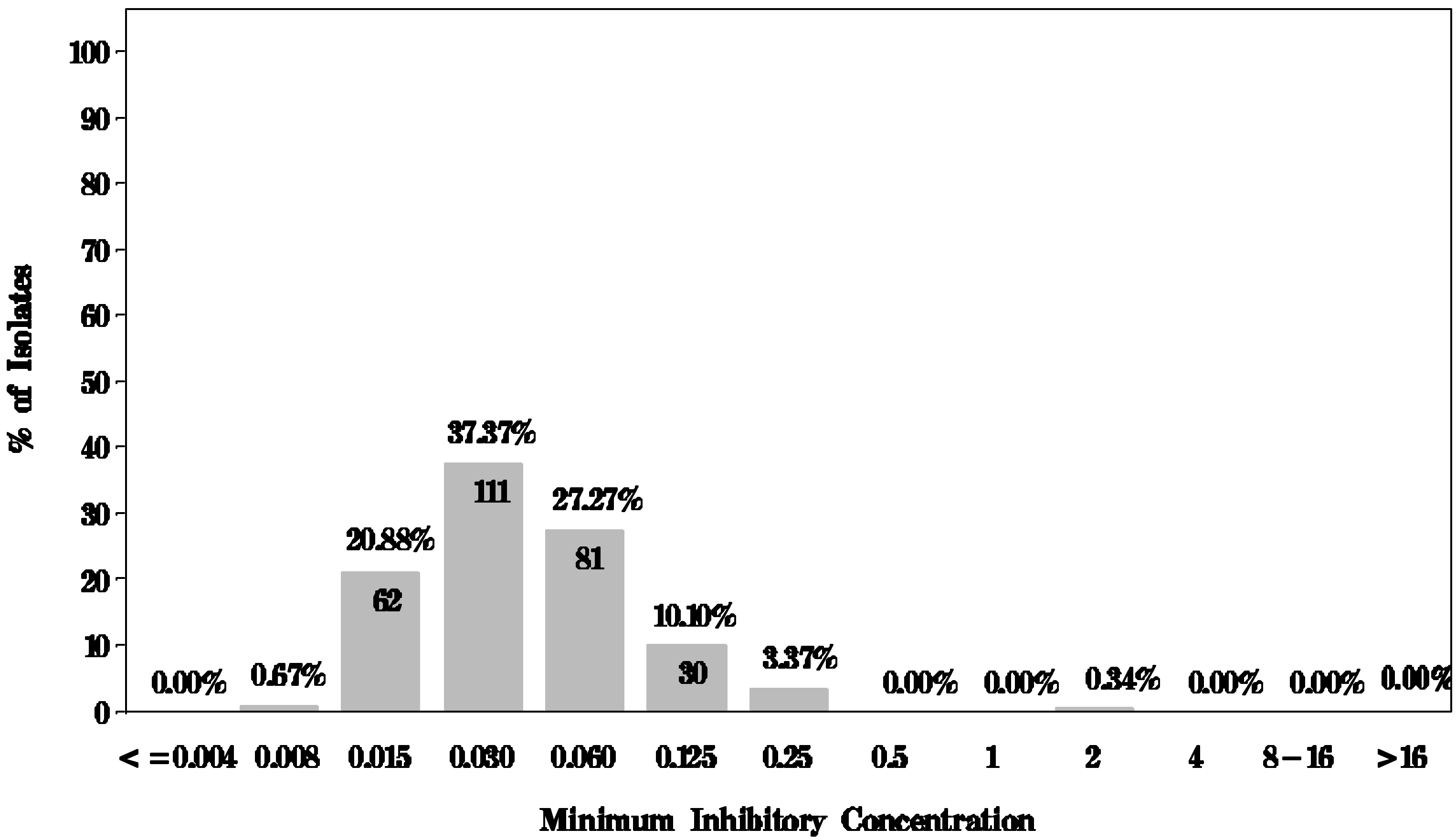


Table 23. Antimicrobial Resistance among *Campylobacter* by Meat Type,[*†] 2002.

Antimicrobial Agent	*Chicken Breast (n=288)*	*Ground Turkey (n=4)*	*Pork Chop (n=5)*
Doxycycline	27.4%	50.0%	20.0%
Ciprofloxacin	13.5%	50.0%	
Erythromycin	5.9%		20.0%

[*] No *Campylobacter* recovered from ground beef.
[†] No resistance to Gentamicin or Meropenem in these isolates; one *C. coli* from ground turkey had MER MIC=2µg/ml.

Figure 10a. Antimicrobial Resistance among *Campylobacter* from Chicken Breast (n=288), 2002.

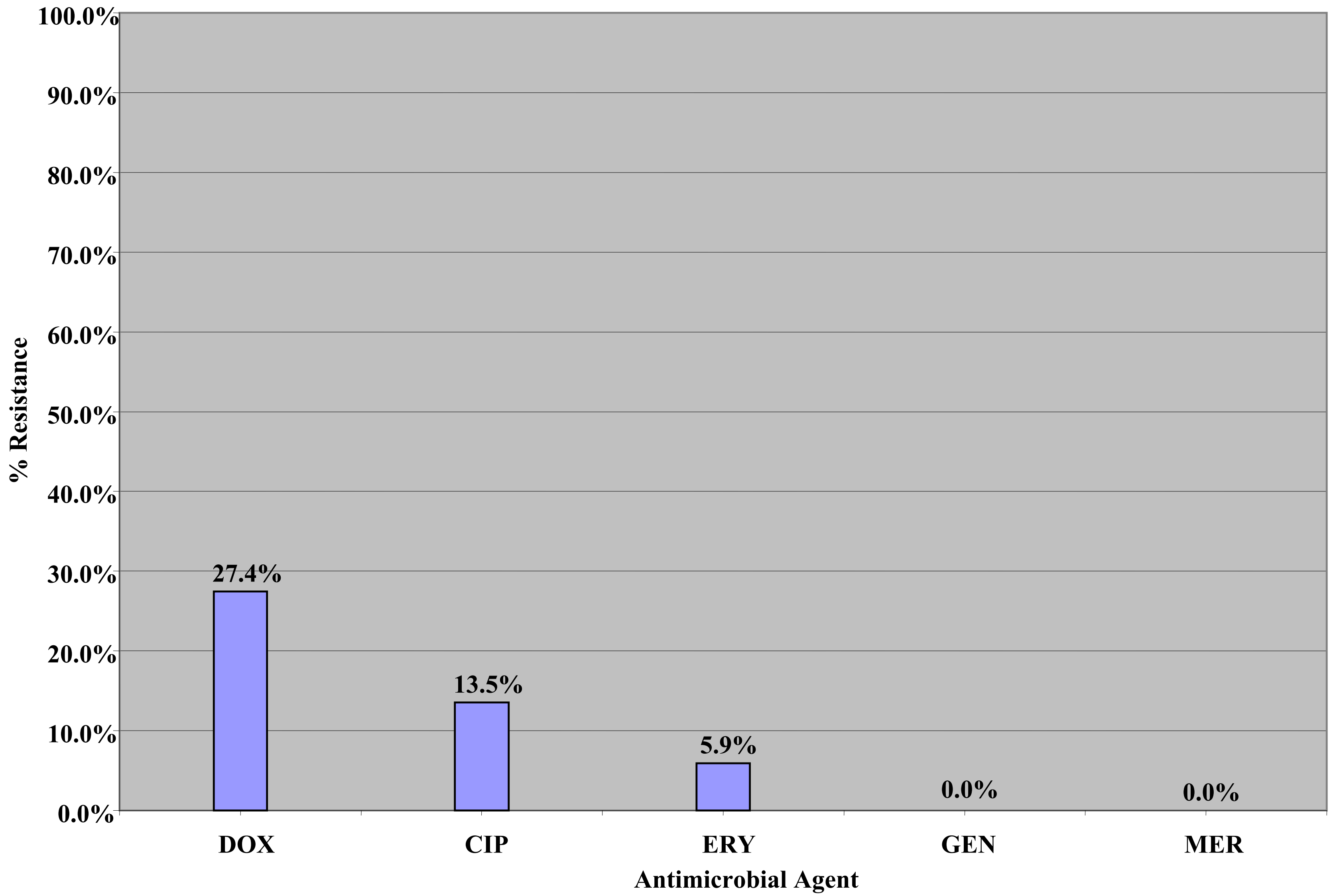


Figure 10b. Antimicrobial Resistance among *Campylobacter* from Ground Turkey (n=4), 2002.

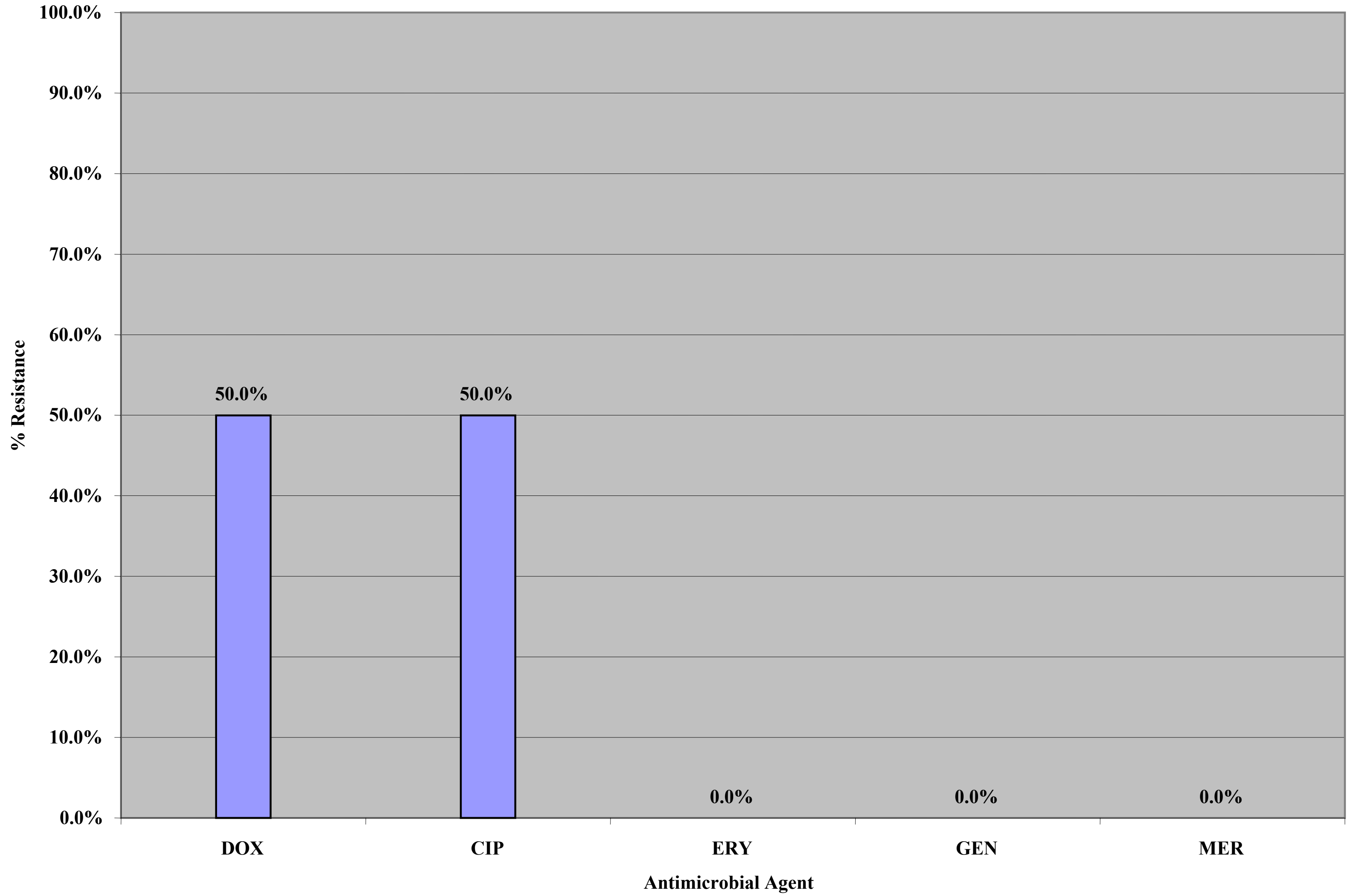
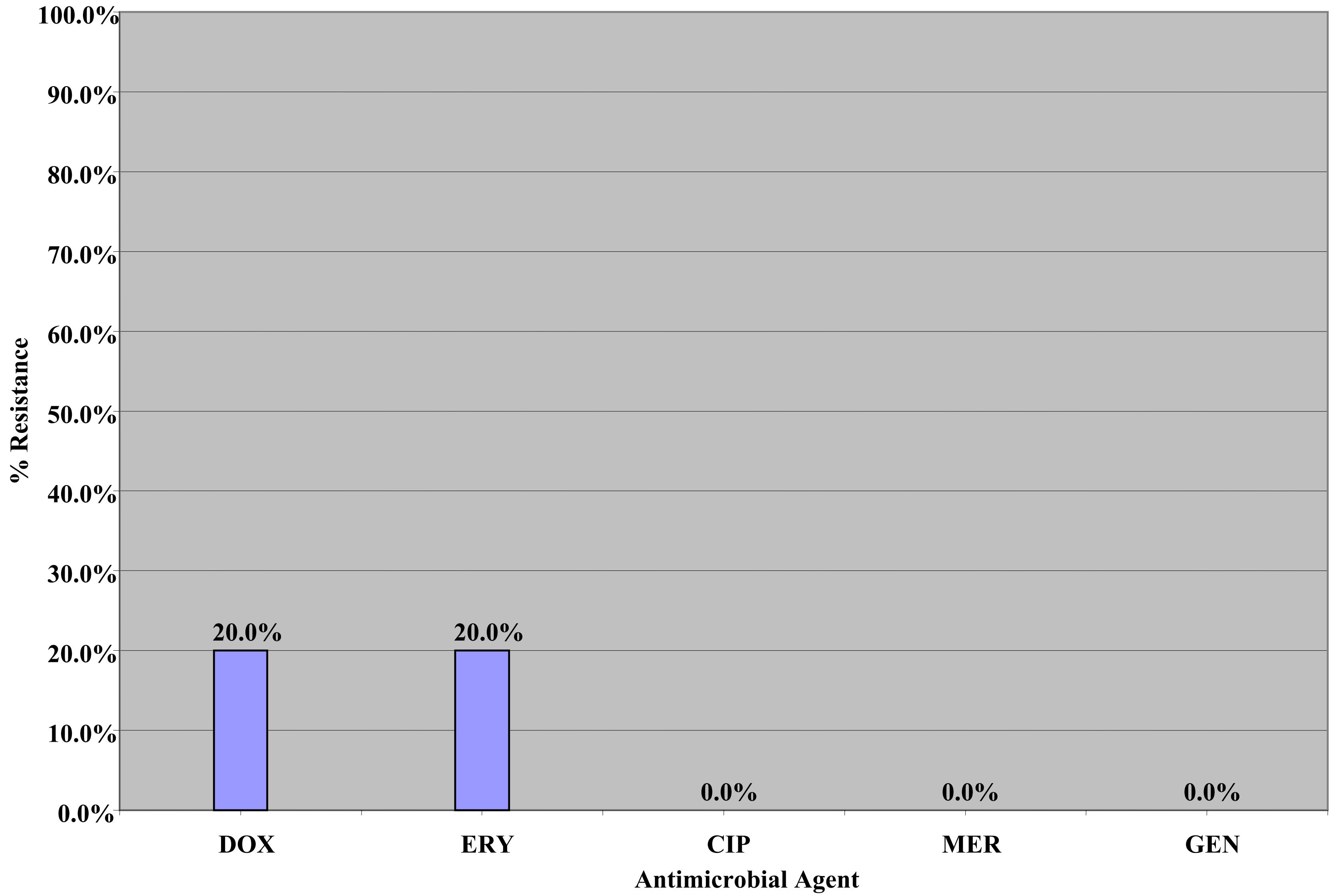


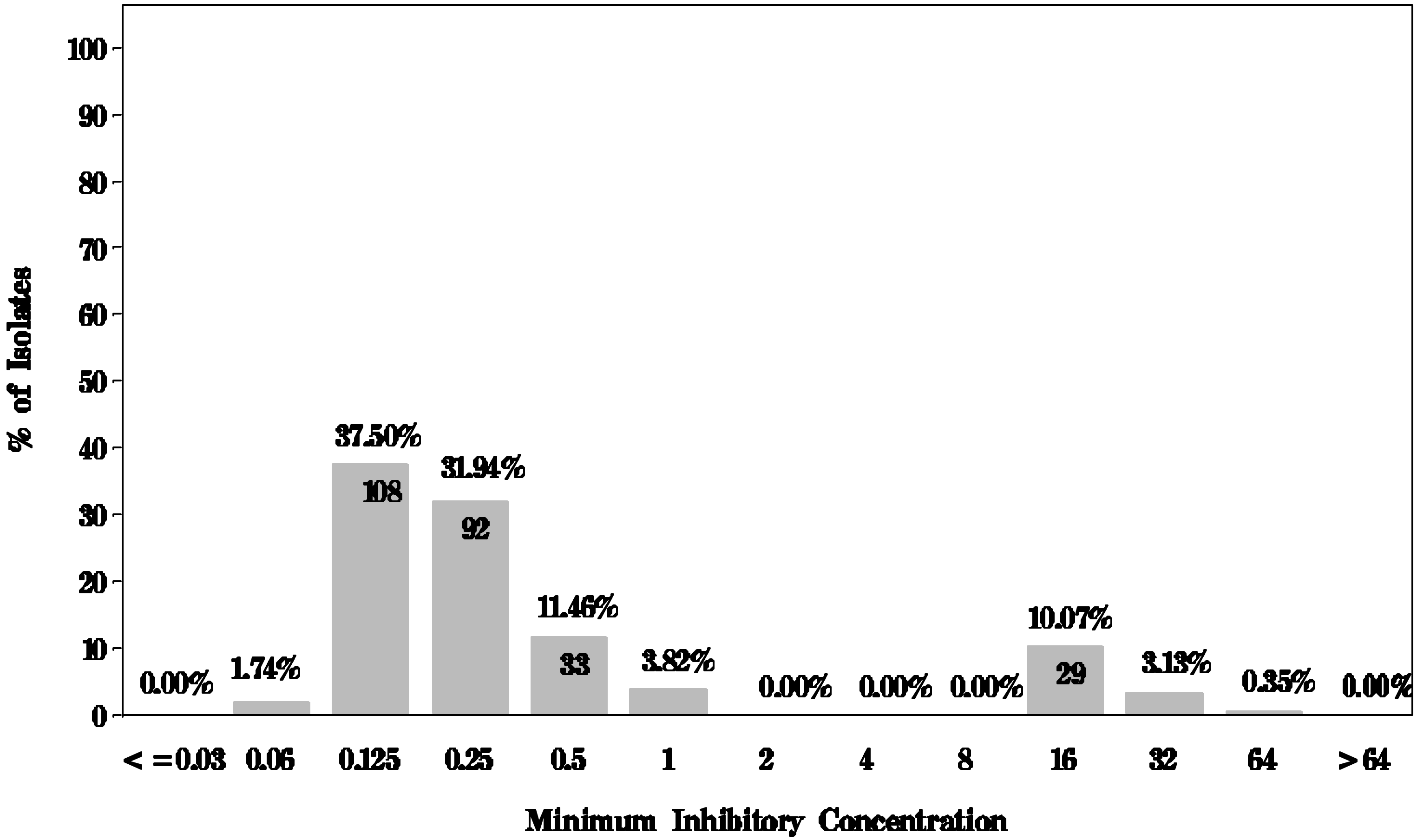
Figure 10c. Antimicrobial Resistance among *Campylobacter* from Pork Chops (n=5), 2002.



NARMS

Figure 11: Minimum Inhibitory Concentration of Ciprofloxacin for *Campylobacter* in Chicken Breast (N=288 Isolates)

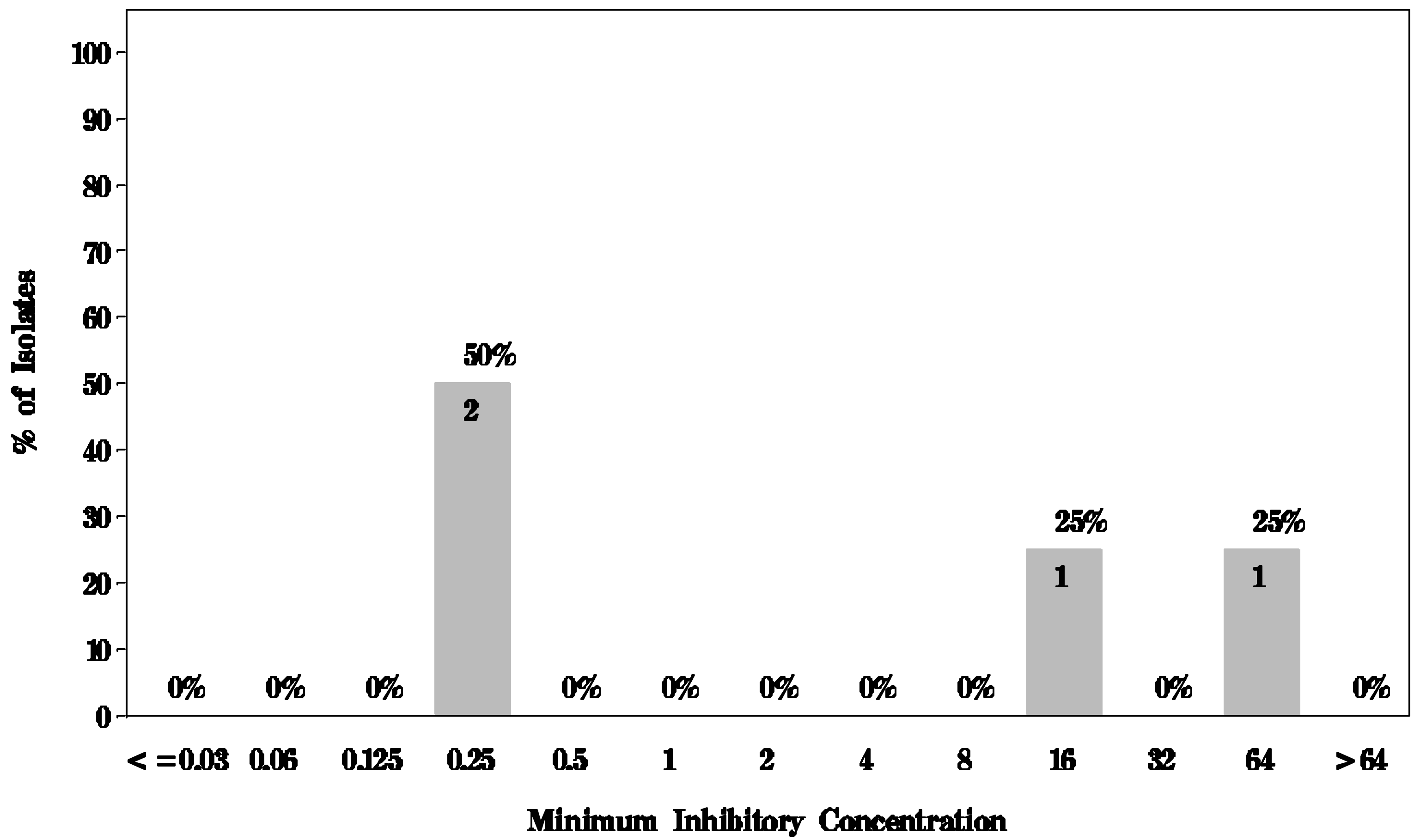
Breakpoints: Susceptible<=1 μg/mL Resistant>=4μg/mL



NARMS

Figure 11: Minimum Inhibitory Concentration of Ciprofloxacin for *Campylobacter* in Ground Turkey (N=4 Isolates)

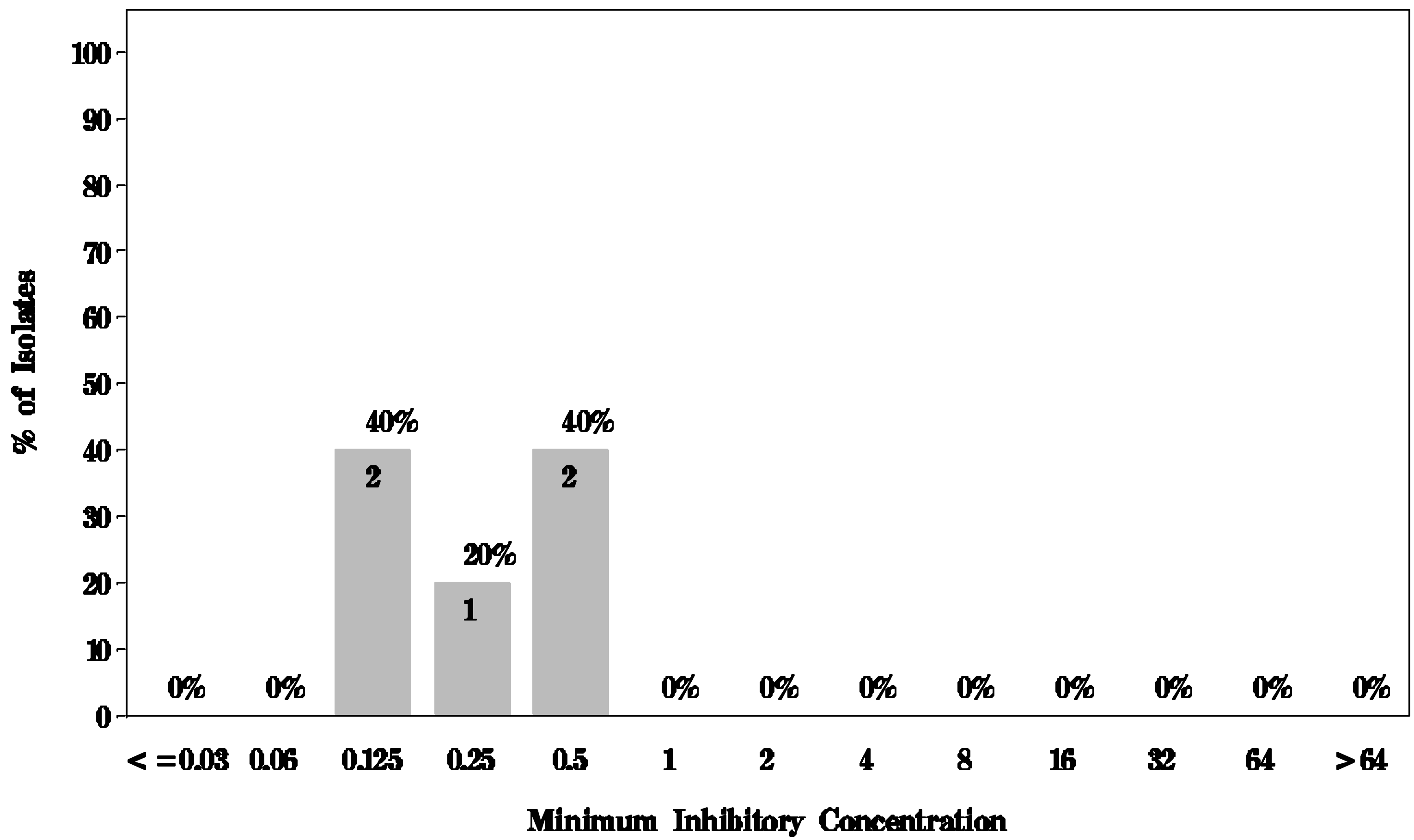
Breakpoints: Susceptible<=1 μg/mL Resistant>=4μg/mL



NARMS

Figure 11: Minimum Inhibitory Concentration of Ciprofloxacin for *Campylobacter* in Pork Chop (N=5 Isolates)

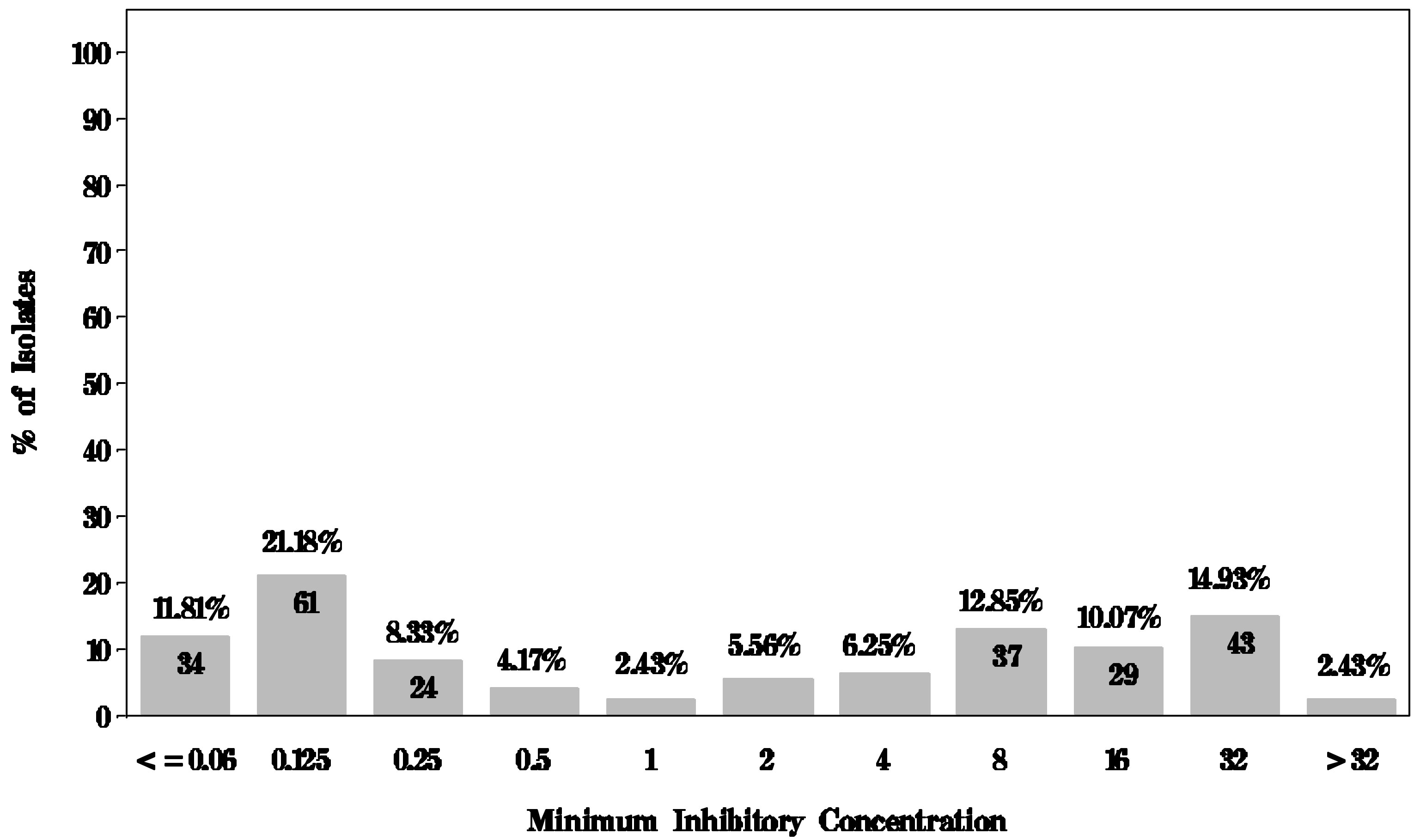
Breakpoints: Susceptible<=1 µg/mL Resistant>=4µg/mL



NARMS

Figure 11: Minimum Inhibitory Concentration of Doxycycline for *Campylobacter* in Chicken Breast (N=288 Isolates)

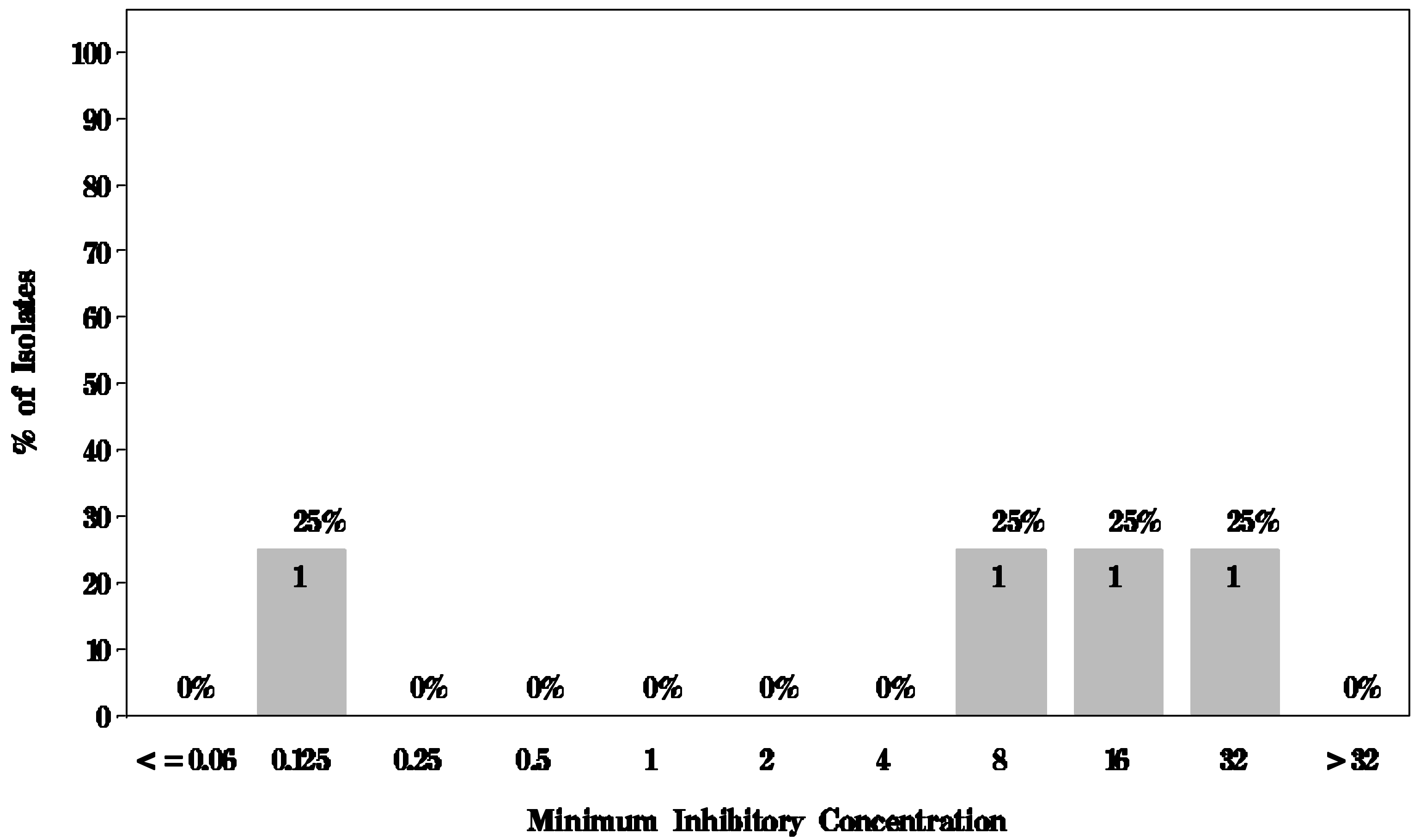
Breakpoints: Susceptible<=4 μg/mL Resistant>=16μg/mL



NARMS

Figure 11: Minimum Inhibitory Concentration of Doxycycline for *Campylobacter* in Ground Turkey (N=4 Isolates)

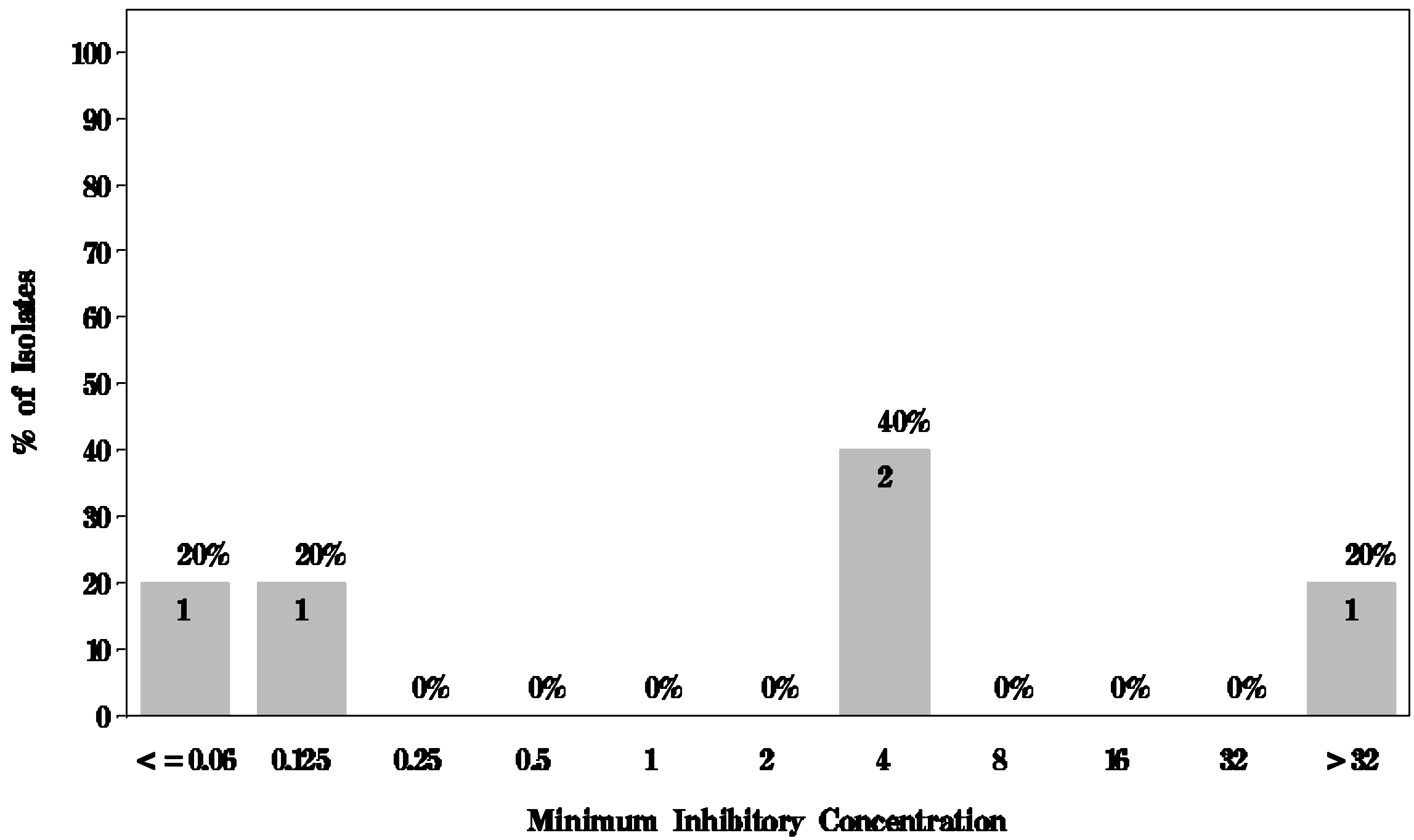
Breakpoints: Susceptible <=4 μg/mL Resistant >=16μg/mL



NARMS

Figure 11: Minimum Inhibitory Concentration of Doxycycline for *Campylobacter* in Pork Chop (N=5 Isolates)

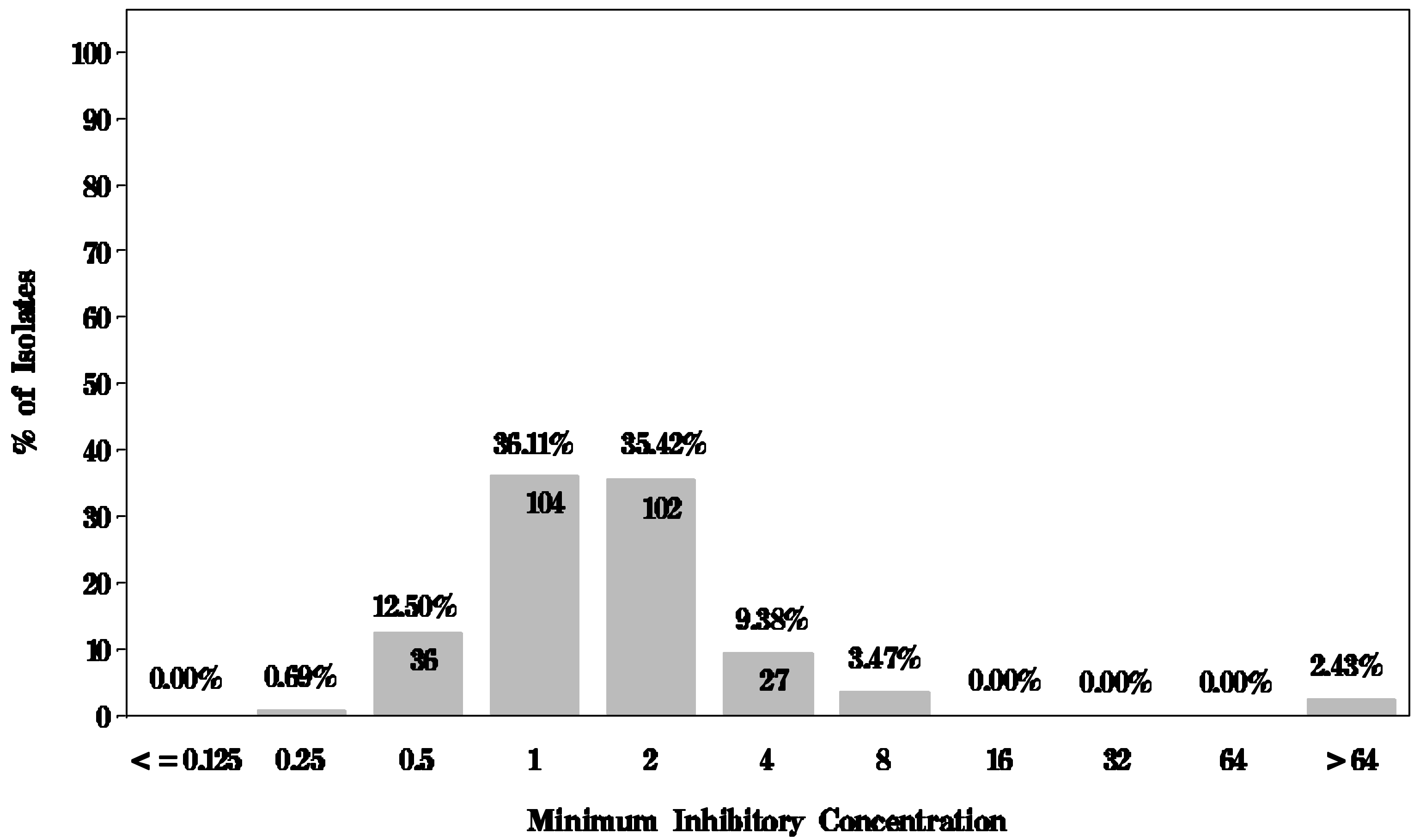
Breakpoints: Susceptible<=4 μg/mL Resistant>=16μg/mL



NARMS

Figure 11: Minimum Inhibitory Concentration of Erythromycin for *Campylobacter* in Chicken Breast (N=288 Isolates)

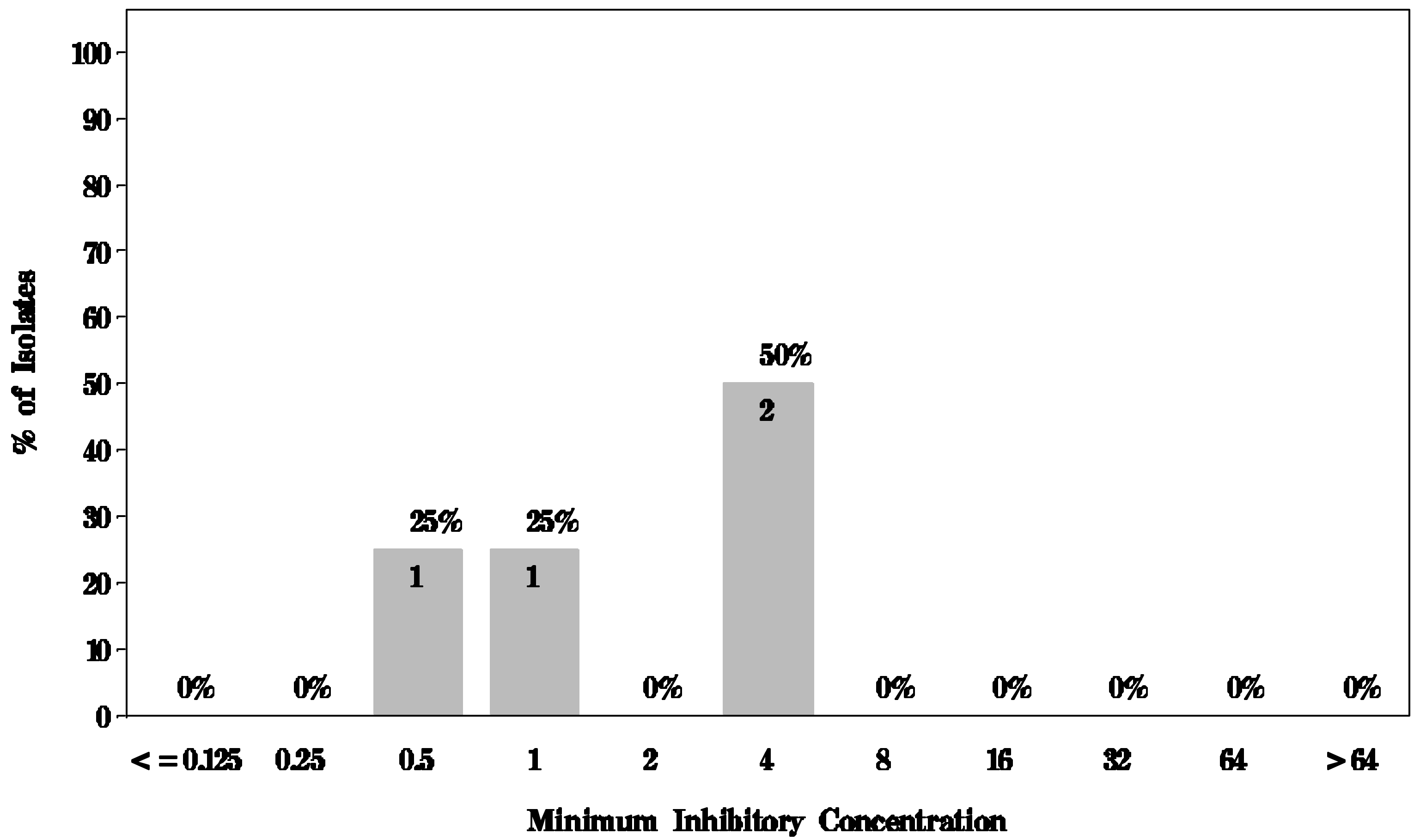
Breakpoints: Susceptible<=0.5 μg/mL Resistant>=8μg/mL



NARMS

Figure 11: Minimum Inhibitory Concentration of Erythromycin for *Campylobacter* in Ground Turkey (N=4 Isolates)

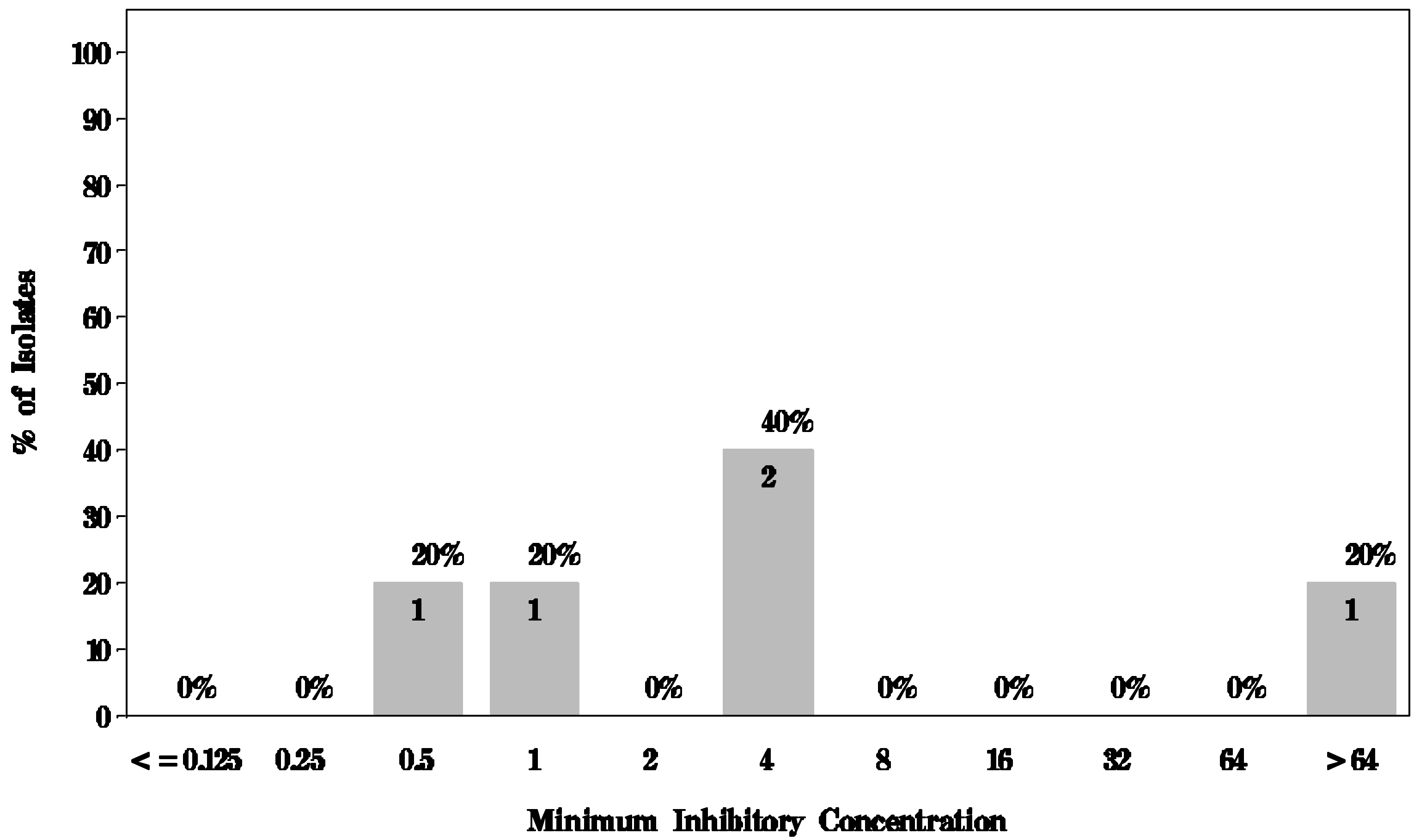
Breakpoints: Susceptible<=0.5 μg/mL Resistant>=8μg/mL



NARMS

Figure 11: Minimum Inhibitory Concentration of Erythromycin for *Campylobacter* in Pork Chop (N=5 Isolates)

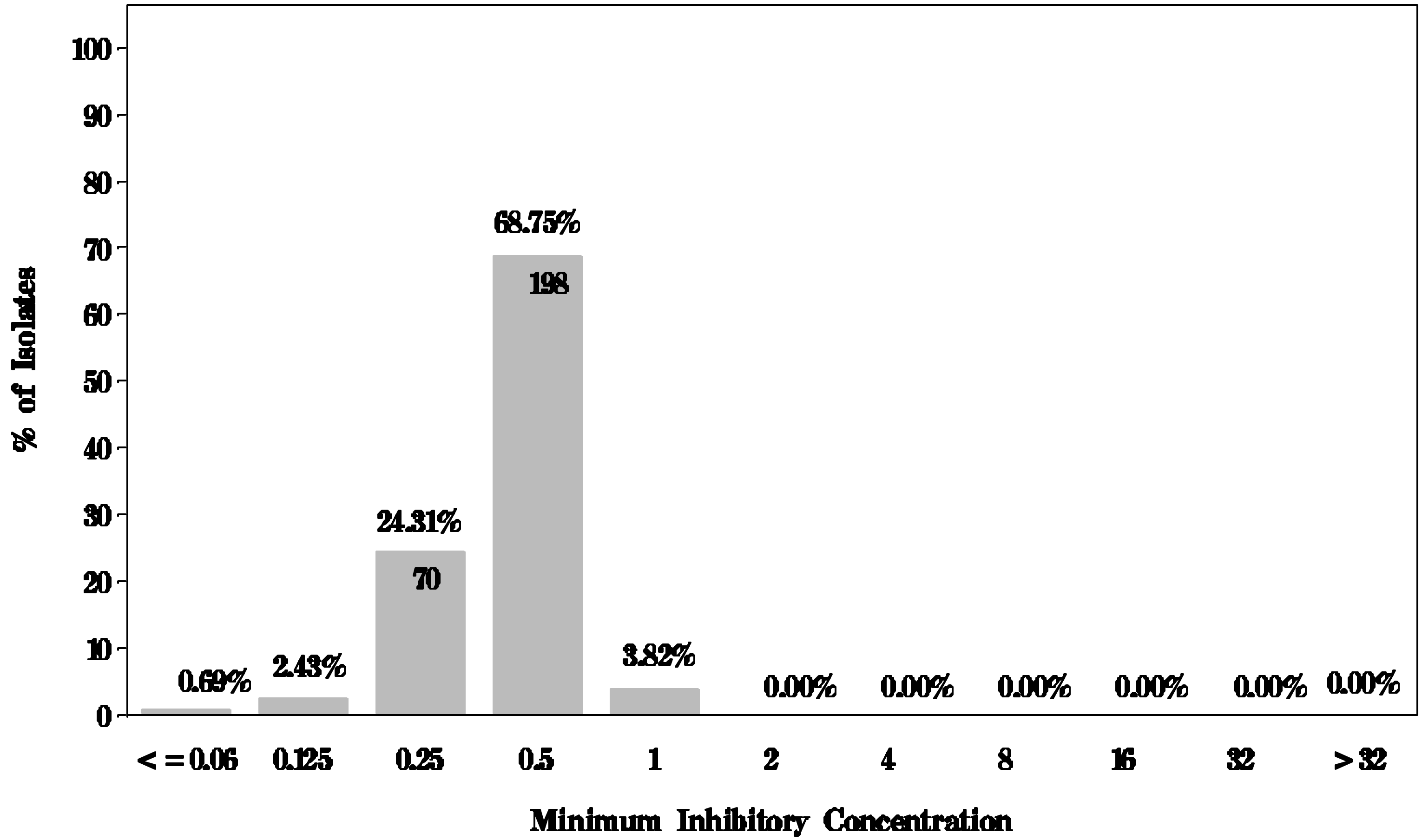
Breakpoints: Susceptible<=0.5 μg/mL Resistant>=8μg/mL



NARMS

Figure 11: Minimum Inhibitory Concentration of Gentamicin for *Campylobacter* in Chicken Breast (N=288 Isolates)

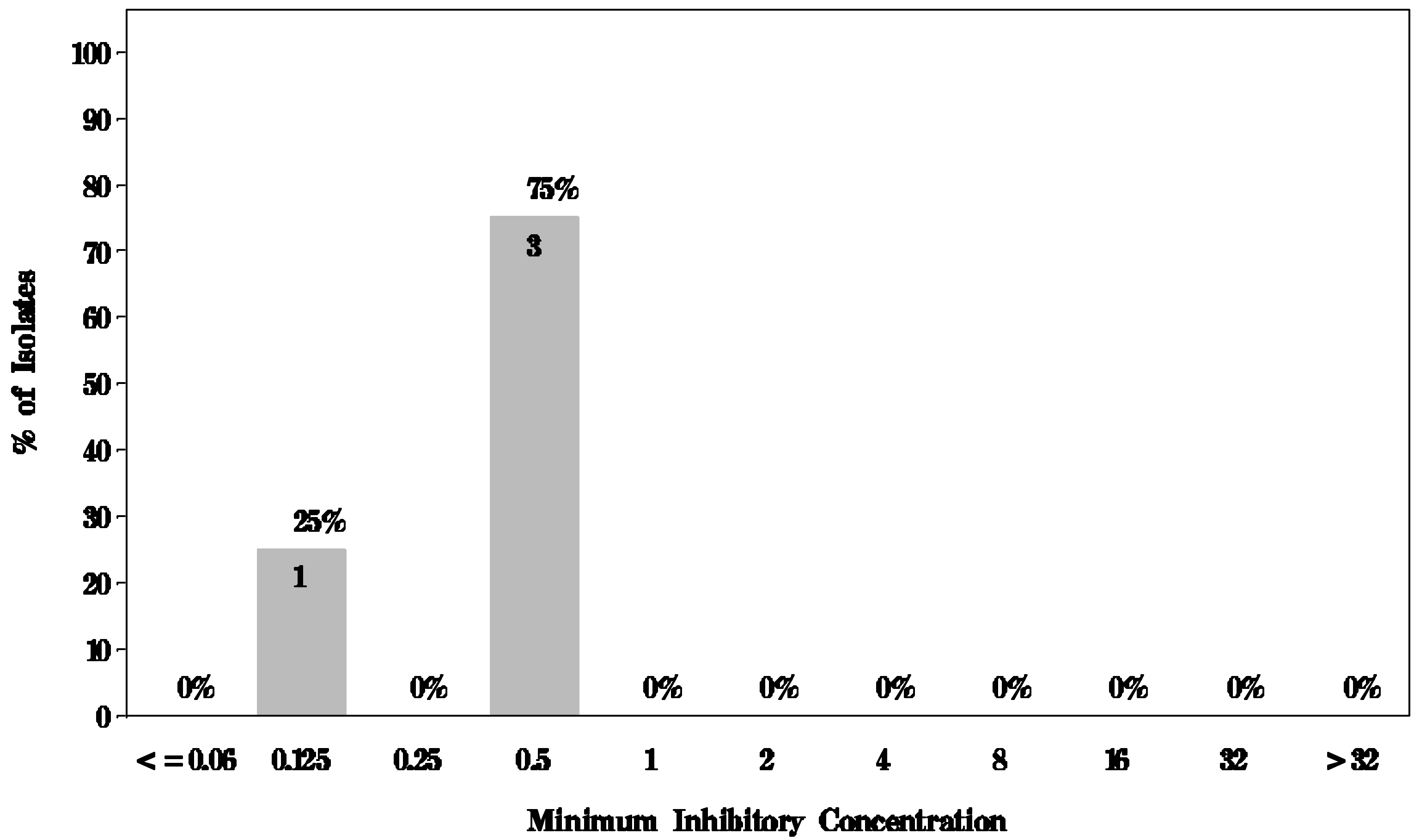
Breakpoints: Susceptible <=4 μg/mL Resistant >=16μg/mL



NARMS

Figure 11: Minimum Inhibitory Concentration of Gentamicin for *Campylobacter* in Ground Turkey (N=4 Isolates)

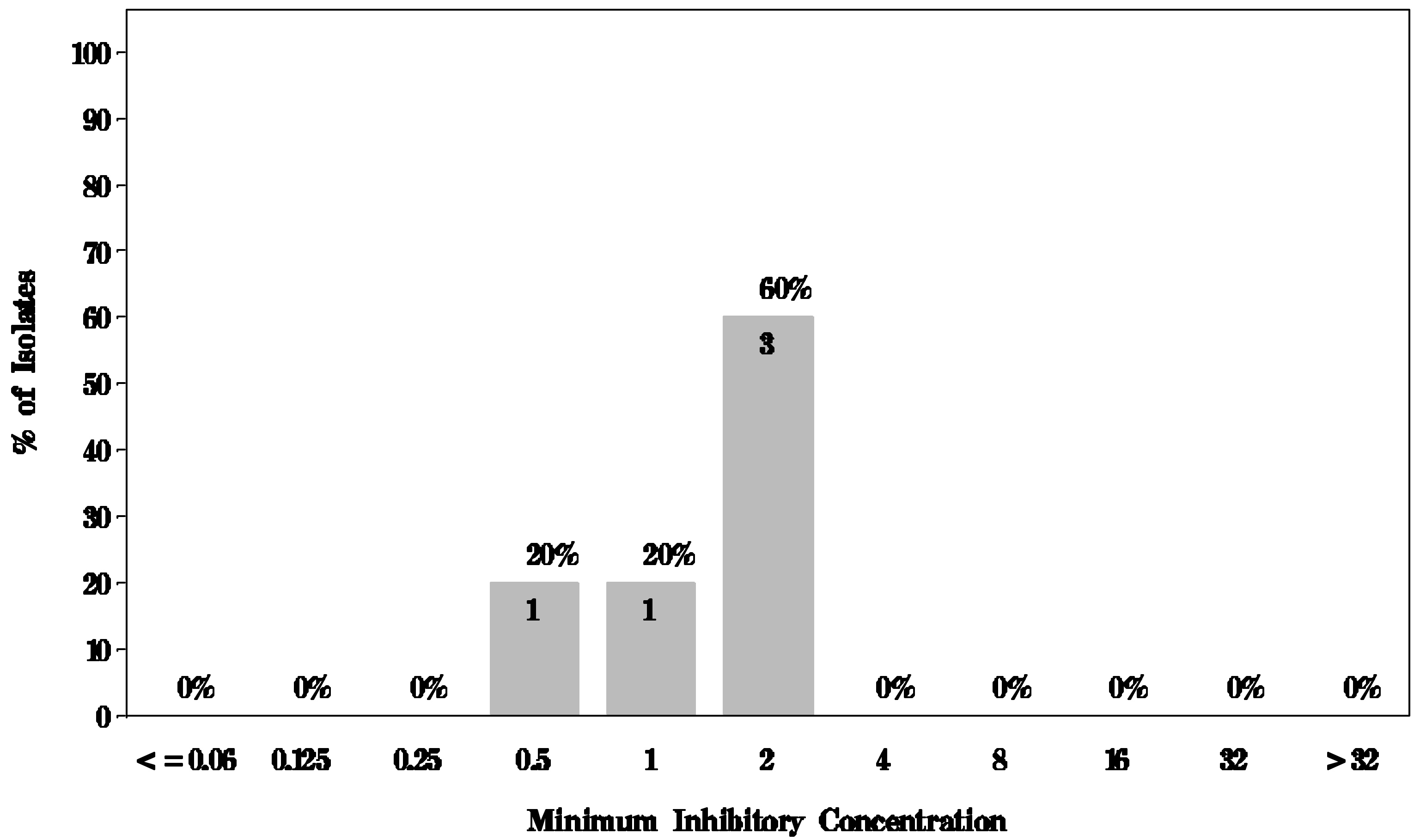
Breakpoints: Susceptible<=4 μg/mL Resistant>=16μg/mL



NARMS

Figure 11: Minimum Inhibitory Concentration of Gentamicin for *Campylobacter* in Pork Chop (N=5 Isolates)

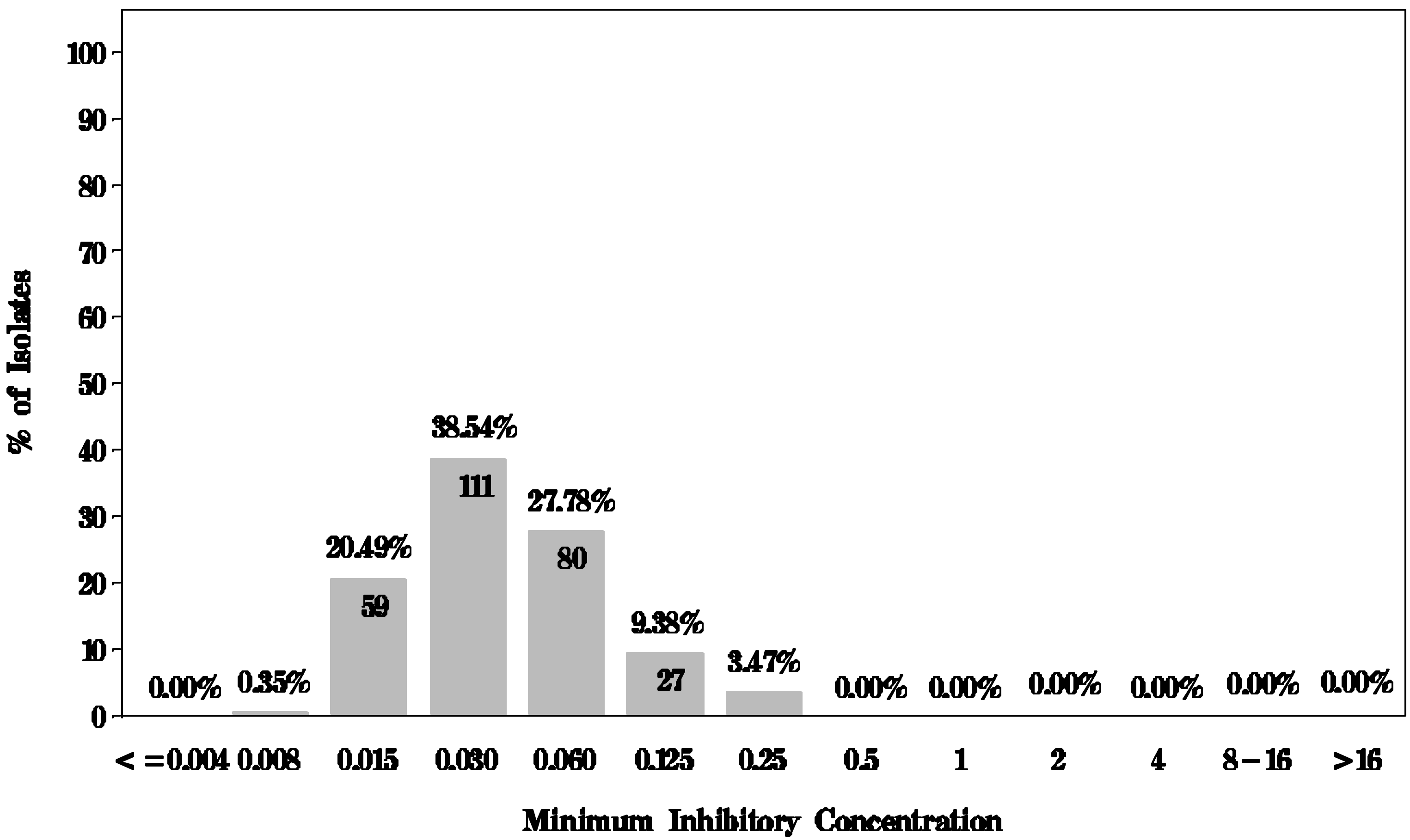
Breakpoints: Susceptible<=4 μg/mL Resistant>=16μg/mL



NARMS

Figure 11: Minimum Inhibitory Concentration of Meropenem for *Campylobacter* in Chicken Breast (N=288 Isolates)

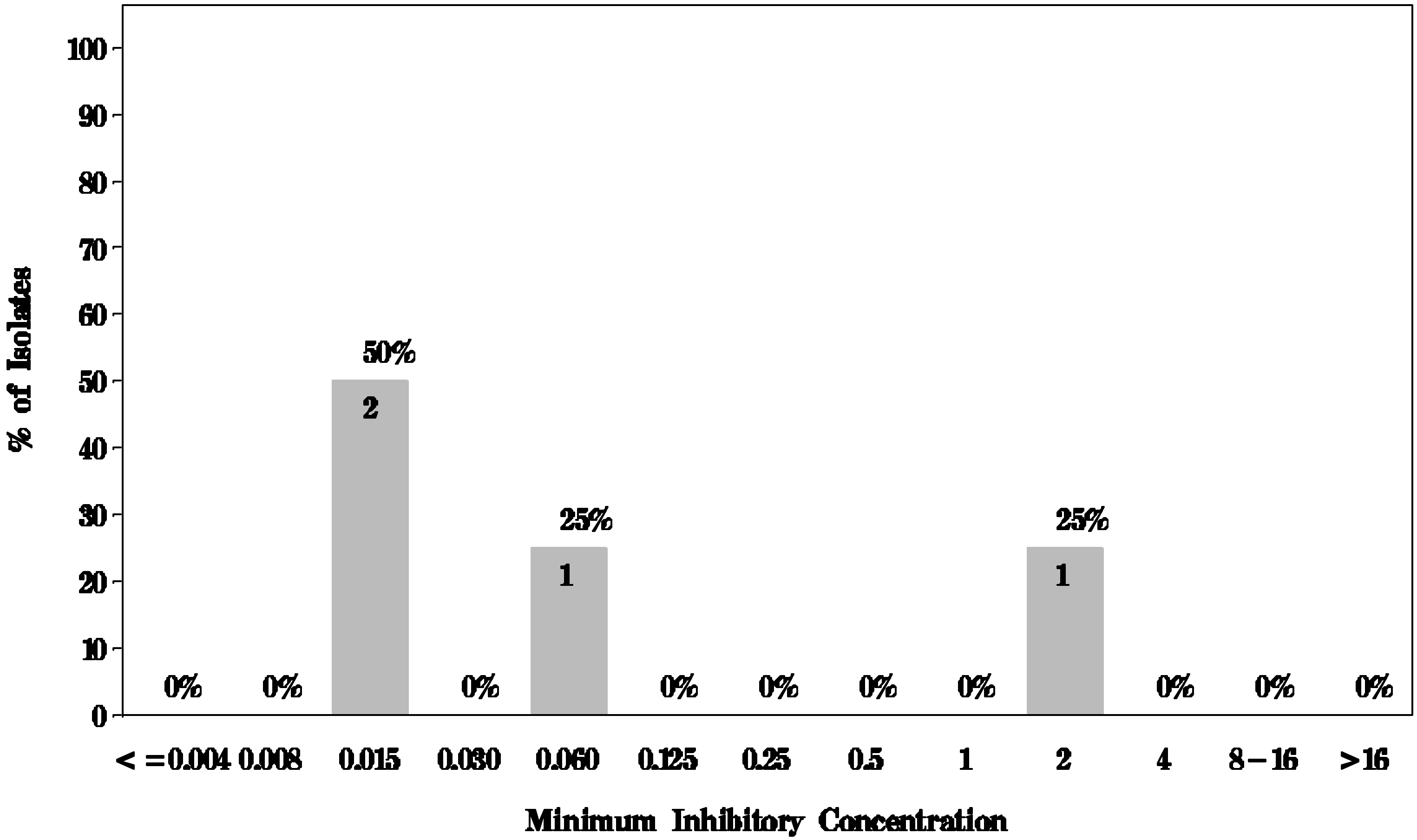
Breakpoints: Susceptible<=4 µg/mL Resistant>=16µg/mL



NARMS

Figure 11: Minimum Inhibitory Concentration of Meropenem for *Campylobacter* in Ground Turkey (N=4 Isolates)

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



NARMS

Figure 11: Minimum Inhibitory Concentration of Meropenem for *Campylobacter* in Pork Chop (N=5 Isolates)

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

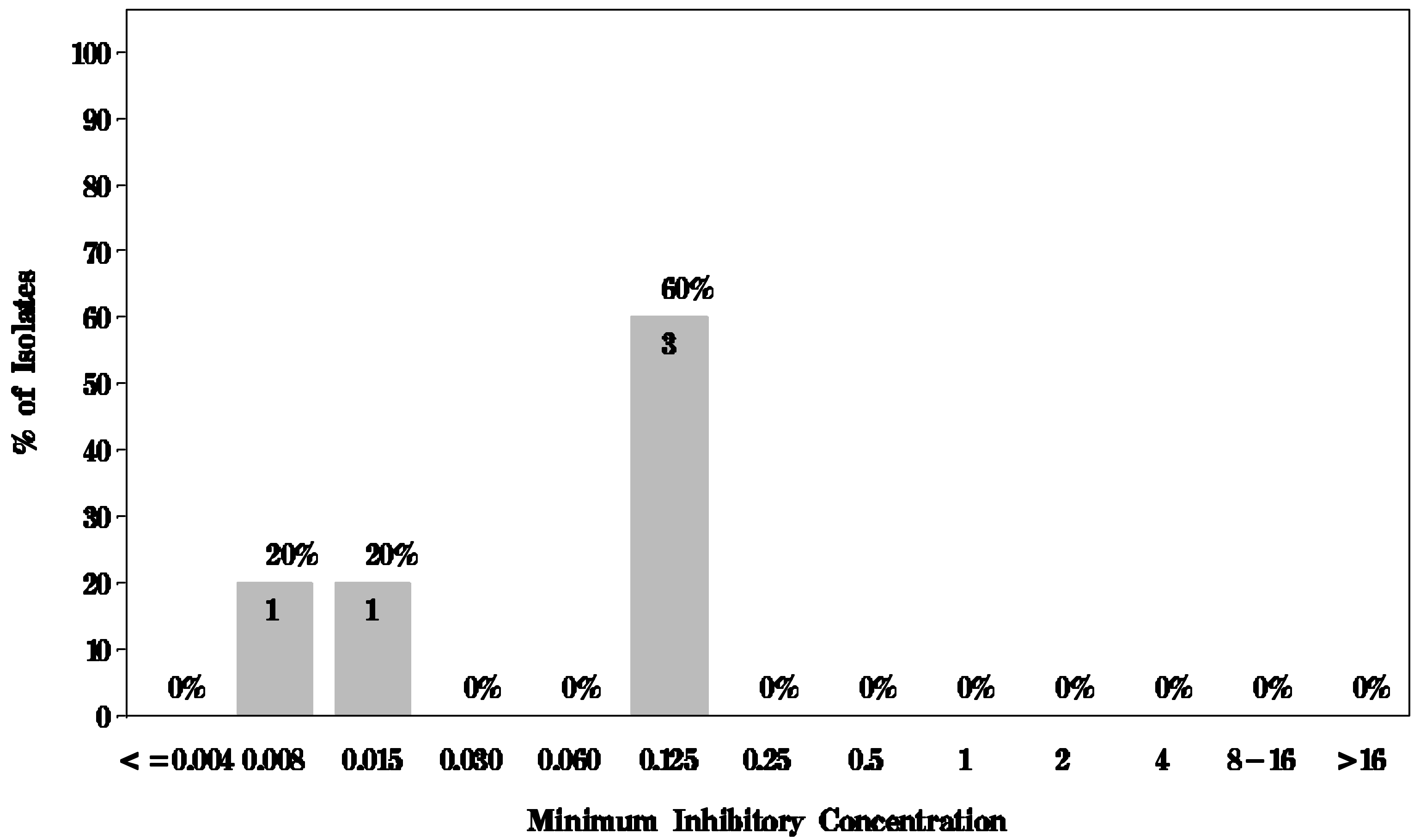


Table 24. Antimicrobial Resistance among *Campylobacter* by Species, 2002.

Species	*Antimicrobial Agent*				
	DOX	**CIP**	**ERY**	**GEN**	**MER***
***C. coli* (n=95)**	42.1%	10.5%	19.0%		
***C. jejuni* (n=202)**	20.8%	15.4%			
Total %R (N=297)	**27.6%**	**13.8%**	**6.1%**	**0.0%**	**0.0%**

* One *C. coli* from ground turkey had MER MIC=2 µg/ml.

Table 25. Antimicrobial Resistance among *Campylobacter jejuni* & *C. coli* by Meat Type,[*] 2002.

Meat Type	*Species*	*Antimicrobial Agent*[†]		
		DOX	**CIP**	**ERY**
Chicken Breast	***C. coli* (n=90)**	42.2%	10.0%	18.9%
	***C. jejuni* (n=198)**	20.7%	15.2%	
Ground Turkey	***C. coli* (n=2)**	50.0%	50.0%	
	***C. jejuni* (n=2)**	50.0%	50.0%	
Pork Chop	***C. coli* (n=3)**	33.3%		33.3%
	***C. jejuni* (n=2)**			

[*] No *Campylobacter* recovered from ground beef.
[†] No resistance seen to Gentamicin or Meropenem in *Campylobacter* isolates; one *C. coli* from ground turkey had MER MIC=2 µg/ml.

Table 26. Antimicrobial Resistance among *Campylobacter* by Site, Meat Type, and Antimicrobial Agent, 2002.

Site*	***Meat Type**†*	***Antimicrobial Agent**‡*		
		DOX	**CIP**	**ERY**
CT	CB (n=74)	36.5%	28.4%	6.8%
	GT (n=2)	50.0%	50.0%	
	PC (n=1)			
	Total (n=77)	**36.4%**	**28.6%**	**6.5%**
GA	CB (n=84)	26.2%	6.0%	2.4%
	GT (n=0)			
	PC (n=0)			
	Total (n=84)	**26.2%**	**6.0%**	**2.4%**
MD	CB (n=30)	23.3%	20.0%	13.3%
	GT (n=0)			
	PC (n=1)			
	Total (n=31)	**22.6%**	**19.4%**	**12.9%**
MN	CB (n=33)	3.0%		
	GT (n=1)	100.0%	100.0%	
	PC (n=0)			
	Total (n=34)	**5.9%**	**2.9%**	**0.0%**
TN	CB (n=66)	33.3%	10.6%	9.1%
	GT (n=1)			
	PC (n=3)	33.3%		33.3%
	Total (n=70)	**32.9%**	**10.0%**	**10.0%**
	Total %R (N=297)	**27.6%**	**13.8%**	**6.1%**

* No resistant isolates recovered from OR.

† No *Campylobacter* recovered from ground beef.

‡ No resistance seen to Gentamicin or Meropenem in *Campylobacter* isolates; one isolate from ground turkey had MER MIC=2 µg/ml.

Table 27. Number of *Campylobacter* Isolates (N=297) Resistant to Multiple Antimicrobial Agents,[*] 2002.

Meat Type	***Number of Antimicrobials***			
	0	**1**	**2**	**3**
CB	173	97	17	1
GT	1	2	1	0
PC	4	0	1	0
Total	**178**	**99**	**19**	**1**

[*] No *Campylobacter* recovered from ground beef.

Table 28. Overall *Enterococcus* Species Identified, 2002

Species	n
faecalis	893
faecium	506
hirae	102
durans	10
gallinarum	5
avium	4
Total	1520

Table 29. *Enterococcus* Species by Meat Type, 2002

	Chicken Breast		Ground Turkey		Ground Beef		Pork Chop	
Species	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
faecalis (n=893)	134	15.0%	294	32.9%	210	23.5%	255	28.6%
faecium (n=506)	231	45.7%	89	17.6%	93	18.4%	93	18.4%
hirae (n=102)	12	11.8%	2	2.0%	76	74.5%	12	11.8%
avium (n=4)	3	75.0%		0.0%	1	25.0%		0.0%
durans (n=10)	1	10.0%		0.0%	3	30.0%	6	60.0%
gallinarum (n=5)		0.0%	2	40.0%		0.0%	3	60.0%
Total (N=1520)	**381**	**25.1%**	**387**	**25.5%**	**383**	**25.2%**	**369**	**24.3%**

Table 30. *Enterococcus* Species by Site and Meat Type, 2002

		Chicken Breast		Ground Turkey		Ground Beef		Pork Chop	
Site	**Species**	**n**	**%**	**#**	**%**	**#**	**%**	**#**	**%**
GA	***faecalis*** **(n=393)**	84	21.4%	118	30.0%	85	21.6%	106	27.0%
	faecium **(n=47)**	27	57.4%	2	4.3%	7	14.9%	11	23.4%
	hirae **(n=33)**	7	21.2%		0.0%	24	72.7%	2	6.1%
	avium **(n=2)**	2	100.0%		0.0%		0.0%		0.0%
	durans **(n=2)**		0.0%		0.0%	2	100.0%		0.0%
	Total (n=477)	**120**	**25.2%**	**120**	**25.2%**	**118**	**24.7%**	**119**	**24.9%**
MD	***faecalis*** **(n=117)**	10	8.5%	38	32.5%	31	26.5%	38	32.5%
	faecium **(n=284)**	105	37.0%	74	26.1%	56	19.7%	49	17.3%
	hirae **(n=31)**	1	3.2%	1	3.2%	20	64.5%	9	29.0%
	avium **(n=1)**	1	100.0%		0.0%		0.0%		0.0%
	durans **(n=5)**		0.0%		0.0%		0.0%	5	100.0%
	Total (n=438)	**117**	**26.7%**	**113**	**25.8%**	**107**	**24.4%**	**101**	**23.1%**
OR	***faecalis*** **(n=115)**	21	18.3%	35	30.4%	22	19.1%	37	32.2%
	faecium **(n=27)**	17	63.0%	4	14.8%	4	14.8%	2	7.4%
	hirae **(n=16)**	2	12.5%		0.0%	14	87.5%		0.0%
	gallinarum **(n=1)**		0.0%	1	100.0%		0.0%		0.0%
	Total (n=159)	**40**	**25.2%**	**40**	**25.2%**	**40**	**25.2%**	**39**	**24.5%**
TN	***faecalis*** **(n=268)**	19	7.1%	103	38.4%	72	26.9%	74	27.6%
	faecium **(n=148)**	82	55.4%	9	6.1%	26	17.6%	31	20.9%
	hirae **(n=22)**	2	9.1%	1	4.5%	18	81.8%	1	4.5%
	avium **(n=1)**		0.0%		0.0%	1	100.0%		0.0%
	durans **(n=3)**	1	33.3%		0.0%	1	33.3%	1	33.3%
	gallinarum **(n=4)**		0.0%	1	25.0%		0.0%	3	75.0%
	Total (n=446)	**104**	**23.3%**	**114**	**25.6%**	**118**	**26.5%**	**110**	**24.7%**

Table 31. *Enterococcus* Isolates by Month for All Sites, 2002

Month	*n*	*%*
January	120	7.9%
February	119	7.8%
March	112	7.4%
April	115	7.6%
May	108	7.1%
June	120	7.9%
July	116	7.6%
August	115	7.6%
September	152	10.0%
October	160	10.5%
November	149	9.8%
December	134	8.8%
Total	**1520**	**100.0%**

Table 32. *Enterococcus* Species by Meat Type and Month for All Sites, 2002

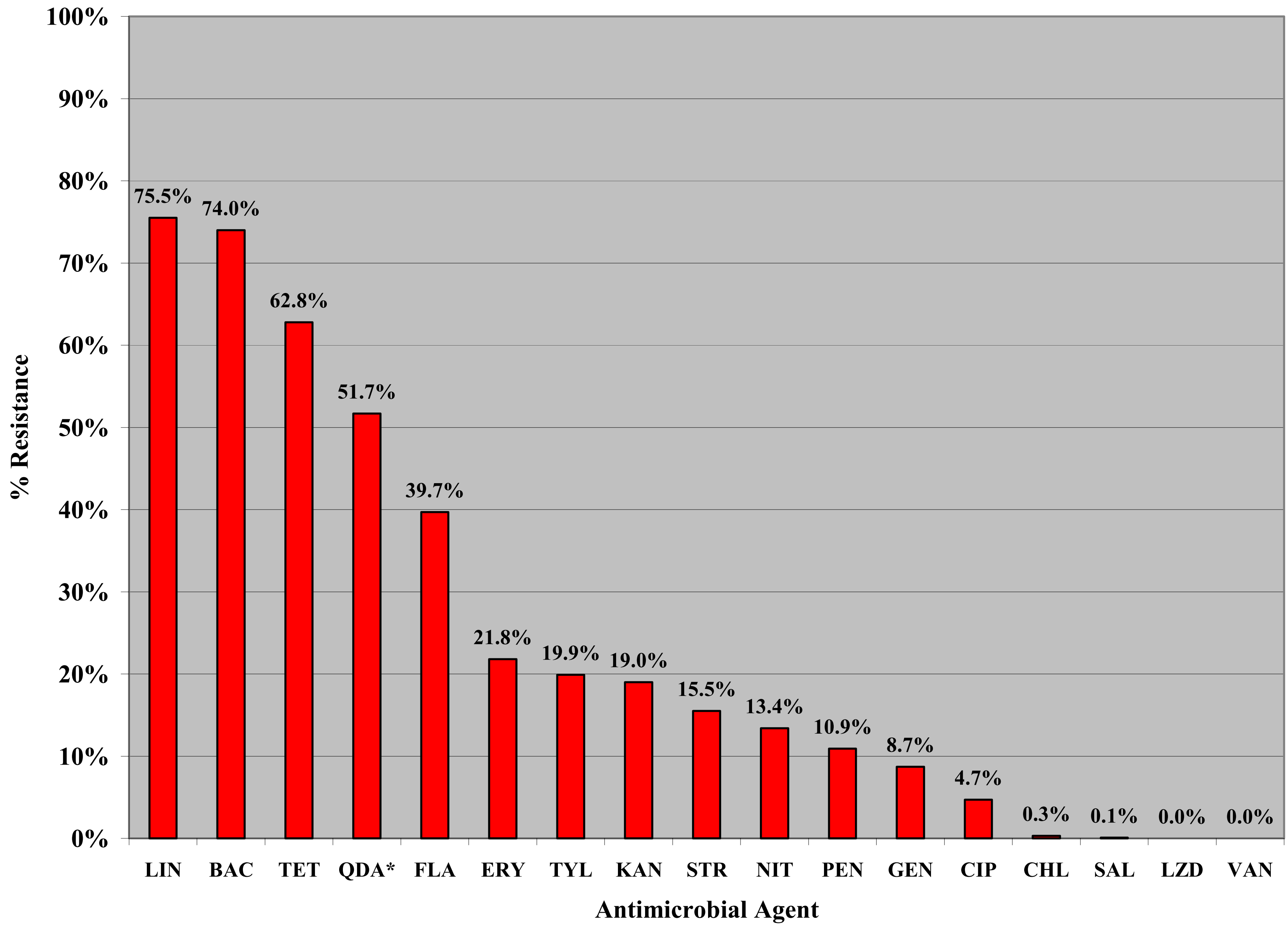
		Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sep		Oct		Nov		Dec	
Meat Type	**Species**	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
CB	*faecalis* (n=134)	21	15.7%	10	7.5%	10	7.5%	11	8.2%	11	8.2%	7	5.2%	9	6.7%	7	5.2%	13	9.7%	14	10.4%	13	9.7%	8	6.0%
	faecium (n=231)	7	3.0%	18	7.8%	19	8.2%	17	7.4%	15	6.5%	22	9.5%	20	8.7%	22	9.5%	22	9.5%	22	9.5%	25	10.8%	22	9.5%
	hirae (n=12)	1	8.3%	1	8.3%							1	8.3%			1	8.3%	5	41.7%	3	25.0%				
	avium (n=3)	1	33.3%							1	33.3%									1	33.3%				
	durans (n=1)			1	100%																				
	Total (n=381)	**30**	7.9%	**30**	7.9%	**29**	7.6%	**28**	7.3%	**27**	7.1%	**30**	7.9%	**29**	7.6%	**30**	7.9%	**40**	10.5%	**40**	10.5%	**38**	10.0%	**30**	7.9%
GT	***faecalis*** (n=294)	21	7.1%	25	8.5%	17	5.8%	24	8.2%	19	6.5%	20	6.8%	20	6.8%	22	7.5%	26	8.8%	31	10.5%	35	11.9%	34	11.6%
	faecium (n=89)	9	10.1%	5	5.6%	8	9.0%	6	6.7%	9	10.1%	9	10.1%	9	10.1%	8	9.0%	10	11.2%	9	10.1%	2	2.2%	5	5.6%
	hirae (n=2)											1	50.0%					1	50.0%						
	gallinarum (n=2)																	2	100%						
	Total (n=387)	**30**	7.8%	**30**	7.8%	**25**	6.5%	**30**	7.8%	**28**	7.2%	**30**	7.8%	**29**	7.5%	**30**	7.8%	**39**	10.1%	**40**	10.3%	**37**	9.6%	**39**	10.1%
GB	***faecalis*** (n=210)	16	7.6%	14	6.7%	17	8.1%	16	7.6%	14	6.7%	16	7.6%	16	7.6%	16	7.6%	20	9.5%	22	10.5%	23	11.0%	20	9.5%
	faecium (n=93)	5	5.4%	13	14.0%	9	9.7%	9	9.7%	5	5.4%	8	8.6%	8	8.6%	2	2.2%	10	10.8%	11	11.8%	6	6.5%	7	7.5%
	hirae (n=76)	9	11.8%	3	3.9%	3	3.9%	2	2.6%	7	9.2%	6	7.9%	5	6.6%	8	10.5%	8	10.5%	6	7.9%	8	10.5%	11	14.5%
	avium (n=1)																			1	100%				
	durans (n=3)																					2	66.7%	1	33.3%
	Total (n=383)	**30**	7.8%	**30**	7.8%	**29**	7.6%	**27**	7.0%	**26**	6.8%	**30**	7.8%	**29**	7.6%	**26**	6.8%	**38**	9.9%	**40**	10.4%	**39**	10.2%	**39**	10.2%
PC	***faecalis*** (n=255)	21	8.2%	21	8.2%	19	7.5%	24	9.4%	12	4.7%	15	5.9%	18	7.1%	18	7.1%	29	11.4%	31	12.2%	26	10.2%	21	8.2%
	faecium (n=93)	9	9.7%	7	7.5%	10	10.8%	6	6.5%	8	8.6%	12	12.9%	11	11.8%	8	8.6%	4	4.3%	8	8.6%	5	5.4%	5	5.4%
	hirae (n=12)			1	8.3%							2	16.7%			3	25.0%	2	16.7%			4	33.3%		
	durans (n=6)									4	66.7%	1	16.7%							1	16.7%				
	gallinarum (n=3)									3	100%														
	Total (369)	**30**	8.1%	**29**	7.9%	**29**	7.9%	**30**	8.1%	**27**	7.3%	**30**	8.1%	**29**	7.9%	**29**	7.9%	**35**	9.5%	**40**	10.8%	**35**	9.5%	**26**	7.0%
Total (N=1520)		120	7.9%	119	7.8%	112	7.4%	115	7.6%	108	7.1%	120	7.9%	116	7.6%	115	7.6%	152	10.0%	160	10.5%	149	9.8%	134	8.8%

Table 33. Antimicrobial Resistance (% R) among *Enterococcus* Isolates (N=1520), 2002

Antimicrobial Agent	n	% R
Quinupristin-Dalfopristin*	324	51.7%
Lincomycin	1148	75.5%
Bacitracin	1124	74.0%
Tetracycline	954	62.8%
Flavomycin	603	39.7%
Erythromycin	332	21.8%
Tylosin	302	19.9%
Kanamycin	289	19.0%
Streptomycin	235	15.5%
Nitrofurantoin	204	13.4%
Penicillin	166	10.9%
Gentamicin	132	8.7%
Ciprofloxacin	71	4.7%
Chloramphenicol	4	0.3%
Salinomycin	2	0.1%
Linezolid	0	0.0%
Vancomycin	0	0.0%

* Presented for all species except *E. faecalis* (n=893)

Figure 12. Antimicrobial Resistance among *Enterococcus* Isolates (N=1520), 2002

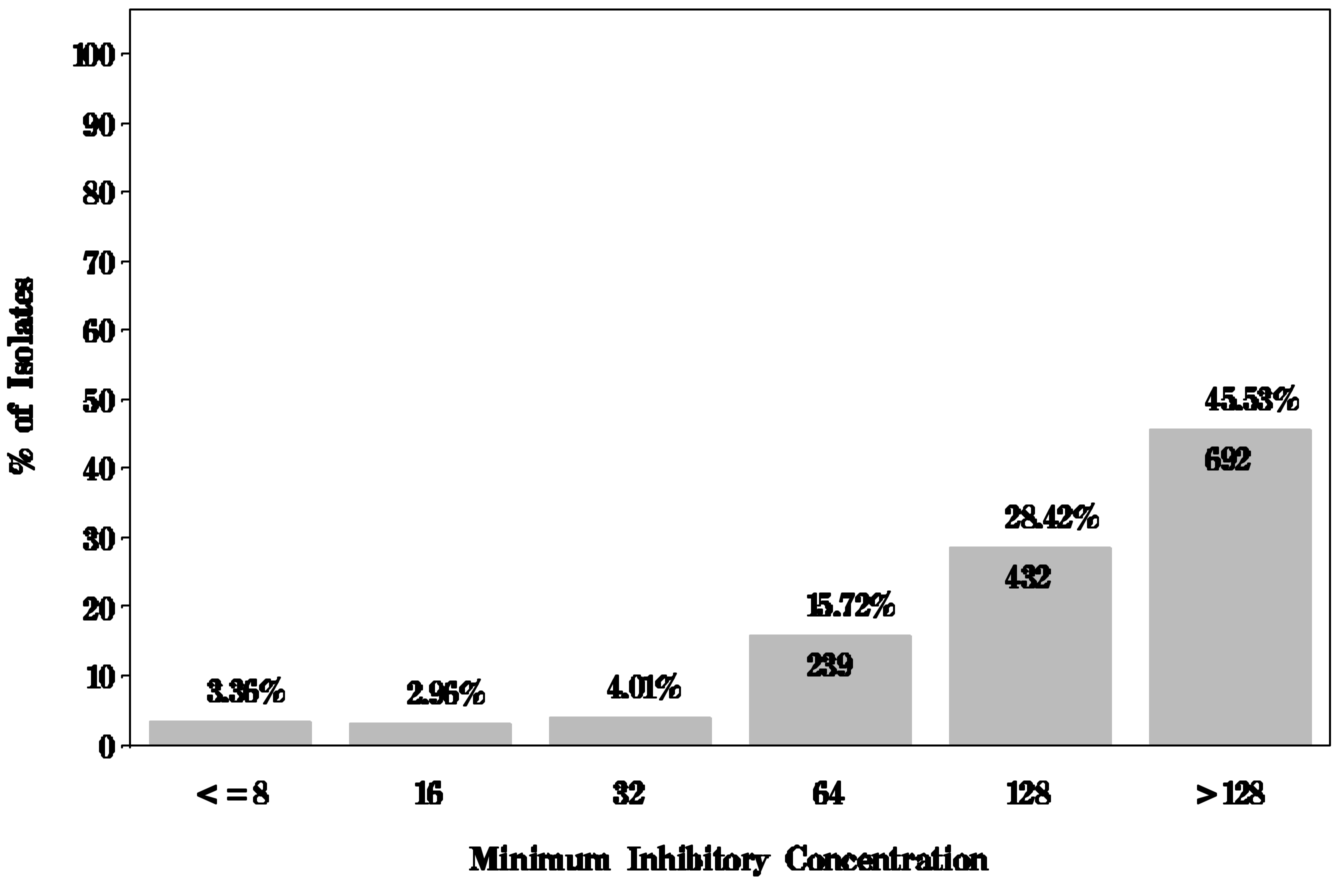


*Presented for all species except *E. faecalis* in QDA (N=1520-893=627 non *E. faecalis*)

NARMS

Figure 13: Minimum Inhibitory Concentration of Bacitracin for *Enterococcus* (N=1520 Isolates)

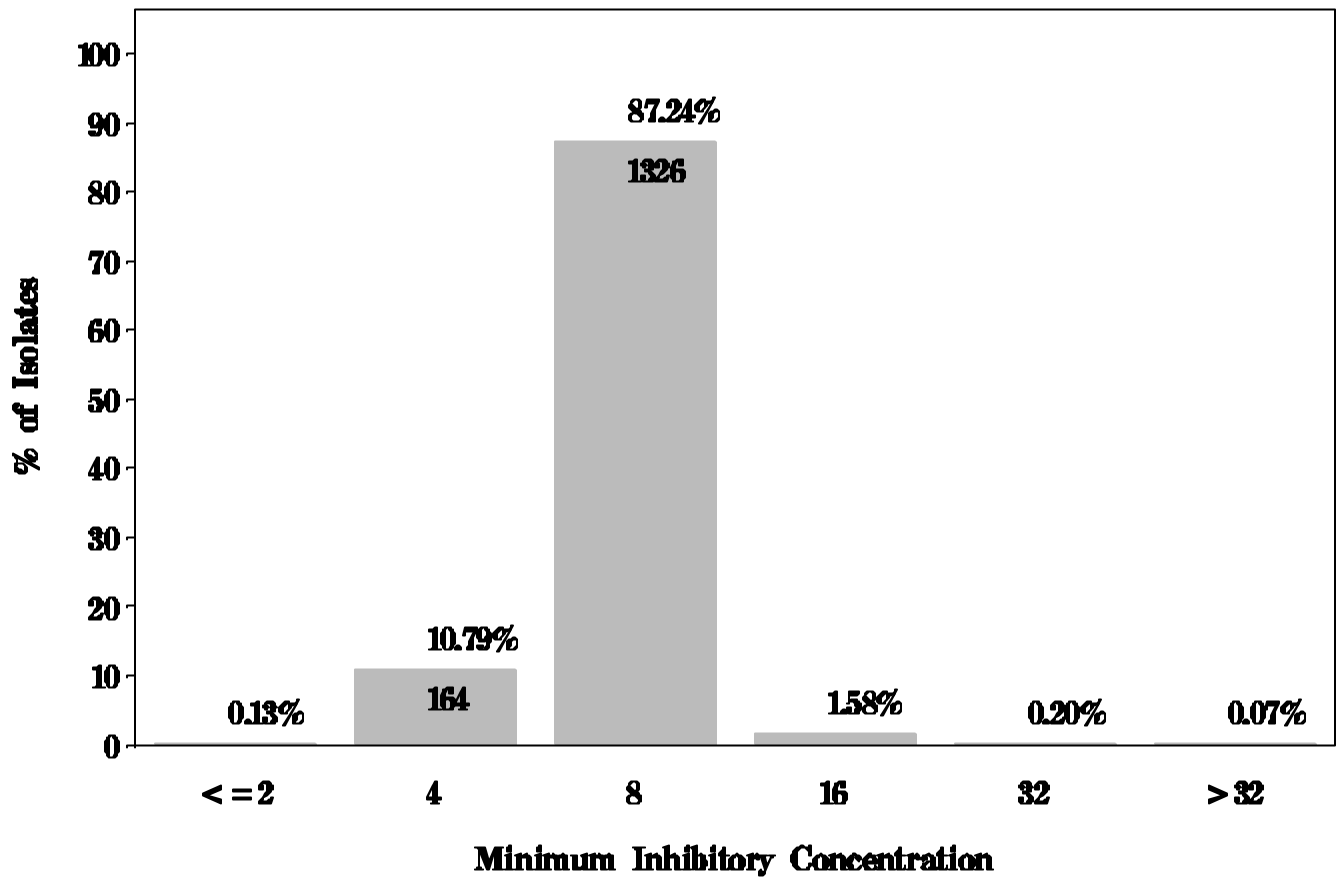
Breakpoints: Susceptible<=32 μg/mL Resistant>=128 μg/mL



NARMS

Figure 13: Minimum Inhibitory Concentration of Chloramphenicol for *Enterococcus* (N=1520 Isolates)

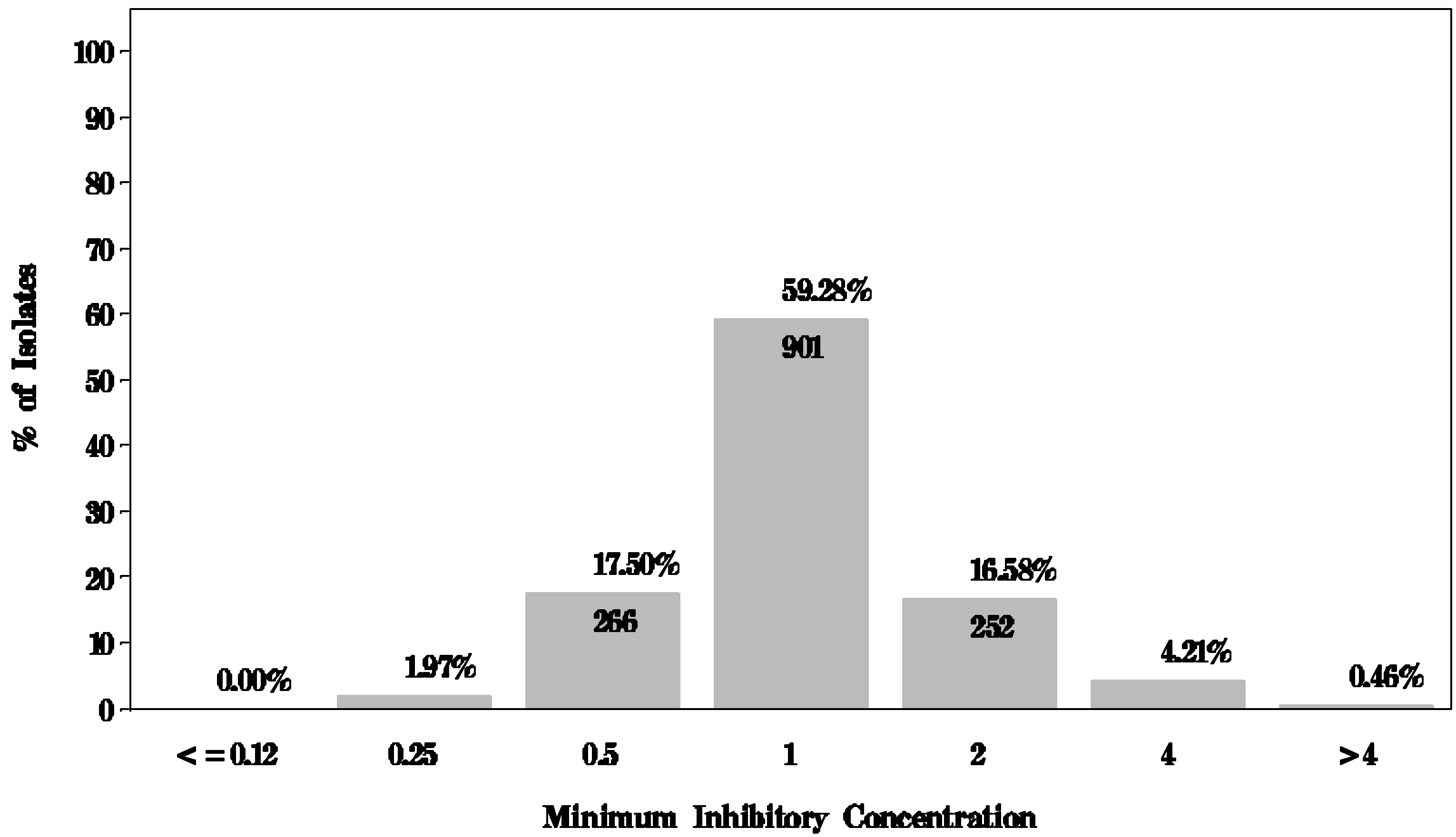
Breakpoints: Susceptible <=8 μg/mL Resistant >=32 μg/mL



NARMS

Figure 13: Minimum Inhibitory Concentration of Ciprofloxacin for *Enterococcus* (N=1520 Isolates)

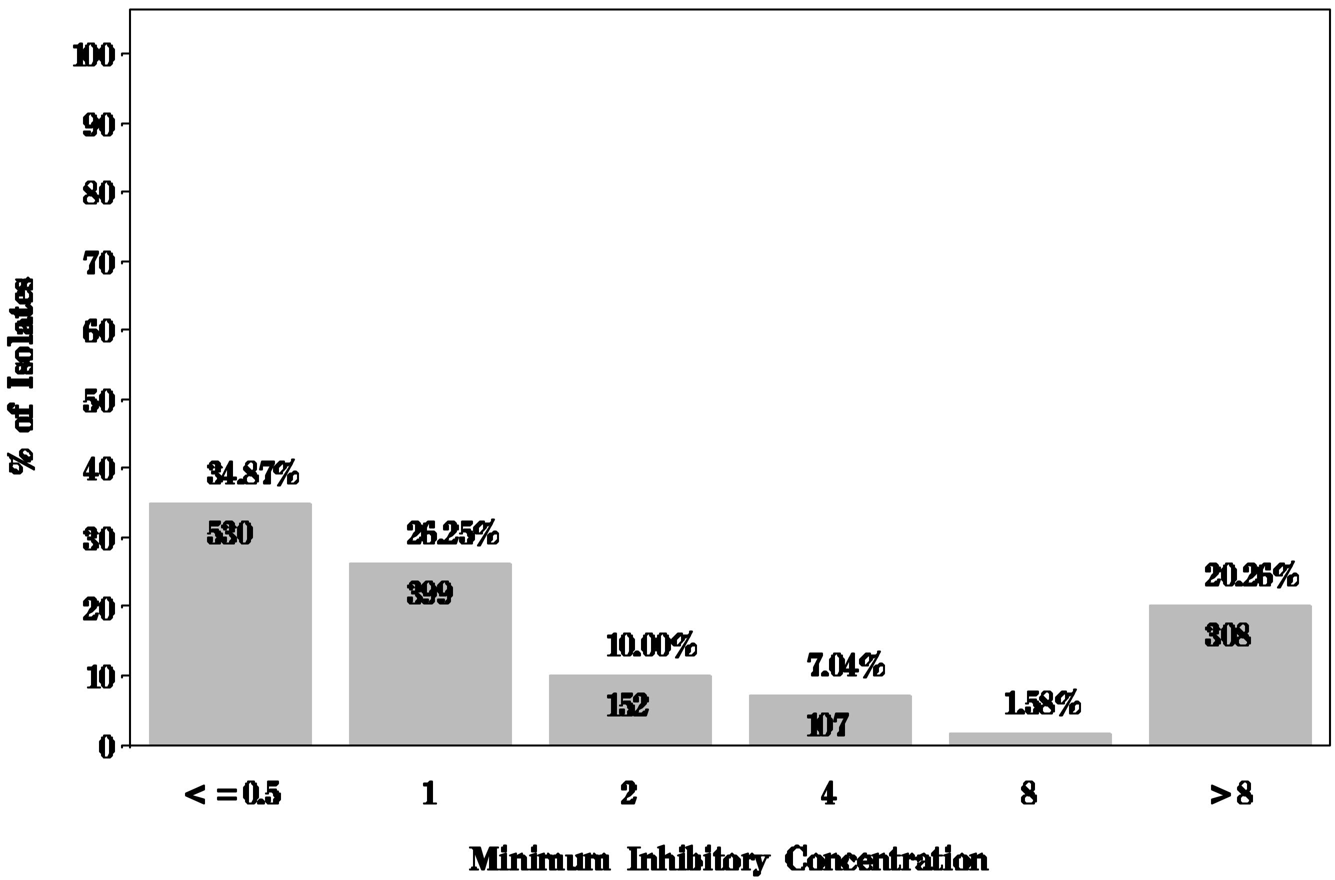
Breakpoints: Susceptible <=1 μg/mL Resistant >=4 μg/mL



NARMS

Figure 13: Minimum Inhibitory Concentration of Erythromycin for *Enterococcus* (N=1520 Isolates)

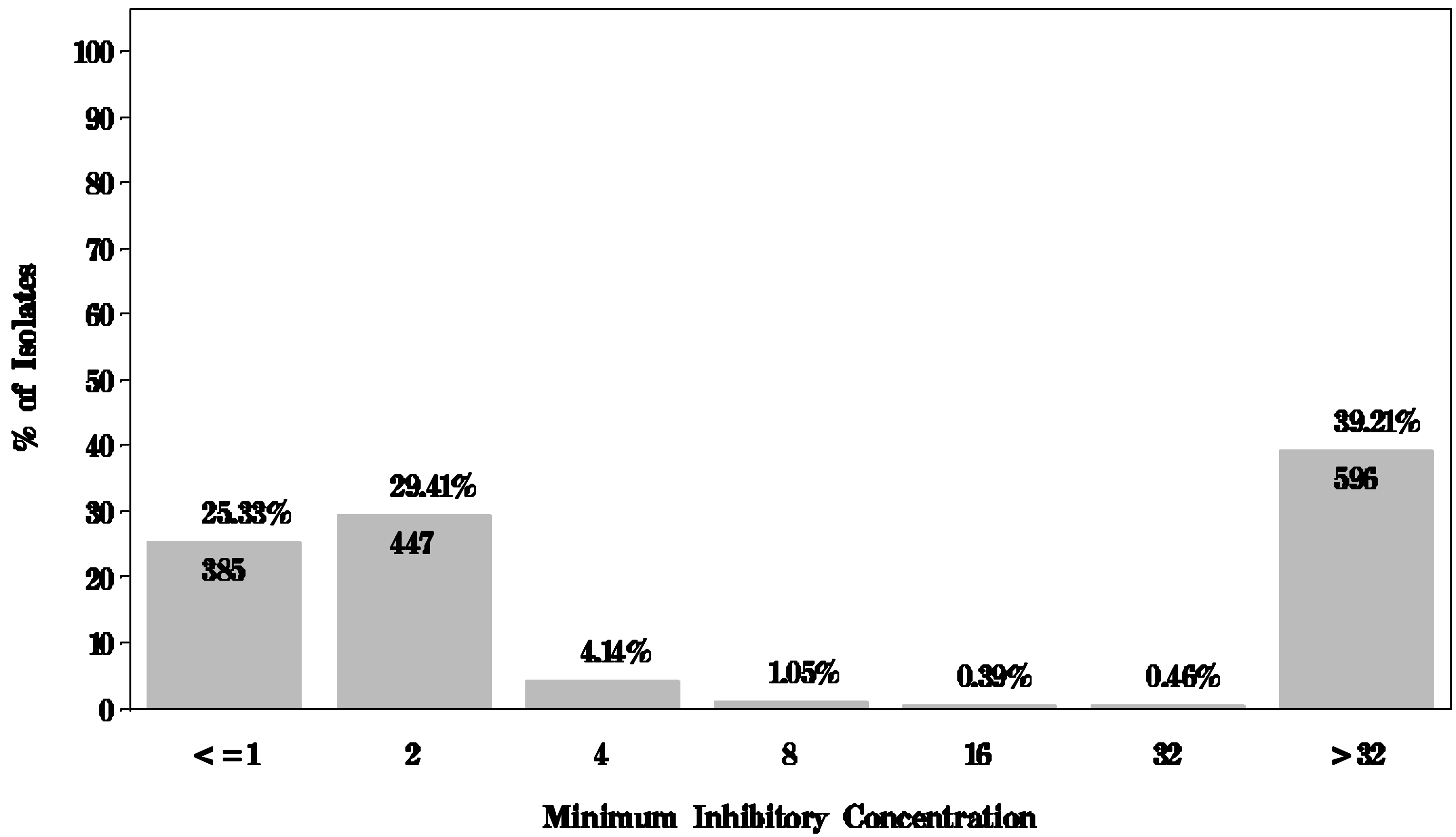
Breakpoints: Susceptible<=.5 μg/mL Resistant>=8 μg/mL



NARMS

Figure 13: Minimum Inhibitory Concentration of Flavomycin for *Enterococcus* (N=1520 Isolates)

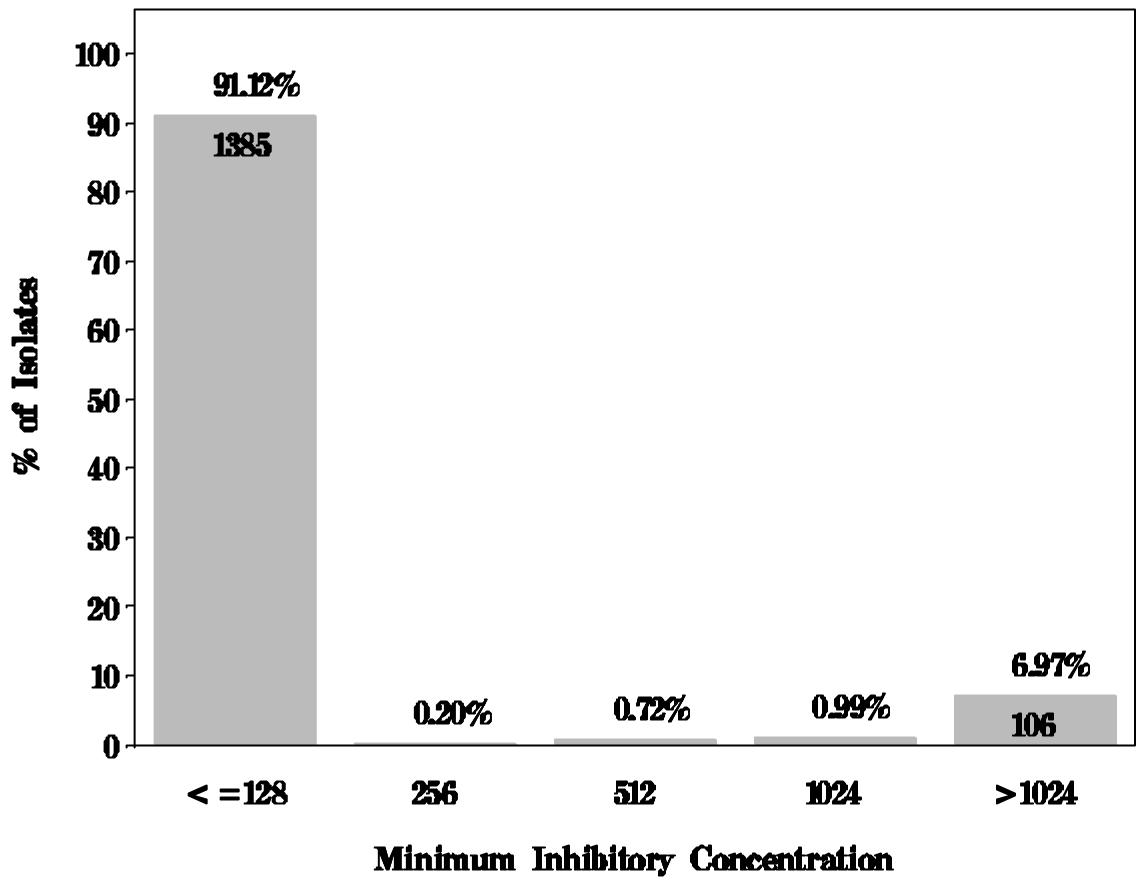
Breakpoints: Susceptible <=8 μg/mL Resistant >=32 μg/mL



NARMS

Figure 13: Minimum Inhibitory Concentration of Gentamicin for *Enterococcus* (N=1520 Isolates)

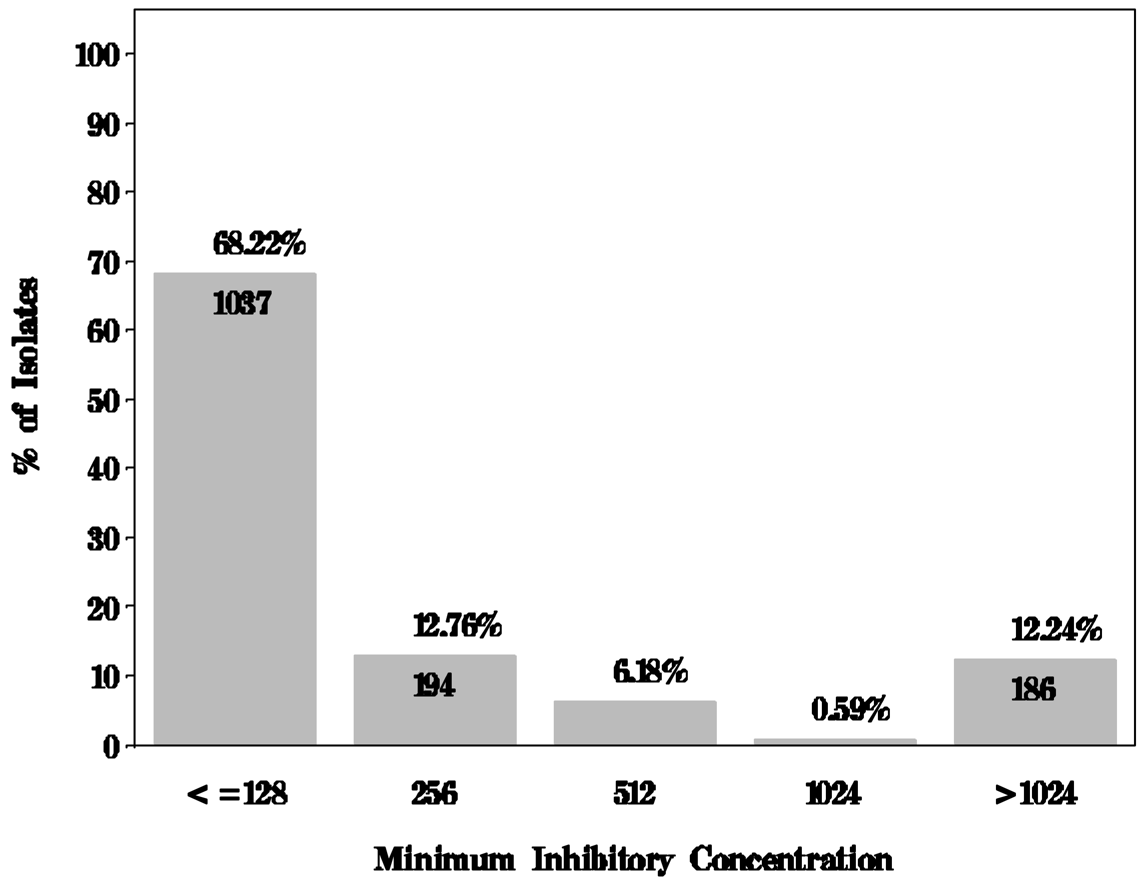
Breakpoints: Susceptible<500 μg/mL Resistant>=500 μg/mL



NARMS

Figure 13: Minimum Inhibitory Concentration of Kanamycin for *Enterococcus* (N=1520 Isolates)

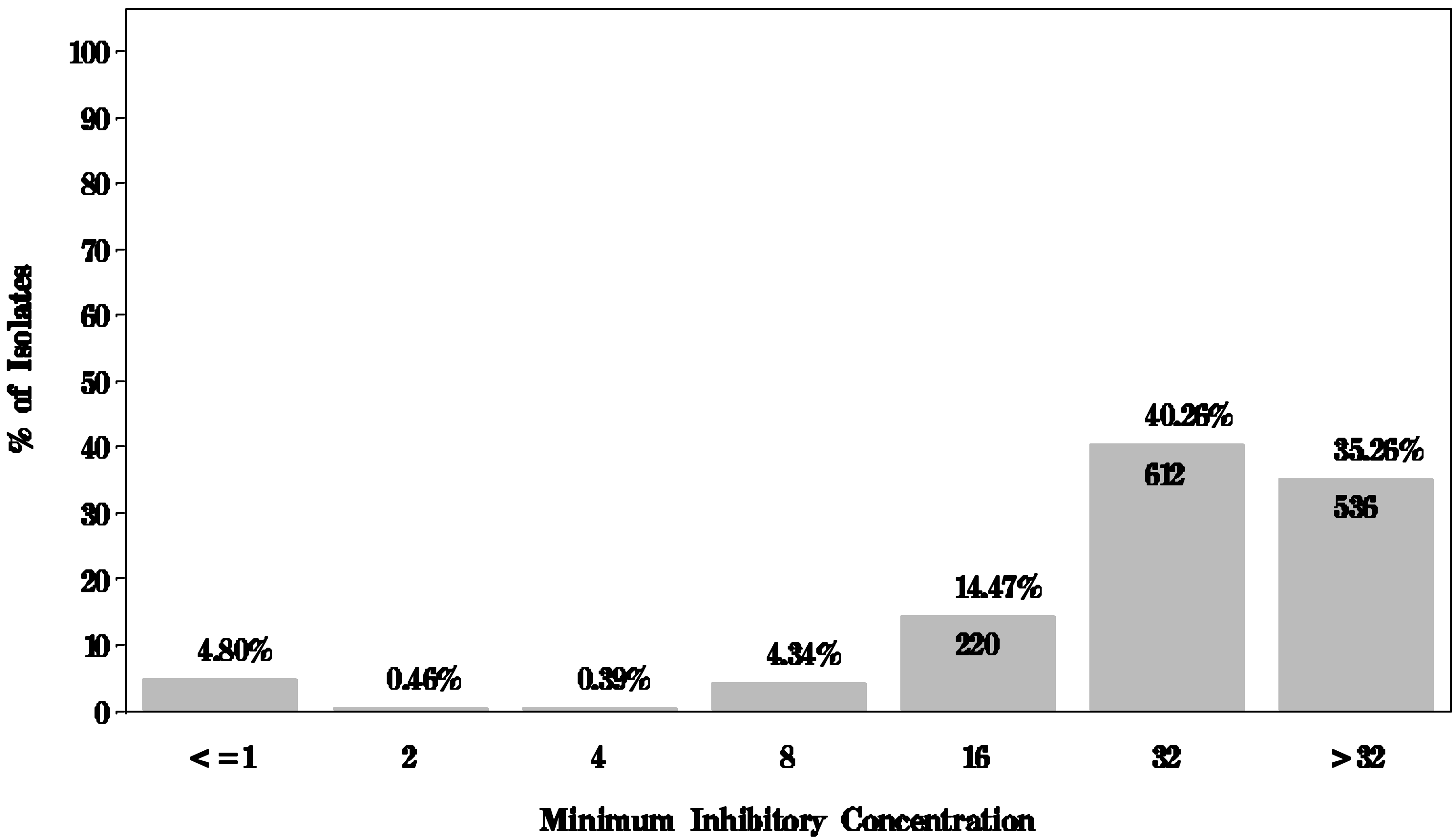
Breakpoints: Susceptible<=128 μg/mL Resistant>=512 μg/mL



NARMS

Figure 13: Minimum Inhibitory Concentration of Lincomycin for *Enterococcus* (N=1520 Isolates)

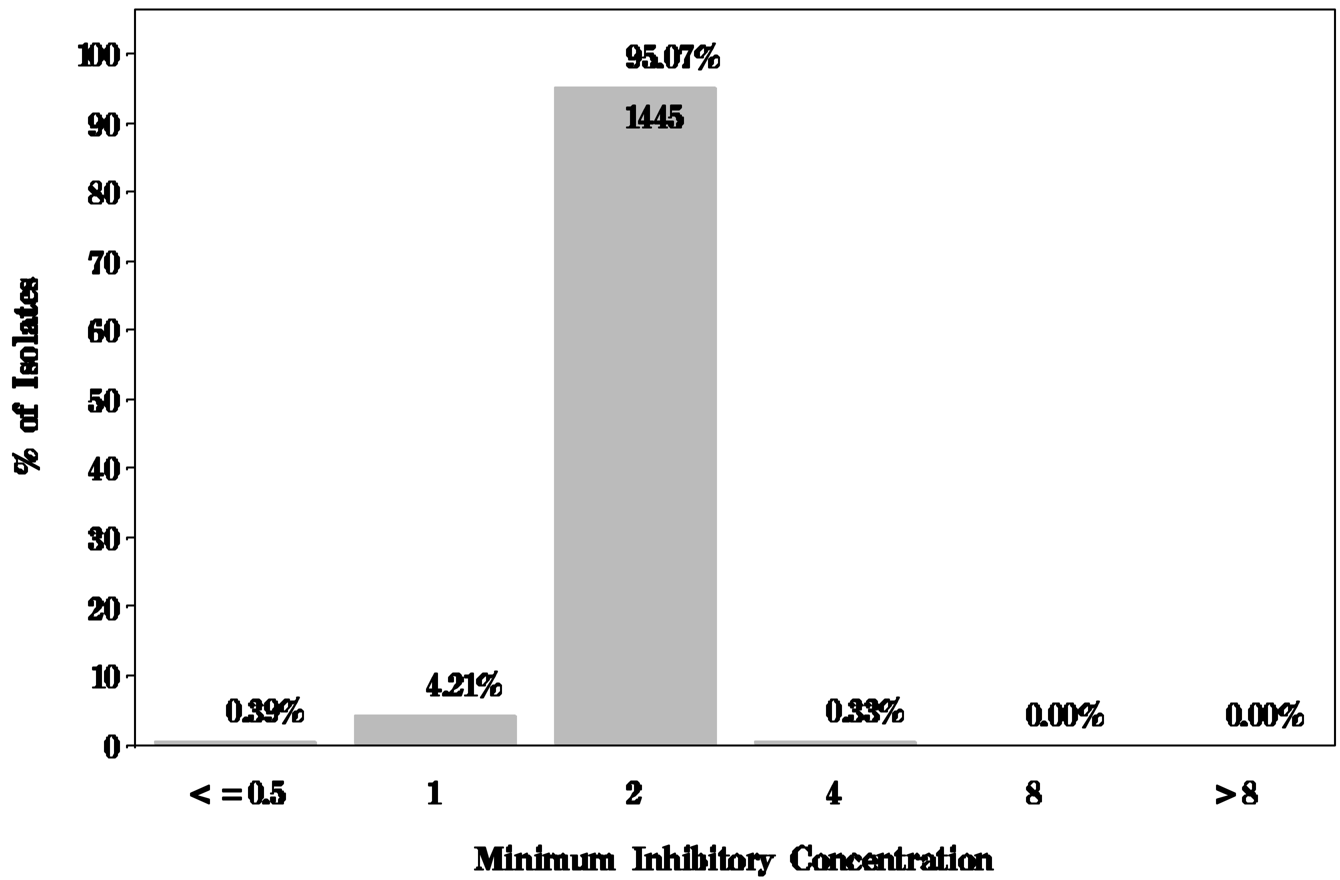
Breakpoints: Susceptible<=8 μg/mL Resistant>=32 μg/mL



NARMS

Figure 13: Minimum Inhibitory Concentration of Linezolid for *Enterococcus* (N=1520 Isolates)

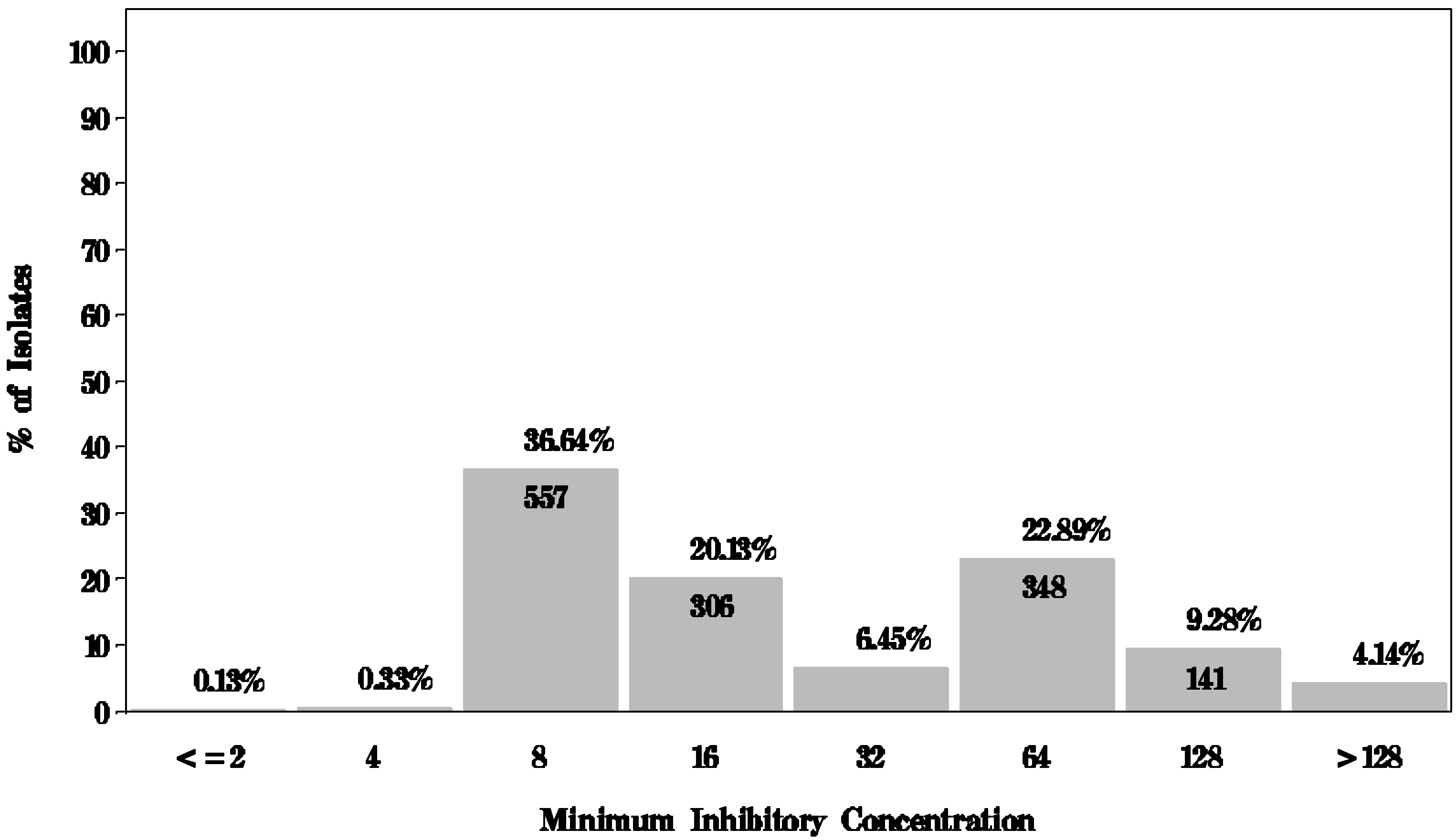
Breakpoints: Susceptible <=2 μg/mL Resistant >=8 μg/mL



NARMS

Figure 13: Minimum Inhibitory Concentration of Nitrofurantoin for *Enterococcus* (N=1520 Isolates)

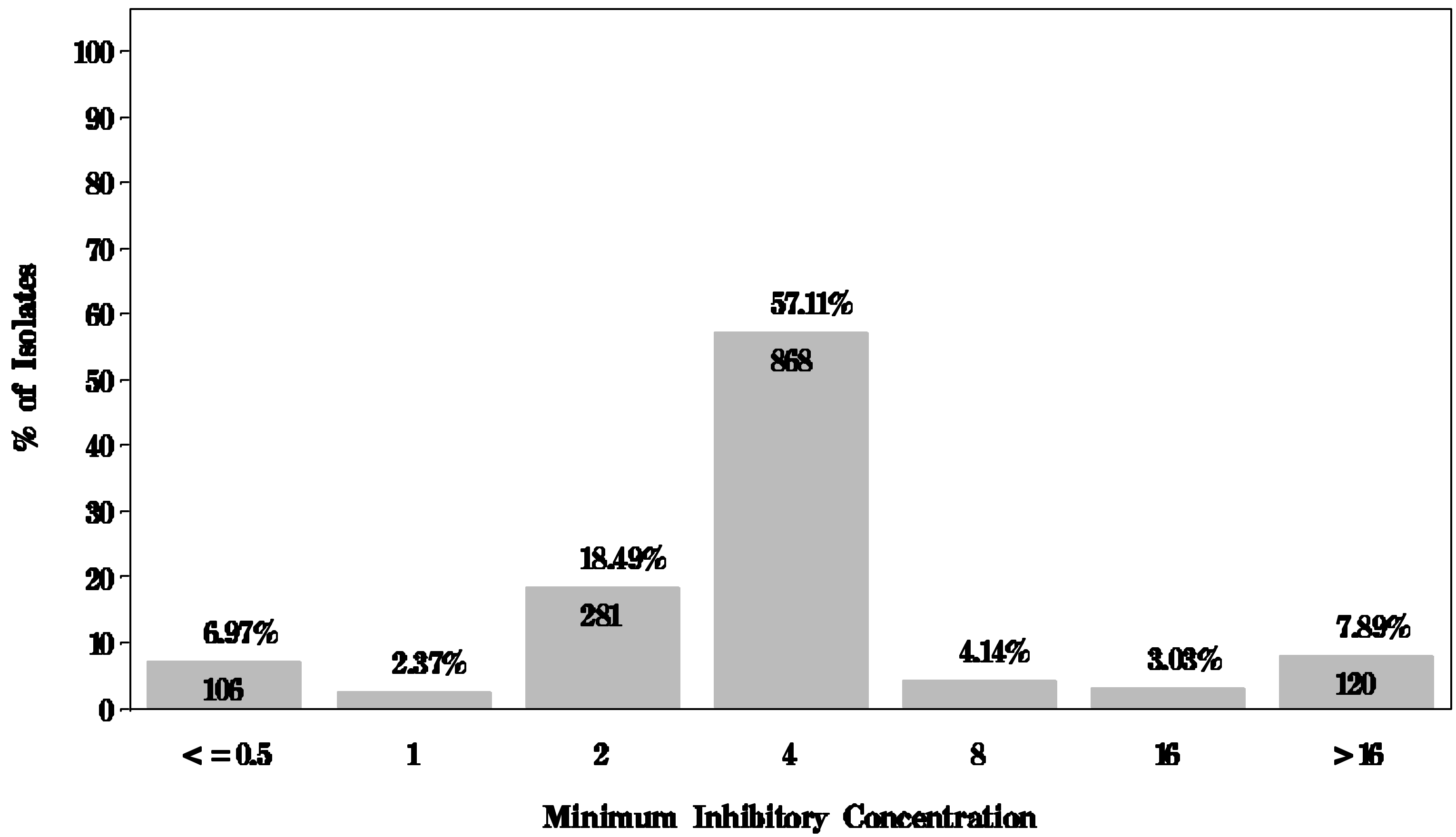
Breakpoints: Susceptible<=32 μg/mL Resistant>=128 μg/mL



NARMS

Figure 13: Minimum Inhibitory Concentration of Penicillin for *Enterococcus* (N=1520 Isolates)

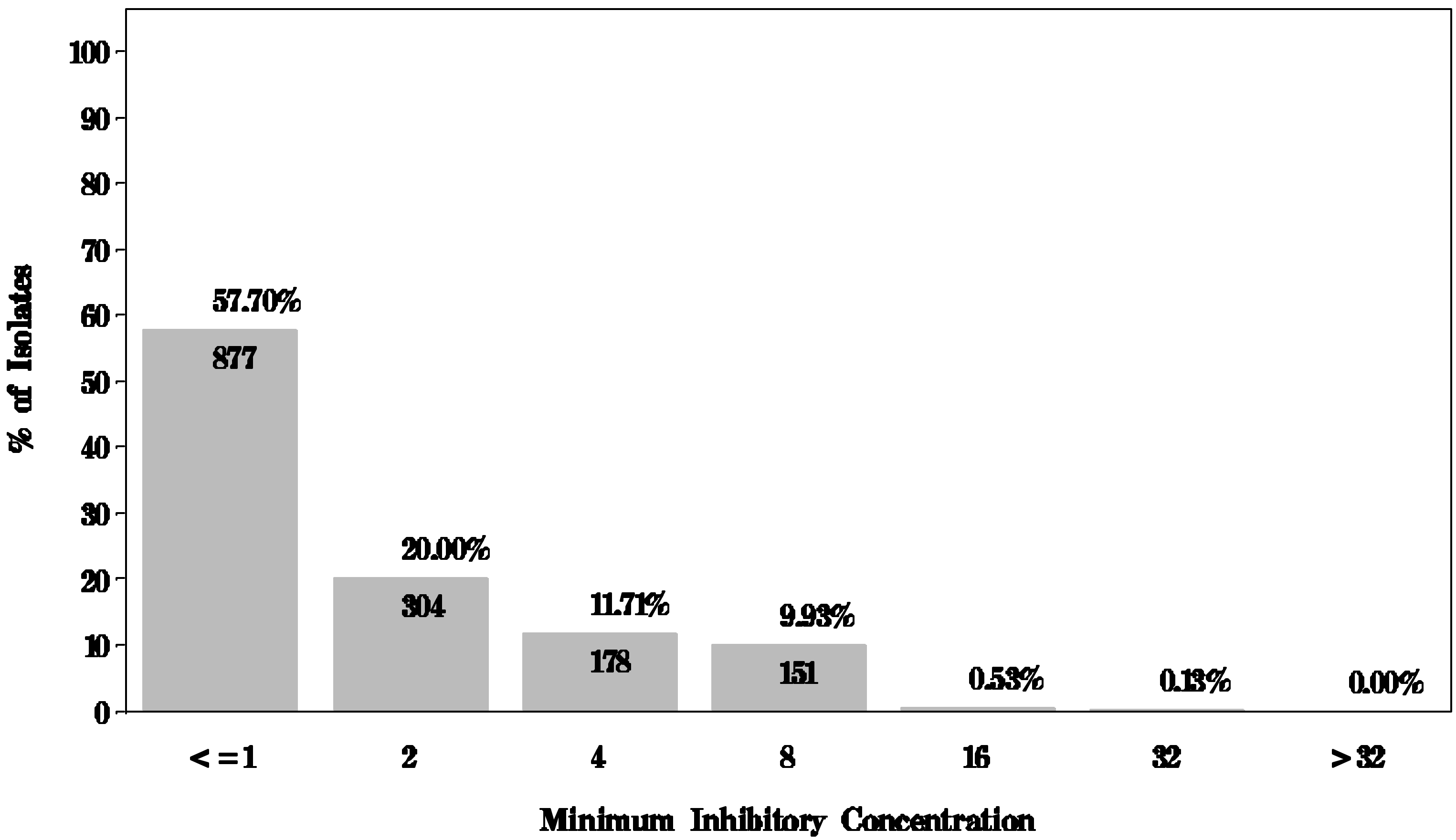
Breakpoints: Susceptible <=8 μg/mL Resistant >=16 μg/mL



NARMS

Figure 13: Minimum Inhibitory Concentration of Salinomycin for *Enterococcus* (N=1520 Isolates)

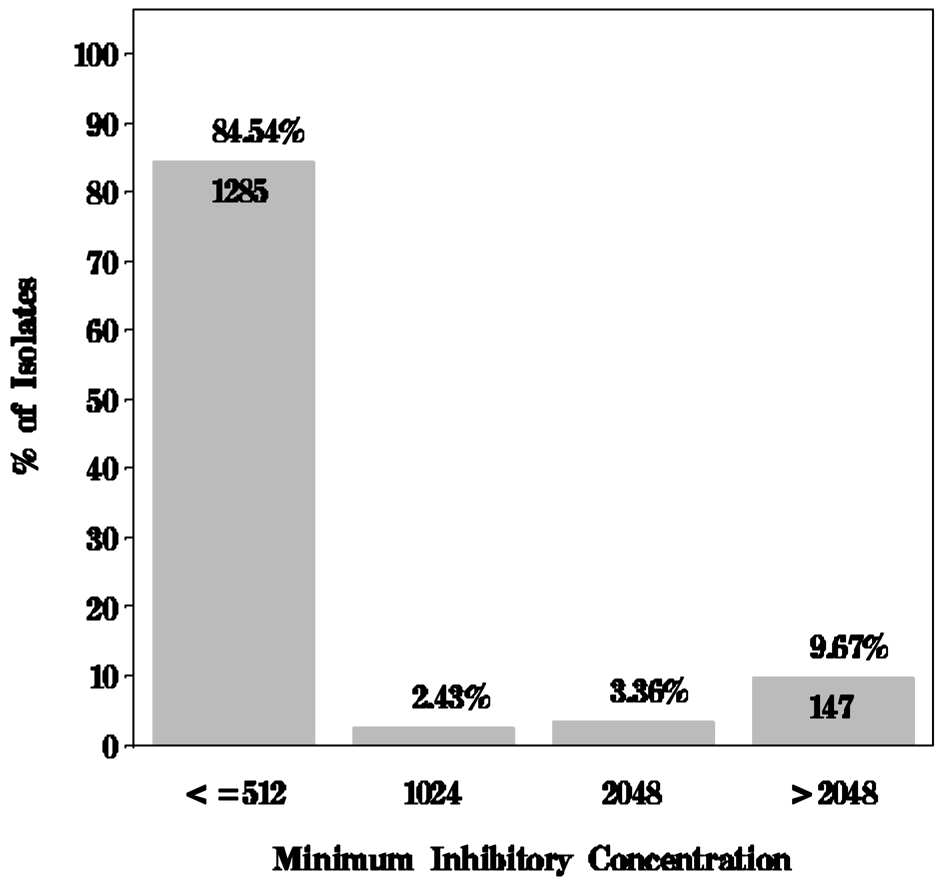
Breakpoints: Susceptible<=8 µg/mL Resistant>=32 µg/mL



NARMS

Figure 13: Minimum Inhibitory Concentration of Streptomycin for *Enterococcus* (N=1520 Isolates)

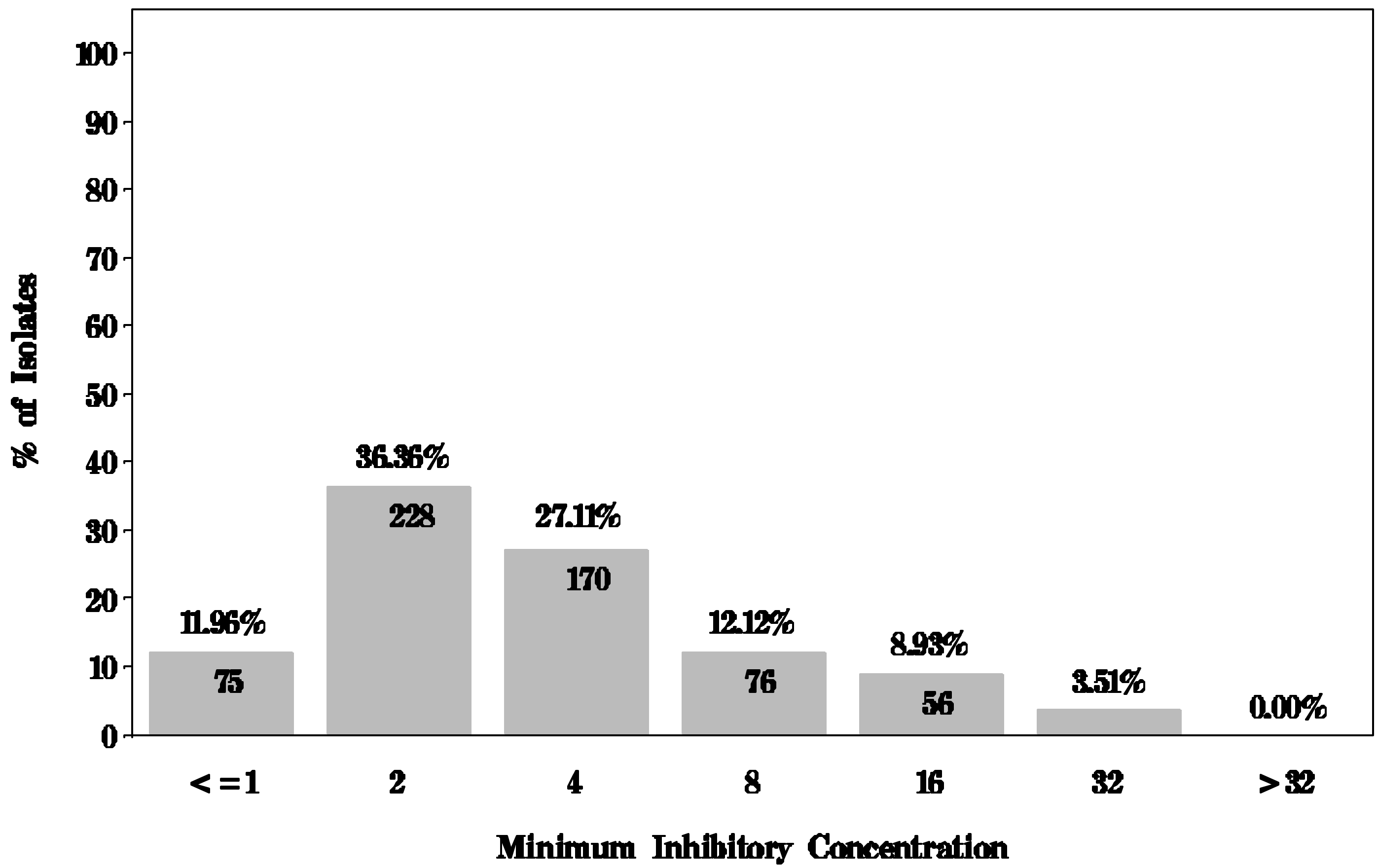
Breakpoints: Susceptible<1000 μg/mL Resistant>=1000 μg/mL



NARMS

Figure 13: Minimum Inhibitory Concentration of Quinupristin−dalfopristin for *Enterococcus* (N=627 Isolates)

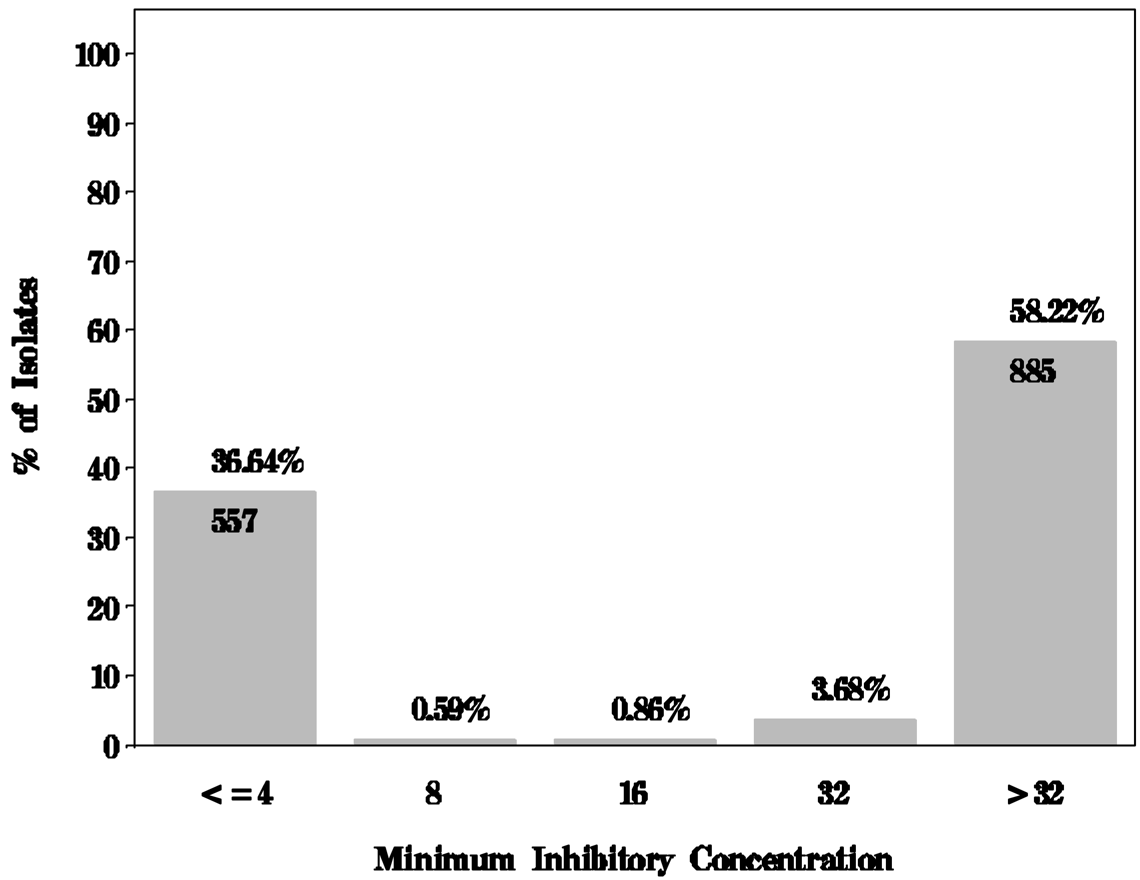
Breakpoints: Susceptible <=1 μg/mL Resistant >=4 μg/mL



NARMS

Figure 13: Minimum Inhibitory Concentration of Tetracycline for *Enterococcus* (N=1520 Isolates)

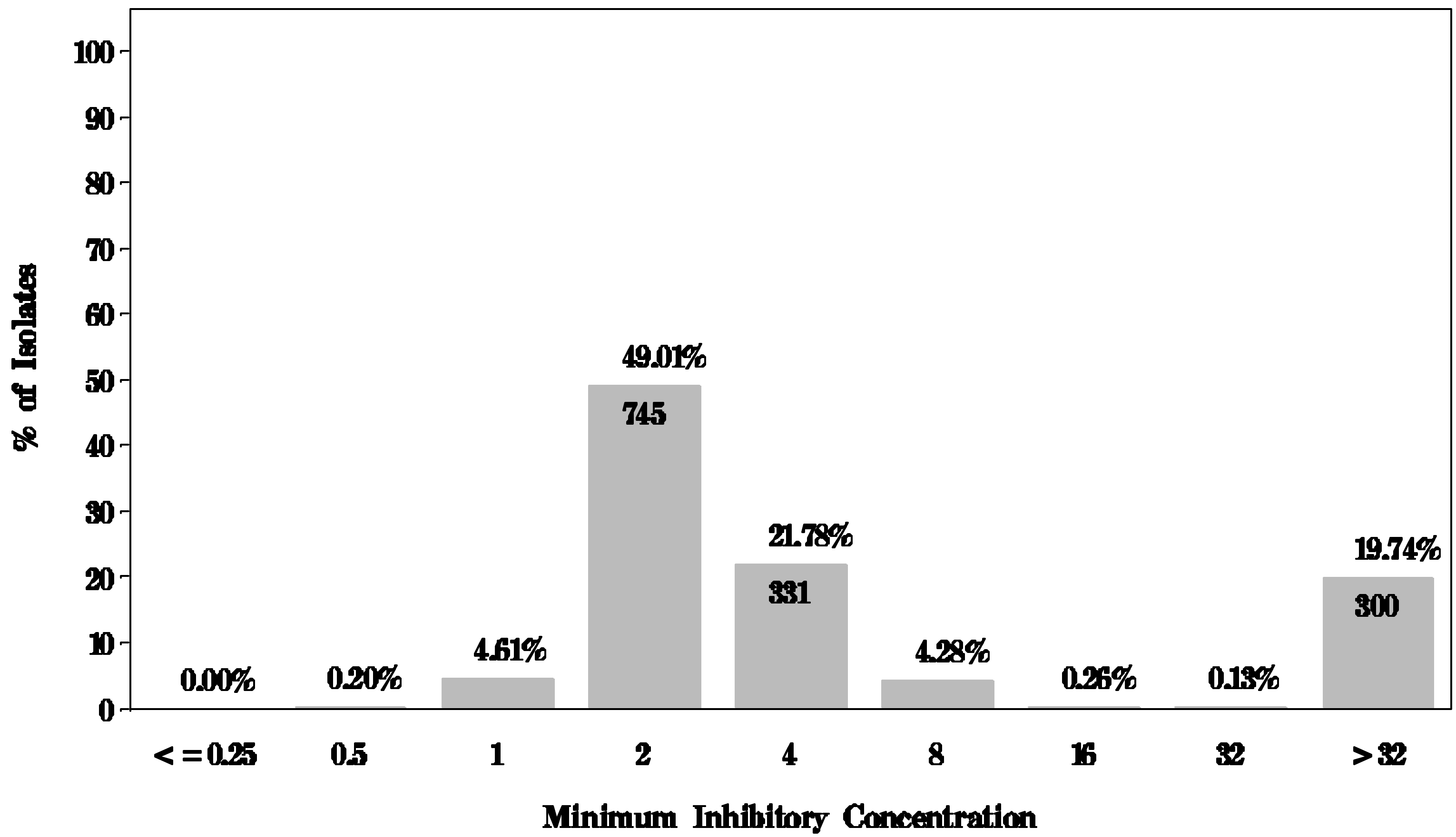
Breakpoints: Susceptible <=4 μg/mL Resistant >=16 μg/mL



NARMS

Figure 13: Minimum Inhibitory Concentration of Tylosin for *Enterococcus* (N=1520 Isolates)

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



NARMS

Figure 13: Minimum Inhibitory Concentration of Vancomycin for *Enterococcus* (N=1520 Isolates)

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

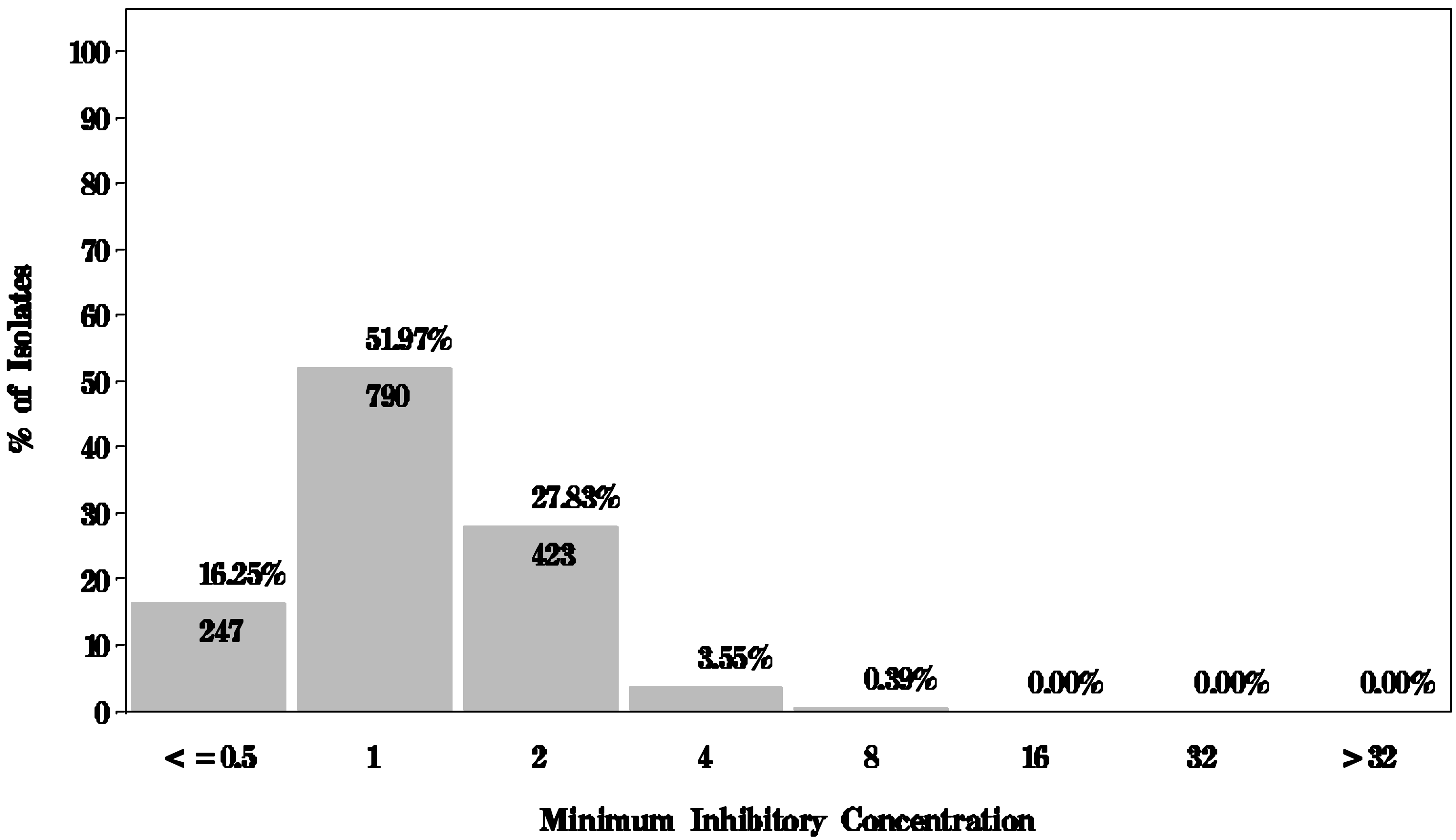
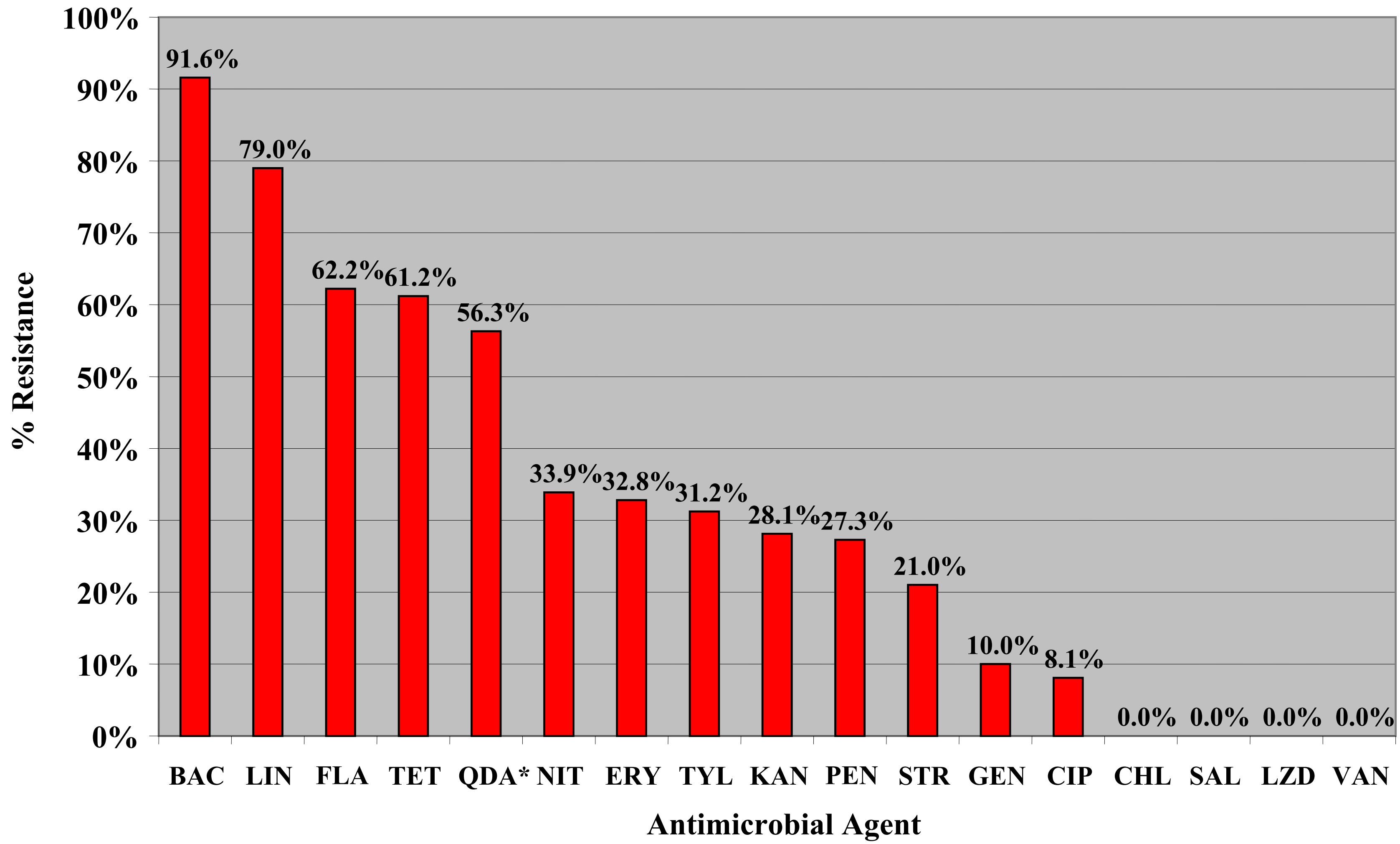


Table 34. Antimicrobial Resistance among *Enterococcus* by Meat Type for All Sites, 2002

	Chicken Breast (N=381)		Ground Turkey (N=387)		Ground Beef (N=383)		Pork Chop (N=369)	
Antimicrobial Agent	**n**	**% R**	**n**	**% R**	**n**	**% R**	**n**	**% R**
Quinupristin-Dalfopristin*	139	56.3%	74	79.6%	80	46.2%	31	27.2%
Lincomycin	301	79.0%	342	88.4%	258	67.4%	247	66.9%
Bacitracin	349	91.6%	318	82.2%	206	53.8%	251	68.0%
Tetracycline	233	61.2%	332	85.8%	108	28.2%	281	76.2%
Flavomycin	237	62.2%	86	22.2%	165	43.1%	115	31.2%
Erythromycin	125	32.8%	136	35.1%	29	7.6%	42	11.4%
Tylosin	119	31.2%	126	32.6%	25	6.5%	32	8.7%
Kanamycin	107	28.1%	127	32.8%	26	6.8%	29	7.9%
Streptomycin	80	21.0%	107	27.7%	15	3.9%	33	8.9%
Nitrofurantoin	129	33.9%	52	13.4%	18	4.7%	5	1.4%
Penicillin	104	27.3%	59	15.3%	0	0.0%	3	0.8%
Gentamicin	38	10.0%	79	20.4%	7	1.8%	8	2.2%
Ciprofloxacin	31	8.1%	21	5.4%	12	3.1%	7	1.9%
Chloramphenicol	0	0.0%	1	0.3%	2	0.52%	1	0.3%
Salinomycin	0	0.0%	2	0.5%	0	0.0%	0	0.0%
Linezolid	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Vancomycin	0	0.0%	0	0.0%	0	0.0%	0	0.0%

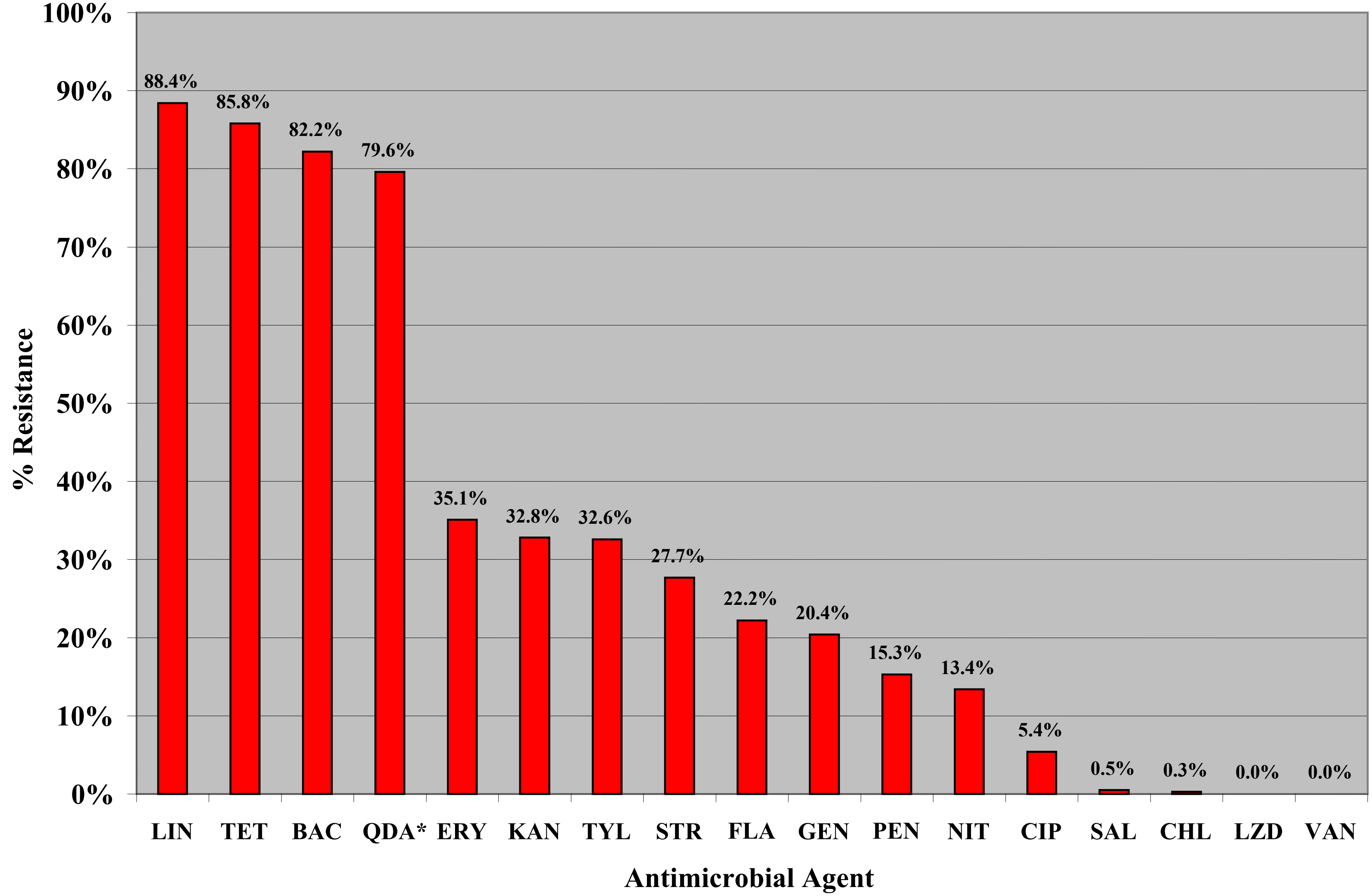
* Presented for all species except *E. faecalis* which is considered intrinsically resistant.

Figure 14a. Antimicrobial Resistance among *Enterococcus* from Chicken Breast (n=381), 2002



* Presented for all species except *E. faecalis* in QDA (n=381-134= 247 non *E. faecalis*)

Figure 14b. Antimicrobial Resistance among *Enterococcus* from Ground Turkey (n=387), 2002



* Presented for all species except *E. faecalis* in QDA (n=387-294= 93 non *E. faecalis*)

Figure 14c. Antimicrobial Resistance among *Enterococcus* from Ground Beef (n=383), 2002

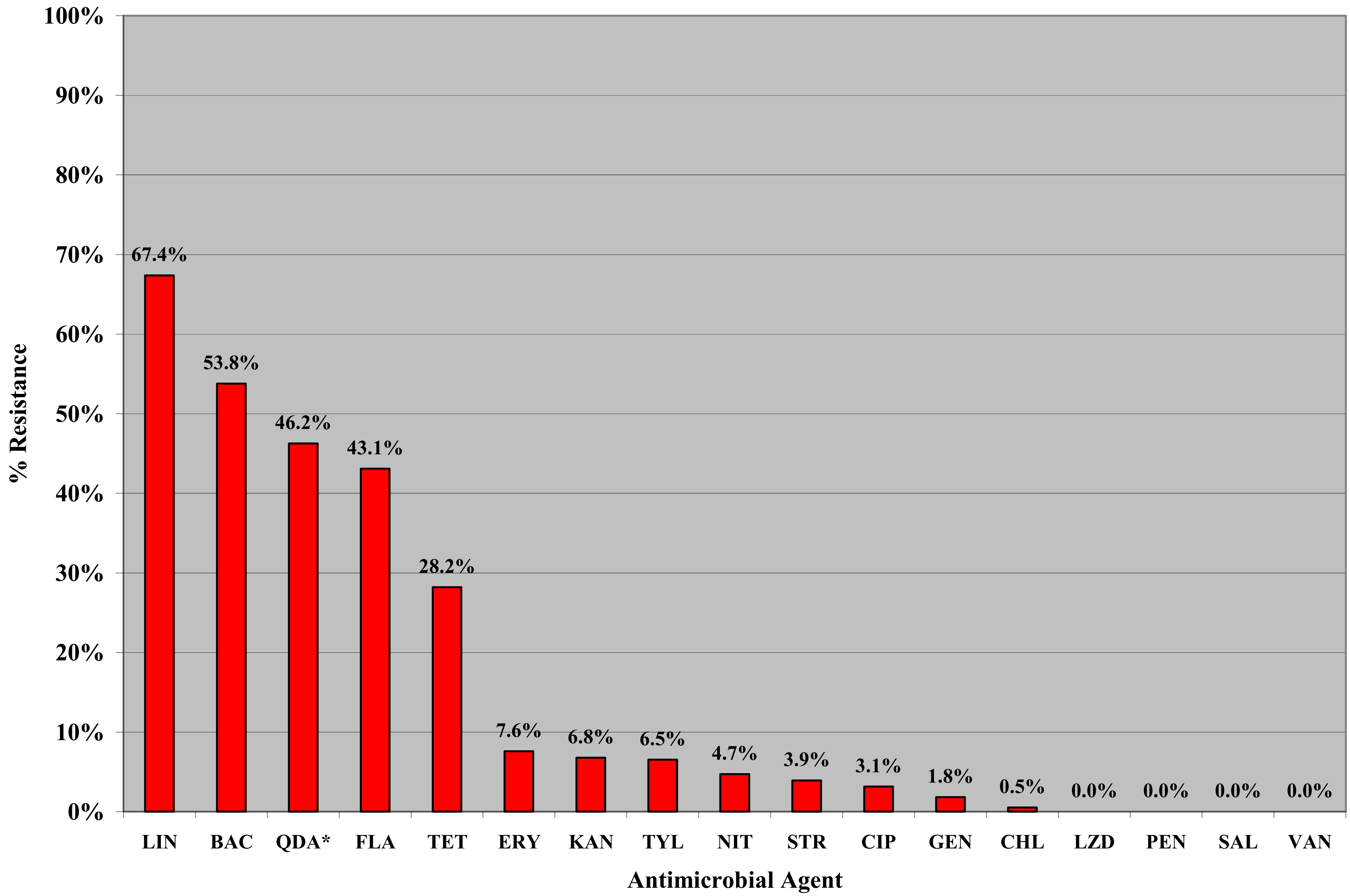
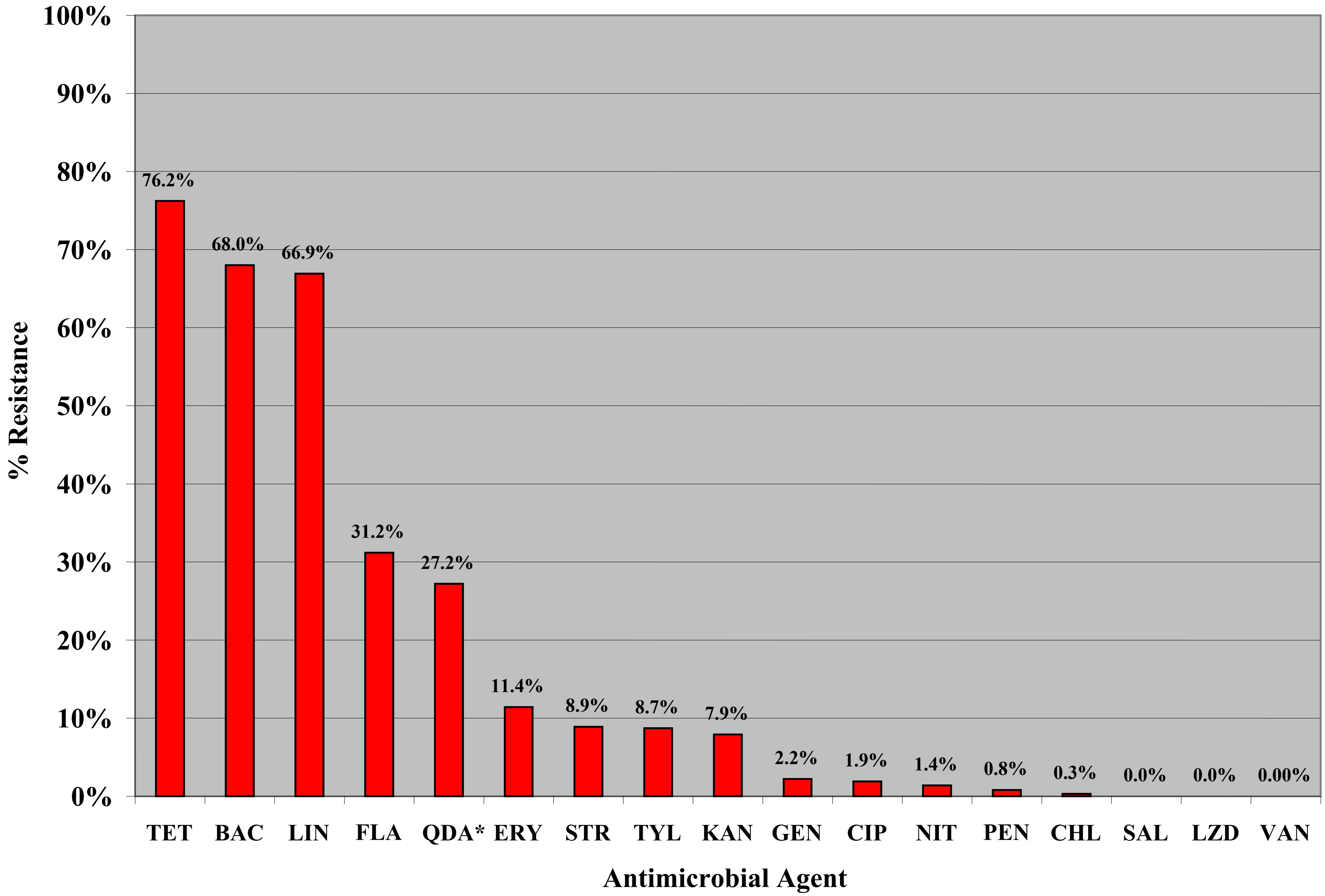


Figure 14d. Antimicrobial Resistance among *Enterococcus* from Pork Chop (n=369), 2002

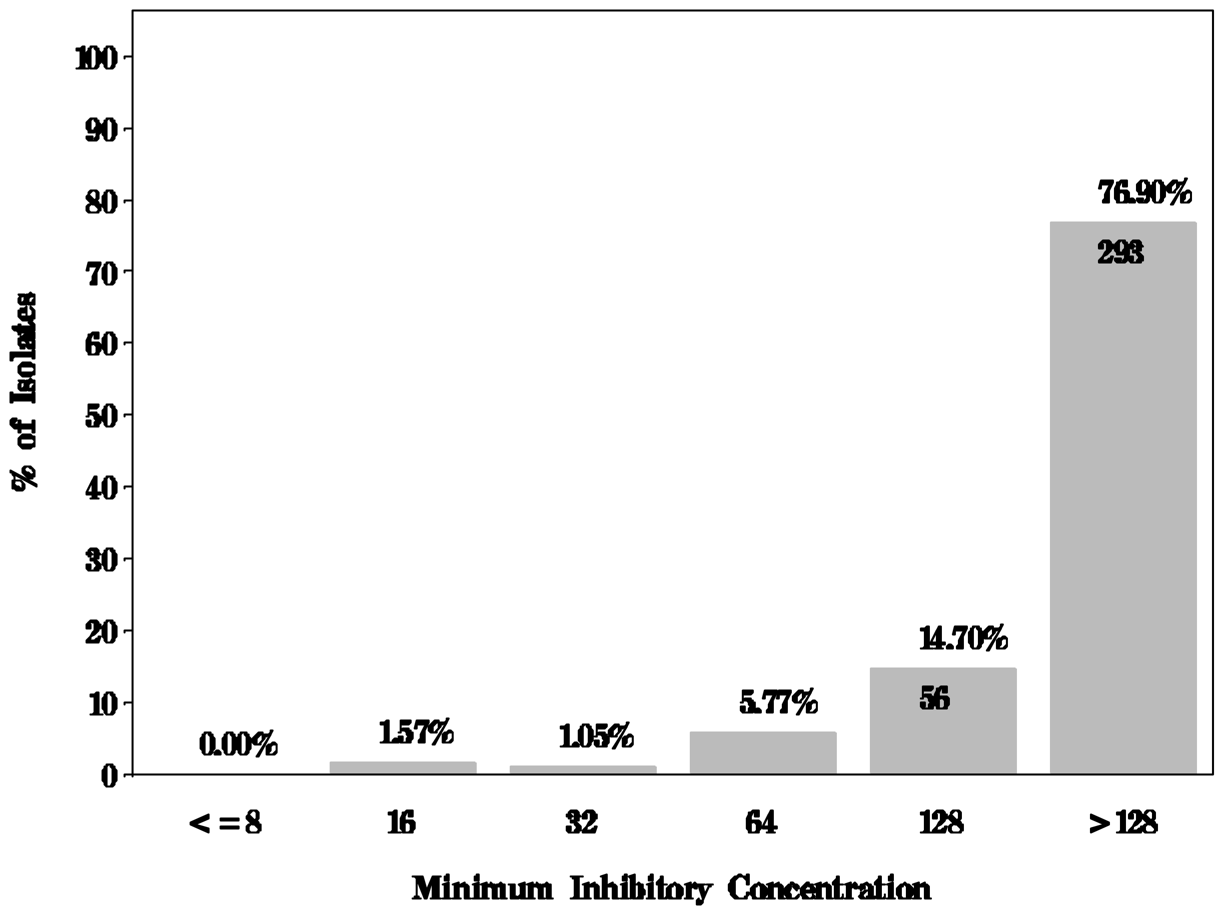


* Presented for all species except *E. faecalis* in QDA (n=369- 255= 114 non *E. faecalis*)

NARMS

Figure 15: Minimum Inhibitory Concentration of Bacitracin for *Enterococcus* in Chicken Breast (N=381 Isolates)

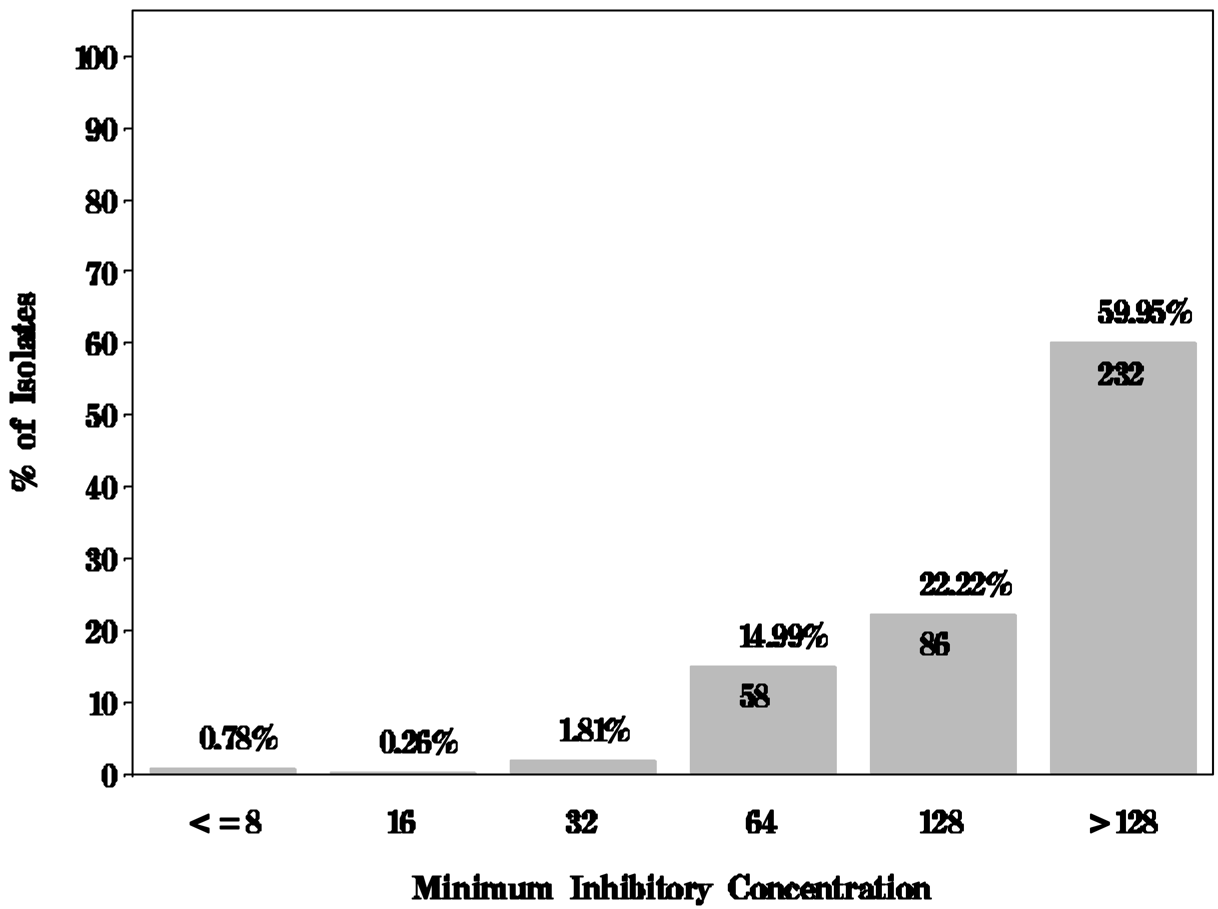
Breakpoints: Susceptible<=32 µg/mL Resistant>=128µg/mL



NARMS

Figure 15: Minimum Inhibitory Concentration of Bacitracin for *Enterococcus* in Ground Turkey (N=387 Isolates)

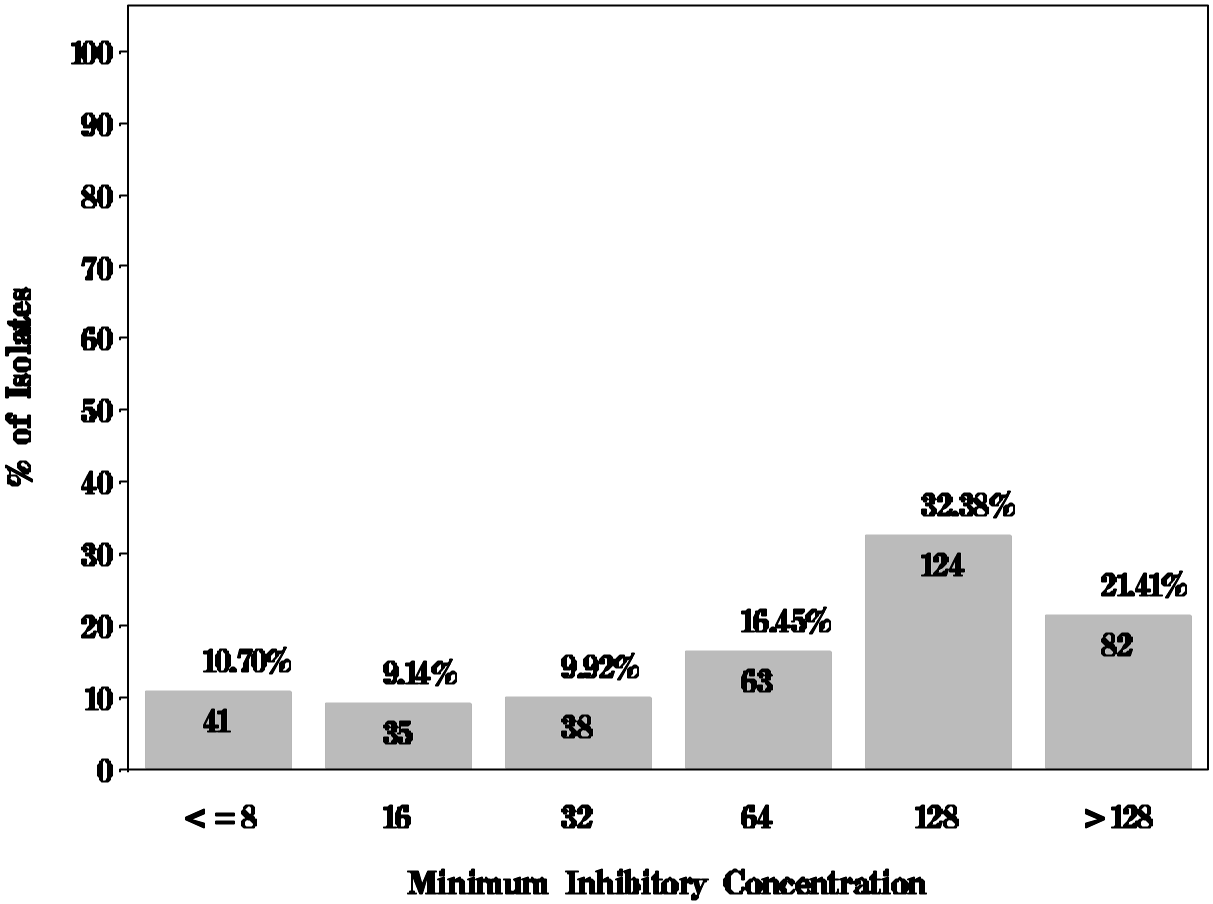
Breakpoints: Susceptible<=32 µg/mL Resistant>=128µg/mL



NARMS

Figure 15: Minimum Inhibitory Concentration of Bacitracin for *Enterococcus* in Ground Beef (N=383 Isolates)

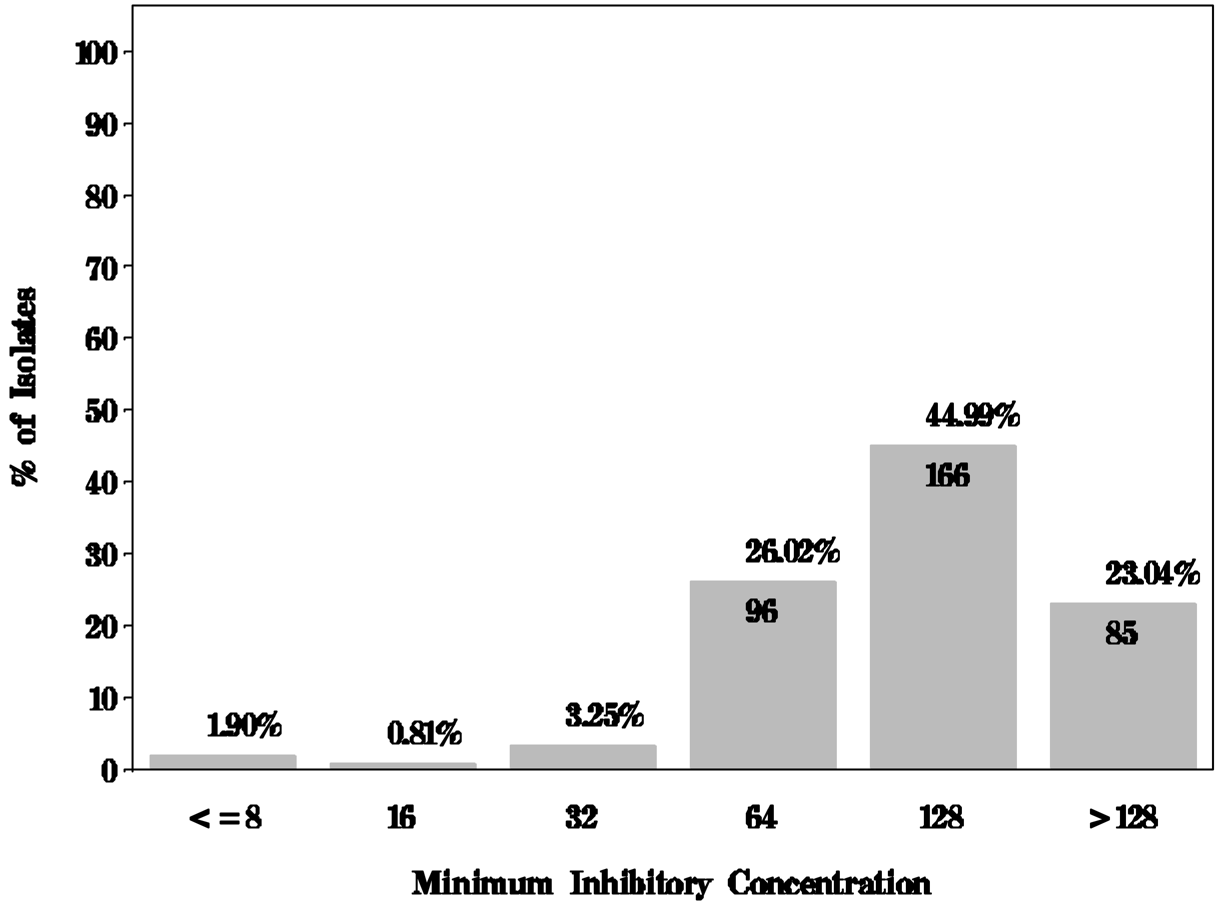
Breakpoints: Susceptible<=32 µg/mL Resistant>=128µg/mL



NARMS

Figure 15: Minimum Inhibitory Concentration of Bacitracin for *Enterococcus* in Pork Chop (N=369 Isolates)

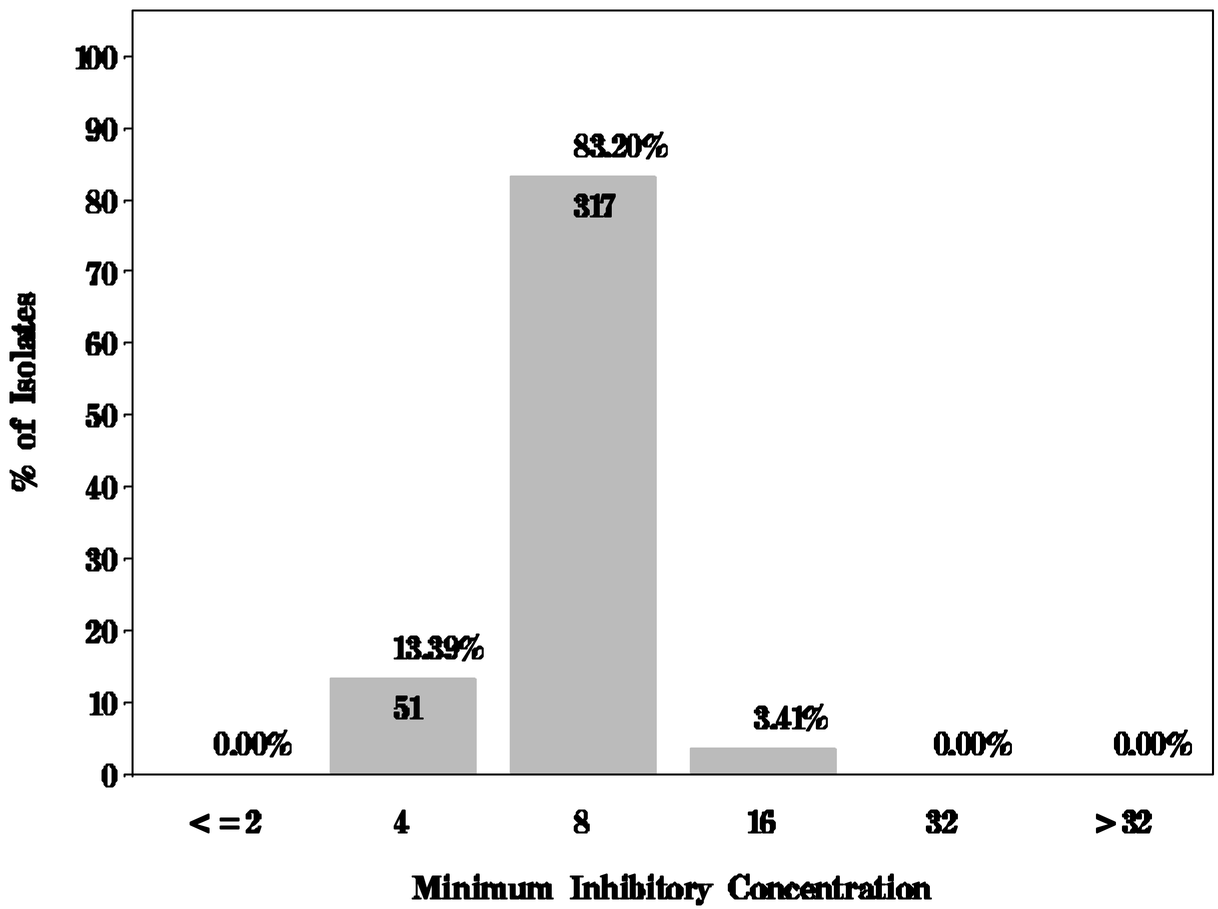
Breakpoints: Susceptible<=32 μg/mL Resistant>=128μg/mL



NARMS

Figure 15: Minimum Inhibitory Concentration of Chloramphenicol for *Enterococcus* in Chicken Breast (N=381 Isolates)

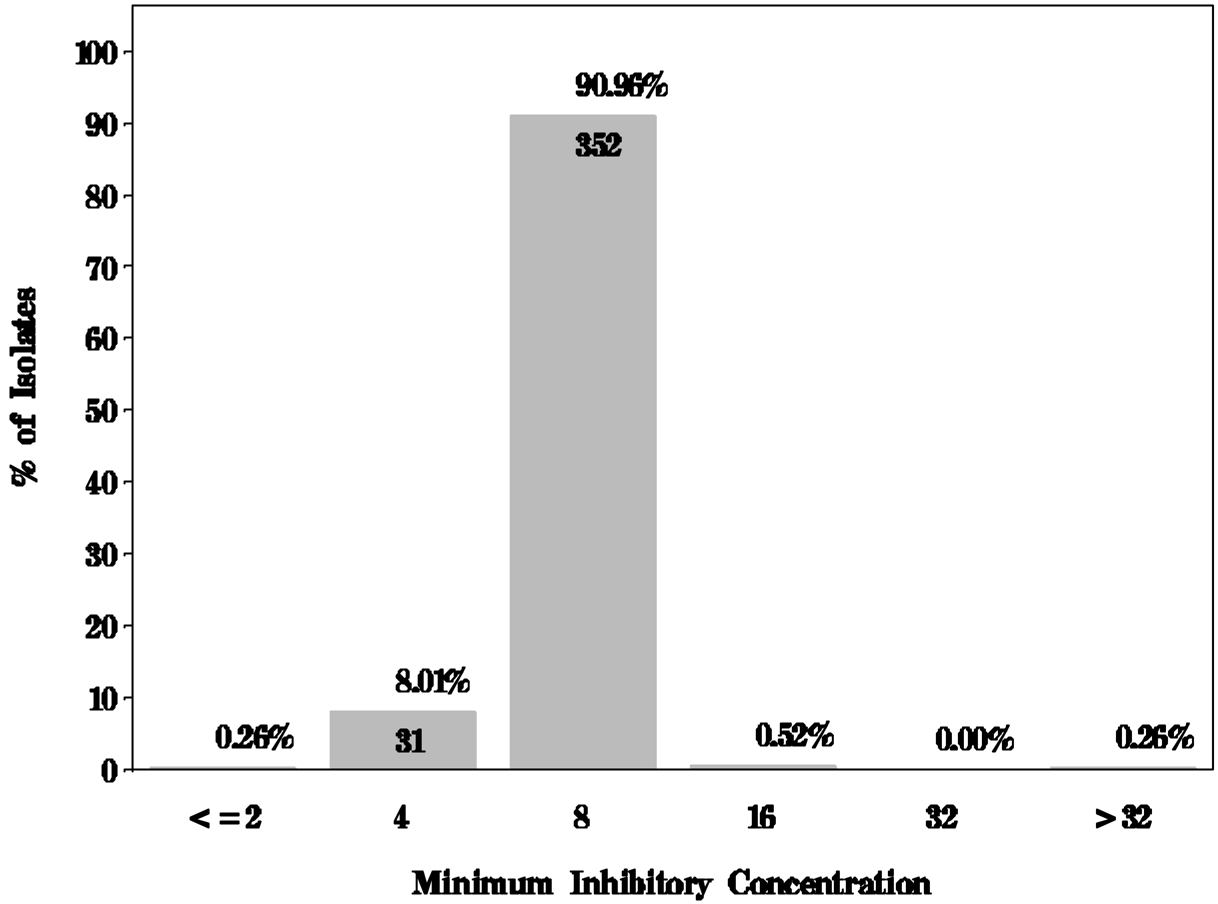
Breakpoints: Susceptible<=8 µg/mL Resistant>=32µg/mL



NARMS

Figure 15: Minimum Inhibitory Concentration of Chloramphenicol for *Enterococcus* in Ground Turkey (N=387 Isolates)

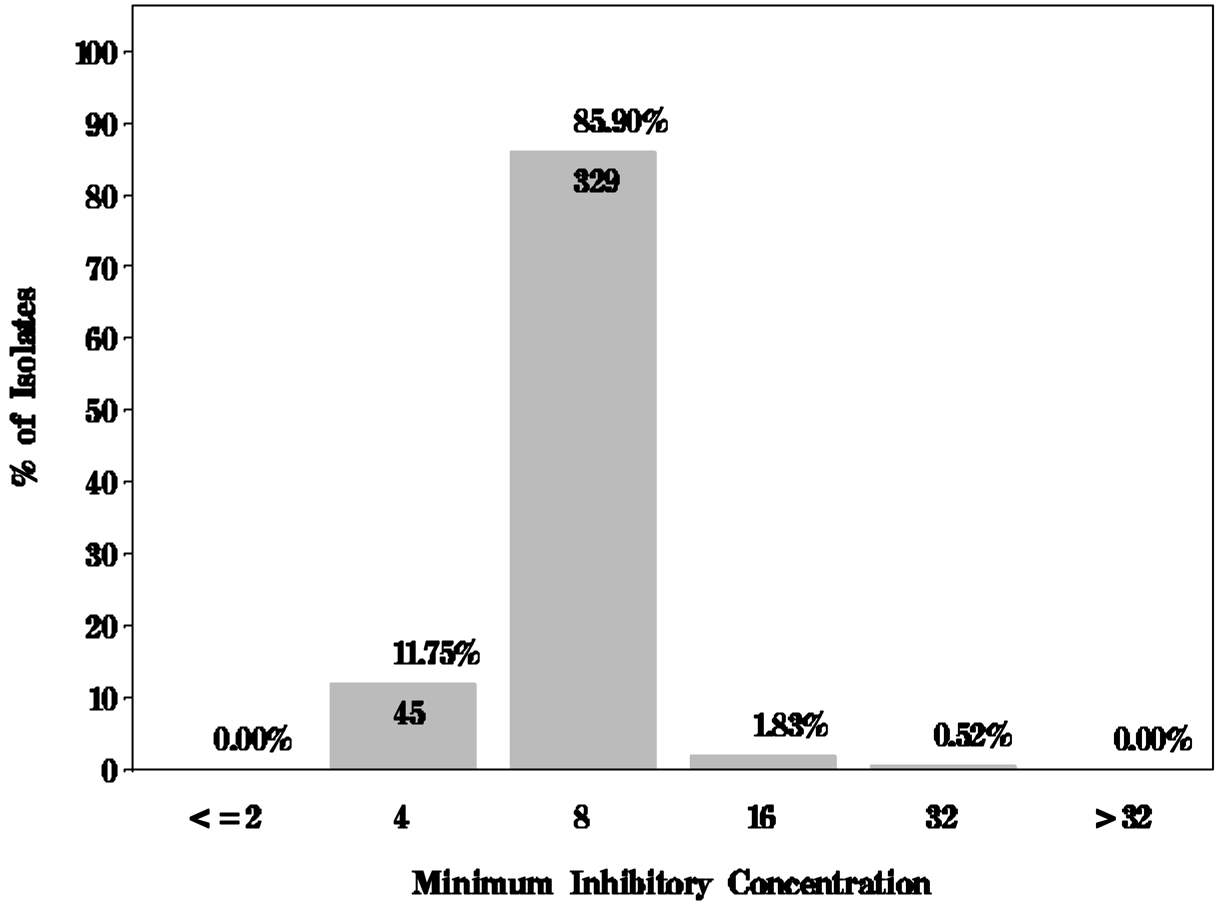
Breakpoints: Susceptible<=8 μg/mL Resistant>=32μg/mL



NARMS

Figure 15: Minimum Inhibitory Concentration of Chloramphenicol for *Enterococcus* in Ground Beef (N=383 Isolates)

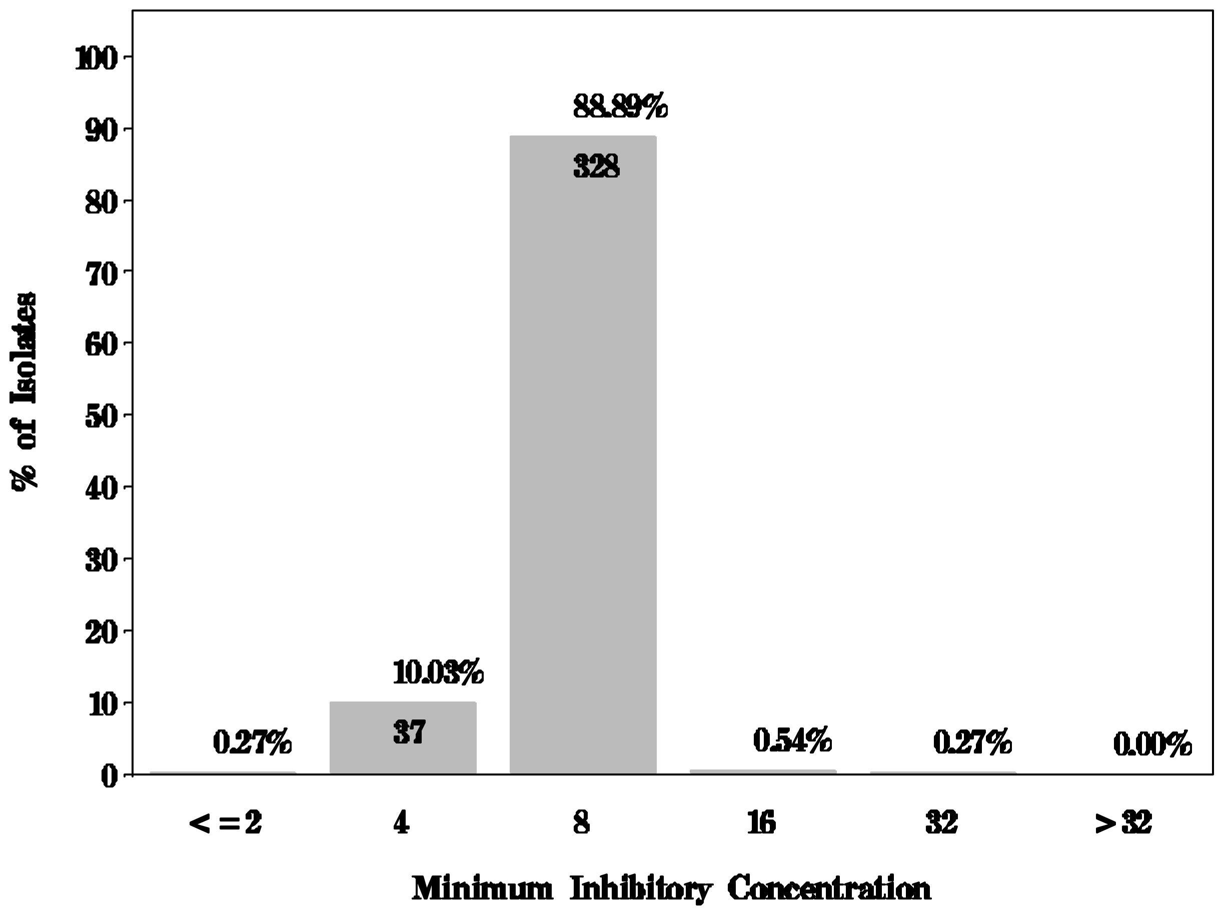
Breakpoints: Susceptible<=8 μg/mL Resistant>=32μg/mL



NARMS

Figure 15: Minimum Inhibitory Concentration of Chloramphenicol for *Enterococcus* in Pork Chop (N=369 Isolates)

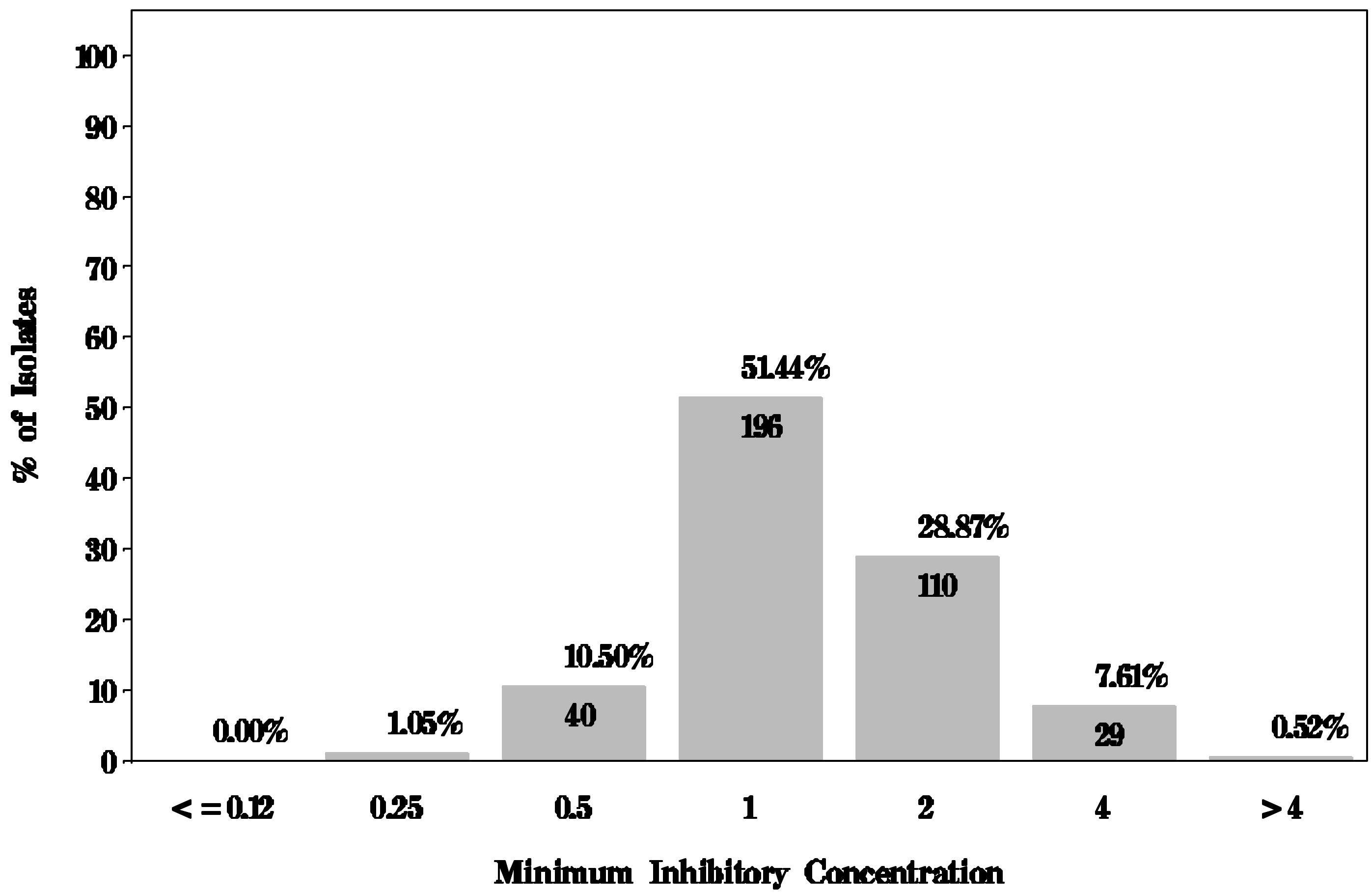
Breakpoints: Susceptible<=8 μg/mL Resistant>=32μg/mL



NARMS

Figure 15: Minimum Inhibitory Concentration of Ciprofloxacin for *Enterococcus* in Chicken Breast (N=381 Isolates)

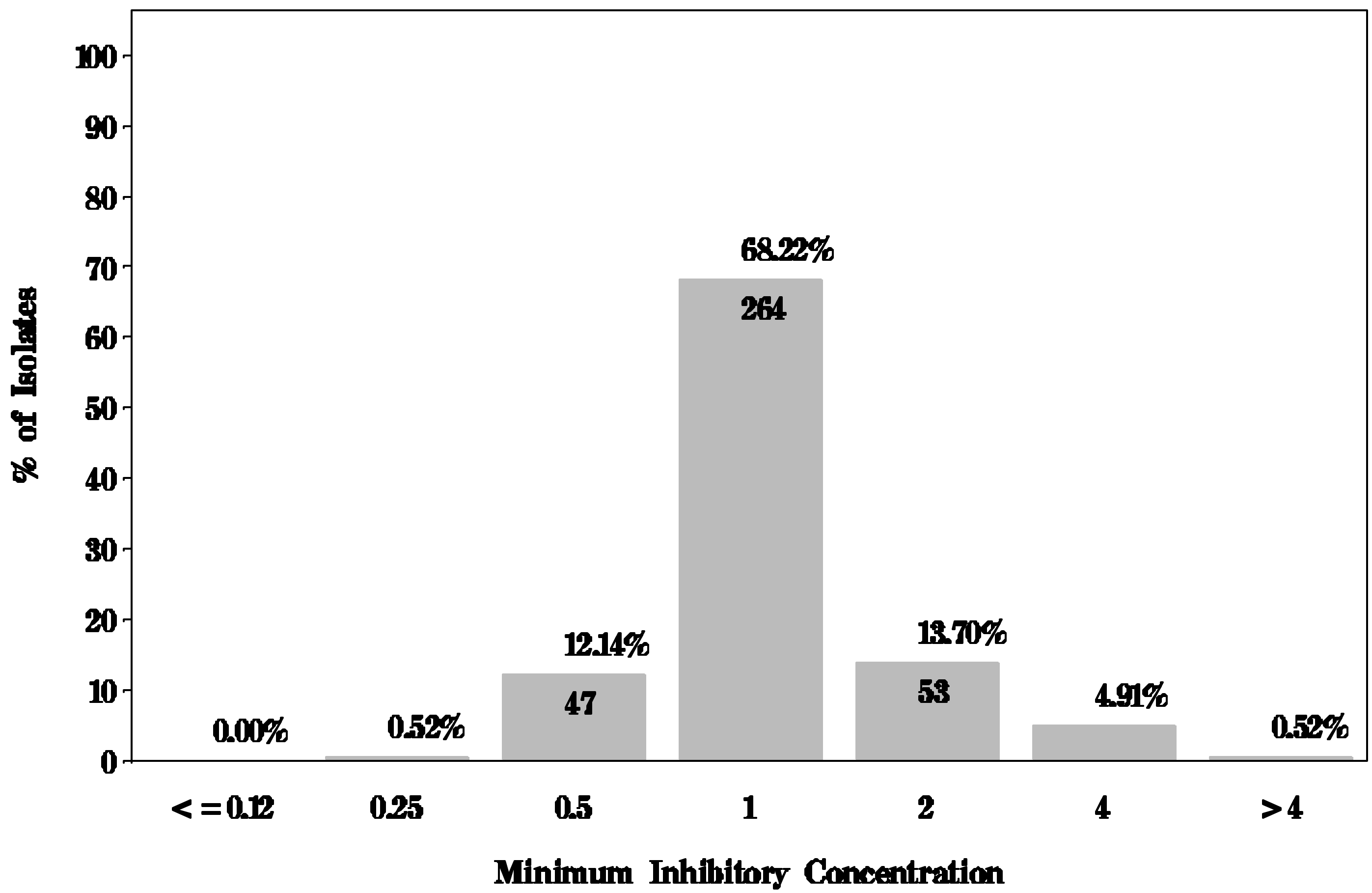
Breakpoints: Susceptible<=1 μg/mL Resistant>=4μg/mL



NARMS

Figure 15: Minimum Inhibitory Concentration of Ciprofloxacin for *Enterococcus* in Ground Turkey (N=387 Isolates)

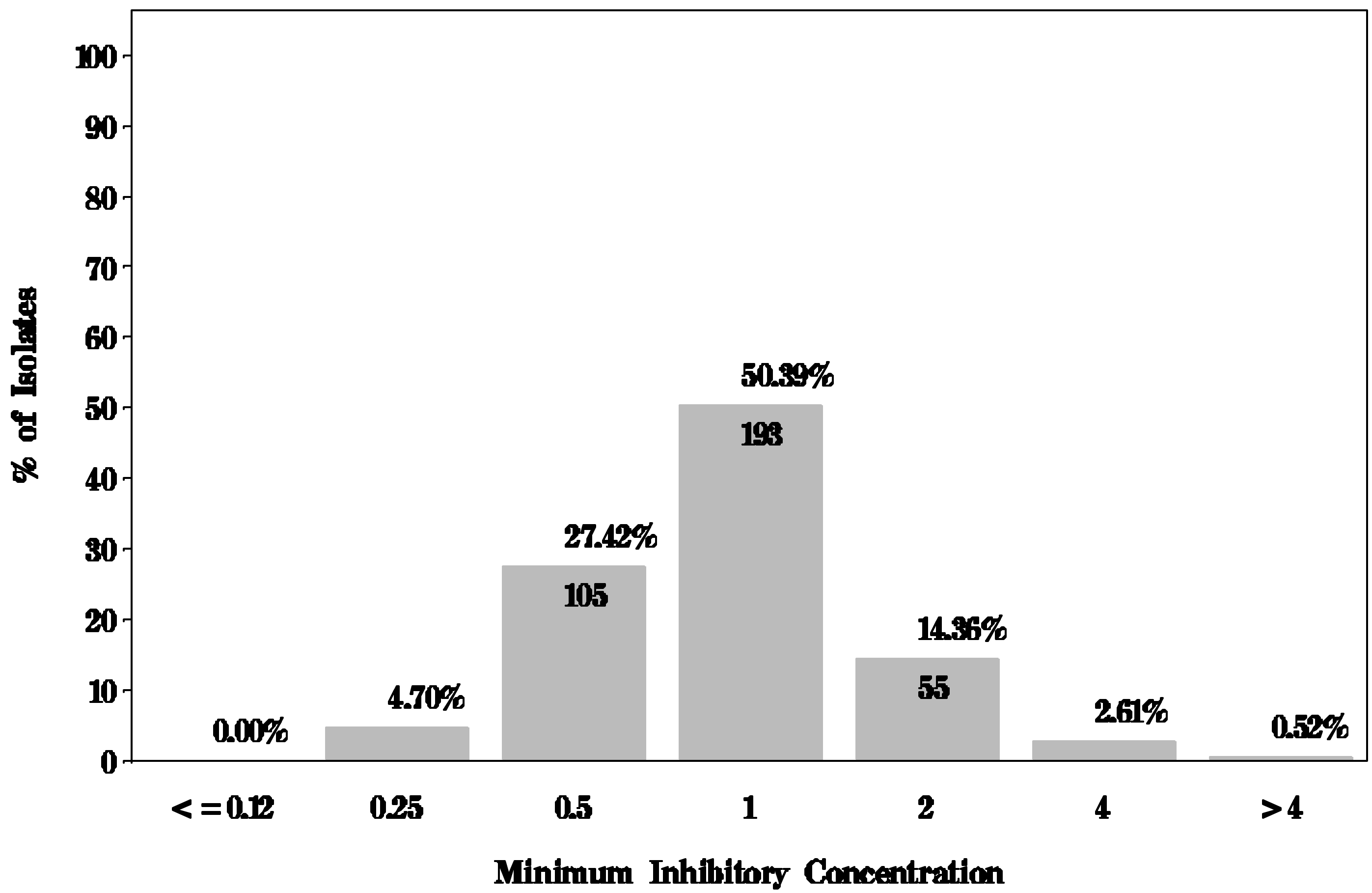
Breakpoints: Susceptible<=1 μg/mL Resistant>=4μg/mL



NARMS

Figure 15: Minimum Inhibitory Concentration of Ciprofloxacin for *Enterococcus* in Ground Beef (N=383 Isolates)

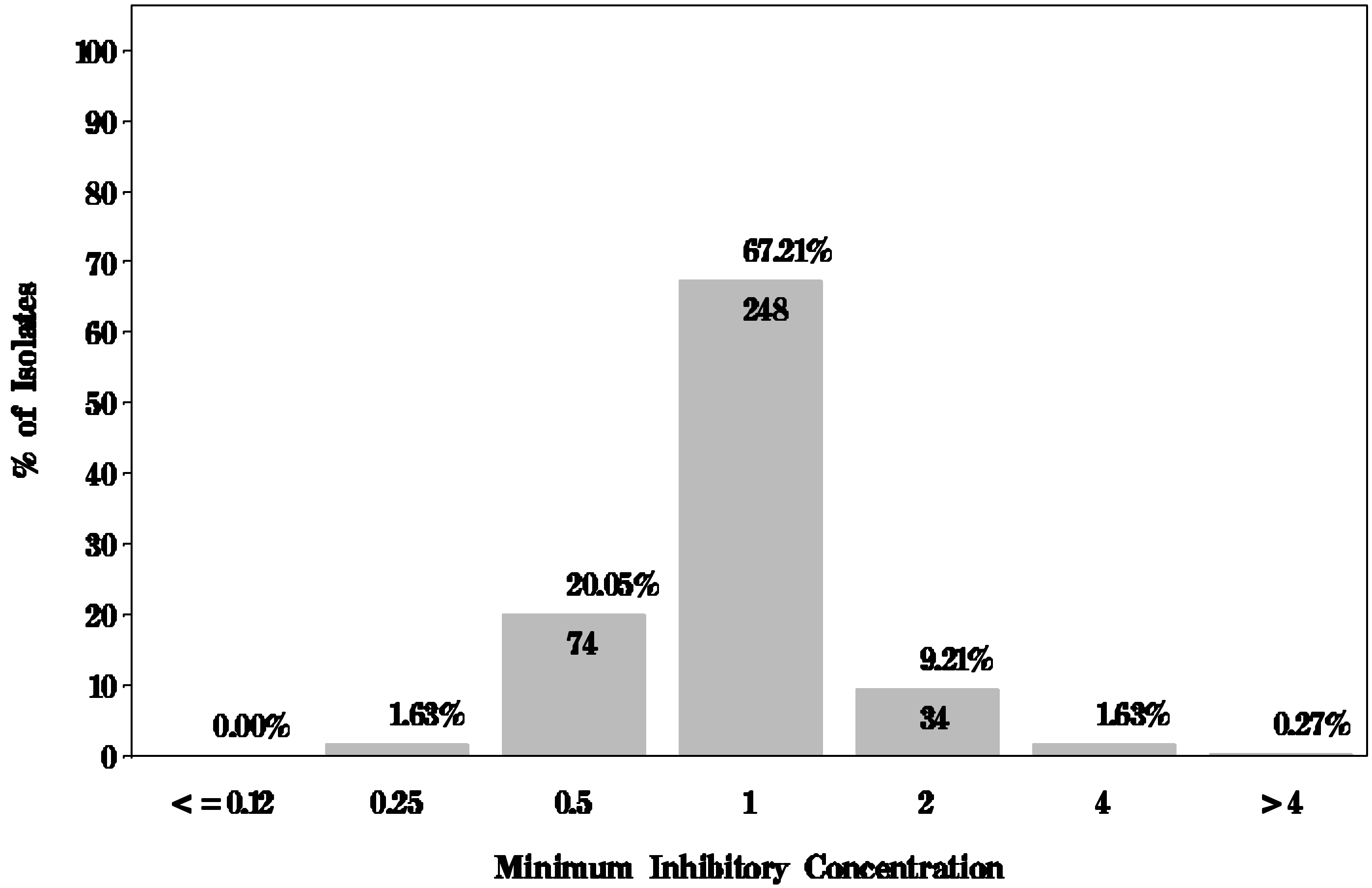
Breakpoints: Susceptible<=1 μg/mL Resistant>=4μg/mL



NARMS

Figure 15: Minimum Inhibitory Concentration of Ciprofloxacin for *Enterococcus* in Pork Chop (N=369 Isolates)

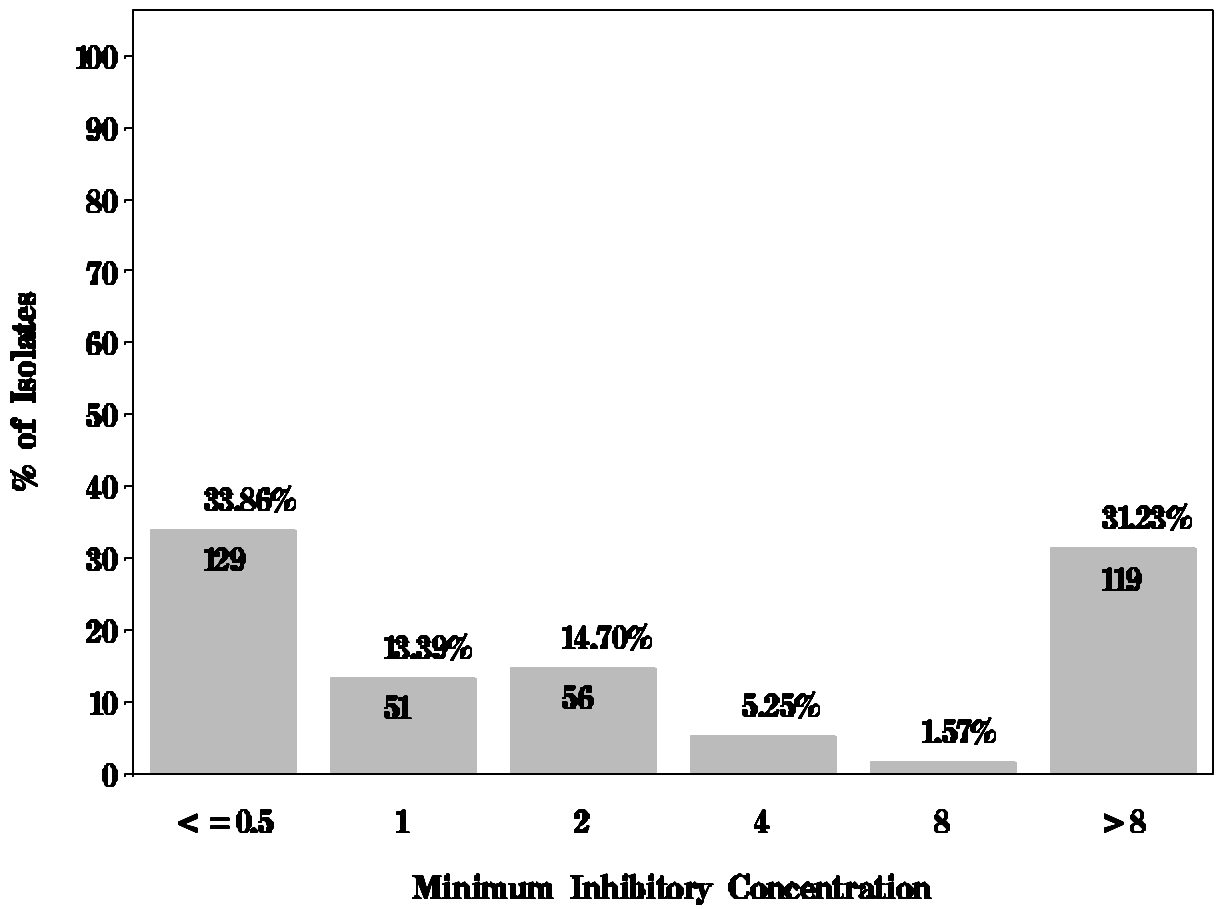
Breakpoints: Susceptible<=1 μg/mL Resistant>=4μg/mL



NARMS

Figure 15: Minimum Inhibitory Concentration of Erythromycin for *Enterococcus* in Chicken Breast (N=381 Isolates)

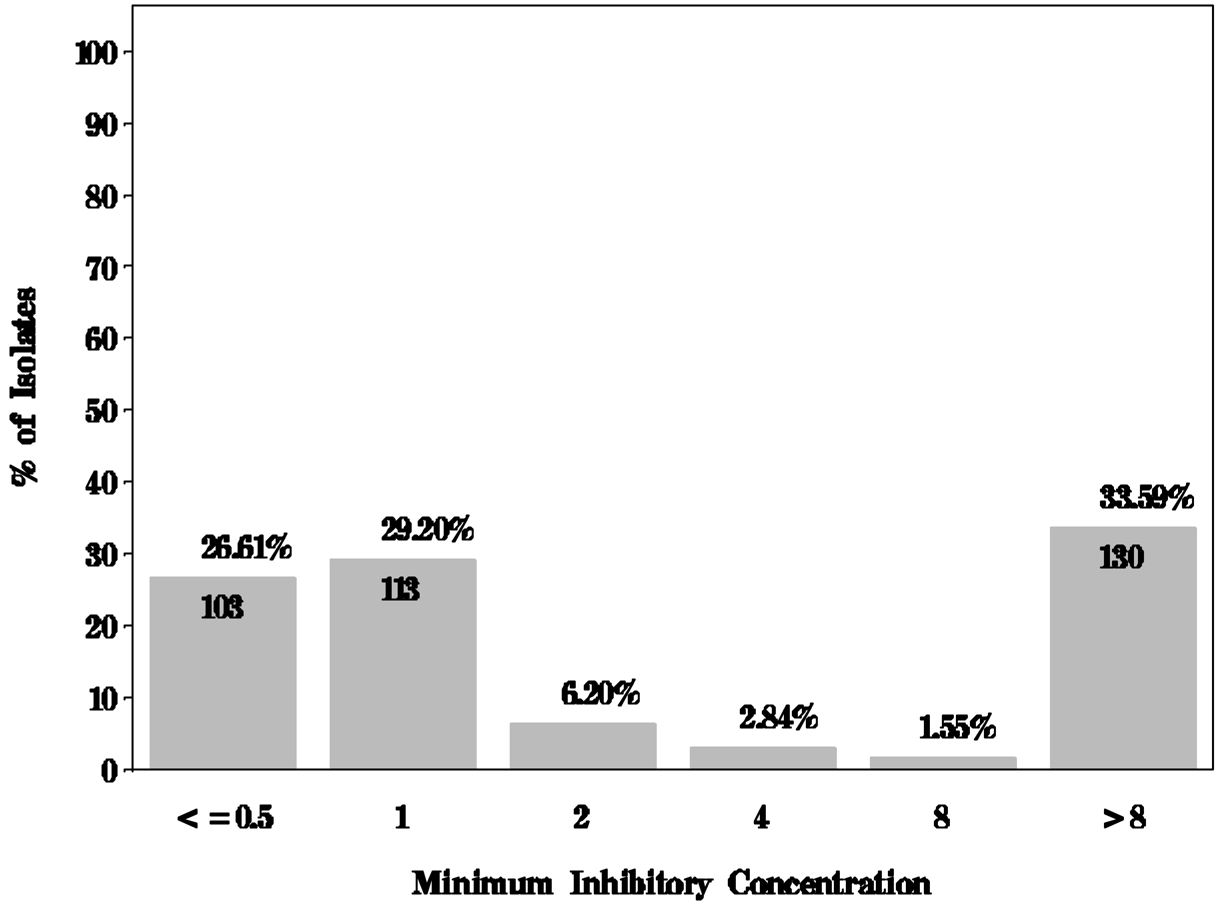
Breakpoints: Susceptible<=.5 μg/mL Resistant>=8μg/mL



NARMS

Figure 15: Minimum Inhibitory Concentration of Erythromycin for *Enterococcus* in Ground Turkey (N=387 Isolates)

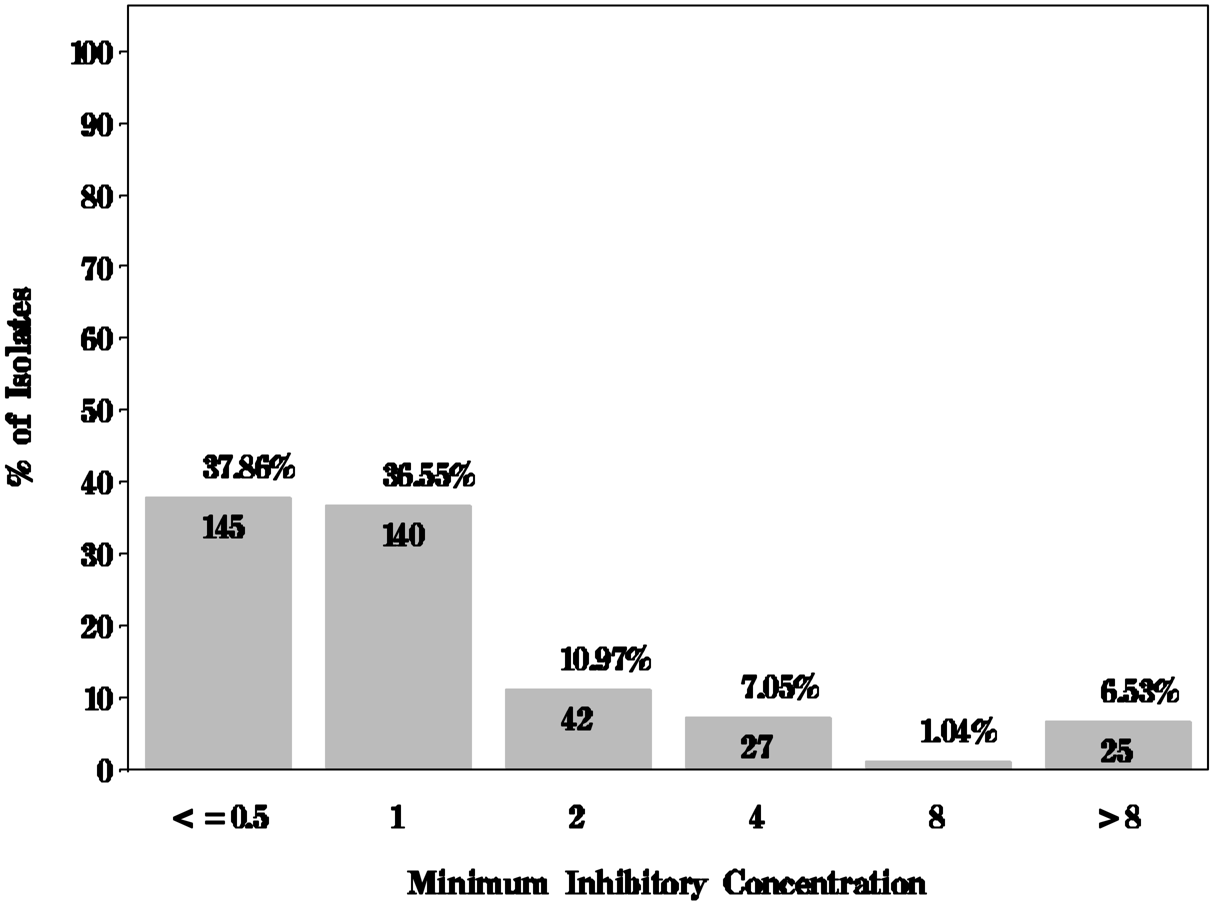
Breakpoints: Susceptible<=.5 μg/mL Resistant>=8μg/mL



NARMS

Figure 15: Minimum Inhibitory Concentration of Erythromycin for *Enterococcus* in Ground Beef (N=383 Isolates)

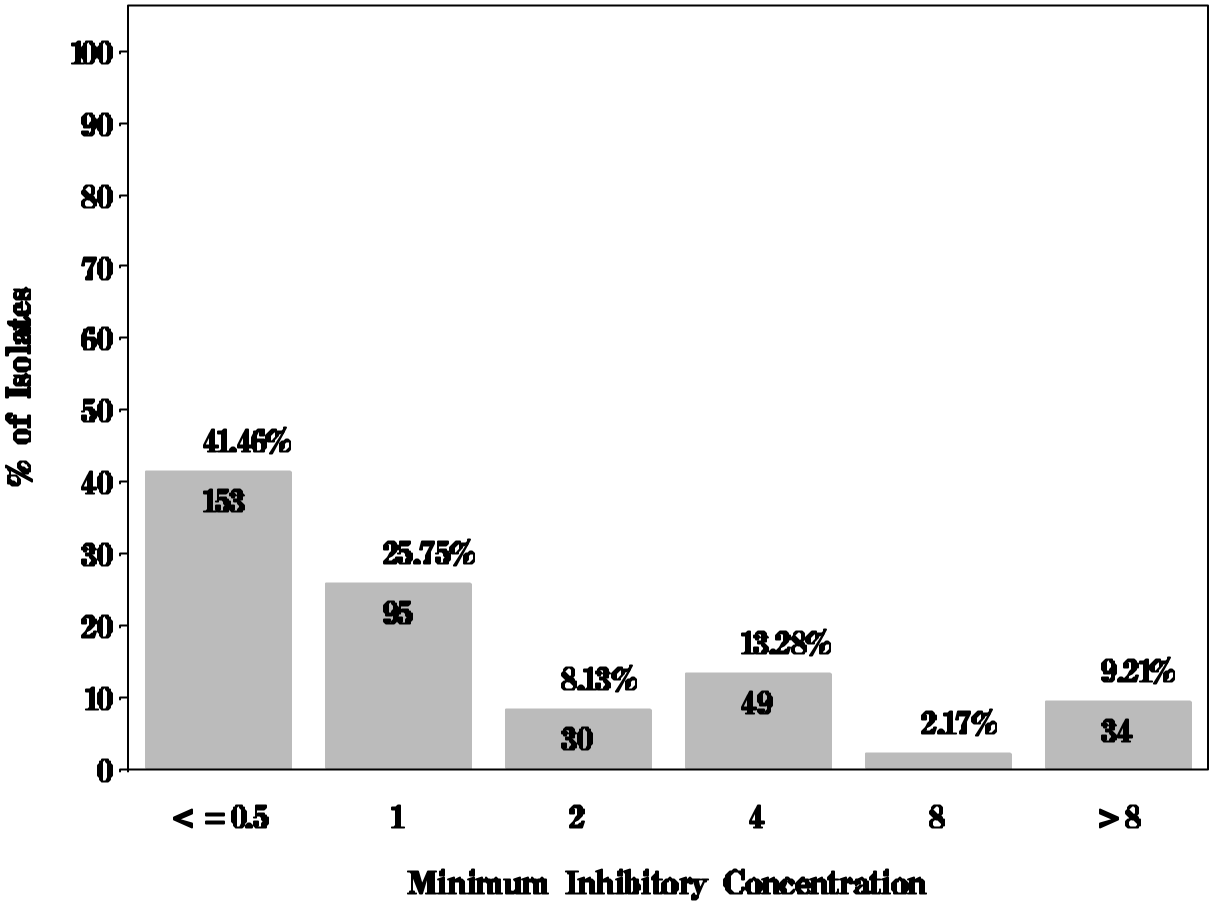
Breakpoints: Susceptible<=.5 μg/mL Resistant>=8μg/mL



NARMS

Figure 15: Minimum Inhibitory Concentration of Erythromycin for *Enterococcus* in Pork Chop (N=369 Isolates)

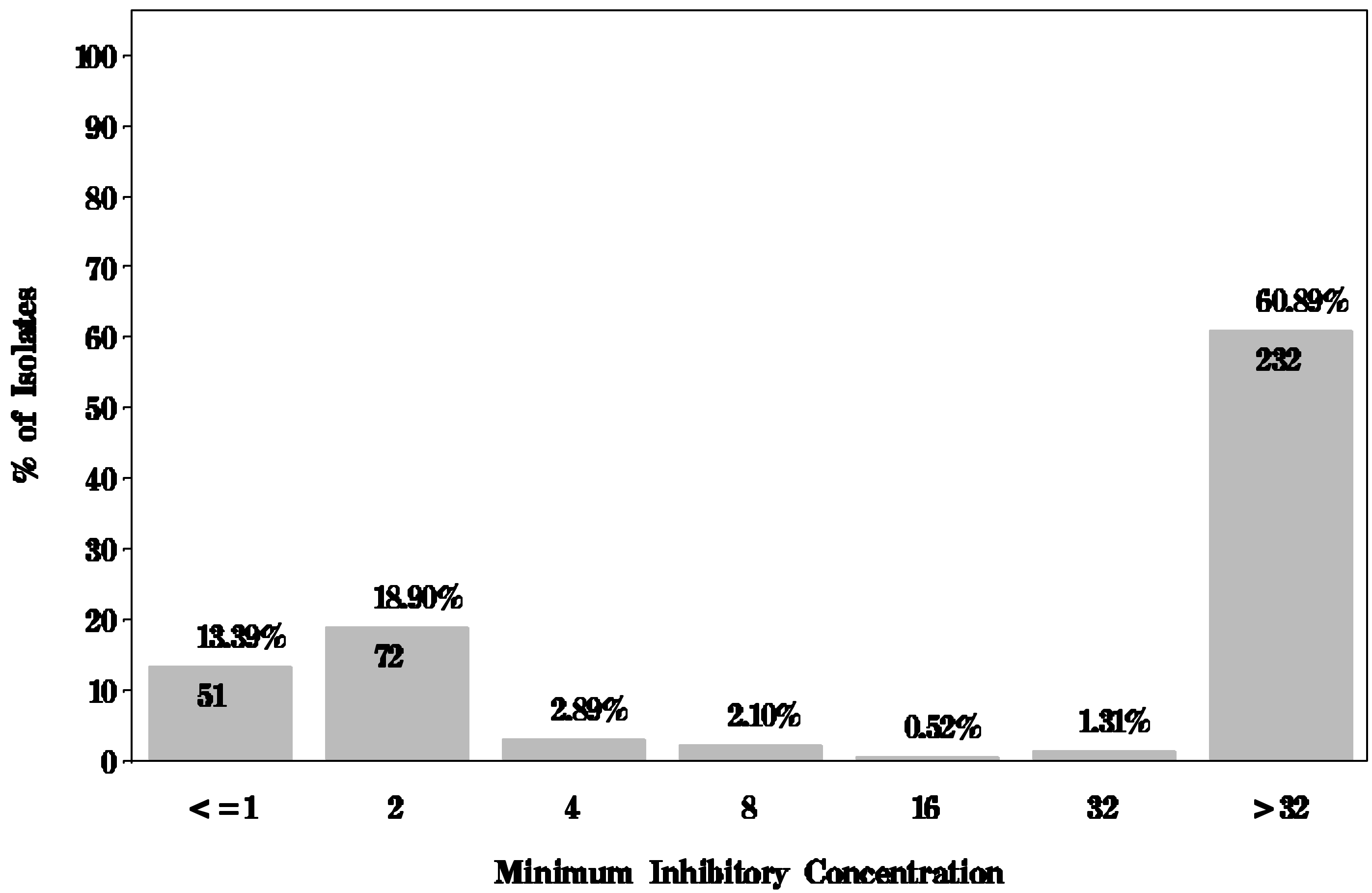
Breakpoints: Susceptible<=.5 μg/mL Resistant>=8μg/mL



NARMS

Figure 15: Minimum Inhibitory Concentration of Flavomycin for *Enterococcus* in Chicken Breast (N=381 Isolates)

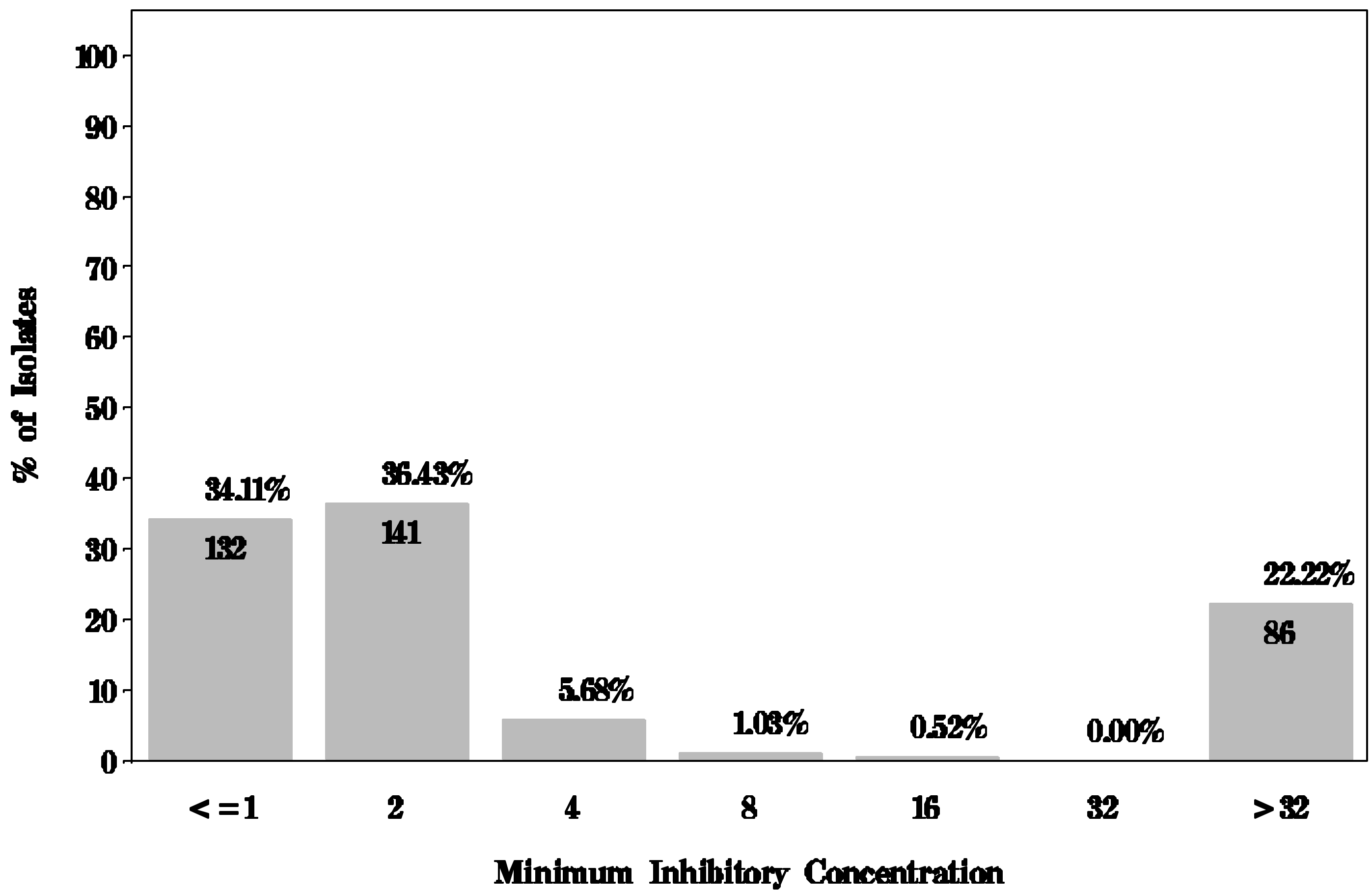
Breakpoints: Susceptible<=8 µg/mL Resistant>=32µg/mL



NARMS

Figure 15: Minimum Inhibitory Concentration of Flavomycin for *Enterococcus* in Ground Turkey (N=387 Isolates)

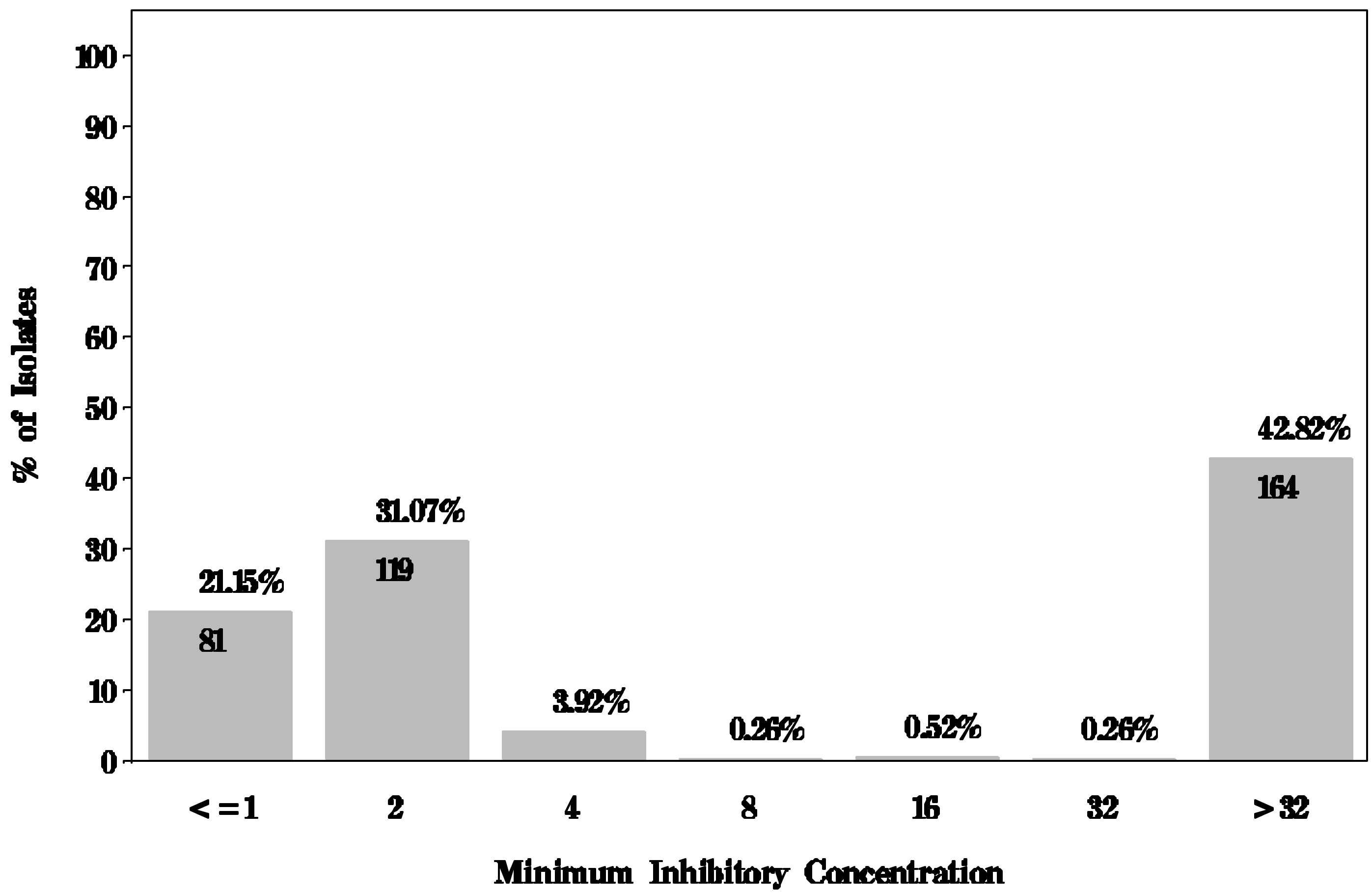
Breakpoints: Susceptible<=8 µg/mL Resistant>=32µg/mL



NARMS

Figure 15: Minimum Inhibitory Concentration of Flavomycin for *Enterococcus* in Ground Beef (N=383 Isolates)

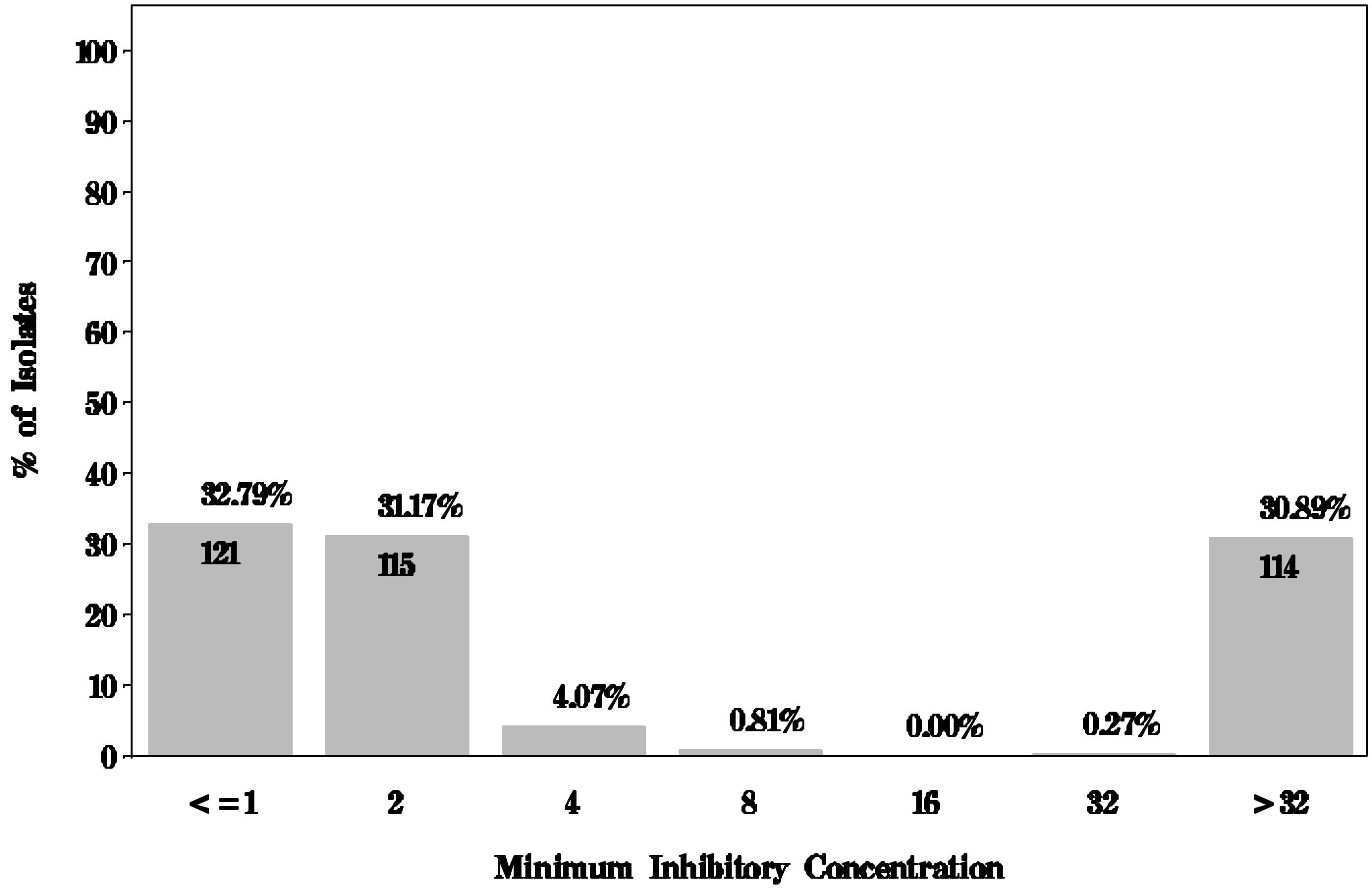
Breakpoints: Susceptible<=8 µg/mL Resistant>=32µg/mL



NARMS

Figure 15: Minimum Inhibitory Concentration of Flavomycin for *Enterococcus* in Pork Chop (N=369 Isolates)

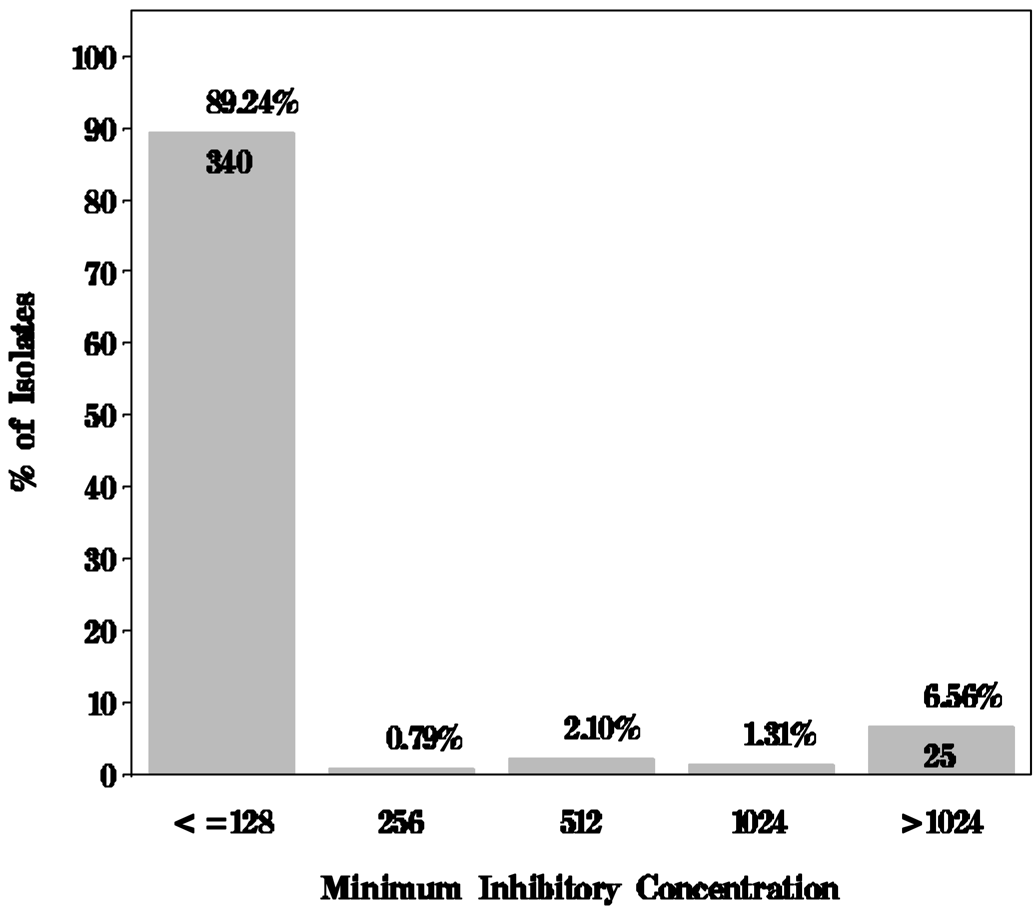
Breakpoints: Susceptible<=8 μg/mL Resistant>=32μg/mL



NARMS

Figure 15: Minimum Inhibitory Concentration of Gentamicin for *Enterococcus* in Chicken Breast (N=381 Isolates)

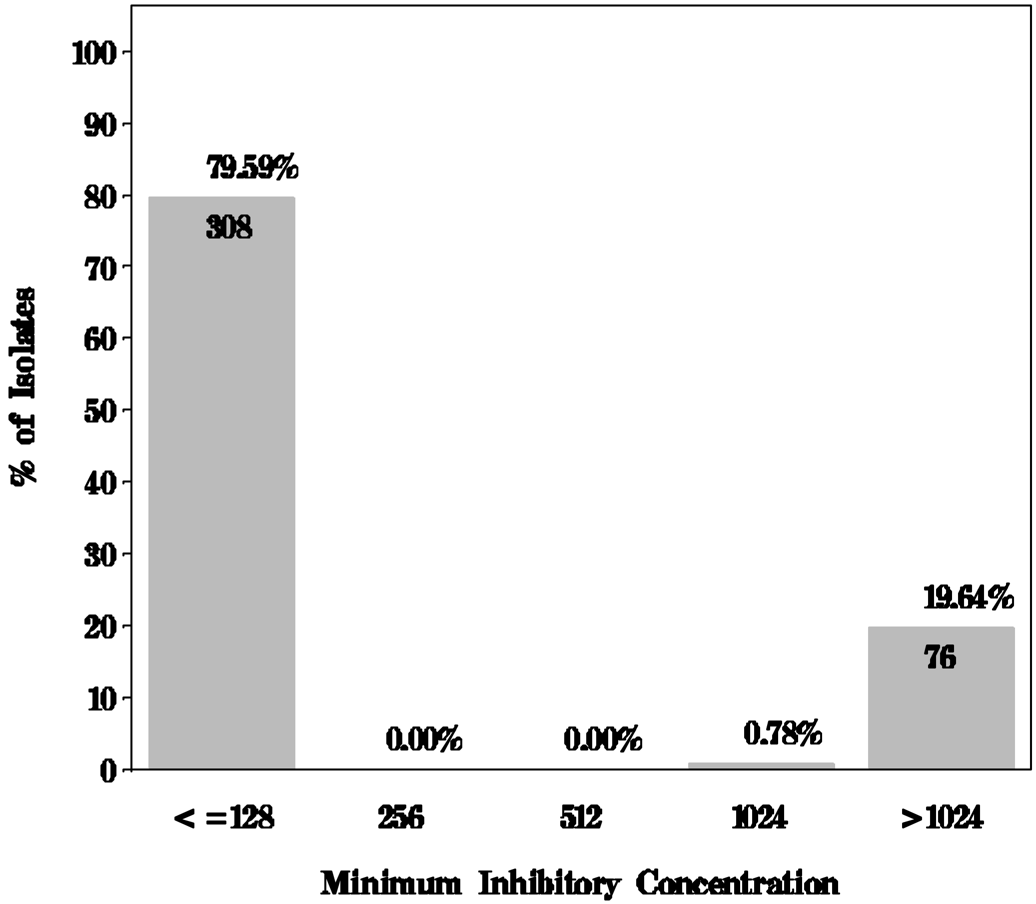
Breakpoints: Susceptible<500 μg/mL Resistant>=500μg/mL



NARMS

Figure 15: Minimum Inhibitory Concentration of Gentamicin for *Enterococcus* in Ground Turkey (N=387 Isolates)

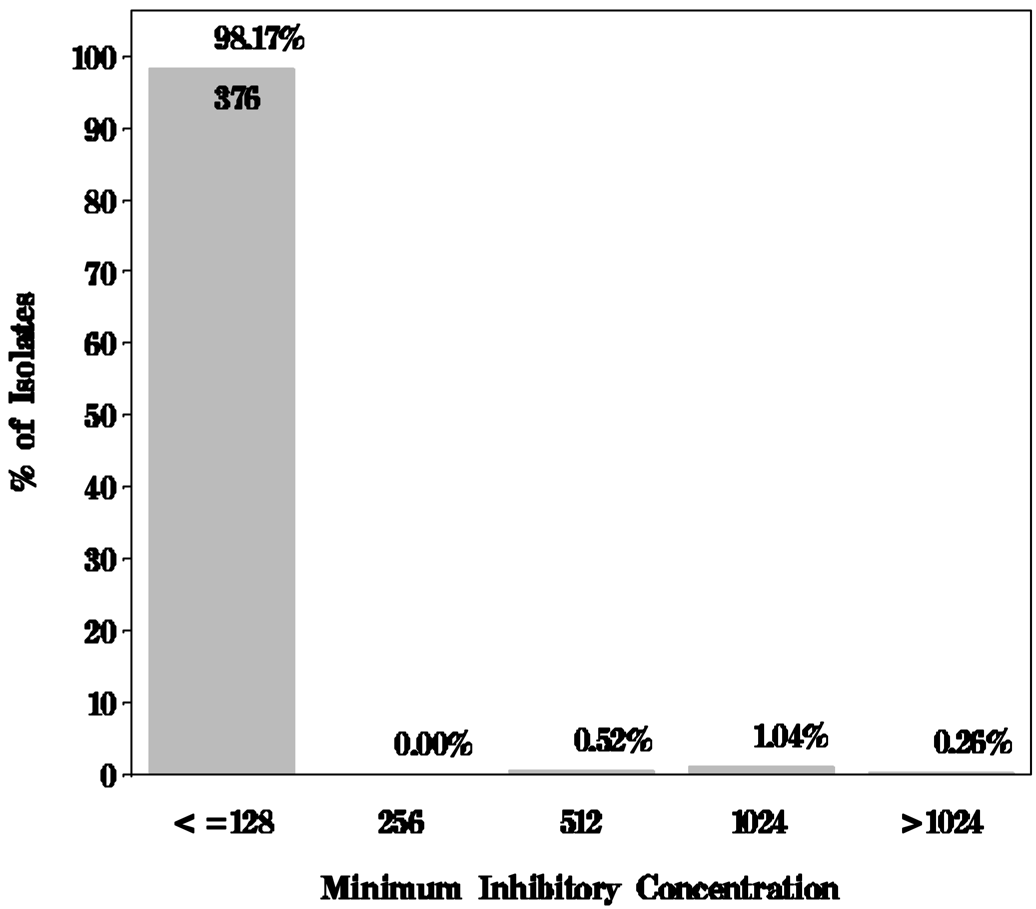
Breakpoints: Susceptible<500 μg/mL Resistant>=500μg/mL



NARMS

Figure 15: Minimum Inhibitory Concentration of Gentamicin for *Enterococcus* in Ground Beef (N=383 Isolates)

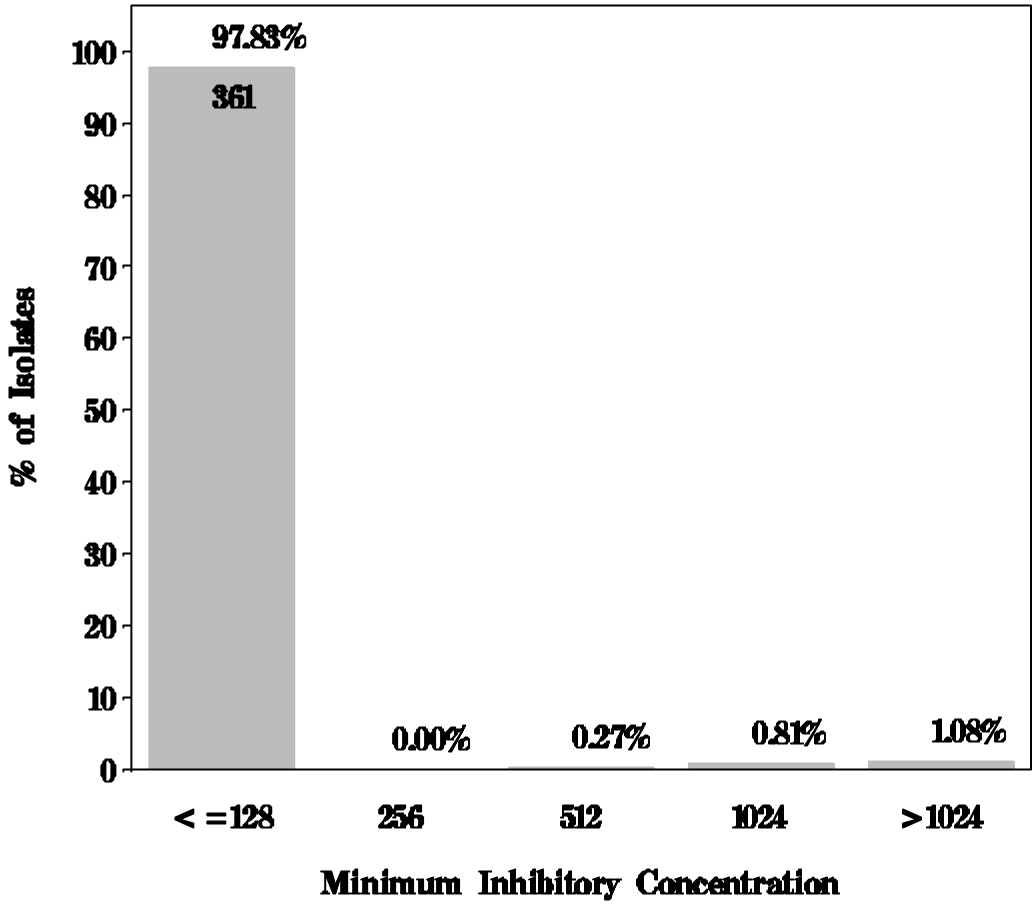
Breakpoints: Susceptible<500 μg/mL Resistant>=500μg/mL



NARMS

Figure 15: Minimum Inhibitory Concentration of Gentamicin for *Enterococcus* in Pork Chop (N=369 Isolates)

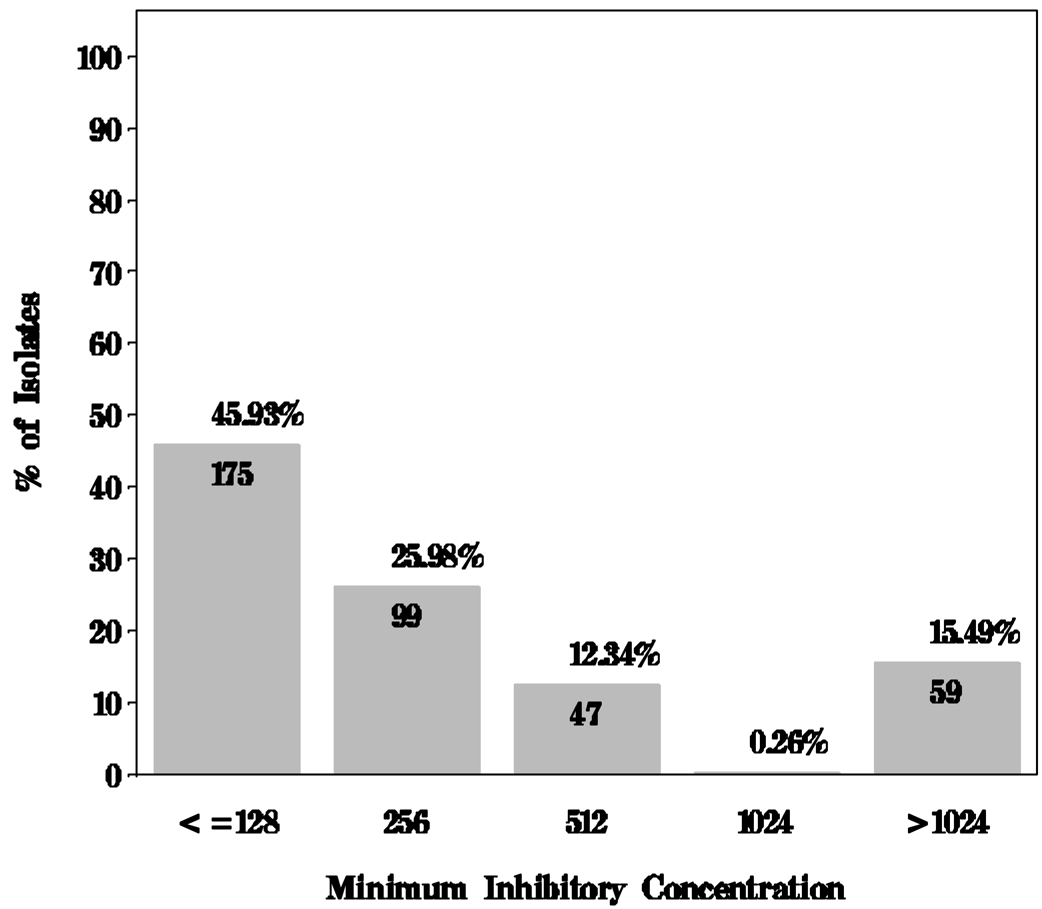
Breakpoints: Susceptible<500 µg/mL Resistant>=500µg/mL



NARMS

Figure 15: Minimum Inhibitory Concentration of Kanamycin for *Enterococcus* in Chicken Breast (N=381 Isolates)

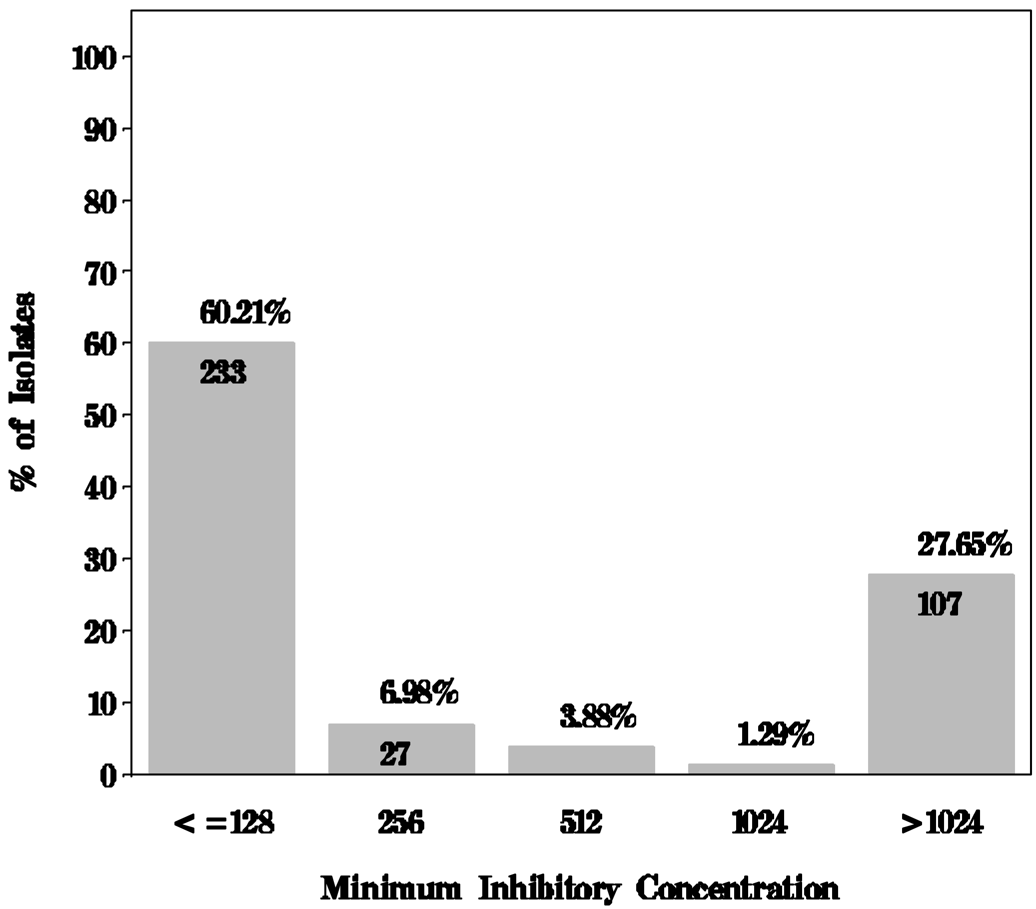
Breakpoints: Susceptible<=128 μg/mL Resistant>=512μg/mL



NARMS

Figure 15: Minimum Inhibitory Concentration of Kanamycin for *Enterococcus* in Ground Turkey (N=387 Isolates)

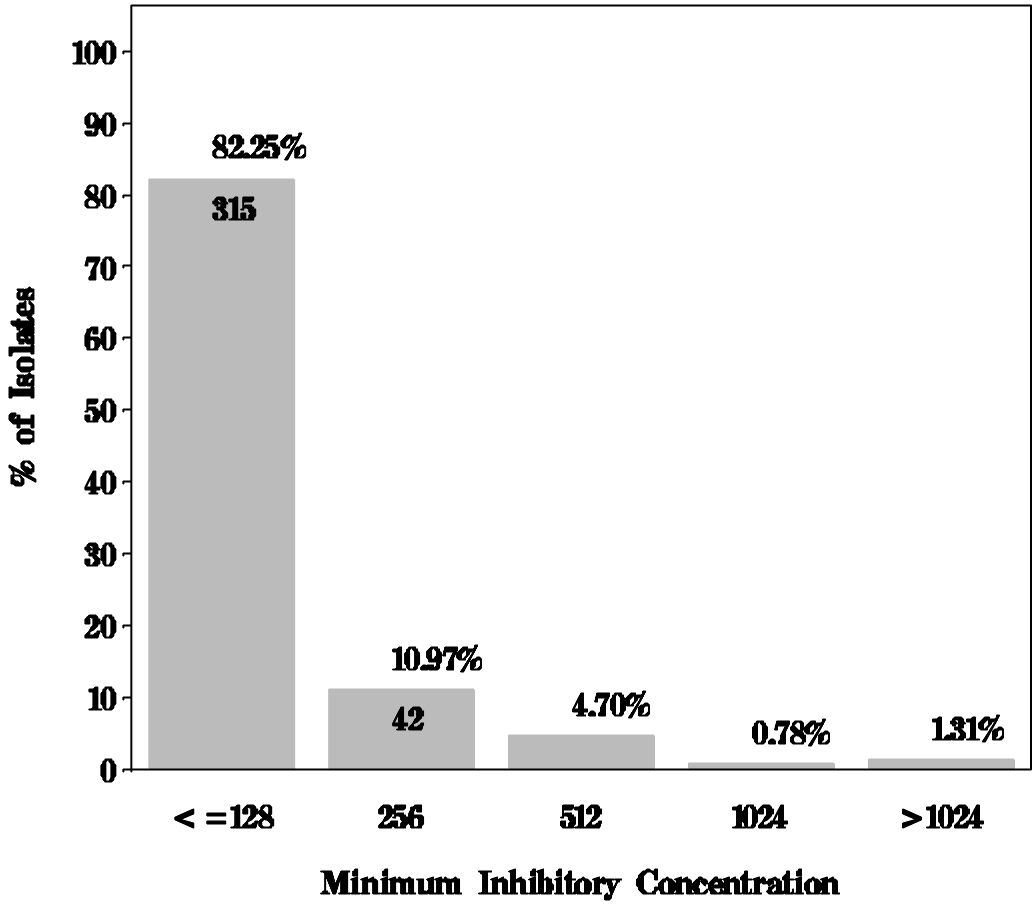
Breakpoints: Susceptible<=128 μg/mL Resistant>=512μg/mL



NARMS

Figure 15: Minimum Inhibitory Concentration of Kanamycin for *Enterococcus* in Ground Beef (N=383 Isolates)

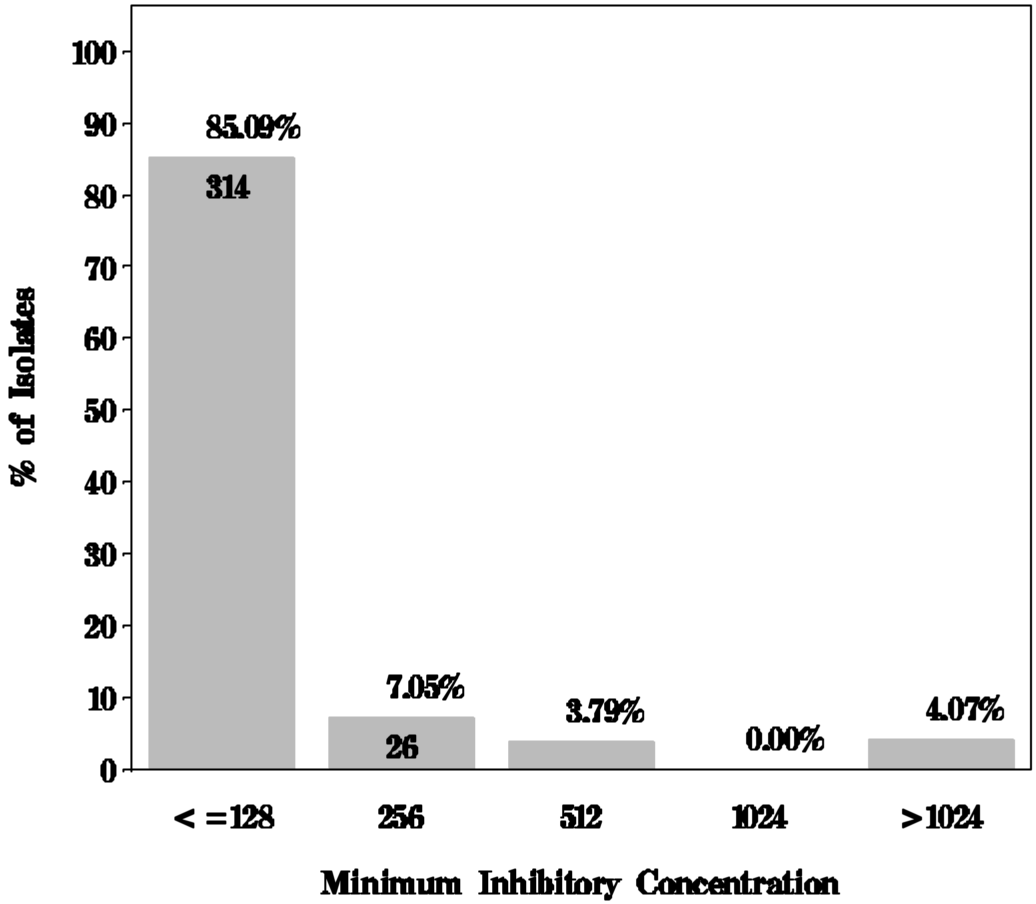
Breakpoints: Susceptible<=128 µg/mL Resistant>=512µg/mL



NARMS

Figure 15: Minimum Inhibitory Concentration of Kanamycin for *Enterococcus* in Pork Chop (N=369 Isolates)

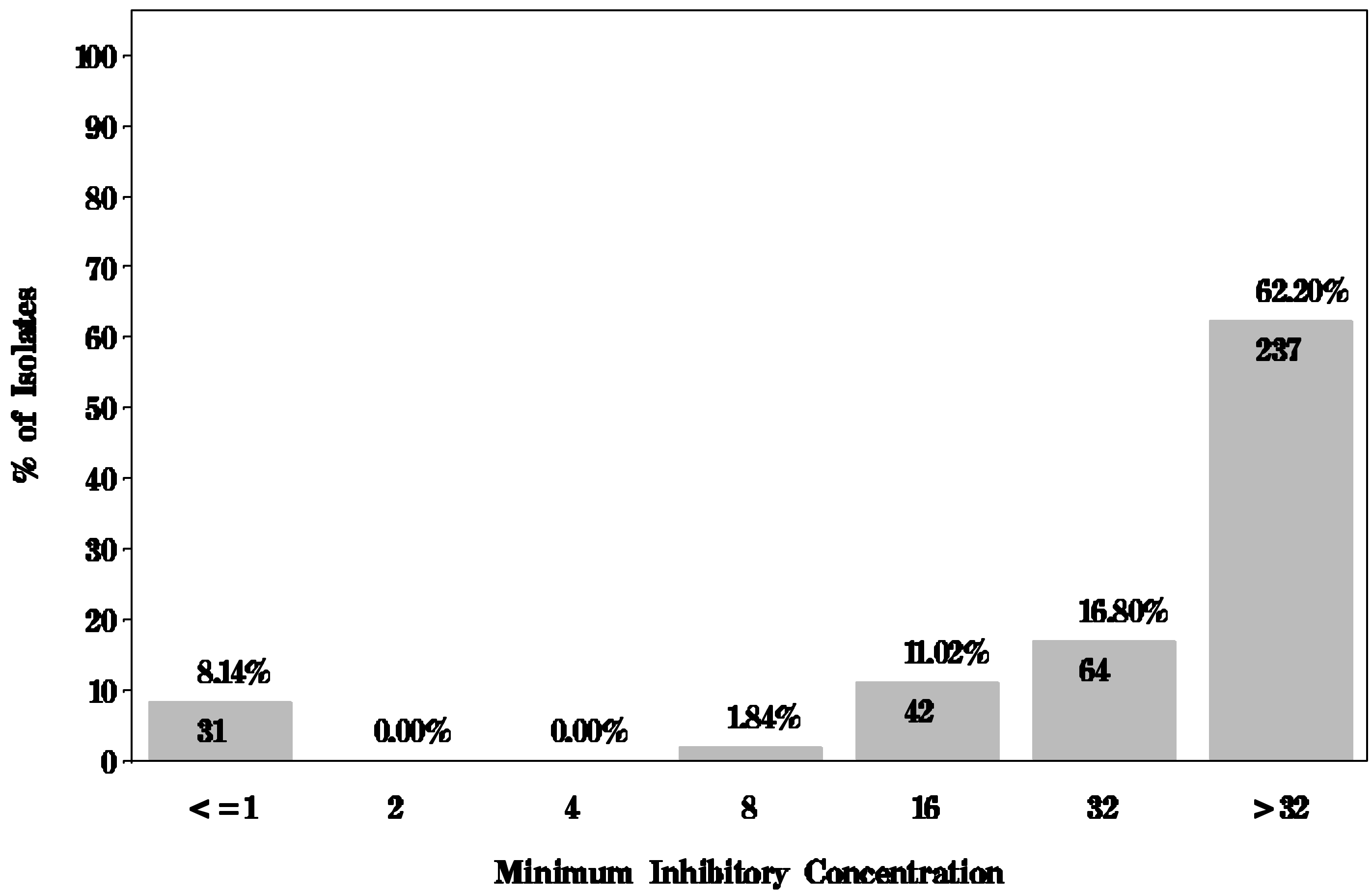
Breakpoints: Susceptible< =128 µg/mL Resistant> =512µg/mL



NARMS

Figure 15: Minimum Inhibitory Concentration of Lincomycin for *Enterococcus* in Chicken Breast (N=381 Isolates)

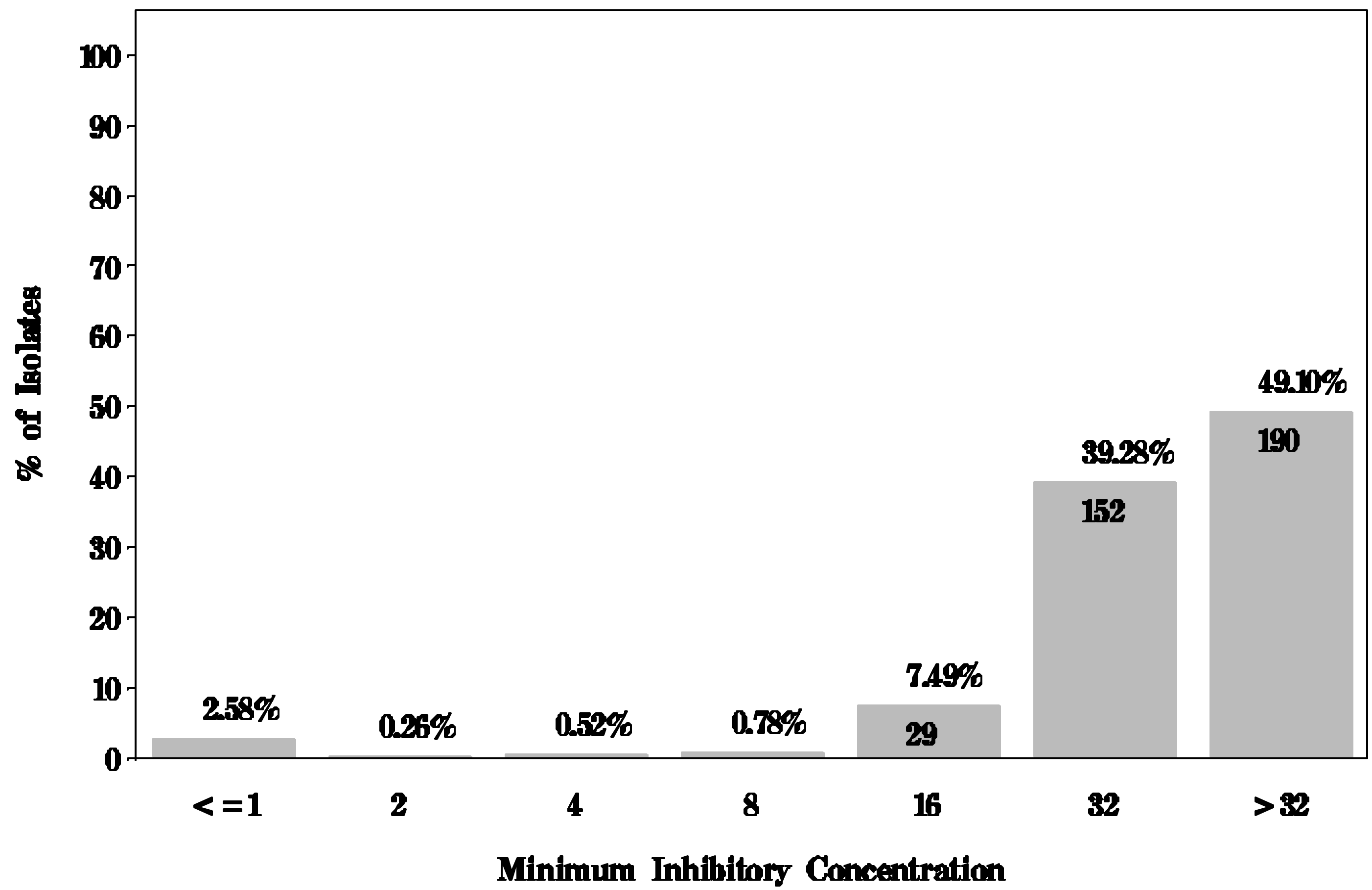
Breakpoints: Susceptible<=8 μg/mL Resistant>=32μg/mL



NARMS

Figure 15: Minimum Inhibitory Concentration of Lincomycin for *Enterococcus* in Ground Turkey (N=387 Isolates)

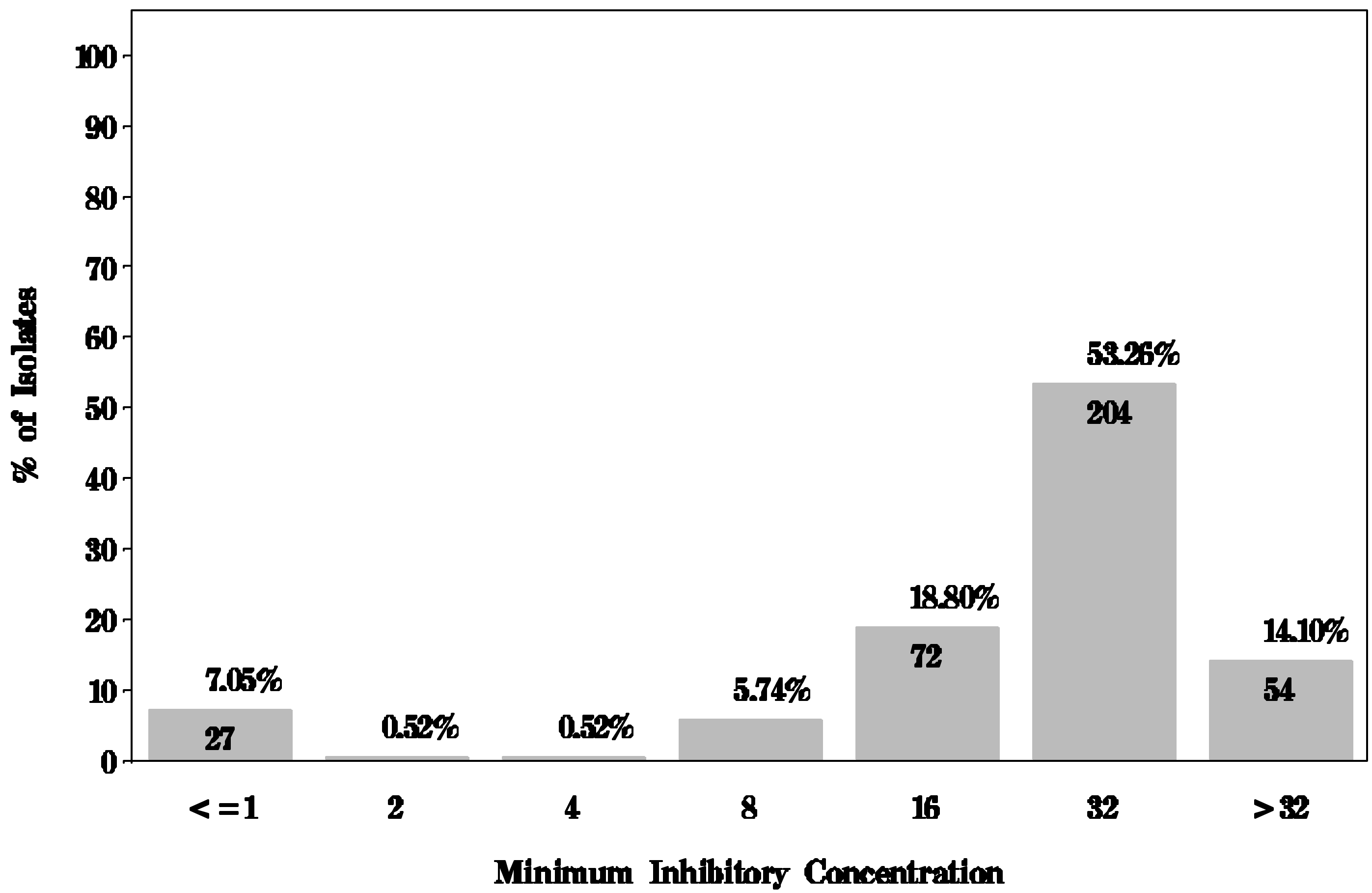
Breakpoints: Susceptible<=8 μg/mL Resistant>=32μg/mL



NARMS

Figure 15: Minimum Inhibitory Concentration of Lincomycin for *Enterococcus* in Ground Beef (N=383 Isolates)

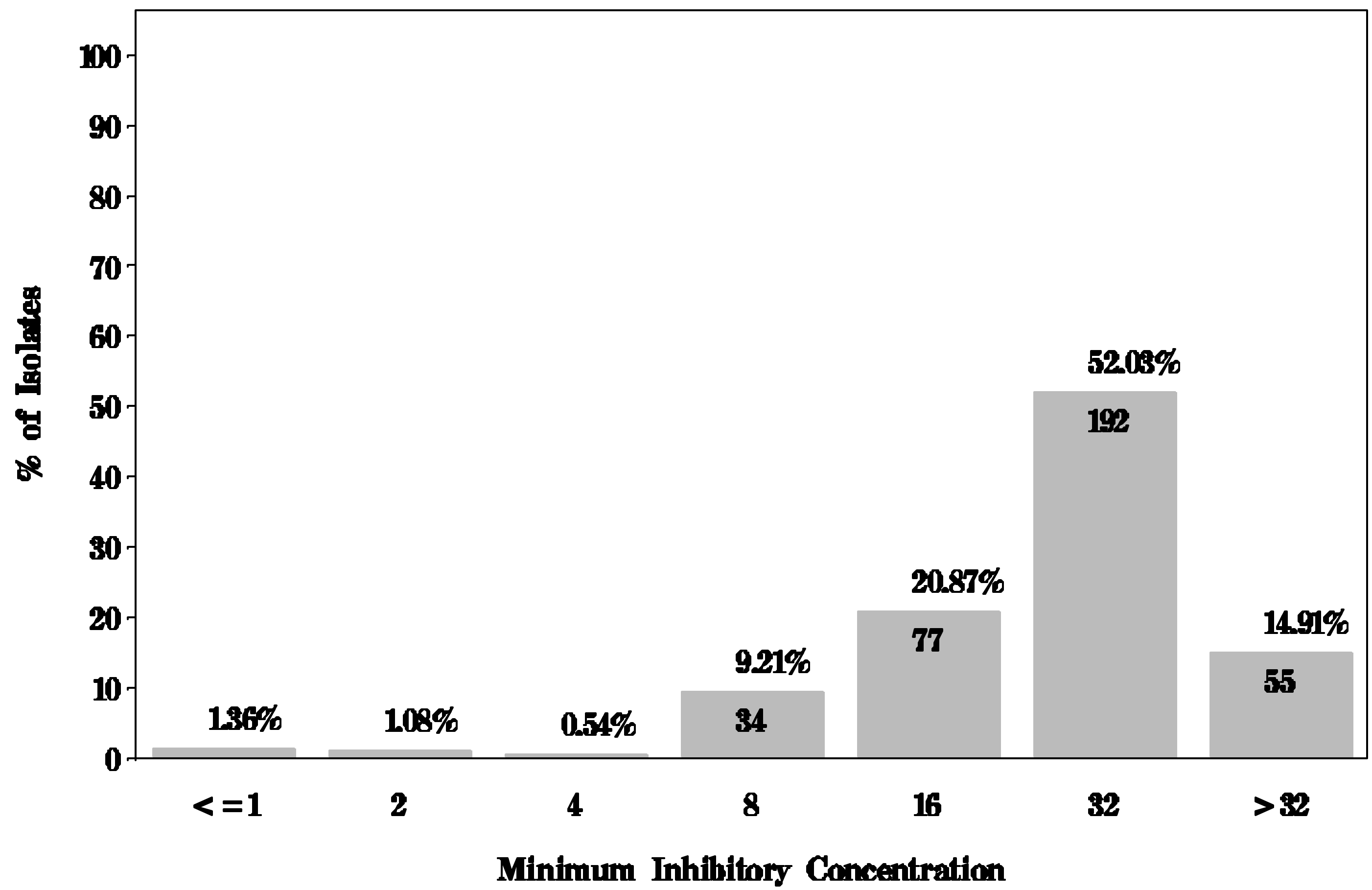
Breakpoints: Susceptible<=8 μg/mL Resistant>=32μg/mL



NARMS

Figure 15: Minimum Inhibitory Concentration of Lincomycin for *Enterococcus* in Pork Chop (N=369 Isolates)

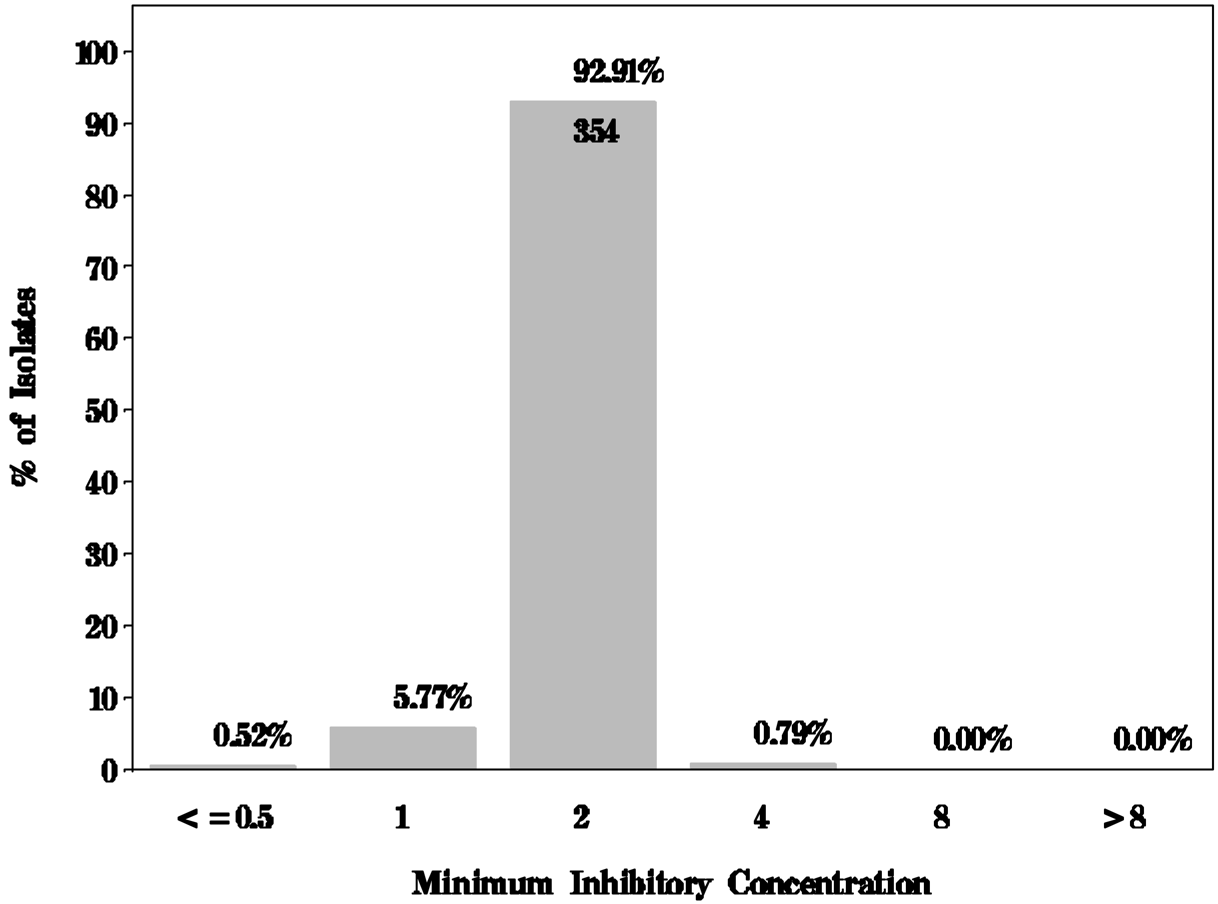
Breakpoints: Susceptible<=8 μg/mL Resistant>=32μg/mL



NARMS

Figure 15: Minimum Inhibitory Concentration of Linezolid for *Enterococcus* in Chicken Breast (N=381 Isolates)

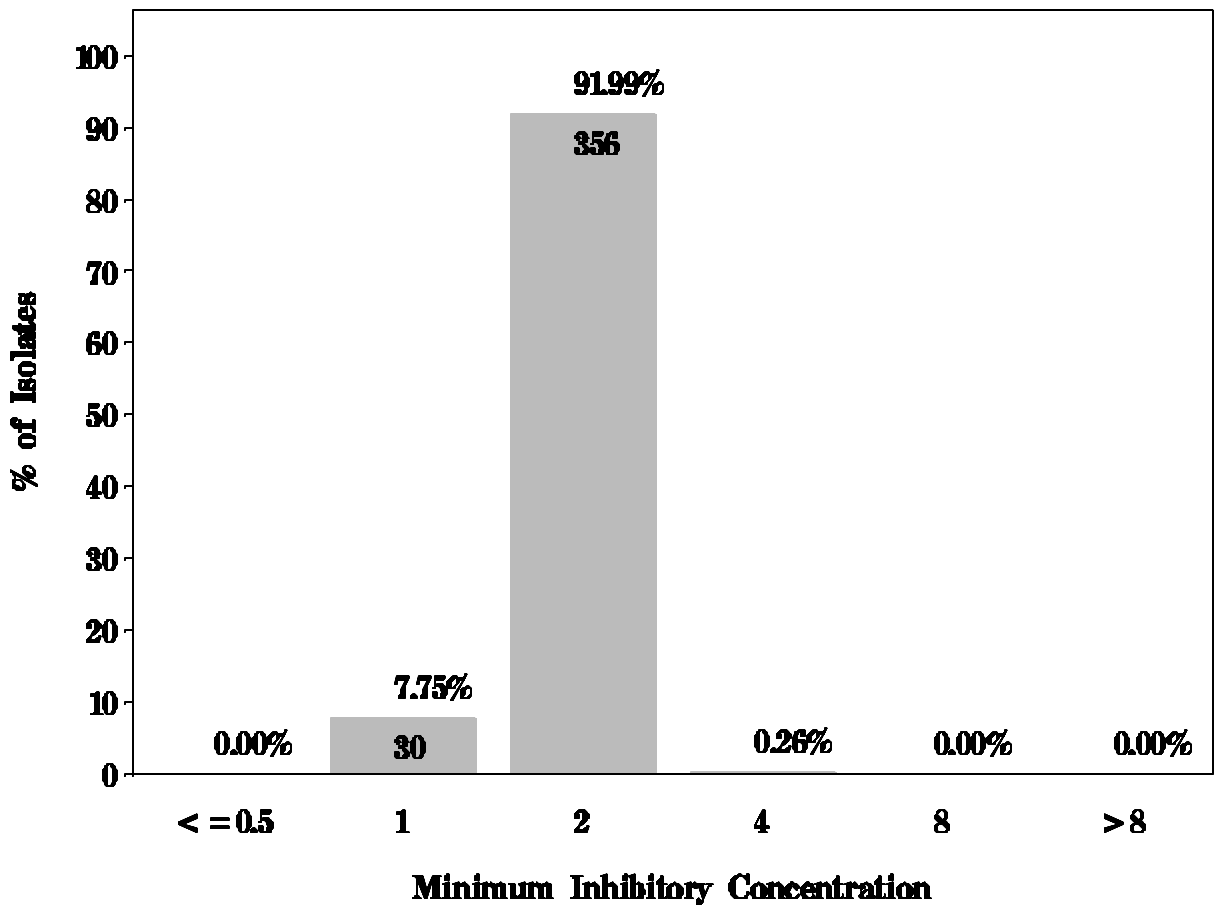
Breakpoints: Susceptible<=2 μg/mL Resistant>=8μg/mL



NARMS

Figure 15: Minimum Inhibitory Concentration of Linezolid for *Enterococcus* in Ground Turkey (N=387 Isolates)

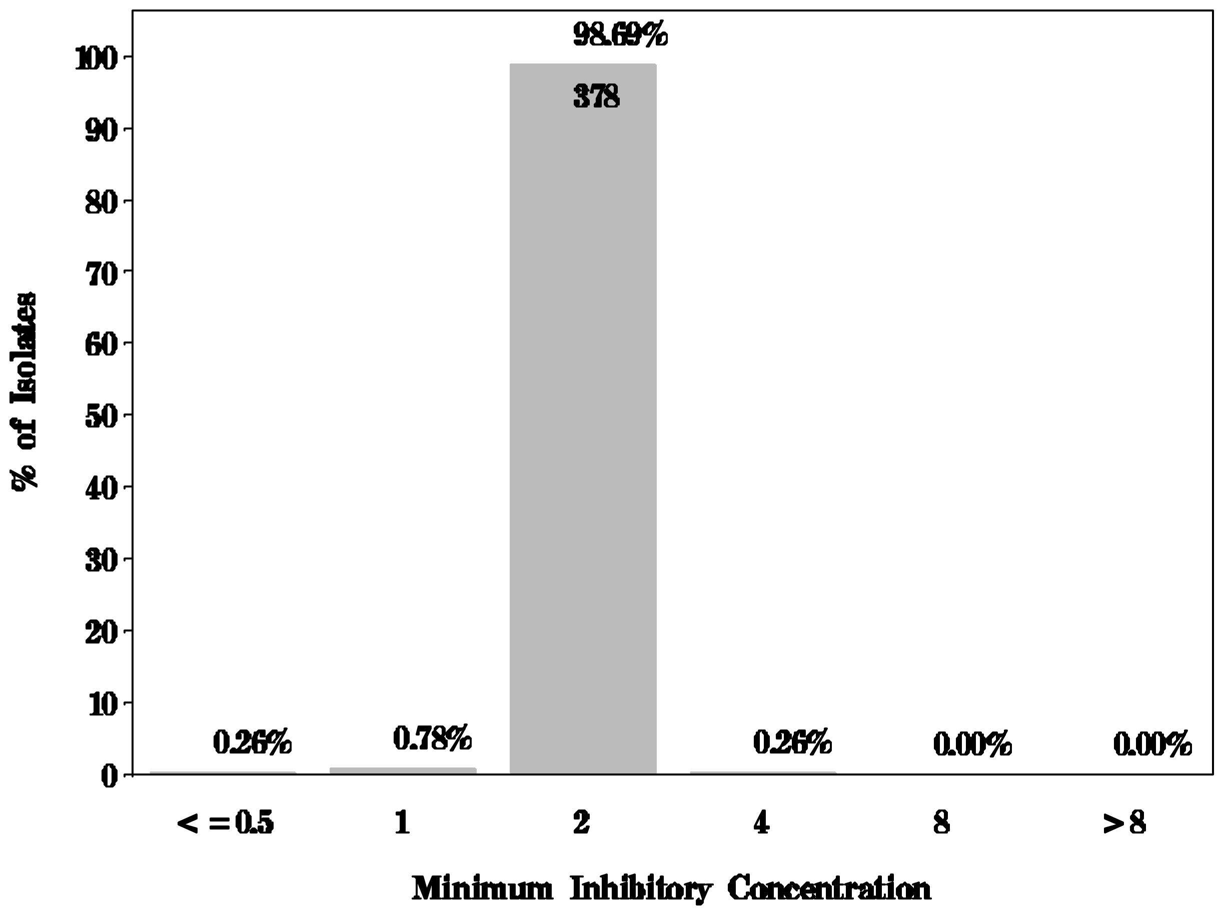
Breakpoints: Susceptible<=2 μg/mL Resistant>=8μg/mL



NARMS

Figure 15: Minimum Inhibitory Concentration of Linezolid for *Enterococcus* in Ground Beef (N=383 Isolates)

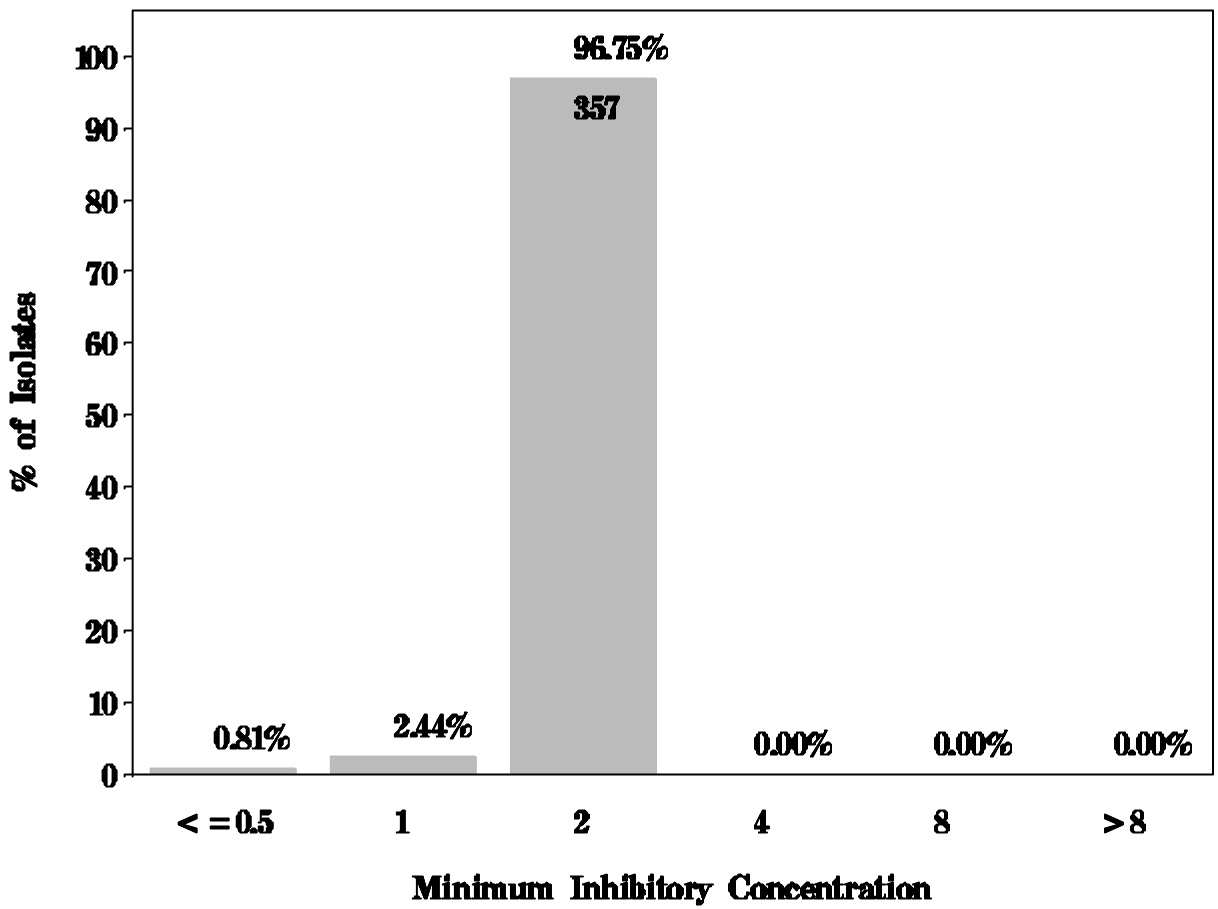
Breakpoints: Susceptible<=2 μg/mL Resistant>=8μg/mL



NARMS

Figure 15: Minimum Inhibitory Concentration of Linezolid for *Enterococcus* in Pork Chop (N=369 Isolates)

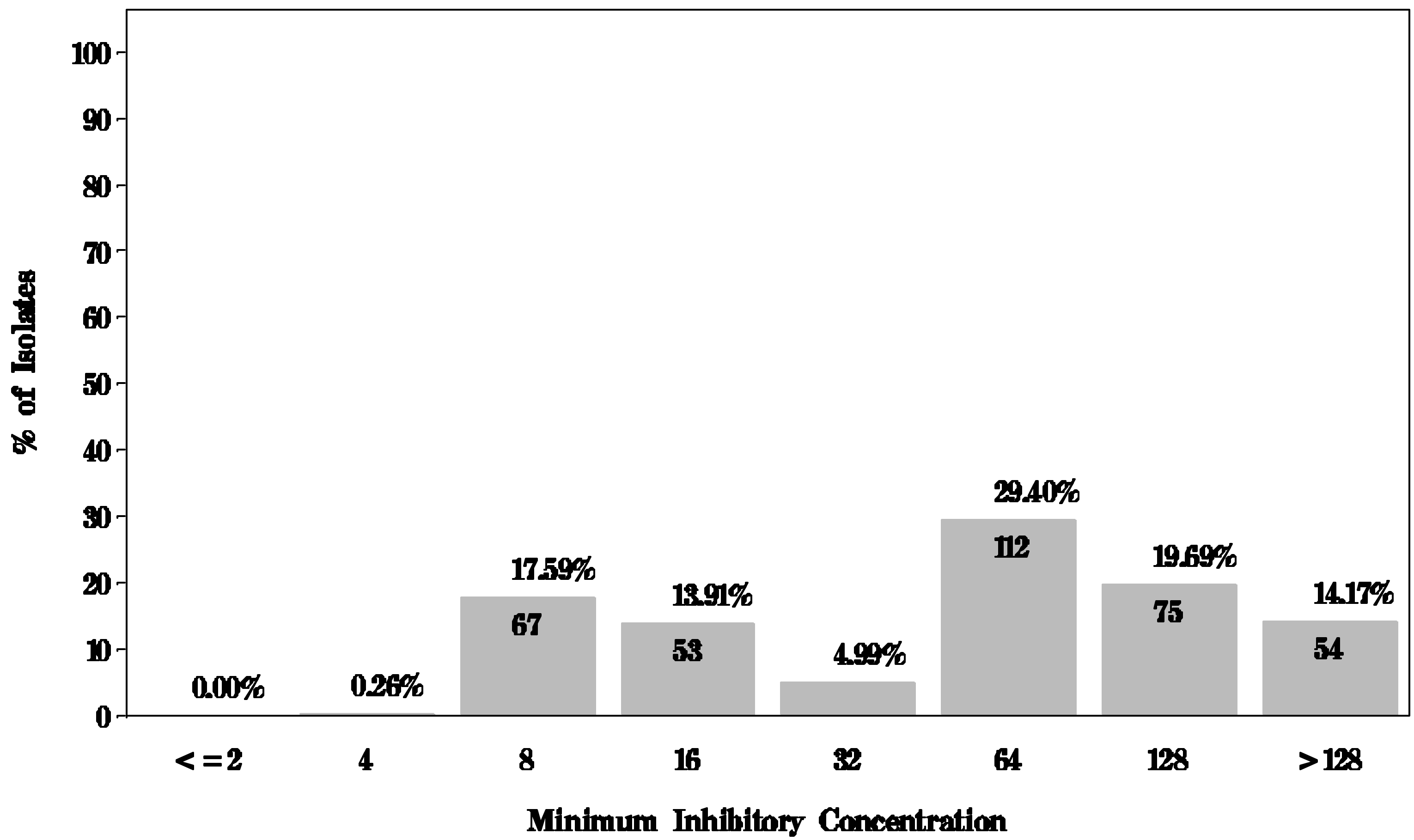
Breakpoints: Susceptible<=2 µg/mL Resistant>=8µg/mL



NARMS

Figure 15: Minimum Inhibitory Concentration of Nitrofurantoin for *Enterococcus* in Chicken Breast (N=381 Isolates)

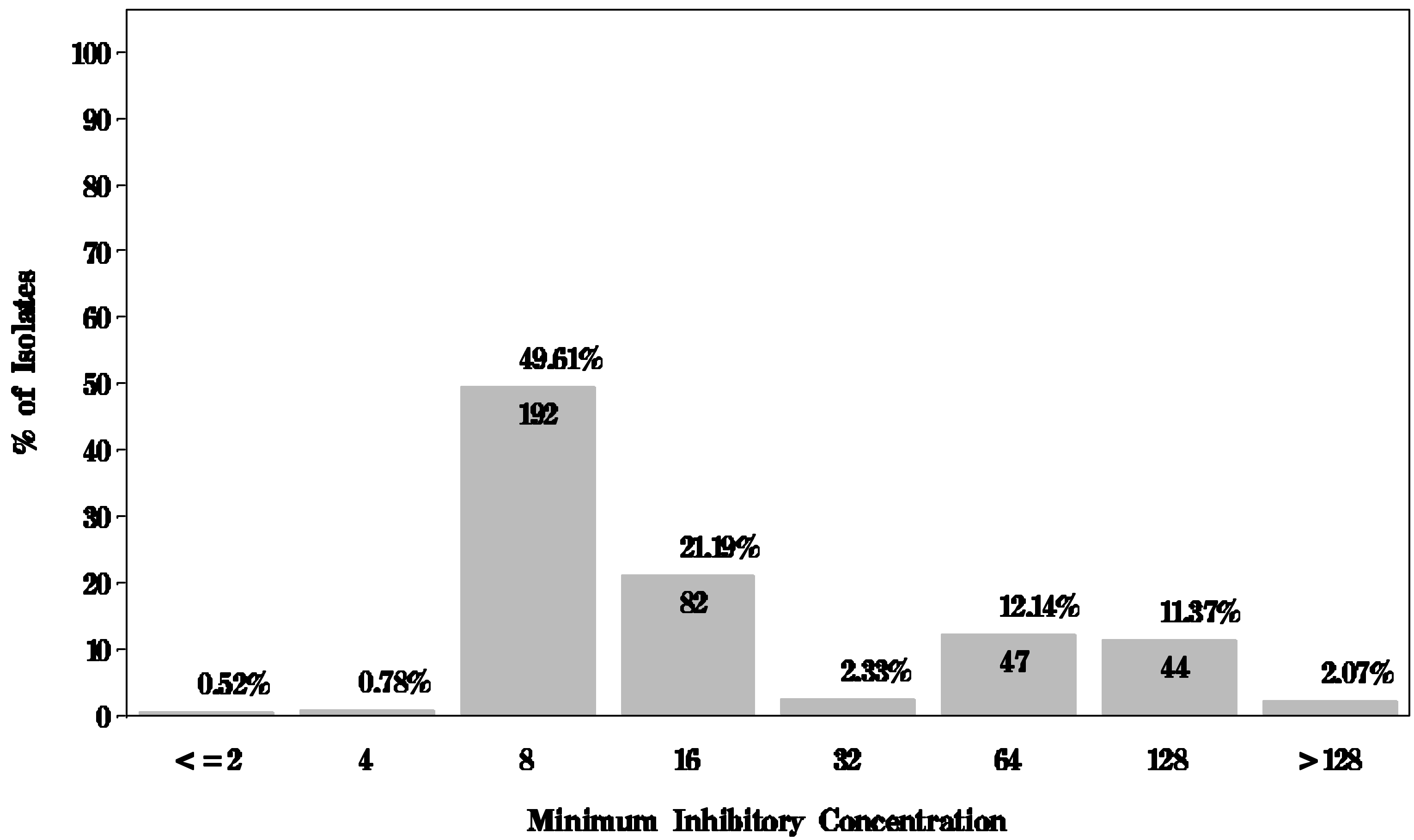
Breakpoints: Susceptible<=32 μg/mL Resistant>=128μg/mL



NARMS

Figure 15: Minimum Inhibitory Concentration of Nitrofurantoin for *Enterococcus* in Ground Turkey (N=387 Isolates)

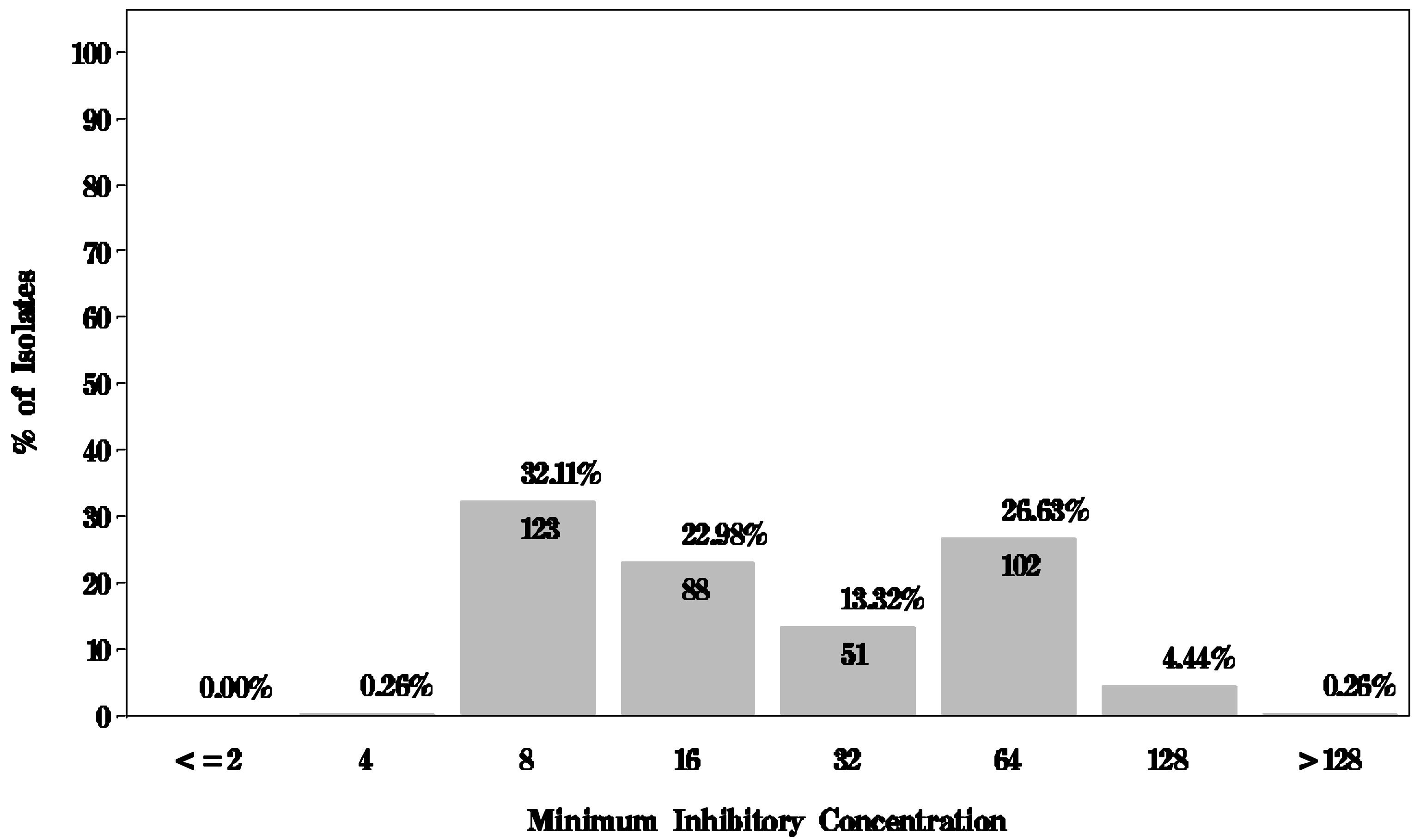
Breakpoints: Susceptible<=32 μg/mL Resistant>=128μg/mL



NARMS

Figure 15: Minimum Inhibitory Concentration of Nitrofurantoin for *Enterococcus* in Ground Beef (N=383 Isolates)

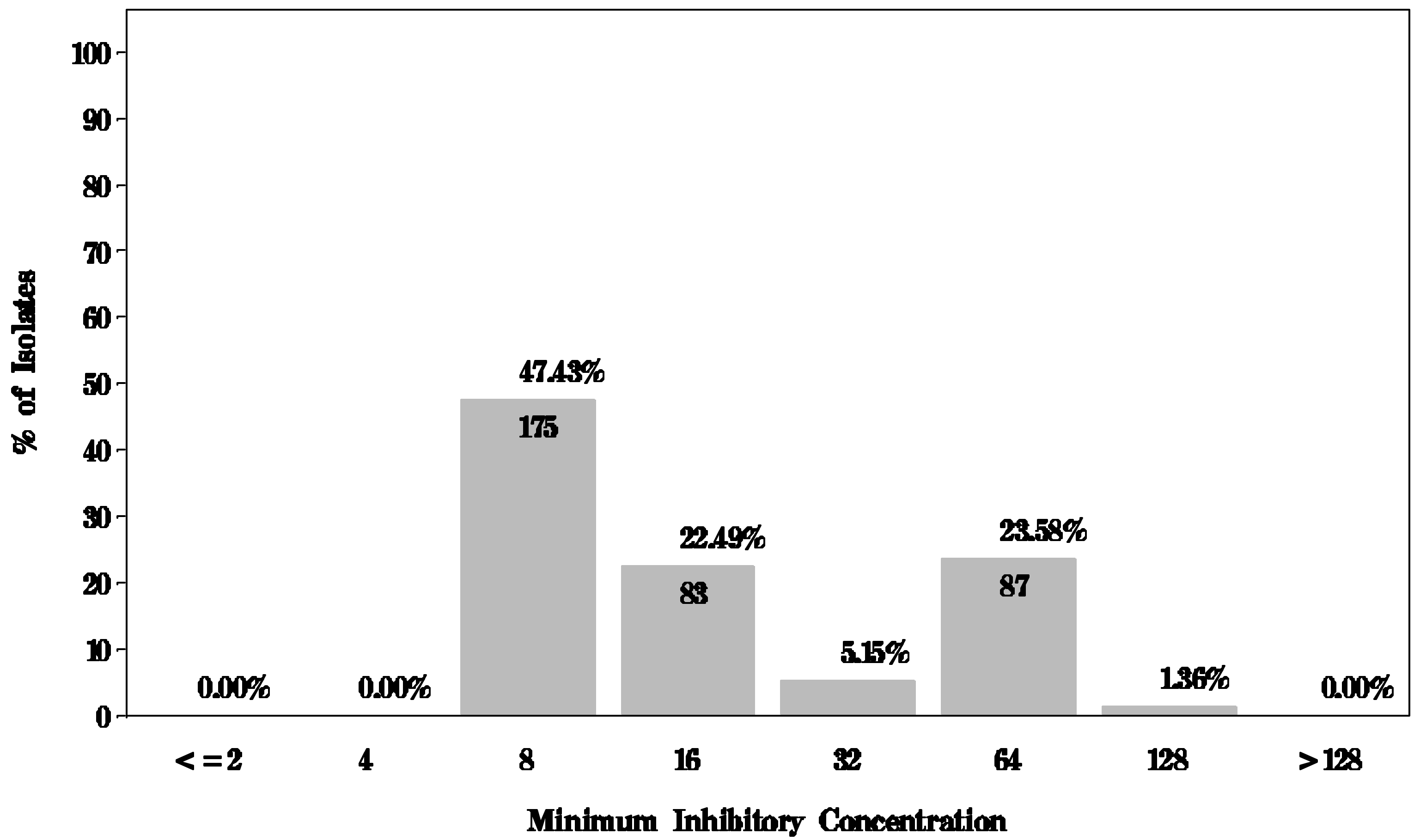
Breakpoints: Susceptible<=32 µg/mL Resistant>=128µg/mL



NARMS

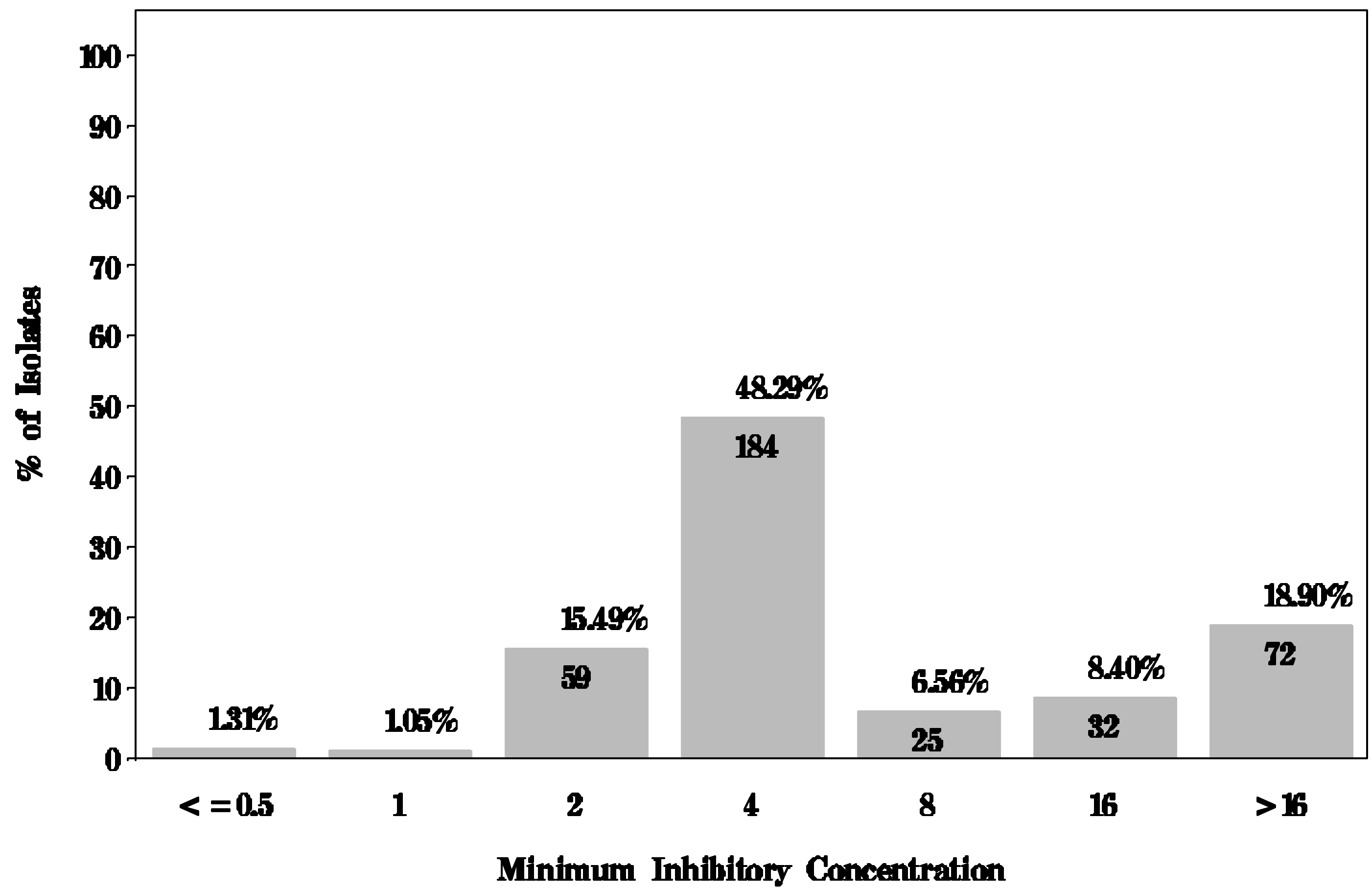
Figure 15: Minimum Inhibitory Concentration of Nitrofurantoin for *Enterococcus* in Pork Chop (N=369 Isolates)

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



NARMS

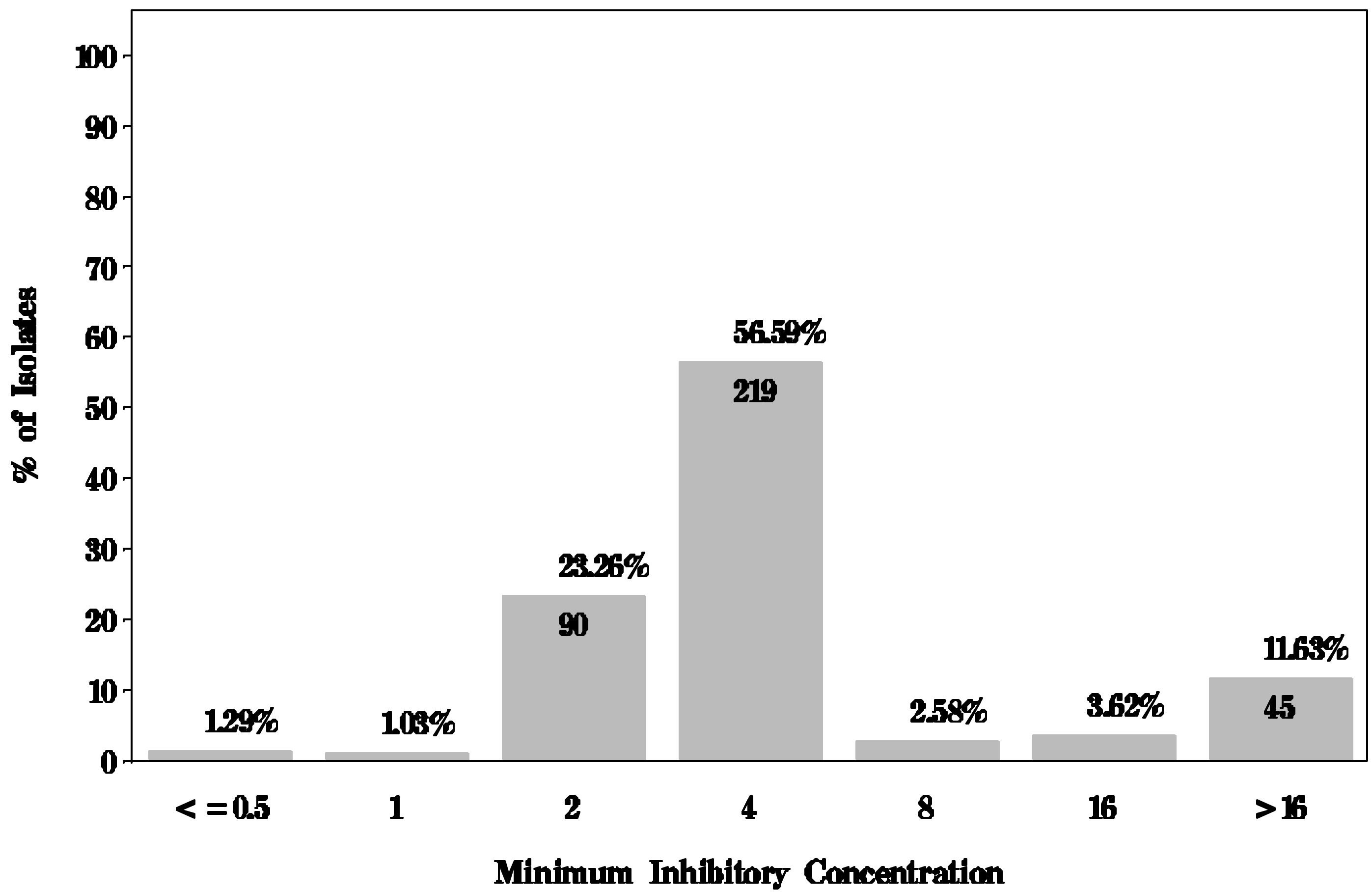
Figure 15: Minimum Inhibitory Concentration of Penicillin
for *Enterococcus* in Chicken Breast (N=381 Isolates)
Breakpoints: Susceptible<=8 μg/mL Resistant>=16μg/mL



NARMS

Figure 15: Minimum Inhibitory Concentration of Penicillin for *Enterococcus* in Ground Turkey (N=387 Isolates)

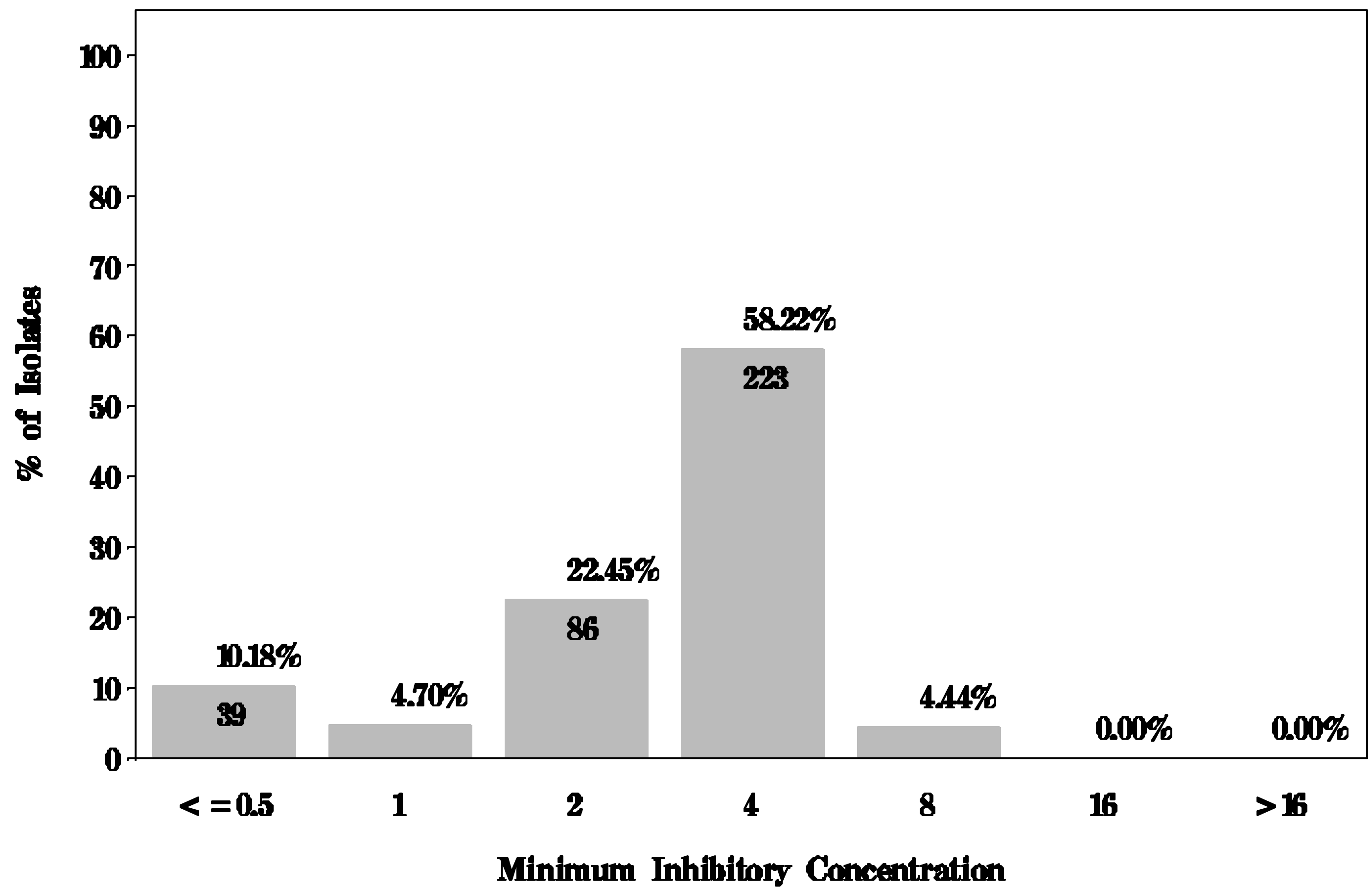
Breakpoints: Susceptible<=8 μg/mL Resistant>=16μg/mL



NARMS

Figure 15: Minimum Inhibitory Concentration of Penicillin for *Enterococcus* in Ground Beef (N=383 Isolates)

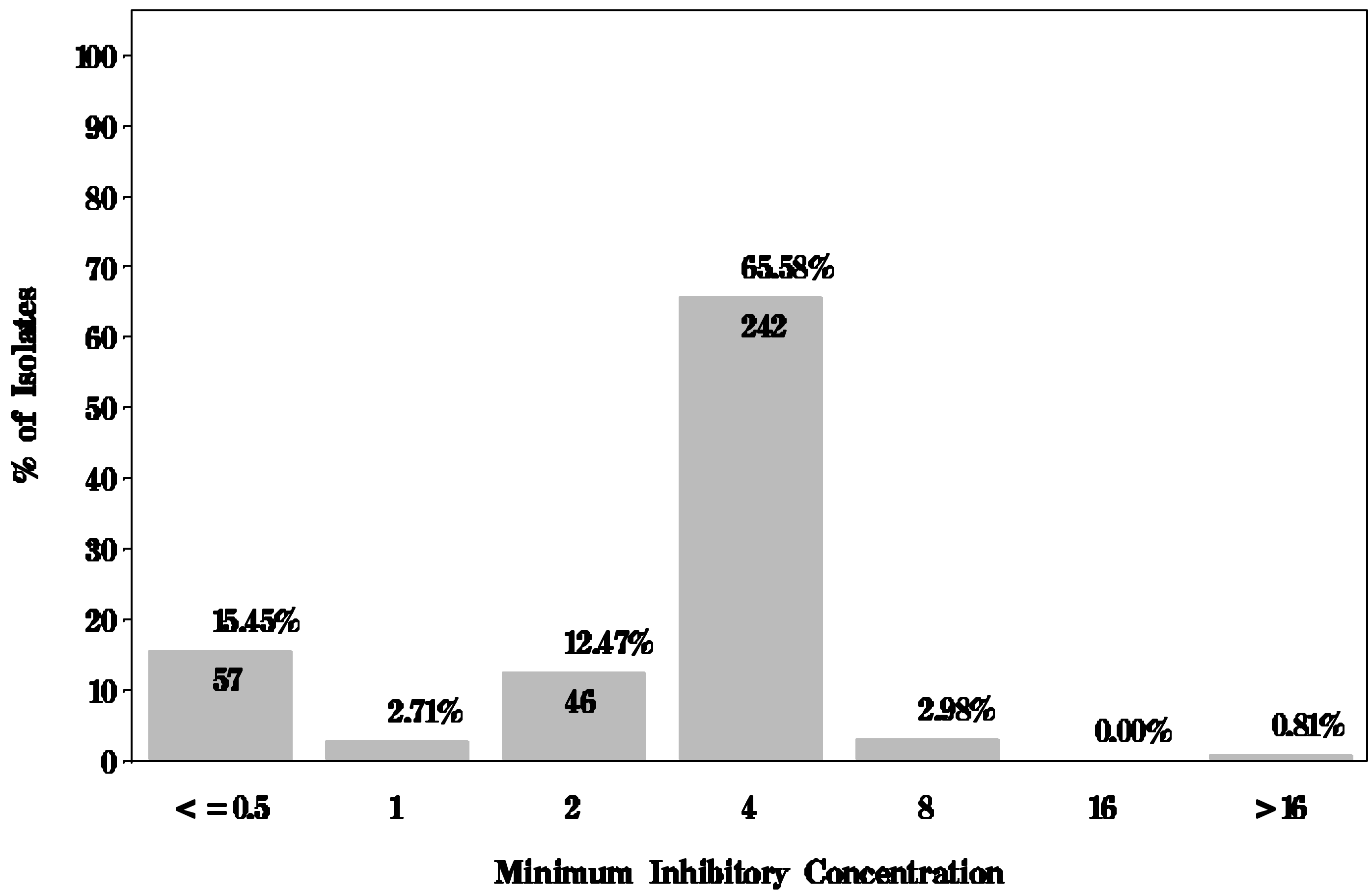
Breakpoints: Susceptible<=8 μg/mL Resistant>=16μg/mL



NARMS

Figure 15: Minimum Inhibitory Concentration of Penicillin for *Enterococcus* in Pork Chop (N=369 Isolates)

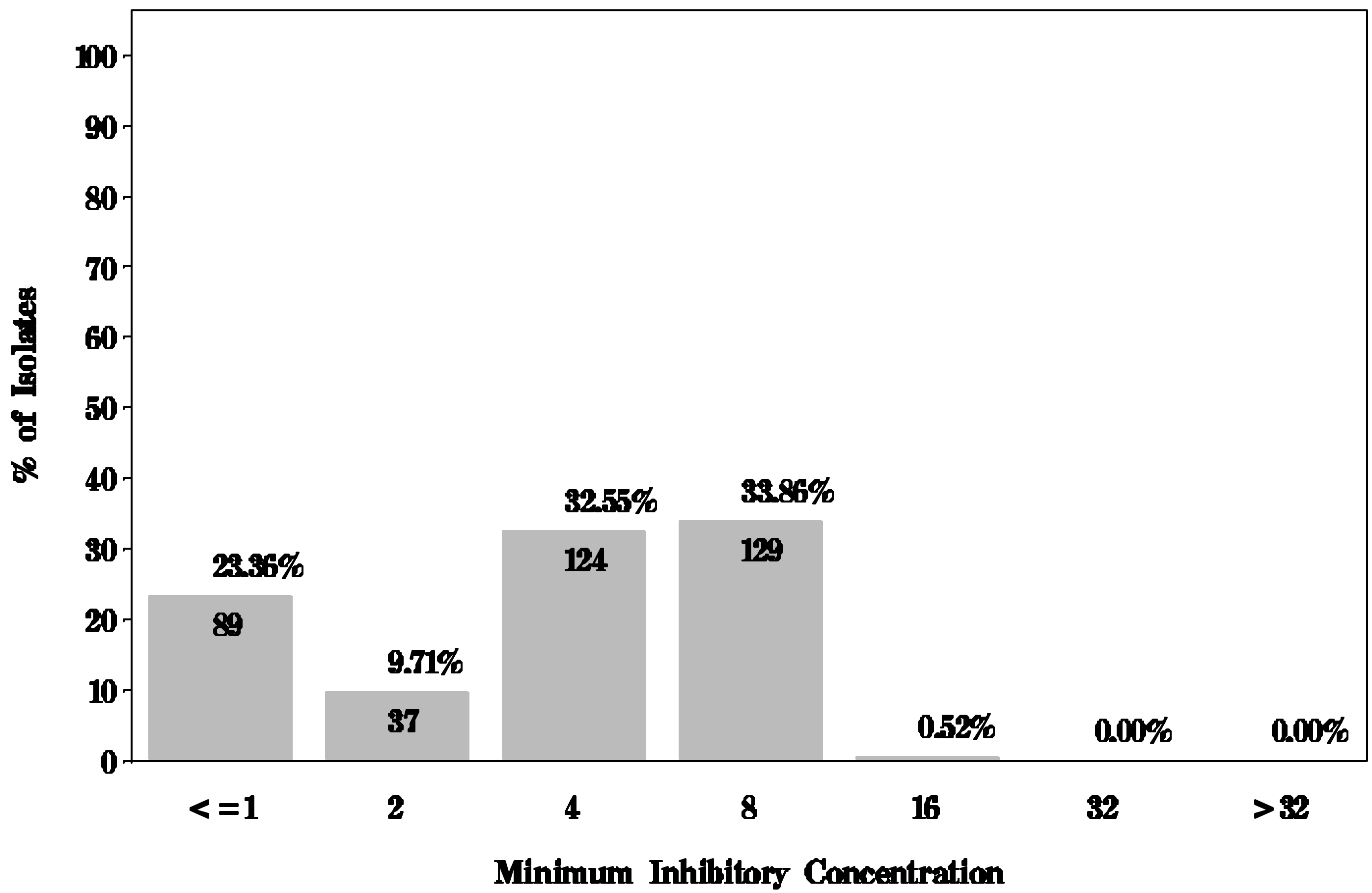
Breakpoints: Susceptible<=8 μg/mL Resistant>=16μg/mL



NARMS

Figure 15: Minimum Inhibitory Concentration of Salinomycin for *Enterococcus* in Chicken Breast (N=381 Isolates)

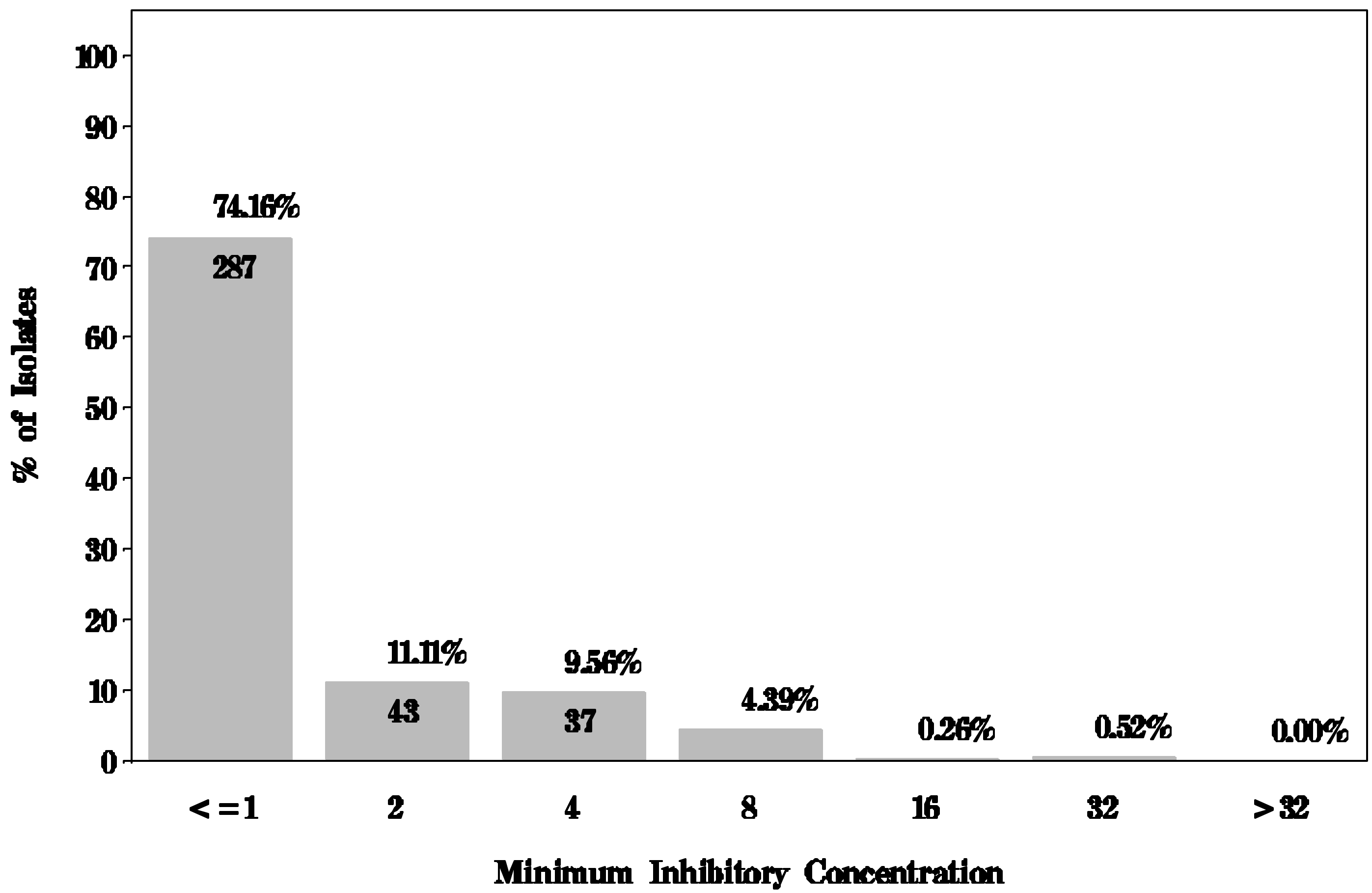
Breakpoints: Susceptible<=8 μg/mL Resistant>=32μg/mL



NARMS

Figure 15: Minimum Inhibitory Concentration of Salinomycin for *Enterococcus* in Ground Turkey (N=387 Isolates)

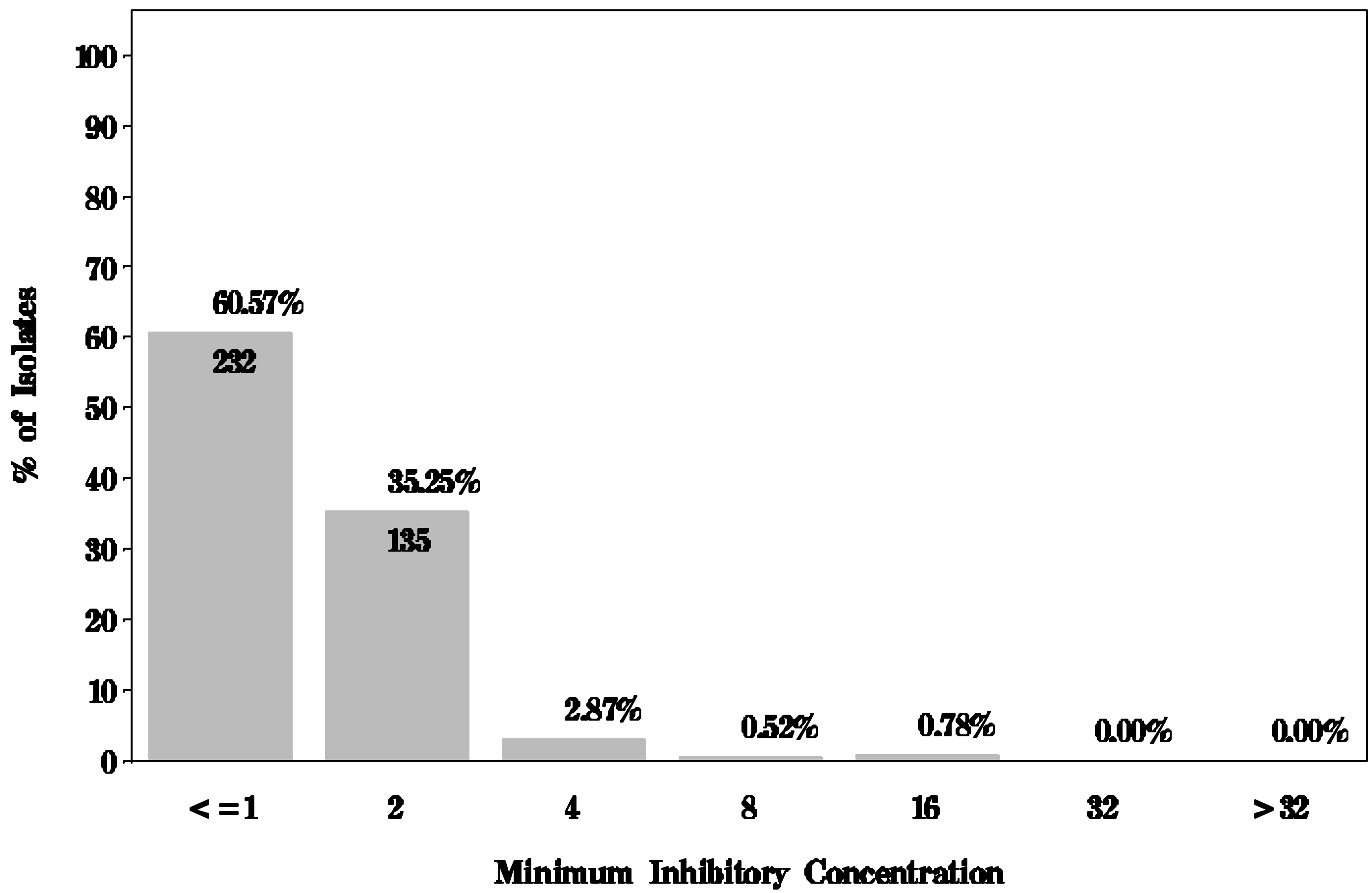
Breakpoints: Susceptible<=8 μg/mL Resistant>=32μg/mL



NARMS

Figure 15: Minimum Inhibitory Concentration of Salinomycin for *Enterococcus* in Ground Beef (N=383 Isolates)

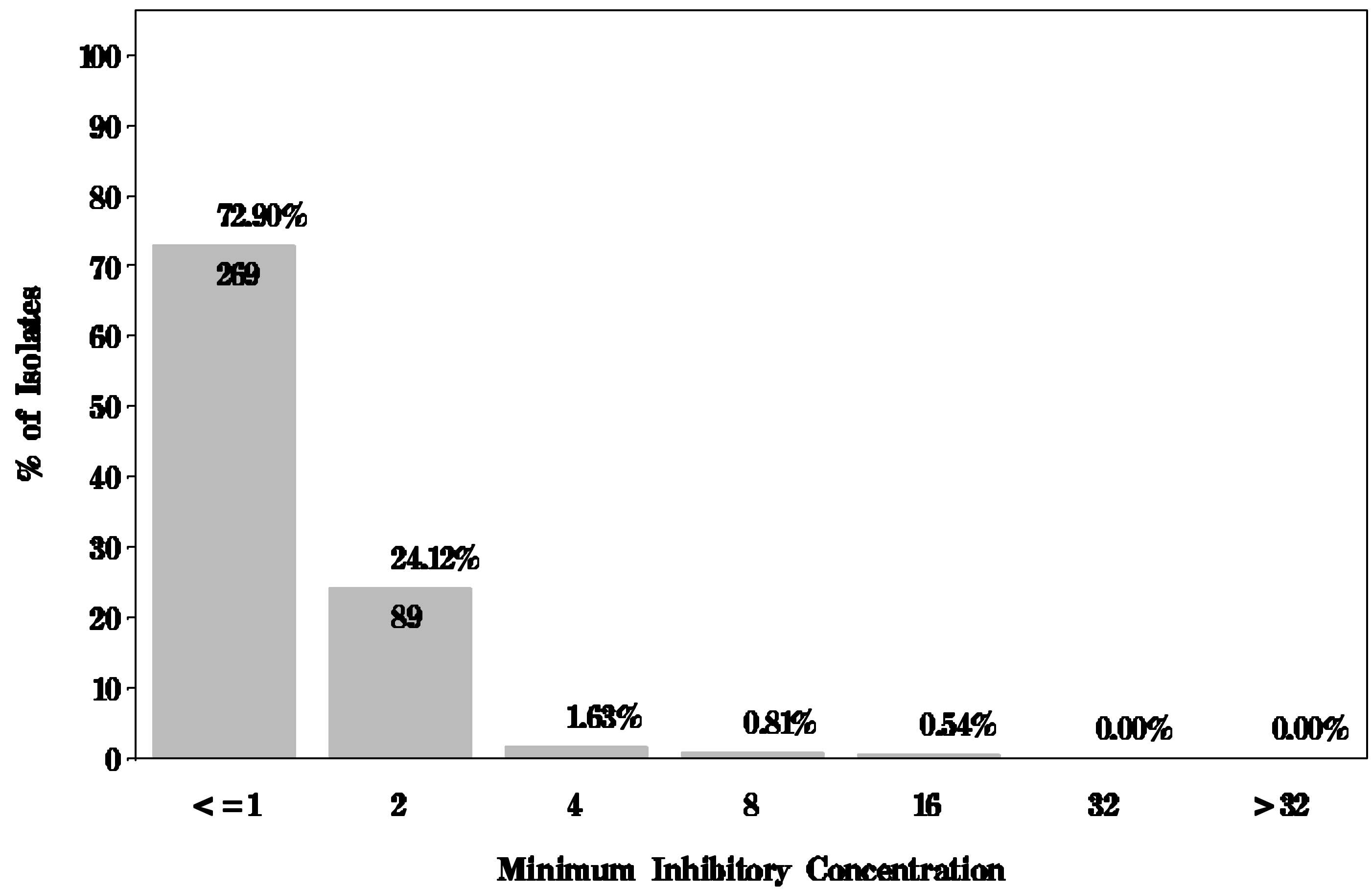
Breakpoints: Susceptible<=8 μg/mL Resistant>=32μg/mL



NARMS

Figure 15: Minimum Inhibitory Concentration of Salinomycin for *Enterococcus* in Pork Chop (N=369 Isolates)

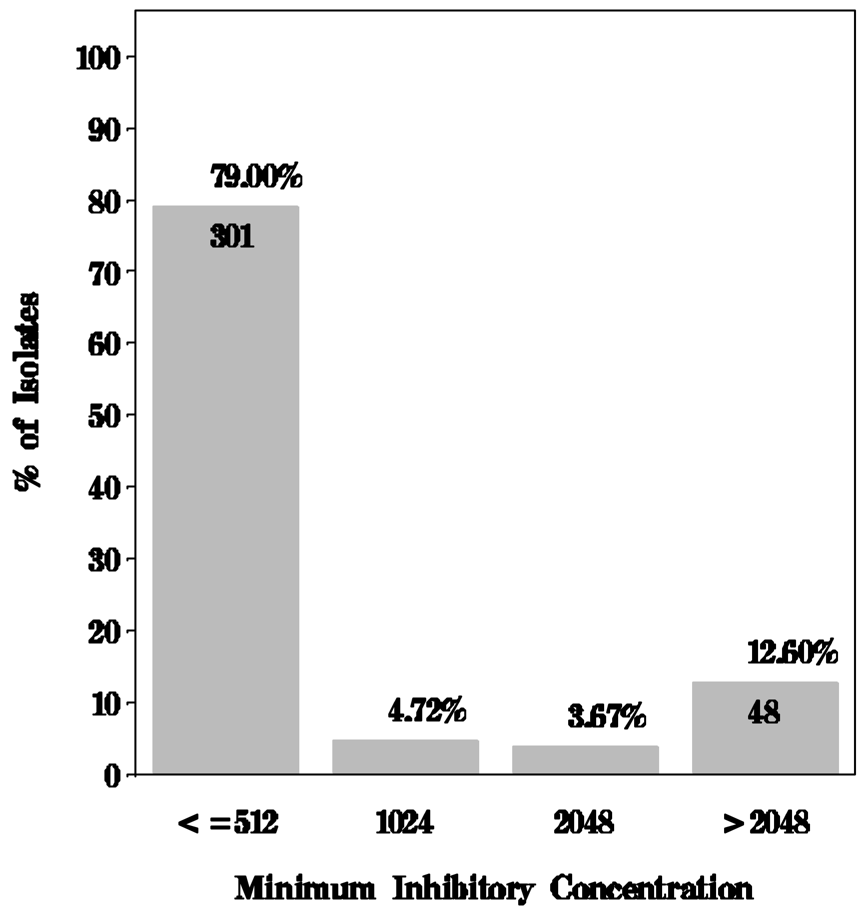
Breakpoints: Susceptible<=8 µg/mL Resistant>=32µg/mL



NARMS

Figure 15: Minimum Inhibitory Concentration of Streptomycin for *Enterococcus* in Chicken Breast (N=381 Isolates)

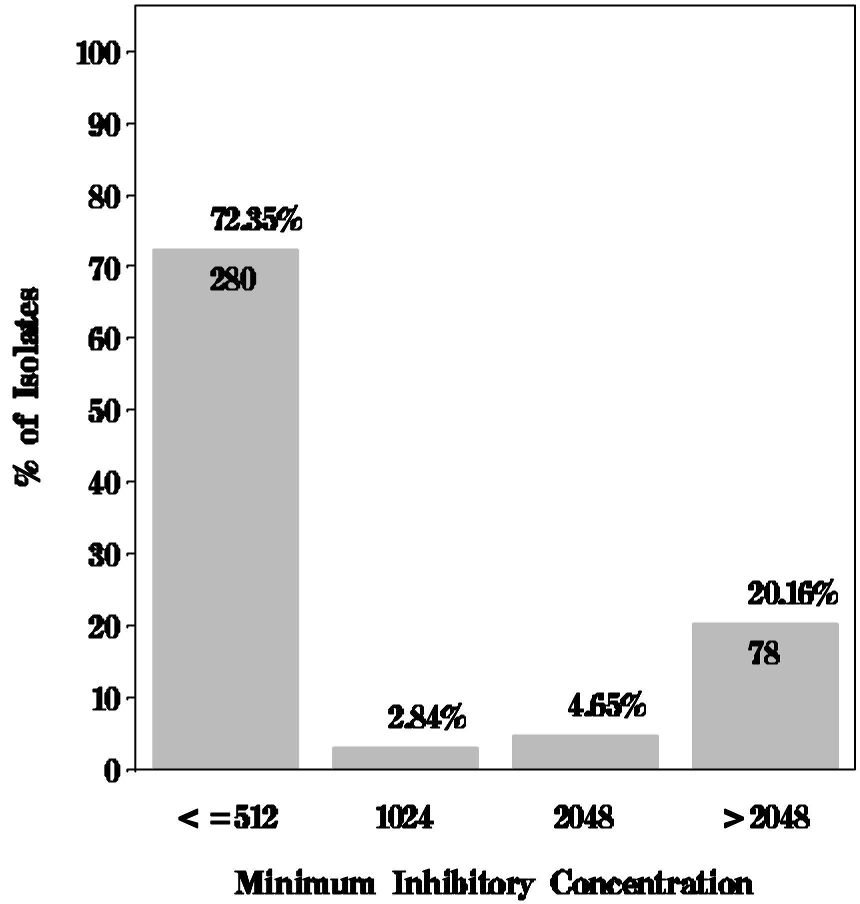
Breakpoints: Susceptible<1000 μg/mL Resistant>=1000μg/mL



NARMS

Figure 15: Minimum Inhibitory Concentration of Streptomycin for *Enterococcus* in Ground Turkey (N=387 Isolates)

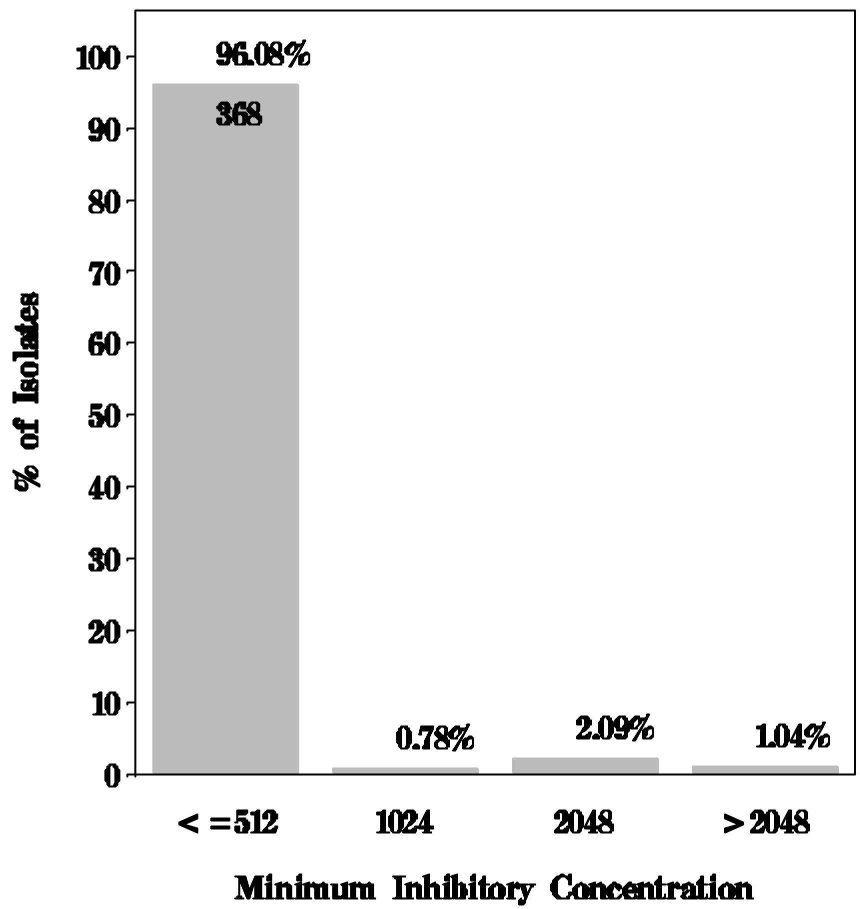
Breakpoints: Susceptible<1000 μg/mL Resistant>=1000μg/mL



NARMS

Figure 15: Minimum Inhibitory Concentration of Streptomycin for *Enterococcus* in Ground Beef (N=383 Isolates)

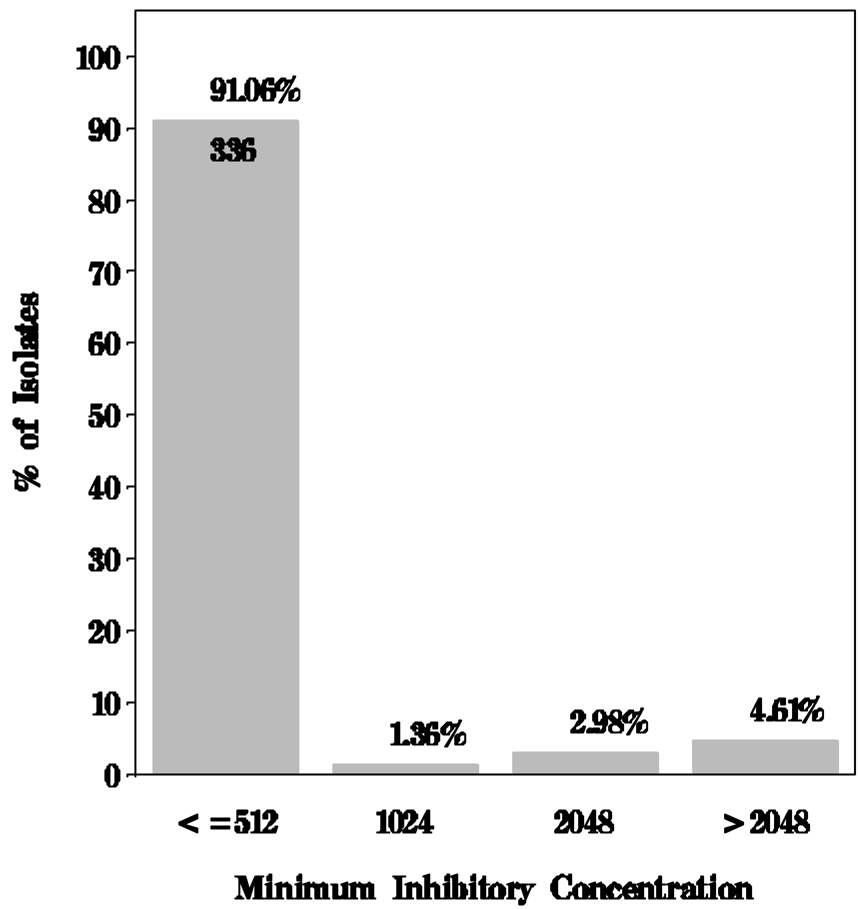
Breakpoints: Susceptible<1000 μg/mL Resistant>=1000μg/mL



NARMS

Figure 15: Minimum Inhibitory Concentration of Streptomycin for *Enterococcus* in Pork Chop (N=369 Isolates)

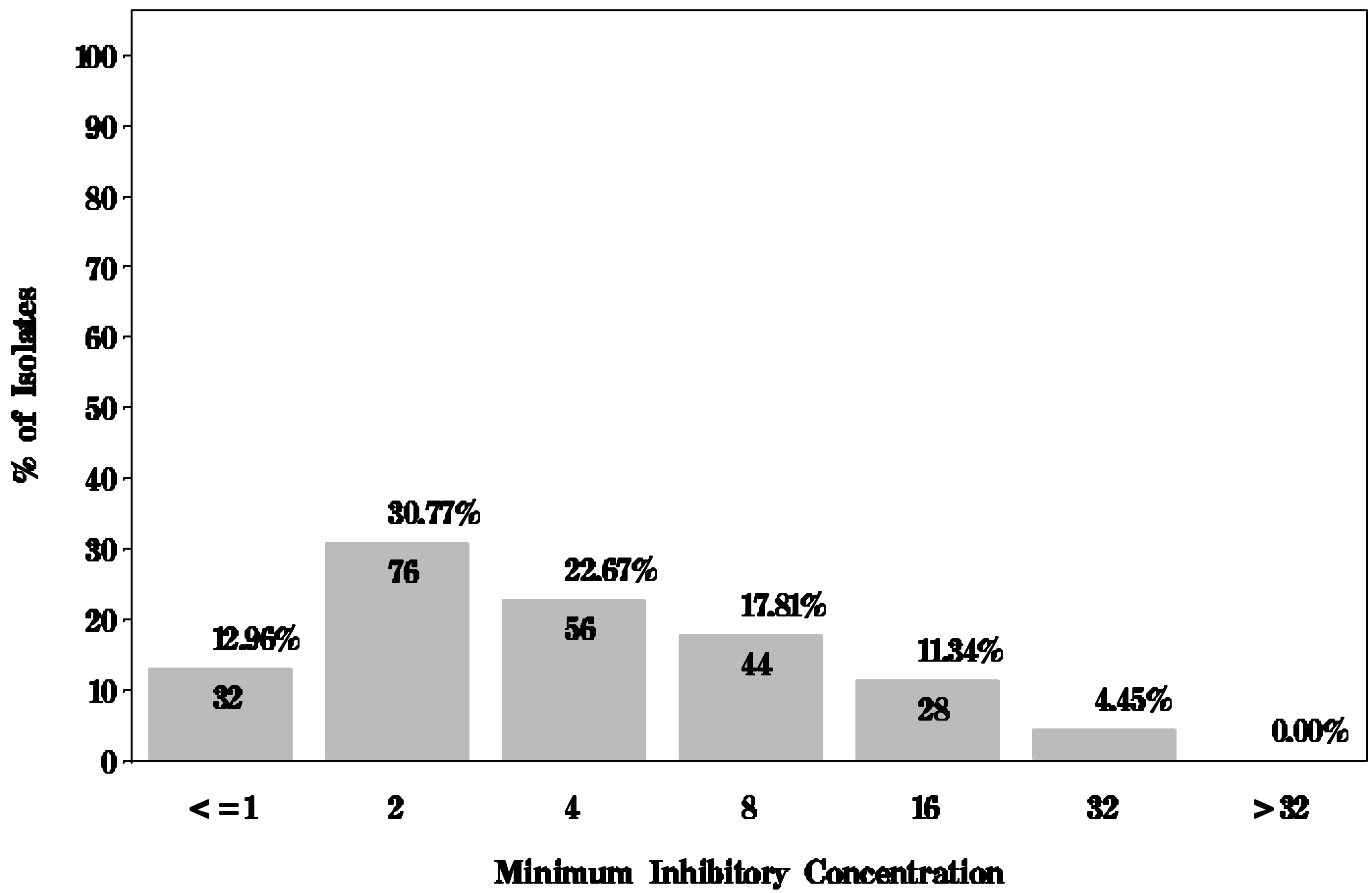
Breakpoints: Susceptible<1000 μg/mL Resistant>=1000μg/mL



NARMS

Figure 15: Minimum Inhibitory Concentration of Quinupristin−dalfopristin for *Enterococcus* in Chicken Breast (N=247 Isolates)

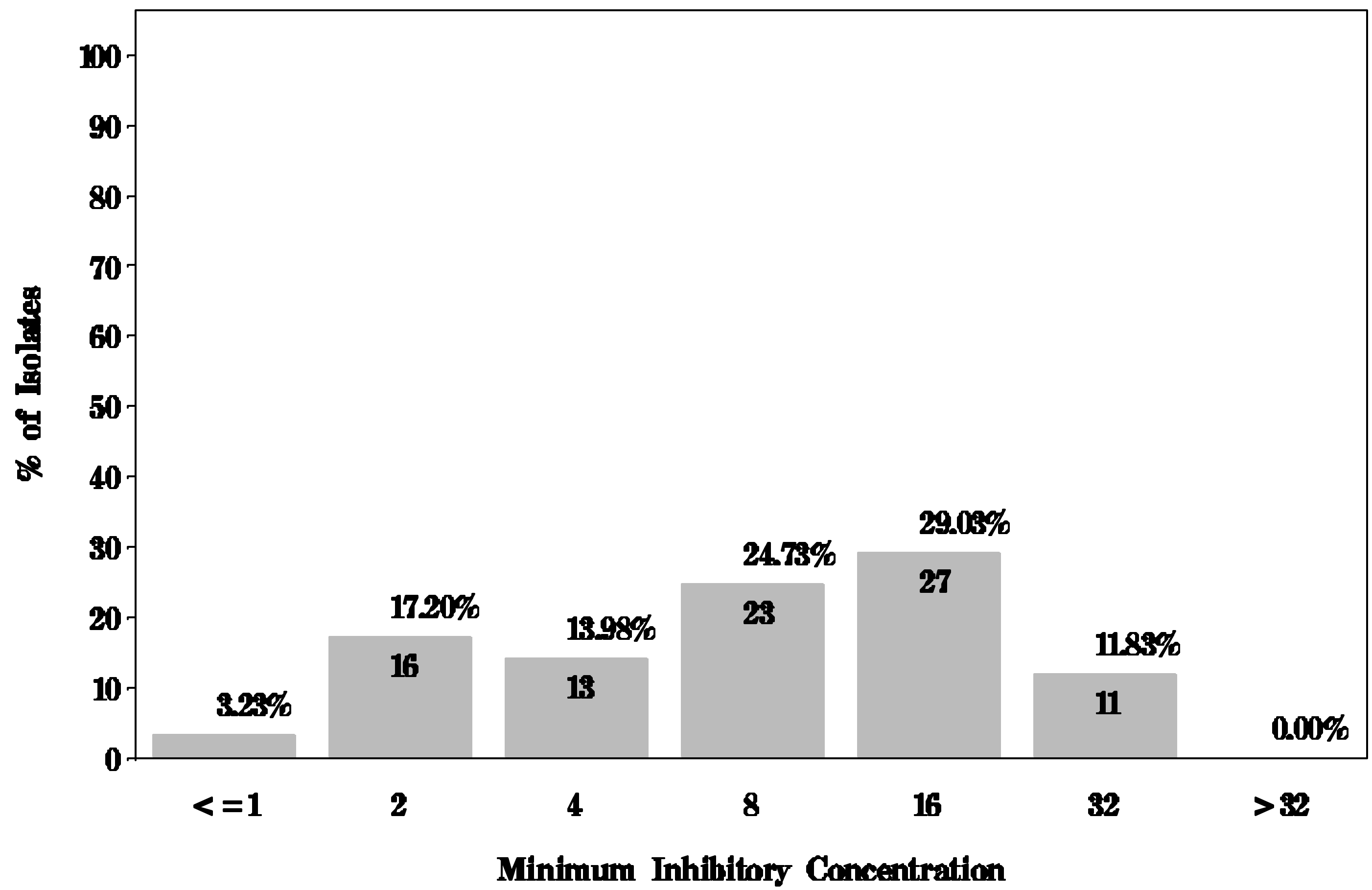
Breakpoints: Susceptible<=1 µg/mL Resistant>=4µg/mL



NARMS

Figure 15: Minimum Inhibitory Concentration of Quinupristin−dalfopristin for *Enterococcus* in Ground Turkey (N=93 Isolates)

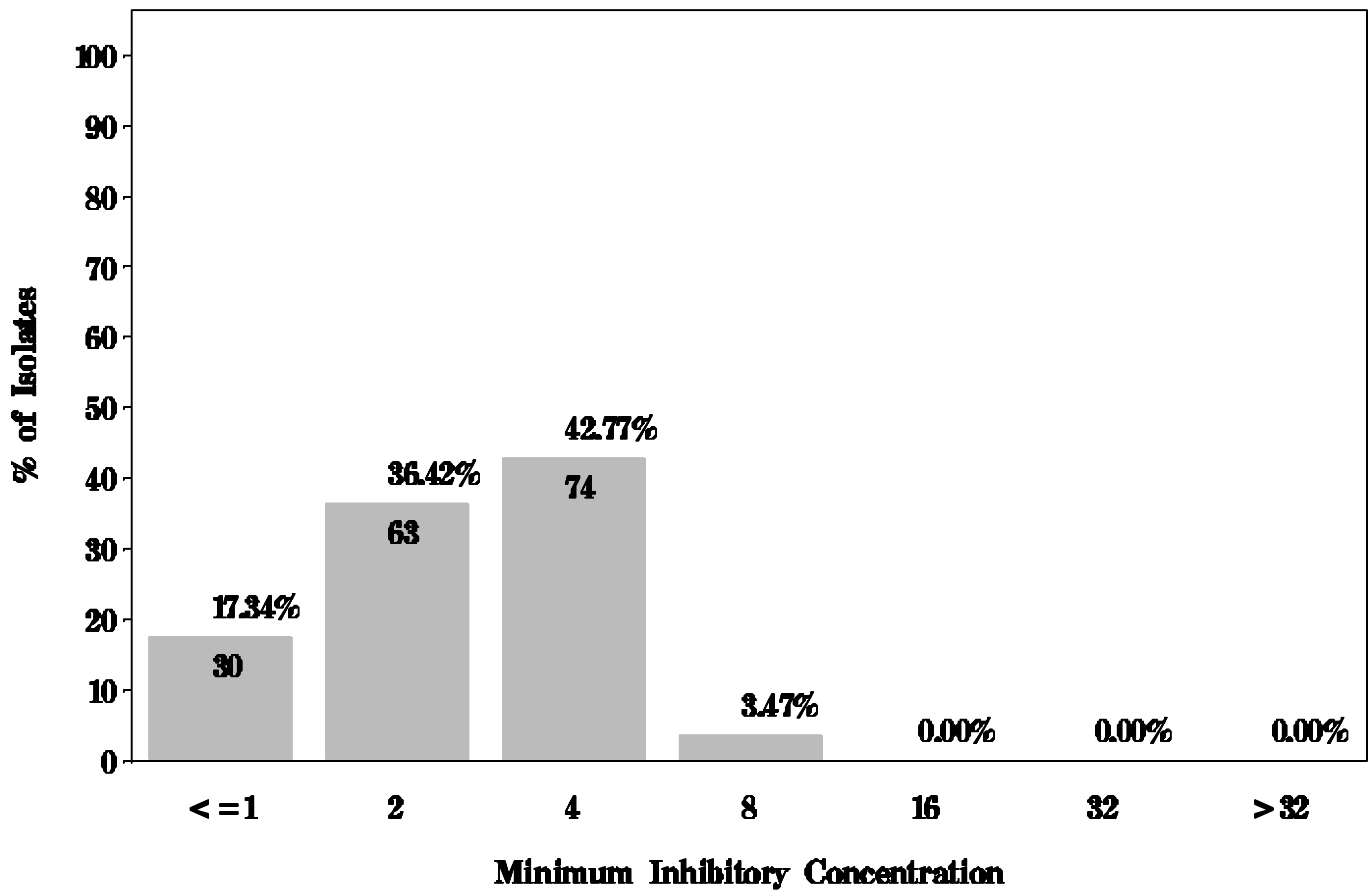
Breakpoints: Susceptible<=1 µg/mL Resistant>=4µg/mL



NARMS

Figure 15: Minimum Inhibitory Concentration of Quinupristin−dalfopristin for *Enterococcus* in Ground Beef (N=173 Isolates)

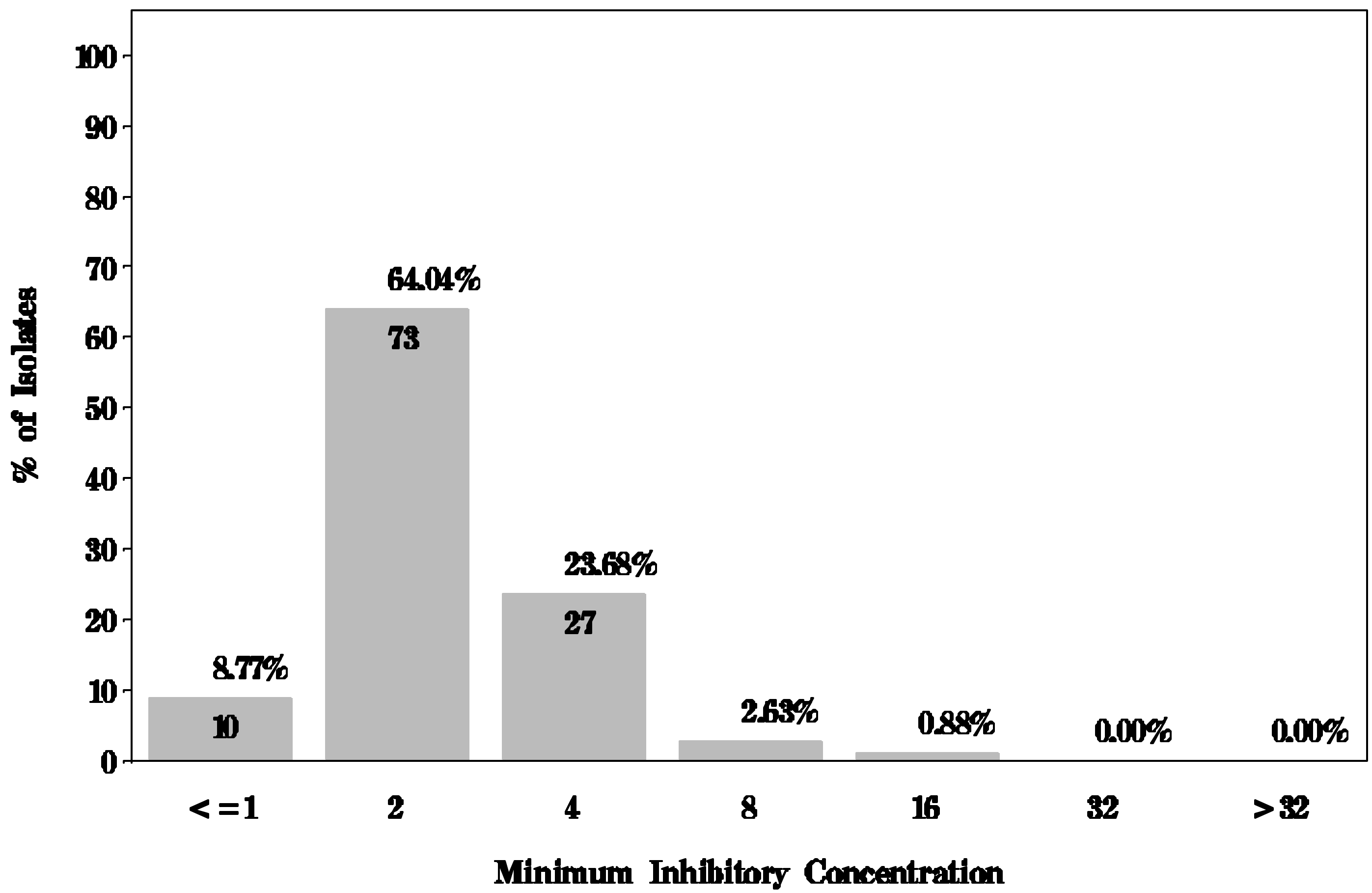
Breakpoints: Susceptible<=1 μg/mL Resistant>=4μg/mL



NARMS

Figure 15: Minimum Inhibitory Concentration of Quinupristin−dalfopristin for *Enterococcus* in Pork Chop (N=114 Isolates)

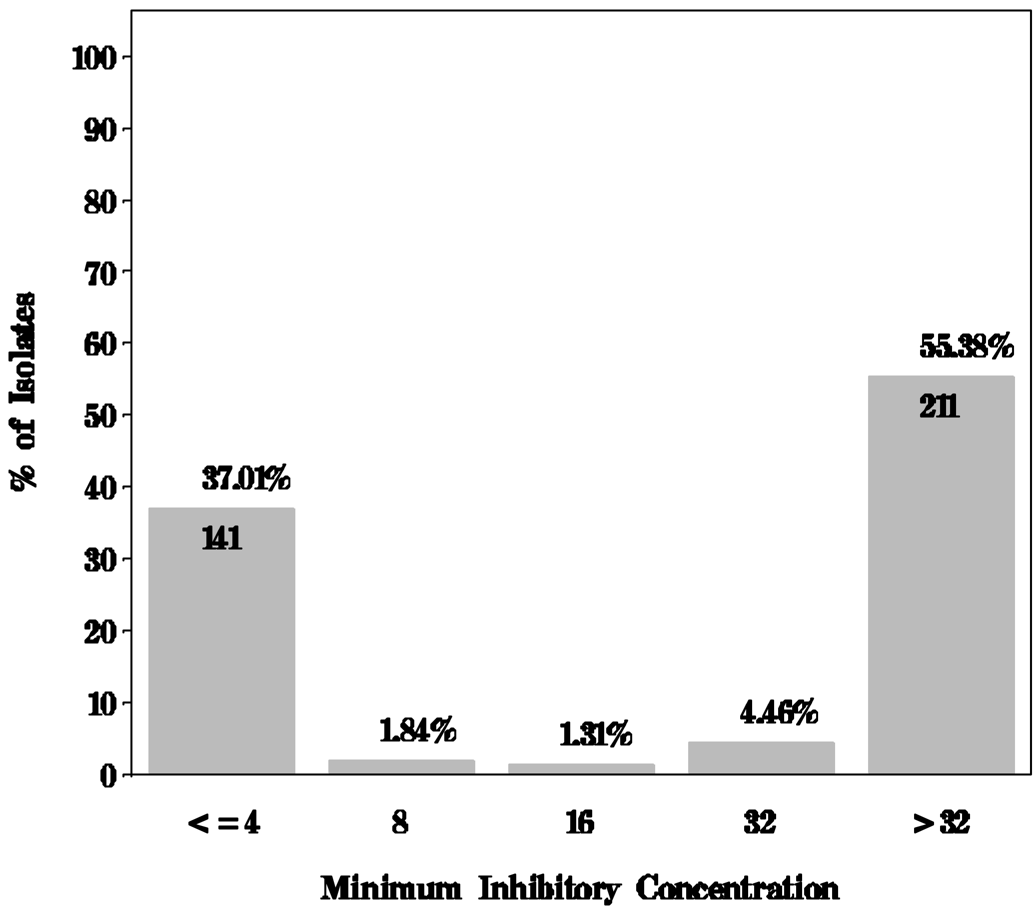
Breakpoints: Susceptible<=1 μg/mL Resistant>=4μg/mL



NARMS

Figure 15: Minimum Inhibitory Concentration of Tetracycline for *Enterococcus* in Chicken Breast (N=381 Isolates)

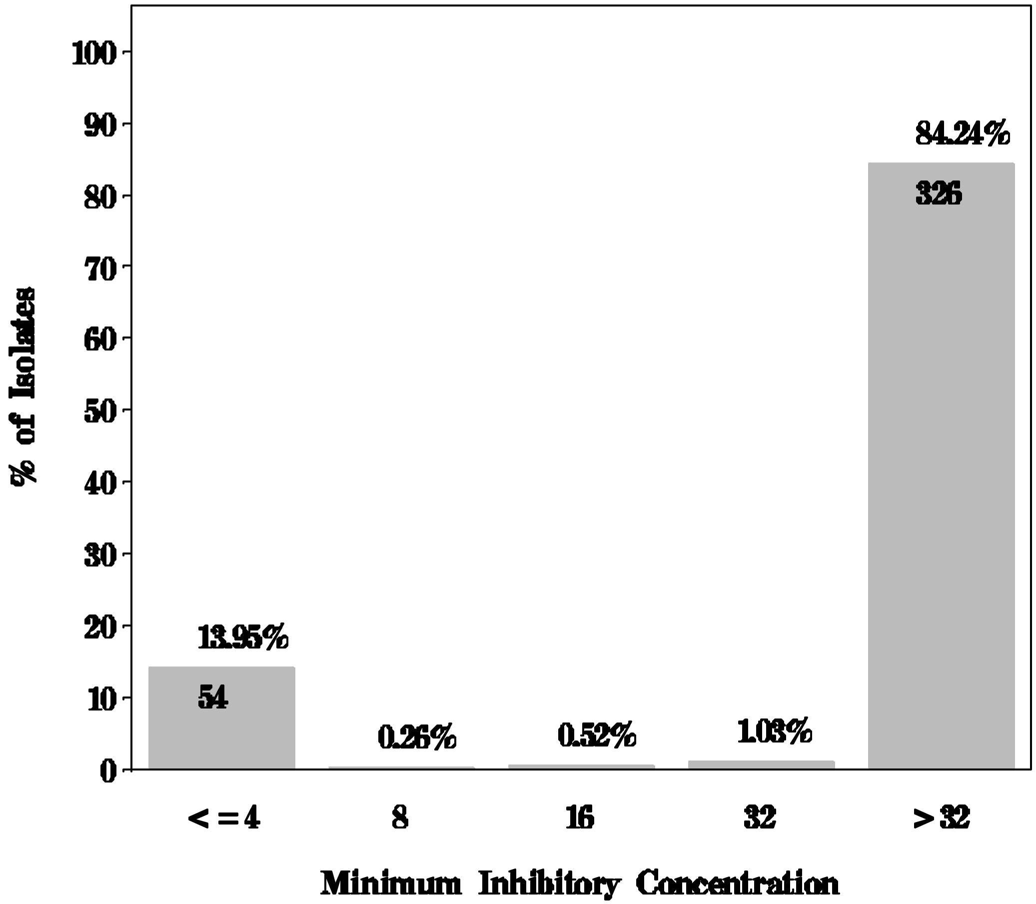
Breakpoints: Susceptible <=4 μg/mL Resistant >=16μg/mL



NARMS

Figure 15: Minimum Inhibitory Concentration of Tetracycline for *Enterococcus* in Ground Turkey (N=387 Isolates)

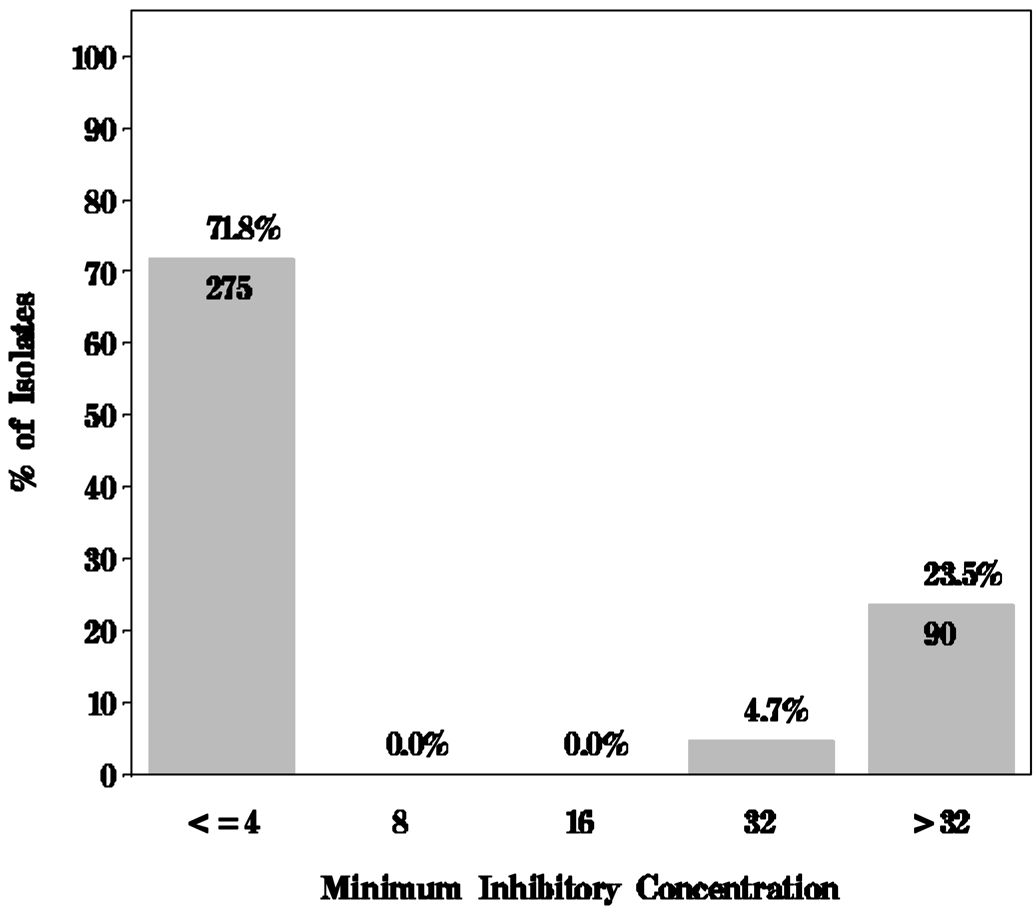
Breakpoints: Susceptible<=4 µg/mL Resistant>=16µg/mL



NARMS

Figure 15: Minimum Inhibitory Concentration of Tetracycline for *Enterococcus* in Ground Beef (N=383 Isolates)

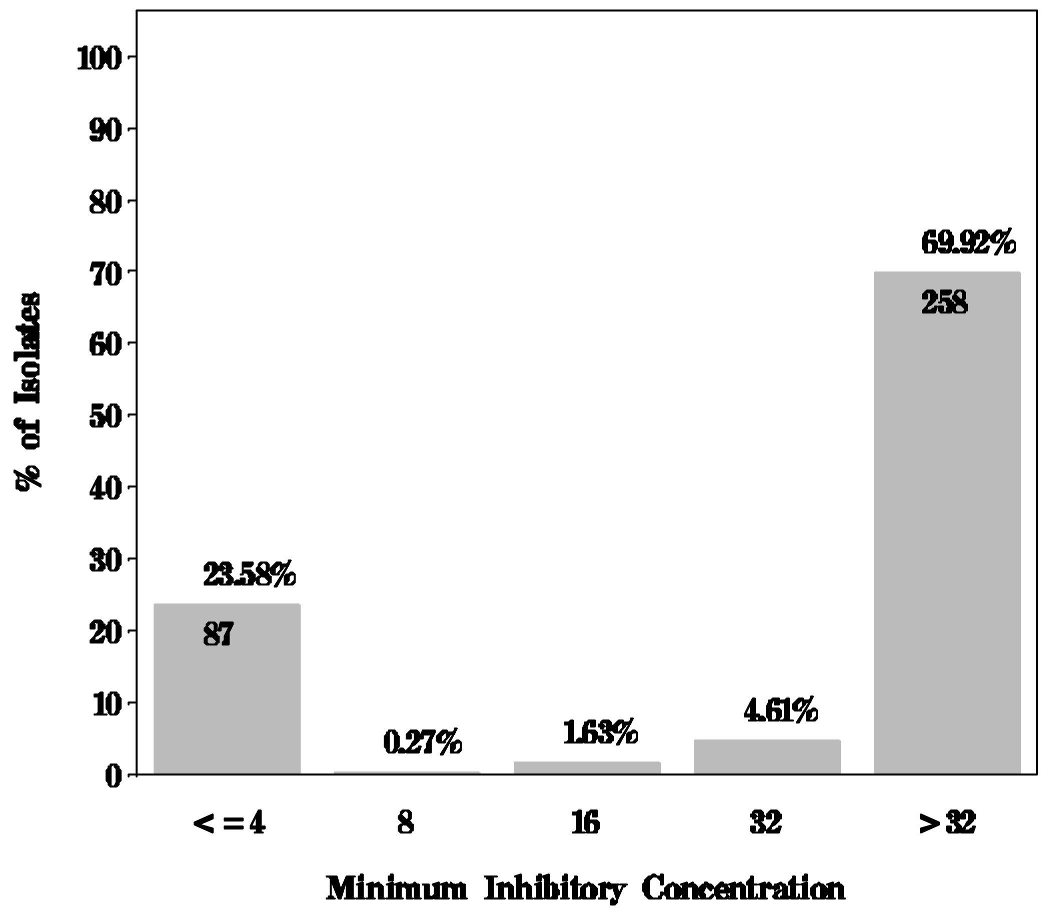
Breakpoints: Susceptible<=4 µg/mL Resistant>=16µg/mL



NARMS

Figure 15: Minimum Inhibitory Concentration of Tetracycline for *Enterococcus* in Pork Chop (N=369 Isolates)

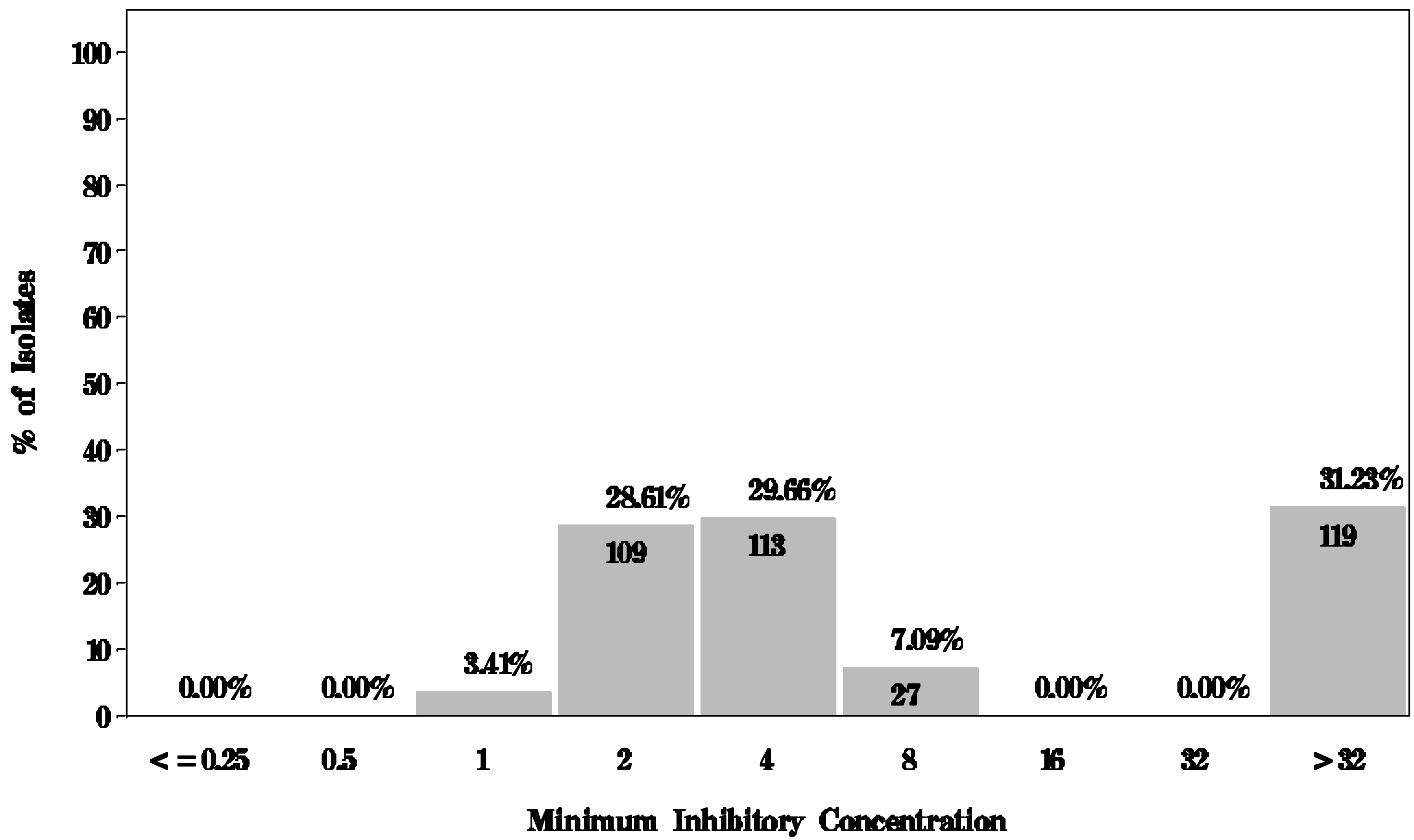
Breakpoints: Susceptible <=4 μg/mL Resistant >=16μg/mL

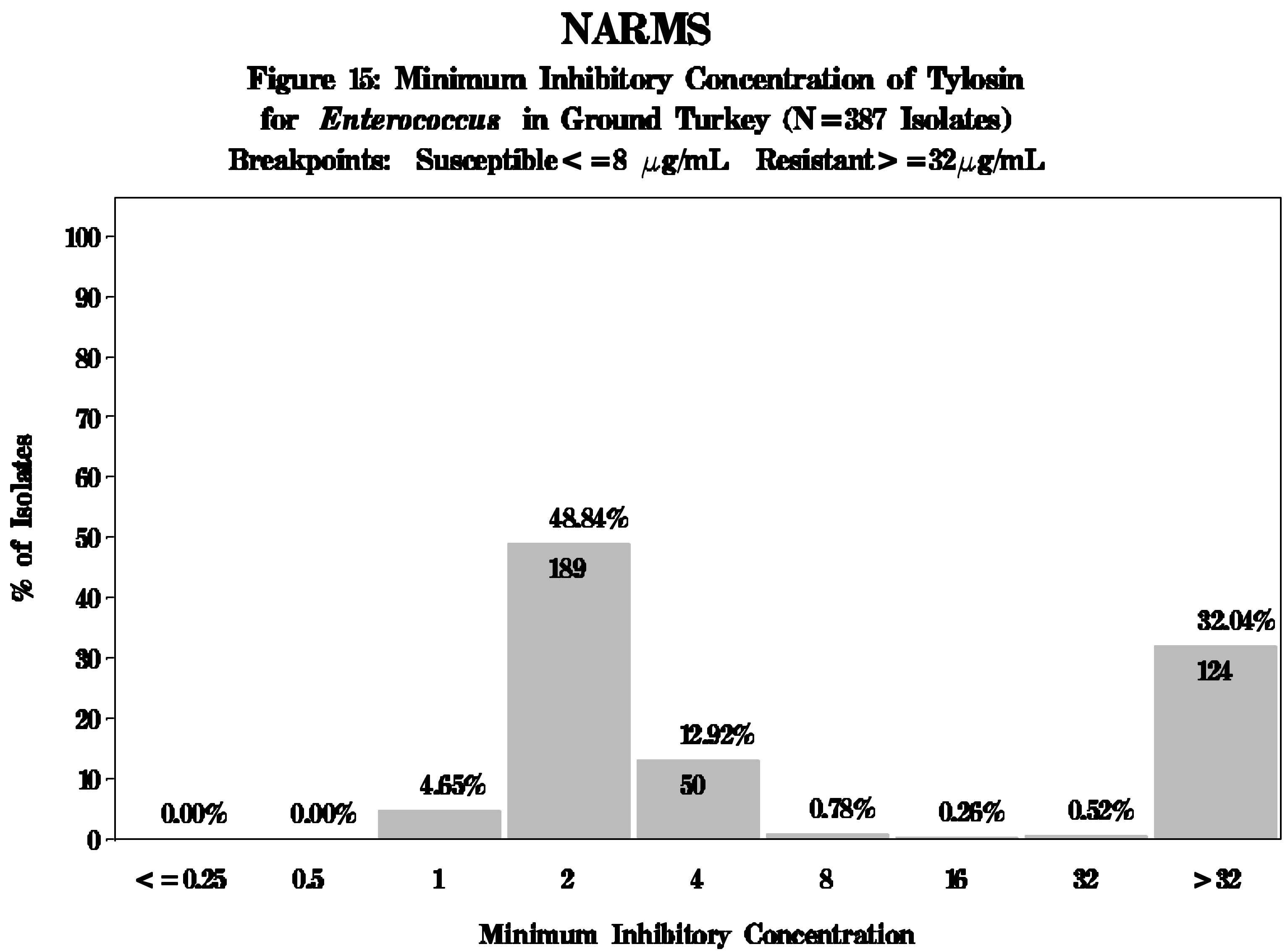


NARMS

Figure 15: Minimum Inhibitory Concentration of Tylosin for *Enterococcus* in Chicken Breast (N=381 Isolates)

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

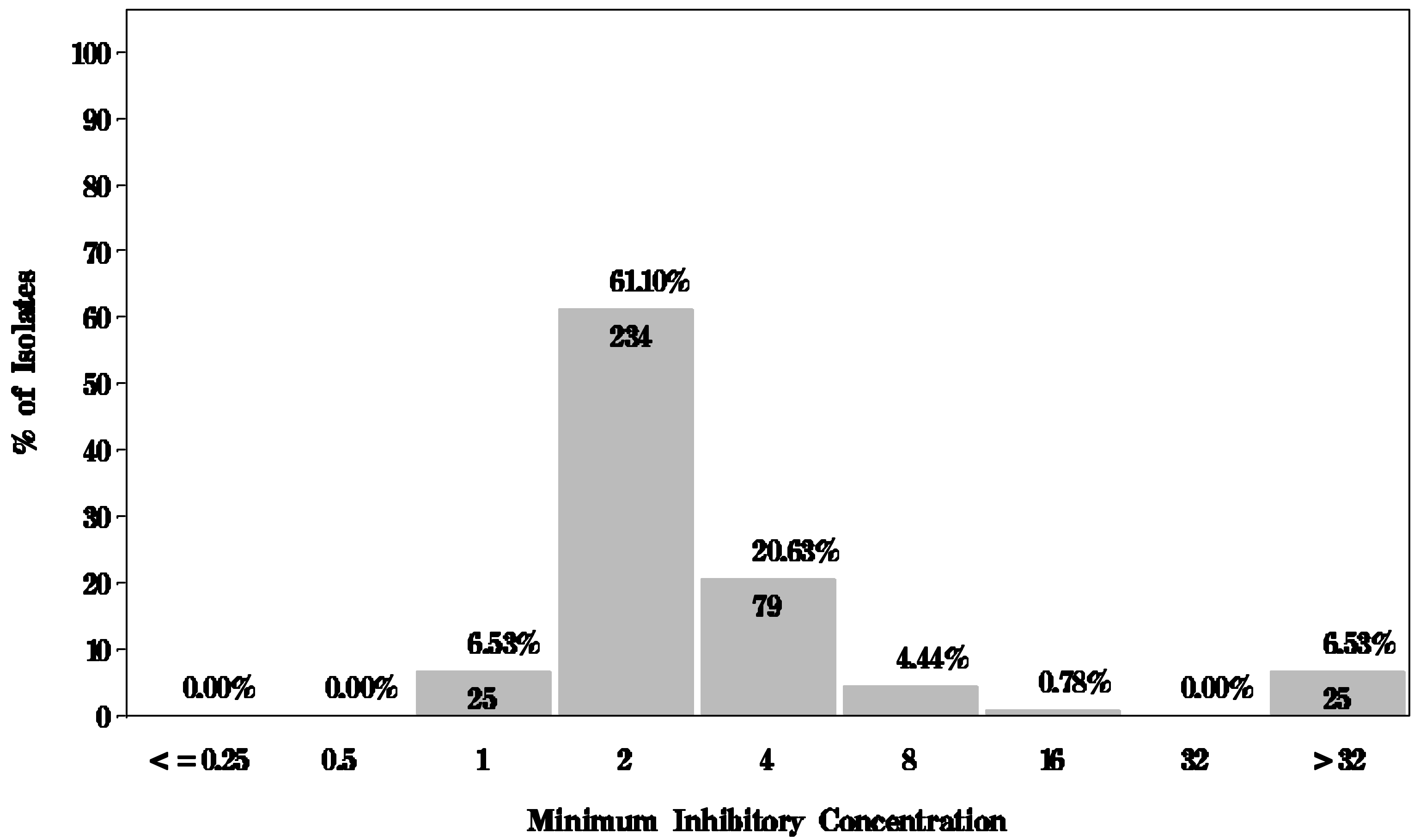



NARMS
Figure 15: Minimum Inhibitory Concentration of Tylosin
for Enterococcus in Ground Turkey (N=387 Isolates)
Breakpoints: Susceptible<=8 µg/mL Resistant>=32µg/mL
% of Isolates
100
90
80
70
60
50
40
30
20
10
0
0.00%
0.00%
4.65%
48.84%
189
12.92%
50
0.78%
0.26%
0.52%
32.04%
124
<=0.25
0.5
1
2
4
8
16
32
>32
Minimum Inhibitory Concentration

NARMS

Figure 15: Minimum Inhibitory Concentration of Tylosin for *Enterococcus* in Ground Beef (N=383 Isolates)

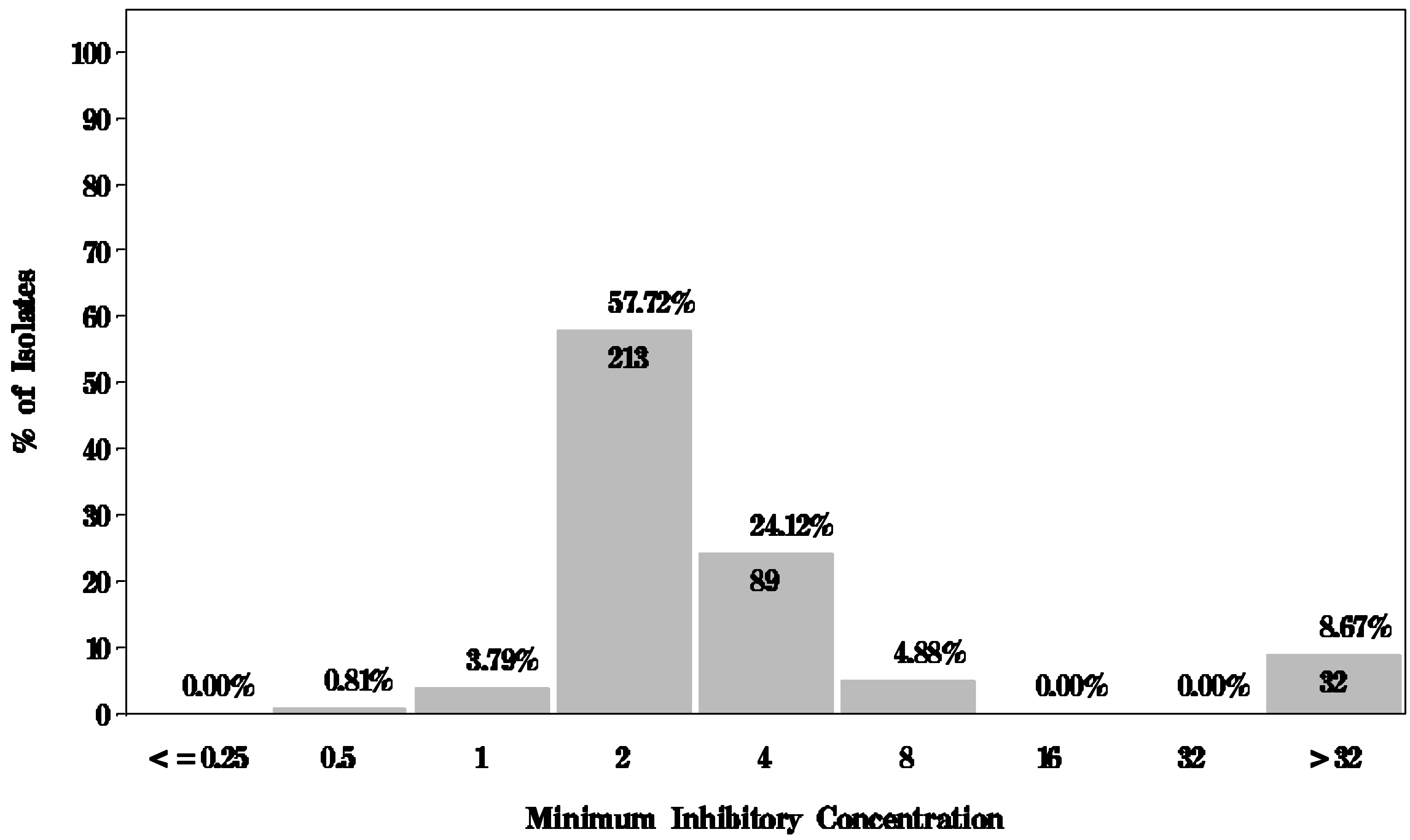
Breakpoints: Susceptible<=8 μg/mL Resistant>=32μg/mL



NARMS

Figure 15: Minimum Inhibitory Concentration of Tylosin for *Enterococcus* in Pork Chop (N=369 Isolates)

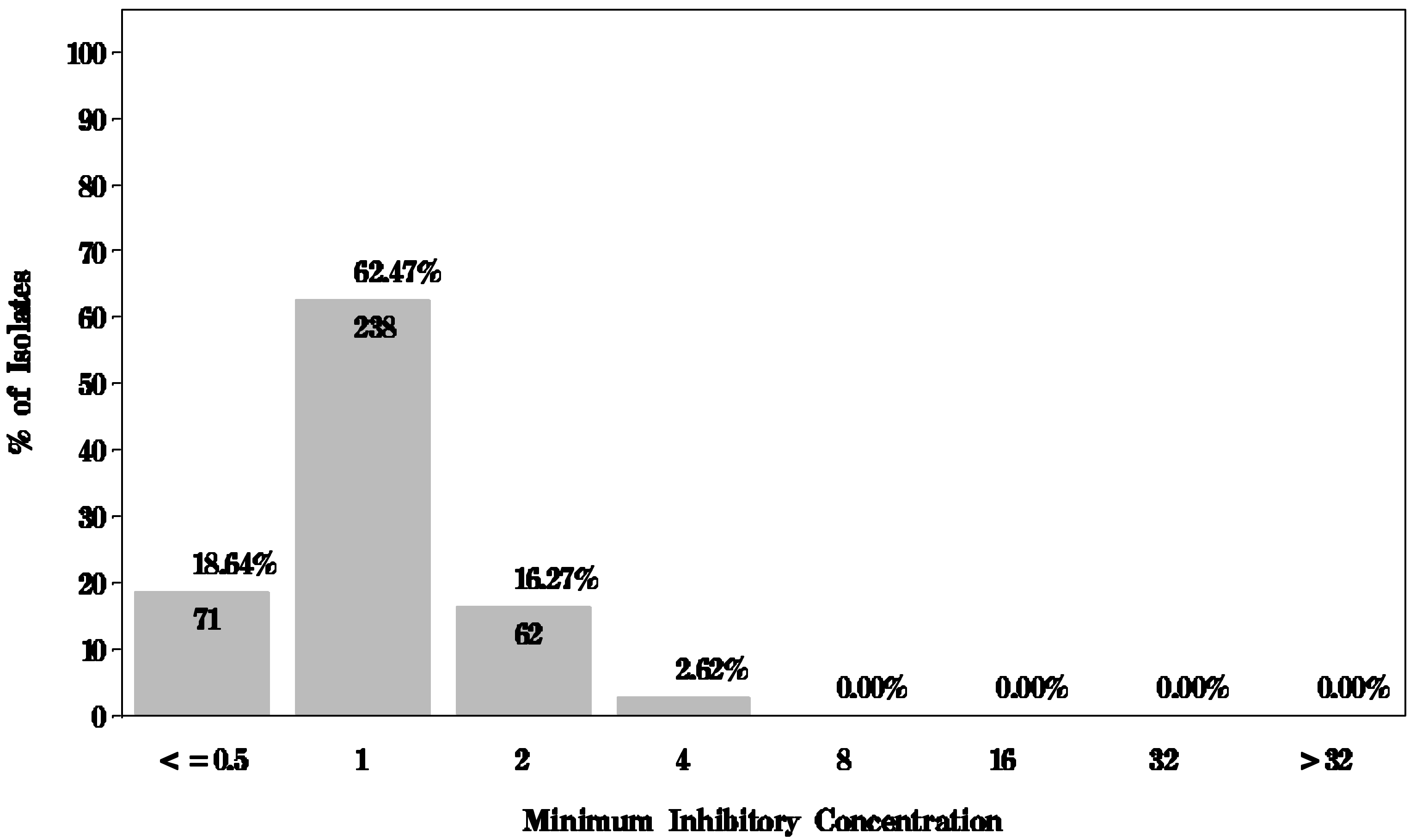
Breakpoints: Susceptible <=8 μg/mL Resistant >=32μg/mL



NARMS

Figure 15: Minimum Inhibitory Concentration of Vancomycin for *Enterococcus* in Chicken Breast (N=381 Isolates)

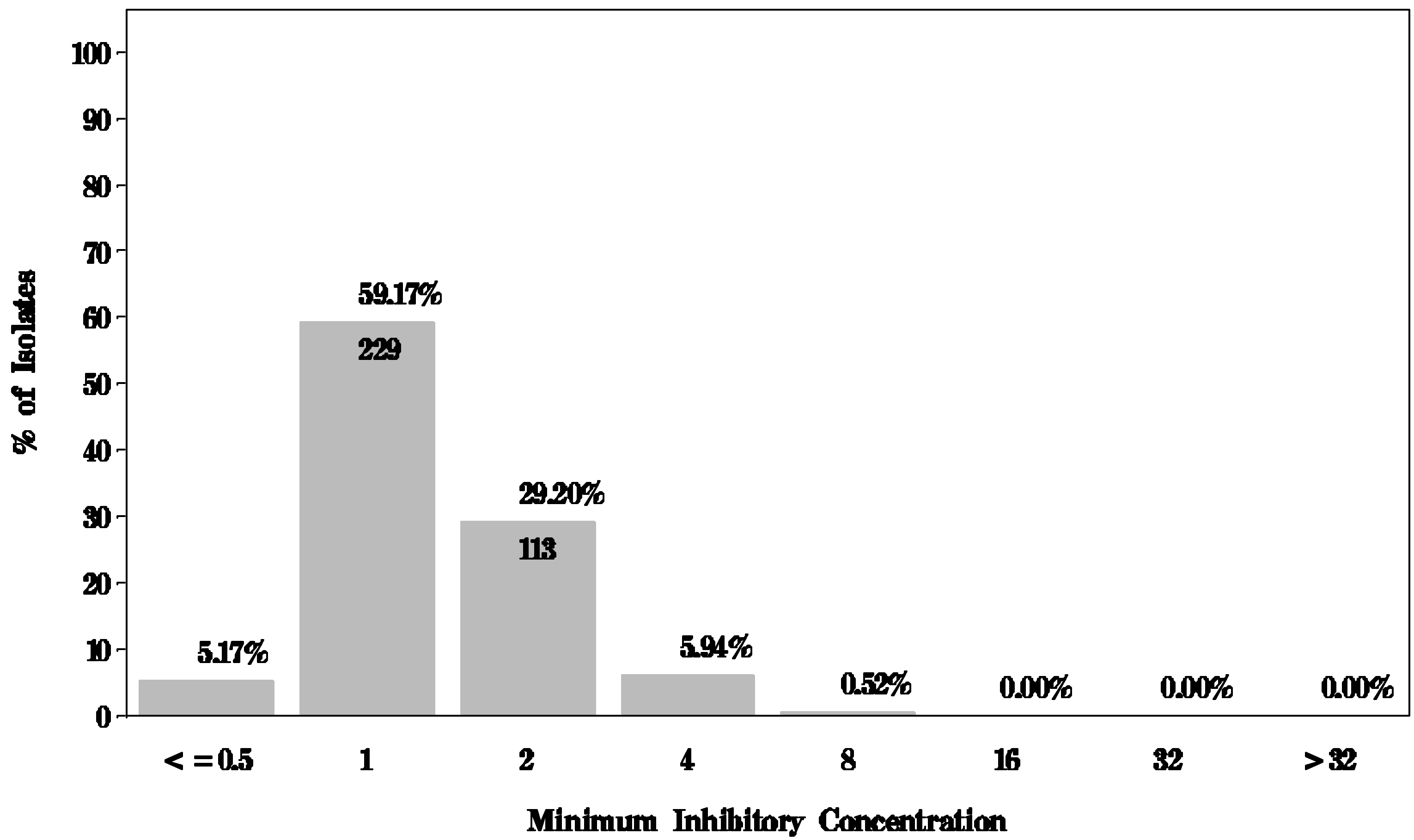
Breakpoints: Susceptible<=4 μg/mL Resistant>=32μg/mL



NARMS

Figure 15: Minimum Inhibitory Concentration of Vancomycin for *Enterococcus* in Ground Turkey (N=387 Isolates)

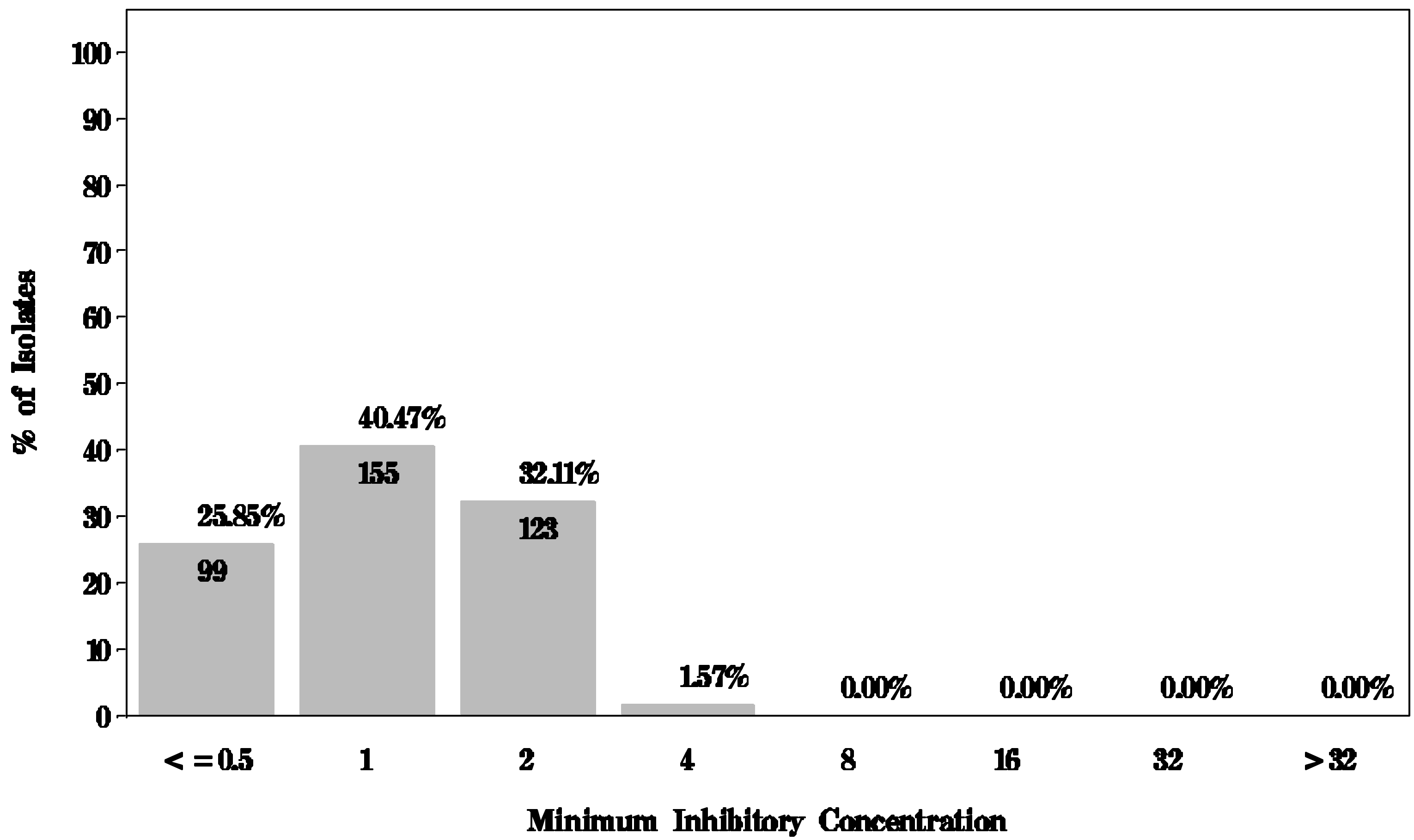
Breakpoints: Susceptible<=4 µg/mL Resistant>=32µg/mL



NARMS

Figure 15: Minimum Inhibitory Concentration of Vancomycin for *Enterococcus* in Ground Beef (N=383 Isolates)

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



NARMS

Figure 15: Minimum Inhibitory Concentration of Vancomycin for *Enterococcus* in Pork Chop (N=369 Isolates)

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

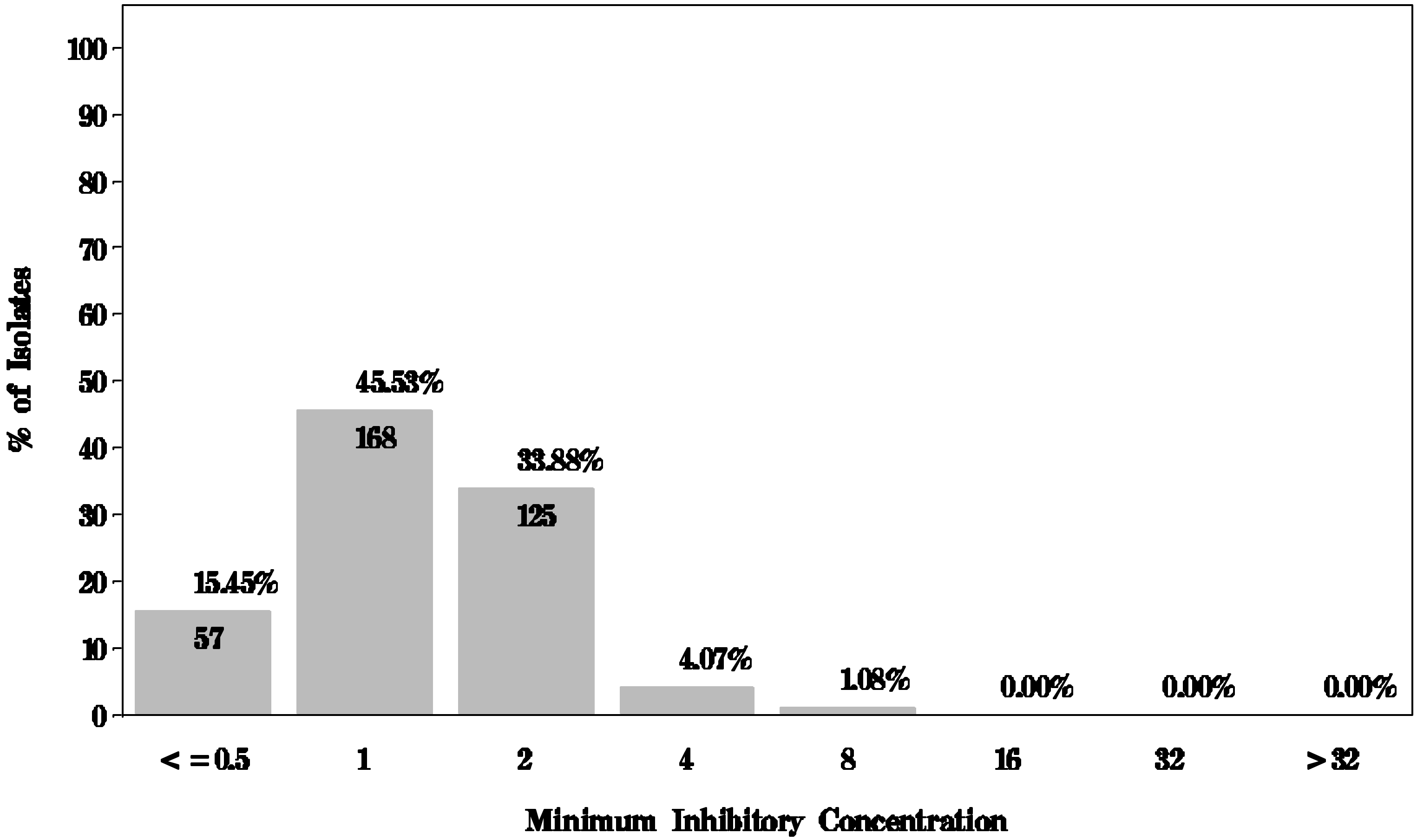


Table 35. Antimicrobial Resistance among *Enterococcus* by Species, 2002

	avium (n=4)		*durans* (n=10)		*faecalis* (n=893)		*faecium* (n=506)		*gallinarum* (n=5)		*hirae* (n=102)	
Antimicrobial	# R	% R	# R	% R	# R	% R	# R	% R	# R	% R	# R	% R
QDA*	3	75.0%	4	40.0%	*	*	268	53.0%	3	60.0%	46	45.1%
LIN	3	75.0%	5	50.0%	798	89.4%	286	56.5%	0	0.0%	56	54.9%
BAC	4	100.0%	6	60.0%	649	72.7%	451	89.1%	5	100.0%	9	8.8%
TET	3	75.0%	2	20.0%	584	65.4%	295	58.3%	4	80.0%	66	64.7%
FLA	3	75.0%	9	90.0%	6	0.7%	484	95.7%	5	100.0%	96	94.1%
ERY	3	75.0%	0	0.0%	178	19.9%	134	26.5%	0	0.0%	17	16.7%
TYL	3	75.0%	0	0.0%	186	20.8%	96	19.0%	0	0.0%	17	16.7%
KAN	0	0.0%	1	10.0%	146	16.4%	139	27.5%	0	0.0%	3	2.9%
STR	0	0.0%	1	10.0%	147	16.5%	82	16.2%	0	0.0%	5	4.9%
NIT	1	25.0%	1	10.0%	7	0.8%	193	38.1%	0	0.0%	2	2.0%
PEN	0	0.0%	1	10.0%	0	0.0%	164	32.4%	0	0.0%	1	1.0%
GEN	1	25.0%	0	0.0%	107	12.0%	23	4.6%	0	0.0%	1	1.0%
CIP	0	0.0%	0	0.0%	4	0.5%	66	13.0%	0	0.0%	1	1.0%
CHL	0	0.0%	0	0.0%	2	0.2%	1	0.2%	0	0.0%	1	1.0%
SAL	0	0.0%	0	0.0%	2	0.2%	0	0.0%	0	0.0%	0	0.0%
LZD	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
VAN	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%

* QDA resistance is not presented for *E. faecalis*..

Table 36. Antimicrobial Resistance among *Enterococcus faecalis* & *E. faecium* by Meat Type, 2002

		Chicken Breast		Ground Turkey		Ground Beef		Pork Chop	
Antimicrobial Agent	**Species**	**# Resistant**	**% Resistance**	**# Resistant**	**% Resistance**	**# Resistant**	**% Resistance**	**# Resistant**	**% Resistance**
QDA*	***faecalis****								
	faecium***	128	55.4%	73	82.0%	44	47.3%	23	24.7%
BAC	***faecalis***	114	85.1%	227	77.2%	126	60.0%	182	71.4%
	faecium	225	97.4%	88	98.9%	77	82.8%	61	65.6%
LIN	***faecalis***	127	94.8%	269	91.5%	184	87.6%	218	85.5%
	faecium	161	69.7%	72	80.9%	30	32.3%	23	24.7%
TET	***faecalis***	90	67.2%	250	85.0%	39	18.6%	205	80.4%
	faecium	131	56.7%	79	88.8%	21	22.6%	64	68.8%
FLA	***faecalis***	0	0.0%	0	0.0%	1	0.5%	5	2.0%
	faecium	223	96.5%	82	92.1%	88	94.6%	91	97.9%
ERY	***faecalis***	61	45.5%	91	31.0%	3	1.4%	23	9.0%
	faecium	59	25.5%	45	50.6%	11	11.8%	19	20.4%
KAN	***faecalis***	45	33.6%	78	26.5%	8	3.8%	15	5.9%
	faecium	59	25.5%	49	55.1%	17	18.3%	14	15.1%
TYL	***faecalis***	65	48.5%	94	32.0%	4	1.9%	23	9.0%
	faecium	49	21.2%	32	36.0%	6	6.5%	9	9.7%
STR	***faecalis***	39	29.1%	71	24.2%	10	4.8%	27	10.6%
	faecium	39	16.9%	35	39.3%	3	3.2%	5	5.4%
NIT	***faecalis***	1	0.8%	6	2.0%	0	0.0%	0	0.0%
	faecium	126	54.6%	45	50.6%	17	18.3%	5	5.4%
PEN	***faecalis***	0	0.0%	0	0.0%	0	0.0%	0	0.0%
	faecium	102	44.2%	59	66.3%	0	0.0%	3	3.2%
GEN	***faecalis***	30	22.4%	65	22.1%	5	2.4%	7	2.8%
	faecium	7	3.0%	14	15.7%	1	1.1%	1	1.1%

*QDA resistance is not presented for *E. faecalis.*
** *E. faecalis*: Chicken Breast, n=134; Ground Turkey, n=294; Ground Beef, n=210; Pork Chop, n=255
*** *E. faecium*: Chicken Breast, n=231; Ground Turkey, n=89; Ground Beef, n=93; Pork Chop, n=93

CIP	***faecalis***	0	0.0%	1	0.3%	0	0.0%	3	1.2%
	faecium	30	13.0%	20	22.5%	12	12.9%	4	4.3%
CHL	***faecalis***	0	0.0%	1	0.3%	0	0.0%	1	0.4%
	faecium	0	0.0%	0	0.0%	1	1.1%	0	0.0%
SAL	***faecalis***	0	0.0%	2	0.7%	0	0.0%	0	0.0%
	faecium	0	0.0%	0	0.0%	0	0.0%	0	0.0%
LZD	***faecalis***	0	0.0%	0	0.0%	0	0.0%	0	0.0%
	faecium	0	0.0%	0	0.0%	0	0.0%	0	0.0%
VAN	***faecalis***	0	0.0%	0	0.0%	0	0.0%	0	0.0%
	faecium	0	0.0%	0	0.0%	0	0.0%	0	0.0%

*QDA resistance is not presented for *E. faecalis.*
** *E. faecalis*: Chicken Breast, n=134; Ground Turkey, n=294; Ground Beef, n=210; Pork Chop, n=255
*** *E. faecium*: Chicken Breast, n=231; Ground Turkey, n=89; Ground Beef, n=93; Pork Chop, n=93

Table 37. Antimicrobial Resistance among *Enterococcus* by Site, Meat Type, and Antimicrobial Agent, 2002

		Antimicrobial Agent																
		QDA*	**LIN**	**BAC**	**TET**	**FLA**	**ERY**	**TYL**	**KAN**	**STR**	**NIT**	**PEN**	**GEN**	**CIP**	**CHL**	**SAL**	**LZD**	**VAN**
GA	CB (n=120)	63.9%	85.0%	88.3%	72.5%	28.3%	44.2%	45.0%	32.5%	30.8%	5.8%	2.5%	19.2%	5.0%				
	GT (n=120)	100.0%	94.2%	85.8%	89.2%	0.8%	35.8%	37.5%	28.3%	26.7%	0.8%		25.8%					
	GB (n=118)	45.5%	78.8%	46.6%	23.7%	25.4%	5.1%	5.1%	3.4%	0.8%			0.8%		0.8%			
	PC (n=119)	46.2%	71.4%	61.3%	73.1%	12.6%	4.2%	4.2%	5.9%	11.8%			4.2%					
	Total (N=477)	65.4%	**82.4%**	**70.6%**	**64.8%**	**16.8%**	**22.4%**	**23.1%**	**17.6%**	**17.6%**	**1.7%**	**0.6%**	**12.6%**	**1.3%**	**0.2%**			
MD	CB (n=117)	84.0%	82.9%	95.7%	68.4%	89.7%	33.3%	28.2%	23.9%	17.1%	57.3%	53.0%	2.6%	11.1%				
	GT (n=113)	40.8%	90.3%	88.5%	87.6%	63.7%	50.4%	39.8%	50.4%	35.4%	40.7%	47.8%	23.9%	15.0%		0.9%		
	GB (n=107)	23.8%	43.0%	64.5%	27.1%	70.1%	4.7%	2.8%	7.5%	1.9%	8.4%		0.9%	4.7%				
	PC (n=101)	15.8%	49.5%	65.3%	64.4%	62.4%	12.9%	7.9%	6.9%	4.0%	3.0%	3.0%	1.0%	2.0%	1.0%			
	Total (N=438)	20.0%	**67.4%**	**79.2%**	**62.3%**	**71.9%**	**26.0%**	**20.3%**	**22.8%**	**15.1%**	**28.5%**	**27.2%**	**7.3%**	**8.4%**	**0.2%**	**0.2%**		
OR	CB (n=40)	27.8%	77.5%	90.0%	35.0%	45.0%	17.5%	20.0%	27.5%	5.0%	42.5%	30.0%	10.0%	10.0%				
	GT (n=40)	100.0%	65.0%	90.0%	67.5%	12.5%	20.0%	17.5%	25.0%	17.5%	2.5%		15.0%					
	GB (n=40)	50.6%	72.5%	57.5%	40.0%	42.5%	5.0%	5.0%	7.5%	10.0%			5.0%					
	PC (n=39)	72.7%	97.4%	84.6%	84.6%	5.1%	10.3%	5.1%	5.1%	7.7%			2.6%	5.1%				
	Total (N=159)	63.0%	**78.0%**	**80.5%**	**56.6%**	**26.4%**	**13.2%**	**11.9%**	**16.4%**	**10.1%**	**11.3%**	**7.5%**	**8.2%**	**3.8%**				
TN	CB (n=104)	22.2%	68.3%	91.3%	50.0%	76.9%	25.0%	23.1%	27.9%	20.2%	36.5%	26.0%	7.7%	7.7%				
	GT (n=114)	51.7%	88.6%	69.3%	86.8%	7.0%	24.6%	25.4%	22.8%	24.6%	3.5%	4.4%	13.2%	3.5%	0.9%	0.9%		
	GB (n=118)	63.9%	76.3%	50.0%	29.7%	36.4%	13.6%	11.9%	9.3%	6.8%	7.6%		2.5%	5.9%	0.8%			
	PC (n=110)	100.0%	67.3%	71.8%	87.3%	31.8%	18.2%	15.5%	11.8%	10.9%	1.8%		0.9%	2.7%				
	Total (N=446)	45.5%	**75.3%**	**70.0%**	**63.2%**	**37.2%**	**20.2%**	**18.8%**	**17.7%**	**15.5%**	**11.9%**	**7.2%**	**6.1%**	**4.9%**	**0.4%**	**0.2%**		
Total (N=1520)		78.2%	75.5%	73.9%	62.8%	39.7%	21.8%	19.9%	19.0%	15.5%	13.4%	10.9%	8.7%	4.7%	0.3%	0.1%		

* Does not include *E. faecalis* in QDA, as it is considered intrinsically resistant.

Table 38. Number of *Enterococcus faecalis* (N=893) Resistant to Multiple Antimicrobial Agents,* 2002

Meat Type	*Number of Antimicrobials*				
	0	**1**	**2-4**	**5-7**	**≥8**
CB	3	13	56	52	10
GT	4	16	170	77	27
GB	13	61	131	1	3
PC	12	18	208	14	4
Total	**32**	**108**	**565**	**144**	**44**

***Does not include QDA, as *E. faecalis* is considered intrinsically resistant.**

Table 39. Number of *Enterococcus faecium* (N=506) Resistant to Multiple Antimicrobial Agents, 2002

Meat Type	*Number of Antimicrobials*				
	0	**1**	**2-4**	**5-7**	**≥8**
CB	0	0	75	107	49
GT	0	0	13	24	52
GB	0	5	66	19	4
PC	1	3	70	14	4
Total	**1**	**8**	**224**	**164**	**109**

Table 40. *Escherichia coli* by Meat Type, 2002

Meat Type	N	# Isolates	% Positive
Chicken Breast	390	282	72.3 %
Ground Turkey	395	304	78.0 %
Ground Beef	399	295	73.9 %
Pork Chop	390	184	47.2 %
Total	**1574**	**1065**	**67.7%**

Table 41. *Escherichia coli* by Site and Meat Type, 2002

	Georgia		Maryland		Oregon		Tennessee	
Meat Type	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Chicken Breast (N=390)	104	29.3%	107	27.6%	9	15.8%	62	23.4%
Ground Turkey (N=395)	103	29.0%	110	28.4%	17	29.8%	74	27.9%
Ground Beef (N=399)	93	26.2%	105	27.1%	22	38.6%	75	28.3%
Pork Chop (N=390)	55	15.5%	66	17.0%	9	15.8%	54	20.4%
Total	**355**	**100.0%**	**388**	**100.0%**	**57**	**100.0%**	**265**	**100.0%**

Table 42. *Escherichia coli* Isolates by Month for All Sites, 2002

Month	# Isolates	% Positive
January	76	7.1%
February	84	7.9%
March	81	7.6%
April	82	7.7%
May	95	8.9%
June	88	8.3%
July	62	5.8%
August	76	7.1%
September	106	10.0%
October	115	10.8%
November	104	9.8%
December	96	9.0%
Total	**1065**	**100%**

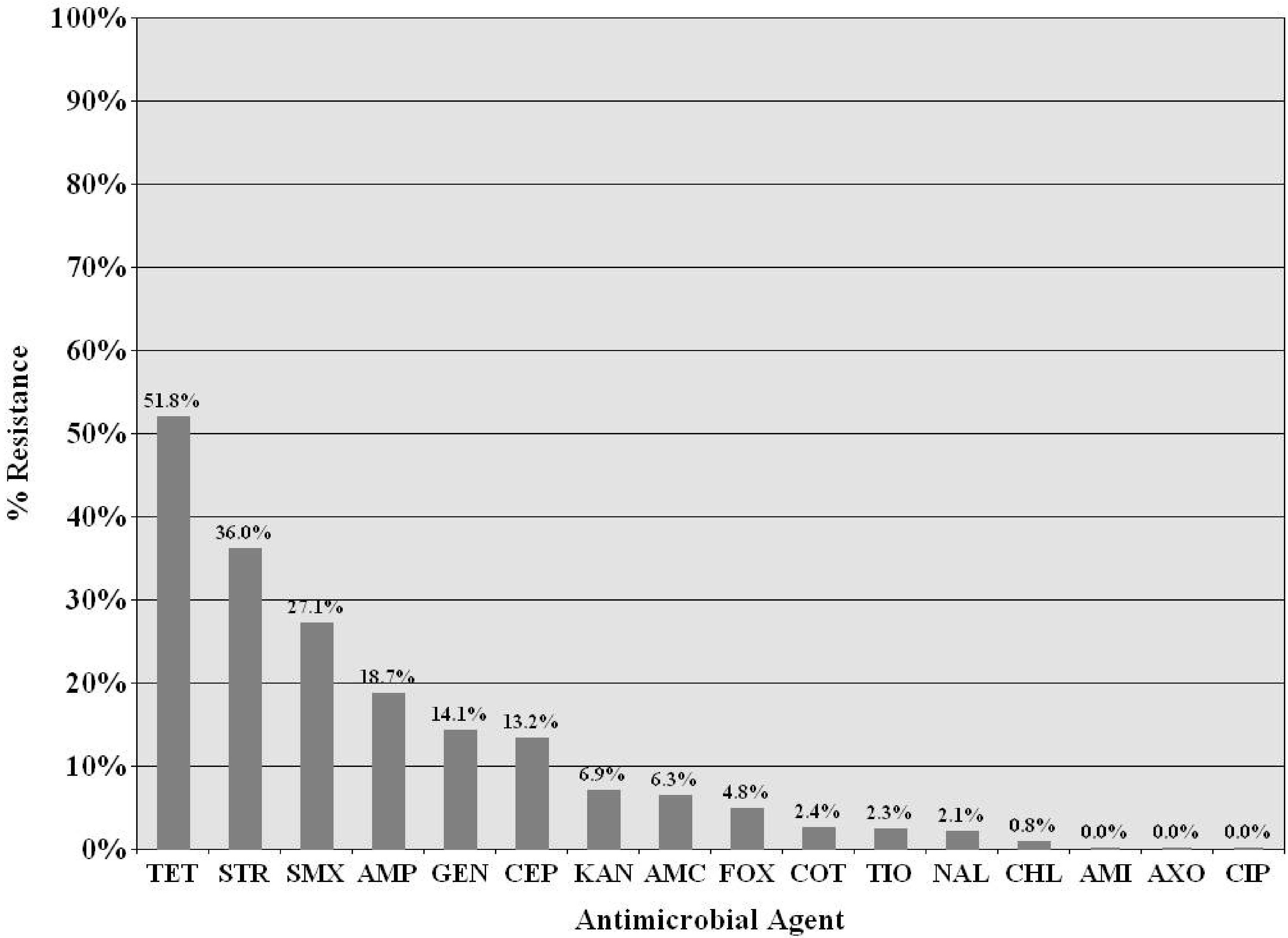
Table 43. *Escherichia coli* by Meat Type and Month for All Sites, 2002

	Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sep		Oct		Nov		Dec	
Meat Type	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
CB (n=282)	22	7.8%	25	8.9%	25	8.9%	21	7.4%	29	10.3%	29	10.3%	20	7.1%	19	6.7%	24	8.5%	25	8.9%	19	6.7%	24	8.5%
GT (n=304)	20	7.6%	23	7.6%	20	5.9%	16	8.6%	27	9.2%	25	8.2%	18	5.9%	20	6.6%	25	8.2%	34	11.2%	35	11.5%	29	9.5%
GB (n=295)	23	6.8%	23	7.8%	18	6.8%	26	5.4%	28	9.2%	25	8.5%	17	5.8%	19	6.4%	37	12.5%	30	10.2%	32	10.8%	29	9.8%
PC (n=184)	11	6.0%	13	7.1%	18	9.8%	19	10.3%	11	6.0%	9	4.9%	7	3.8%	18	9.8%	20	10.9%	26	14.1%	18	9.8%	14	7.6%
Total (N=1065)	**76**	**7.1%**	**84**	**7.9%**	**81**	**7.6%**	**82**	**7.7%**	**95**	**8.9%**	**88**	**8.3%**	**62**	**5.8%**	**76**	**7.1%**	**106**	**10.0%**	**115**	**10.8%**	**104**	**9.8%**	**96**	**9.0%**

Table 44. Antimicrobial Resistance among *E. coli* Isolates (n=1065), 2002

Antimicrobial Agent	# Resistant	% Resistance
Tetracycline	552	51.8%
Streptomycin	383	36.0%
Sulfamethoxazole	289	27.1%
Ampicillin	199	18.7%
Gentamicin	150	14.1%
Cephalothin	141	13.2%
Kanamycin	74	7.0%
Amoxicillin/Clavulanic Acid	67	6.3%
Cefoxitin	51	4.8%
Trimethoprim/Sulfamethoxazole	26	2.4%
Ceftiofur	24	2.4%
Nalidixic Acid	22	2.1%
Chloramphenicol	9	0.8%
Amikacin	0	0.0%
Ceftriaxone	0	0.0%
Ciprofloxicin	0	0.0%

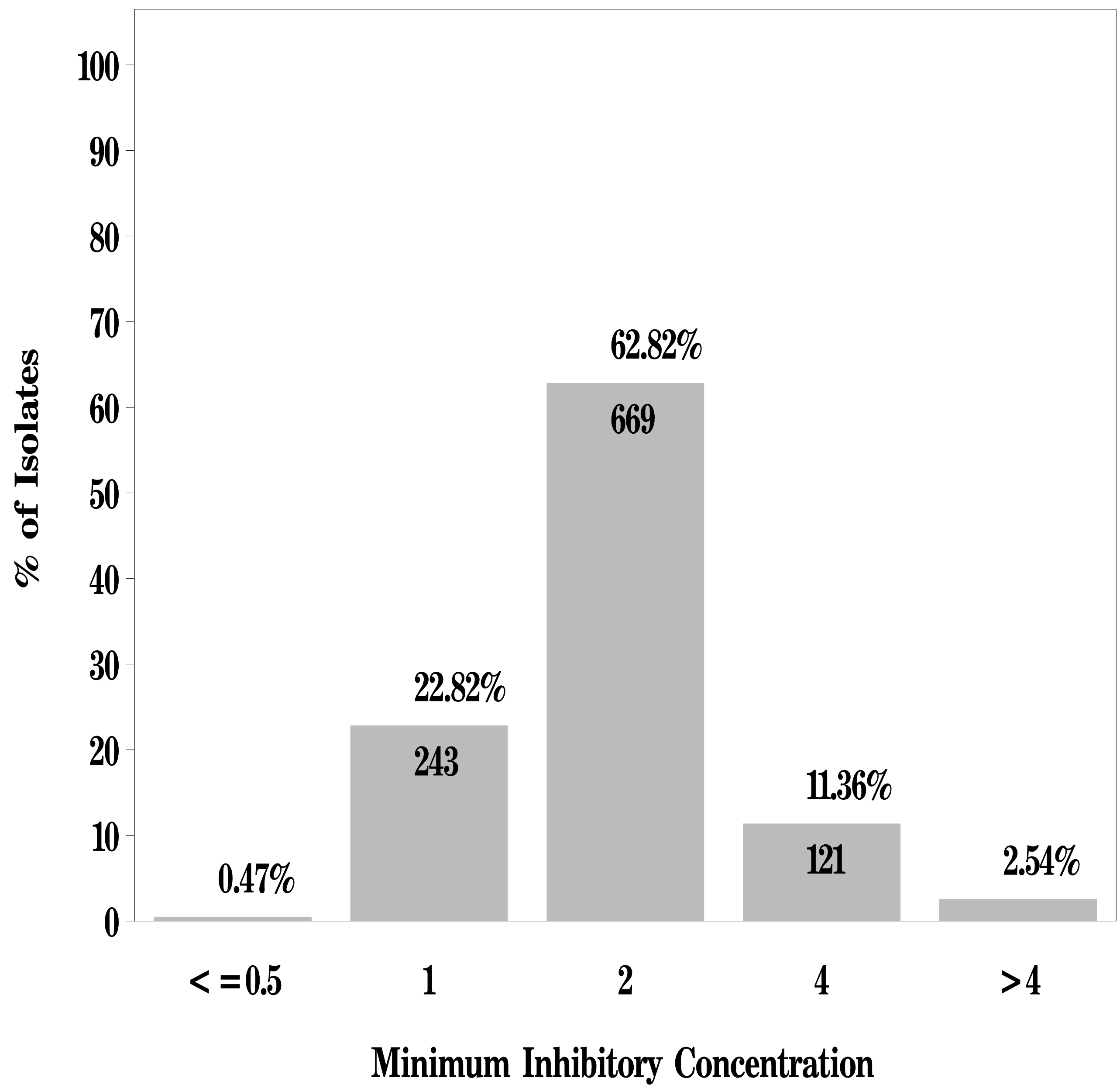
Figure 16. Antimicrobial Resistance among *E. coli* Isolates (n=1065), 2002



NARMS

Figure 17: Minimum Inhibitory Concentration of Amikacin for *Escherichia coli* (N=1065 Isolates)

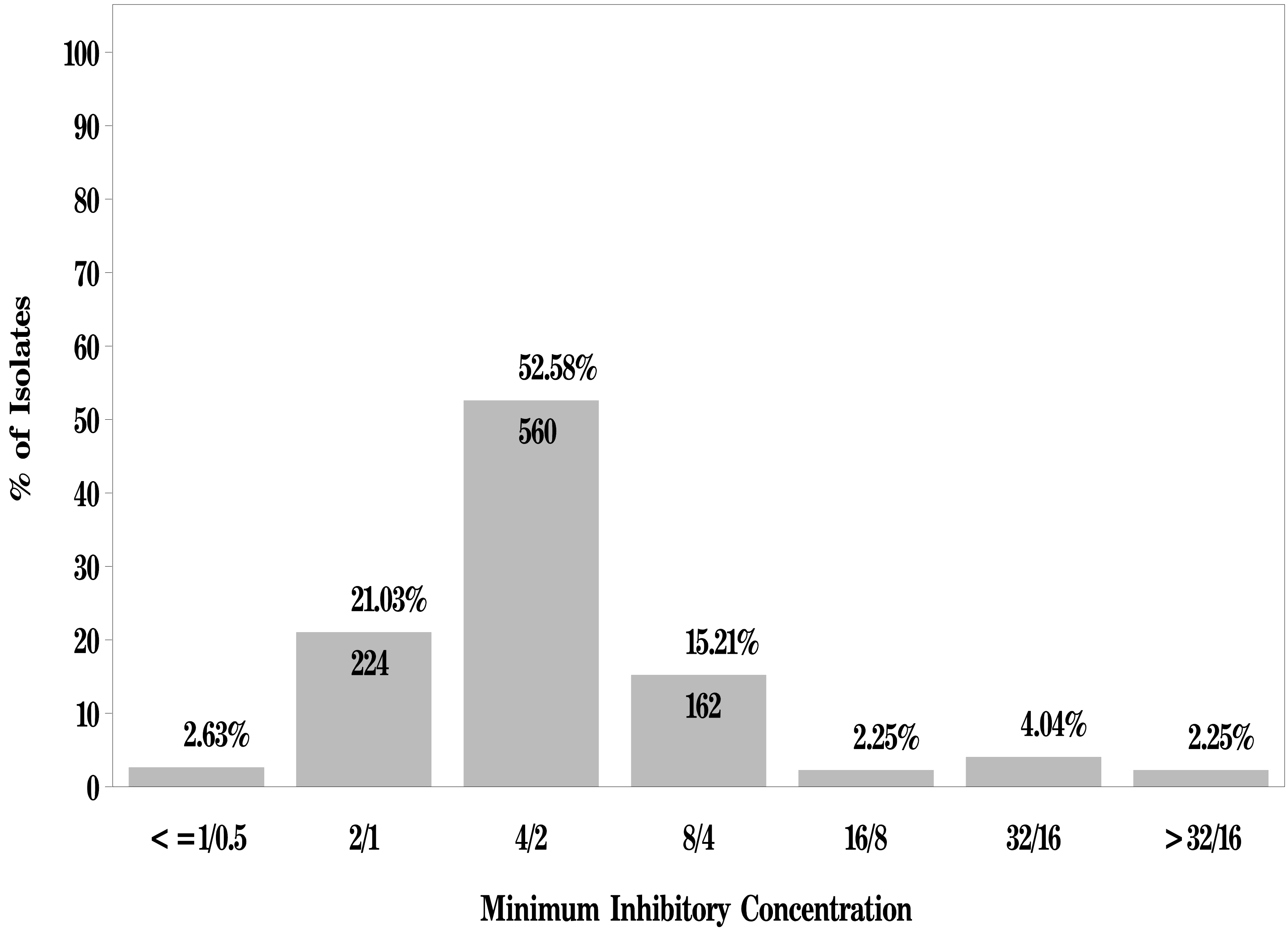
Breakpoints: Susceptible<=16 μg/mL Resistant>=64 μg/mL



NARMS

Figure 17: Minimum Inhibitory Concentration of Amoxicillin/Clavulanic acid for *Escherichia coli* (N=1065 Isolates)

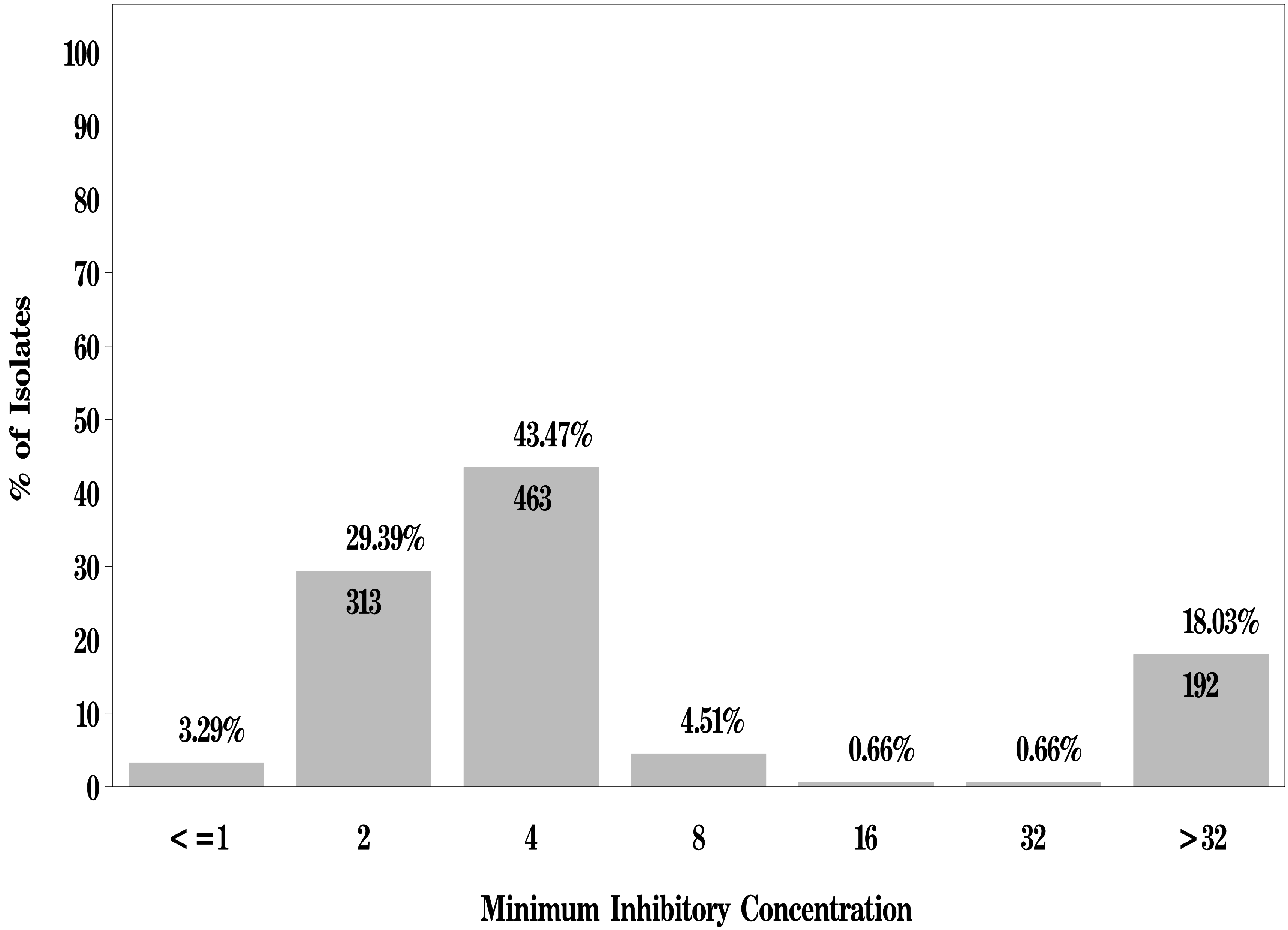
Breakpoints: Susceptible <=8/4 μg/mL Resistant >=32/16 μg/mL



NARMS

Figure 17: Minimum Inhibitory Concentration of Ampicillin for *Escherichia coli* (N=1065 Isolates)

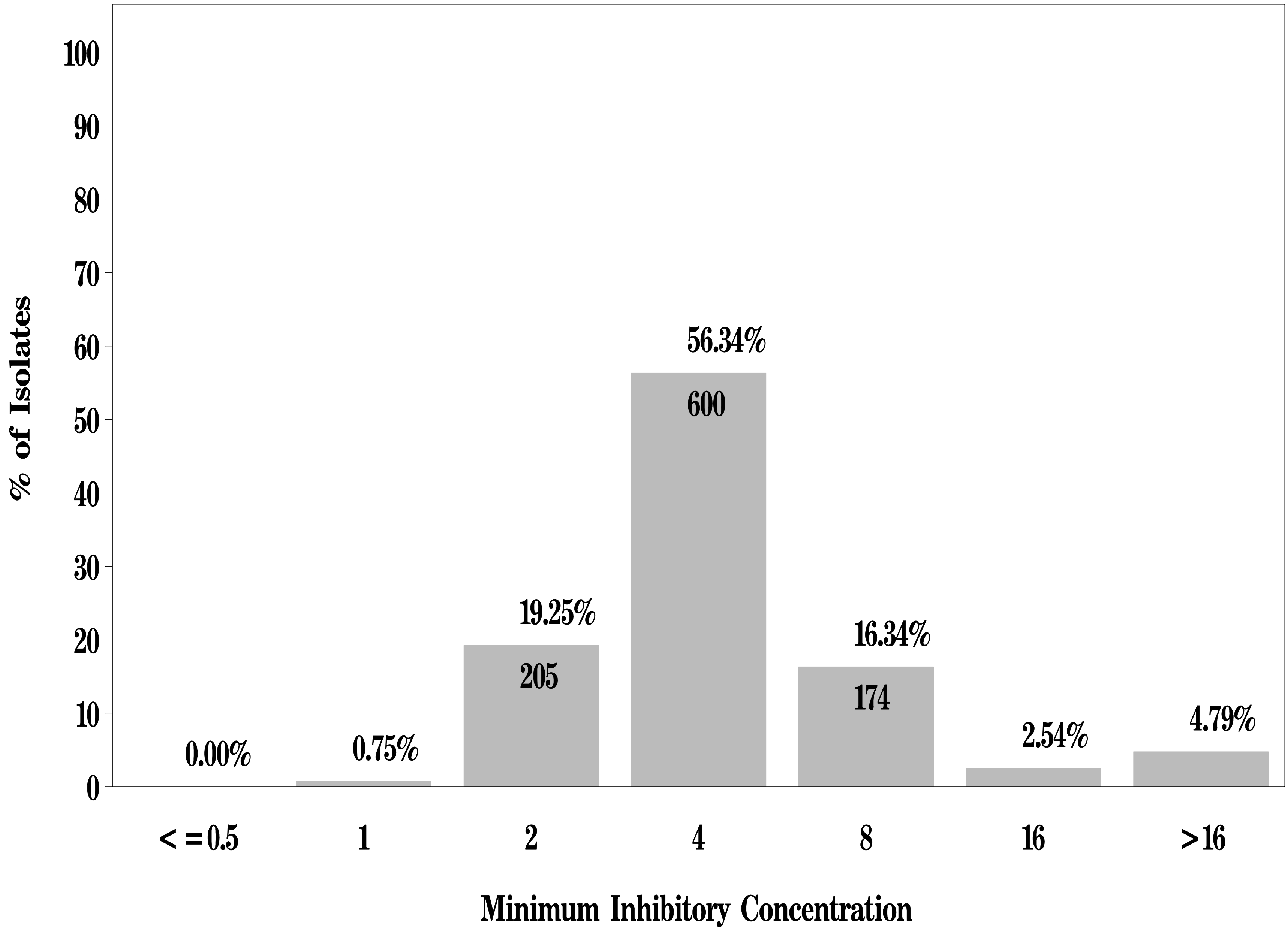
Breakpoints: Susceptible<=8 μg/mL Resistant>=32 μg/mL



NARMS

Figure 17: Minimum Inhibitory Concentration of Cefoxitin for *Escherichia coli* (N=1065 Isolates)

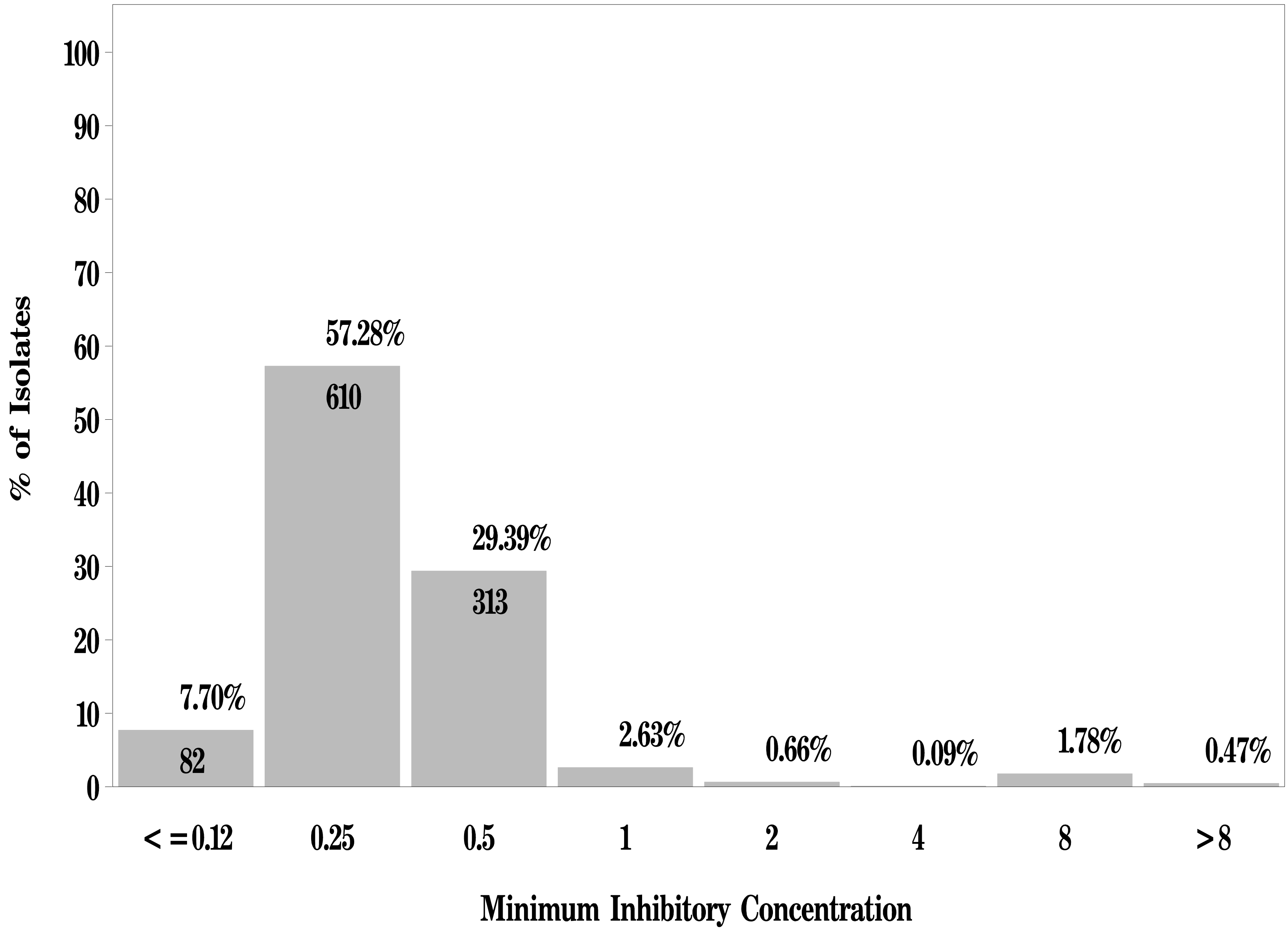
Breakpoints: Susceptible<=8 μg/mL Resistant>=32 μg/mL



NARMS

Figure 17: Minimum Inhibitory Concentration of Ceftiofur for *Escherichia coli* (N=1065 Isolates)

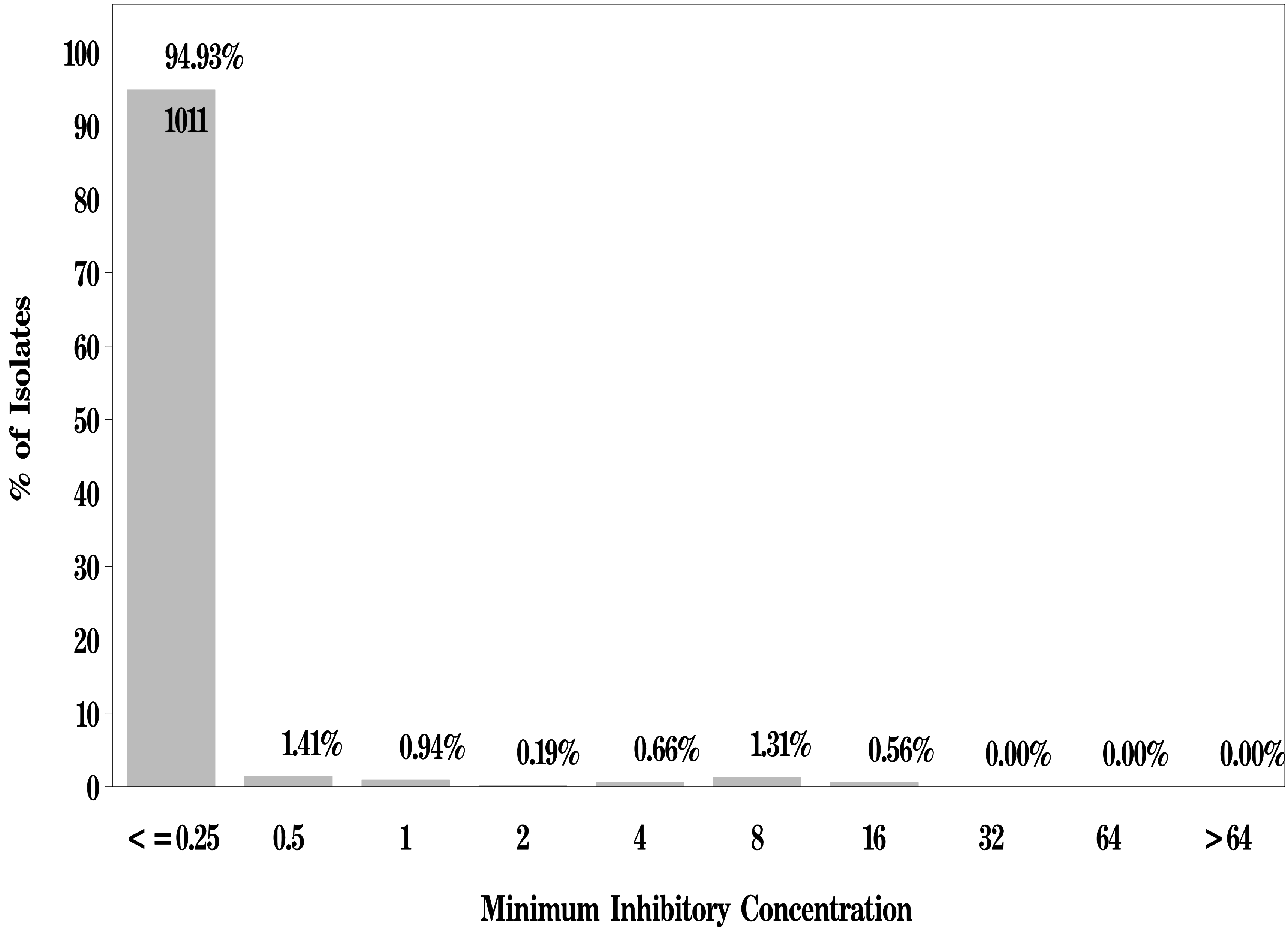
Breakpoints: Susceptible <=2 μg/mL Resistant >=8 μg/mL



NARMS

Figure 17: Minimum Inhibitory Concentration of Ceftriaxone for *Escherichia coli* (N=1065 Isolates)

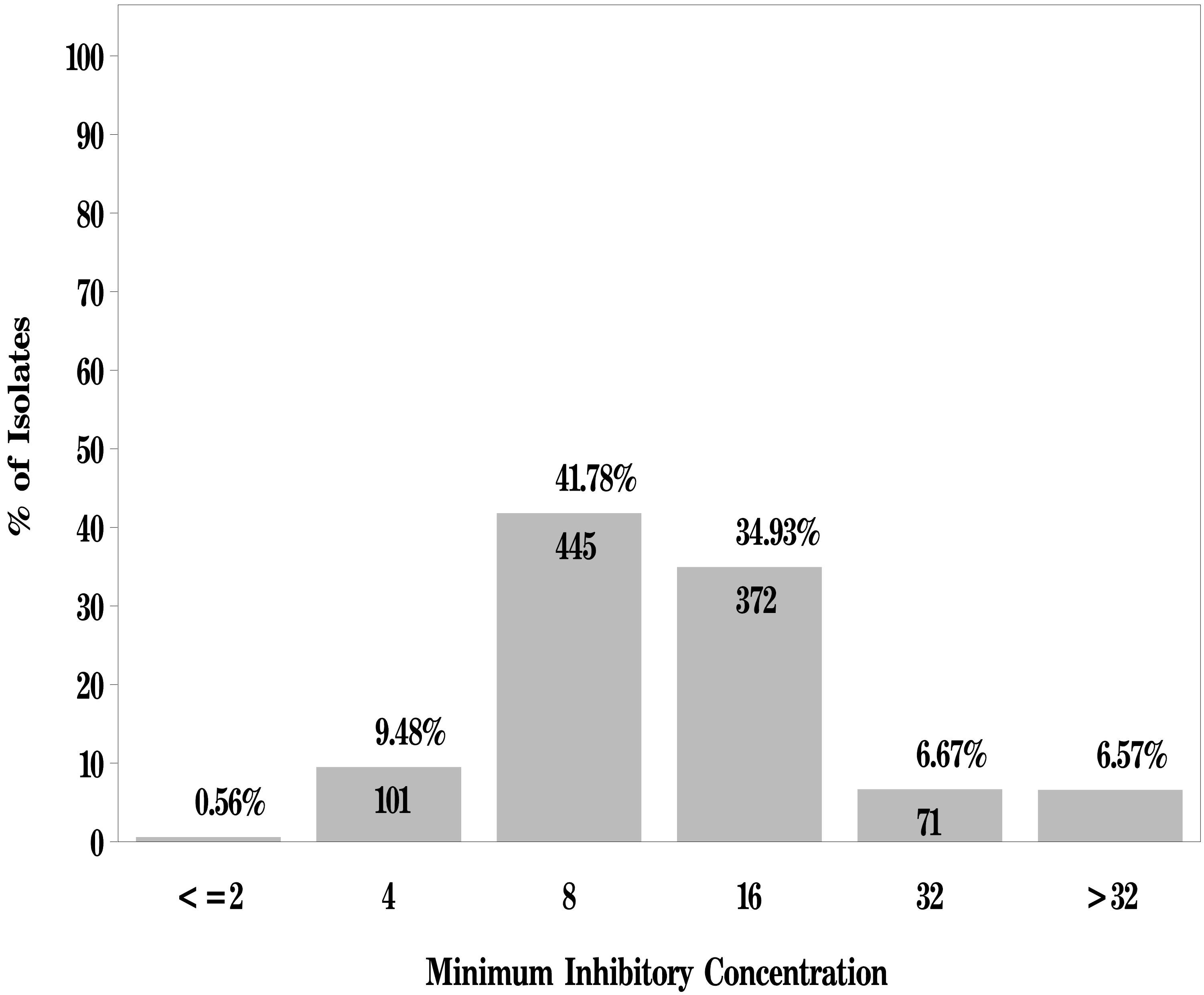
Breakpoints: Susceptible<=8 µg/mL Resistant>=64 µg/mL



NARMS

Figure 17: Minimum Inhibitory Concentration of Cephalothin for *Escherichia coli* (N=1065 Isolates)

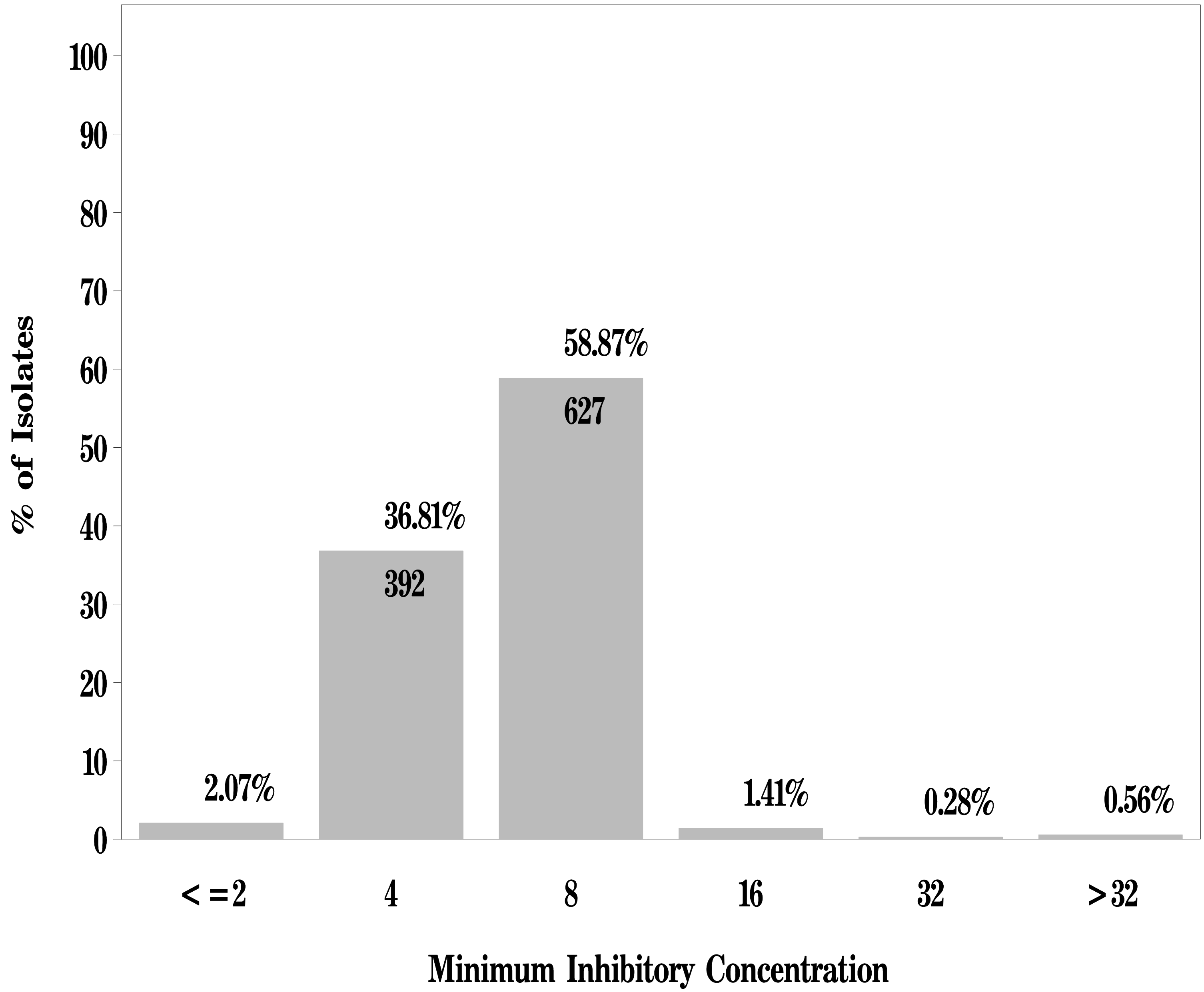
Breakpoints: Susceptible <=8 μg/mL Resistant >=32 μg/mL



NARMS

Figure 17: Minimum Inhibitory Concentration of Chloramphenicol for *Escherichia coli* (N=1065 Isolates)

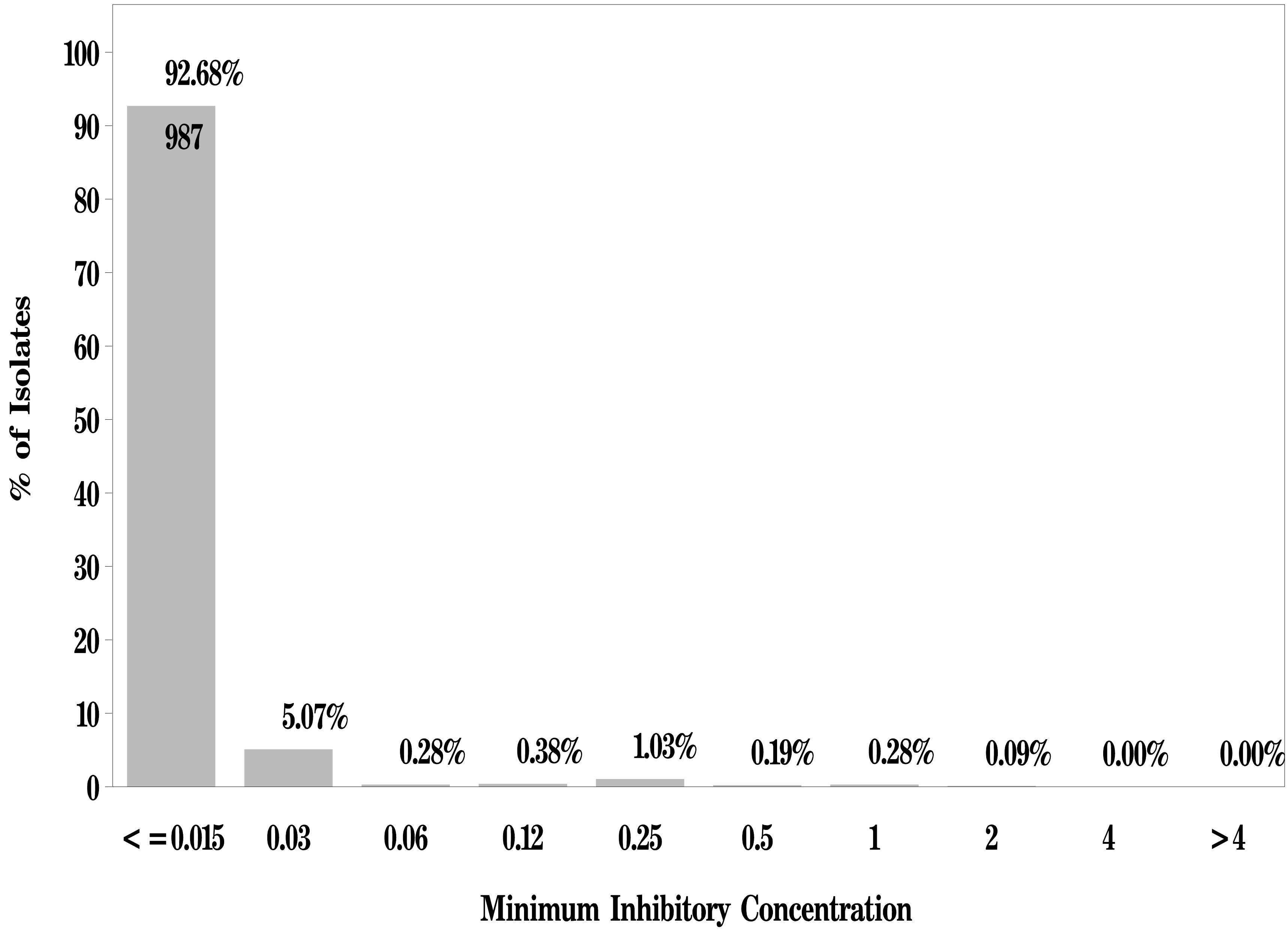
Breakpoints: Susceptible <=8 µg/mL Resistant >=32 µg/mL



NARMS

Figure 17: Minimum Inhibitory Concentration of Ciprofloxacin for *Escherichia coli* (N=1065 Isolates)

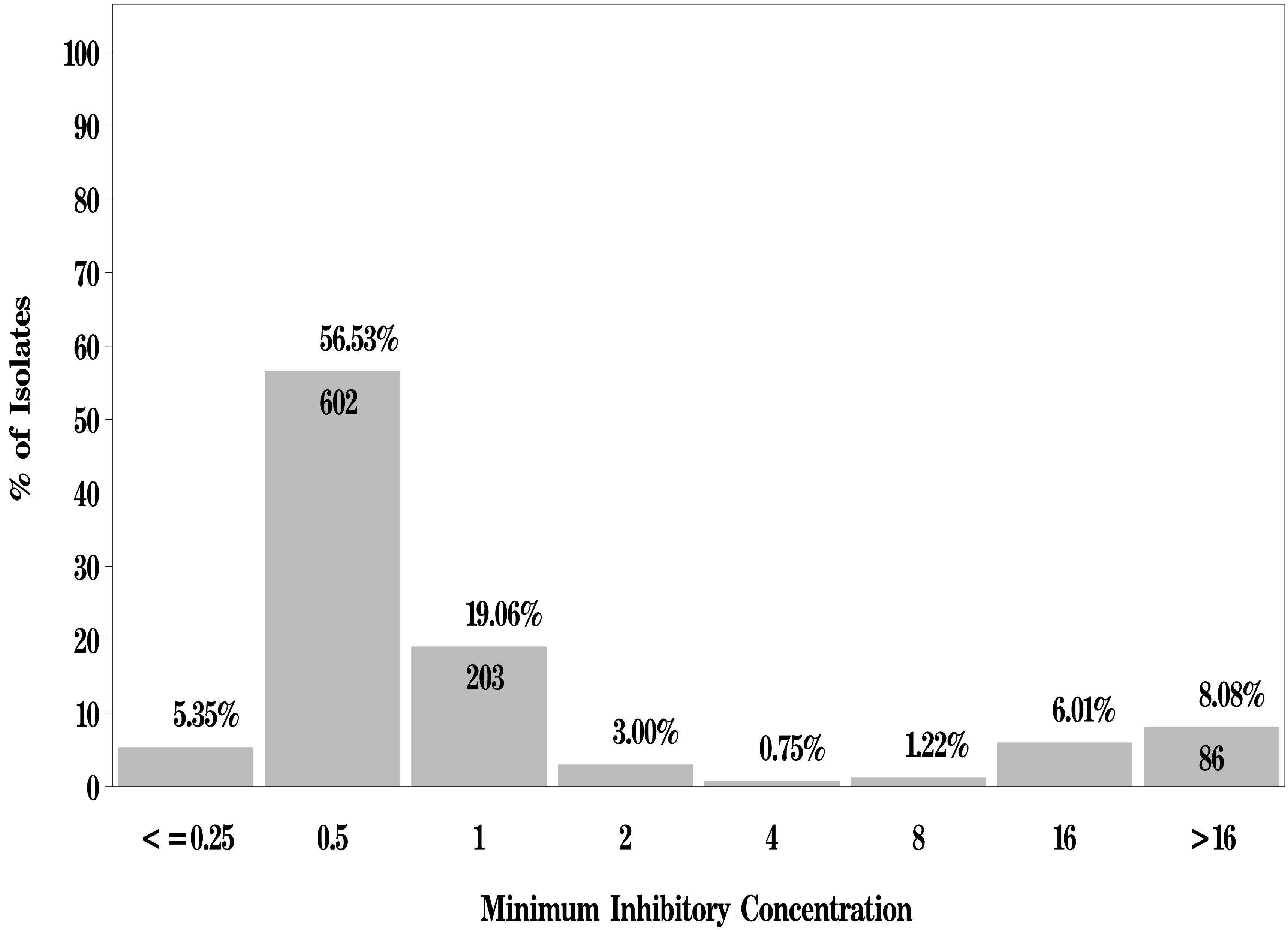
Breakpoints: Susceptible <=1 μg/mL Resistant >=4 μg/mL



NARMS

Figure 17: Minimum Inhibitory Concentration of Gentamicin for *Escherichia coli* (N=1065 Isolates)

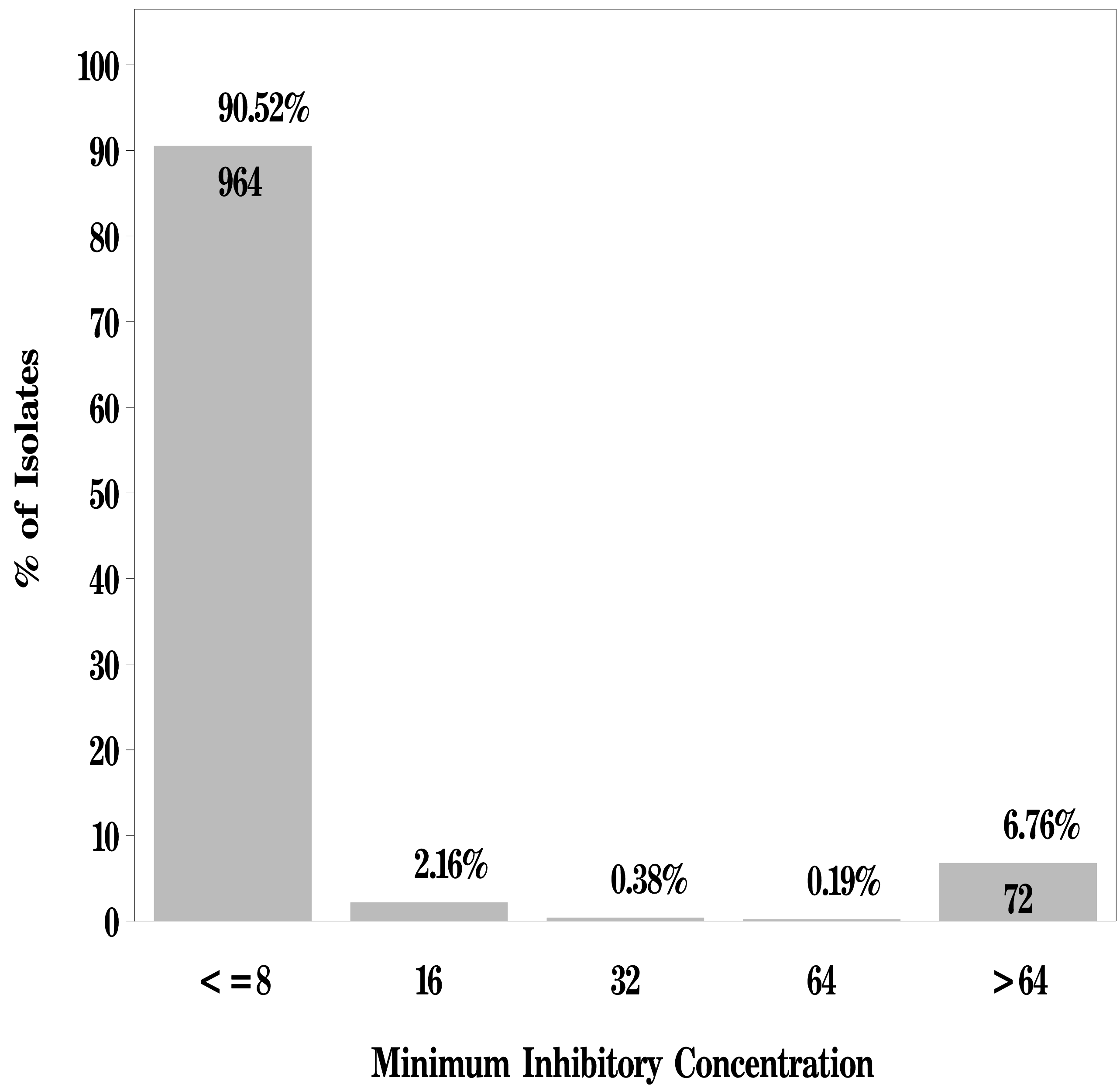
Breakpoints: Susceptible<=4 μg/mL Resistant>=16 μg/mL



NARMS

Figure 17: Minimum Inhibitory Concentration of Kanamycin for *Escherichia coli* (N=1065 Isolates)

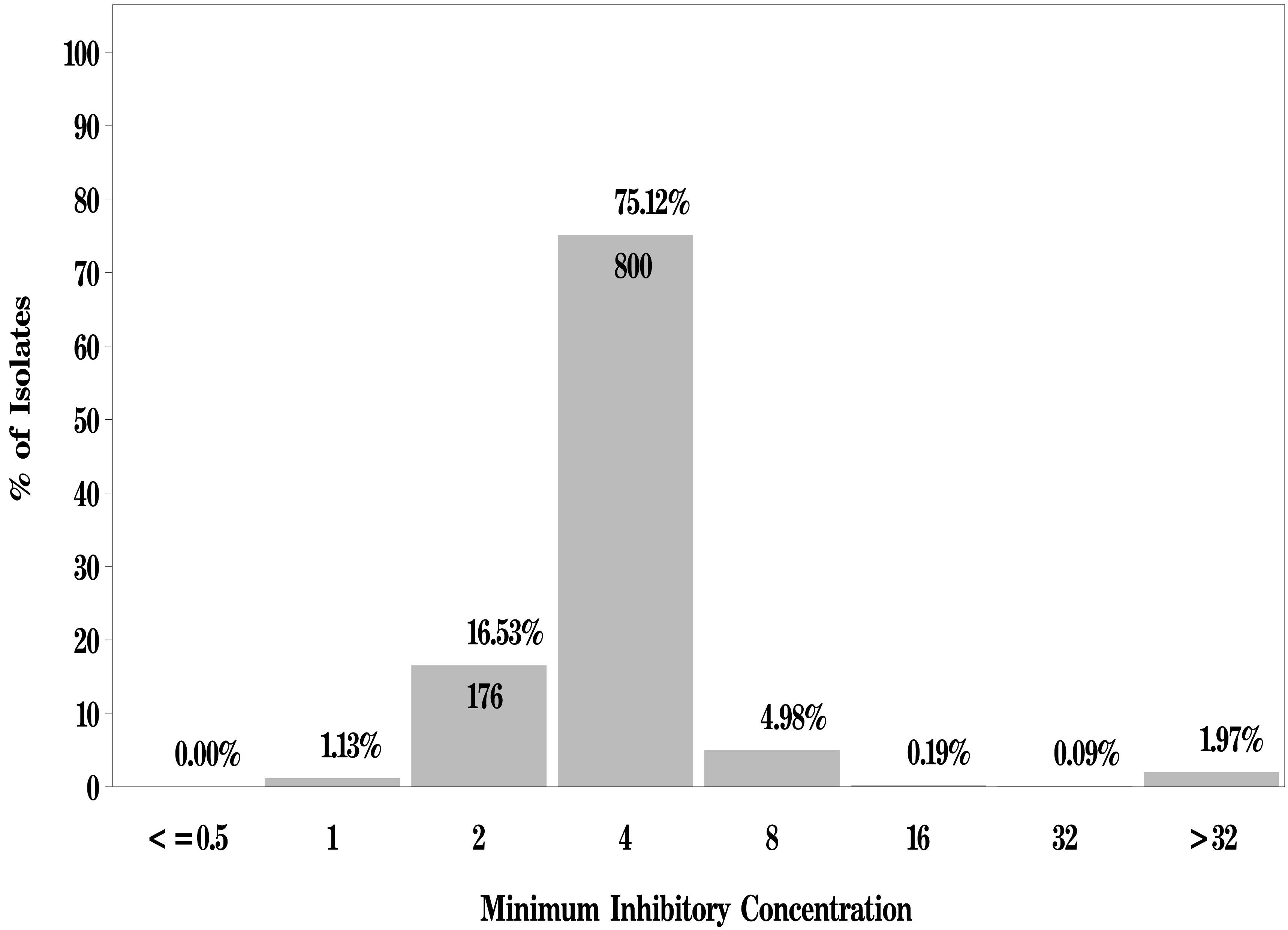
Breakpoints: Susceptible<=16 µg/mL Resistant>=64 µg/mL



NARMS

Figure 17: Minimum Inhibitory Concentration of Nalidixic acid for *Escherichia coli* (N=1065 Isolates)

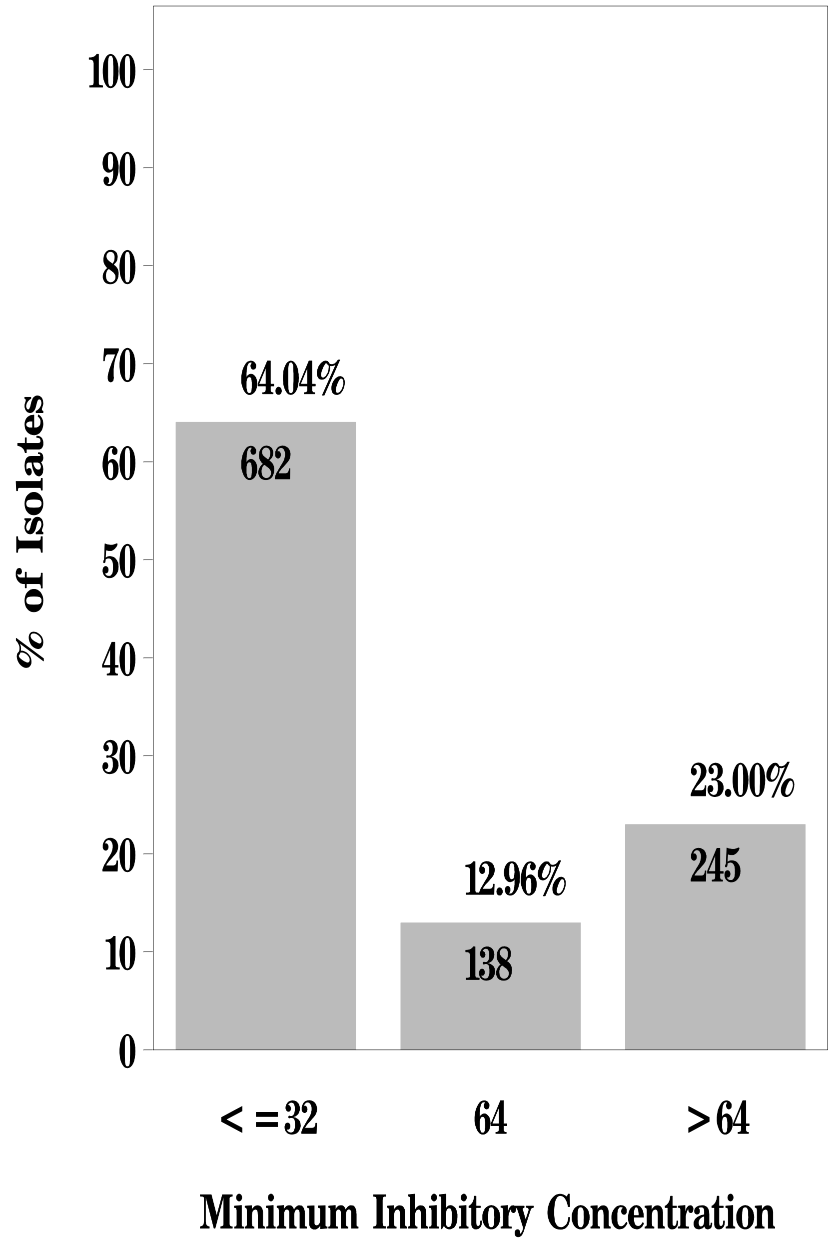
Breakpoints: Susceptible <=16 μg/mL Resistant >=32 μg/mL



NARMS

Figure 17: Minimum Inhibitory Concentration of Streptomycin for *Escherichia coli* (N=1065 Isolates)

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



NARMS

Figure 17: Minimum Inhibitory Concentration of Sulfamethoxazole for *Escherichia coli* (N=1065 Isolates)

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

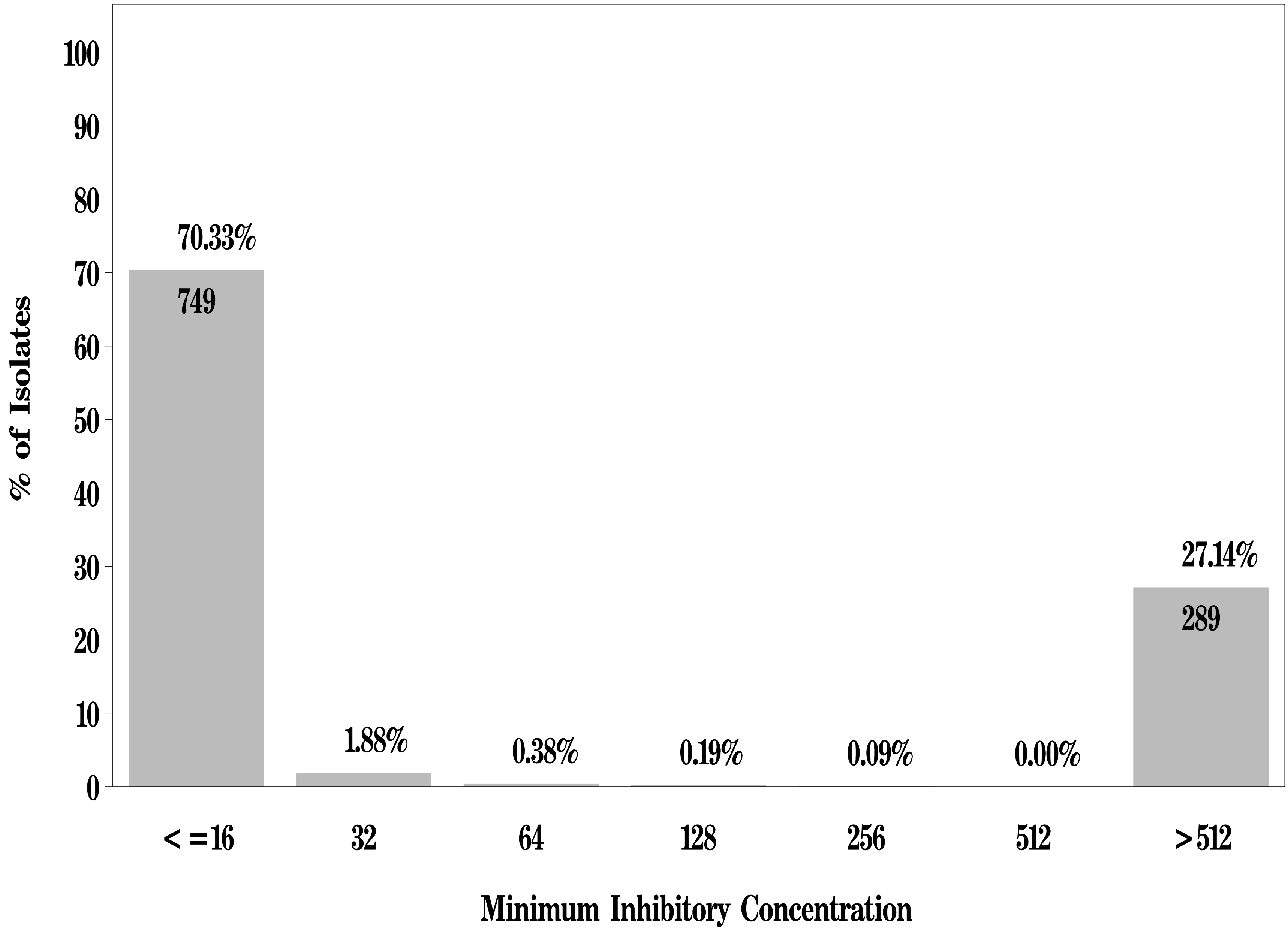


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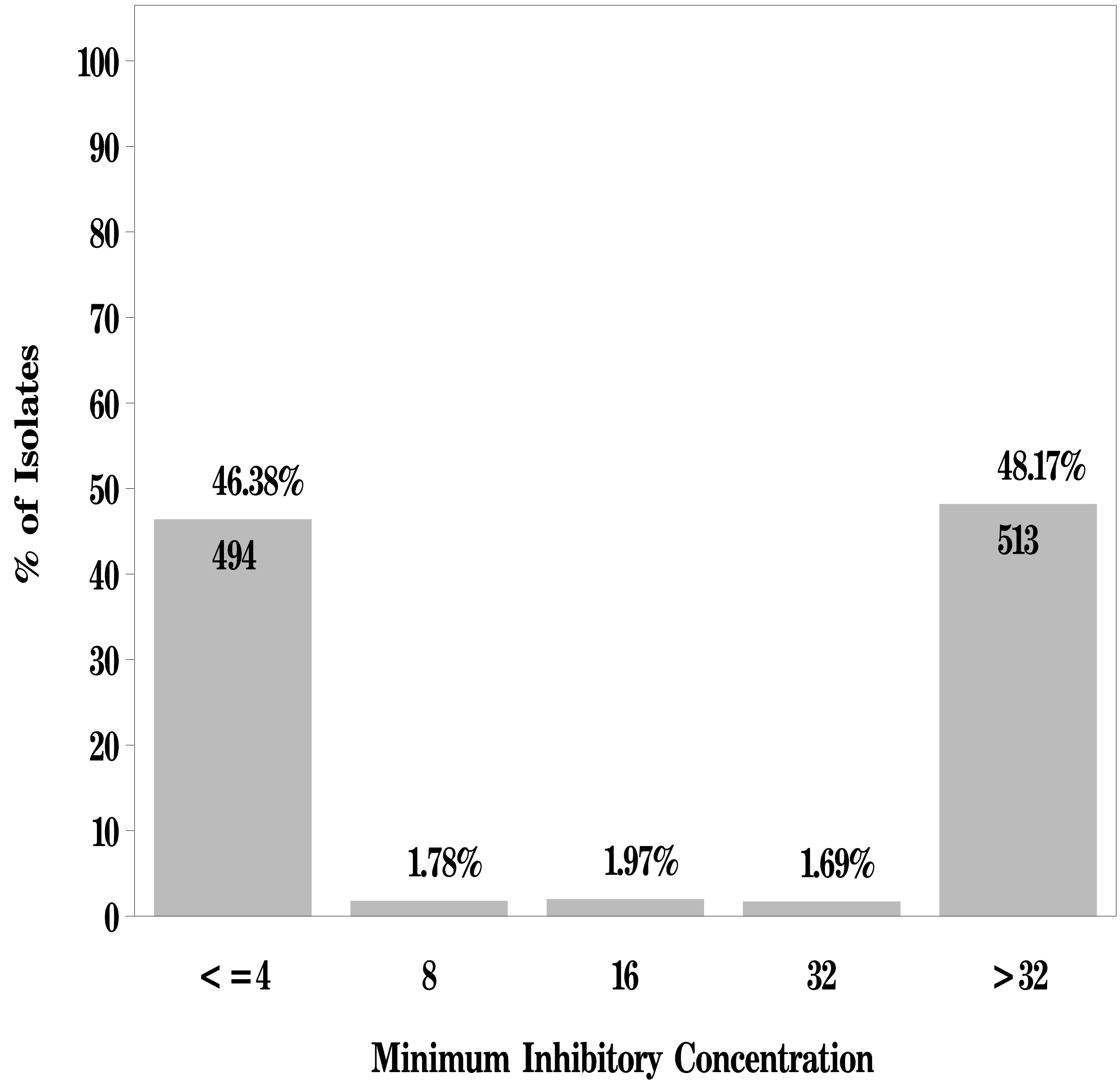
Figure 17: Minimum Inhibitory Concentration of Tetracycline for *Escherichia coli* (N=1065 Isolates)

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



NARMS

Figure 17: Minimum Inhibitory Concentration of Trimethoprim/sulfamethoxazole for *Escherichia coli* (N=1065 Isolates)

Breakpoints: Susceptible <=2/38 µg/mL Resistant >=4/76 µg/mL

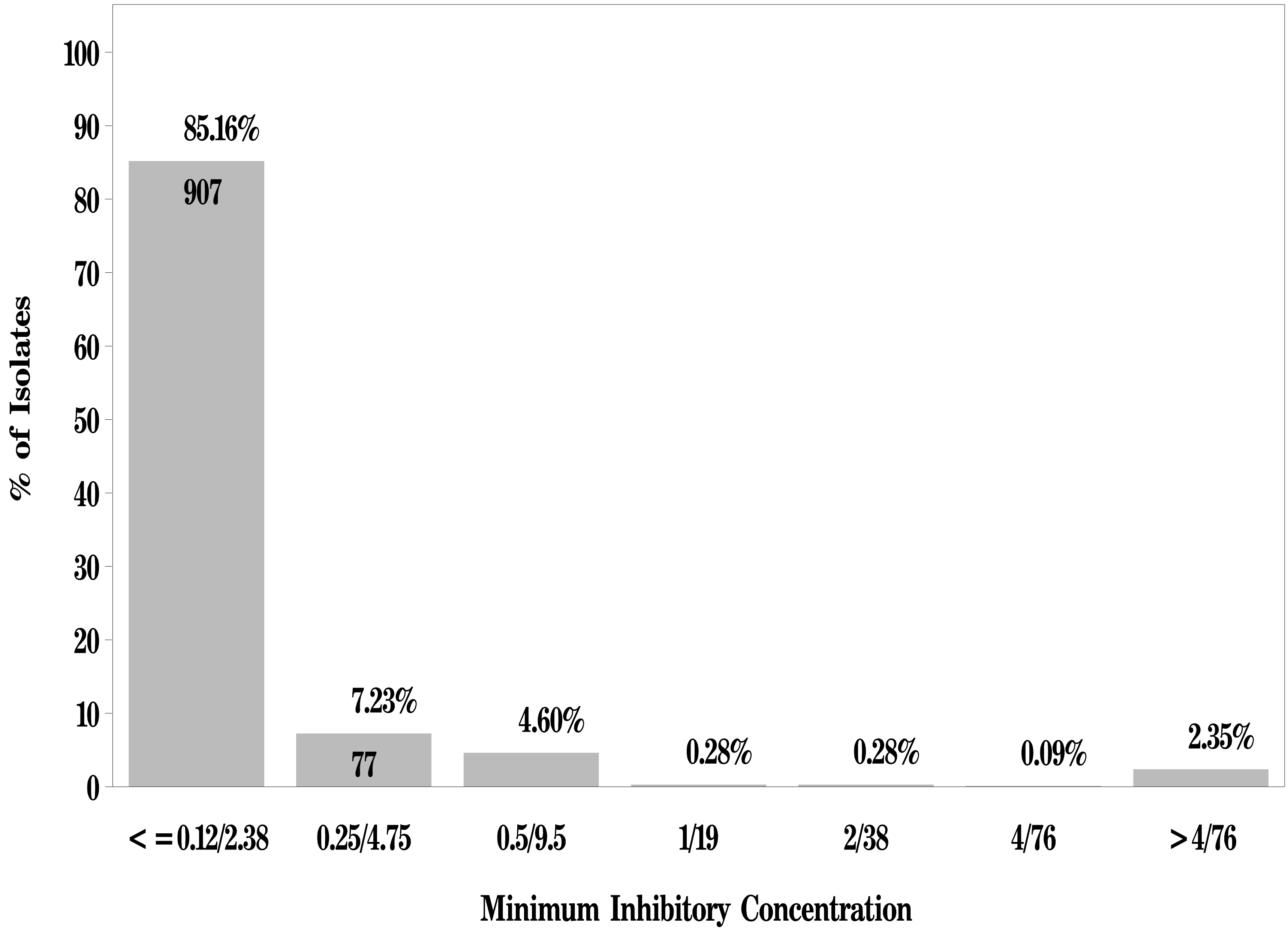


Table 45. Antimicrobial Resistance among *Escherichia coli* by Meat Type, 2002

	Chicken Breast (n=282)		Ground Turkey (n=304)		Ground Beef (n=295)		Pork Chop (n=184)	
Antimicrobial	**# Resistant**	**% Resistance**	**# Resistant**	**% Resistance**	**# Resistant**	**% Resistance**	**# Resistant**	**% Resistance**
TET	130	46.1%	234	77.0%	91	30.9%	97	52.7%
STR	139	49.3%	175	57.6%	28	9.5%	41	22.3%
SMX	91	32.3%	146	48.0%	29	9.8%	23	12.5%
AMP	61	21.6%	95	31.3%	18	6.1%	25	13.6%
GEN	65	23.1%	82	27.0%	1	0.3%	2	1.1%
CEP	60	21.3%	45	14.8%	17	5.8%	19	10.3%
KAN	17	6.0%	40	13.2%	7	2.4%	10	5.4%
AMC	34	12.1%	17	5.6%	6	2.0%	10	5.4%
FOX	31	11.0%	10	3.3%	4	1.4%	6	3.3%
COT	10	3.6%	12	4.0%	2	0.7%	2	1.1%
TIO	20	7.1%	3	1.0%	0	0.0%	1	0.5%
NAL	8	2.8%	13	4.3%	0	0.0%	1	0.5%
CHL	2	0.7%	1	0.3%	3	1.0%	3	1.6%
AMI	0	0.0%	0	0.0%	0	0.0%	0	0.0%
AXO	0	0.0%	0	0.0%	0	0.0%	0	0.0%
CIP	0	0.0%	0	0.0%	0	0.0%	0	0.0%

Figure 18a. Antimicrobial Resistance among *E. coli* from Chicken Breast (n=282), 2002

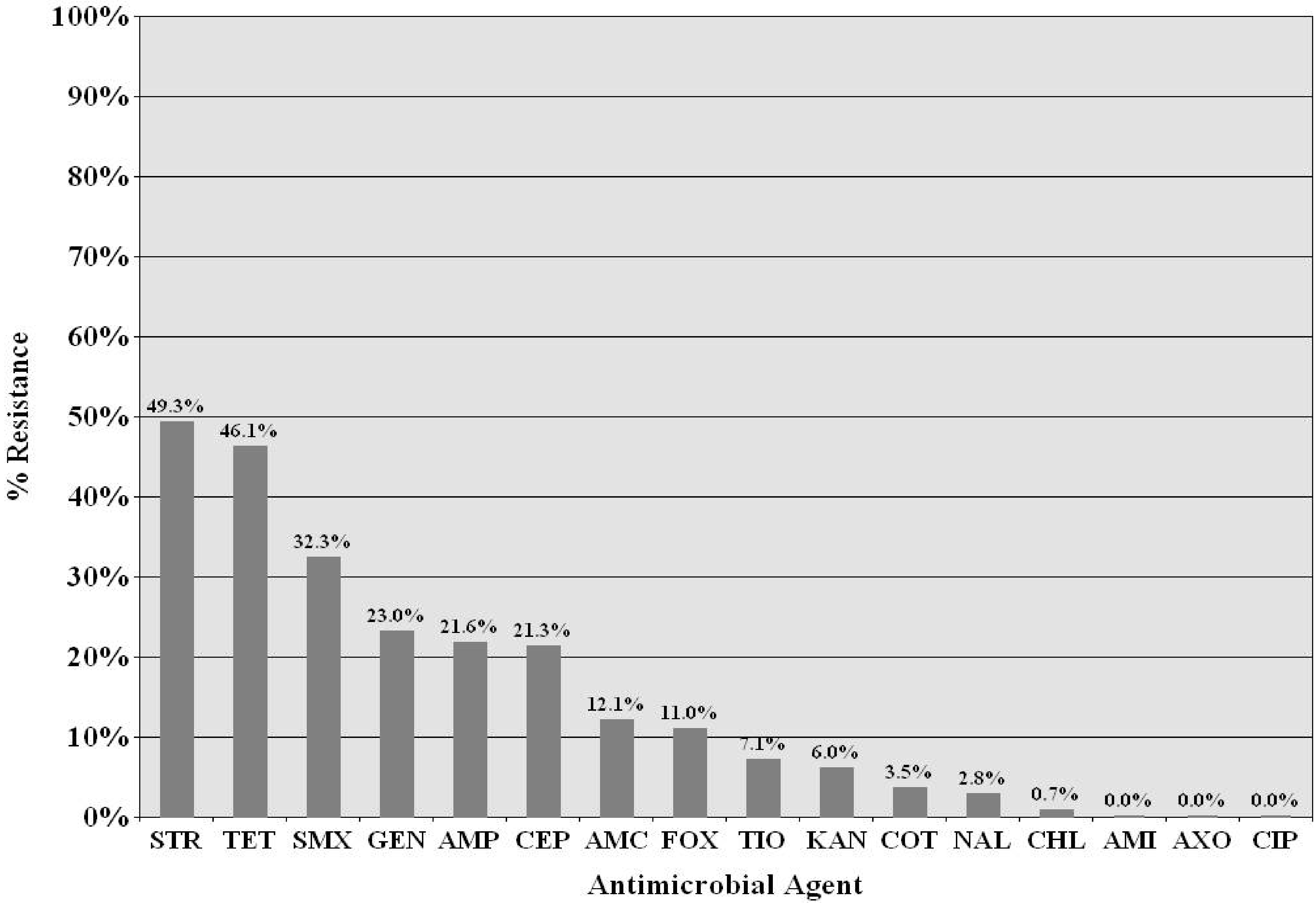


Figure 18b. Antimicrobial Resistance among *E. coli* from Ground Turkey (n=304), 2002

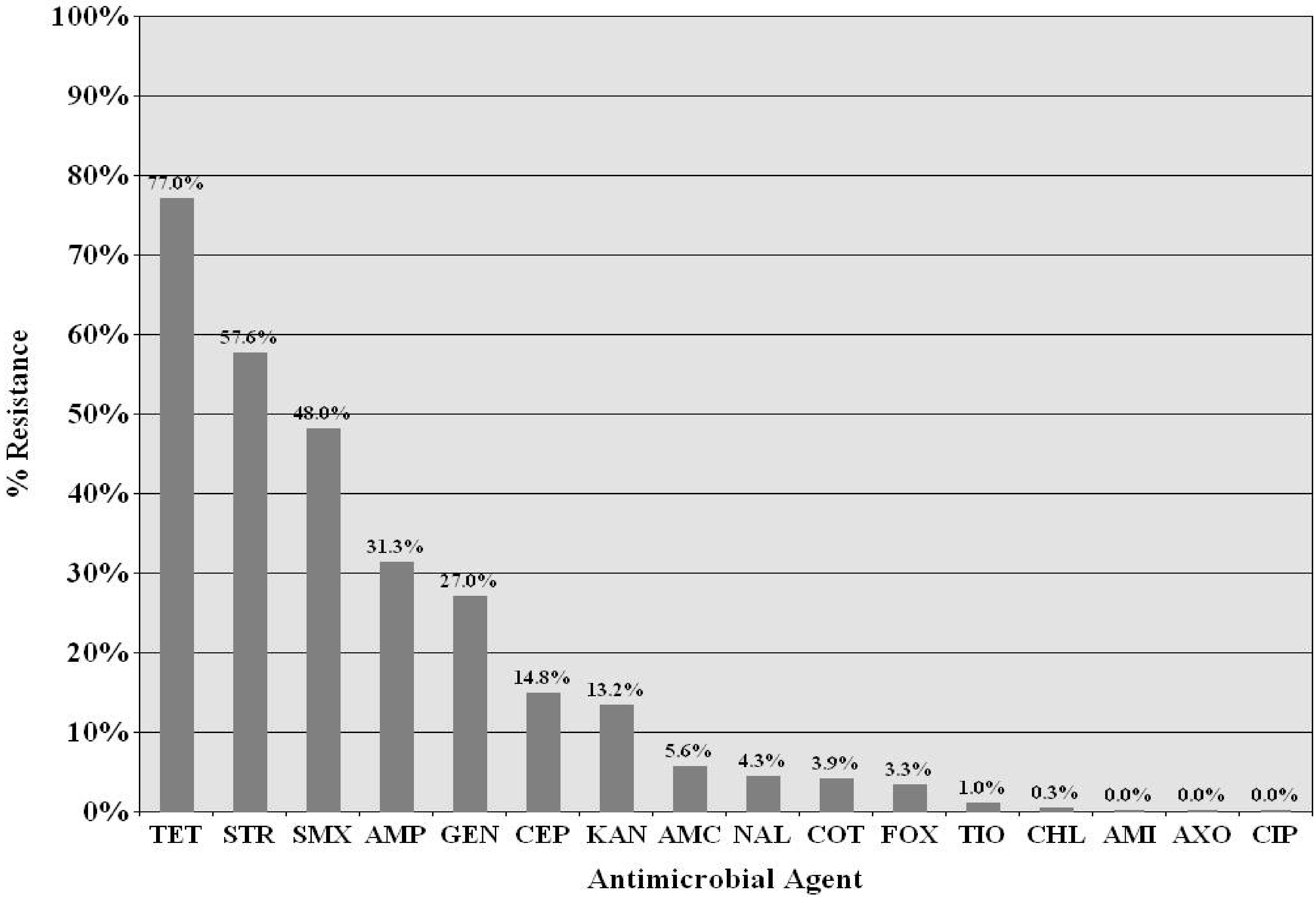


Figure 18c. Antimicrobial Resistance among *E. coli* from Ground Beef (n= 295), 2002

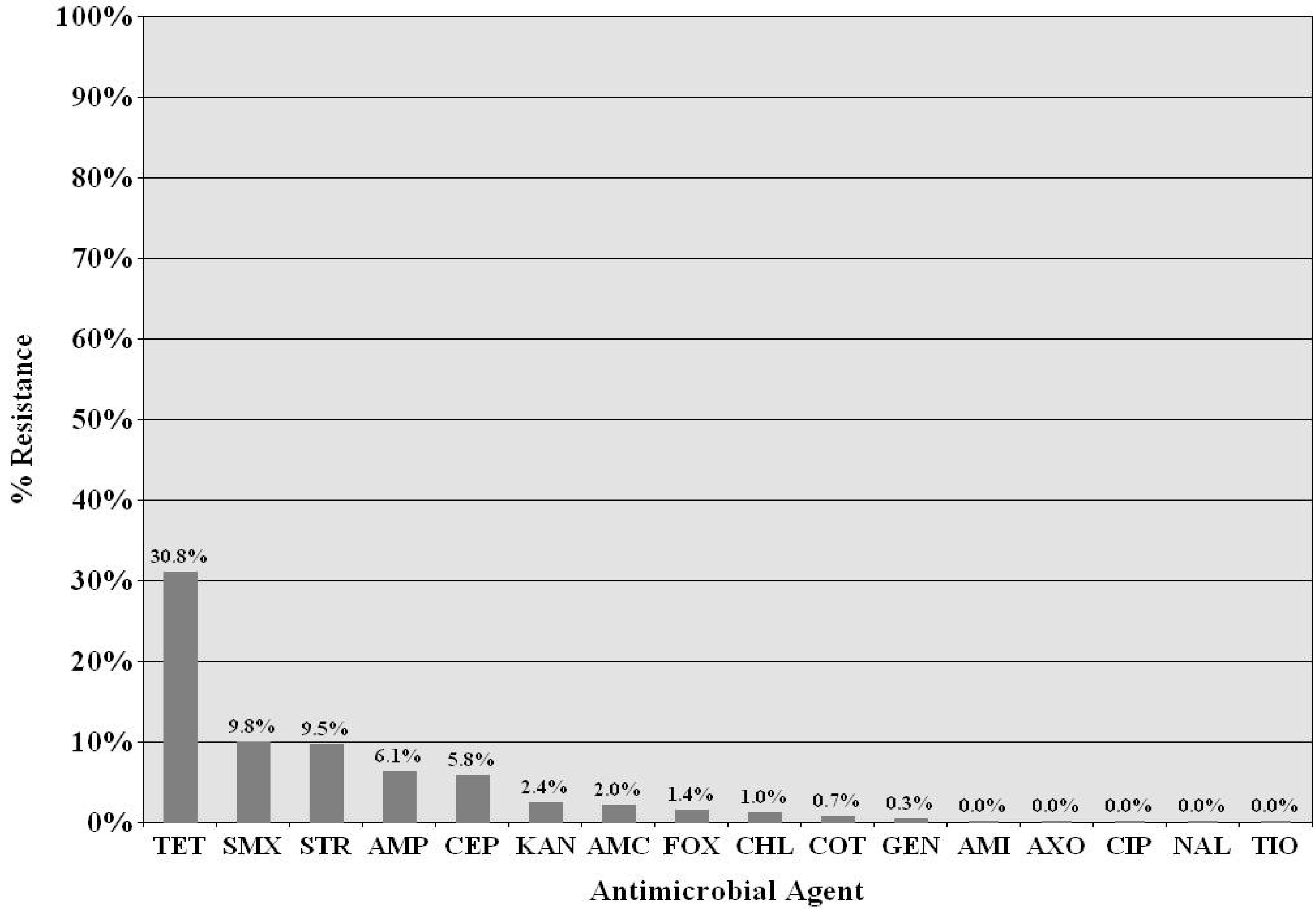


Figure 18d. Antimicrobial Resistance among *E. coli* from Pork Chop (n=184), 2002

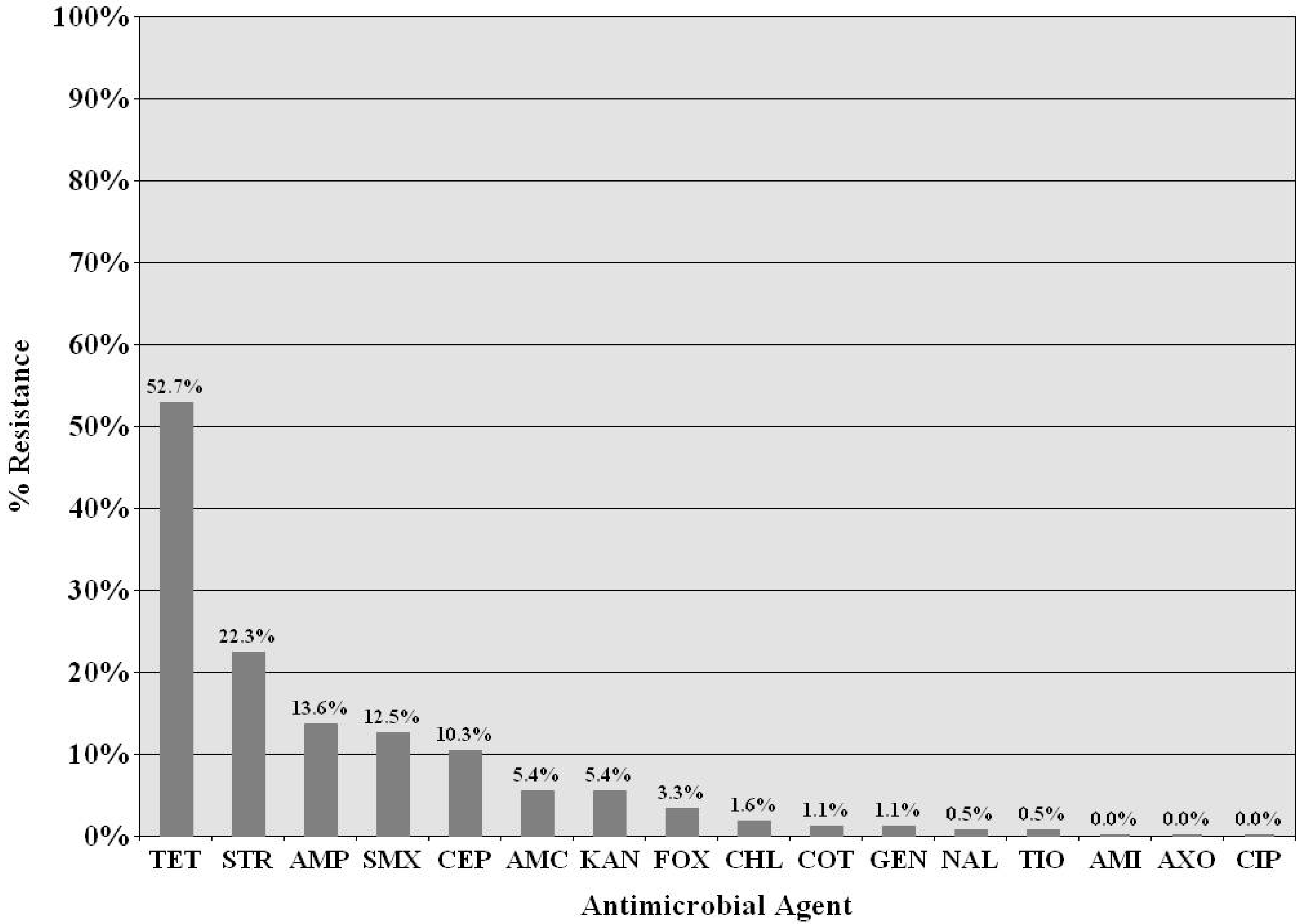


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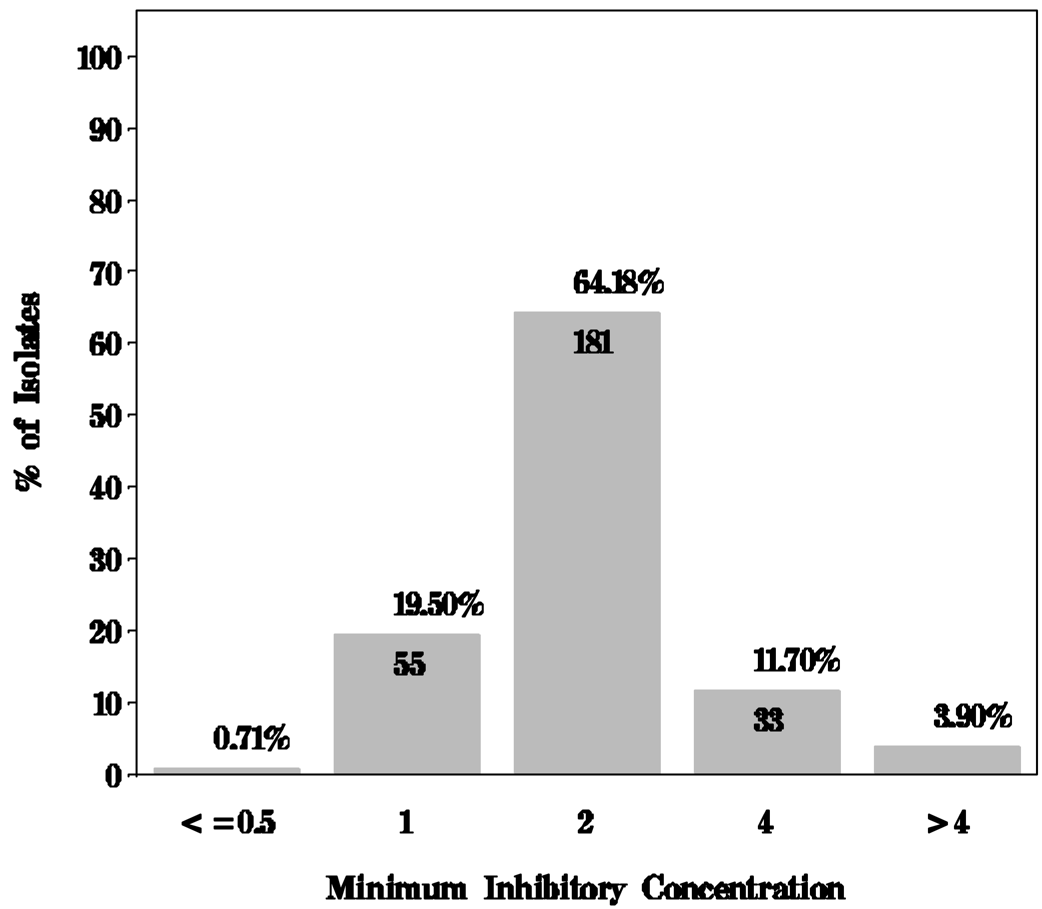
Figure 19: Minimum Inhibitory Concentration of Amikacin for *Escherichia coli* in Chicken Breast (N=282 Isolates)

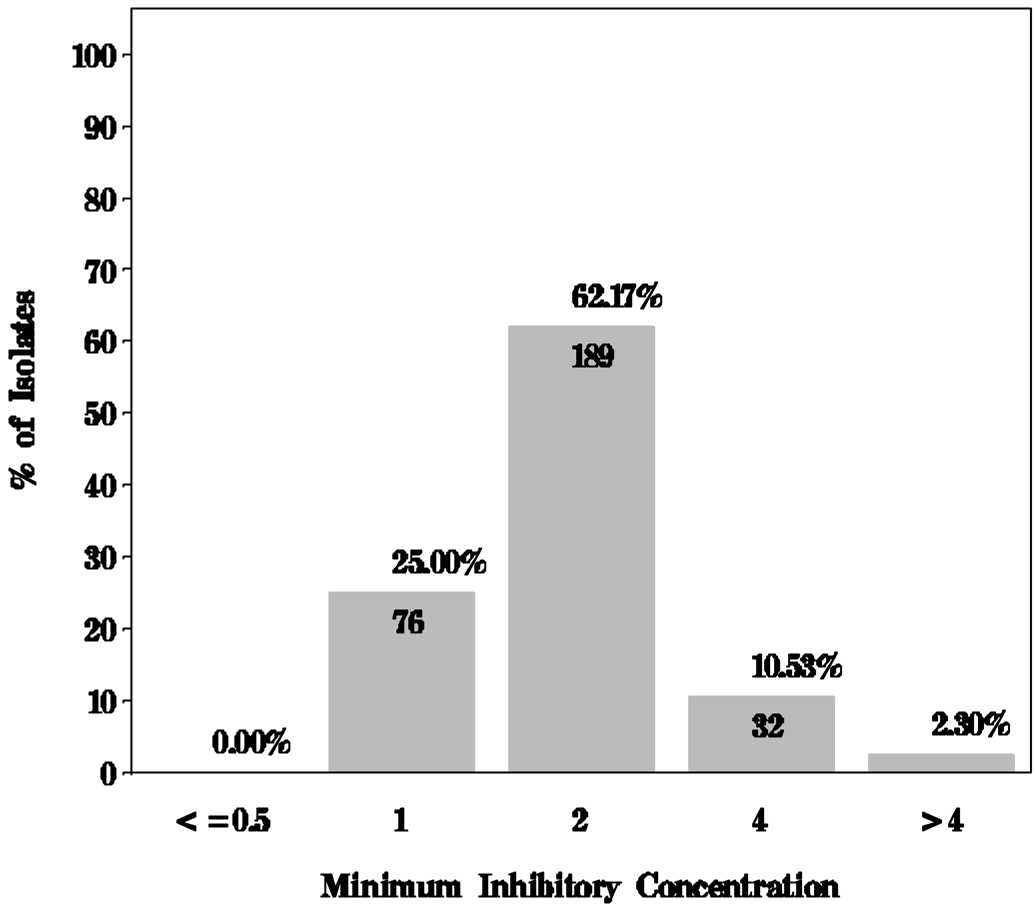
Breakpoints: Susceptible<=16 μg/mL Resistant>=64μg/mL



NARMS

Figure 19: Minimum Inhibitory Concentration of Amikacin for *Escherichia coli* in Ground Turkey (N=304 Isolates)

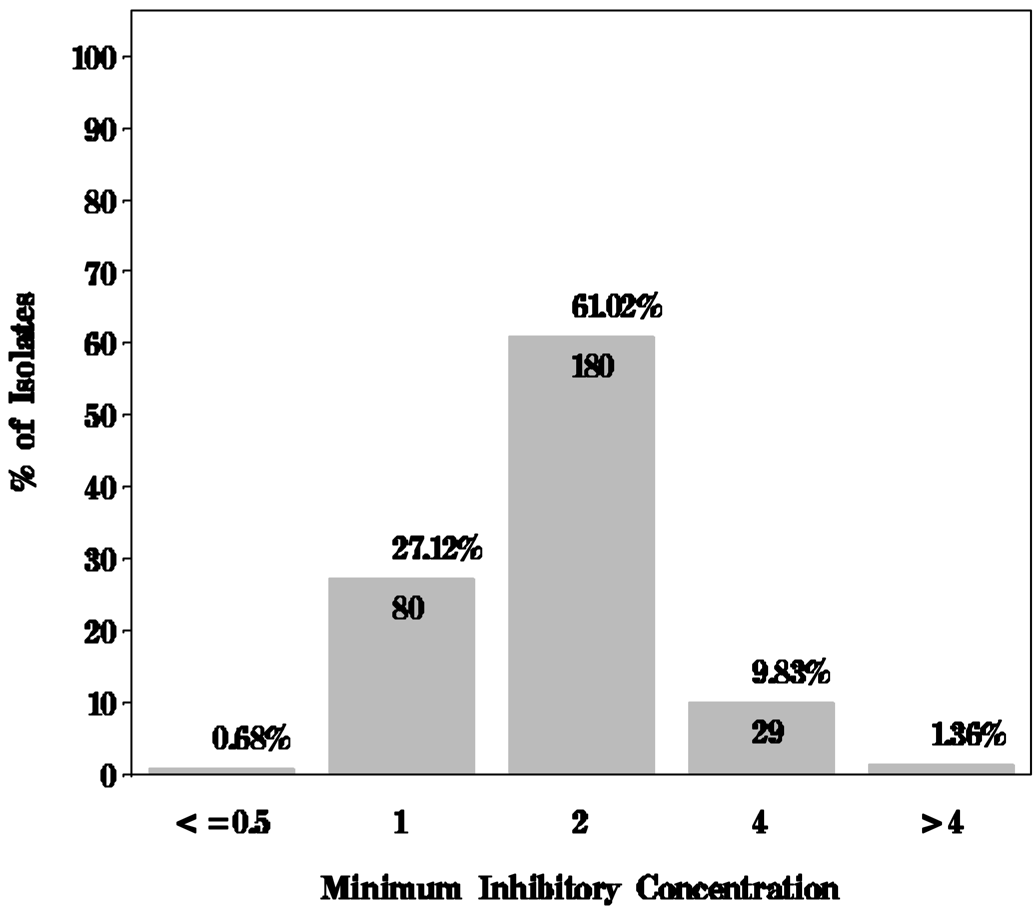
Breakpoints: Susceptible<=16 μg/mL Resistant>=64μg/mL



NARMS

Figure 19: Minimum Inhibitory Concentration of Amikacin for *Escherichia coli* in Ground Beef (N=295 Isolates)

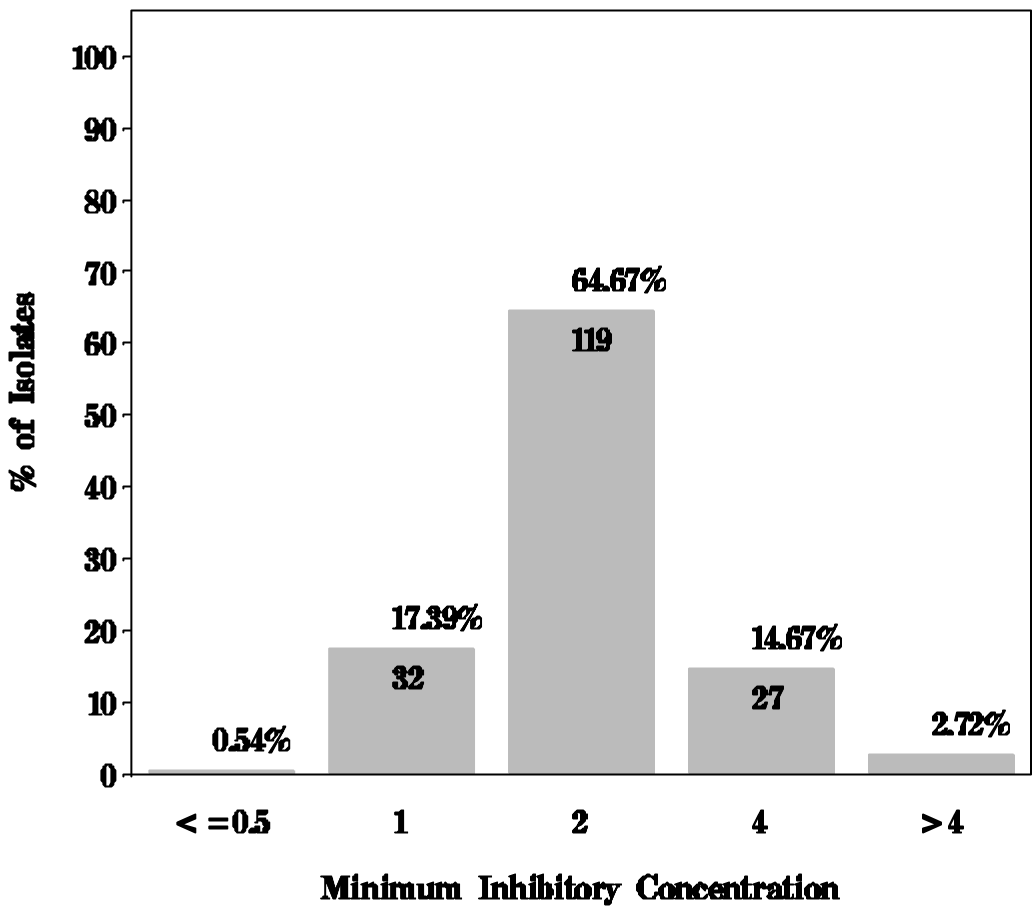
Breakpoints: Susceptible <=16 μg/mL Resistant >=64μg/mL



NARMS

Figure 19: Minimum Inhibitory Concentration of Amikacin for *Escherichia coli* in Pork Chop (N=184 Isolates)

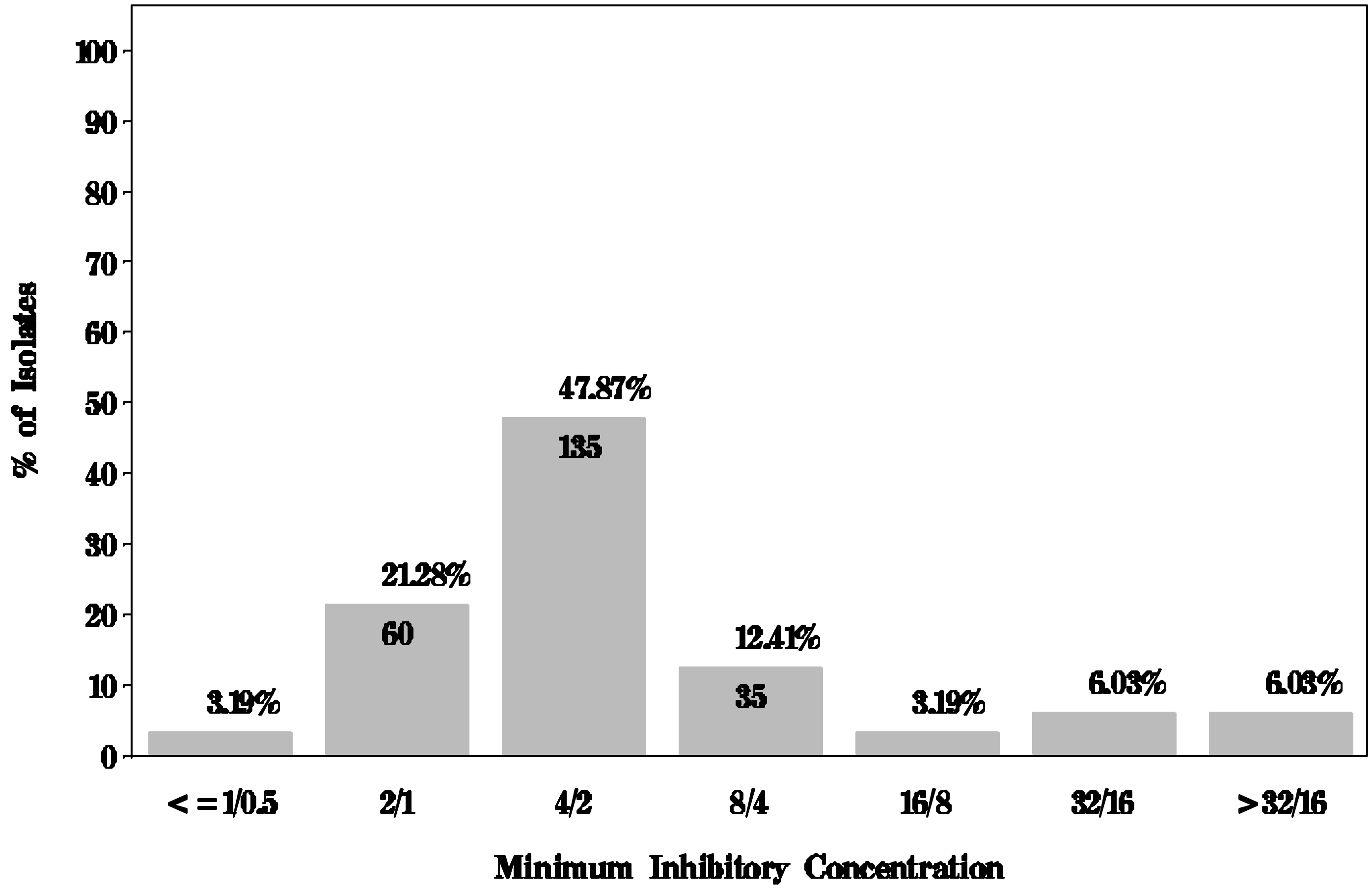
Breakpoints: Susceptible <=16 μg/mL Resistant >=64μg/mL



NARMS

Figure 19: Minimum Inhibitory Concentration of Amoxicillin/Clavulanic acid for *Escherichia coli* in Chicken Breast (N=282 Isolates)

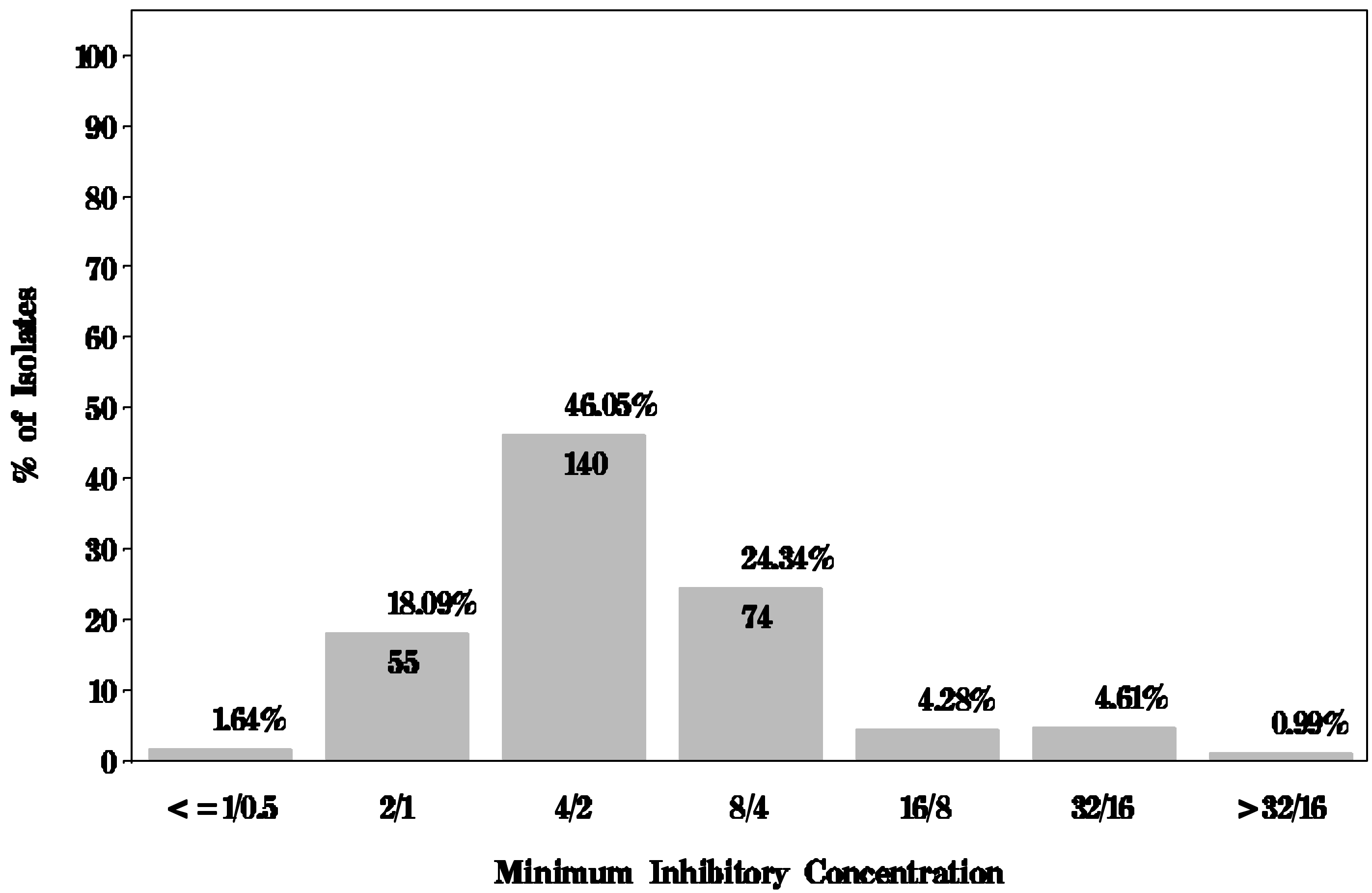
Breakpoints: Susceptible<=8/4 μg/mL Resistant>=32/16 μg/mL



NARMS

Figure 19: Minimum Inhibitory Concentration of Amoxicillin/Clavulanic acid for *Escherichia coli* in Ground Turkey (N=304 Isolates)

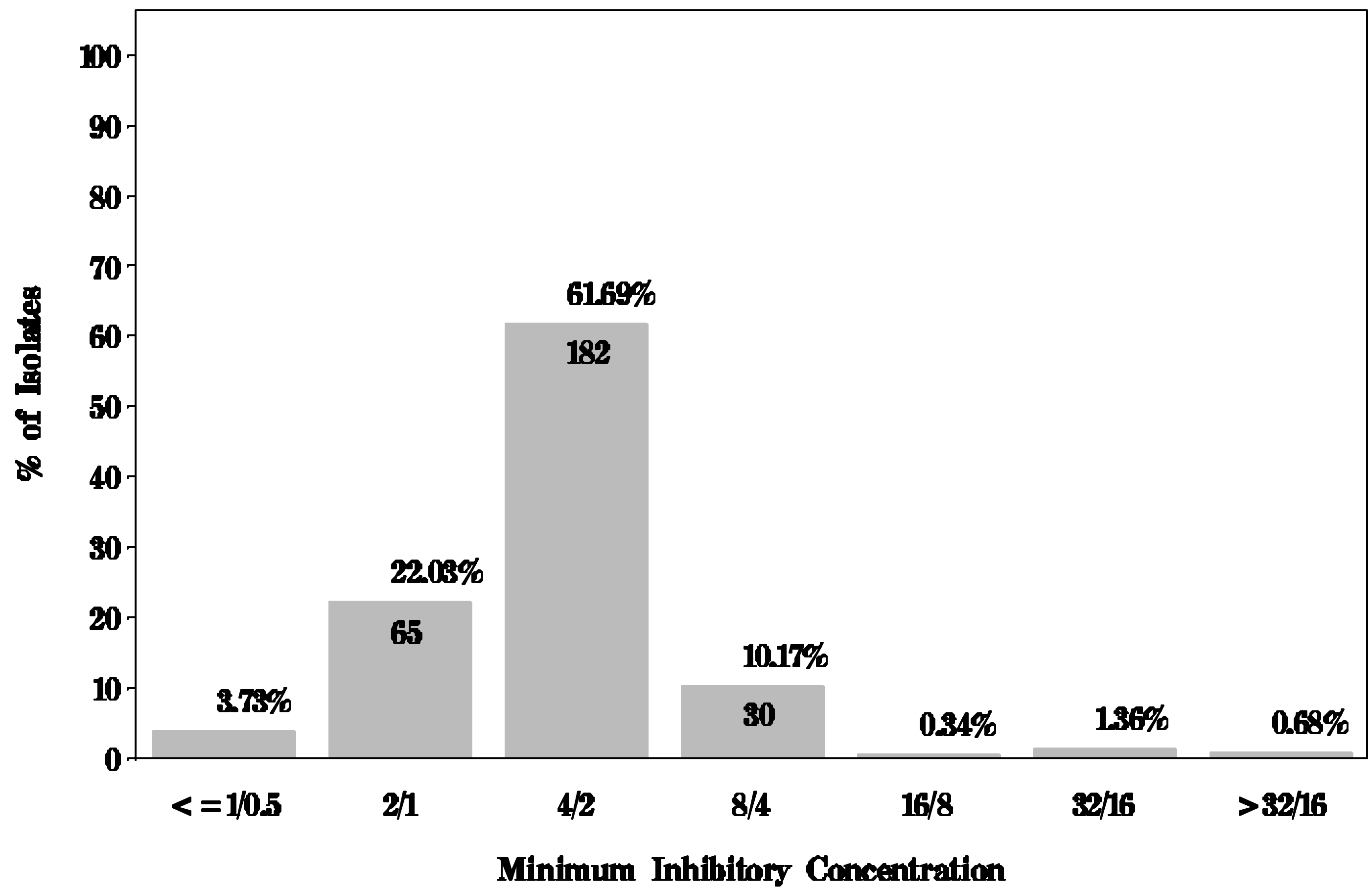
Breakpoints: Susceptible<=8/4 µg/mL Resistant>=32/16 µg/mL



NARMS

Figure 19: Minimum Inhibitory Concentration of Amoxicillin/Clavulanic acid for *Escherichia coli* in Ground Beef (N=295 Isolates)

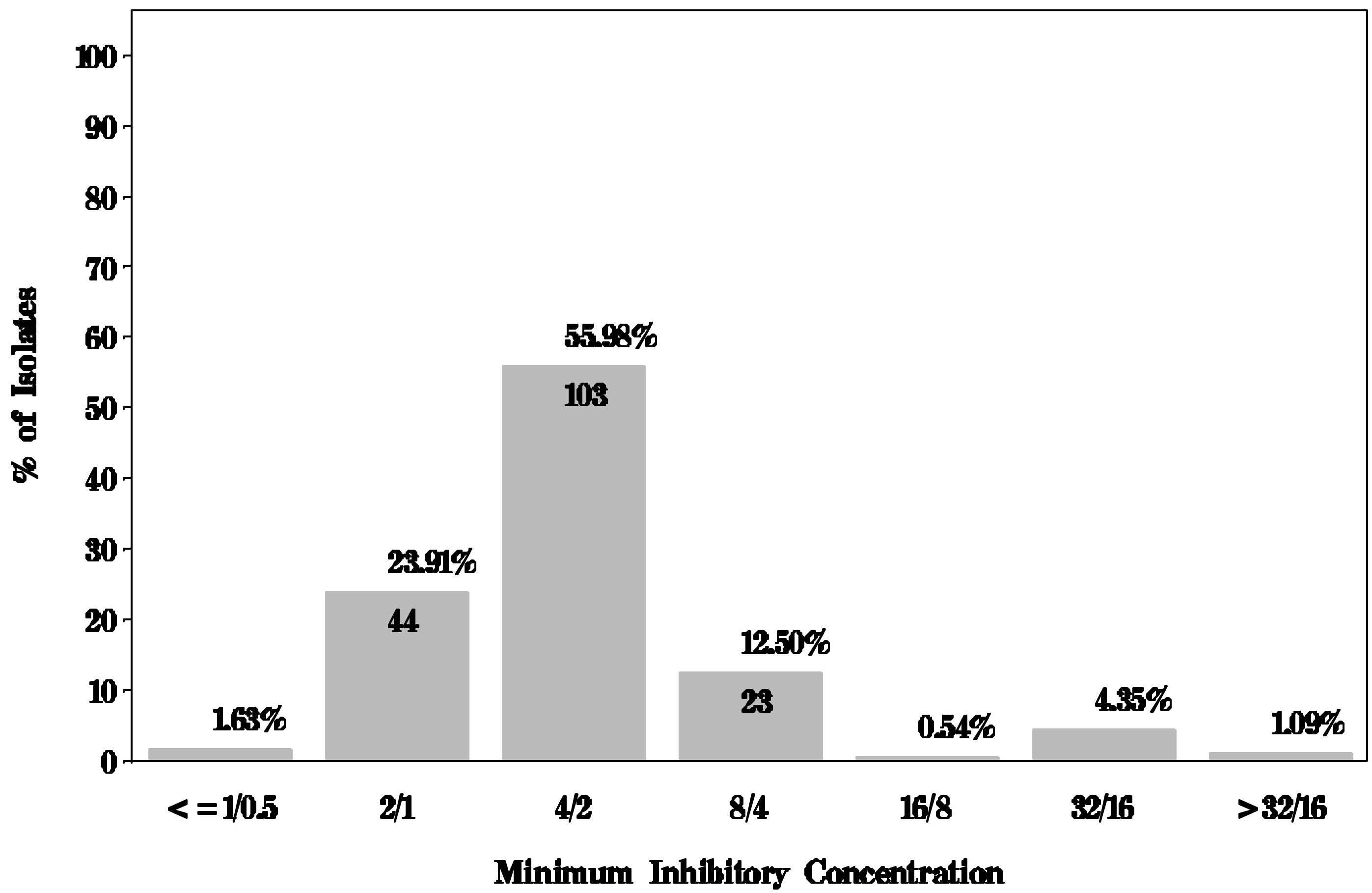
Breakpoints: Susceptible<=8/4 μg/mL Resistant>=32/16 μg/mL



NARMS

Figure 19: Minimum Inhibitory Concentration of Amoxicillin/Clavulanic acid for *Escherichia coli* in Pork Chop (N=184 Isolates)

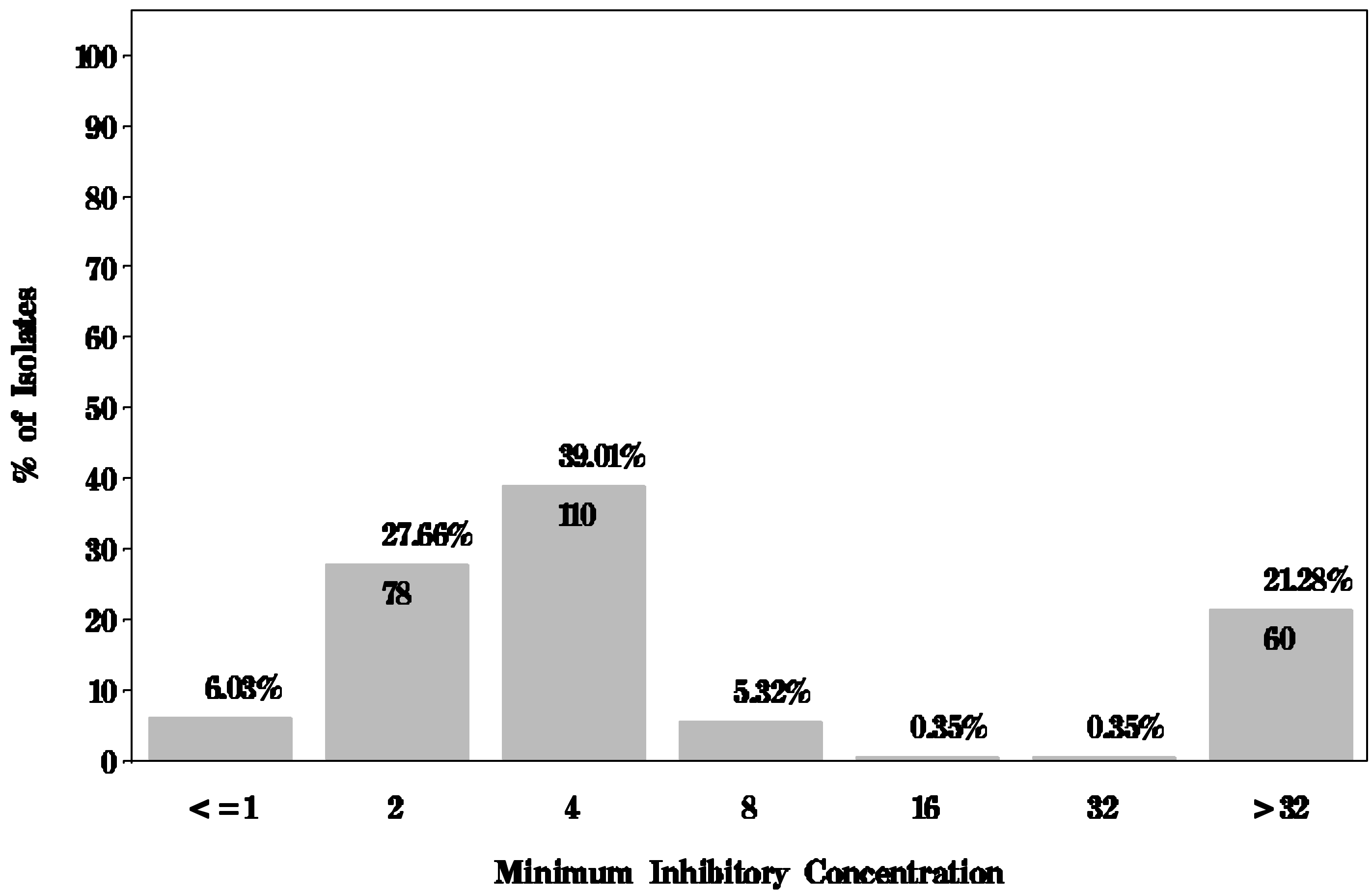
Breakpoints: Susceptible<=8/4 µg/mL Resistant>=32/16 µg/mL



NARMS

Figure 19: Minimum Inhibitory Concentration of Ampicillin for *Escherichia coli* in Chicken Breast (N=282 Isolates)

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



NARMS

Figure 19: Minimum Inhibitory Concentration of Ampicillin for *Escherichia coli* in Ground Turkey (N=304 Isolates)

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

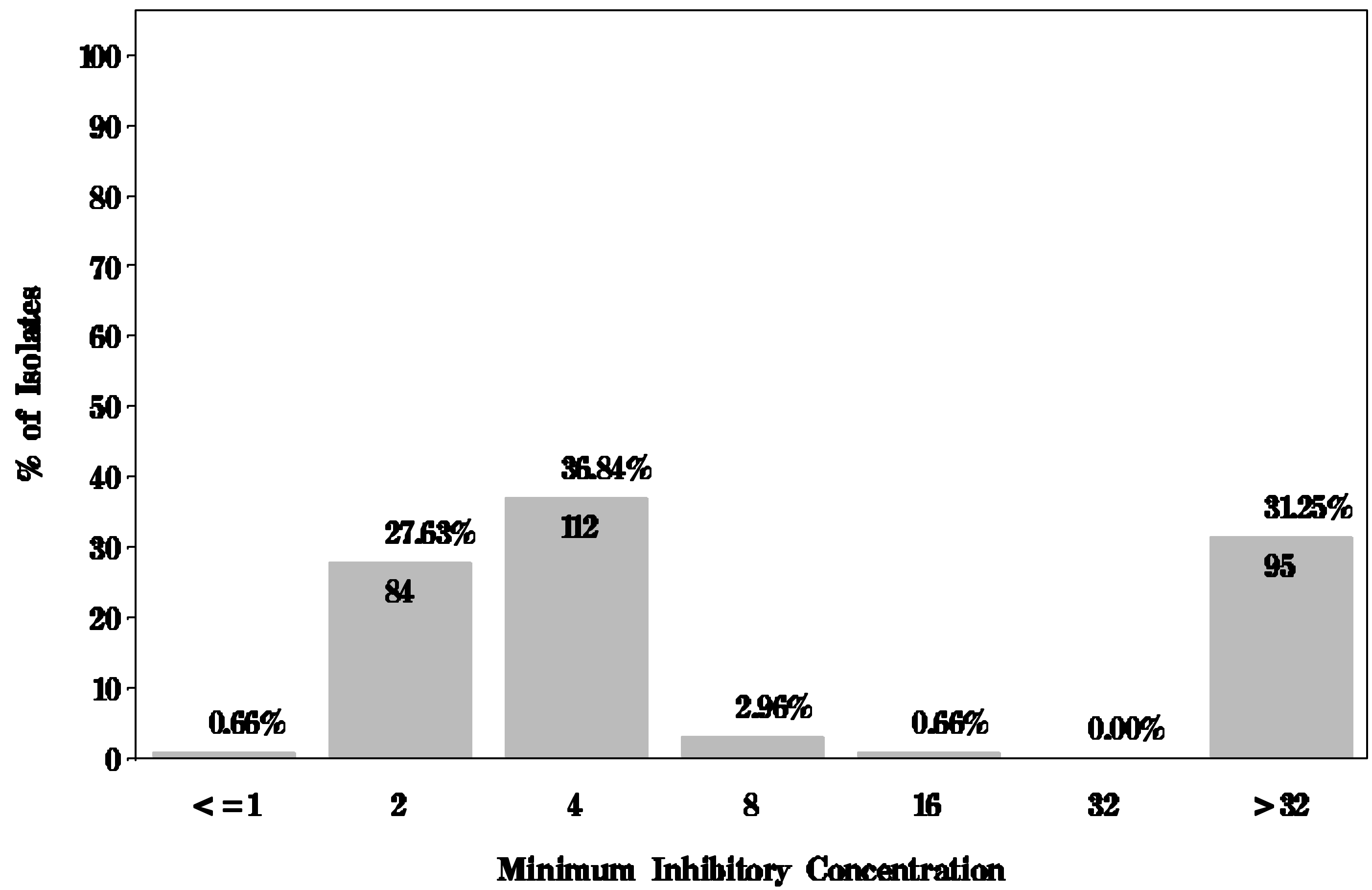


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Figure 19: Minimum Inhibitory Concentration of Ampicillin for *Escherichia coli* in Ground Beef (N=295 Isolates)

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

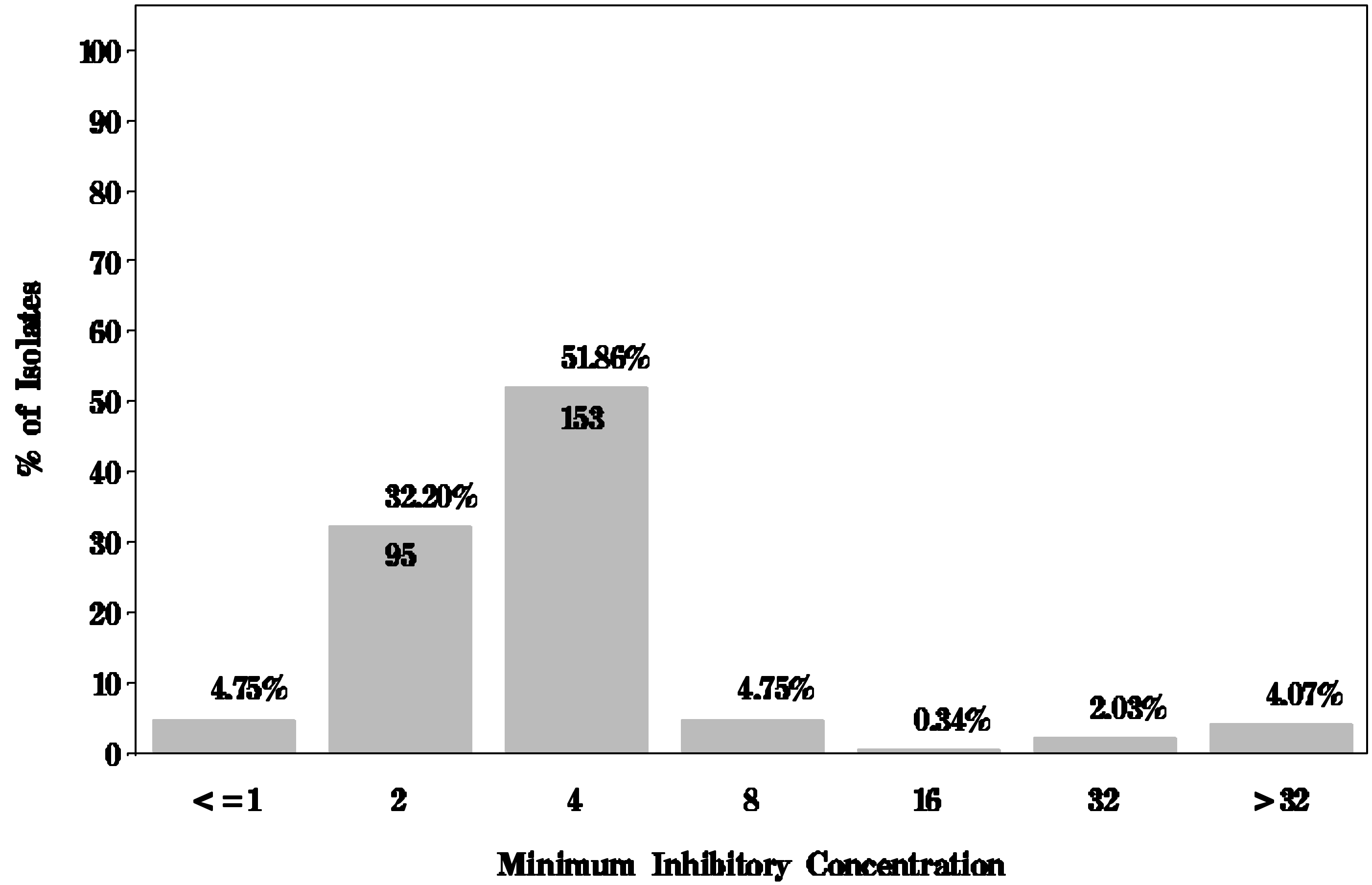

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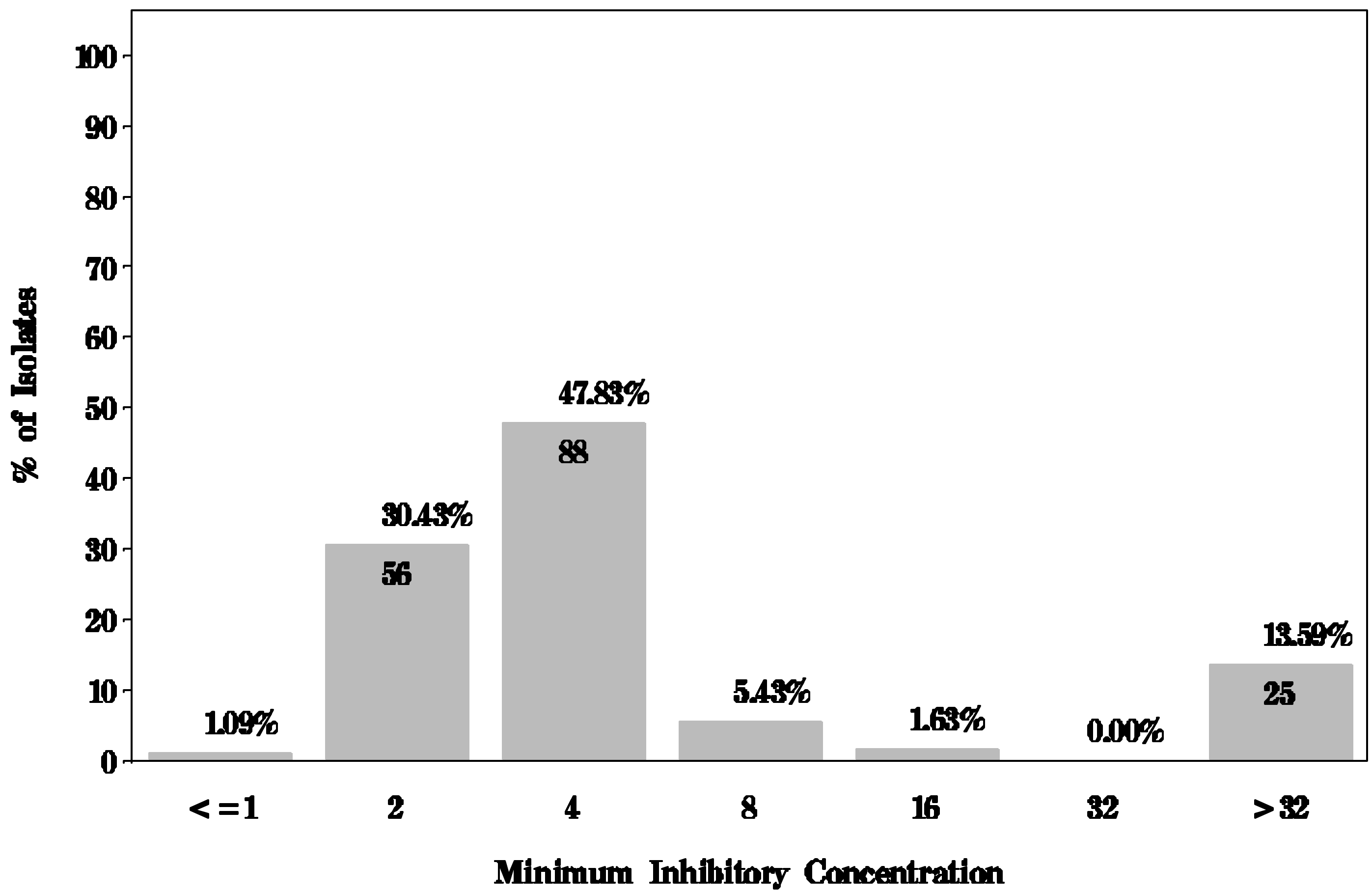
Figure 19: Minimum Inhibitory Concentration of Ampicillin for *Escherichia coli* in Pork Chop (N=184 Isolates)

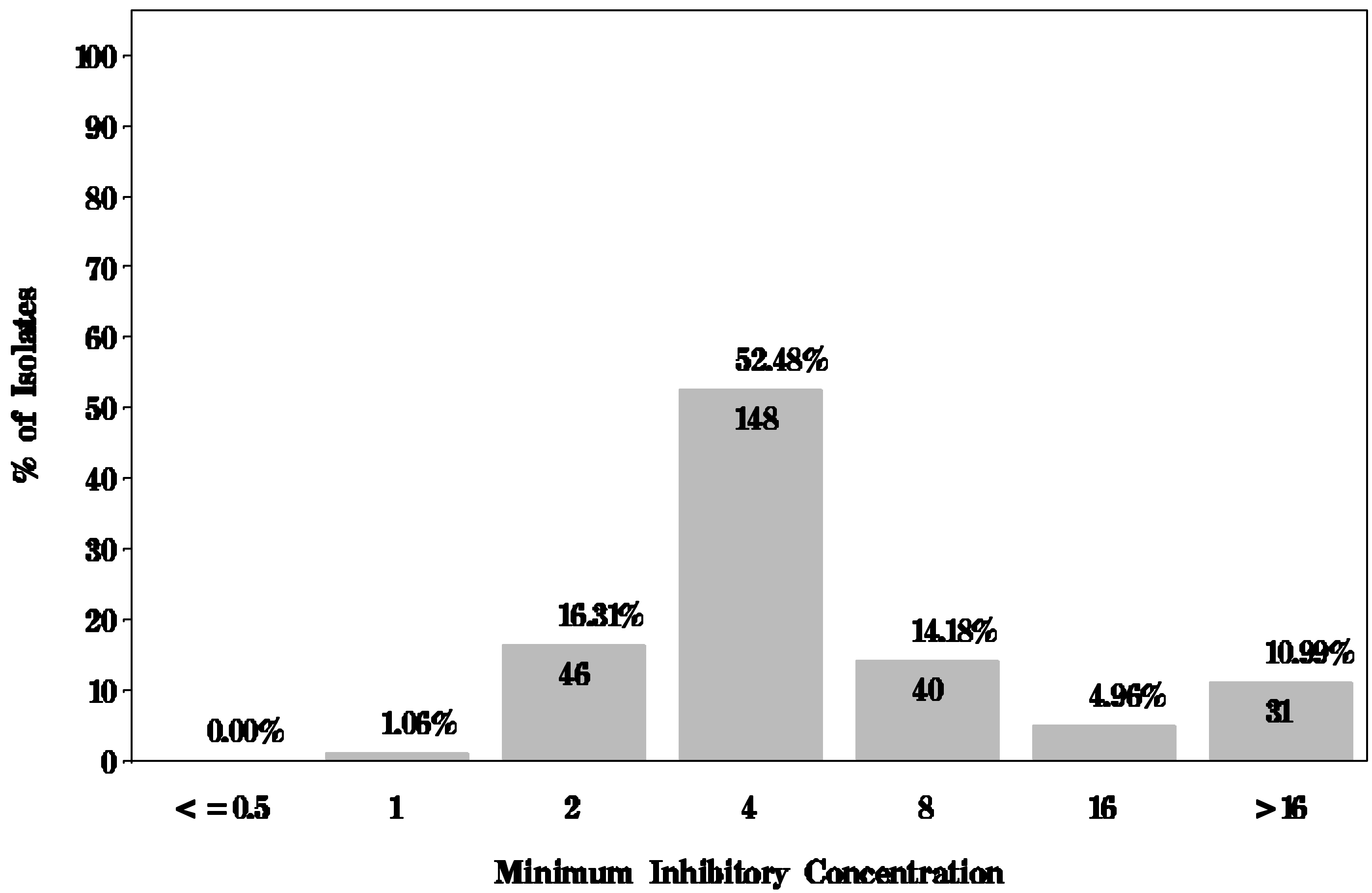
Breakpoints: Susceptible<=8 μg/mL Resistant>=32μg/mL



NARMS

Figure 19: Minimum Inhibitory Concentration of Cefoxitin for *Escherichia coli* in Chicken Breast (N=282 Isolates)

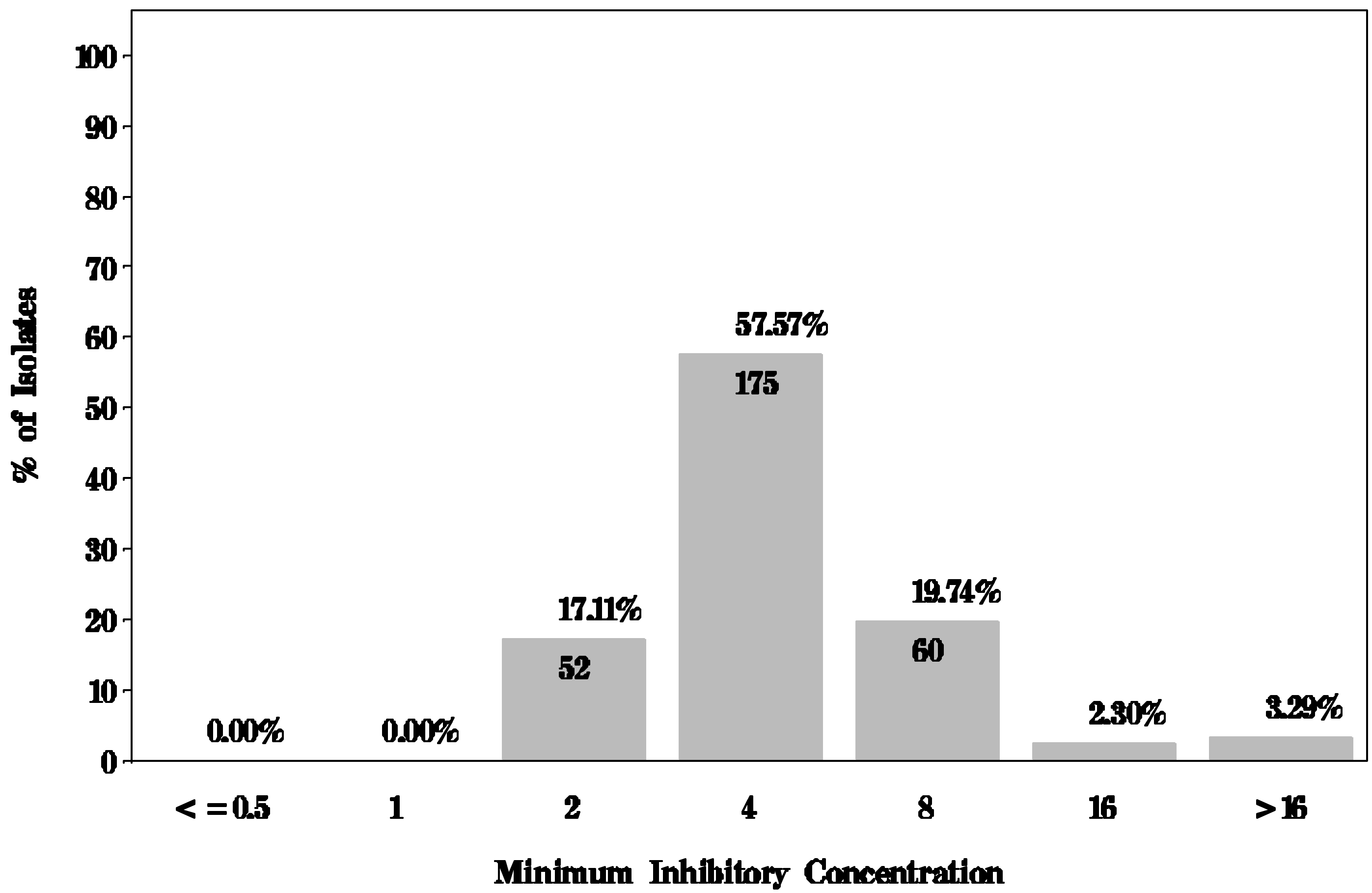
Breakpoints: Susceptible<=8 μg/mL Resistant>=32μg/mL



NARMS

Figure 19: Minimum Inhibitory Concentration of Cefoxitin for *Escherichia coli* in Ground Turkey (N=304 Isolates)

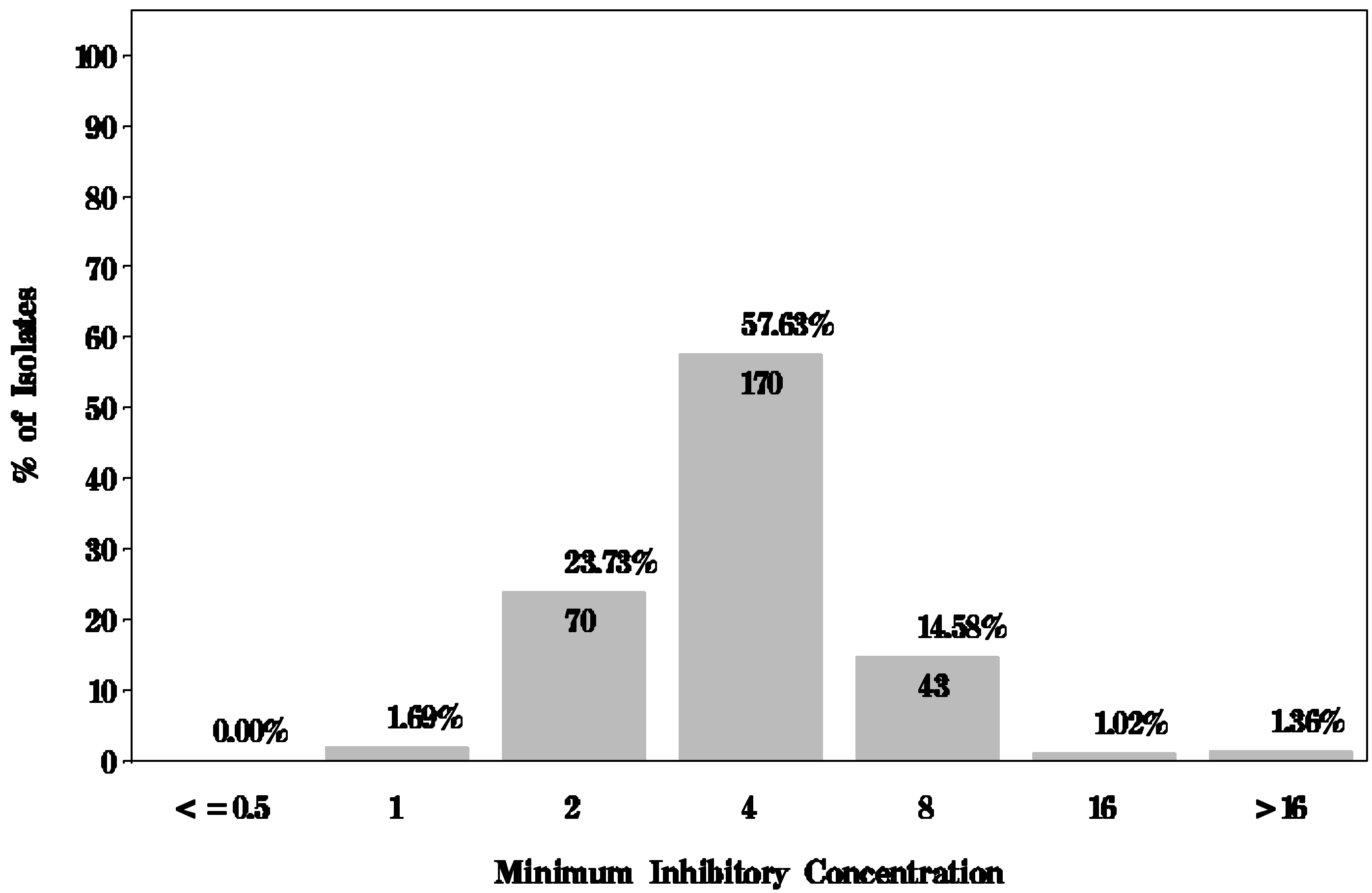
Breakpoints: Susceptible<=8 μg/mL Resistant>=32μg/mL



NARMS

Figure 19: Minimum Inhibitory Concentration of Cefoxitin for *Escherichia coli* in Ground Beef (N=295 Isolates)

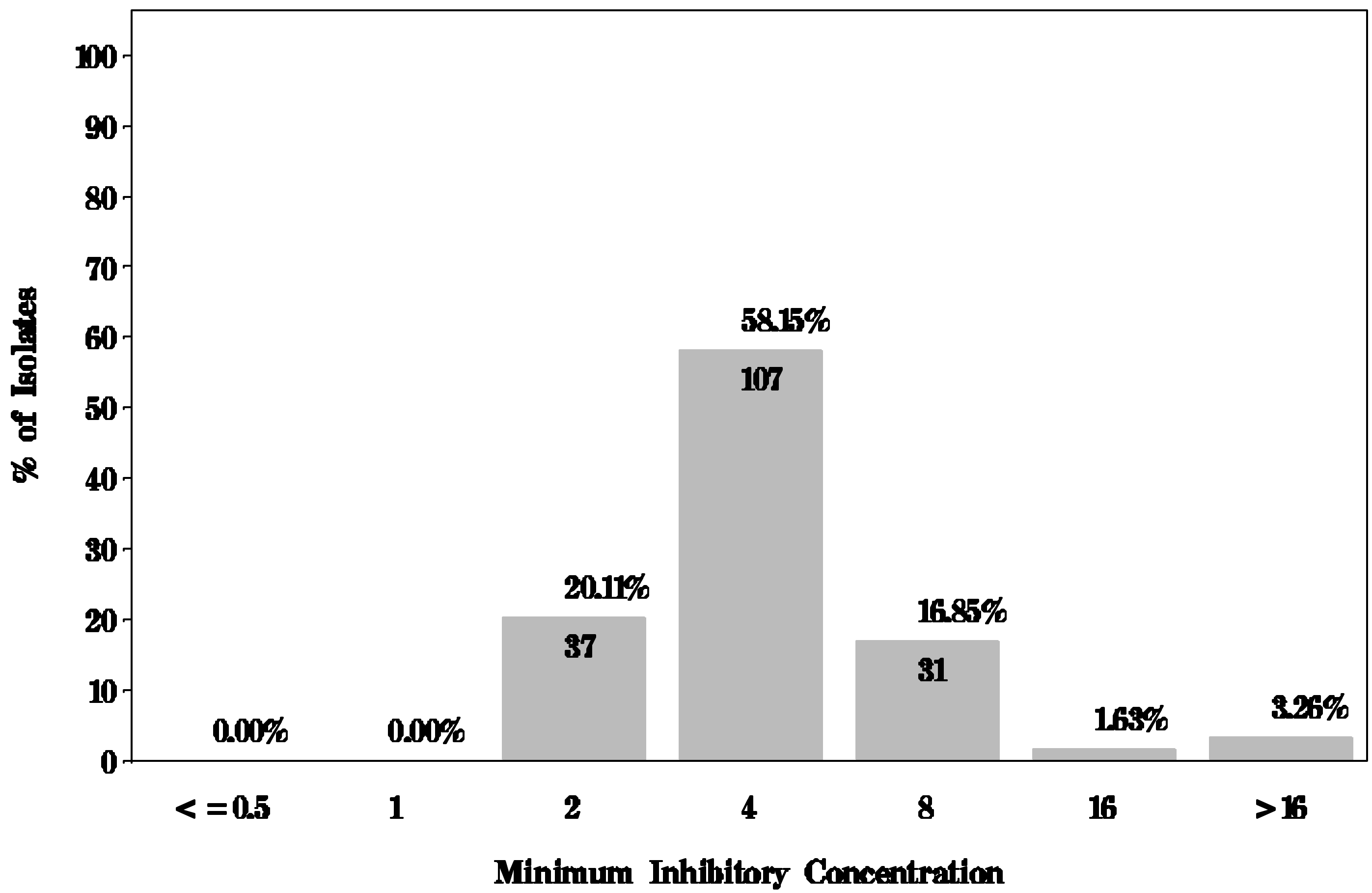
Breakpoints: Susceptible <=8 μg/mL Resistant >=32μg/mL



NARMS

Figure 19: Minimum Inhibitory Concentration of Cefoxitin for *Escherichia coli* in Pork Chop (N=184 Isolates)

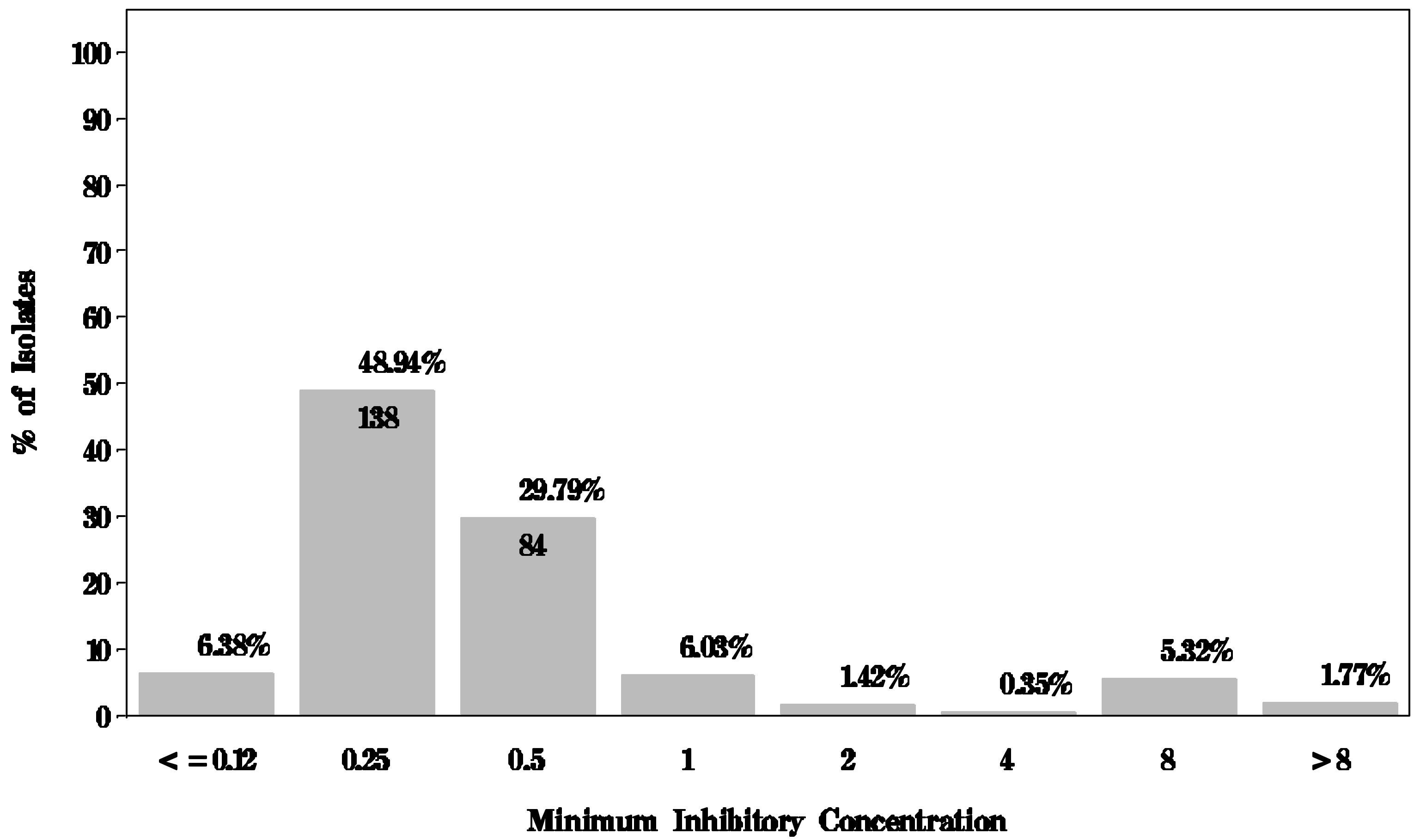
Breakpoints: Susceptible <=8 μg/mL Resistant >=32μg/mL



NARMS

Figure 19: Minimum Inhibitory Concentration of Ceftiofur for *Escherichia coli* in Chicken Breast (N=282 Isolates)

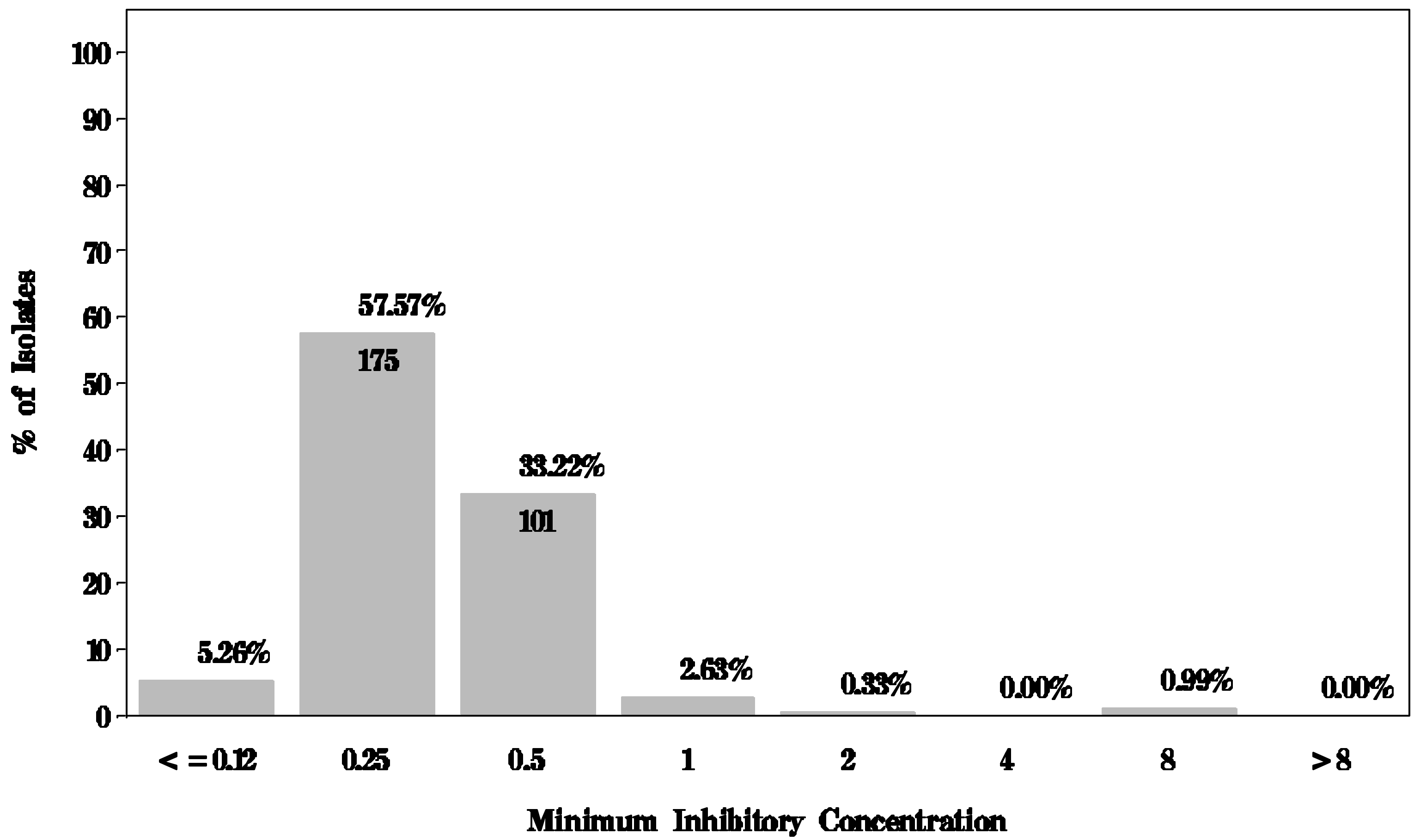
Breakpoints: Susceptible<=2 μg/mL Resistant>=8μg/mL



NARMS

Figure 19: Minimum Inhibitory Concentration of Ceftiofur for *Escherichia coli* in Ground Turkey (N=304 Isolates)

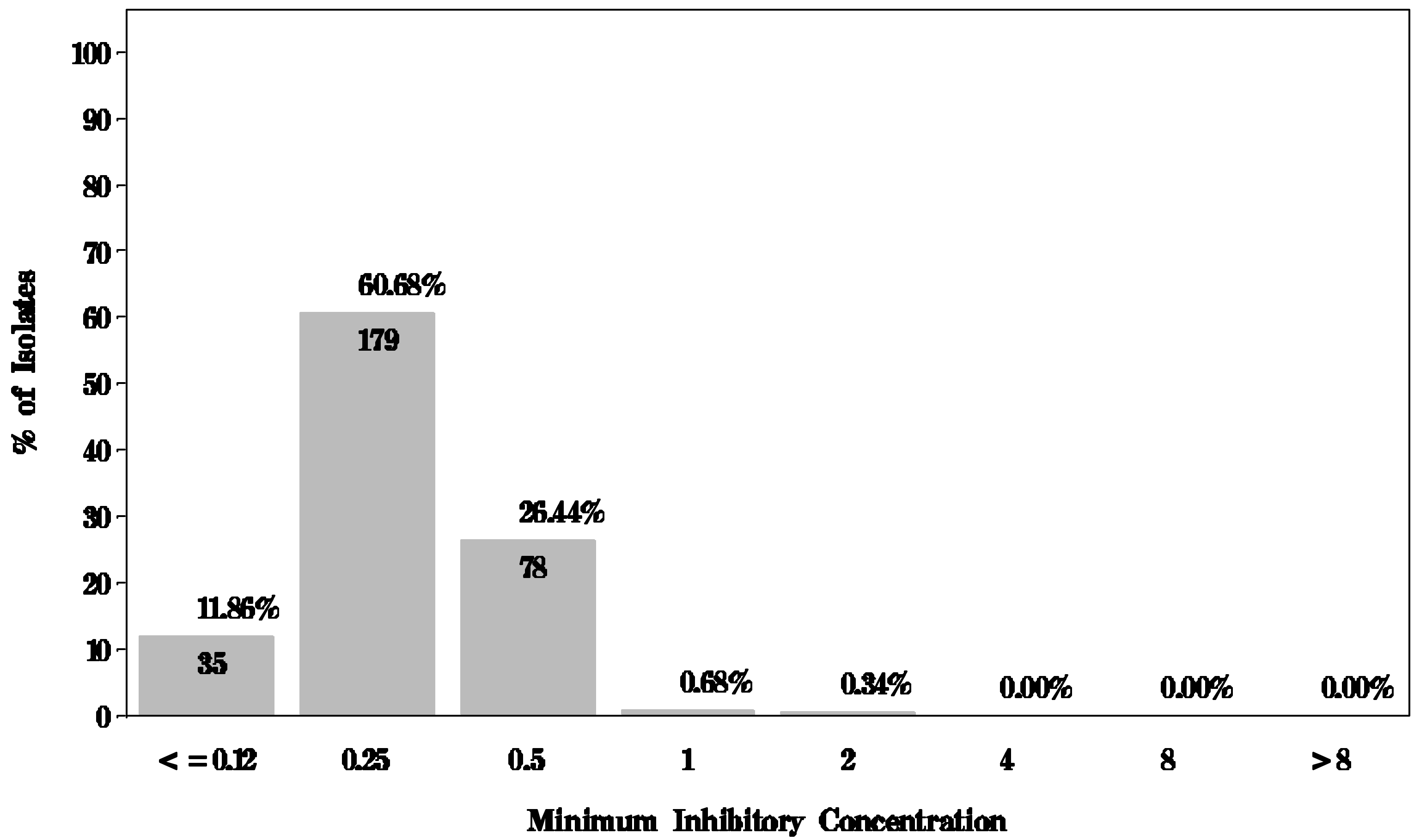
Breakpoints: Susceptible<=2 μg/mL Resistant>=8μg/mL



NARMS

Figure 19: Minimum Inhibitory Concentration of Ceftiofur for *Escherichia coli* in Ground Beef (N=295 Isolates)

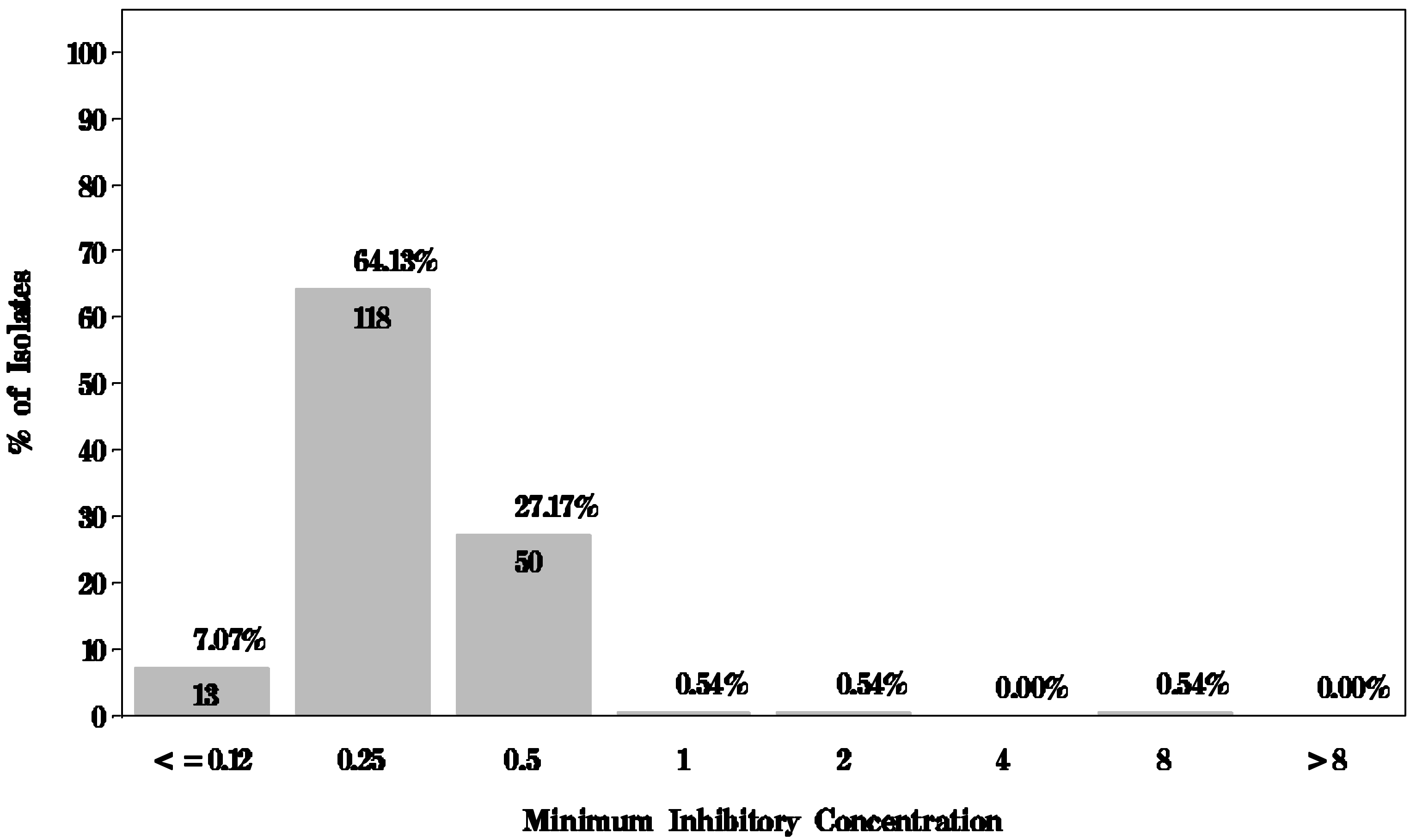
Breakpoints: Susceptible<=2 μg/mL Resistant>=8μg/mL



NARMS

Figure 19: Minimum Inhibitory Concentration of Ceftiofur for *Escherichia coli* in Pork Chop (N=184 Isolates)

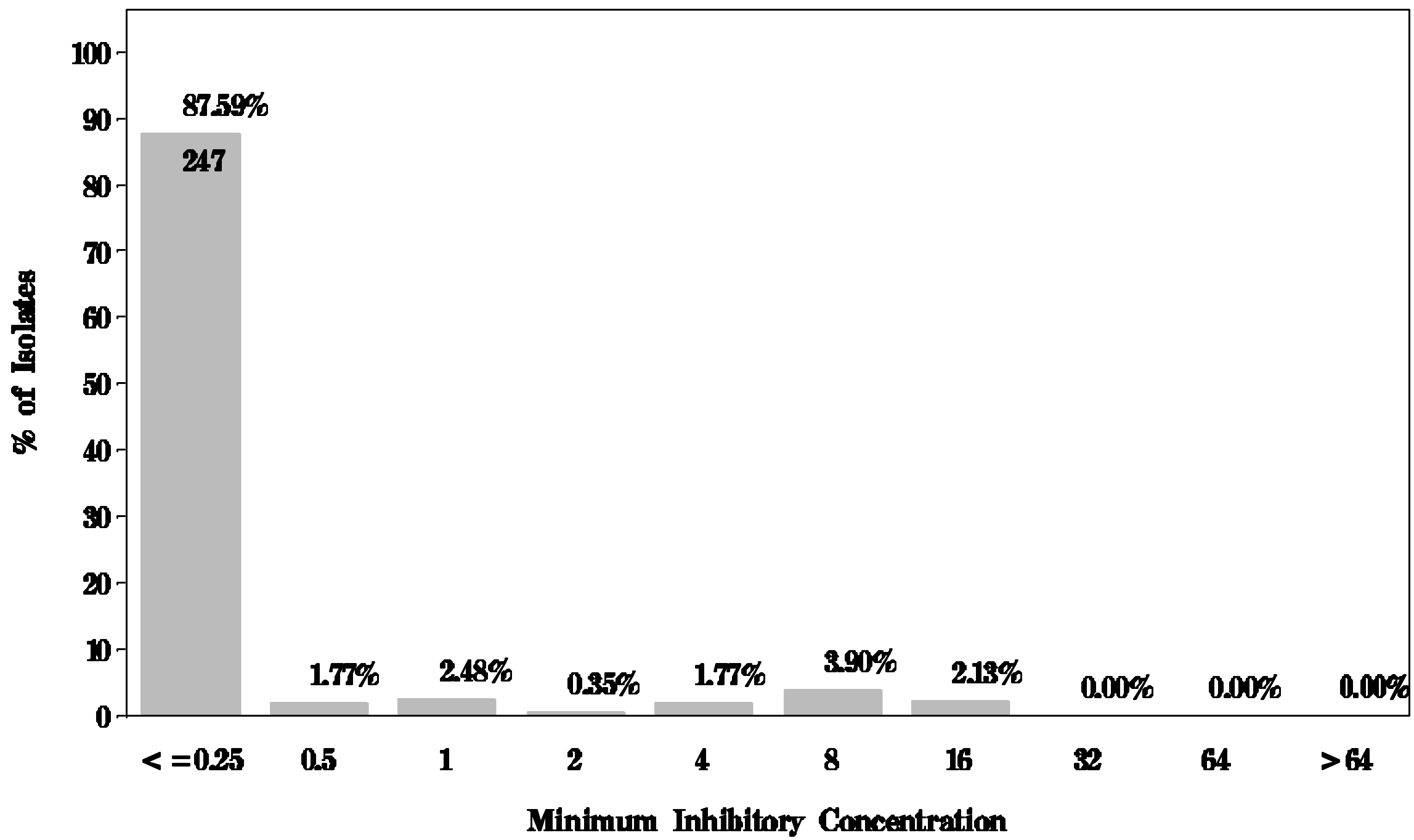
Breakpoints: Susceptible<=2 μg/mL Resistant>=8μg/mL



NARMS

Figure 19: Minimum Inhibitory Concentration of Ceftriaxone for *Escherichia coli* in Chicken Breast (N=282 Isolates)

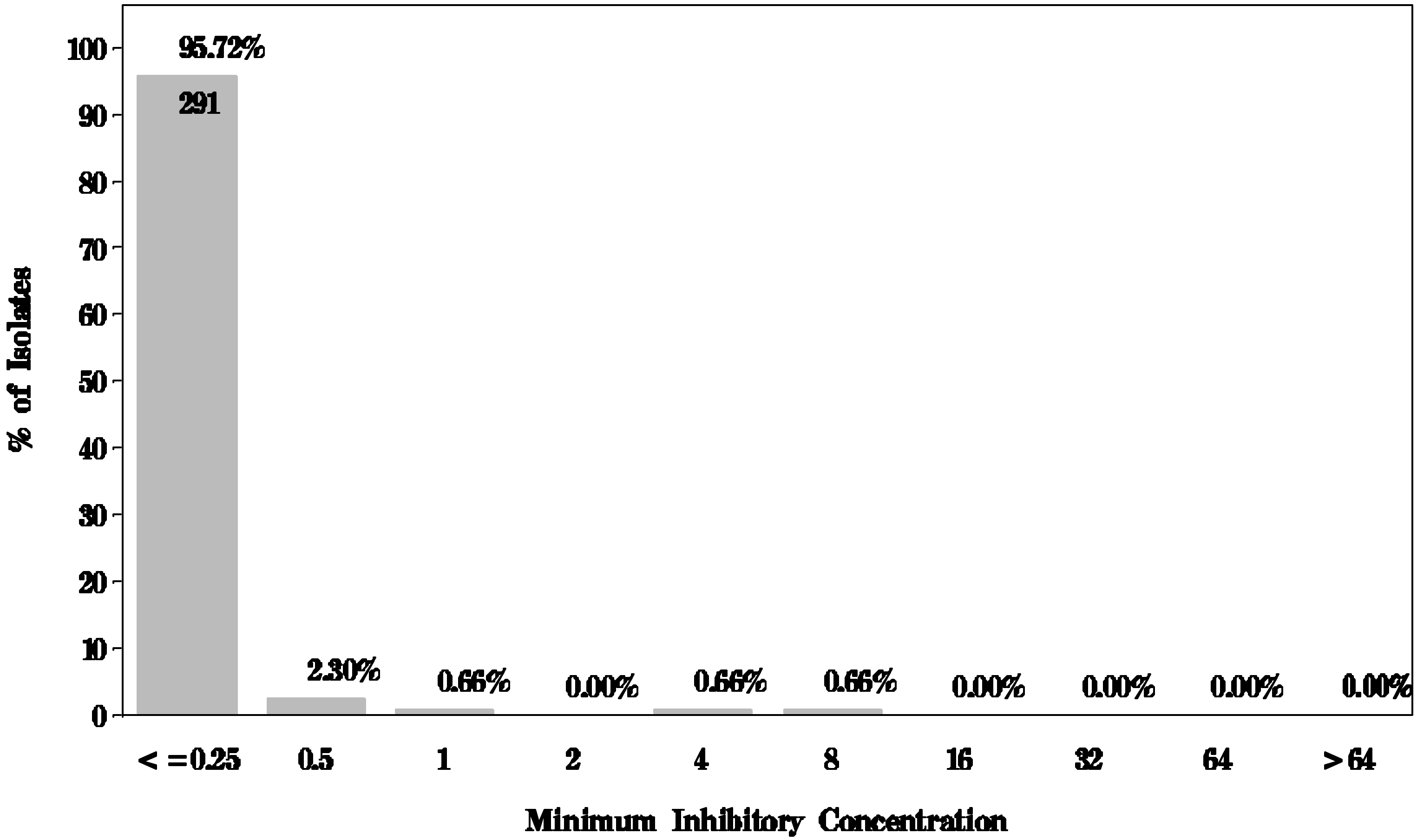
Breakpoints: Susceptible<=8 μg/mL Resistant>=64μg/mL



NARMS

Figure 19: Minimum Inhibitory Concentration of Ceftriaxone for *Escherichia coli* in Ground Turkey (N=304 Isolates)

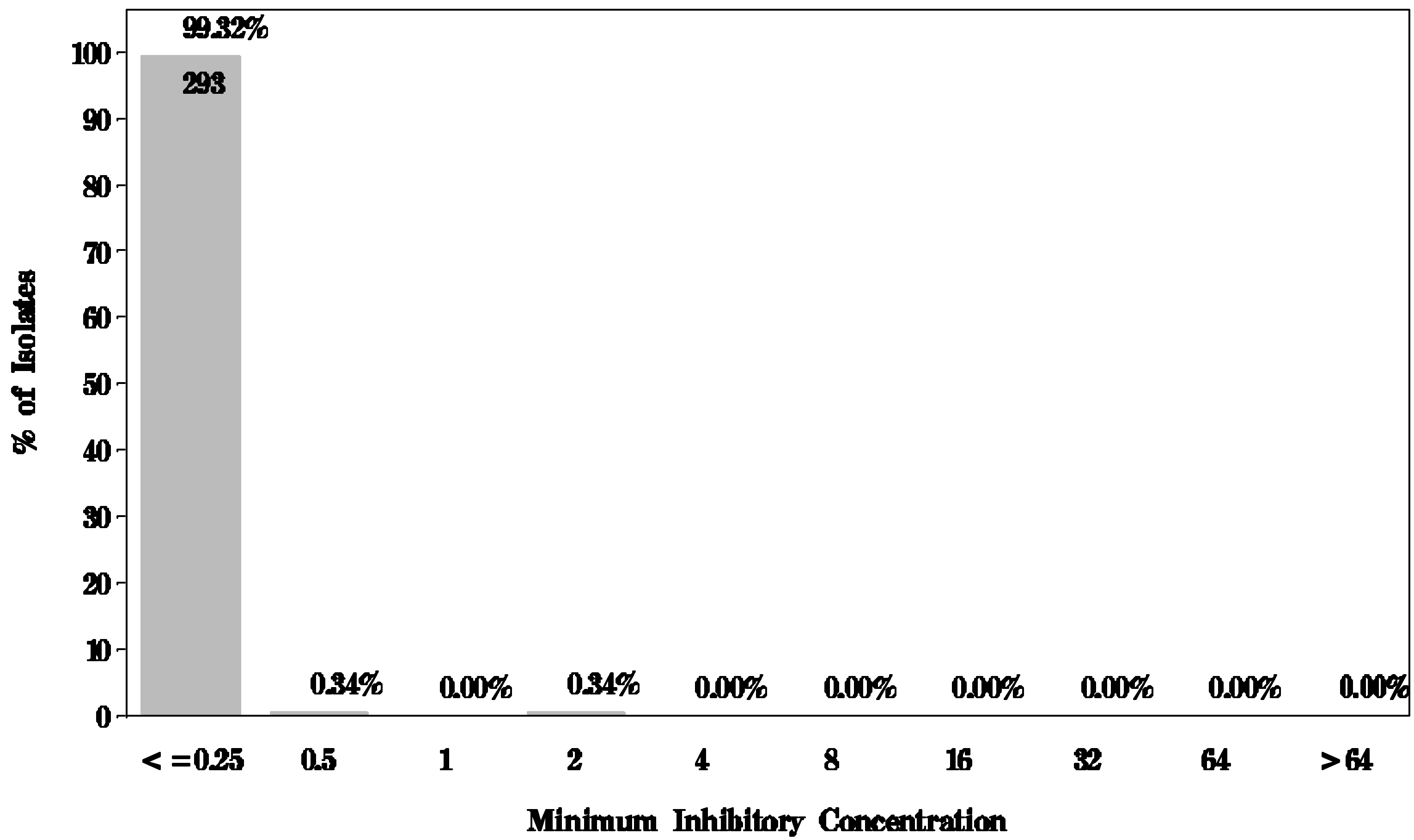
Breakpoints: Susceptible<=8 μg/mL Resistant>=64μg/mL



NARMS

Figure 19: Minimum Inhibitory Concentration of Ceftriaxone for *Escherichia coli* in Ground Beef (N=295 Isolates)

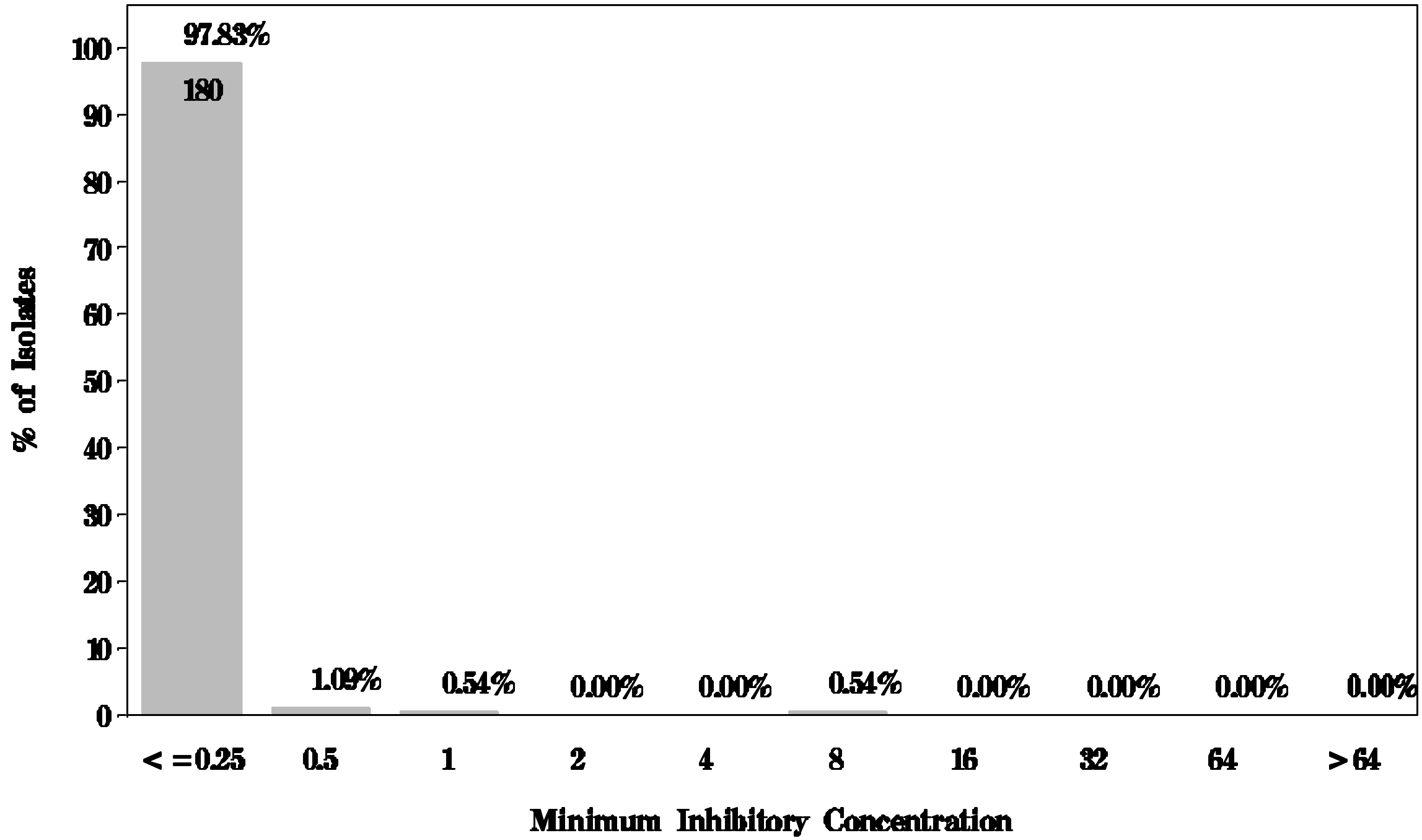
Breakpoints: Susceptible<=8 µg/mL Resistant>=64µg/mL



NARMS

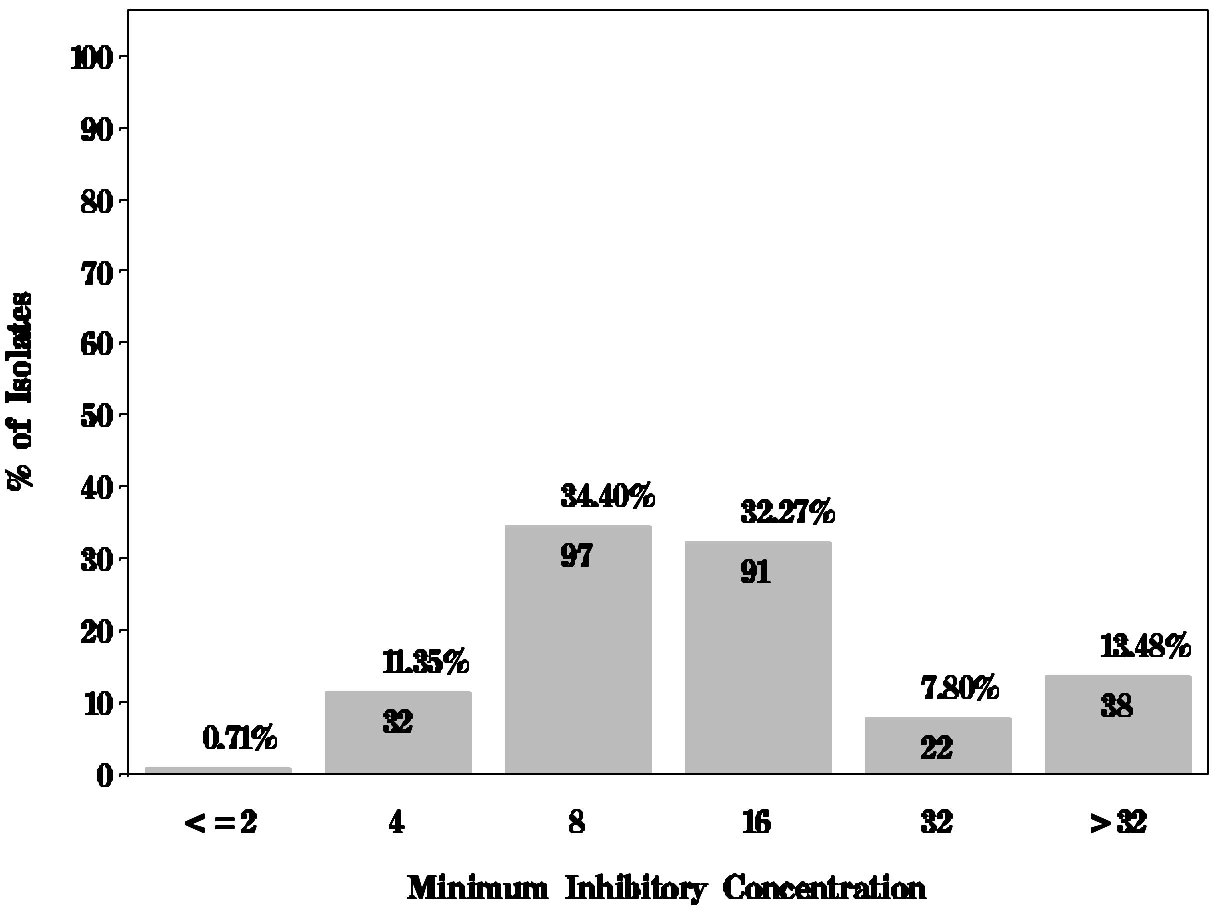
Figure 19: Minimum Inhibitory Concentration of Ceftriaxone for *Escherichia coli* in Pork Chop (N=184 Isolates)

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



NARMS

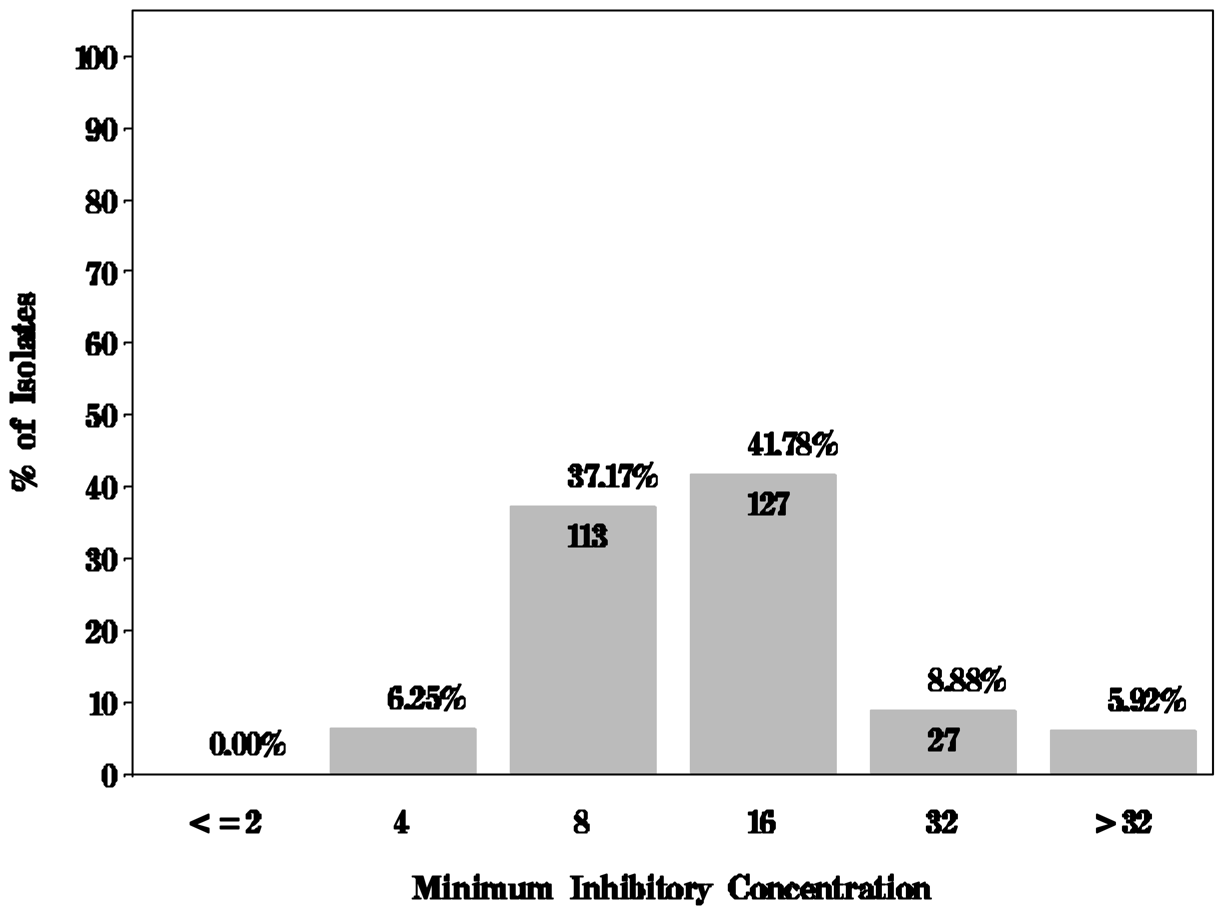
Figure 19: Minimum Inhibitory Concentration of Cephalothin for *Escherichia coli* in Chicken Breast (N=282 Isolates)
Breakpoints: Susceptible <=8 μg/mL Resistant >=32μg/mL



NARMS

Figure 19: Minimum Inhibitory Concentration of Cephalothin for *Escherichia coli* in Ground Turkey (N=304 Isolates)

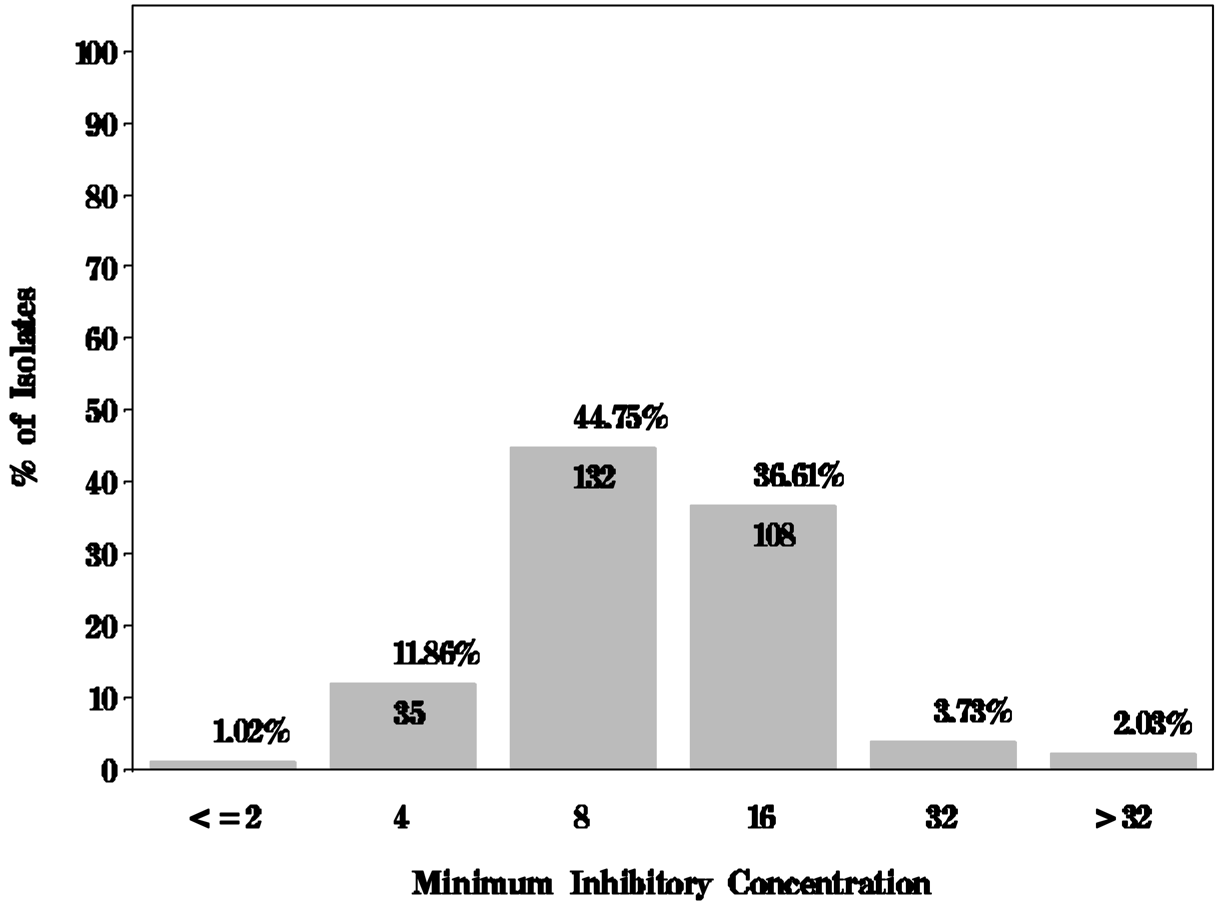
Breakpoints: Susceptible<=8 μg/mL Resistant>=32μg/mL



NARMS

Figure 19: Minimum Inhibitory Concentration of Cephalothin for *Escherichia coli* in Ground Beef (N=295 Isolates)

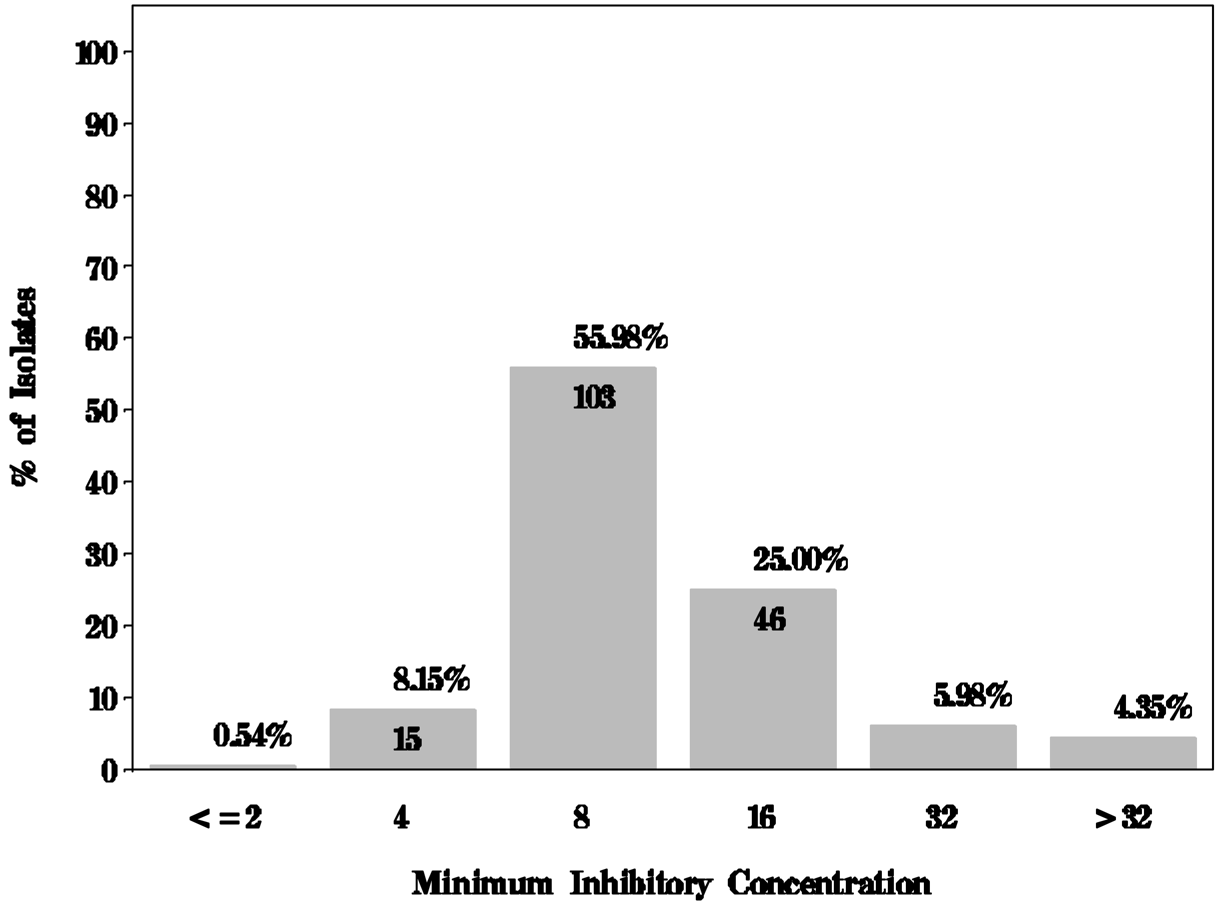
Breakpoints: Susceptible<=8 µg/mL Resistant>=32µg/mL



NARMS

Figure 19: Minimum Inhibitory Concentration of Cephalothin for *Escherichia coli* in Pork Chop (N=184 Isolates)

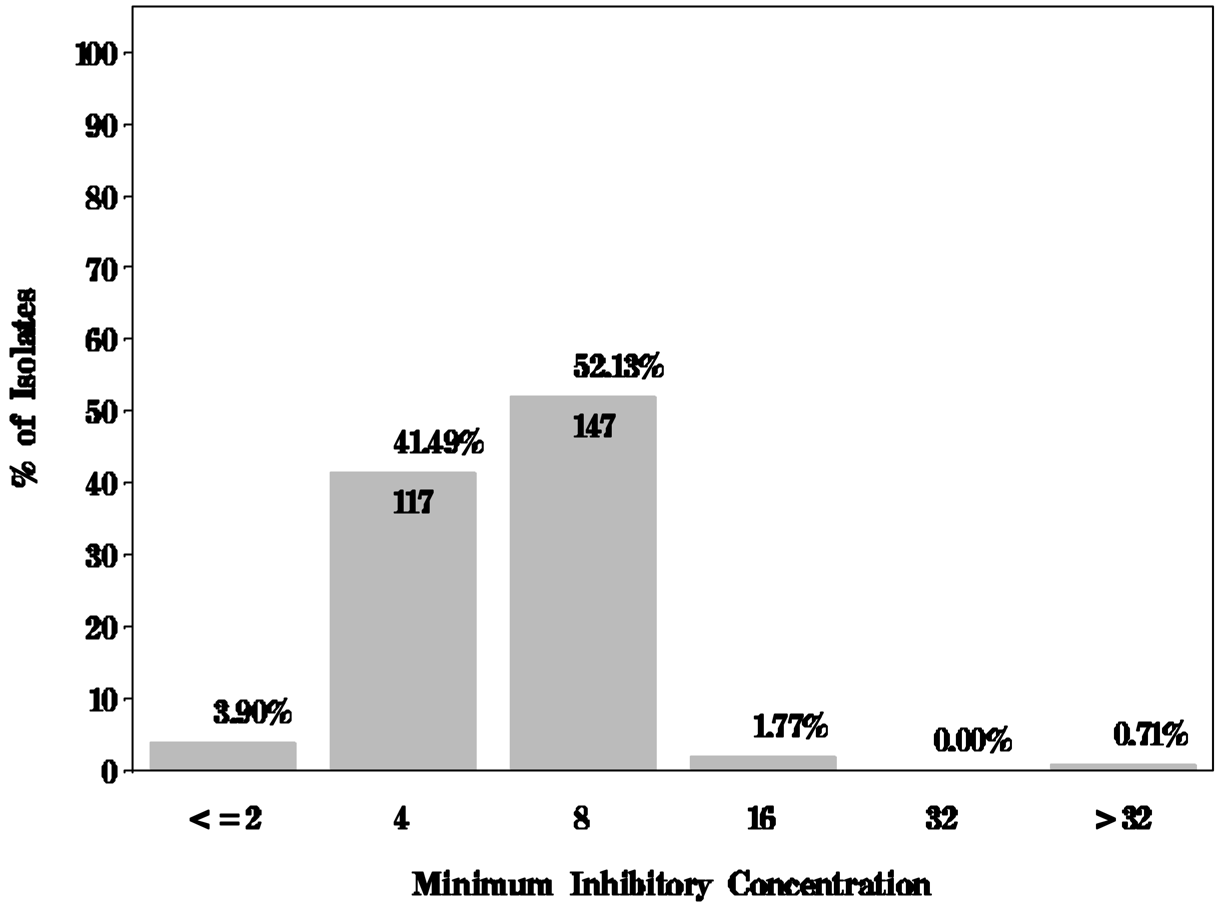
Breakpoints: Susceptible<=8 μg/mL Resistant>=32μg/mL



NARMS

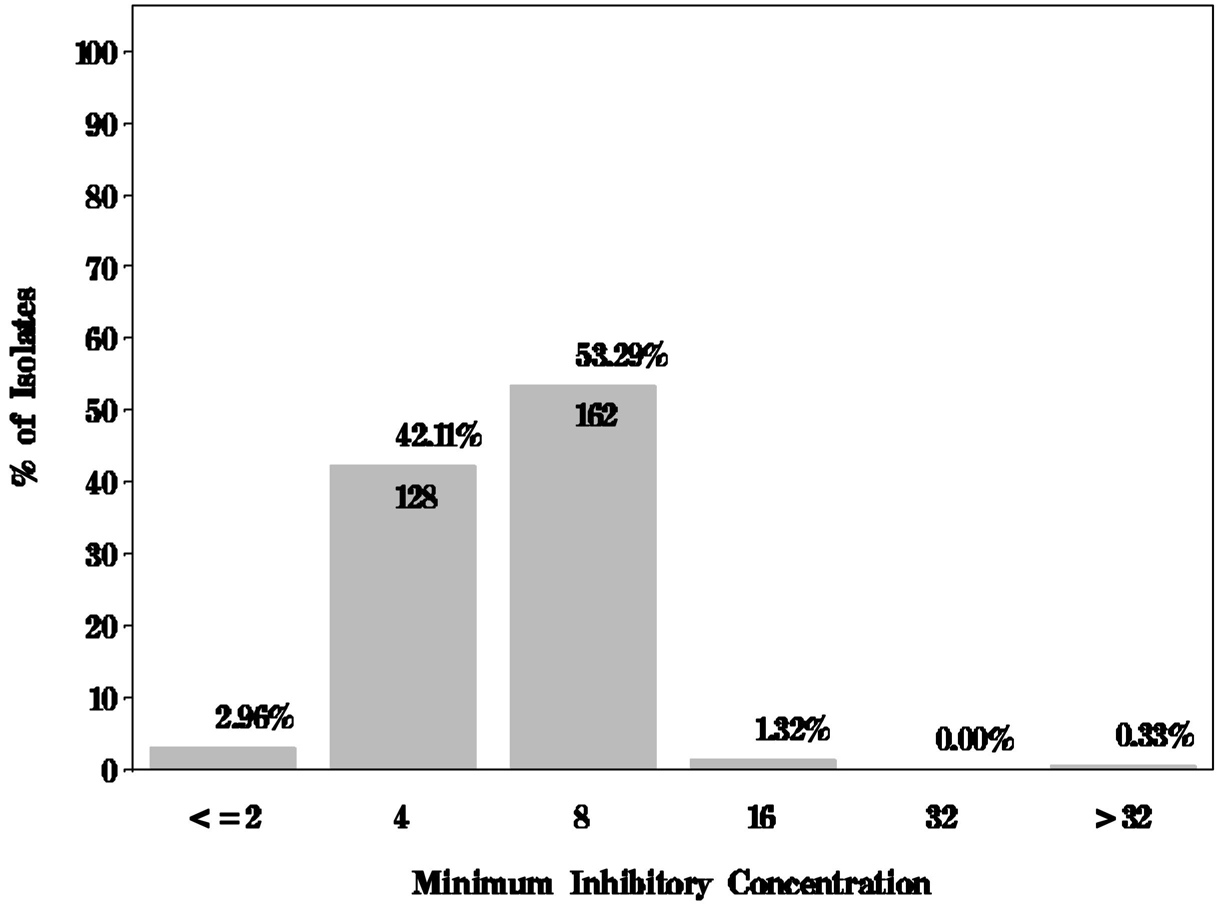
Figure 19: Minimum Inhibitory Concentration of Chloramphenicol for *Escherichia coli* in Chicken Breast (N=282 Isolates)

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



NARMS

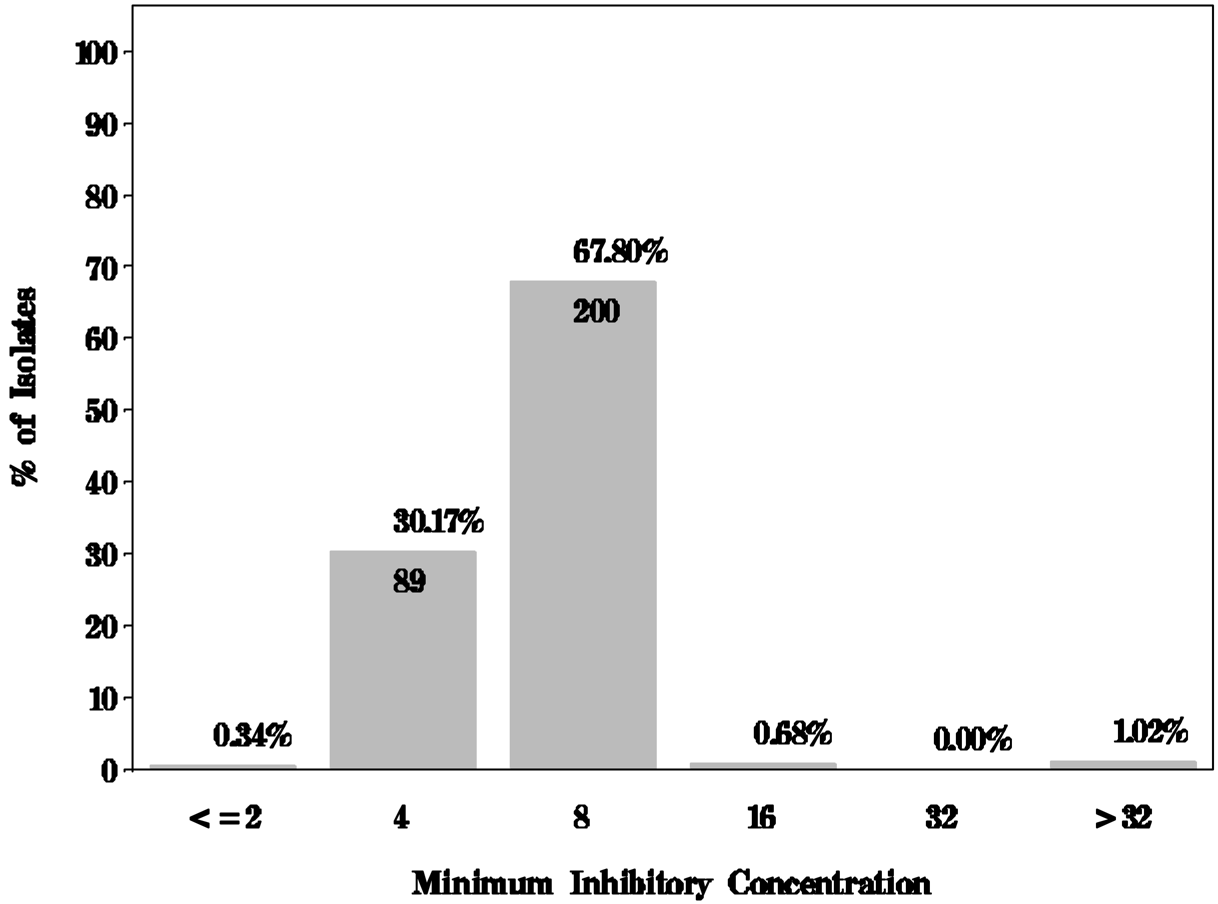
Figure 19: Minimum Inhibitory Concentration of Chloramphenicol for *Escherichia coli* in Ground Turkey (N=304 Isolates)
Breakpoints: Susceptible<=8 μg/mL Resistant>=32μg/mL



NARMS

Figure 19: Minimum Inhibitory Concentration of Chloramphenicol for *Escherichia coli* in Ground Beef (N=295 Isolates)

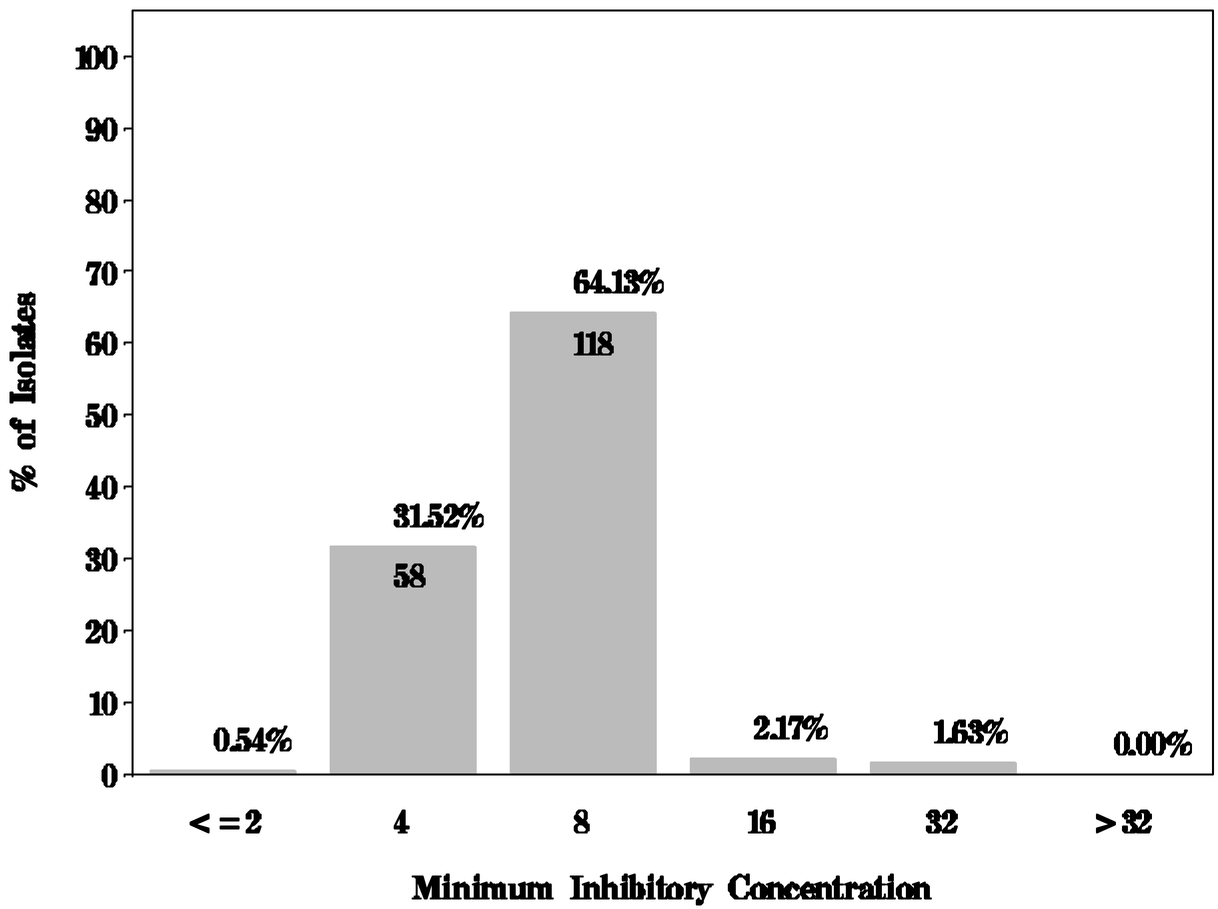
Breakpoints: Susceptible<=8 μg/mL Resistant>=32μg/mL



NARMS

Figure 19: Minimum Inhibitory Concentration of Chloramphenicol for *Escherichia coli* in Pork Chop (N=184 Isolates)

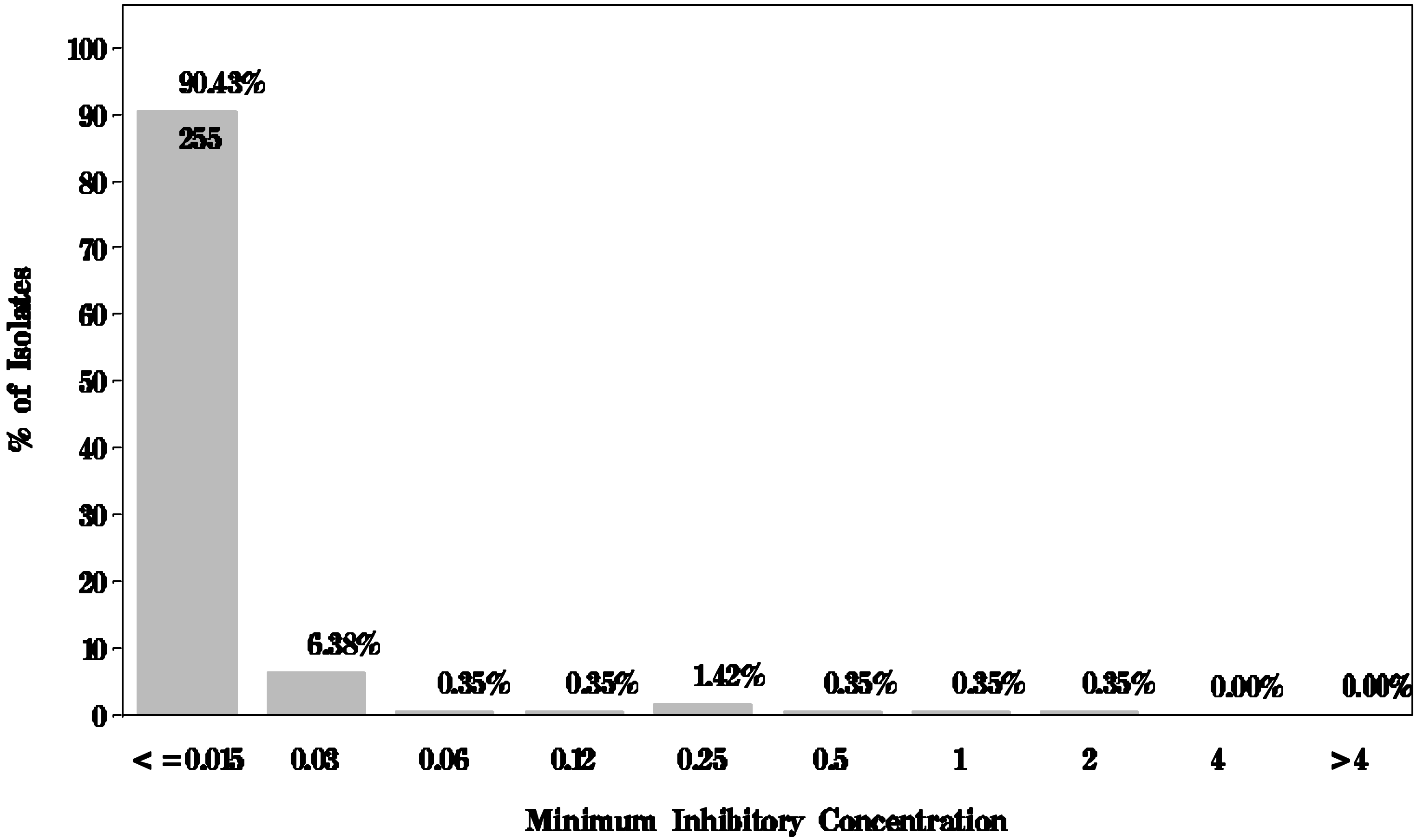
Breakpoints: Susceptible <=8 µg/mL Resistant >=32µg/mL



NARMS

Figure 19: Minimum Inhibitory Concentration of Ciprofloxacin for *Escherichia coli* in Chicken Breast (N=282 Isolates)

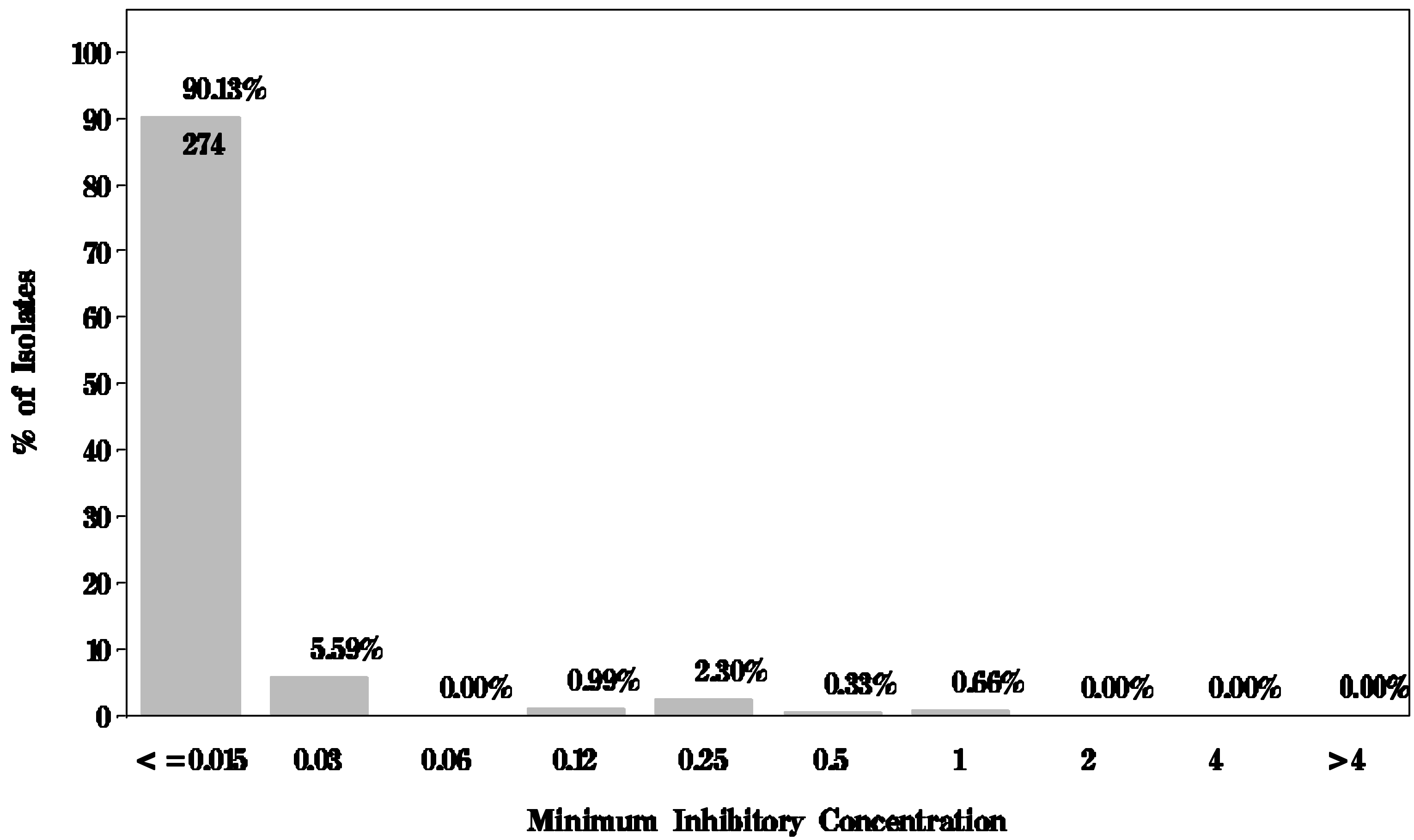
Breakpoints: Susceptible <=1 μg/mL Resistant >=4 μg/mL



NARMS

Figure 19: Minimum Inhibitory Concentration of Ciprofloxacin for *Escherichia coli* in Ground Turkey (N=304 Isolates)

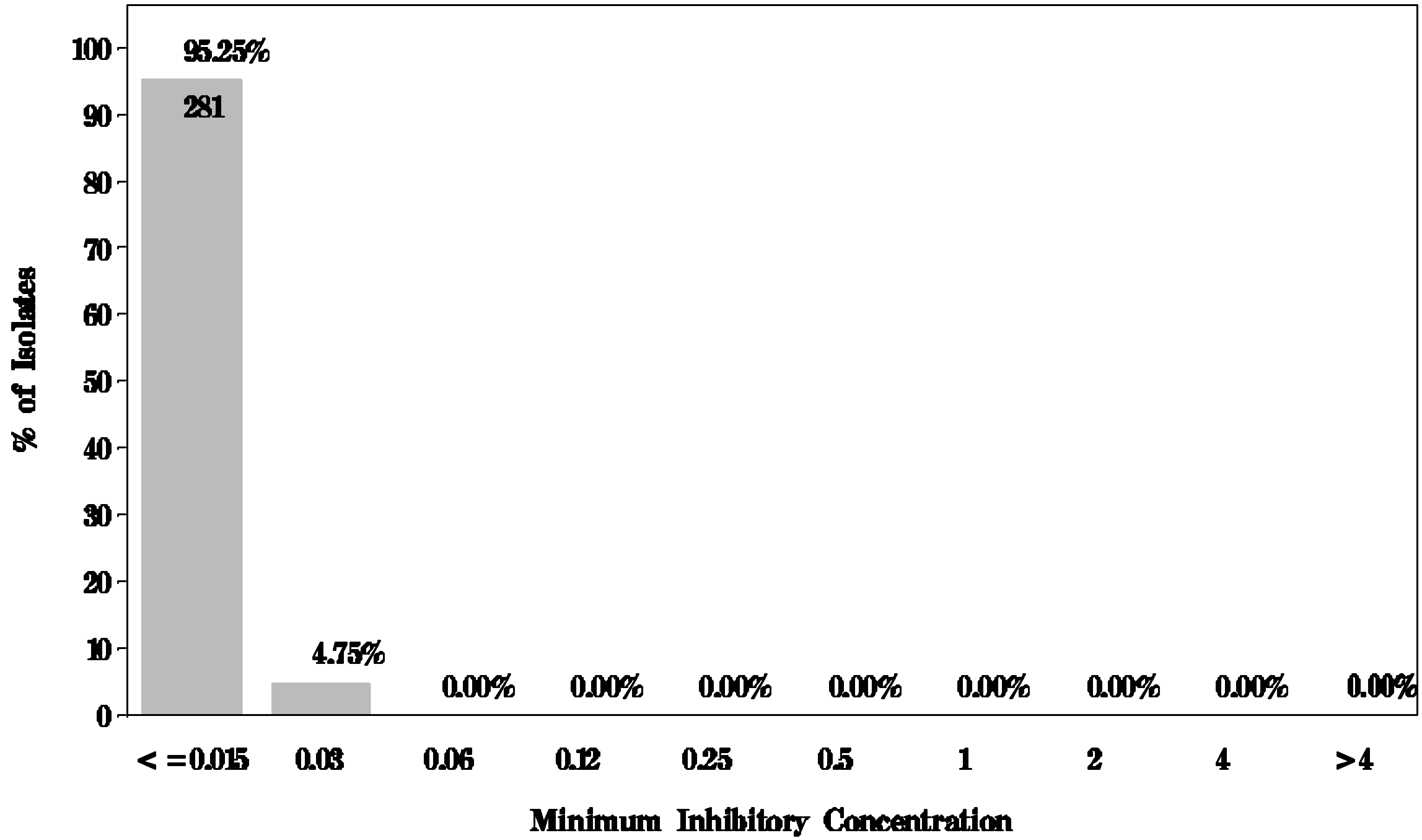
Breakpoints: Susceptible<=1 μg/mL Resistant>=4μg/mL



NARMS

Figure 19: Minimum Inhibitory Concentration of Ciprofloxacin for *Escherichia coli* in Ground Beef (N=295 Isolates)

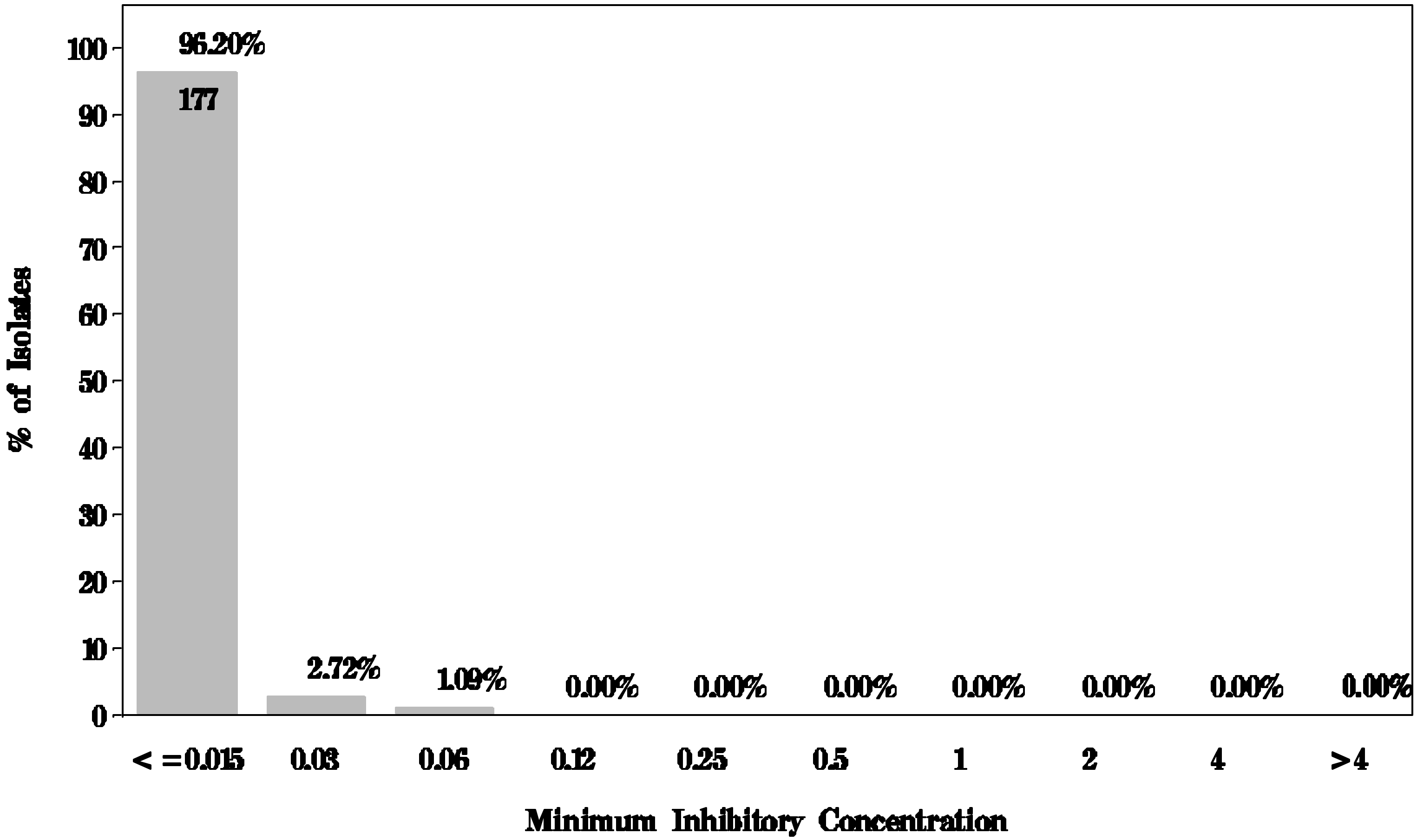
Breakpoints: Susceptible<=1 µg/mL Resistant>=4µg/mL



NARMS

Figure 19: Minimum Inhibitory Concentration of Ciprofloxacin for *Escherichia coli* in Pork Chop (N=184 Isolates)

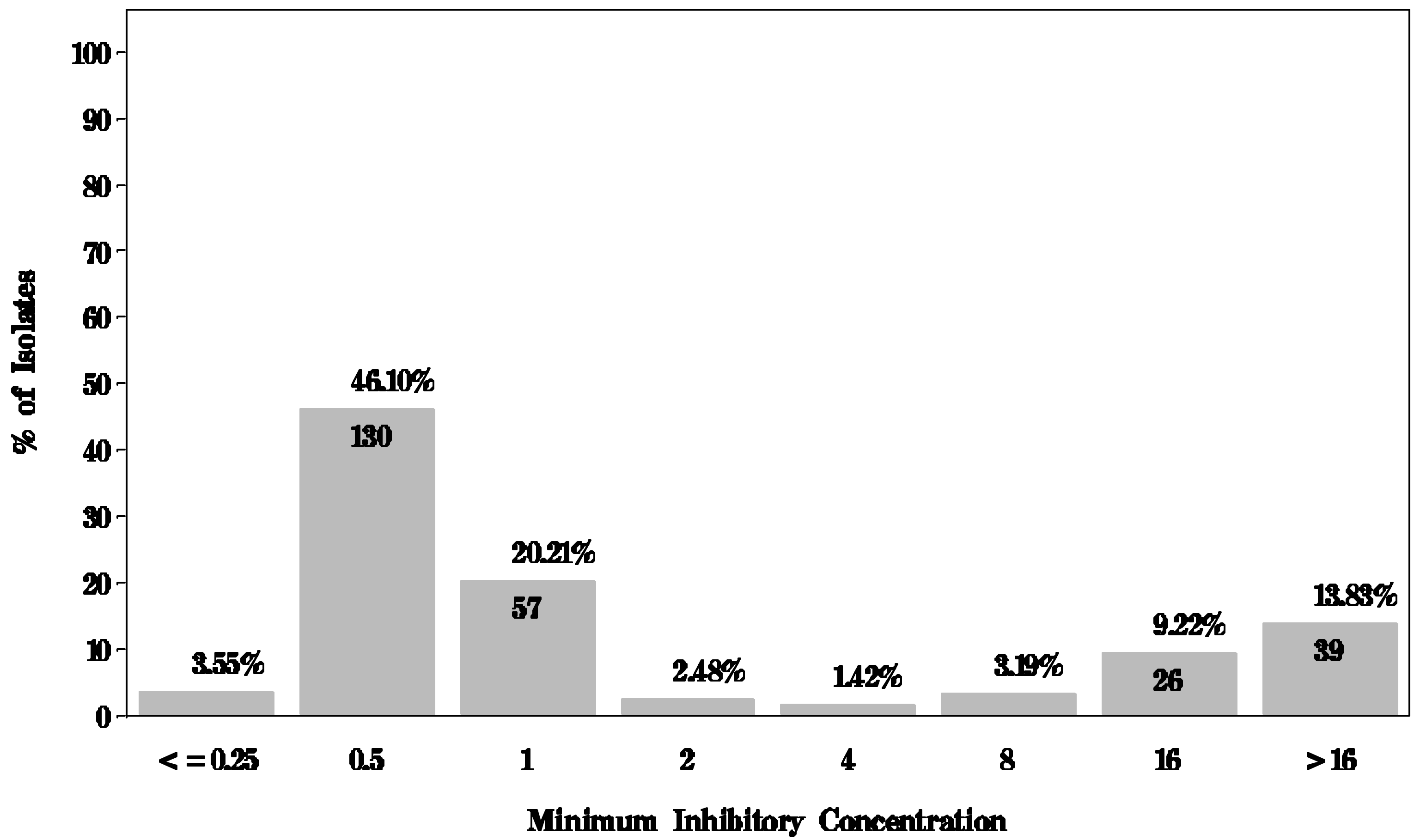
Breakpoints: Susceptible<=1 μg/mL Resistant>=4μg/mL



NARMS

Figure 19: Minimum Inhibitory Concentration of Gentamicin for *Escherichia coli* in Chicken Breast (N=282 Isolates)

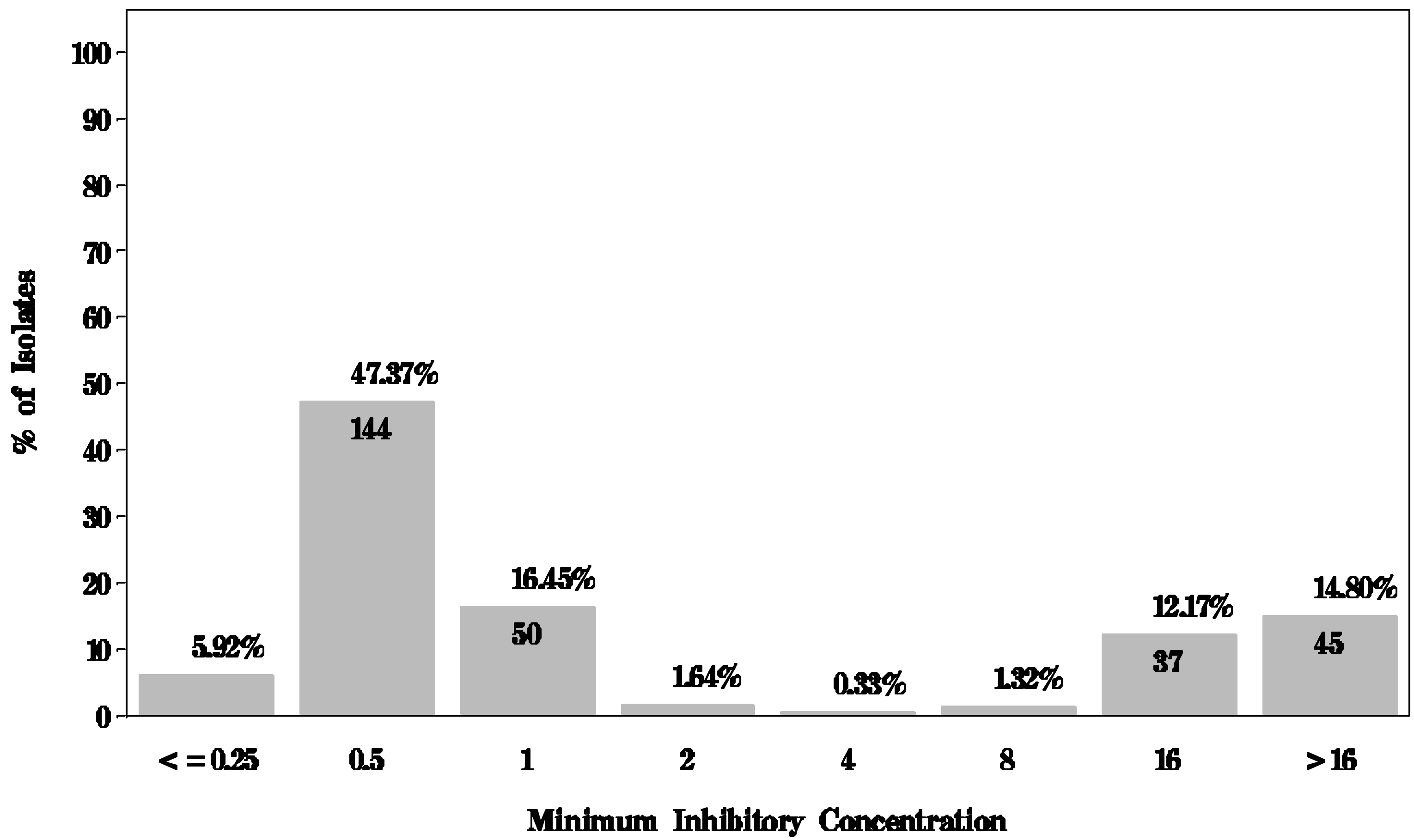
Breakpoints: Susceptible <=4 μg/mL Resistant >=16μg/mL



NARMS

Figure 19: Minimum Inhibitory Concentration of Gentamicin for *Escherichia coli* in Ground Turkey (N=304 Isolates)

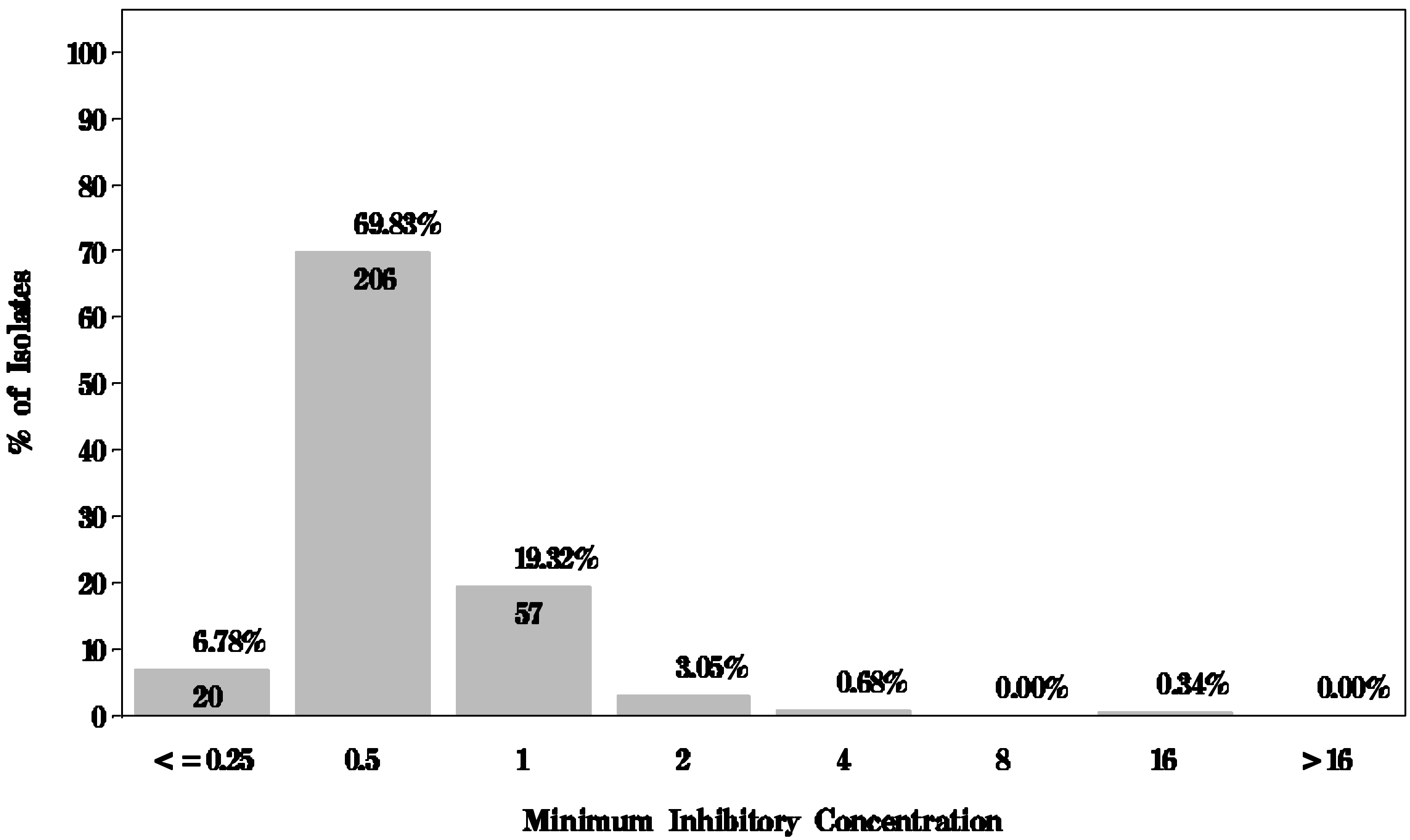
Breakpoints: Susceptible<=4 μg/mL Resistant>=16μg/mL



NARMS

Figure 19: Minimum Inhibitory Concentration of Gentamicin for *Escherichia coli* in Ground Beef (N=295 Isolates)

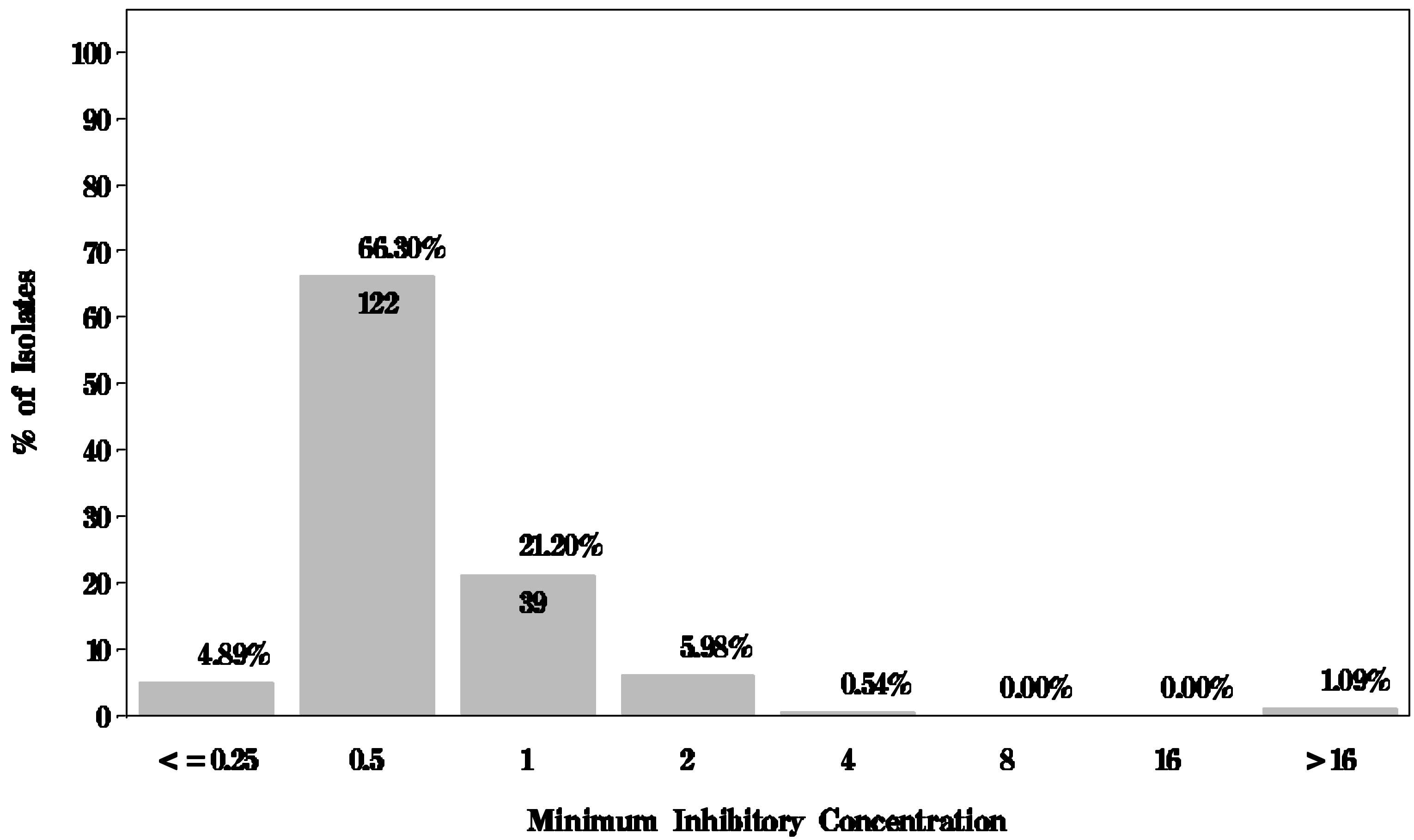
Breakpoints: Susceptible<=4 μg/mL Resistant>=16μg/mL



NARMS

Figure 19: Minimum Inhibitory Concentration of Gentamicin for *Escherichia coli* in Pork Chop (N=184 Isolates)

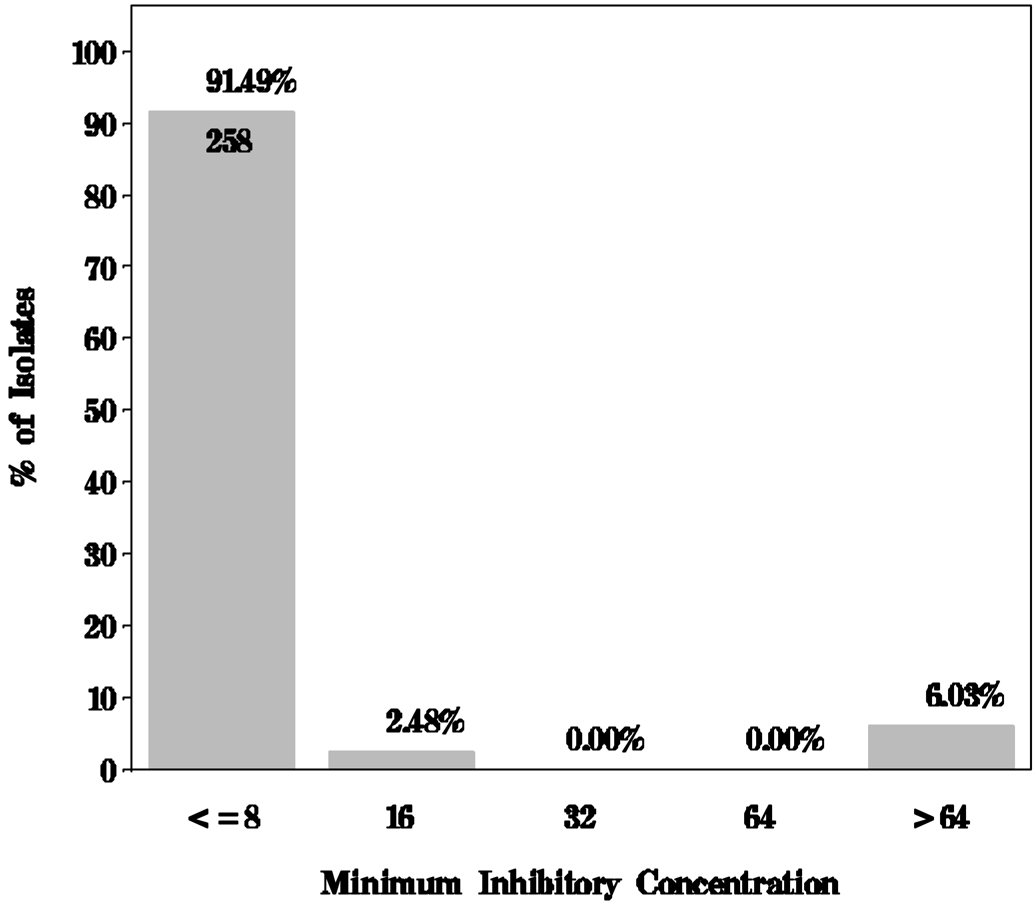
Breakpoints: Susceptible<=4 μg/mL Resistant>=16μg/mL



NARMS

Figure 19: Minimum Inhibitory Concentration of Kanamycin for *Escherichia coli* in Chicken Breast (N=282 Isolates)

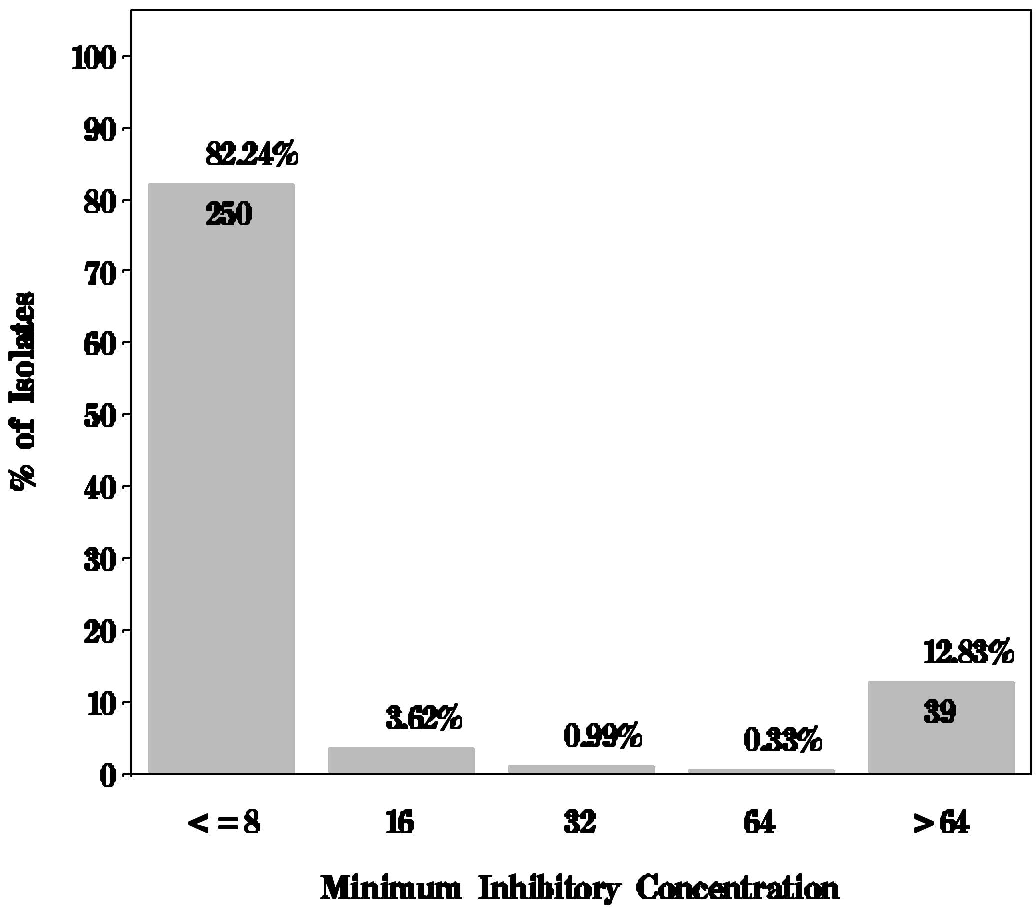
Breakpoints: Susceptible<=16 μg/mL Resistant>=64μg/mL



NARMS

Figure 19: Minimum Inhibitory Concentration of Kanamycin for *Escherichia coli* in Ground Turkey (N=304 Isolates)

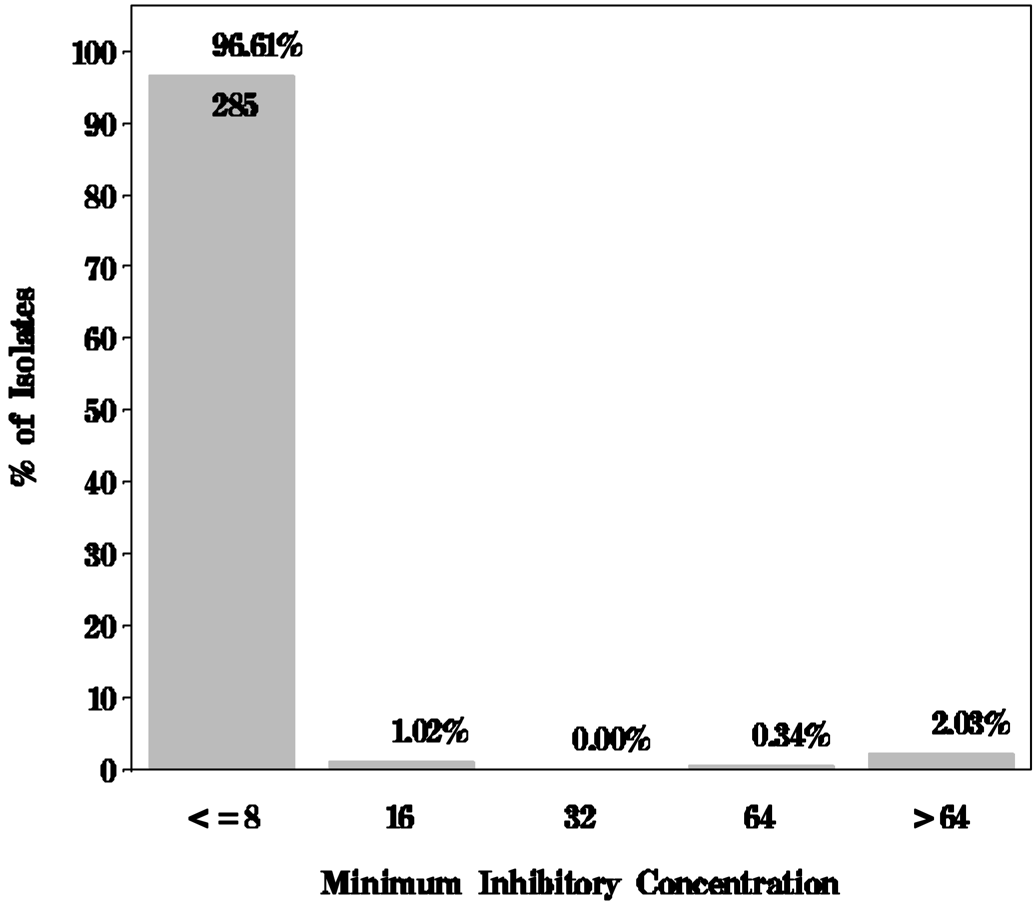
Breakpoints: Susceptible<=16 μg/mL Resistant>=64μg/mL



NARMS

Figure 19: Minimum Inhibitory Concentration of Kanamycin for *Escherichia coli* in Ground Beef (N=295 Isolates)

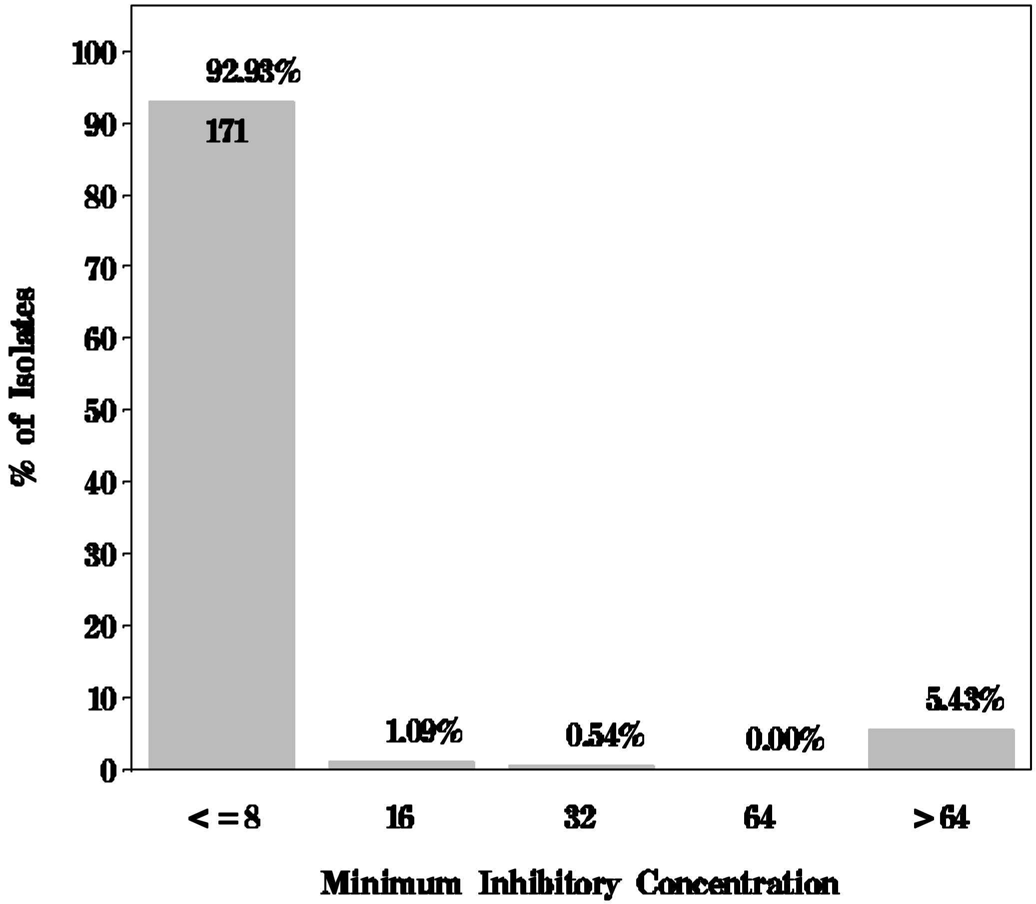
Breakpoints: Susceptible<=16 μg/mL Resistant>=64μg/mL



NARMS

Figure 19: Minimum Inhibitory Concentration of Kanamycin for *Escherichia coli* in Pork Chop (N=184 Isolates)

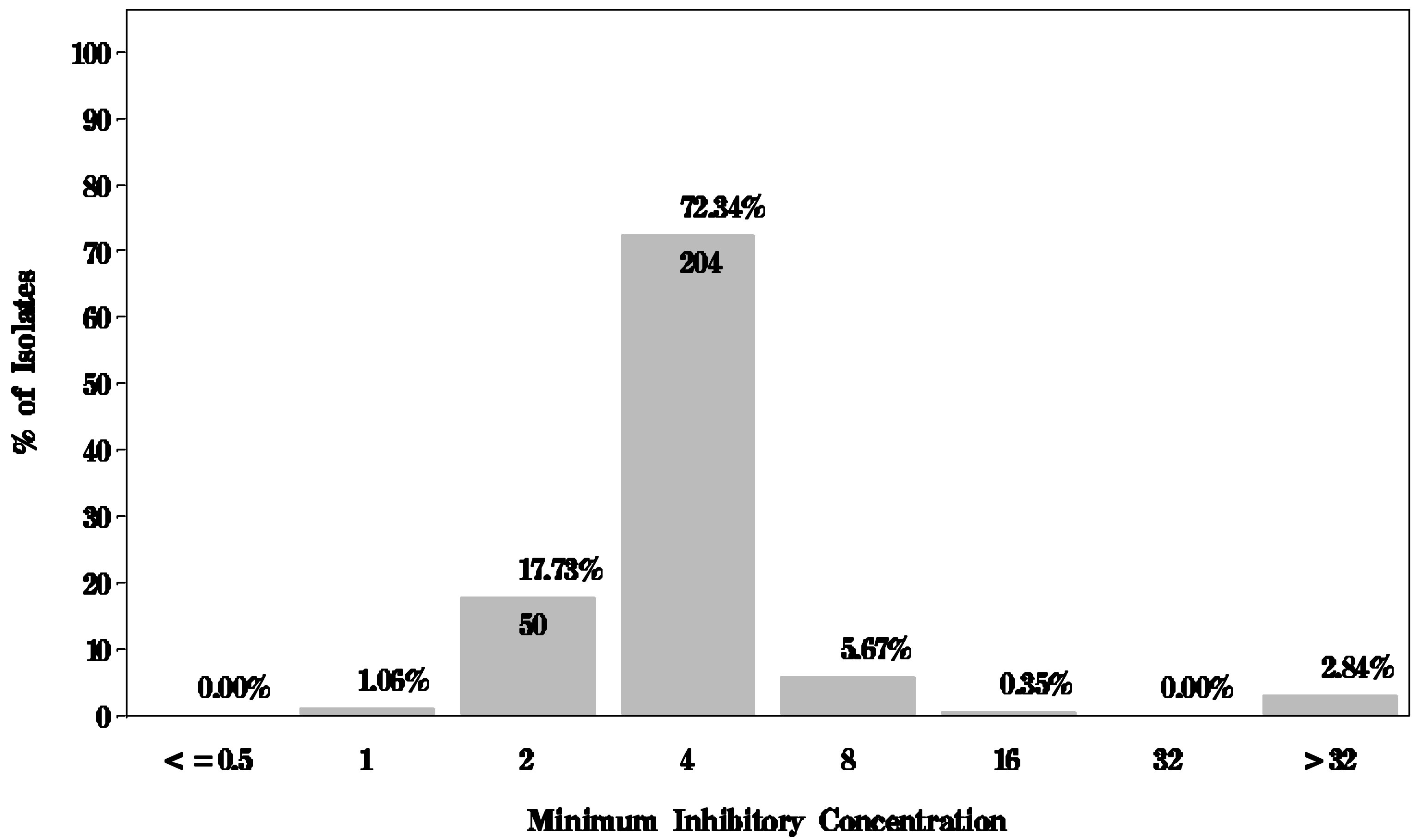
Breakpoints: Susceptible <=16 µg/mL Resistant >=64µg/mL



NARMS

Figure 19: Minimum Inhibitory Concentration of Nalidixic acid for *Escherichia coli* in Chicken Breast (N=282 Isolates)

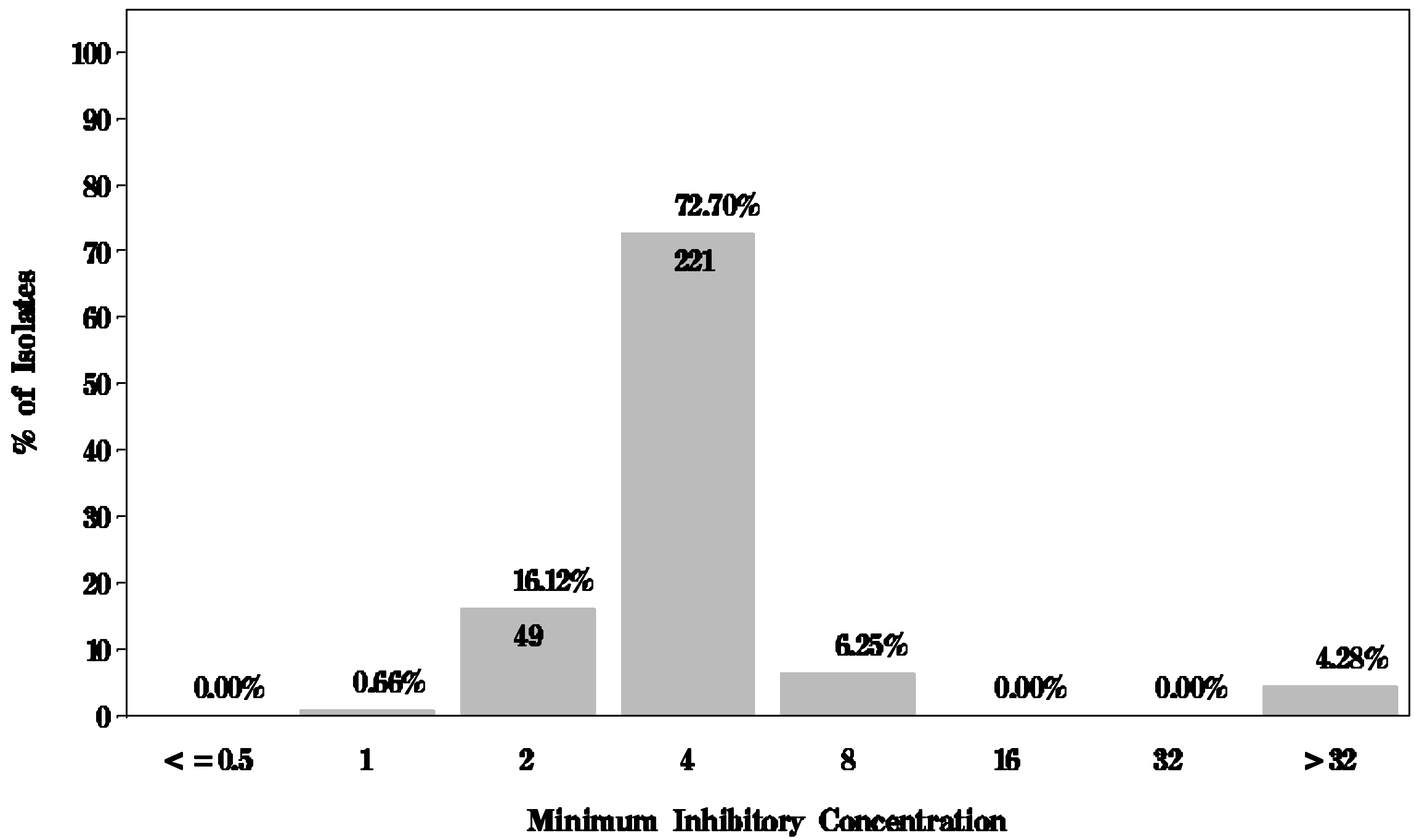
Breakpoints: Susceptible<=16 μg/mL Resistant>=32μg/mL



NARMS

Figure 19: Minimum Inhibitory Concentration of Nalidixic acid for *Escherichia coli* in Ground Turkey (N=304 Isolates)

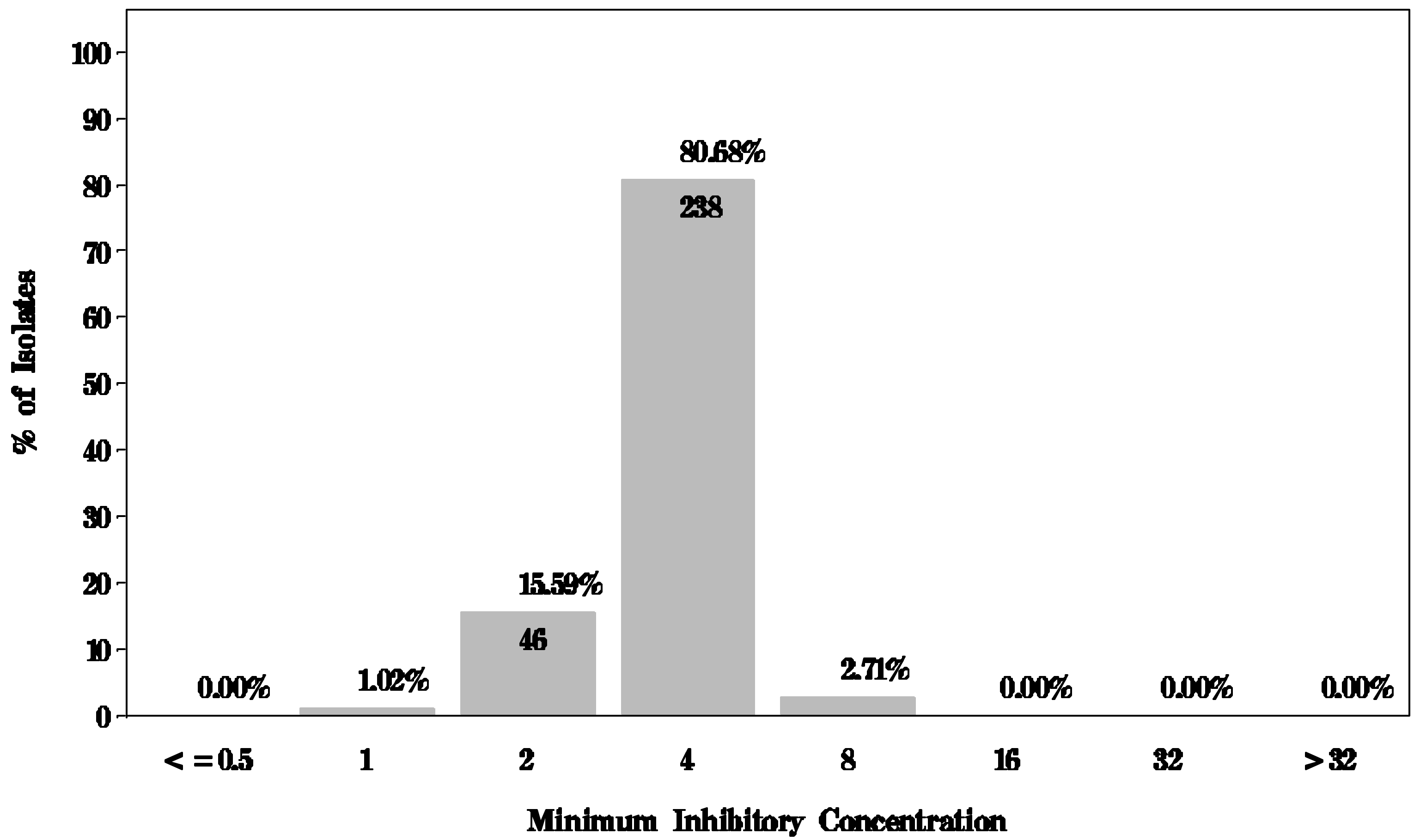
Breakpoints: Susceptible<=16 μg/mL Resistant>=32μg/mL



NARMS

Figure 19: Minimum Inhibitory Concentration of Nalidixic acid for *Escherichia coli* in Ground Beef (N=295 Isolates)

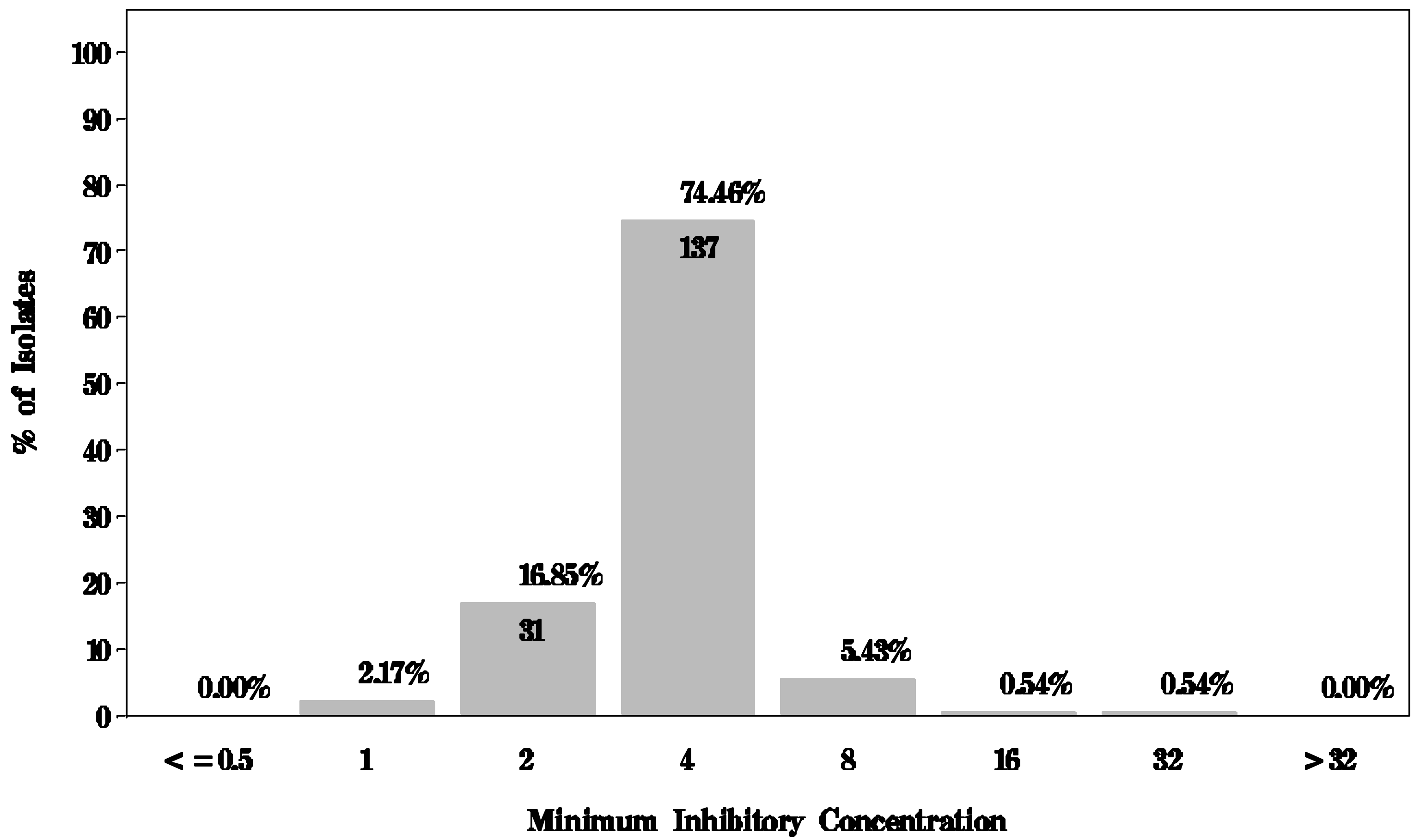
Breakpoints: Susceptible<=16 μg/mL Resistant>=32μg/mL



NARMS

Figure 19: Minimum Inhibitory Concentration of Nalidixic acid for *Escherichia coli* in Pork Chop (N=184 Isolates)

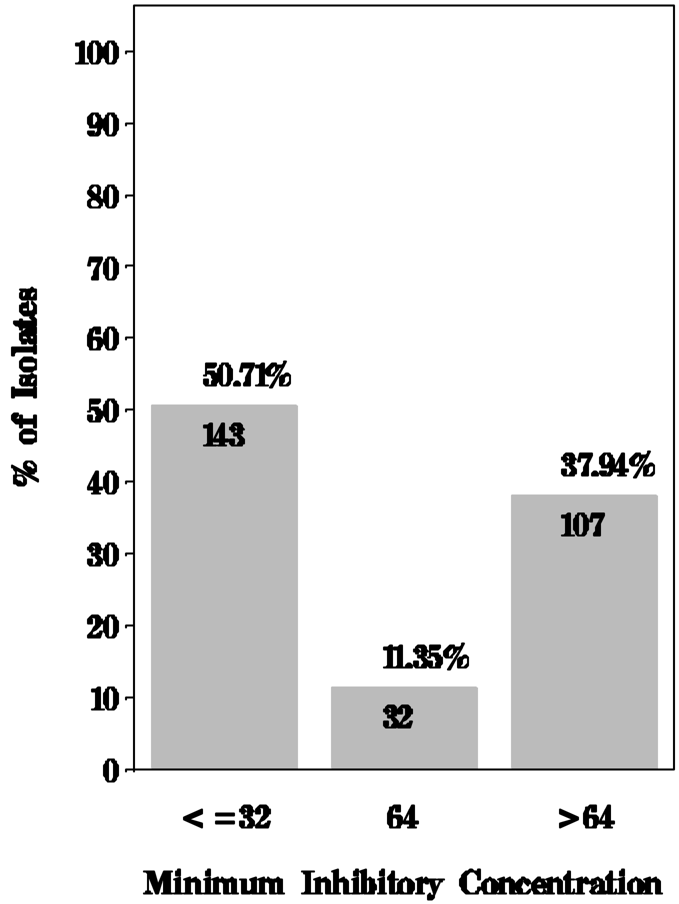
Breakpoints: Susceptible<=16 µg/mL Resistant>=32µg/mL



NARMS

Figure 19: Minimum Inhibitory Concentration of Streptomycin for *Escherichia coli* in Chicken Breast (N=282 Isolates)

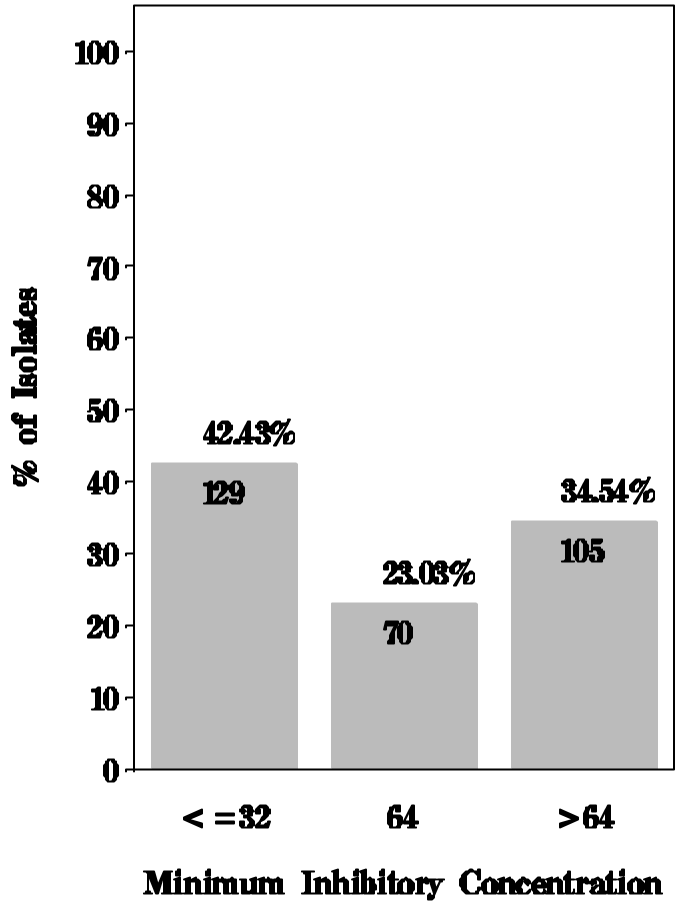
Breakpoints: Susceptible<=32 μg/mL Resistant>=64μg/mL



NARMS

Figure 19: Minimum Inhibitory Concentration of Streptomycin for *Escherichia coli* in Ground Turkey (N=304 Isolates)

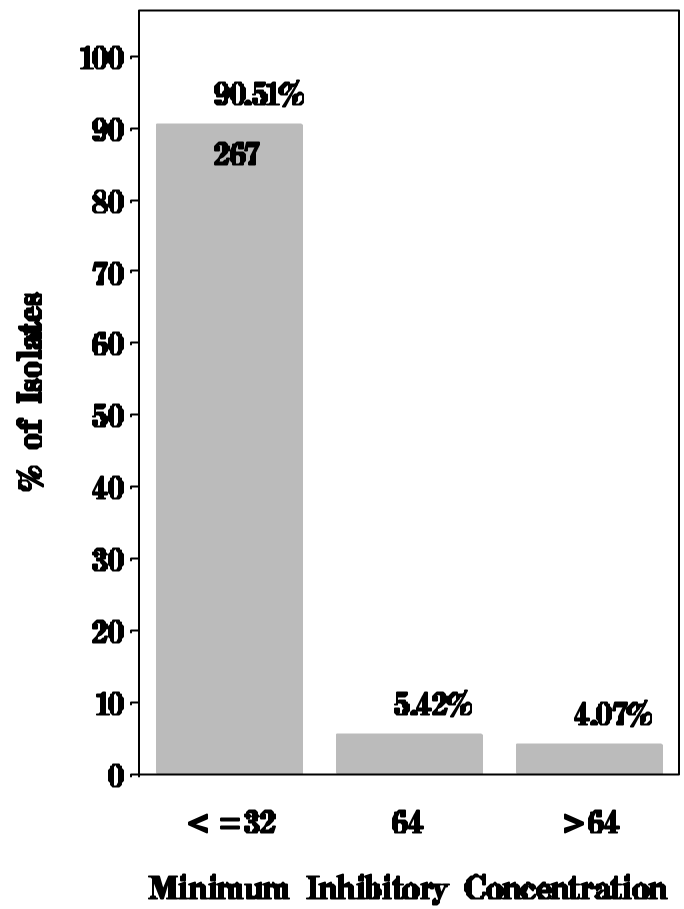
Breakpoints: Susceptible<=32 μg/mL Resistant>=64μg/mL



NARMS

Figure 19: Minimum Inhibitory Concentration of Streptomycin for *Escherichia coli* in Ground Beef (N=295 Isolates)

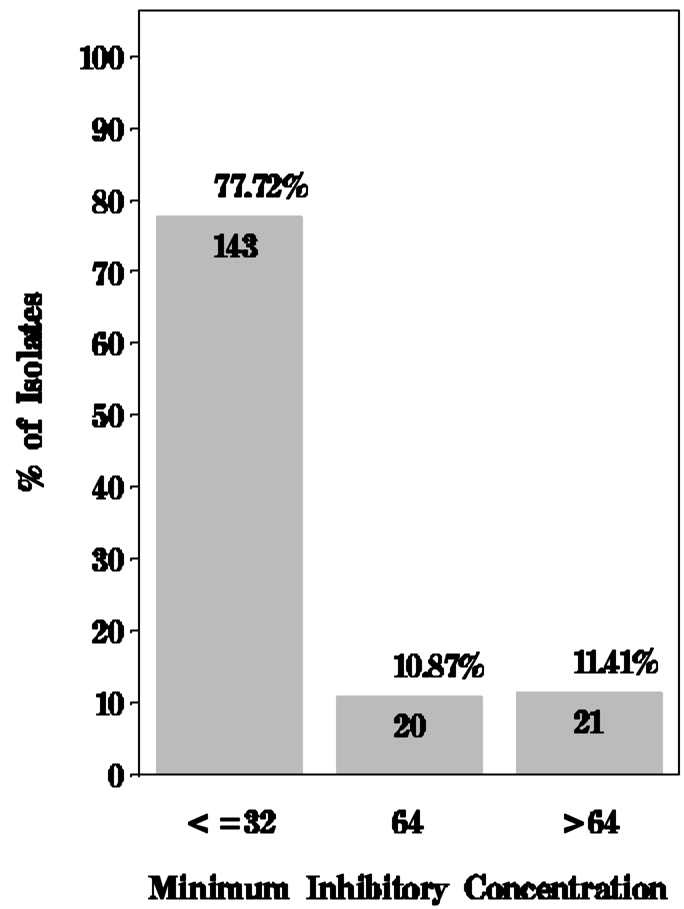
Breakpoints: Susceptible<=32 μg/mL Resistant>=64μg/mL



NARMS

Figure 19: Minimum Inhibitory Concentration of Streptomycin for *Escherichia coli* in Pork Chop (N=184 Isolates)

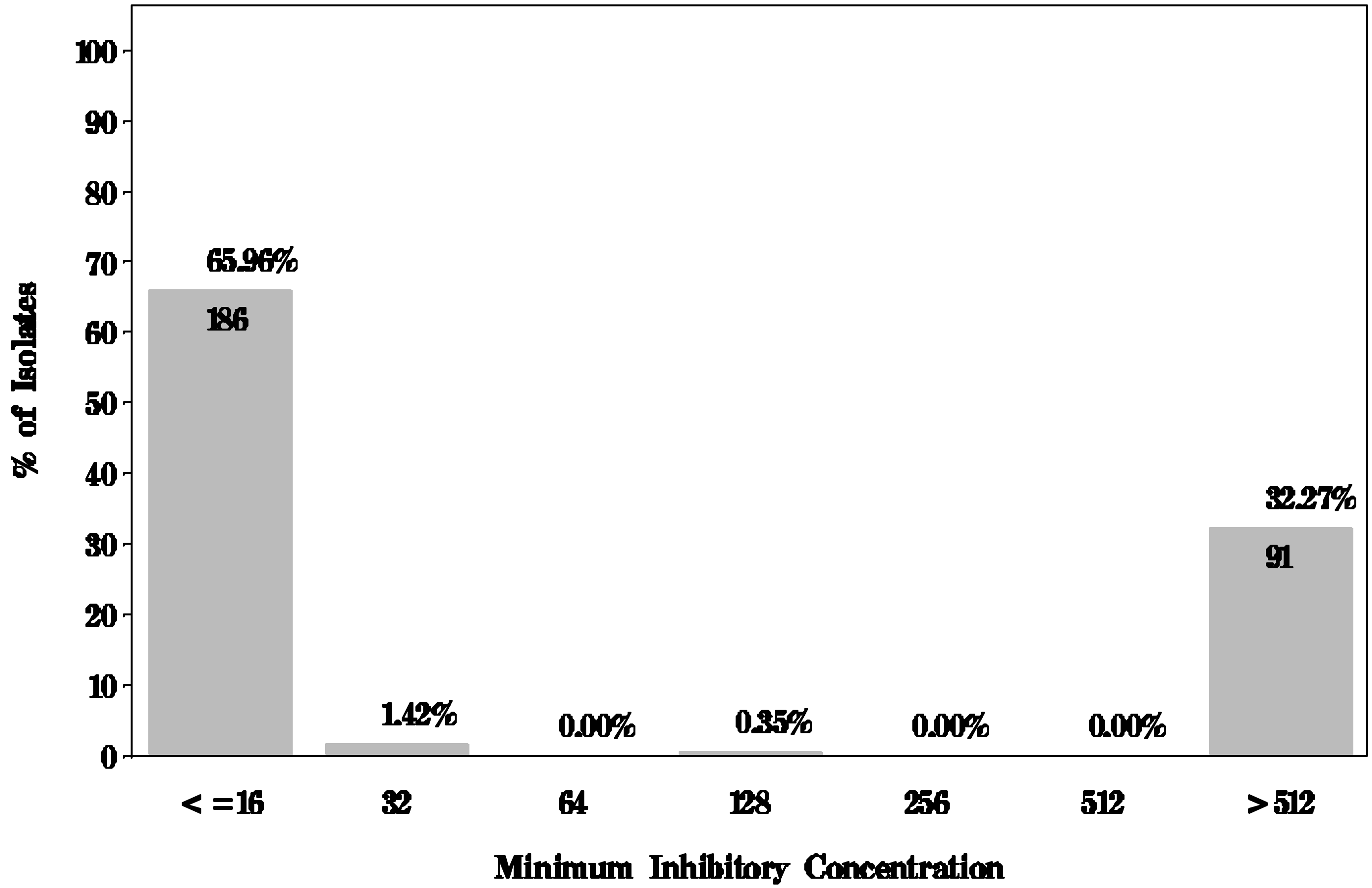
Breakpoints: Susceptible<=32 μg/mL Resistant>=64μg/mL



NARMS

Figure 19: Minimum Inhibitory Concentration of Sulfamethoxazole for *Escherichia coli* in Chicken Breast (N=282 Isolates)

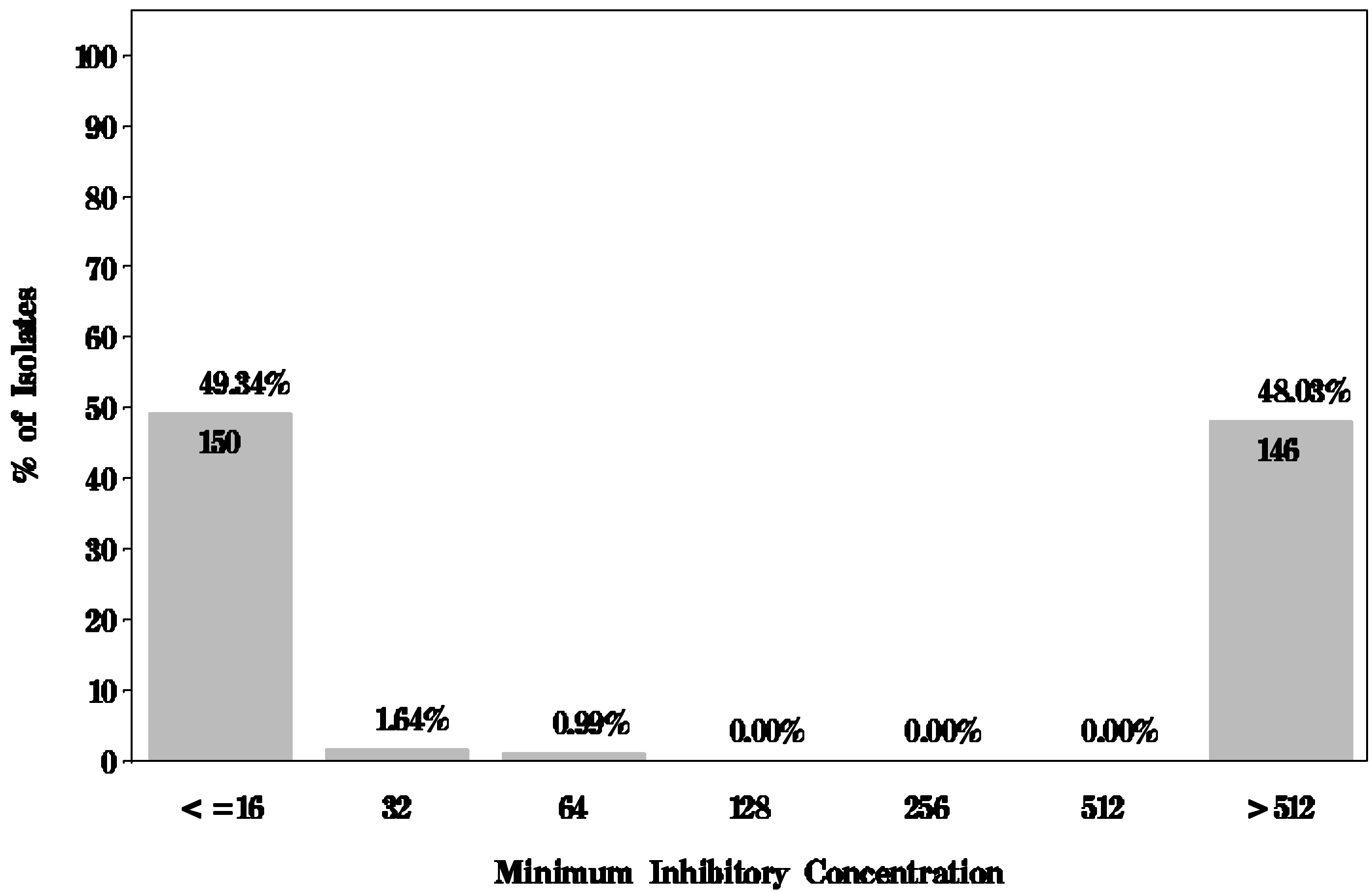
Breakpoints: Susceptible<=256 μg/mL Resistant>=512μg/mL



NARMS

Figure 19: Minimum Inhibitory Concentration of Sulfamethoxazole for *Escherichia coli* in Ground Turkey (N=304 Isolates)

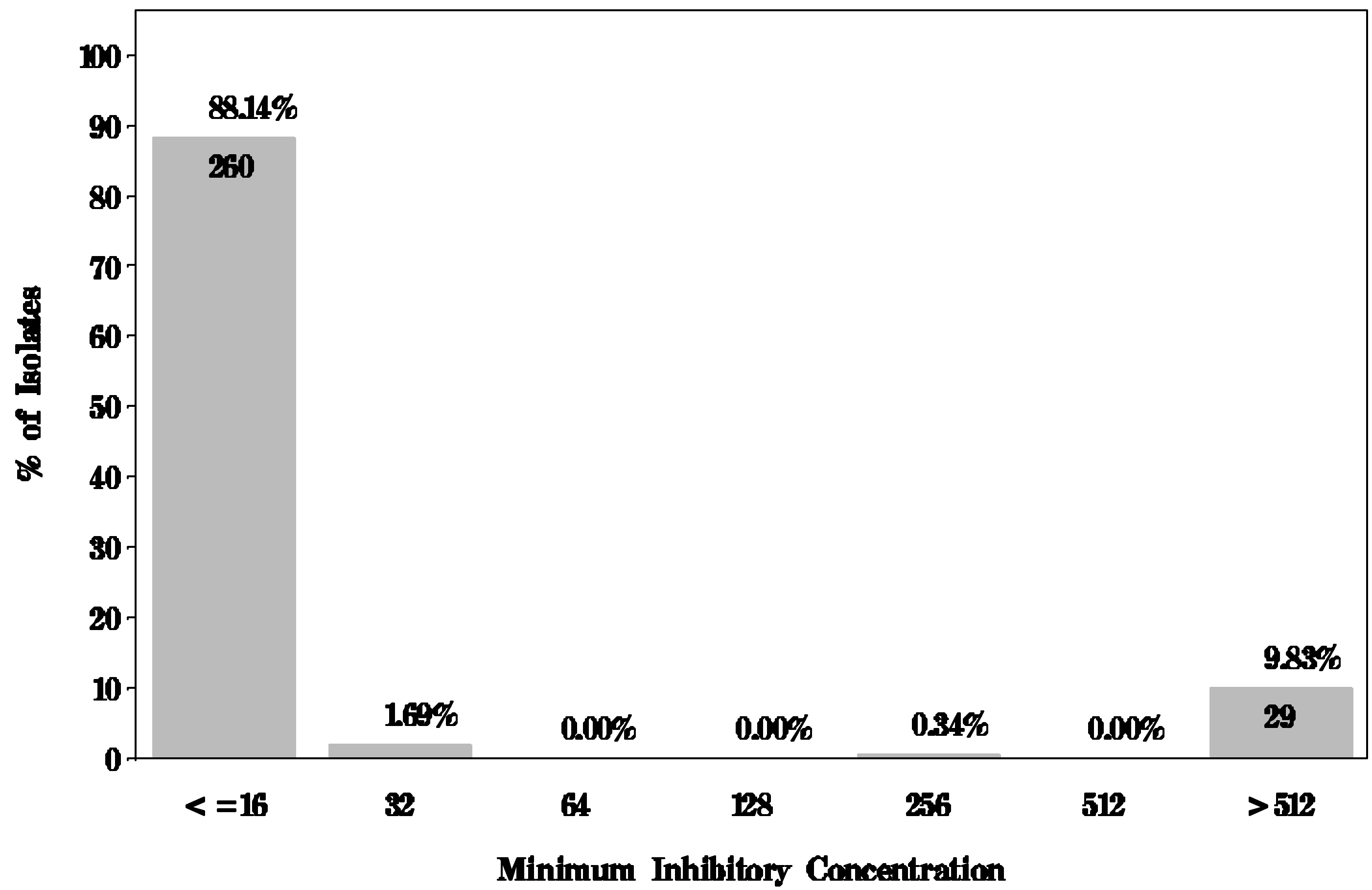
Breakpoints: Susceptible<=256 µg/mL Resistant>=512µg/mL



NARMS

Figure 19: Minimum Inhibitory Concentration of Sulfamethoxazole for *Escherichia coli* in Ground Beef (N=295 Isolates)

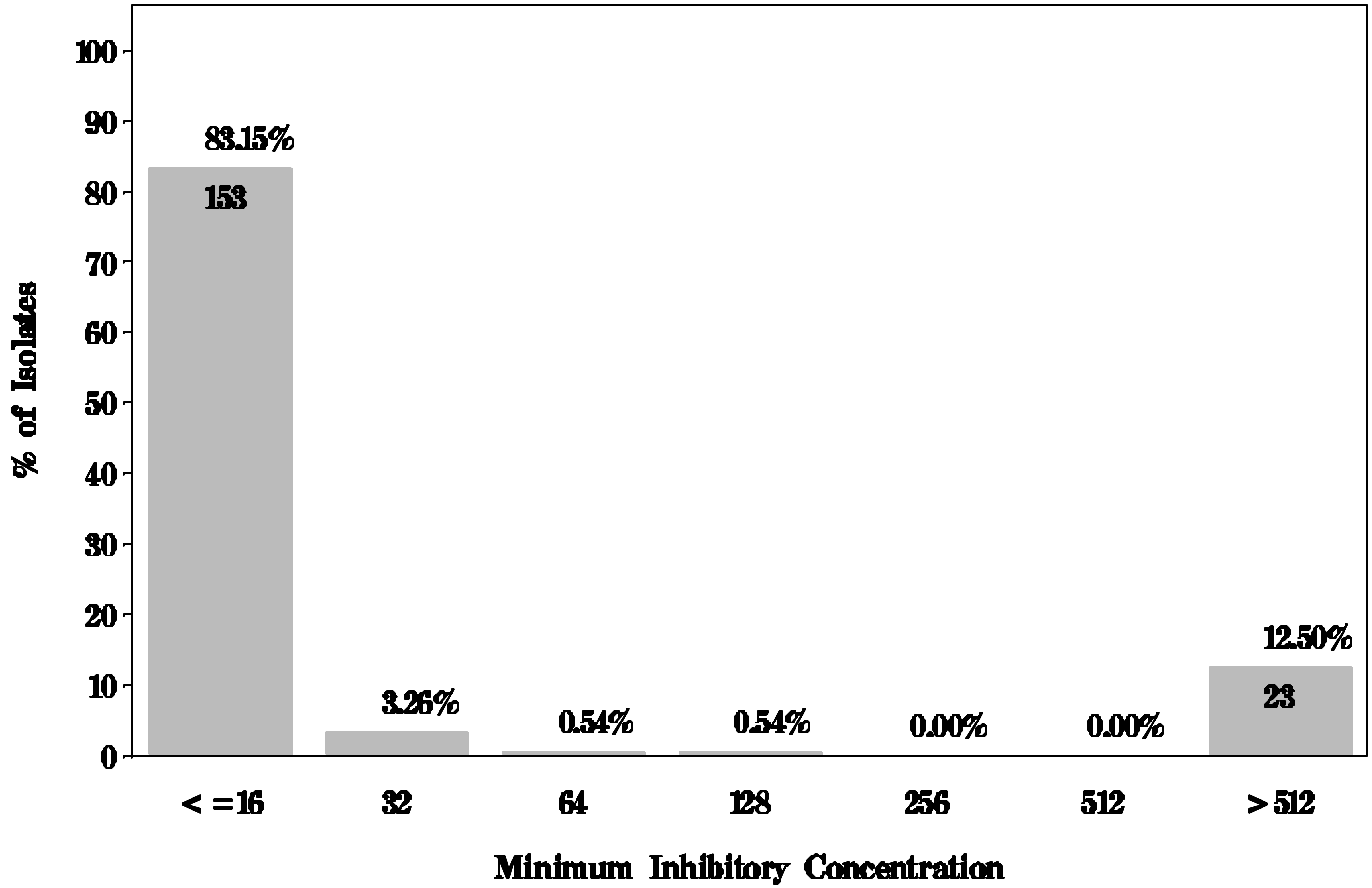
Breakpoints: Susceptible<=256 μg/mL Resistant>=512μg/mL



NARMS

Figure 19: Minimum Inhibitory Concentration of Sulfamethoxazole for *Escherichia coli* in Pork Chop (N=184 Isolates)

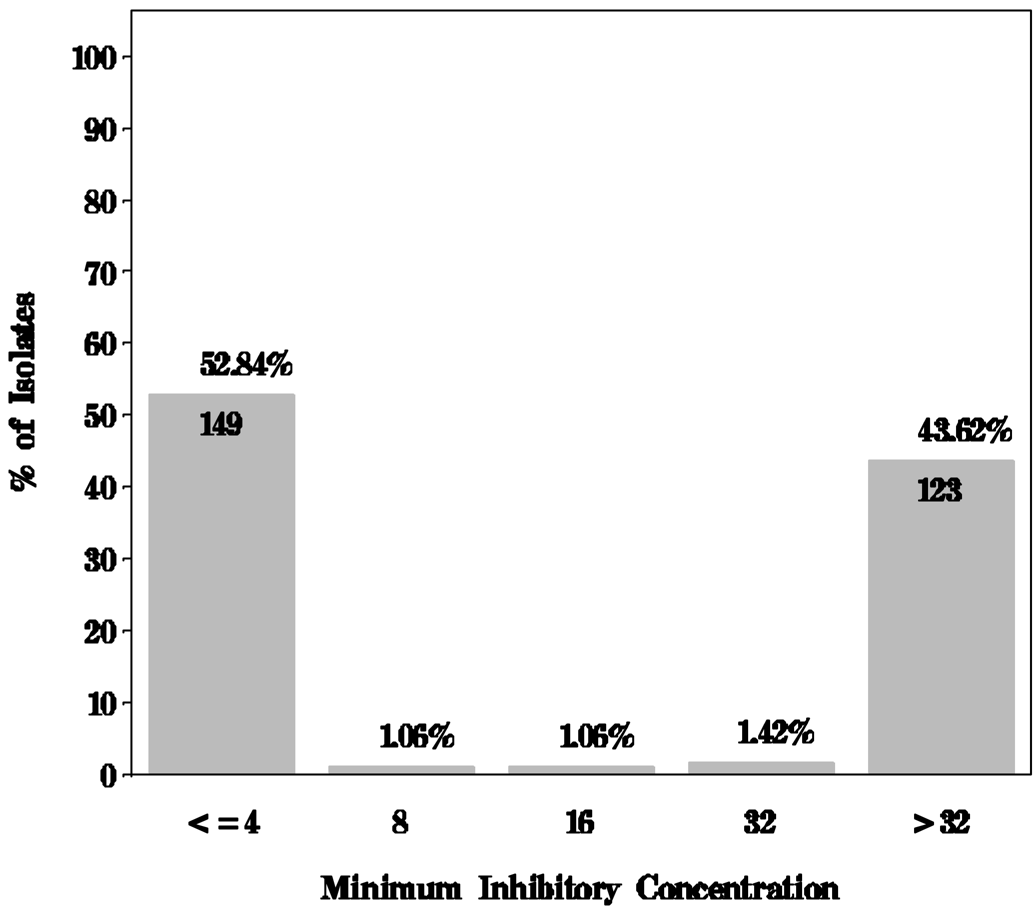
Breakpoints: Susceptible<=256 μg/mL Resistant>=512μg/mL



NARMS

Figure 19: Minimum Inhibitory Concentration of Tetracycline for *Escherichia coli* in Chicken Breast (N=282 Isolates)

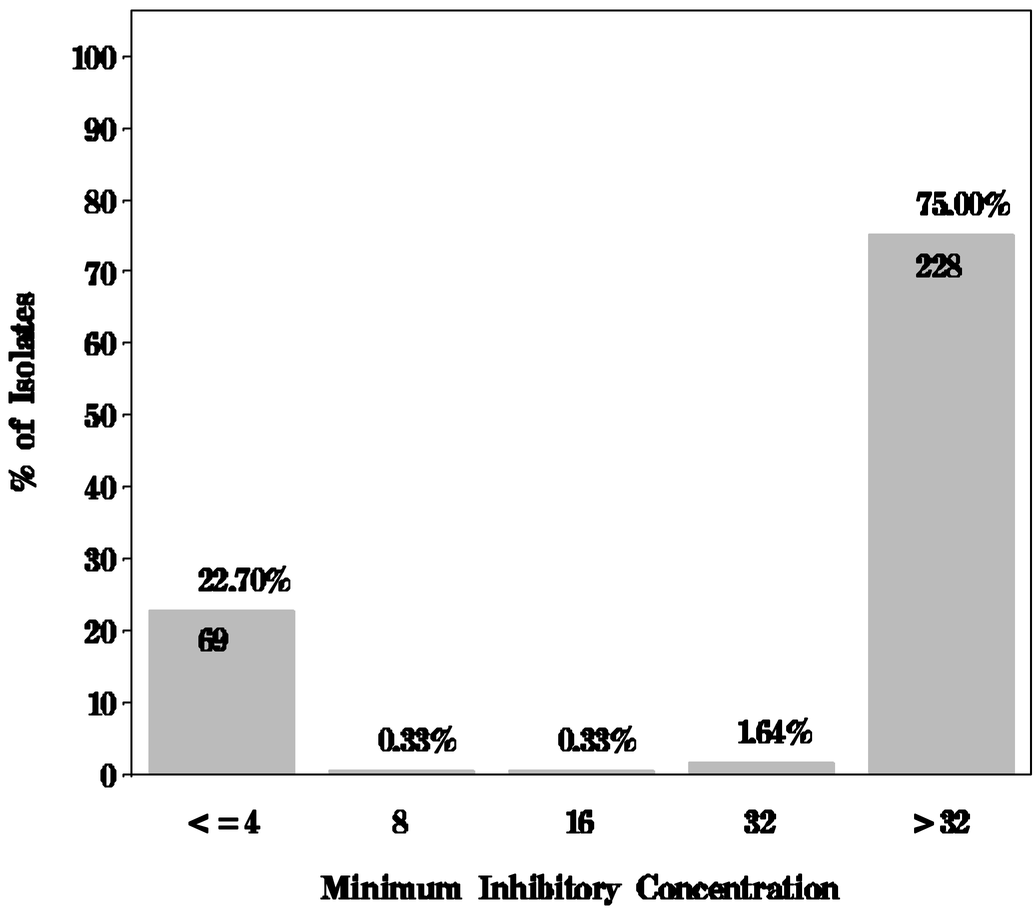
Breakpoints: Susceptible <=4 µg/mL Resistant >=16µg/mL



NARMS

Figure 19: Minimum Inhibitory Concentration of Tetracycline for *Escherichia coli* in Ground Turkey (N=304 Isolates)

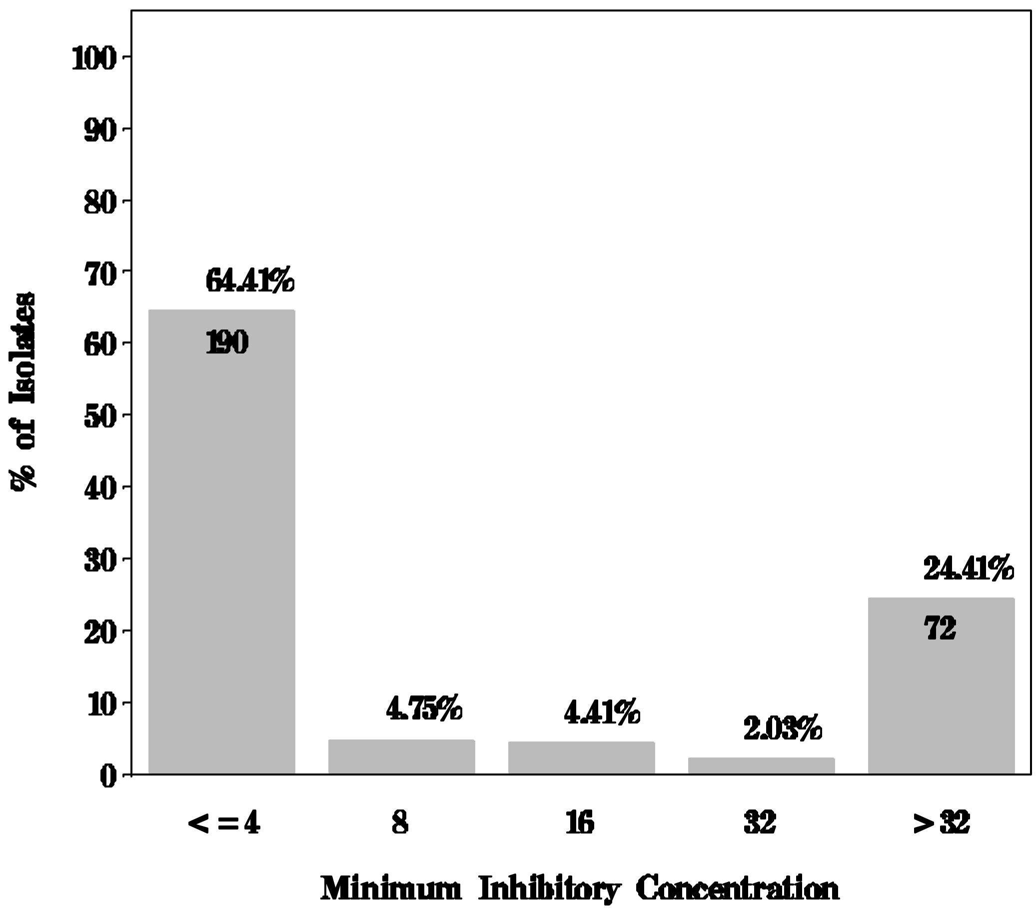
Breakpoints: Susceptible<=4 μg/mL Resistant>=16μg/mL



NARMS

Figure 19: Minimum Inhibitory Concentration of Tetracycline for *Escherichia coli* in Ground Beef (N=295 Isolates)

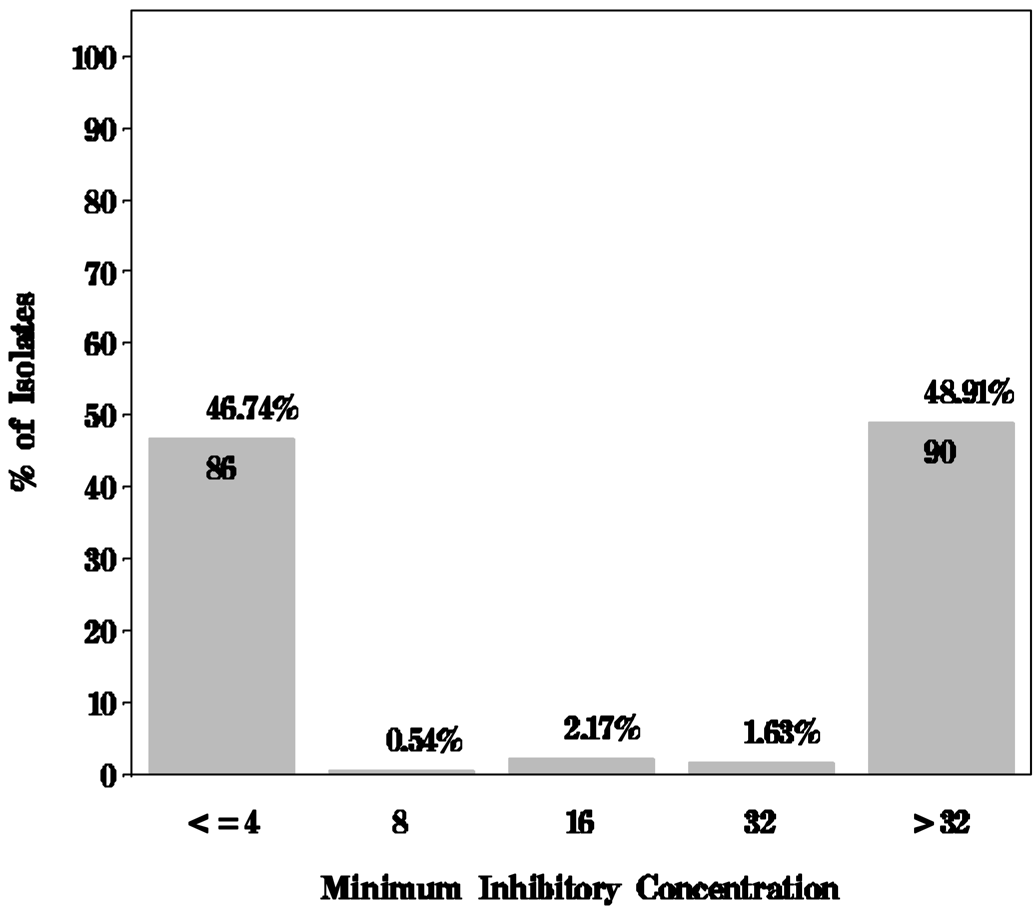
Breakpoints: Susceptible <=4 μg/mL Resistant >=16μg/mL



NARMS

Figure 19: Minimum Inhibitory Concentration of Tetracycline for *Escherichia coli* in Pork Chop (N=184 Isolates)

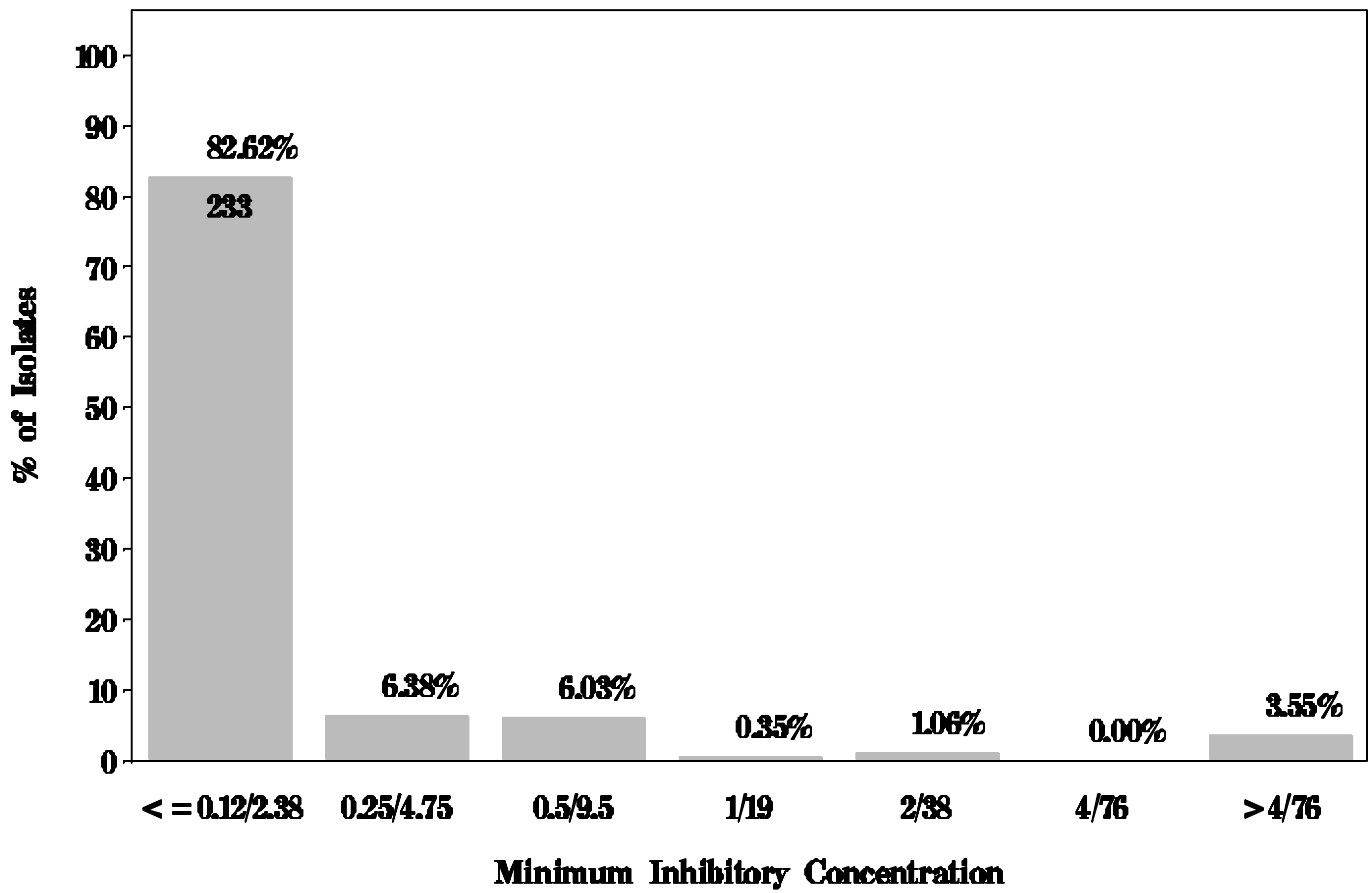
Breakpoints: Susceptible <=4 µg/mL Resistant >=16µg/mL



NARMS

Figure 19: Minimum Inhibitory Concentration of Trimethoprim/sulfamethoxazole for *Escherichia coli* in Chicken Breast (N=282 Isolates)

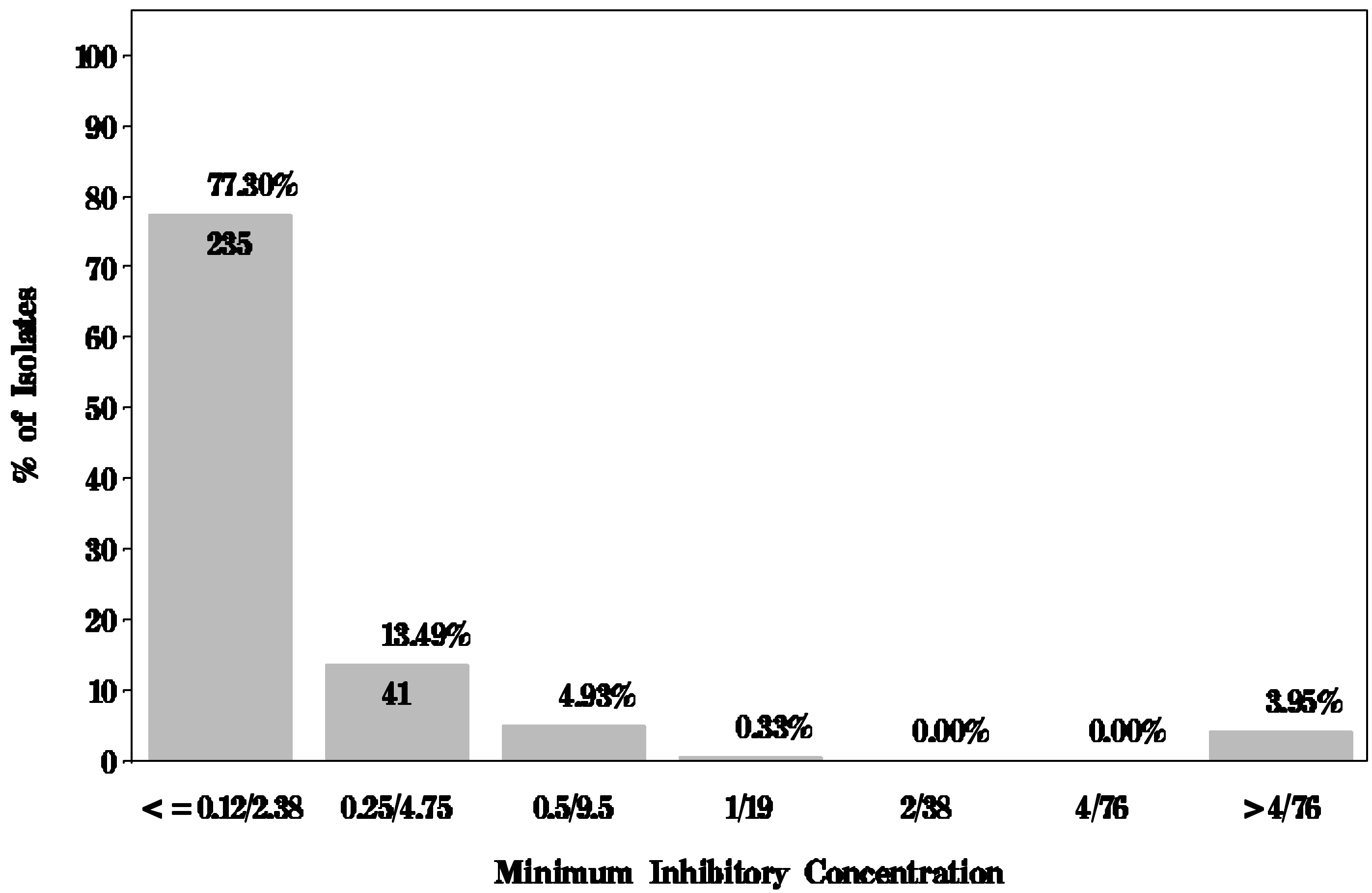
Breakpoints: Susceptible<=2/38 µg/mL Resistant>=4/76µg/mL



NARMS

Figure 19: Minimum Inhibitory Concentration of Trimethoprim/sulfamethoxazole for *Escherichia coli* in Ground Turkey (N=304 Isolates)

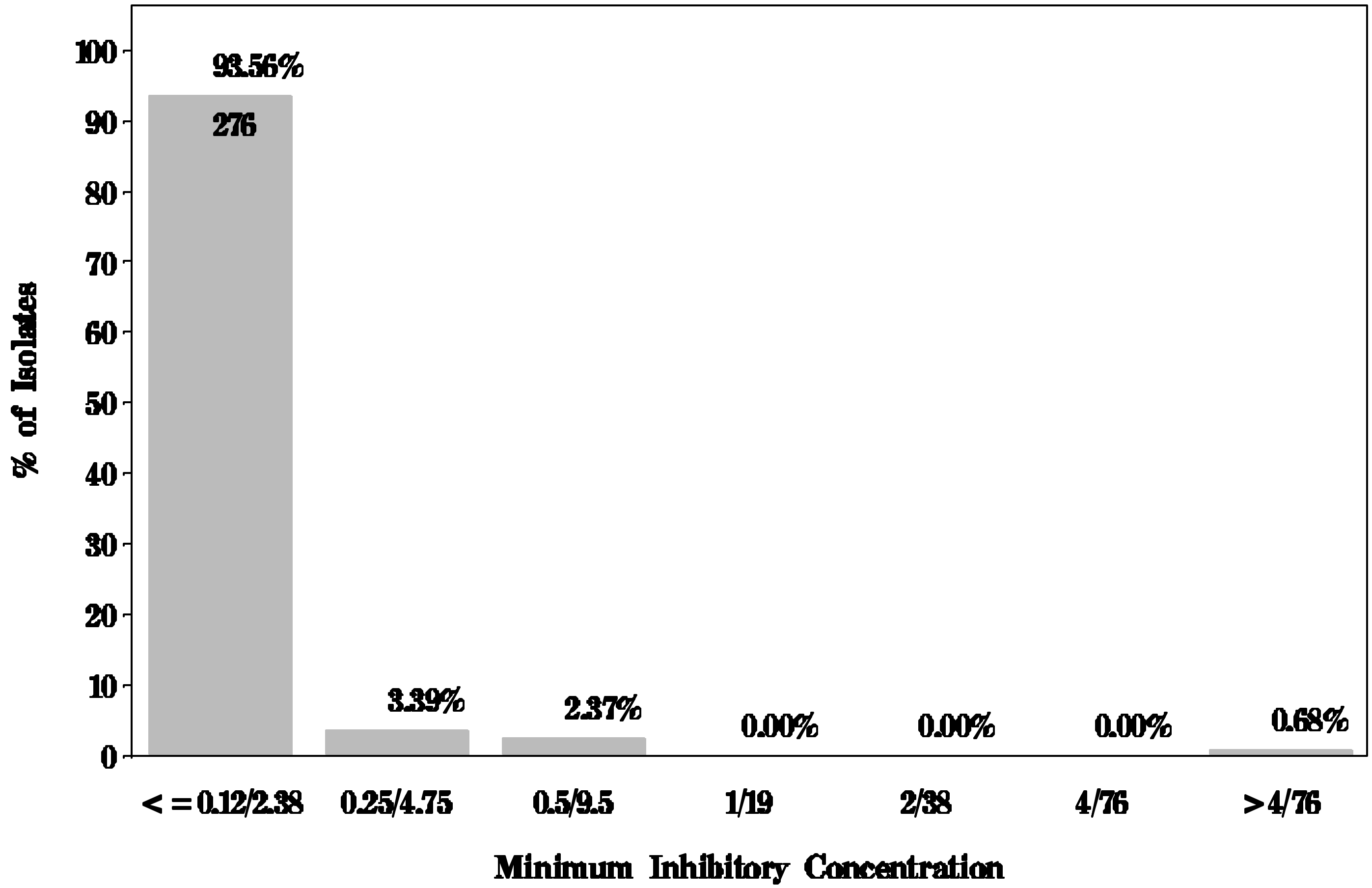
Breakpoints: Susceptible<=2/38 μg/mL Resistant>=4/76μg/mL



NARMS

Figure 19: Minimum Inhibitory Concentration of Trimethoprim/sulfamethoxazole for *Escherichia coli* in Ground Beef (N=295 Isolates)

Breakpoints: Susceptible<=2/38 μg/mL Resistant>=4/76μg/mL



NARMS

Figure 19: Minimum Inhibitory Concentration of Trimethoprim/sulfamethoxazole for *Escherichia coli* in Pork Chop (N=184 Isolates)

Breakpoints: Susceptible<=2/38 μg/mL Resistant>=4/76μg/mL

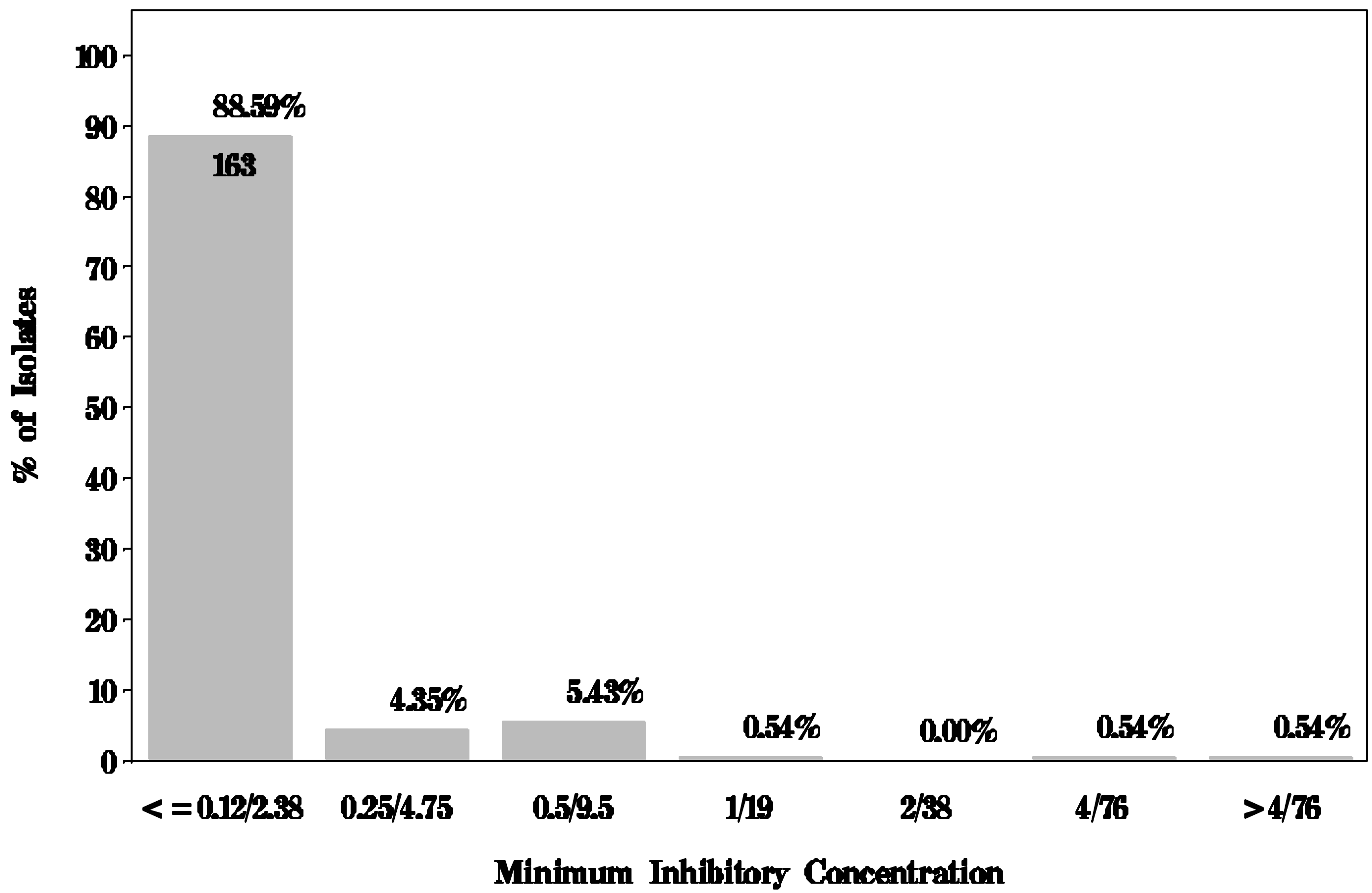


Table 46. Antimicrobial Resistance among *Escherichia coli* by Site, Meat Type, and Antimicrobial Agent, 2002

		Chicken Breast		Ground Beef		Ground Turkey		Pork Chop	
Site	**Antimicrobial**	# R	% R	# R	% R	# R	% R	# R	% R
GA (n=104)	TET	52	50.0%	12	12.9%	78	75.7%	26	47.3%
	STR	56	53.8%	4	4.3%	58	56.3%	11	20.0%
	SMX	43	41.3%	3	3.2%	48	46.6%	5	9.1%
	GEN	37	35.6%	0	0.0%	21	20.4%	0	0.0%
	AMP	8	7.7%	1	1.1%	33	32.0%	8	14.5%
	KAN	6	5.8%	1	1.1%	19	18.4%	4	7.3%
	CEP	11	10.6%	2	2.2%	10	9.7%	4	7.3%
	NAL	4	3.8%	0	0.0%	9	8.7%	0	0.0%
	FOX	5	4.8%	0	0.0%	5	4.9%	0	0.0%
	COT	6	5.8%	0	0.0%	3	2.9%	0	0.0%
	AMI	0	0.0%	0	0.0%	0	0.0%	0	0.0%
	AMC	3	2.9%	0	0.0%	3	2.9%	0	0.0%
	TIO	2	1.9%	0	0.0%	1	1.0%	0	0.0%
	CHL	1	1.0%	0	0.0%	0	0.0%	1	1.8%
	AXO	0	0.0%	0	0.0%	0	0.0%	0	0.0%
	CIP	0	0.0%	0	0.0%	0	0.0%	0	0.0%
MD (n=107)	TET	44	41.1%	44	41.9%	87	79.1%	34	51.5%
	STR	54	50.5%	11	10.5%	61	55.5%	20	30.3%
	AMP	37	34.6%	4	3.8%	40	36.4%	9	13.6%
	SMX	18	16.8%	13	12.4%	51	46.4%	8	12.1%
	CEP	37	34.6%	3	2.9%	21	19.1%	4	6.1%
	GEN	13	12.1%	1	1.0%	33	30.0%	0	0.0%
	AMC	23	21.5%	1	1.0%	7	6.4%	0	0.0%
	KAN	5	4.7%	4	3.8%	13	11.8%	2	3.0%
	FOX	18	16.8%	0	0.0%	4	3.6%	0	0.0%
	TIO	17	15.9%	0	0.0%	2	1.8%	0	0.0%
	COT	3	2.8%	2	1.9%	9	8.2%	1	1.5%
	AMI	0	0.0%	0	0.0%	0	0.0%	0	0.0%
	CHL	1	0.9%	2	1.9%	1	0.9%	0	0.0%
	NAL	2	1.9%	0	0.0%	2	1.8%	0	0.0%
	AXO	0	0.0%	0	0.0%	0	0.0%	0	0.0%
	CIP	0	0.0%	0	0.0%	0	0.0%	0	0.0%
OR (n=9)	TET	7	77.8%	9	40.9%	15	88.2%	8	88.9%
	STR	7	77.8%	7	31.8%	13	76.5%	0	0.0%
	SMX	1	11.1%	3	13.6%	8	47.1%	2	22.2%

	AMP	3	33.3%	2	9.1%	6	35.3%	1	11.1%
	CEP	0	0.0%	3	13.6%	2	11.8%	0	0.0%
	GEN	1	11.1%	0	0.0%	3	17.6%	0	0.0%
	KAN	0	0.0%	1	4.5%	2	11.8%	1	11.1%
	AMI	0	0.0%	0	0.0%	0	0.0%	0	0.0%
	AMC	0	0.0%	1	4.5%	0	0.0%	0	0.0%
	CHL	0	0.0%	1	4.5%	0	0.0%	0	0.0%
	FOX	1	11.1%	0	0.0%	0	0.0%	0	0.0%
	NAL	0	0.0%	1	4.5%	0	0.0%	0	0.0%
	AXO	1	11.1%	0	0.0%	0	0.0%	0	0.0%
	CIP	0	0.0%	0	0.0%	0	0.0%	0	0.0%
	COT	0	0.0%	0	0.0%	0	0.0%	0	0.0%
	TIO	0	0.0%	0	0.0%	0	0.0%	0	0.0%
TN (n=62)	TET	0	0.0%	0	0.0%	0	0.0%	0	0.0%
	SMX	27	43.5%	26	34.7%	54	73.0%	29	53.7%
	STR	29	46.8%	10	13.3%	39	52.7%	8	14.8%
	AMP	22	35.5%	6	8.0%	43	58.1%	10	18.5%
	CEP	13	21.0%	11	14.7%	16	21.6%	7	13.0%
	GEN	12	19.4%	9	12.0%	12	16.2%	11	20.4%
	AMC	14	22.6%	0	0.0%	25	33.8%	2	3.7%
	FOX	8	12.9%	4	5.3%	7	9.5%	10	18.5%
	KAN	8	12.9%	3	4.0%	1	1.4%	6	11.1%
	AMI	0	0.0%	0	0.0%	0	0.0%	0	0.0%
	NAL	2	3.2%	2	2.7%	1	1.4%	1	1.9%
	CHL	1	1.6%	0	0.0%	2	2.7%	1	1.9%
	COT	0	0.0%	0	0.0%	0	0.0%	2	3.7%
	TIO	1	1.6%	0	0.0%	0	0.0%	1	1.9%
	AXO	1	1.6%	0	0.0%	0	0.0%	1	1.9%
	CIP	0	0.0%	0	0.0%	0	0.0%	0	0.0%

Table 47. Number of *E. coli* Resistant to Multiple Antimicrobial Agents, 2002.

Meat Type	***Number of Antimicrobials***				
	0	**1**	**2-4**	**5-7**	**≥8**
CB	69	50	116	38	9
GT	50	40	153	54	7
GB	184	62	47	1	1
PC	76	42	59	5	2
Total	**379**	**194**	**375**	**98**	**19**

Appendix A-1. Number of Samples Tested by Site, Meat Type and Month, 2002

Site: CT

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: 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	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: MN

Meat Type	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Chicken Breast	10	10	10	10	10	*	6	10	10	10	10	10	106
Ground Turkey	10	10	10	10	20	10	7	10	10	10	10	10	127
Ground Beef	10	10	10	10	20	10	3	10	10	10	10	10	123
Pork Chop	10	10	10	10	10	*	3	10	10	10	10	10	103
Total:	**40**	**40**	**40**	**40**	**60**	**20**	**19**	**40**	**40**	**40**	**40**	**40**	**459**

* Samples not collected

Site:OR

Meat Type	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Chicken Breast	*	*	*	*	*	*	*	*	10	10	10	10	40
Ground Turkey	*	*	*	*	*	*	*	*	10	10	10	10	40
Ground Beef	*	*	*	*	*	*	*	*	10	10	10	10	40
Pork Chop	*	*	*	*	*	*	*	*	10	10	10	10	40
Total:									**40**	**40**	**40**	**40**	**160**

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	*	110
Ground Turkey	10	10	5	10	10	10	10	10	10	10	10	10	115
Ground Beef	10	10	10	10	10	10	10	10	9	10	10	10	119
Pork Chop	10	10	10	10	10	10	10	10	10	10	10	*	110
Total:	**40**	**40**	**35**	**40**	**40**	**40**	**40**	**40**	**39**	**40**	**40**	**20**	**454**
Total Year:													**2513**

* Samples not collected

Appendix A-2. Percent Positive Samples by Month, Meat Type, and Bacterium, 2002

Month: January

Meat Type: Chicken Breast

Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	50	18	36.0%
Enterococcus	30	30	100.0%
Escherichia coli	30	22	73.3%
Salmonella	50	5	10.0%

Meat Type: Ground Turkey

Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	50	0	0.0%
Enterococcus	30	30	100.0%
Escherichia coli	30	23	76.7%
Salmonella	50	12	24.0%

Meat Type: Ground Beef

Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	50	0	0.0%
Enterococcus	30	30	100.0%
Escherichia coli	30	20	66.7%
Salmonella	50	0	0.0%

Meat Type: Pork Chop

Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	50	0	0.0%
Enterococcus	30	30	100.0%
Escherichia coli	30	11	36.7%
Salmonella	50	1	2.0%

Month: February

Meat Type: Chicken Breast

Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	50	29	58.0%
Enterococcus	30	30	100.0%
Escherichia coli	30	25	83.3%
Salmonella	50	9	18.0%

Meat Type: Ground Turkey

Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	50	0	0.0%
Enterococcus	30	30	100.0%
Escherichia coli	30	23	76.7%
Salmonella	50	5	10.0%

Meat Type: Ground Beef

Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	50	0	0.0%
Enterococcus	30	30	100.0%
Escherichia coli	30	23	76.7%
Salmonella	50	0	0.0%

Meat Type: Pork Chop

Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	50	3	6.0%
Enterococcus	30	29	96.7%
Escherichia coli	30	13	43.3%
Salmonella	50	0	0.0%

Month: March

Meat Type: Chicken Breast

Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	50	29	58.0%
Enterococcus	30	29	96.7%
Escherichia coli	30	25	83.3%
Salmonella	50	3	6.0%

Meat Type: Ground Turkey

Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	45	0	0.0%
Enterococcus	25	25	100.0%
Escherichia coli	25	18	72.0%
Salmonella	45	4	8.9%

Meat Type: Ground Beef

Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	50	0	0.0%
Enterococcus	30	29	96.7%
Escherichia coli	30	20	66.7%
Salmonella	50	1	2.0%

Meat Type: Pork Chop

Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	50	0	0.0%
Enterococcus	30	29	96.7%
Escherichia coli	30	18	60.0%
Salmonella	50	0	0.0%

Month: April

Meat Type: Chicken Breast

Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	50	22	44.0%
Enterococcus	30	28	93.3%
Escherichia coli	30	21	70.0%
Salmonella	50	4	8.0%

Meat Type: Ground Turkey

Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	50	2	4.0%
Enterococcus	30	30	100.0%
Escherichia coli	30	26	86.7%
Salmonella	50	5	10.0%

Meat Type: Ground Beef

Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	50	0	0.0%
Enterococcus	30	27	90.0%
Escherichia coli	30	16	53.3%
Salmonella	50	1	2.0%

Meat Type: Pork Chop

Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	50	0	0.0%
Enterococcus	30	30	100.0%
Escherichia coli	30	19	63.3%
Salmonella	50	0	0.0%

Month: May

Meat Type: Chicken Breast

Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	50	26	52.0%
Enterococcus	30	27	90.0%
Escherichia coli	30	29	96.7%
Salmonella	50	6	12.0%

Meat Type: Ground Turkey

Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	60	0	0.0%
Enterococcus	30	28	93.3%
Escherichia coli	30	28	93.3%
Salmonella	60	4	6.7%

Meat Type: Ground Beef

Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	60	0	0.0%
Enterococcus	30	26	86.7%
Escherichia coli	30	27	90.0%
Salmonella	60	0	0.0%

Meat Type: Pork Chop

Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	50	0	0.0%
Enterococcus	30	27	90.0%
Escherichia coli	30	11	36.7%
Salmonella	50	0	0.0%

Month: June

Meat Type: Chicken Breast

Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	40	24	60.0%
Enterococcus	30	30	100.0%
Escherichia coli	30	29	96.7%
Salmonella	40	1	2.5%

Meat Type: Ground Turkey

Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	50	0	0.0%
Enterococcus	30	30	100.0%
Escherichia coli	30	25	83.3%
Salmonella	50	4	8.0%

Meat Type: Ground Beef

Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	50	0	0.0%
Enterococcus	30	30	100.0%
Escherichia coli	30	25	83.3%
Salmonella	50	2	4.0%

Meat Type: Pork Chop

Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	40	0	0.0%
Enterococcus	30	30	100.0%
Escherichia coli	30	9	30.0%
Salmonella	40	2	5.0%

Month: July

Meat Type: Chicken Breast

Bacterium	**# of Samples**	**# of Isolates**	**Positive (%)**
Campylobacter	46	17	37.0%
Enterococcus	30	29	96.7%
Escherichia coli	30	20	66.7%
Salmonella	46	7	15.2%

Meat Type: Ground Turkey

Bacterium	**# of Samples**	**# of Isolates**	**Positive (%)**
Campylobacter	47	1	2.1%
Enterococcus	30	29	96.7%
Escherichia coli	30	18	60.0%
Salmonella	47	8	17.0%

Meat Type: Ground Beef

Bacterium	**# of Samples**	**# of Isolates**	**Positive (%)**
Campylobacter	43	0	0.0%
Enterococcus	30	29	96.7%
Escherichia coli	30	17	56.7%
Salmonella	43	0	0.0%

Meat Type: Pork Chop

Bacterium	**# of Samples**	**# of Isolates**	**Positive (%)**
Campylobacter	43	0	0.0%
Enterococcus	30	29	96.7%
Escherichia coli	30	7	23.3%
Salmonella	43	0	0.0%

Month: August

Meat Type: Chicken Breast

Bacterium	**# of Samples**	**# of Isolates**	**Positive (%)**
Campylobacter	50	31	62.0%
Enterococcus	30	30	100.0%
Escherichia coli	30	19	63.3%
Salmonella	50	3	6.0%

Meat Type: Ground Turkey

Bacterium	**# of Samples**	**# of Isolates**	**Positive (%)**
Campylobacter	50	0	0.0%
Enterococcus	30	30	100.0%
Escherichia coli	30	20	66.7%
Salmonella	50	1	2.0%

Meat Type: Ground Beef

Bacterium	**# of Samples**	**# of Isolates**	**Positive (%)**
Campylobacter	50	0	0.0%
Enterococcus	30	26	86.7%
Escherichia coli	30	19	63.3%
Salmonella	50	1	2.0%

Meat Type: Pork Chop

Bacterium	**# of Samples**	**# of Isolates**	**Positive (%)**
Campylobacter	50	0	0.0%
Enterococcus	30	29	96.7%
Escherichia coli	30	18	60.0%
Salmonella	50	1	2.0%

Month: **September**

Meat Type: Chicken Breast

Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	60	27	45.0%
Enterococcus	40	40	100.0%
Escherichia coli	40	24	60.0%
Salmonella	60	8	13.3%

Meat Type: Ground Turkey

Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	60	0	0.0%
Enterococcus	40	39	97.5%
Escherichia coli	40	25	62.5%
Salmonella	60	0	0.0%

Meat Type: Ground Beef

Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	59	0	0.0%
Enterococcus	39	38	97.4%
Escherichia coli	39	38	97.4%
Salmonella	59	0	0.0%

Meat Type: Pork Chop

Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	60	0	0.0%
Enterococcus	40	35	87.5%
Escherichia coli	40	20	50.0%
Salmonella	60	0	0.0%

Month: October

Meat Type: Chicken Breast

Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	60	21	35.0%
Enterococcus	40	40	100.0%
Escherichia coli	40	25	62.5%
Salmonella	60	4	6.7%

Meat Type: Ground Turkey

Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	60	0	0.0%
Enterococcus	40	40	100.0%
Escherichia coli	40	34	85.0%
Salmonella	60	11	18.3%

Meat Type: Ground Beef

Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	60	0	0.0%
Enterococcus	40	40	100.0%
Escherichia coli	40	30	75.0%
Salmonella	60	2	3.3%

Meat Type: Pork Chop

Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	60	1	1.7%
Enterococcus	40	40	100.0%
Escherichia coli	40	26	65.0%
Salmonella	60	3	5.0%

Month: November

Meat Type: Chicken Breast

Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	60	21	35.0%
Enterococcus	40	38	95.0%
Escherichia coli	40	19	47.5%
Salmonella	60	5	8.3%

Meat Type: Ground Turkey

Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	60	1	1.7%
Enterococcus	40	37	92.5%
Escherichia coli	40	35	87.5%
Salmonella	60	11	18.3%

Meat Type: Ground Beef

Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	60	0	0.0%
Enterococcus	40	39	97.5%
Escherichia coli	40	32	80.0%
Salmonella	60	1	1.7%

Meat Type: Pork Chop

Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	60	1	1.7%
Enterococcus	40	35	87.5%
Escherichia coli	40	18	45.0%
Salmonella	60	3	5.0%

Month: December

Meat Type: Chicken Breast

Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	50	24	48.0%
Enterococcus	30	30	100.0%
Escherichia coli	30	24	80.0%
Salmonella	50	5	10.0%

Meat Type: Ground Turkey

Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	60	0	0.0%
Enterococcus	40	39	97.5%
Escherichia coli	40	29	72.5%
Salmonella	60	9	15.0%

Meat Type: Ground Beef

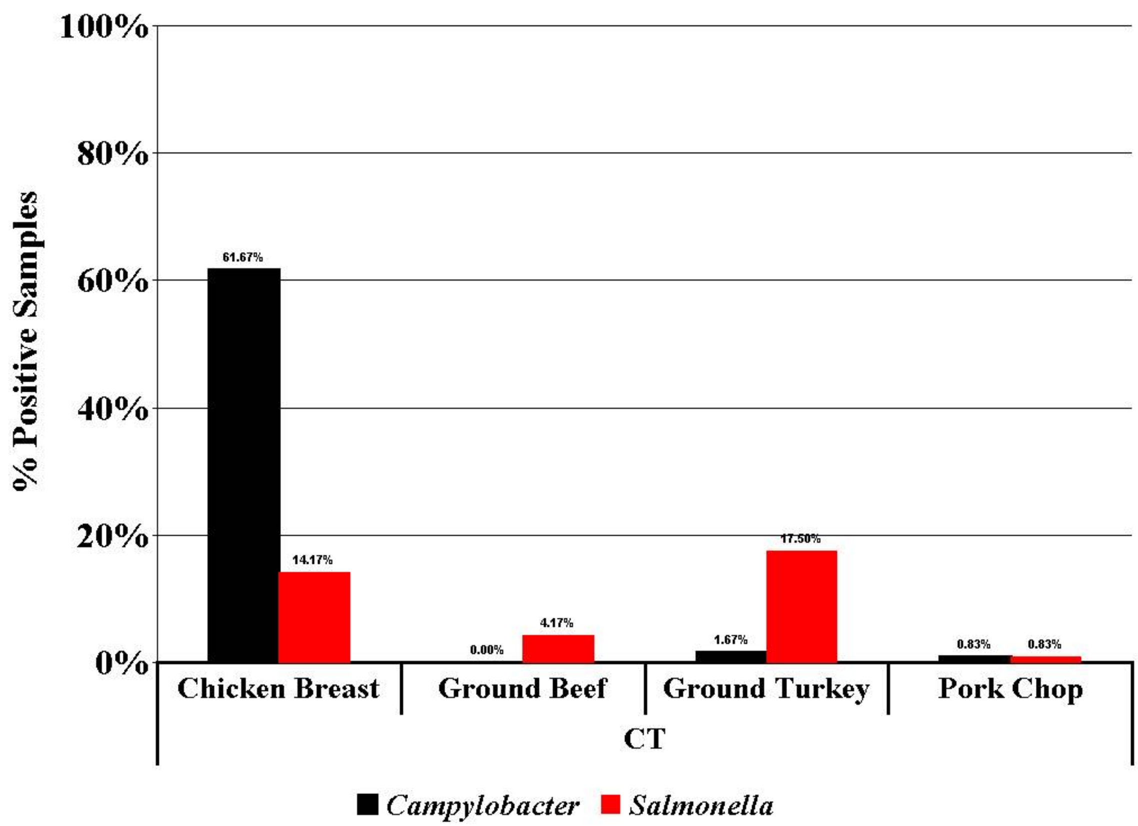
Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	60	0	0.0%
Enterococcus	40	39	97.5%
Escherichia coli	40	29	72.5%
Salmonella	60	1	1.7%

Meat Type: Pork Chop

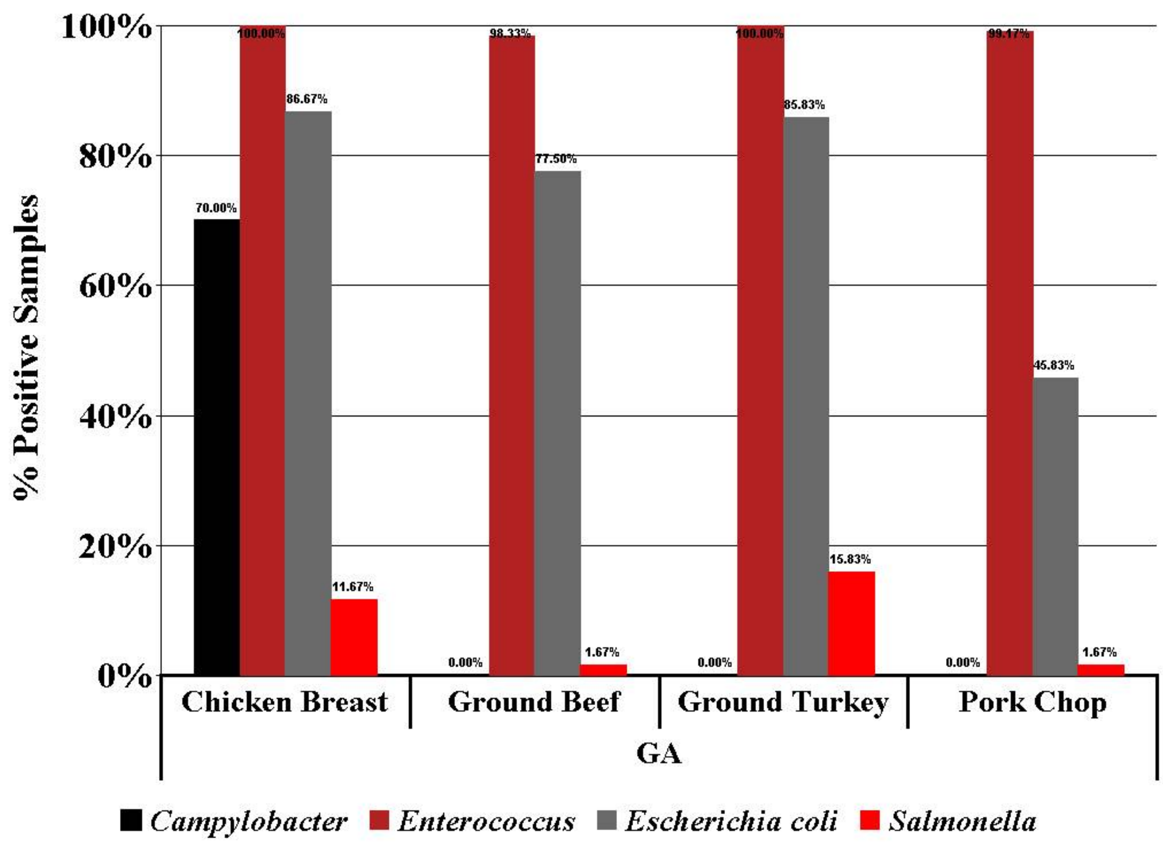
Bacterium	# of Samples	# of Isolates	Positive (%)
Campylobacter	50	0	0.0%
Enterococcus	30	26	86.7%
Escherichia coli	30	14	46.7%
Salmonella	50	0	0.0%

		Bacterium	Appendix A-3. Percent Positive Samples by Meat Type, Bacterium and Site										
		Campylobacter			*Enterococcus*			*Escherichia coli*			*Salmonella*		
Meat Type	**Site**	**N**	**Isolate**	**%Positive**	**N**	**Isolate**	**%Positive**	**N**	**Isolate**	**%Positive**	**N**	**Isolate**	**%Positive**
Chicken Breast	CT	120	74	61.67%							120	17	14.17%
	GA	120	84	70.00%	120	120	100.00%	120	104	86.67%	120	14	11.67%
	MD	120	30	25.00%	120	117	97.50%	120	107	89.17%	120	8	6.67%
	MN	106	33	31.13%							106	4	3.77%
	OR	40	1	2.50%	40	40	100.00%	40	9	22.50%	40	4	10.00%
	TN	110	66	60.00%	110	104	94.55%	110	62	56.36%	110	13	11.82%
	Total	616	288	46.75%	390	381	97.69%	390	282	72.31%	616	60	9.74%
Ground Turkey	CT	120	2	1.67%							120	21	17.50%
	GA	120	0	0.00%	120	120	100.00%	120	103	85.83%	120	19	15.83%
	MD	120	0	0.00%	120	113	94.17%	120	110	91.67%	120	9	7.50%
	MN	127	1	0.79%							127	7	5.51%
	OR	40	0	0.00%	40	40	100.00%	40	17	42.50%	40	2	5.00%
	TN	115	1	0.87%	115	114	99.13%	115	74	64.35%	115	16	13.91%
	Total	642	4	0.62%	395	387	97.97%	395	304	76.96%	642	74	11.53%
Ground Beef	CT	120	0	0.00%							120	5	4.17%
	GA	120	0	0.00%	120	118	98.33%	120	93	77.50%	120	2	1.67%
	MD	120	0	0.00%	120	107	89.17%	120	105	87.50%	120	2	1.67%
	MN	123	0	0.00%							123	0	0.00%
	OR	40	0	0.00%	40	40	100.00%	40	22	55.00%	40	0	0.00%
	TN	119	0	0.00%	119	118	99.16%	119	75	63.03%	119	0	0.00%
	Total	642	0	0.00%	399	383	95.99%	399	295	73.93%	642	9	1.40%
Pork Chop	CT	120	1	0.83%							120	1	0.83%
	GA	120	0	0.00%	120	119	99.17%	120	55	45.83%	120	2	1.67%
	MD	120	1	0.83%	120	101	84.17%	120	66	55.00%	120	6	5.00%
	MN	103	0	0.00%							103	0	0.00%
	OR	40	0	0.00%	40	39	97.50%	40	9	22.50%	40	0	0.00%
	TN	110	3	2.73%	110	110	100.00%	110	54	49.09%	110	1	0.91%
	Total	613	5	0.82%	390	369	94.62%	390	184	47.18%	613	10	1.63%
Total		2513	297	11.82%	1574	1520	96.57%	1574	1065	67.66%	2513	153	6.09%

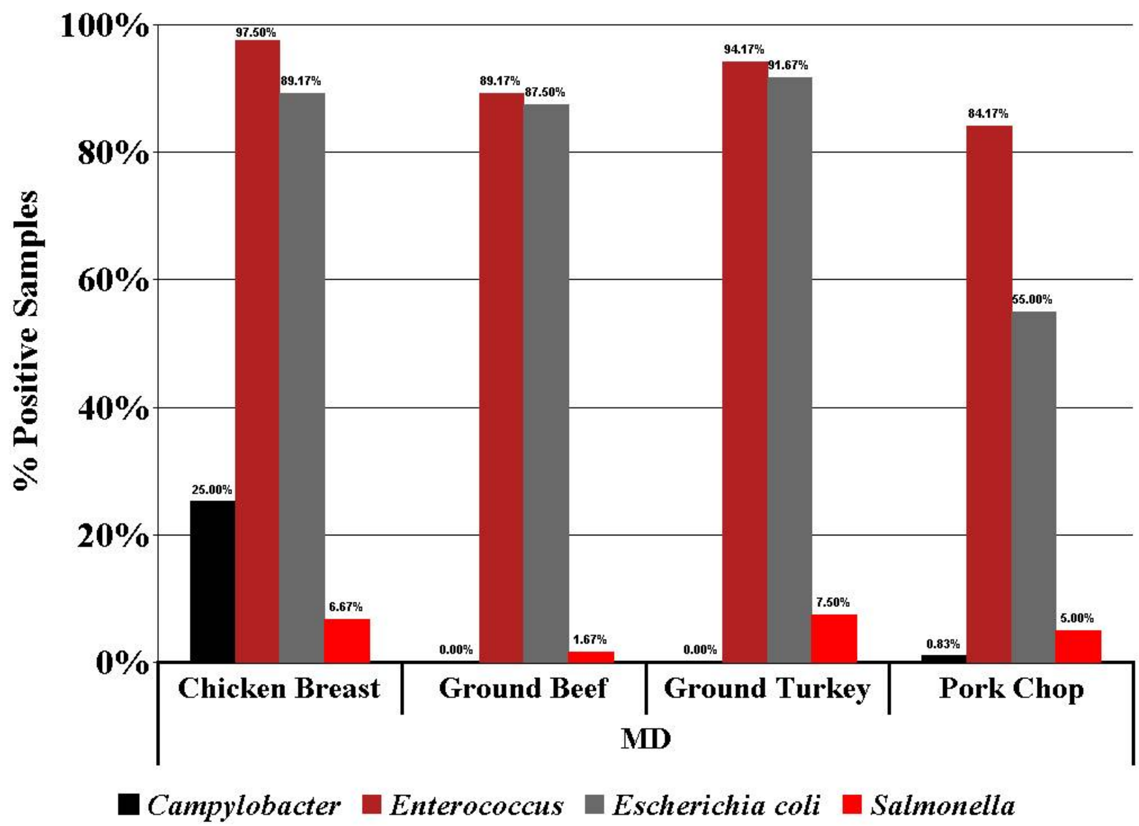
Appendix 3a. Percent Positive Samples by Meat Type, Bacterium in Connecticut, 2002



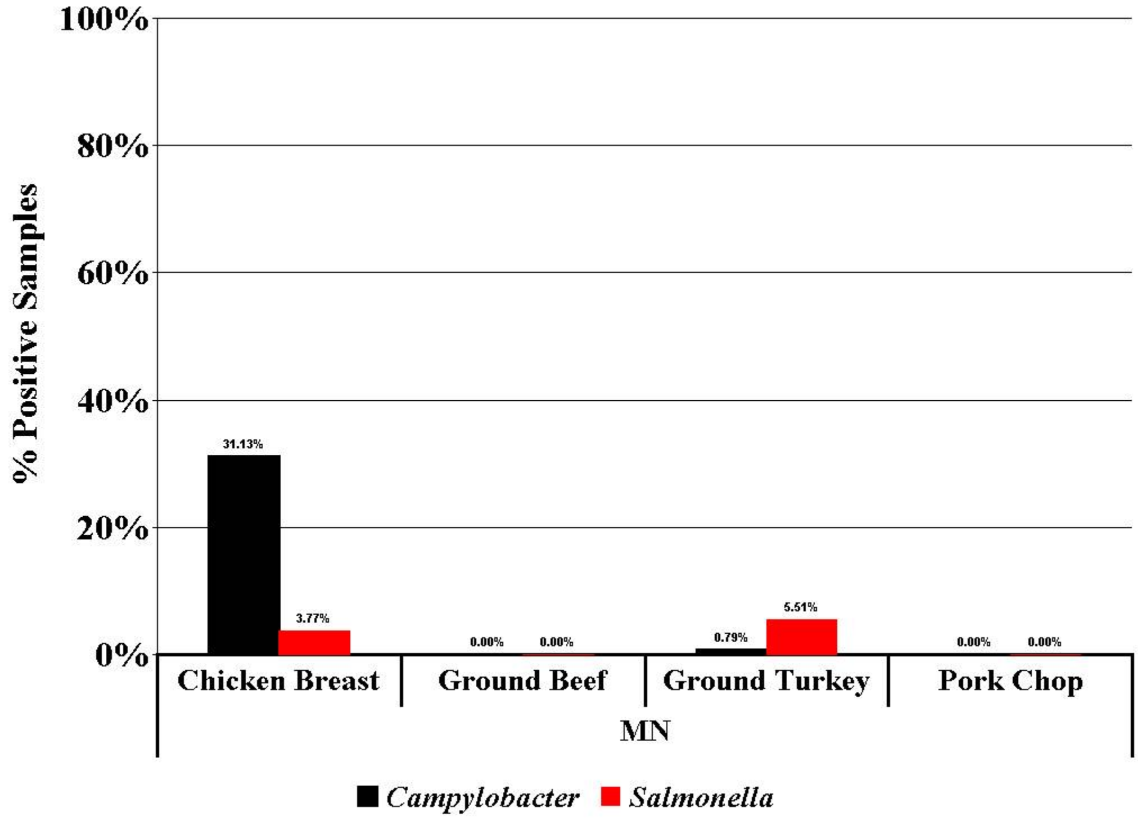
Appendix 3b. . Percent Positive Samples by Meat Type, Bacterium in Georgia, 2002



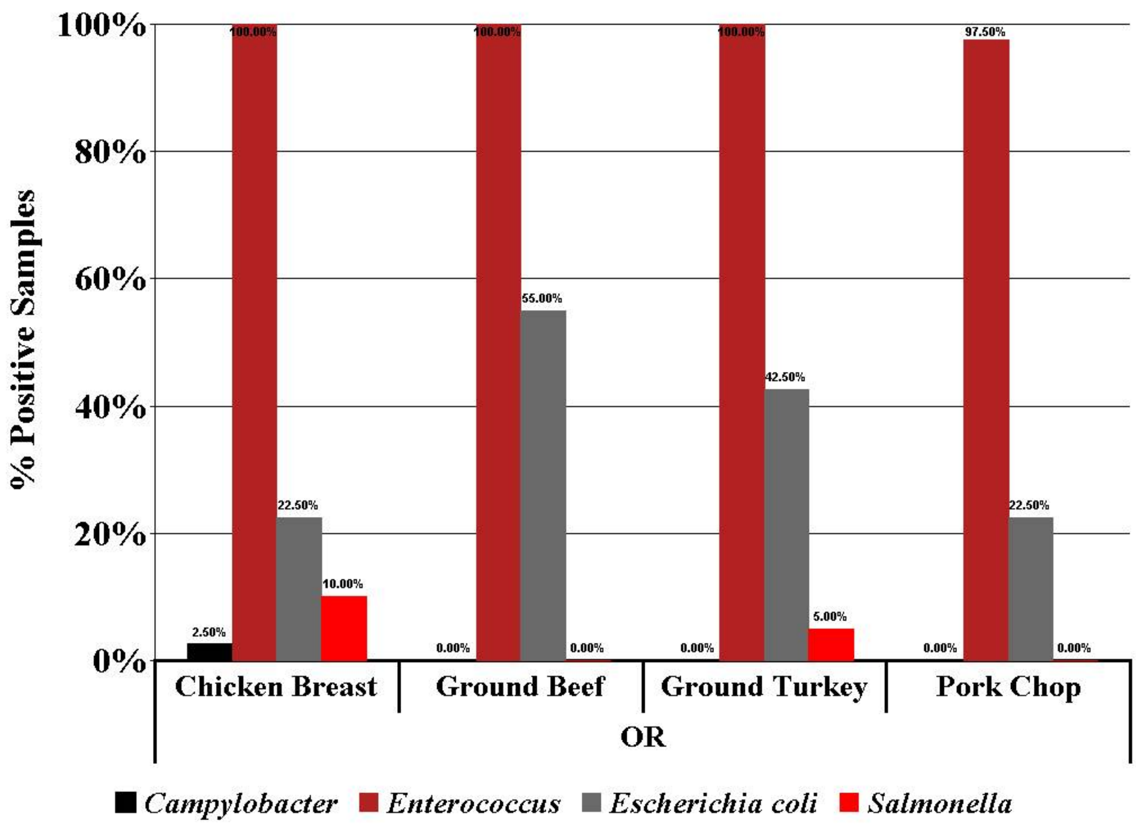
Appendix 3c. Percent Positive Samples by Meat Type, Bacterium in Maryland, 2002



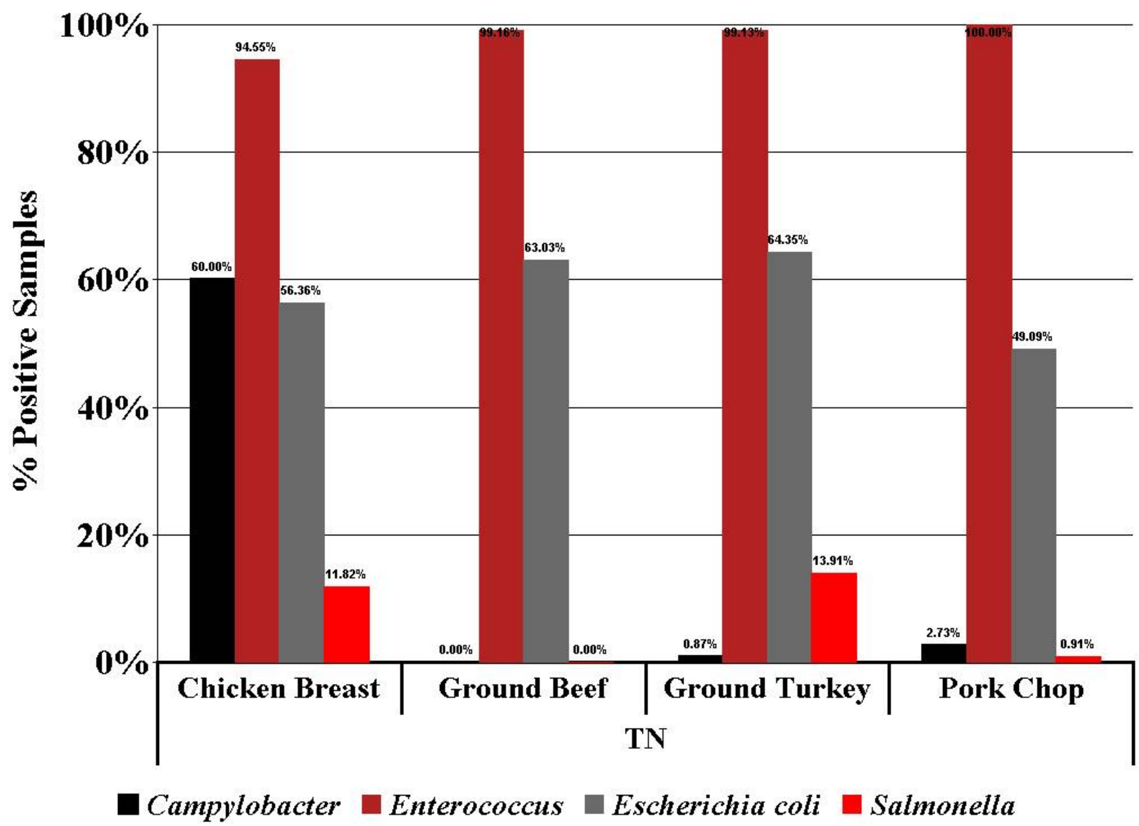
Appendix 3d. Percent Positive Samples by Meat Type, Bacterium in Minnesota, 2002



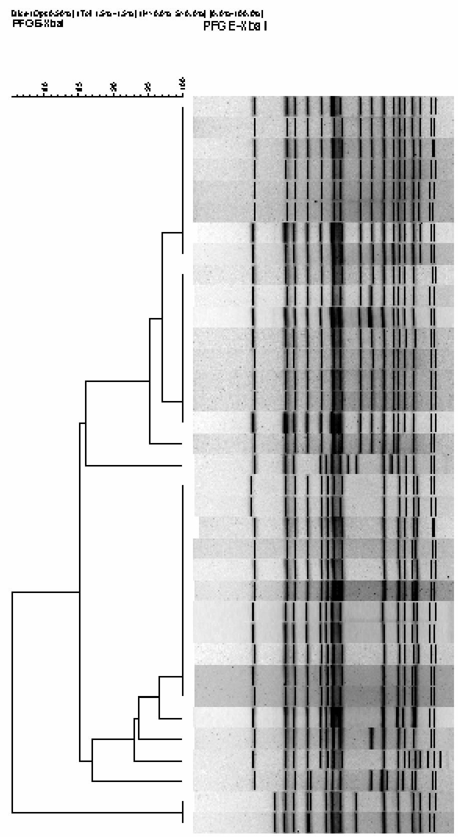
Appendix 3e. Percent Positive Samples by Meat Type, Bacterium in Oregon, 2002



Appendix 3f. Percent Positive Samples by Meat Type, Bacterium in Tennessee, 2002

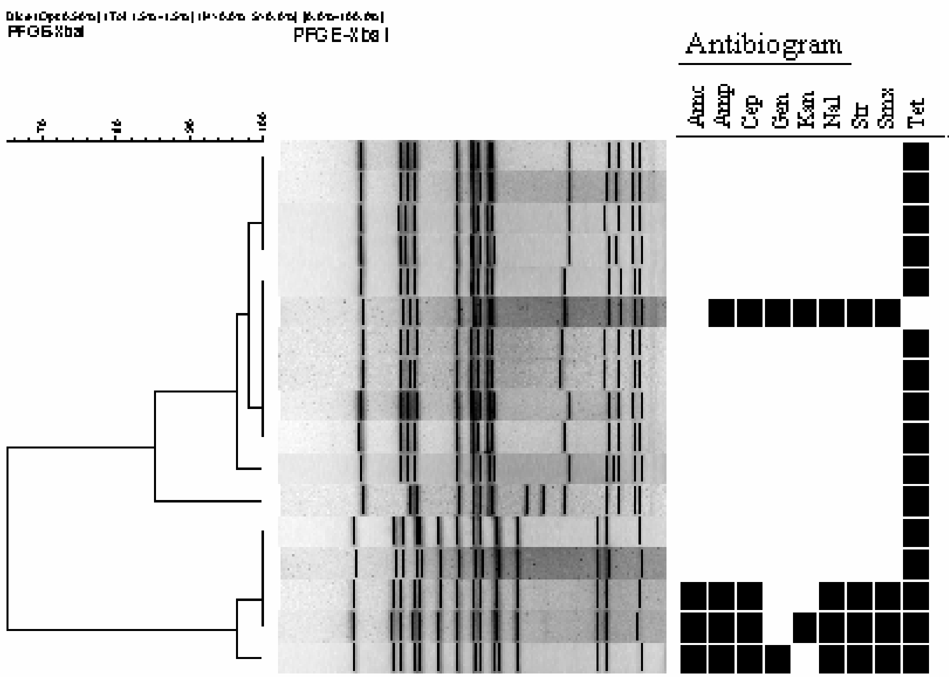


A-4a. PFGE Profiles of *Salmonella* Heidelberg, 2002.



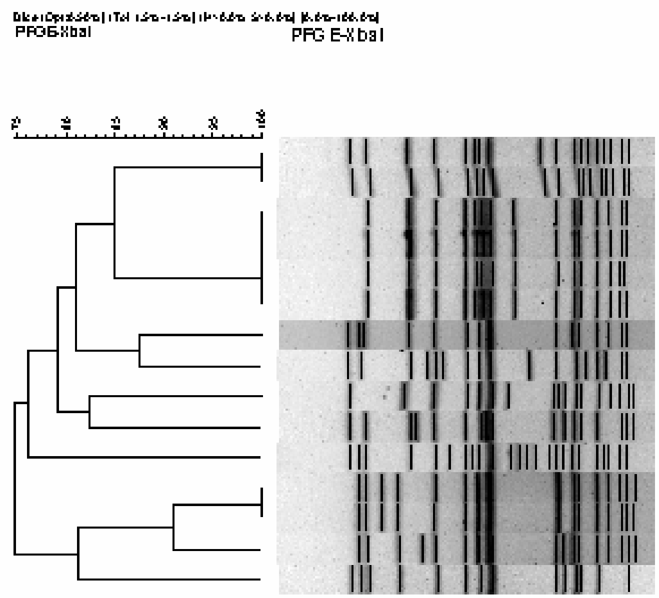
Amx	Amp	Fox	Cep	Gen	Kan	Nal	Str	Smx	Tet	Tio	CVM #	State	Source	Date Isolated	Serotype
					■		■		■		20042	TN	Ground Turkey	01/02	Heidelberg
					■		■		■		20043	TN	Ground Turkey	01/02	Heidelberg
				■	■		■	■	■		20052	TN	Chicken Breast	05/02	Heidelberg
				■	■		■	■	■		20053	TN	Chicken Breast	05/02	Heidelberg
				■	■		■	■	■		20054	TN	Chicken Breast	05/02	Heidelberg
				■	■		■	■	■		20055	TN	Chicken Breast	05/02	Heidelberg
				■	■		■	■	■		23194	TN	Ground Turkey	11/02	Heidelberg
					■		■		■		28646	GA	Ground Turkey	10/02	Heidelberg
				■			■	■			20041	TN	Ground Turkey	01/02	Heidelberg
■	■	■	■	■	■		■	■	■	■	21380	CT	Ground Turkey	07/02	Heidelberg
■	■	■	■	■	■		■	■	■	■	21381	CT	Ground Turkey	07/02	Heidelberg
							■				21983	MN	Ground Turkey	12/02	Heidelberg
											21984	MN	Ground Turkey	12/02	Heidelberg
				■			■	■	■		21985	MN	Ground Turkey	12/02	Heidelberg
											21986	MN	Ground Turkey	12/02	Heidelberg
											28642	GA	Ground Turkey	10/02	Heidelberg
											22020	OR	Chicken Breast	12/02	Heidelberg
						■			■		22687	MD	Ground Turkey	07/02	Heidelberg
											18103	GA	Ground Turkey	01/02	Heidelberg
											18104	GA	Ground Turkey	01/02	Heidelberg
											18812	GA	Ground Turkey	03/02	Heidelberg
	■		■								20791	GA	Chicken Breast	05/02	Heidelberg
											21350	MN	Chicken Breast	03/02	Heidelberg
■	■	■	■	■	■		■	■	■	■	21382	CT	Ground Turkey	07/02	Heidelberg
	■		■	■			■	■			21383	CT	Chicken Breast	09/02	Heidelberg
							■				21407	OR	Chicken Breast	09/02	Heidelberg
											22696	MD	Ground Turkey	10/02	Heidelberg
				■			■	■	■		22701	MD	Pork Chop	11/02	Heidelberg
				■			■	■	■		22702	MD	Pork Chop	11/02	Heidelberg
				■			■	■			22700	MD	Pork Chop	11/02	Heidelberg
											22394	CT	Chicken Breast	10/02	Heidelberg
							■		■		20787	GA	Chicken Breast	04/02	Heidelberg
■	■	■	■				■	■	■	■	20692	CT	Ground Turkey	06/02	Heidelberg
					■		■		■		22396	CT	Ground Turkey	10/02	Heidelberg
					■		■		■		22399	CT	Ground Turkey	10/02	Heidelberg

A-4b. PFGE Profiles of *Salmonella* Saintpaul, 2002.



CVM #	State	Source	Date Isolated	Serotype
23196	TN	Ground Turkey	11/02	Saintpaul
28647	GA	Ground Turkey	10/02	Saintpaul
22019	OR	Ground Turkey	11/02	Saintpaul
22149	GA	Ground Turkey	07/02	Saintpaul
18102	GA	Ground Turkey	01/02	Saintpaul
18699	CT	Ground Turkey	04/02	Saintpaul
20047	TN	Ground Turkey	02/02	Saintpaul
20048	TN	Ground Turkey	02/02	Saintpaul
23197	TN	Ground Turkey	11/02	Saintpaul
28651	GA	Ground Turkey	10/02	Saintpaul
22018	OR	Ground Turkey	11/02	Saintpaul
20039	TN	Ground Turkey	01/02	Saintpaul
23195	TN	Ground Turkey	11/02	Saintpaul
21027	TN	Ground Turkey	02/02	Saintpaul
22397	CT	Ground Turkey	10/02	Saintpaul
22398	CT	Ground Turkey	10/02	Saintpaul
22395	CT	Ground Turkey	10/02	Saintpaul

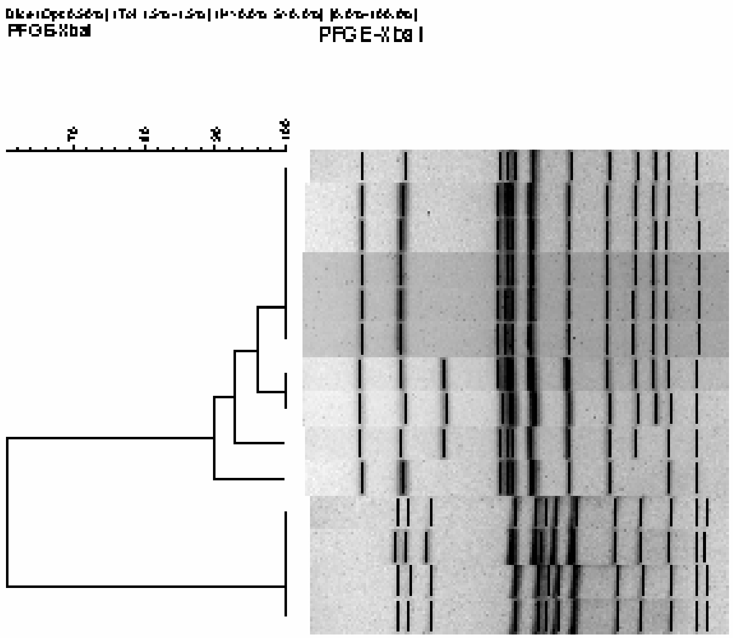
A-4c. PFGE Profiles of *Salmonella* Typhimurium, 2002.



Antibiogram

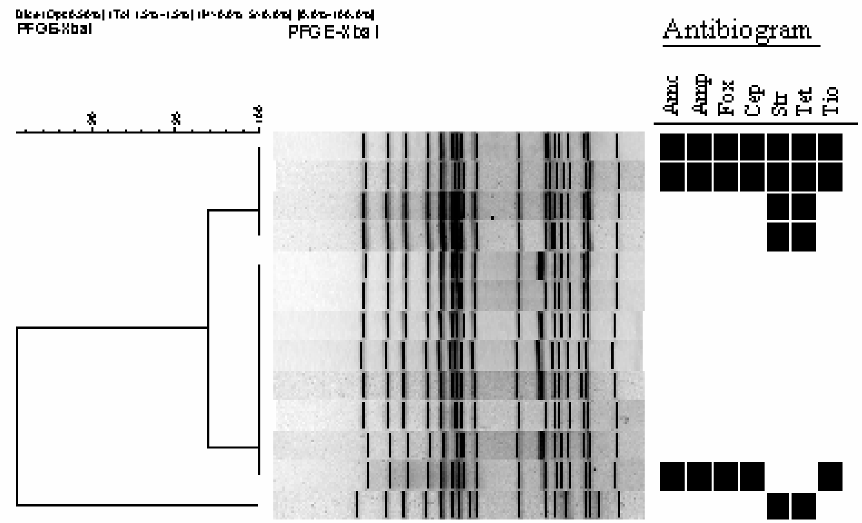
Amc	Amp	Fox	Cep	Chl	Str	Smx	Tet	Tio	CVM #	State	Source	Date Isolated	Serotype
■	■	■	■					■	22685	MD	Chicken Breast	07/02	Typhimurium var. O 5 - (Copenhagen)
■	■	■	■					■	22686	MD	Chicken Breast	07/02	Typhimurium var. O 5 - (Copenhagen)
						■	■		21376	CT	Chicken Breast	07/02	Typhimurium var. O 5 - (Copenhagen)
						■	■		21377	CT	Chicken Breast	07/02	Typhimurium var. O 5 - (Copenhagen)
						■	■		21378	CT	Chicken Breast	07/02	Typhimurium var. O 5 - (Copenhagen)
						■	■		21379	CT	Chicken Breast	07/02	Typhimurium var. O 5 - (Copenhagen)
									22703	MD	Chicken Breast	12/02	Typhimurium
■	■	■	■					■	21352	MN	Chicken Breast	05/02	Typhimurium var. O 5 - (Copenhagen)
							■		18106	GA	Pork Chop	01/02	Typhimurium var. O 5 - (Copenhagen)
	■			■	■	■	■		22691	MD	Pork Chop	08/02	Typhimurium var. O 5 - (Copenhagen)
									18697	CT	Ground Beef	04/02	Typhimurium
									22400	CT	Ground Turkey	10/02	Typhimurium
									22401	CT	Ground Turkey	10/02	Typhimurium
									22402	CT	Ground Beef	10/02	Typhimurium
									20050	TN	Chicken Breast	04/02	Typhimurium

A-4d. PFGE Profiles of *Salmonella* Enteritidis, 2002.



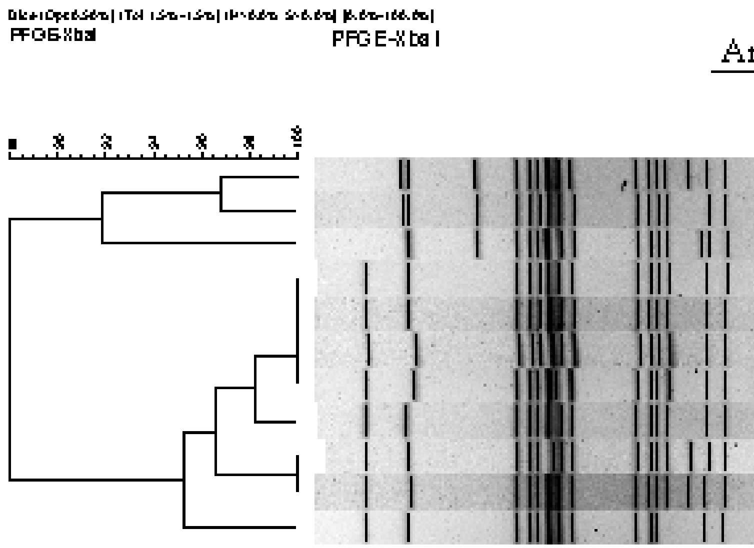
CVM #	State	Source	Date Isolated	Serotype
19755	MD	Ground Beef	03/02	Enteritidis
22689	MD	Chicken Breast	08/02	Enteritidis
22690	MD	Chicken Breast	08/02	Enteritidis
22704	MD	Ground Turkey	12/02	Enteritidis
22705	MD	Ground Turkey	12/02	Enteritidis
22706	MD	Ground Turkey	12/02	Enteritidis
18088	CT	Chicken Breast	02/02	Enteritidis
18093	CT	Ground Turkey	02/02	Enteritidis
18685	CT	Chicken Breast	03/02	Enteritidis
22695	MD	Ground Turkey	10/02	Enteritidis
20034	TN	Chicken Breast	01/02	Enteritidis
20035	TN	Chicken Breast	01/02	Enteritidis
20036	TN	Chicken Breast	01/02	Enteritidis
20037	TN	Chicken Breast	01/02	Enteritidis

A-4e. PFGE Profiles of *Salmonella* Kentucky, 2002.



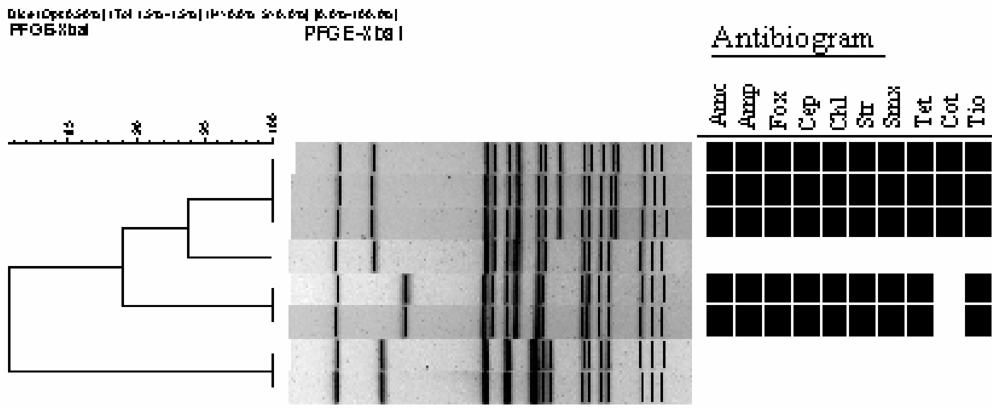
CVM #	State	Source	Date Isolated	Serotype
21384	CT	Chicken Breast	09/02	Kentucky
22694	MD	Chicken Breast	09/02	Kentucky
23192	TN	Chicken Breast	11/02	Kentucky
23193	TN	Chicken Breast	11/02	Kentucky
18087	CT	Chicken Breast	02/02	Kentucky
18089	CT	Chicken Breast	02/02	Kentucky
18090	CT	Chicken Breast	02/02	Kentucky
18091	CT	Chicken Breast	02/02	Kentucky
20044	TN	Chicken Breast	02/02	Kentucky
20051	TN	Chicken Breast	04/02	Kentucky
20793	GA	Chicken Breast	06/02	Kentucky
21359	MN	Ground Turkey	05/02	Kentucky
21982	MN	Chicken Breast	12/02	Kentucky

A-4f. PFGE Profiles for *Salmonella* Hadar, 2002.



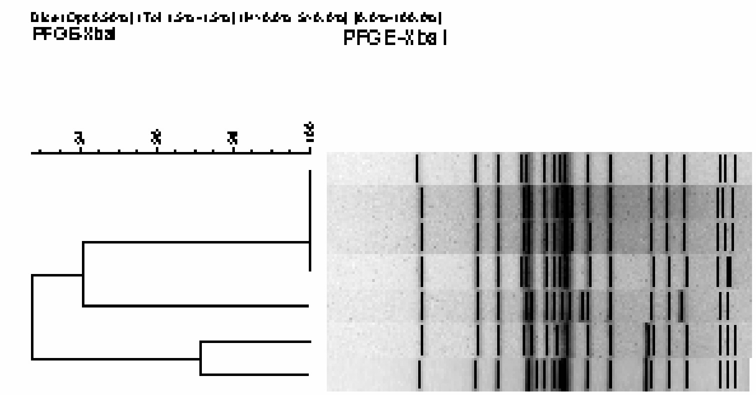
Antibiogram: STR	Antibiogram: TET	CVM #	State	Source	Date Isolated	Serotype
■	■	20789	GA	Ground Turkey	04/02	Hadar
■	■	20790	GA	Ground Turkey	04/02	Hadar
■	■	21351	MN	Ground Turkey	04/02	Hadar
■	■	18105	GA	Chicken Breast	01/02	Hadar
■	■	22021	OR	Chicken Breast	12/02	Hadar
		22147	GA	Ground Turkey	07/02	Hadar
		22148	GA	Ground Turkey	07/02	Hadar
■	■	22693	MD	Chicken Breast	09/02	Hadar
■	■	18811	GA	Ground Turkey	03/02	Hadar
■	■	22017	OR	Chicken Breast	11/02	Hadar
■	■	28650	GA	Ground Turkey	10/02	Hadar

A-4g. PFGE Profiles for *Salmonella* Newport, 2002.



CVM #	State	Source	Date Isolated	Serotype
22697	MD	Ground Turkey	10/02	Newport
22698	MD	Pork Chop	10/02	Newport
22699	MD	Pork Chop	10/02	Newport
22151	GA	Ground Beef	08/02	Newport
22404	CT	Ground Beef	11/02	Newport
22707	MD	Ground Beef	12/02	Newport
23198	TN	Ground Turkey	11/02	Newport
23199	TN	Ground Turkey	11/02	Newport

A-4h. PFGE Profiles for *Salmonella* Reading, 2002.

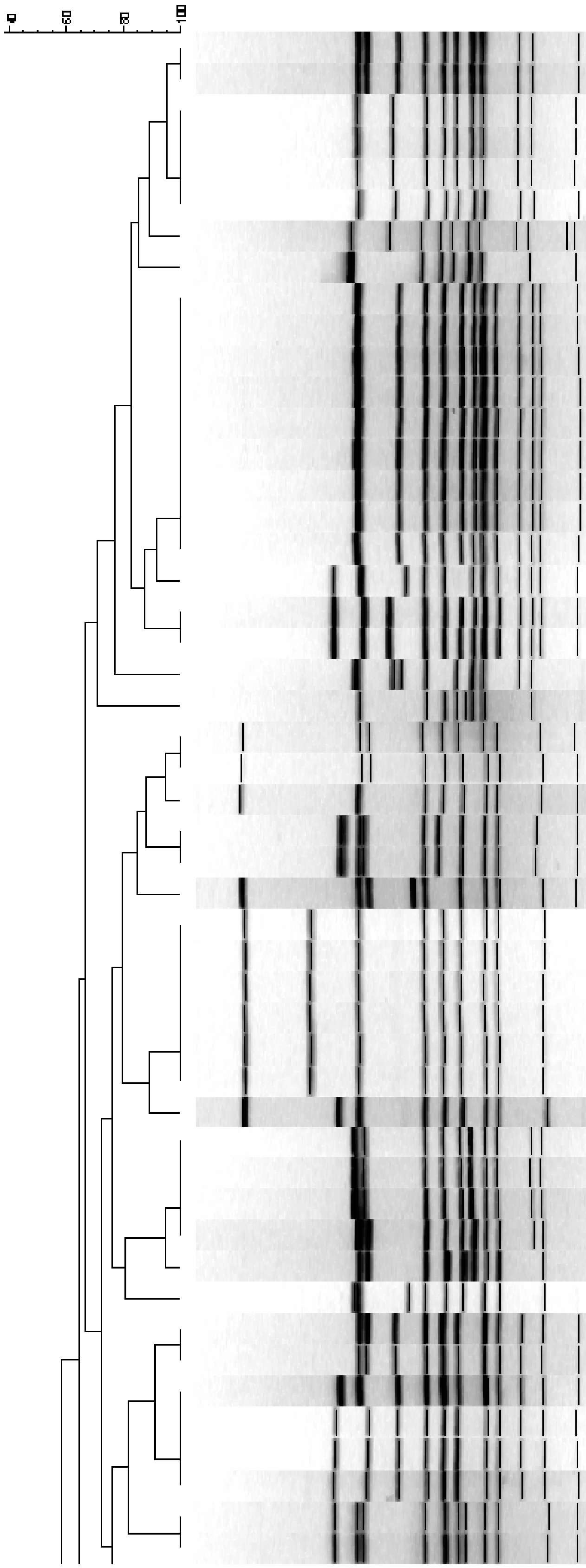


Antibiogram

Amp	Cep	Chl	Kan	Str	Smx	Tet	CVM #	State	Source	Date Isolated	Serotype
							18810	GA	Ground Turkey	03/02	Reading
							20588	CT	Ground Turkey	05/02	Reading
							20589	CT	Ground Turkey	05/02	Reading
							21360	MN	Ground Turkey	08/02	Reading
■	■					■	20792	GA	Ground Turkey	05/02	Reading
							20794	GA	Ground Turkey	06/02	Reading
■		■	■	■	■	■	20795	GA	Pork Chop	06/02	Reading

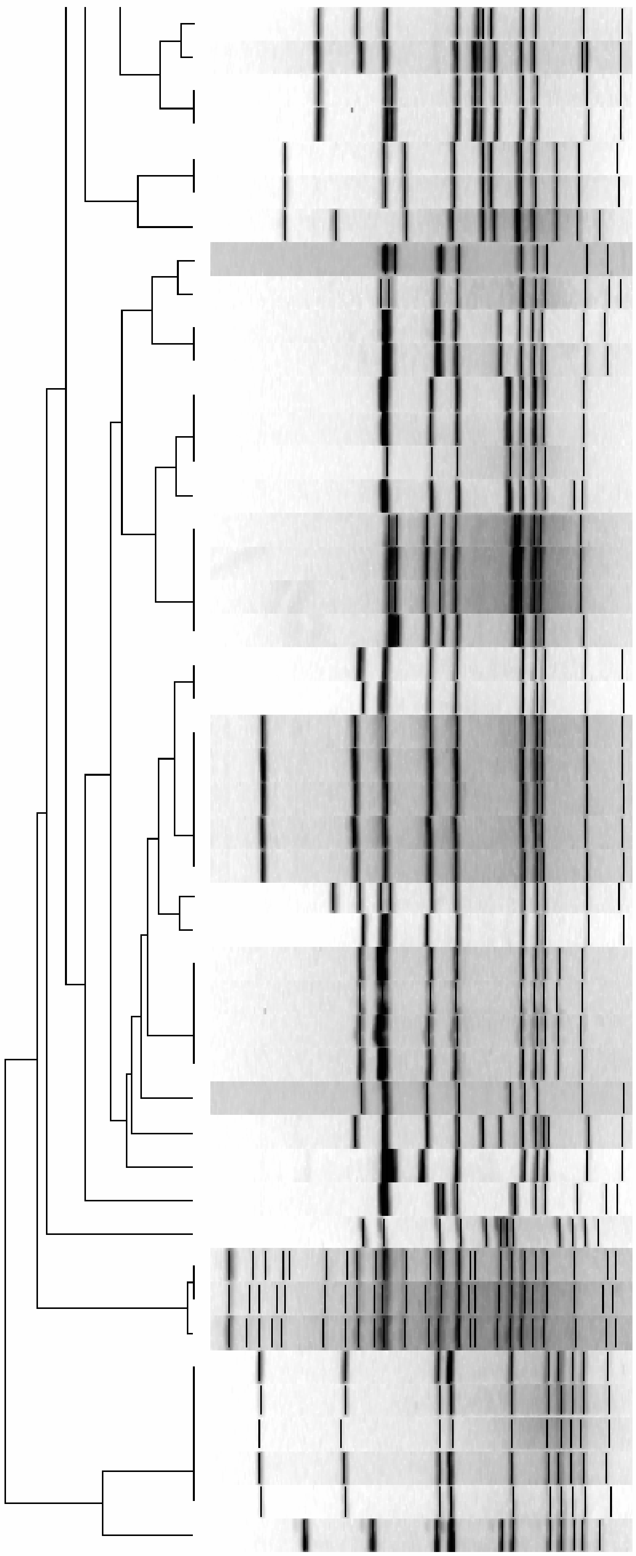
Dice (Opt:0.50%) (Tol 1.5%-1.5%) (H>0.0% S>0.0%) [0.1%-100.0%]
PFGE-SmaI

PFGE-SmaI



Agar Dilution

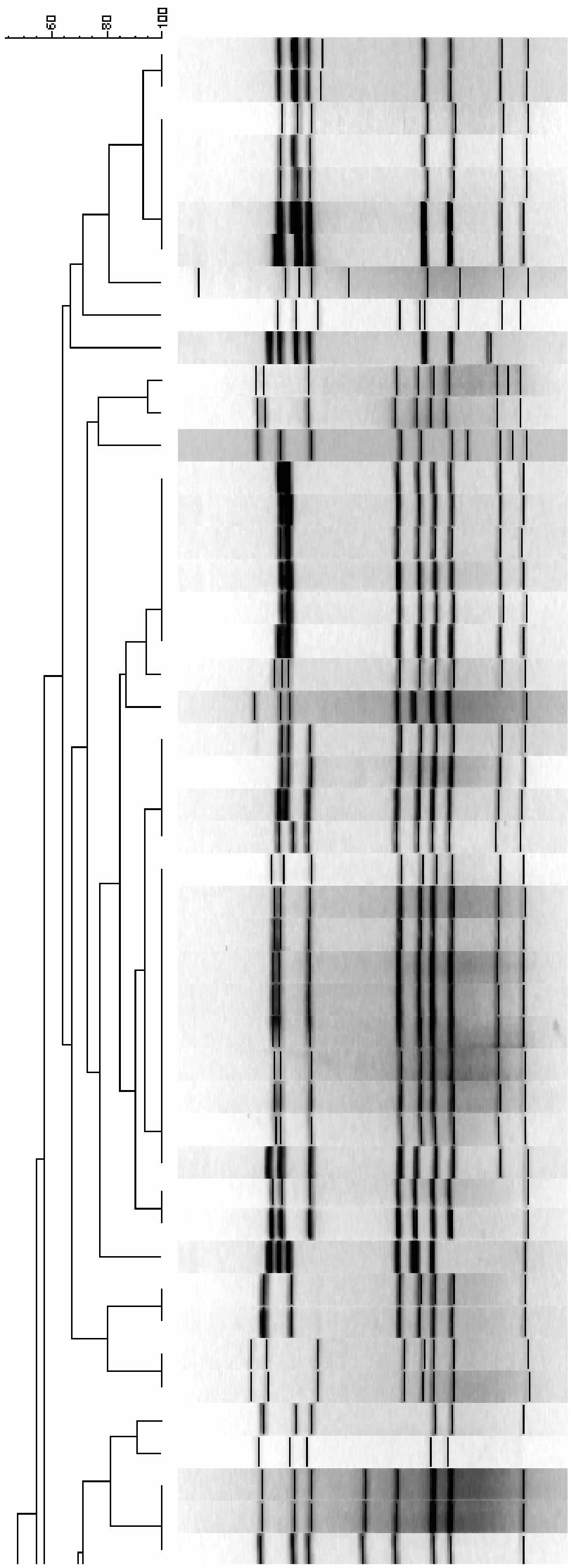
CIP	ERY	DOX	GEN	CVM #	State	Source	Date Isolated	Species
				28654	GA	Chicken Breast	12/02	coli
				28655	GA	Chicken Breast	10/02	coli
		■		20107	TN	Chicken Breast	06/02	coli
		■		20108	TN	Chicken Breast	06/02	coli
		■		20109	TN	Chicken Breast	06/02	coli
		■		20113	TN	Chicken Breast	06/02	coli
		■		20115	TN	Chicken Breast	06/02	coli
	■	■		18706	CT	Chicken Breast	04/02	coli
				22003	MN	Chicken Breast	12/02	coli
				22004	MN	Chicken Breast	12/02	coli
				22005	MN	Chicken Breast	12/02	coli
				22006	MN	Chicken Breast	12/02	coli
				22007	MN	Chicken Breast	12/02	coli
				22008	MN	Chicken Breast	12/02	coli
				22009	MN	Chicken Breast	12/02	coli
				22010	MN	Chicken Breast	12/02	coli
				22011	MN	Chicken Breast	12/02	coli
				28674	GA	Chicken Breast	12/02	coli
				28672	GA	Chicken Breast	12/02	coli
				28675	GA	Chicken Breast	12/02	coli
		■		20110	TN	Chicken Breast	06/02	coli
				20804	GA	Chicken Breast	05/02	coli
				18708	CT	Chicken Breast	04/02	coli
				18709	CT	Chicken Breast	04/02	coli
■	■	■		20799	GA	Chicken Breast	04/02	coli
	■			20058	TN	Chicken Breast	01/02	coli
	■			20060	TN	Chicken Breast	01/02	coli
				18174	GA	Chicken Breast	02/02	coli
		■		23210	TN	Chicken Breast	09/03	coli
	■	■		23211	TN	Chicken Breast	09/02	coli
	■	■		23212	TN	Chicken Breast	09/02	coli
	■	■		23213	TN	Chicken Breast	09/02	coli
		■		23214	TN	Chicken Breast	09/02	coli
	■	■		23215	TN	Chicken Breast	09/02	coli
		■		28658	GA	Chicken Breast	10/02	coli
				22406	CT	Chicken Breast	10/02	coli
				22407	CT	Chicken Breast	10/02	coli
				22408	CT	Chicken Breast	10/02	coli
■				28659	GA	Chicken Breast	11/02	coli
■				28660	GA	Chicken Breast	11/02	coli
■		■		23653	MD	Chicken Breast	12/02	coli
				22159	GA	Chicken Breast	08/02	coli
				22165	GA	Chicken Breast	08/02	coli
		■		18173	GA	Chicken Breast	02/02	coli
				20111	TN	Chicken Breast	06/02	coli
				20112	TN	Chicken Breast	06/02	coli
				20114	TN	Chicken Breast	06/02	coli
■				20607	CT	Chicken Breast	06/02	coli
■				20608	CT	Chicken Breast	06/02	coli



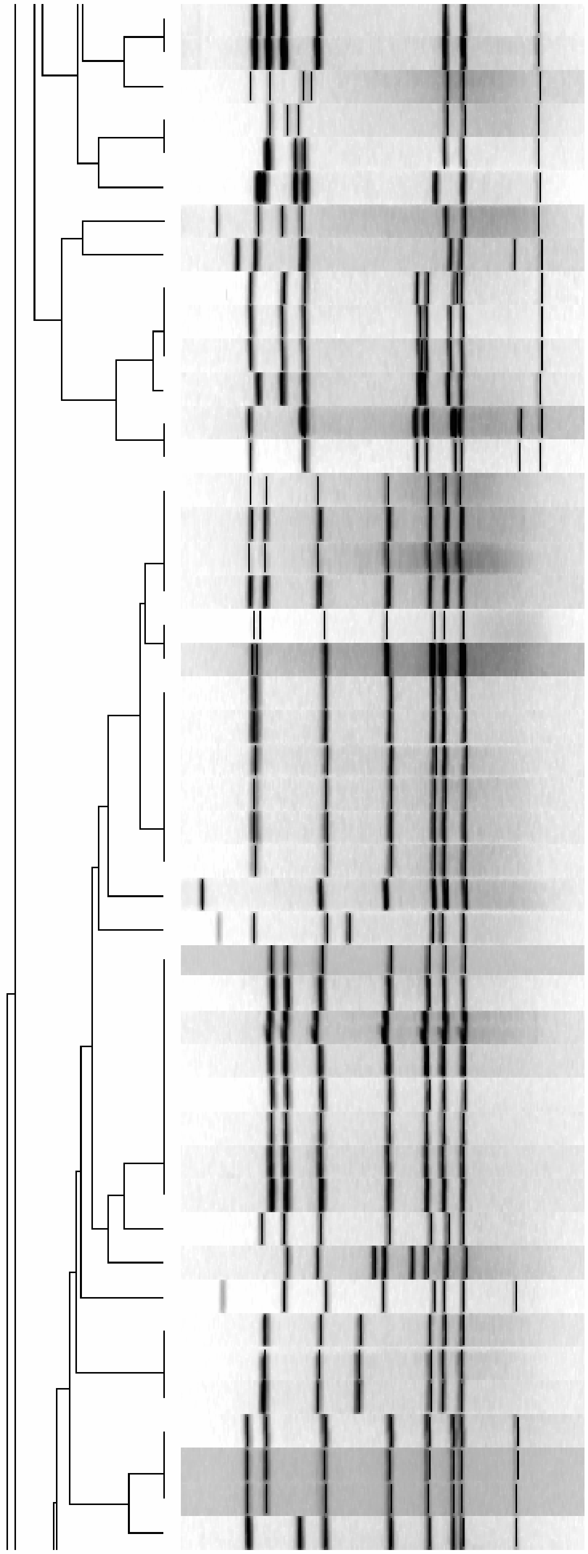
	Agar Dilution							
CIP	ERY	DOX	GEN	CVM #	State	Source	Date Isolated	Species
		■		20801	GA	Chicken Breast	04/02	coli
		■		22166	GA	Chicken Breast	09/02	coli
		■		19762-1	MD	Chicken Breast	01/02	coli
		■		19763-1	MD	Chicken Breast	01/02	coli
				20076	TN	Pork Chop	02/02	coli
				20077	TN	Pork Chop	02/02	coli
	■	■		20078	TN	Pork Chop	02/02	coli
■		■		18096	CT	Chicken Breast	02/02	coli
		■		21401	CT	Chicken Breast	09/02	coli
				18704	CT	Chicken Breast	04/02	coli
				21366	MN	Chicken Breast	05/02	coli
	■			21051-1	MD	Chicken Breast	05/02	coli
	■			21053-1	MD	Chicken Breast	05/02	coli
	■			21054	MD	Chicken Breast	05/02	coli
		■		21052-1	MD	Chicken Breast	05/02	coli
				21371	MN	Chicken Breast	08/02	coli
				21372	MN	Chicken Breast	08/02	coli
				21373	MN	Chicken Breast	08/02	coli
				21375	MN	Chicken Breast	08/02	coli
■		■		21063	MD	Chicken Breast	06/02	coli
		■		21064	MD	Chicken Breast	06/02	coli
		■		20596	CT	Chicken Breast	05/02	coli
		■		20597	CT	Chicken Breast	05/02	coli
		■		20598	CT	Chicken Breast	05/02	coli
		■		20599	CT	Chicken Breast	05/02	coli
		■		20600	CT	Chicken Breast	05/02	coli
	■			18817	GA	Chicken Breast	03/02	coli
■	■			19775	MD	Chicken Breast	02/02	coli
	■	■		22409	CT	Chicken Breast	10/02	coli
	■	■		22411	CT	Chicken Breast	10/02	coli
	■	■		22412	CT	Chicken Breast	10/02	coli
	■	■		22413	CT	Chicken Breast	10/02	coli
				17541	CT	Chicken Breast	02/02	coli
				20606	CT	Chicken Breast	06/02	coli
				28673	GA	Chicken Breast	12/02	coli
				23217	TN	Ground Turkey	11/02	coli
■		■		21370	MN	Ground Turkey	07/02	coli
		■		20807	GA	Chicken Breast	06/02	coli
		■		20813	GA	Chicken Breast	06/02	coli
		■		20814	GA	Chicken Breast	06/02	coli
				20079	TN	Chicken Breast	03/02	coli
				20080	TN	Chicken Breast	03/02	coli
				20081	TN	Chicken Breast	03/02	coli
				20082	TN	Chicken Breast	03/02	coli
				20086	TN	Chicken Breast	03/02	coli
				22160	GA	Chicken Breast	08/02	coli

Dice (Opt:0.50%) (Tol 1.5%-1.5%) (H>0.0% S>0.0%) [0.1%-100.0%]
PFGE-SmaI

PFGE-SmaI

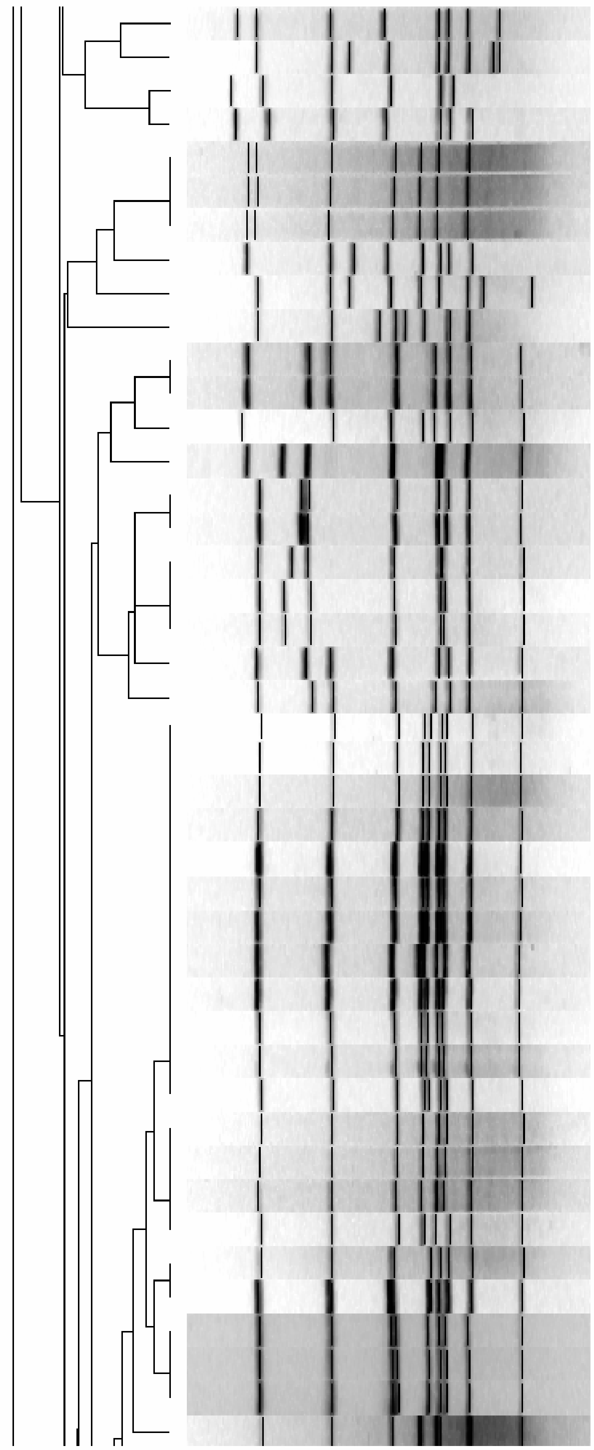


Agar Dilution								
CIP	ERY	DOX	GEN	CVM #	State	Source	Date Isolated	Specie
				20796	GA	Chicken Breast	04/02	jejuni
				20797	GA	Chicken Breast	04/02	jejuni
				20065	TN	Chicken Breast	01/02	jejuni
■				23216	TN	Chicken Breast	10/02	jejuni
				28662	GA	Chicken Breast	11/02	jejuni
				28668	GA	Chicken Breast	12/02	jejuni
				28669	GA	Chicken Breast	12/02	jejuni
■				20090	TN	Chicken Breast	03/02	jejuni
				23645	MD	Pork Chop	11/02	jejuni
				28656	GA	Chicken Breast	10/02	jejuni
■				18700	CT	Ground Turkey	04/02	jejuni
■		■		18707	CT	Chicken Breast	04/02	jejuni
				18101	CT	Chicken Breast	02/02	jejuni
				23201	TN	Chicken Breast	08/02	jejuni
				23203	TN	Chicken Breast	08/02	jejuni
				23204	TN	Chicken Breast	08/02	jejuni
				23206	TN	Chicken Breast	08/02	jejuni
				23208	TN	Chicken Breast	08/02	jejuni
				23209	TN	Chicken Breast	08/02	jejuni
				23207	TN	Chicken Breast	08/02	jejuni
				21389	CT	Chicken Breast	07/02	jejuni
				20798	GA	Chicken Breast	04/02	jejuni
				28677	GA	Chicken Breast	12/02	jejuni
				22745	MD	Chicken Breast	09/02	jejuni
				22748	MD	Chicken Breast	09/02	jejuni
		■		18701	CT	Ground Turkey	04/02	jejuni
				20091	TN	Chicken Breast	03/02	jejuni
				20092	TN	Chicken Breast	03/02	jejuni
				20093	TN	Chicken Breast	03/02	jejuni
				20095	TN	Chicken Breast	03/02	jejuni
				20096	TN	Chicken Breast	03/02	jejuni
				20097	TN	Chicken Breast	03/02	jejuni
				20098	TN	Chicken Breast	03/02	jejuni
				21374	MN	Chicken Breast	08/02	jejuni
				28661	GA	Chicken Breast	11/02	jejuni
				21989	MN	Chicken Breast	10/02	jejuni
				21990	MN	Chicken Breast	10/02	jejuni
				22156	GA	Chicken Breast	07/02	jejuni
		■		21367	MN	Chicken Breast	07/02	jejuni
				21368	MN	Chicken Breast	07/02	jejuni
				20809	GA	Chicken Breast	06/02	jejuni
				20810	GA	Chicken Breast	06/02	jejuni
				18702	CT	Chicken Breast	04/02	jejuni
				20105	TN	Chicken Breast	05/02	jejuni
■				21393	CT	Chicken Breast	08/02	jejuni
■				21394	CT	Chicken Breast	08/02	jejuni
				22595	CT	Chicken Breast	12/02	jejuni

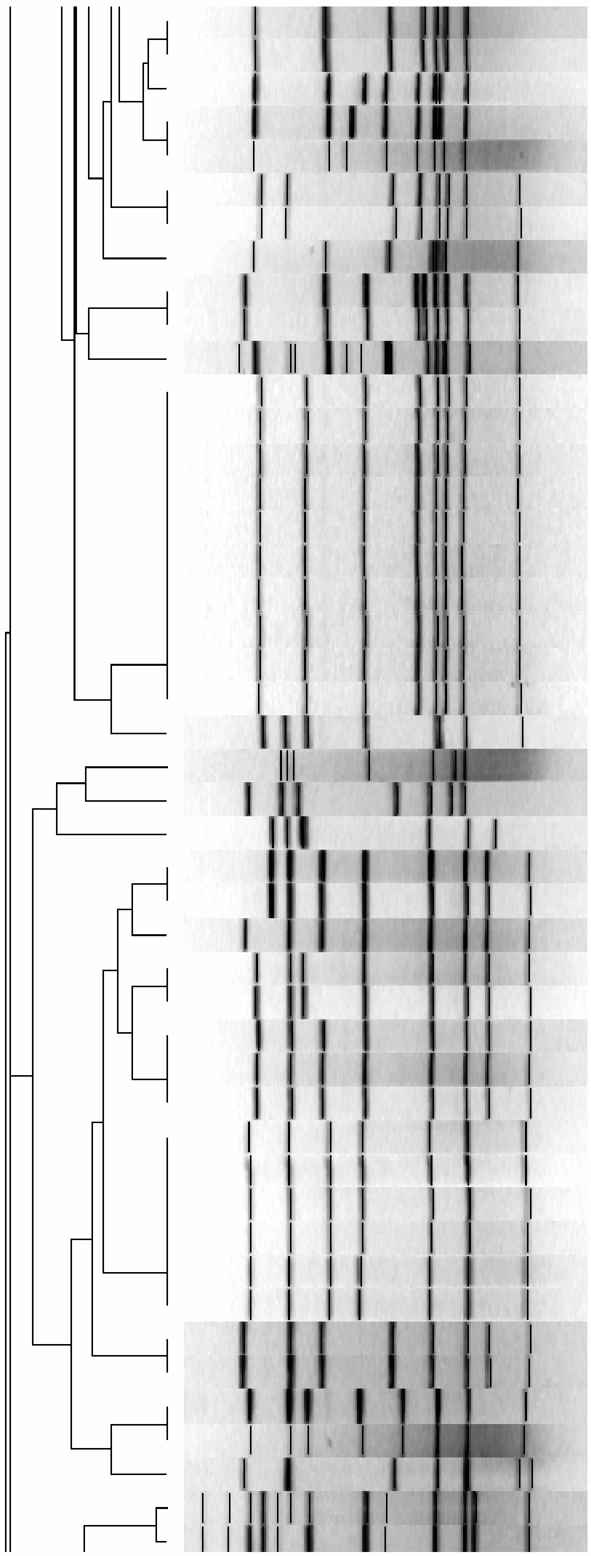


Agar Dilution								
CIP	ERY	DOX	GEN	CVM #	State	Source	Date Isolated	Species
				28665	GA	Chicken Breast	11/02	jejuni
				28666	GA	Chicken Breast	11/02	jejuni
				20803	GA	Chicken Breast	05/02	jejuni
				19792	MD	Chicken Breast	03/02	jejuni
				22162	GA	Chicken Breast	08/02	jejuni
				28676	GA	Chicken Breast	12/02	jejuni
				22158	GA	Chicken Breast	07/02	jejuni
				22414	CT	Pork Chop	10/02	jejuni
		■		21398	CT	Chicken Breast	08/02	jejuni
				28652	GA	Chicken Breast	12/02	jejuni
				28653	GA	Chicken Breast	12/01	jejuni
				28667	GA	Chicken Breast	11/02	jejuni
		■		21395-1	CT	Chicken Breast	08/02	jejuni
				21397	CT	Chicken Breast	08/02	jejuni
				21991	MN	Chicken Breast	10/02	jejuni
				21994	MN	Chicken Breast	10/02	jejuni
				21992	MN	Chicken Breast	10/02	jejuni
				21993	MN	Chicken Breast	10/02	jejuni
				20106	TN	Chicken Breast	05/02	jejuni
				21391	CT	Chicken Breast	07/02	jejuni
■				21400	CT	Chicken Breast	09/02	jejuni
■				21402	CT	Chicken Breast	09/02	jejuni
■				21403	CT	Chicken Breast	09/02	jejuni
■				21404	CT	Chicken Breast	09/02	jejuni
■				21405	CT	Chicken Breast	09/02	jejuni
■				21406	CT	Chicken Breast	09/02	jejuni
				22012	MN	Chicken Breast	12/02	jejuni
■		■		19779	MD	Chicken Breast	02/02	jejuni
				18108	GA	Chicken Breast	01/02	jejuni
				18109	GA	Chicken Breast	01/02	jejuni
				22157	GA	Chicken Breast	07/02	jejuni
				22169	GA	Chicken Breast	09/02	jejuni
				22172	GA	Chicken Breast	09/02	jejuni
				23200	TN	Chicken Breast	08/02	jejuni
				23202	TN	Chicken Breast	08/02	jejuni
				23205	TN	Chicken Breast	08/02	jejuni
				18818	GA	Chicken Breast	03/02	jejuni
				20808	GA	Chicken Breast	06/02	jejuni
				19778-2	MD	Chicken Breast	02/02	jejuni
				20057	TN	Chicken Breast	01/02	jejuni
				20062	TN	Chicken Breast	01/02	jejuni
				20063	TN	Chicken Breast	01/02	jejuni
		■		18097	CT	Chicken Breast	02/02	jejuni
		■		18098	CT	Chicken Breast	02/02	jejuni
		■		18099	CT	Chicken Breast	02/02	jejuni
				28671	GA	Chicken Breast	12/02	jejuni

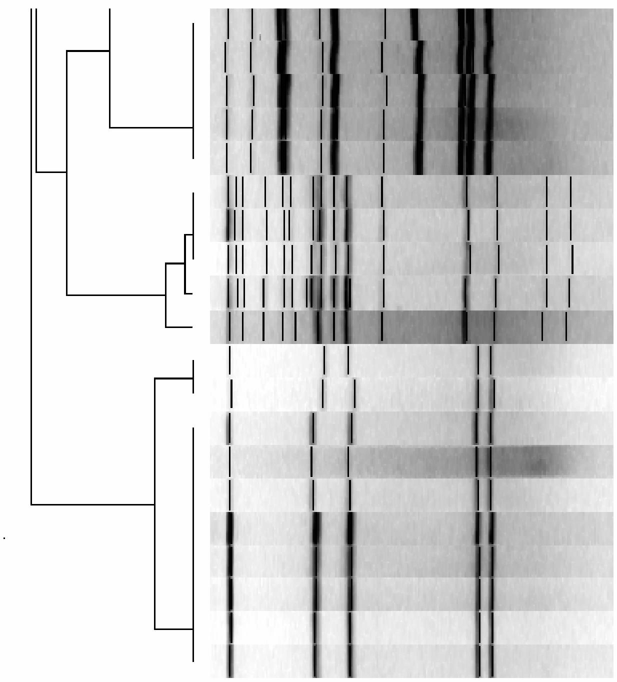
Agar Dilution



CIP	ERY	DOX	GEN	CVM #	State	Source	Date Isolated	Species
■				20064	TN	Chicken Breast	01/02	jejuni
■				21057	MD	Chicken Breast	06/02	jejuni
■				21046	MD	Chicken Breast	05/02	jejuni
		■		22164	GA	Chicken Breast	08/02	jejuni
■				18692	CT	Chicken Breast	03/02	jejuni
■				18694-1	CT	Chicken Breast	03/02	jejuni
■				18696	CT	Chicken Breast	03/02	jejuni
				20800	GA	Chicken Breast	04/02	jejuni
				21365	MN	Chicken Breast	05/02	jejuni
■				18703	CT	Chicken Breast	04/02	jejuni
				18175	GA	Chicken Breast	02/02	jejuni
				18176	GA	Chicken Breast	02/02	jejuni
				20802	GA	Chicken Breast	04/02	jejuni
				22155	GA	Chicken Breast	07/02	jejuni
				22167	GA	Chicken Breast	09/02	jejuni
				22168	GA	Chicken Breast	09/02	jejuni
				20059	TN	Chicken Breast	01/02	jejuni
				28663	GA	Chicken Breast	11/02	jejuni
				28664	GA	Chicken Breast	11/02	jejuni
		■		22163	GA	Chicken Breast	08/02	jejuni
				22161	GA	Chicken Breast	08/02	jejuni
				20103	TN	Chicken Breast	05/02	jejuni
				20104	TN	Chicken Breast	05/02	jejuni
		■		20805	GA	Chicken Breast	05/02	jejuni
		■		20806	GA	Chicken Breast	05/02	jejuni
				22709	MD	Chicken Breast	07/02	jejuni
				22712	MD	Chicken Breast	07/02	jejuni
				22734	MD	Chicken Breast	08/02	jejuni
				22736	MD	Chicken Breast	08/02	jejuni
				22749	MD	Chicken Breast	09/02	jejuni
				22751	MD	Chicken Breast	09/02	jejuni
				22752	MD	Chicken Breast	09/02	jejuni
				23652	MD	Chicken Breast	12/02	jejuni
				18687	CT	Chicken Breast	03/02	jejuni
				18688	CT	Chicken Breast	03/02	jejuni
				18689-1	CT	Chicken Breast	03/02	jejuni
				21399	CT	Chicken Breast	09/02	jejuni
■		■		21386	CT	Chicken Breast	07/02	jejuni
■				21388-1	CT	Chicken Breast	07/02	jejuni
				17542	CT	Chicken Breast	02/02	jejuni
				17543	CT	Chicken Breast	02/02	jejuni
				18107	GA	Chicken Breast	01/02	jejuni
				21390	CT	Chicken Breast	07/02	jejuni



Agar Dilution								
CIP	ERY	DOX	GEN	CVM #	State	Source	Date Isolated	Species
				21385	CT	Chicken Breast	07/02	jejuni
				21387	CT	Chicken Breast	07/02	jejuni
■				18182	GA	Chicken Breast	02/02	jejuni
■				18181	GA	Chicken Breast	02/02	jejuni
■				18695	CT	Chicken Breast	03/02	jejuni
		■		20811	GA	Chicken Breast	06/02	jejuni
		■		20812	GA	Chicken Breast	06/02	jejuni
■		■		21396	CT	Chicken Breast	08/02	jejuni
				22708	MD	Chicken Breast	07/02	jejuni
				22710	MD	Chicken Breast	07/02	jejuni
				18094	CT	Chicken Breast	02/02	jejuni
		■		20066	TN	Chicken Breast	02/02	jejuni
		■		20067	TN	Chicken Breast	02/02	jejuni
		■		20068	TN	Chicken Breast	02/02	jejuni
		■		20069	TN	Chicken Breast	02/02	jejuni
		■		20070	TN	Chicken Breast	02/02	jejuni
		■		20071	TN	Chicken Breast	02/02	jejuni
		■		20072	TN	Chicken Breast	02/02	jejuni
		■		20073	TN	Chicken Breast	02/02	jejuni
		■		20074	TN	Chicken Breast	02/02	jejuni
		■		20075	TN	Chicken Breast	02/02	jejuni
				28670	GA	Chicken Breast	12/02	jejuni
		■		18690	CT	Chicken Breast	03/02	jejuni
				20116	TN	Chicken Breast	06/02	jejuni
				22171	GA	Chicken Breast	09/02	jejuni
				21996	MN	Chicken Breast	11/02	jejuni
				22002	MN	Chicken Breast	11/02	jejuni
				21995	MN	Chicken Breast	11/02	jejuni
				21999	MN	Chicken Breast	11/02	jejuni
				22000	MN	Chicken Breast	11/02	jejuni
				21997	MN	Chicken Breast	11/02	jejuni
				21998	MN	Chicken Breast	11/02	jejuni
				22001	MN	Chicken Breast	11/02	jejuni
		■		18813	GA	Chicken Breast	03/02	jejuni
		■		18814	GA	Chicken Breast	03/02	jejuni
		■		18815	GA	Chicken Breast	03/02	jejuni
		■		18816	GA	Chicken Breast	03/02	jejuni
				18819	GA	Chicken Breast	03/02	jejuni
				18820	GA	Chicken Breast	03/04	jejuni
		■		18177	GA	Chicken Breast	02/02	jejuni
		■		18178	GA	Chicken Breast	02/02	jejuni
		■		18179	GA	Chicken Breast	02/02	jejuni
		■		18180	GA	Chicken Breast	02/02	jejuni
				28657	GA	Chicken Breast	10/02	jejuni
				19759	MD	Chicken Breast	01/02	jejuni
				19760	MD	Chicken Breast	01/02	jejuni



Agar Dilution

CIP	ERY	DOX	GEN	CVM #	State	Source	Date Isolated	Species
				21392	CT	Chicken Breast	08/02	jejuni
				22415	CT	Chicken Breast	11/02	jejuni
		■		22592	CT	Chicken Breast	11/02	jejuni
				22593	CT	Chicken Breast	11/02	jejuni
				22594	CT	Chicken Breast	11/02	jejuni
■				20083	TN	Chicken Breast	03/02	jejuni
■				20088	TN	Chicken Breast	03/02	jejuni
■				20089	TN	Chicken Breast	03/02	jejuni
■				20085	TN	Chicken Breast	03/02	jejuni
				22170	GA	Chicken Breast	09/02	jejuni
				21049	MD	Chicken Breast	05/02	jejuni
				21408	OR	Chicken Breast	09/02	jejuni
				18691	CT	Chicken Breast	03/02	jejuni
■				18693	CT	Chicken Breast	03/02	jejuni
				18705	CT	Chicken Breast	04/02	jejuni
		■		20601	CT	Chicken Breast	05/02	jejuni
		■		20602	CT	Chicken Breast	05/02	jejuni
		■		20603	CT	Chicken Breast	05/02	jejuni
		■		20604	CT	Chicken Breast	05/02	jejuni
		■		20605	CT	Chicken Breast	05/02	jejuni

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. ↓	Growth (√ One) Y	N	*Salmonella* IF GROWTH Serotype	Isolate ID Number	Growth (√ One) Y	N	*Campylobacter* IF GROWTH Species	Isolate ID Number	Growth (√ One) Y	N	*E. coli* (GA, MD, TN, OR) IF GROWTH Isolate ID Number	Growth (√ One) Y	N	Enterococci (GA,MD,TN, OR) 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, 2002

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 microdilution 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). 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 NCCLS approved agar dilution procedure was used to determine MICs to ciprofloxacin, doxycycline, erythromycin, gentamicin, and meropenem. (4,5). The NCCLS recommended quality control organism *Campylobacter jejuni* ATCC 33560 was used each time that antimicrobial susceptibility testing was performed (5). As there are no 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 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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