National Antimicrobial Resistance Monitoring System (NARMS)
Quarterly Conference Call

Date: Wednesday, May 28, 2003
Time: 2:00 E.S.T.
Federal Number: 404-639-3277
Non-federal Number: 800-311-3437
Conference Code: 972537

A. Administrative
   1. Roll call

B. Surveillance
   1. Status of manuscripts and abstracts
   2. NARMS nationwide
      i. Shipment of isolates (lab tubes)
      ii. Isolate submission guidelines
   3. Status of 2002 isolates
   4. Preliminary 2001 results
      i. 2001 Annual Report
   5. Phage typing
      i. *S.* Enteritidis
      ii. *S.* Newport and *S.* Typhimurium
   6. *Campylobacter* **(FoodNet sites only)**

C. Miscellaneous Topics
   1. ELC funding
   2. FWA and IRB
   3. Educational activities
   4. February conference call minutes
   5. NARMS Scientific Meeting (March 4-5, 2004, Atlanta, GA)

D. Upcoming conference calls, meetings, and deadlines

Meetings:

NFID	Washington, DC	June 23-25, 2003
AVMA	Denver, CO	July 19-23, 2003
ICAAC	Chicago, IL	September 14-17, 2003

Deadlines:

NFID abstract submission	April 1, 2003
ICAAC abstract submission	May 8, 2003
AVMA abstract submission	Unknown

Updated: 4-11-03

Status of Active Manuscripts

PRELIMINARY INFORMATION: SUBJECT TO CHANGE: NOT FOR DISTRIBUTION

Lead investigator (1st author)	Senior Author	Epi or Lab-section Author	Proposal	Abstract	Status	Date of last correspondence	Comments
Anderson, A	Angulo, F		Review of non-typhi *Salmonella* , NARMS 1996-2001		1	unknown	
Anderson, A	Angulo, F		Human health consequences of antimicrobial use in agriculture	IDSA 2001	5	1/19/2003	submitted to MDR
Angulo, F			Public Health Consequences of Use of Antimicrobial Agents in Agriculture		3	2/19/2003	Seminars in Pediatric Infectious Diseases
Bird, M	Barrett T	Stevenson, J	Assessing the Emergence of a Multi-Drug Resistant Salmonella Serotype Newport Using PFGE and Plasmid Profiling (1996-2000)	ICAAC2002	0	5/23/2002	
Chiller, T	Angulo, F		Sensititre review of human enterococci data	IDSA 2002	0	4/11/2003	Reanalysis/Writing
Crump, J	Angulo, F		Reevaluating fluoroquinolone minimum inhibitory concentration breakpoints for *Salmonella* Typhi and for non-Typhi *Salmonella*		5	1/22/2003	Accepted at CID
Doublet, B		Whichard, J	Plasmid-Mediated Florfenicol and Ceftriaxone Resistance Encoded by the floR and blacmy2 Genes in Salmonella enterica serotypes Typhimurium and Newport Isolated in the United States		4	4/11/2003	Has been cleared by FDA; waiting for CDC clearance (with Todd W)
Dunne, E	Angulo, F		Detection of a prevalent multi-drug resistant strain of *Salmonella* Typhimurium, R-type AKSSuT	ASM 2000	2	unknown	
Fiorentino (Rabatsky-Er), T	Angulo, F		Phage type and antimicrobial resistance trends among human *Salmonella* serotype Typhimurium isolates 1997-1998: Continued dominance of DT104 ACSSuT	ICEID; 2000	5	4/4/2003	Submitted to EID
Glynn, K	Angulo, F		Prior antimicrobial use increases sporadic infections with multidrug-resistant *Salmonella* serotype Typhimurium: a FoodNet case-control study	IDSA; 1998	5	5/28/2002	CID Supplement
Gupta, A	Angulo, F		Fluoroquinolone-resistant *Campylobacter* infections in the United States, 1997-2000: NARMS data leads to regulatory action	EIS Conf 2001; IDSA 2001	4	5/1/2003	
Gupta, A	Angulo, F		Antimicrobial S. Newport outbreak and surveillance	IDSA 2001	5	1/22/2003	Submitted to JID
Karpati, A	Rubin, C	Angulo, F	Microbiological characteristics and antimicrobial resistance patterns of bacteria from the local environment of large-scale animal feeding operations		5	unknown	
Kassenborg, H	Angulo, F		Fluoroquinolone-resistant *Campylobacter* infections: eating poultry outside the home and foreign travel are risk factors	ICEID; 2000	5		CID Supplement
Kretsinger, K	Angulo, F	Moore, M	Prevalence of HLGR among human and retail food enterococci isolates	EIS 2003	0		
Nelson, J	Angulo, F		Fluoroquinolone-resistant *Campylobacter* causes longer duration of diarrhea than fluoroquinolone-susceptible *Campylobacter* strains in FoodNet sites	ICEID; 2000	4	4/11/2003	
Olsen, S	Sobel, J		Multistate outbreak of highly resistant *Salmonella* Typhimurium infections due to pasteurized milk: is our milk safe?	IDSA 2001	5	5/1/2003	Submitted to JAMA
Sivapalasingam, S	Angulo, F		Antibiotic resistance of Shigella, NARMS	IDSA 2001	2	4/11/2003	
Stevenson, J	Angulo, F		Nalidixic Acid resistance among non-typhoidal *Salmonella* , NARMS 1996-2000		1	5/2/2002	
Wright, J	Angulo, F		Multidrug-resistant *Salmonella* outbreaks in veterinary facilities		2	4/14/2003	2nd draft
Zirnstein, G	Angulo, F		Detection of *Salmonella gyr* A quinolone resistance mutations by MAMA PCR and DNA sequence analysis		1	4/11/2003	Updating with Typhi sequences

0=Analysis, 1=Writing, 2=Draft being reviewed by co-authors, 3=Incorporating comments,4=NCID/CDC clearance, 5=At journal, 6=Published 7=On website *if in status <2 beyond 6 mos,

Updated: 04-11-2003

Published Manuscripts

Lead investigator (1st author)	Senior Author	Authors	Title	Abstract	Status	Journal Citation
McDonald, C	Angulo, F	McDonald C, Rossiter S, Mackinson C, Wang Y, Johnson S, Sullivan M, Sokolow R, DeBess E, Gilbert L, Benson J, Hill B, Angulo F	Quinupristin/dalfopristin-resistant *Enterococcus faecim* from retail chickens and human stool specimens in the United States	ICEID; 2000	7	NEJM 2001; 345 (16)
Ribot, E	Barrett, T	Ribot E, Wierzba R, Angulo F, Barrett T	Comparison and characterization of *Salmonella* serotype Typhimurium DT104 isolates from humans in the United States in 1985, 1990 and 1996		7	EID 2002; 8 (4)
Carrattoli, A	Fey, P	Carattoli A, Tosini F, Giles WP, Rupp ME, Hinrichs SH, Angulo FJ, Barrett TJ, and Fey PD	Characterization of plasmids carrying CMY-2 from expanded-spectrum cephalosproin-resistant *Salmonella* isolated in the United States between 1996 and 1998	ICAAC; 2001	7	AAC 2002; 46 (5): 1269-1272
Crump, J	Angulo, F		Bacterial contamination of commercial animal feed and its relation to human foodborne illness		7	CID 2002; 35 (1 Oct): 859-865
Donabedian, S	Angulo, F		Molecular Characterization of Gentamicin-Resistant *Enterococci* in the United States: Evidence of Spread from Animals to Humans through Food	ICAAC 2000	7	JCM 2003; 41 (3): 1109-13
Tzouvelekis, L	Whichard, J		Imipenem Resistance in a *Salmonella* Clinical Strain Due to Plasmid-Mediated Class A Carbapenemase KPC-2		7	AAC 2003; 47 (4): 1297-1300

ASM Conference - 2003

Lab	Title and Authors	Status
1	Emergence of Plasmid-mediated *bla* CMY genes and multidrug resistance among *Escherichia coli* O157:H7: Results of NARMS Monitoring 2000-2001 **J.M. Whichard**, A.Carattoli, B. S. Morabito, R. Connor, M. M. Bird, D. Wheeler, E. M. Ribot, N. L. Baker, P. M. Griffin, T. J. Barrett	**Poster**
2	Quinolone Resistance of *E. coli* from Chicken Specimens, 1981-2000 **K. Gay**, N. Orosco, D. Wheeler, C. DebRoy, T. Barrett, A. Anderson	**Poster**
3	Surveillance of U.S. *Salmonella* Enteritidis Outbreaks in 2001 Using Phage Typing **E. Lyszkowicz**, N. Tucker, B.H. Holland, J.M. Whichard, T.J. Barrett	**Poster**
Non-CDC	**Title and Authors**	
4	Ciprofloxacin-resistant *Escherichia coli* and other Gram-negative enteric flora in healthy children in Seattle X Qin, Y Razia, D Boster, JR Stapp, DL Smith, CR Braden, F Angulo, PI Tarr	**Accepted**

*Note: Abstracts can be viewed at the NARMS members only site, under "Submitted Conference Abstracts".

Preliminary Information: Subject to Change: Not for Public Distribution

NFID Conference on Antimicrobial Resistance - 2003

Epi	Title and Authors	Status
1	Quinolone Resistance Among *Shigella*: NARMS 1999-2001 N. Baker, J.M. Nelson, K. Joyce, K. Gay, F.J. Angulo, and the NARMS Working Group	**Poster**
2	Vancomycin-resistant Enterococci from Human Stools in the Community A. Drake, J.E. Stevenson, K. Lewis, K. Gay, F.J. Angulo, and the NARMS Enterococci Working Group	**Oral**
3	Increasing Incidence of Ciprofloxacin-Resistant *Campylobacter*: FoodNet and NARMS 1997-2001 J.M. Nelson, N. Baker, C. Theriot, D. Vugia, J. Beebe, T. Rabatsky-Ehr, S. Segler, M. Hawkins, K. Smith, A.K. Rourke, B. Shiferaw, T.F. Jones, F.J. Angulo, and FoodNet and NARMS Working Groups	**Oral**
4	Quinolone Resistance among Non-Typhi *Salmonella* and *E. coli* O157:H7 - NARMS, 1996-2001 J. E. Stevenson, J. M. Nelson, K. Joyce, M. Omondi, F. J. Angulo, and the NARMS Working Group	**Oral**

*Note: Abstracts can be viewed at the NARMS members only site, under "Submitted Conference Abstracts".

Preliminary Information: Subject to Change: Not for Public Distribution

CHRO - 2003 Aarhus, Denmark		
Epi	**Title and Authors**	**Status**
1	Increasing incidence of ciprofloxacin-resistant *Campylobacter* in the United States: FoodNet and NARMS 1997-2001 J.M. Nelson, K. Molbak, C. Theriot, D. Vugia, J. Beebe, T. Rabatsky-Ehr S. Segler, M. Hawkins, K. Smith, A.K. Rourke, B. Shiferaw, T.F. Jones, F.J. Angulo, and FoodNet and NARMS Working Groups	**Submitted**

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Updated: July 22, 2002

Routine Enteric Pathogen Isolate Submission to CDC: NARMS - 2003*

(Use NARMS Isolate Submission Log Sheets; a Specific Log Sheet is Available for Each Pathogen)

Pathogen	NARMS Isolate Submission Requirement	Isolate Submission Frequency	Contact Person	Where to Submit
Non-Typhi *Salmonella*	every 20th	At least quarterly – Monthly preferred	Kevin Joyce	CDC/NCID/DBMD/FDDB/NARMS MS G-29 NARMS Laboratory Building 17/ Room 1227 1600 Clifton Rd. Atlanta, GA 30333
E. coli O157	every 20th			
Shigella	every 20th			
Salmonella Typhi	ALL			
Listeria monocytogenes	ALL	At least every two weeks		
Campylobacter **(FoodNet Sites Only)**	1st isolate received every week	Once per month		
Non-cholerae *Vibrio*	ALL	At least quarterly – Monthly preferred		
Vibrio cholerae **	ALL	Immediately upon receipt	Cheryl Bopp	Centers for Disease Control and Prevention Data & Specimen Handling Sect. Bldg. 4, RM. B35-G12 1600 Clifton Rd., NE Atlanta, GA 30333

***Routine, non-outbreak associated isolate submission. Do NOT use DASH form for NARMS isolate submission.**

****Please send ALL *V. cholerae* isolates immediately upon receipt to Joy Wells. Please USE DASH FORM for ALL *V. cholerae* isolates.**

2001-03 DATA ARE PRELIMINARY: SUBJECT TO CHANGE: NOT FOR PUBLIC DISTRIBUTION

Status of Isolates in NARMS (2001-2003) as of May 27, 2003

2003 NARMS (Preliminary)

Isolate	Rec'd CDC 2003 (N)	Tested by CDC (N)	(%)	Not Tested (N)	(%)
Non-Typhi *Salmonella*	166	0	(0)	166	(100)
Salmonella Typhi	59	0	(0)	59	(100)
Shigella	54	0	(0)	54	(100)
E. coli O157	13	0	(0)	13	(100)
Listeria	0	0	(0)	0	(100)
Vibrio	5	0	(0)	5	(100)
Campylobacter	69	0	(0)	69	(100)

2002 NARMS (Preliminary)

Isolate	Rec'd CDC 2002 (N)	Tested by CDC (N)	(%)	Not Tested (N)	(%)
Non-Typhi *Salmonella*	2046	448	(22)	1598	(78)
Salmonella Typhi	249	55	(22)	194	(78)
Shigella	715	129	(18)	586	(82)
E. coli O157	458	55	(12)	403	(88)
Listeria	137	0	(0)	137	(100)
Vibrio	113	0	(0)	113	(100)
Campylobacter	509	355	(70)	154	(30)

2001 NARMS (Preliminary)

Isolate	Rec'd CDC 2001 (N)	Tested by CDC (N)	(%)	Not Tested (N)	(%)
Non-Typhi *Salmonella*	1419	1419	(100)	0	(0)
Salmonella Typhi	197	197	(100)	0	(0)
Shigella	344	344	(100)	0	(0)
E. coli O157	277	277	(100)	0	(0)
Listeria	73	0	(0)	73	(100)
Vibrio	63	0	(0)	63	(100)
Campylobacter	384	384	(100)	0	(0)

Updated: May 27, 2003 **Preliminary Information: Subject to Change: Not for Public Distribution**

National Antimicrobial Resistance Monitoring System (NARMS)
2002 Non-Typhi *Salmonella* isolates sent to CDC
by Site and Month (N=2,046)

Site	Total	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
AZ	**45**	5	3	4	4	5	0	0	1	1	14	3	5
CA	**58**	1	4	2	5	2	7	5	6	6	6	5	9
CO	**59**	6	3	2	4	4	6	10	7	5	5	4	3
CT	**52**	4	3	3	3	4	5	6	7	4	7	3	3
FL	**102**	5	7	3	4	8	12	5	13	16	11	12	6
GA	**205**	6	5	8	9	14	18	31	33	32	25	13	11
HI	**34**	1	2	2	6	4	3	4	2	5	2	3	0
KS	**28**	2	1	2	2	3	3	3	4	3	3	2	0
LA	**105**	4	3	6	5	9	8	13	12	14	19	8	4
LX	**95**	5	4	4	12	12	7	7	14	8	9	6	2
MA	**130**	7	12	6	8	12	8	17	17	14	16	6	7
MD	**115**	4	6	8	7	7	14	17	20	11	12	7	2
ME	**15**	2	2	0	1	1	0	2	2	2	1	1	1
MI	**94**	8	4	12	6	8	15	15	6	8	5	4	3
MN	**57**	3	2	4	5	4	5	7	7	6	5	5	4
MT	**8**	1	0	1	1	2	0	0	1	0	1	1	0
NE	**22**	2	3	2	1	0	2	2	2	2	2	2	1
NJ	**62**	0	0	0	0	0	8	7	13	12	12	6	4
NM	**36**	3	4	2	2	3	1	4	5	4	2	4	2
NYC	**136**	10	9	9	12	9	7	13	19	16	18	5	9
NYS	**172**	8	10	9	16	11	25	19	15	25	17	10	7
OR	**29**	2	3	2	5	3	4	2	4	3	1	0	0
SD	**20**	2	2	1	1	0	3	2	3	2	2	0	3
TN	**68**	4	4	1	4	6	8	13	10	12	6	0	0
TX	**151**	8	4	7	9	11	14	20	22	19	17	13	7
WA	**74**	4	6	3	8	7	6	12	8	3	8	5	4
WI	**59**	2	2	4	6	5	3	8	10	8	5	3	3
WV	**29**	3	1	3	2	2	2	5	2	3	4	2	0
Total	**2,046**												

Updated: May 27, 2003

National Antimicrobial Resistance Monitoring System (NARMS)
2003 Non-Typhi *Salmonella* isolates sent to CDC by site and month (N=166)

Site	Total	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
AL	**4**	2	1	1									
AK													
AZ	**3**	2	1	0									
AR													
CA	**33**	13	14	6									
CO	**4**	4	0	0									
CT	**3**	1	2	0									
DE	**1**	0	1	0									
DC													
FL	**5**	3	2	0									
GA													
HI	**1**	0	1	0									
ID	**4**	1	0	3									
IL	**15**	6	8	1									
IN	**3**	2	1	0									
IA	**2**	1	0	1									
KS													
KY	**3**	1	1	1									
LA	**1**	1	0	0									
LX	**6**	3	3	0									
ME													
MD	**2**	2	0	0									
MA													
MI	**7**	3	2	2									
MN	**4**	2	2	0									
MS	**1**	1	0	0									
MO	**5**	2	2	1									
MT													
NE	**6**	2	2	2									
NV													
NH													
NJ													
NM	**2**	1	1	0									
NYC	**7**	4	3	0									
NYS	**5**	3	2	0									
NC	**9**	4	2	3									
ND	**1**	1	0	0									
OH	**12**	6	4	2									
OK													
OR													
PA	**9**	6	3	0									
RI	**1**	0	1	0									
SC	**4**	2	1	1									
SD	**2**	0	2	0									
TN													
TX													
UT	**1**	0	1	0									
VT													
VA													
WA													
WV													
WI													
Total	**166**												

Updated: May 27, 2003 **Preliminary Information: Subject to Change: Not for Public Distribution**

National Antimicrobial Resistance Monitoring System (NARMS)
2002 *Salmonella* Typhi isolates sent to CDC
by Site and Month (N=249)

Site	Total	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
AZ	**5**	0	0	0	0	0	0	0	0	3	0	0	2
CA	**23**	3	2	0	2	2	2	2	1	0	0	0	9
CO	**3**	0	1	0	1	0	0	0	0	0	0	0	1
CT	**11**	1	0	0	0	2	0	0	2	6	0	0	0
FL	**15**	2	0	1	0	3	1	0	2	4	2	0	0
GA	**5**	0	0	1	0	0	2	0	2	0	0	0	0
HI	**5**	0	0	0	0	0	0	1	0	2	2	0	0
KS	**0**	0	0	0	0	0	0	0	0	0	0	0	0
LA	**1**	0	1	0	0	0	0	0	0	0	0	0	0
LX	**59**	1	0	4	1	5	8	9	11	12	4	1	3
MA	**8**	3	0	2	1	1	0	0	1	0	0	0	0
MD	**12**	0	0	1	1	1	0	1	0	1	1	1	5
ME	**0**	0	0	0	0	0	0	0	0	0	0	0	0
MI	**6**	2	2	1	0	0	0	0	0	1	0	0	0
MN	**4**	1	0	1	0	1	0	0	0	0	0	0	1
MT	**0**	0	0	0	0	0	0	0	0	0	0	0	0
NE	**2**	0	0	1	0	0	0	0	1	0	0	0	0
NJ	**8**	0	0	0	0	0	6	0	1	1	0	0	0
NM	**2**	0	0	0	0	0	0	0	0	0	1	0	1
NYC	**52**	3	4	3	1	5	6	3	1	11	9	2	4
NYS	**8**	0	3	1	0	1	0	1	1	1	0	0	0
OR	**0**	0	0	0	0	0	0	0	0	0	0	0	0
SD	**0**	0	0	0	0	0	0	0	0	0	0	0	0
TN	**1**	0	0	0	0	0	0	0	1	0	0	0	0
TX	**14**	2	1	2	1	1	1	1	4	0	0	1	0
WA	**4**	0	3	1	0	0	0	0	0	0	0	0	0
WI	**1**	1	0	0	0	0	0	0	0	0	0	0	0
WV	**0**	0	0	0	0	0	0	0	0	0	0	0	0
Total	**249**												

Updated May 27, 2003 **Preliminary Information: Subject to Change: Not for Public Distribution**

National Antimicrobial Resistance Monitoring System (NARMS)
2002 *Shigella* isolates sent to CDC
by Site and Month (N=715)

Site	Total	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
AZ	**31**	2	0	1	2	0	0	0	0	5	6	9	6
CA	**10**	1	0	0	0	0	0	4	2	2	0	1	0
CO	**17**	3	1	0	1	1	0	2	2	2	4	1	0
CT	**12**	1	0	1	2	0	0	3	1	0	1	2	1
FL	**4**	0	1	0	0	1	0	0	2	0	0	0	0
GA	**107**	9	5	5	10	9	8	7	9	9	14	14	8
HI	**5**	0	1	0	0	1	1	0	0	1	1	0	0
KS	**7**	0	1	1	0	1	0	0	1	0	2	1	0
LA	**48**	3	2	0	3	5	7	3	4	4	6	6	5
LX	**24**	3	0	0	0	3	0	2	4	4	4	2	2
MA	**21**	2	3	1	1	1	2	1	3	4	1	1	1
MD	**106**	3	5	5	4	12	10	14	16	11	10	11	5
ME	**1**	1	0	0	0	0	0	0	0	0	0	0	0
MI	**16**	3	1	0	0	1	1	0	2	2	2	2	2
MN	**21**	1	1	2	1	4	2	2	2	1	2	2	1
MT	**1**	0	0	0	0	0	0	0	0	0	0	0	1
NE	**11**	1	1	2	0	0	1	1	1	1	1	1	1
NJ	**81**	0	0	0	0	3	9	9	21	12	12	9	6
NM	**26**	2	0	2	0	1	2	2	3	5	5	2	2
NYC	**45**	4	4	2	5	2	1	6	6	3	3	4	5
NYS	**22**	3	0	2	2	1	0	3	2	2	1	3	3
OR	**6**	1	1	0	0	0	0	1	1	1	1	0	0
SD	**12**	4	2	2	1	0	2	0	0	0	0	1	0
TN	**12**	1	0	1	0	0	2	1	2	2	3	0	0
TX	**34**	1	0	2	1	2	3	4	6	4	3	5	3
WA	**23**	0	1	1	2	1	1	4	2	3	3	4	1
WI	**5**	0	0	0	0	0	1	1	0	1	0	1	1
WV	**8**	1	1	0	1	0	1	0	0	3	0	1	0
Total	**715**												

Updated: May 27, 2003 **Preliminary Information: Subject to Change: Not for Public Distribution**

National Antimicrobial Resistance Monitoring System (NARMS)
2002 *E. coli* O157 isolates sent to CDC
by Site and Month (N=458)

Site	Total	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
AZ	**7**	1	0	0	0	0	0	0	0	1	2	2	1
CA	**8**	0	0	0	1	0	1	1	1	2	1	1	0
CO	**20**	1	1	0	1	1	3	6	3	2	1	1	0
CT	**11**	1	0	1	1	2	1	2	0	2	0	1	0
FL	**7**	0	0	0	0	0	2	1	3	1	0	0	0
GA	**48**	3	2	2	3	6	6	5	11	1	3	2	4
HI	**7**	0	0	0	2	1	0	1	1	1	1	0	0
KS	**3**	0	0	0	0	0	0	1	0	1	1	0	0
LA	**0**												
LX	**9**	0	1	0	0	1	1	2	2	0	2	0	0
MA	**27**	2	0	2	0	2	3	6	5	3	2	1	1
MD	**8**	0	0	0	0	1	0	2	1	1	1	2	0
ME	**11**	0	0	0	0	0	0	3	1	2	2	1	1
MI	**21**	1	1	1	1	0	2	4	2	5	3	0	1
MN	**29**	0	1	1	1	1	3	6	7	6	1	2	0
MT	**4**	0	0	0	0	0	0	1	1	1	0	1	0
NE	**8**	1	0	0	0	0	2	0	1	1	1	1	1
NJ	**14**	0	0	0	0	0	2	4	2	3	1	1	1
NM	**9**	1	1	1	0	1	1	0	0	2	0	1	1
NYC	**11**	0	0	0	0	2	1	2	1	1	1	2	1
NYS	**43**	2	1	2	1	6	5	8	6	5	3	3	1
OR	**34**	0	0	1	2	1	3	1	17	7	2	0	0
SD	**12**	0	0	0	0	2	2	2	2	2	0	1	1
TN	**6**	0	0	0	1	2	0	1	1	0	1	0	0
TX	**7**	0	0	1	0	0	2	1	1	1	1	0	0
WA	**44**	2	1	1	3	6	3	13	3	6	3	1	2
WI	**50**	1	0	1	1	0	3	4	13	18	5	1	3
WV	**3**	2	0	0	0	1	0	0	4	1	2	0	0
Total	**458**												

Updated: May 27, 2003 **Preliminary Information: Subject to Change: Not for Public Distribution**

National Antimicrobial Resistance Monitoring System (NARMS)
2002 *Campylobacter* isolates sent to CDC (FoodNet sites ONLY)
by Site and Month (N=509)

Site	Total	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
CA	**53**	4	4	4	3	5	5	4	6	7	2	5	4
CO	**40**	5	3	1	2	3	5	3	3	7	2	5	1
CT	**57**	7	2	6	4	3	6	6	5	5	3	5	5
GA	**112**	5	5	3	9	12	14	10	20	13	3	12	6
MD	**36**	3	3	4	1	5	6	4	4	4	0	1	1
MN	**60**	5	4	5	5	5	6	5	5	5	5	5	5
NY	**49**	5	3	4	4	4	6	4	4	4	5	3	3
OR	**65**	8	2	4	8	2	8	5	10	8	7	2	1
TN	**37**	3	4	2	3	6	10	3	2	2	1	1	0
Total	**509**												

Table 19. Antimicrobial resistance of non-Typhi *Salmonella* isolates, 1996-2001

Salmonella, Non-Typhi	1996	1997	1998	1999	2000	2001
Salmonella isolates	1326	1301	1465	1498	1378	1419
Isolates resistant to ≥ 1 antimicrobial agents*	37% (493)	34% (443)	27% (397)	26% (390)	26% (353)	28% (394)
Isolates resistant to ≥ 2 antimicrobial agents*	31% (404)	25% (328)	23% (334)	21% (317)	21% (284)	22% (315)
Isolates resistant to ≥ 5 antimicrobial agents*	12% (163)	14% (180)	13% (189)	12% (174)	12% (161)	12% (170)
Isolates resistant to ≥ 8 antimicrobial agents*	0.3% (4)	1% (10)	1% (14)	2% (31)	3% (41)	3% (40)
Serotyped *Salmonella* isolates	93% (1231)	93% (1215)	96% (1410)	97% (1459)	97% (1332)	99% (1399)
Serotyped *Salmonella* which are Enteritidis	29% (357)	25% (301)	17% (244)	18% (270)	24% (319)	20% (282)
S. Enteritidis isolates resistant to ≥ 1 antimicrobial agents*	31% (110)	26% (78)	12% (30)	17% (45)	11% (35)	14% (40)
Serotyped *Salmonella* which are Typhimurium**	23% (306)	25% (326)	26% (377)	24% (362)	22% (303)	24% (325)
S. Typhimurium isolates resistant to ≥ 1 antimicrobial agents*	64% (196)	62% (202)	53% (200)	49% (179)	50% (153)	51% (165)
S. Typhimurium with at least ACSSuT resistance pattern	34% (103)	35% (115)	32% (120)	28% (102)	28% (84)	29% (96)
Salmonella isolates that were at least Typhimurium ACSSuT	8% (103)	9% (115)	8% (120)	7% (102)	6% (84)	7% (96)
S. Typhimurium with at least AKSSuT resistance pattern	9% (27)	13% (41)	12% (47)	11% (39)	9% (28)	5% (15)
Salmonella isolates that were at least Typhimurium AKSSuT	2% (27)	3% (41)	3% (47)	3% (39)	2% (28)	1% (15)
S. Typhimurium with at least ACKSSuT resistance pattern	4% (13)	3% (9)	4% (17)	3% (12)	3% (8)	1% (4)

*Using only antimicrobial agents (n=15) tested in all six years

**Includes *S*. Typhimurium and *S*. Typhimurium variant Copenhagen

***Amox-Clav=Amoxicillin-Clavulanic Acid

****Trimeth-Sulfa=Trimethoprim-Sulfamethoxazole

ŦE-test criteria include isolates with a ceftriaxone MIC of >=16µg/ml (1996-1998), by Sensititre®; By-hand broth microdilution criteria include isolates with a ceftiofur MIC of >=4µg/ml and/or ceftriaxone MIC of >=2µg/ml (1999-2001), by Sensititre®

DATA ARE PRELIMINARY:SUBJECT TO CHANGE:NOT FOR PUBLIC DISTRIBUTION

National Antimicrobial Resistance Monitoring System For Enteric Bacteria

Table 19. Summary: Antimicrobial resistance of non-Typhi *Salmonella* isolates, 1996-2001

Salmonella, Non-Typhi	1996	1997	1998	1999	2000	2001
Salmonella isolates that were at least Typhimurium ACKSSuT	1% (13)	1% (9)	1% (17)	1% (12)	1% (8)	0.3% (4)
S. Typhimurium isolates at least ACSSuT, AKSSuT, or ACKSSuT	42% (130)	48% (156)	44% (167)	39% (141)	37% (112)	34% (111)
Serotyped *Salmonella* which are Newport	4% (51)	4% (48)	5% (77)	7% (98)	9% (124)	9% (124)
S. Newport isolates resistant to ≥ 1 antimicrobial agents*	18% (9)	12% (6)	5% (4)	23% (23)	24% (30)	35% (43)
S. Newport with at least MDR-AmpC resistance pattern	0% (0)	0% (0)	1% (1)	17% (17)	22% (27)	25% (31)
Salmonella isolates that were at least Newport MDR-AmpC	0% (0)	0% (0)	0.1% (1)	1% (17)	2% (27)	2% (31)
Ciprofloxacin (MIC ≥ 0.25)	0.4% (5)	0.5% (7)	1% (10)	1% (15)	1% (20)	1% (15)
Ciprofloxacin (MIC ≥ 4)	0% (0)	0% (0)	0.1% (1)	0.1% (1)	0.4% (5)	0.2% (3)
Ceftriaxone (MIC ≥ 64)Ŧ	0.1% (1)	0.4% (5)	1% (10)	2% (24)	2% (25)	2% (34)
Nalidixic Acid (MIC ≥ 32)	0.4% (5)	1% (11)	1% (20)	1% (16)	2% (34)	3% (37)

*Using only antimicrobial agents (n=15) tested in all six years

**Includes *S*. Typhimurium and *S*. Typhimurium variant Copenhagen

***Amox-Clav=Amoxicillin-Clavulanic Acid

****Trimeth-Sulfa=Trimethoprim-Sulfamethoxazole

ŦE-test criteria include isolates with a ceftriaxone MIC of >=16µg/ml (1996-1998), by Sensititre®; By-hand broth microdilution criteria include isolates with a ceftiofur MIC of >=4µg/ml and/or ceftriaxone MIC of >=2µg/ml (1999-2001), by Sensititre®

National Antimicrobial Resistance Monitoring System For Enteric Bacteria

Table 19. Summary: Antimicrobial resistance of non-Typhi *Salmonella* isolates, 1996-2001

Salmonella, Non-Typhi	1996	1997	1998	1999	2000	2001
Amikacin (MIC ≥ 64)	Not Tested	0% (0)	0% (0)	0.1% (2)	0% (0)	0% (0)
Amox-Clav*** (MIC ≥ 32)	1% (20)	1% (19)	2% (24)	2% (36)	4% (54)	5% (66)
Ampicillin (MIC ≥ 32)	21% (279)	18% (241)	16% (241)	16% (234)	16% (219)	17% (247)
Apramycin (MIC ≥ 64)	0% (0)	0% (0)	0% (0)	0.3% (5)	0.1% (2)	0% (0)
Cefoxitin (MIC ≥ 32)	Not Tested	Not Tested	Not Tested	Not Tested	3% (43)	3% (48)
Ceftiofur (MIC ≥ 8)	4% (53)	3% (44)	1% (14)	2% (31)	3% (44)	4% (58)
Cephalothin (MIC ≥ 32)	3% (47)	3% (43)	2% (33)	4% (55)	4% (54)	4% (57)
Chloramphenicol (MIC ≥ 32)	11% (141)	10% (131)	10% (145)	9% (138)	10% (138)	12% (164)
Gentamicin (MIC ≥ 16)	5% (64)	3% (38)	3% (42)	2% (34)	3% (37)	2% (27)
Imipenem (MIC ≥ 16)	Not Tested	Not Tested	Not Tested	Not Tested	Not Tested	0% (0)
Kanamycin (MIC ≥ 64)	5% (65)	5% (66)	6% (84)	4% (66)	6% (77)	5% (68)
Streptomycin (MIC ≥ 64)	21% (275)	22% (282)	19% (273)	17% (253)	16% (223)	17% (241)
Sulfamethoxazole (MIC ≥ 512)	23% (305)	25% (328)	19% (283)	18% (271)	17% (235)	18% (251)
Tetracycline (MIC ≥ 16)	24% (321)	22% (283)	20% (295)	19% (291)	19% (256)	20% (280)
Trimeth-Sulfa**** (MIC ≥ 4/76)	4% (51)	2% (24)	2% (34)	2% (31)	2% (29)	2% (28)

*Using only antimicrobial agents (n=15) tested in all six years

**Includes *S*. Typhimurium and *S*. Typhimurium variant Copenhagen

***Amox-Clav=Amoxicillin-Clavulanic Acid

****Trimeth-Sulfa=Trimethoprim-Sulfamethoxazole

ŦE-test criteria include isolates with a ceftriaxone MIC of >=16µg/ml (1996-1998), by Sensititre®; By-hand broth microdilution criteria include isolates with a ceftiofur MIC of >=4µg/ml and/or ceftriaxone MIC of >=2µg/ml (1999-2001), by Sensititre®

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Table 21. Antimicrobial resistance of *Salmonella* Typhi isolates, 1999-2001

Salmonella Typhi	1999	2000	2001
Salmonella Typhi isolates	166	177	197
Isolates resistant to ≥ 1 antimicrobial agents*	29% (49)	28% (50)	41% (81)
Isolates resistant to ≥ 2 antimicrobial agents*	15% (25)	12% (21)	23% (45)
Salmonella Typhi with at least ACSSuT resistance pattern	9% (15)	8% (14)	17% (33)
Salmonella Typhi with at least ACSuTm** resistance pattern	12% (20)	9% (16)	18% (35)
Amikacin (MIC ≥ 64)	0% (0)	1% (2)	0% (0)
Amox-Clav*** (MIC ≥ 32)	1% (1)	0% (0)	0% (0)
Ampicillin (MIC ≥ 32)	13% (21)	9% (16)	20% (40)
Apramycin (MIC ≥ 64)	0% (0)	1% (2)	0% (0)
Cefoxitin (MIC ≥ 32)	Not Tested	2% (3)	0.5% (1)
Ceftiofur (MIC ≥ 8)	1% (2)	1% (1)	0% (0)
Ceftriaxone (MIC ≥ 64)	0% (0)	0% (0)	0% (0)

*Using only antimicrobial agents (n=15) tested in all three years
**ACSuTm=Ampicillin, Chloramphenicol, Sulfamethoxazole-Trimethoprim
***Amox-Clav=Amoxicillin-Clavulanic Acid
****Trimeth-Sulfa=Trimethoprim-Sulfamethoxazole

Table 22. Summary: Antimicrobial resistance of *Salmonella* Typhi isolates, 1999-2001

Salmonella Typhi	1999	2000	2001
Cephalothin (MIC ≥ 32)	2% (4)	1% (2)	0.5% (1)
Chloramphenicol (MIC ≥ 32)	12% (20)	11% (19)	21% (41)
Ciprofloxacin (MIC ≥ 0.25)	15% (25)	21% (38)	20% (39)
Ciprofloxacin (MIC ≥ 4)	0% (0)	0% (0)	0% (0)
Gentamicin (MIC ≥ 16)	0% (0)	1% (1)	0% (0)
Imipenem (MIC ≥ 16)	Not Tested	Not Tested	0% (0)
Kanamycin (MIC ≥ 64)	0% (0)	1% (1)	0.5% (1)
Nalidixic Acid (MIC ≥ 32)	19% (31)	23% (41)	30% (59)
Streptomycin (MIC ≥ 64)	14% (23)	10% (18)	20% (40)
Sulfamethoxazole (MIC ≥ 512)	17% (28)	12% (21)	21% (41)
Tetracycline (MIC ≥ 16)	9% (15)	11% (19)	21% (41)
Trimeth-Sulfa**** (MIC ≥ 4/76)	13% (21)	9% (16)	21% (41)

*Using only antimicrobial agents (n=15) tested in all three years
**ACSuTm=Ampicillin, Chloramphenicol, Sulfamethoxazole-Trimethoprim
***Amox-Clav=Amoxicillin-Clavulanic Acid
****Trimeth-Sulfa=Trimethoprim-Sulfamethoxazole

Table 22. Antimicrobial resistance of *E. coli* O157 isolates, 1996-2001

	1996	1997	1998	1999	2000	2001
E. coli O157 isolates	201	161	313	292	407	277
Isolates resistant to ≥ 1 antimicrobial agents*	21% (42)	12% (20)	7% (23)	10% (30)	10% (40)	9% (24)
Isolates resistant to ≥ 2 antimicrobial agents*	8% (15)	7% (11)	5% (17)	4% (12)	7% (27)	5% (15)
Amikacin (MIC ≥ 64)	Not Tested	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)
Amox-Clav** (MIC ≥ 32)	0% (0)	0% (0)	0% (0)	0.3% (1)	1% (4)	1% (2)
Ampicillin (MIC ≥ 32)	1% (3)	0% (0)	3% (8)	1% (4)	3% (11)	2% (6)
Apramycin (MIC ≥ 64)	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)
Cefoxitin (MIC ≥ 32)	Not Tested	Not Tested	Not Tested	Not Tested	1% (4)	1% (2)
Ceftiofur (MIC ≥ 8)	5% (10)	0% (0)	0% (0)	0% (0)	1% (4)	1% (3)
Ceftriaxone (MIC ≥ 64)	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)
Cephalothin (MIC ≥ 32)	3% (6)	4% (6)	0% (0)	1% (2)	1% (5)	1% (4)
Chloramphenicol (MIC ≥ 32)	0.5% (1)	0% (0)	0.3% (1)	0% (0)	4% (15)	1% (4)
Ciprofloxacin (MIC ≥ 4)	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)
Gentamicin (MIC ≥ 16)	0% (0)	0% (0)	0% (0)	0.3% (1)	0.5% (2)	0.4% (1)
Imipenem (MIC ≥ 16)	Not Tested	Not Tested	Not Tested	Not Tested	Not Tested	0% (0)
Kanamycin (MIC ≥ 64)	0% (0)	0% (0)	0.3% (1)	1% (2)	1% (4)	0% (0)
Nalidixic Acid (MIC ≥ 32)	0% (0)	0% (0)	0% (0)	1% (2)	0.5% (2)	1% (3)
Streptomycin (MIC ≥ 64)	2% (4)	2% (4)	2% (6)	3% (8)	5% (21)	2% (5)
Sulfamethoxazole (MIC ≥ 512)	14% (28)	11% (17)	6% (18)	8% (24)	6% (24)	5% (14)
Tetracycline (MIC ≥ 16)	5% (10)	3% (5)	4% (14)	3% (10)	7% (29)	5% (15)
Trimeth-Sulfa*** (MIC ≥ 4/76)	0% (0)	0% (0)	1% (2)	1% (4)	1% (3)	1% (2)

*Using only antimicrobial agents (n=15) tested in all six years

**Amox-Clav=Amoxicillin-Clavulanic Acid

***Trimeth-Sulfa=Trimethoprim-Sulfamethoxazole

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Table 25. Antimicrobial resistance of *Shigella* isolates, 1999-2001

	1999	2000	2001
Shigella isolates	375	451	344
Isolates resistant to ≥ 1 antimicrobial agents*	91% (341)	93% (418)	95% (327)
Isolates resistant to ≥ 2 antimicrobial agents*	65% (245)	67% (302)	71% (244)
Shigella with at least ACSSuT resistance pattern	8% (32)	5% (25)	6% (22)
Shigella with at least ACSuTm** resistance pattern	10% (37)	7% (31)	7% (24)
Amikacin (MIC ≥ 64)	0% (0)	0.2% (1)	0% (0)
Amox-Clav*** (MIC ≥ 32)	1% (4)	2% (10)	4% (15)
Ampicillin (MIC ≥ 32)	78% (291)	79% (356)	80% (274)
Apramycin (MIC ≥ 64)	0% (0)	0.2% (1)	0% (0)
Cefoxitin (MIC ≥ 32)	Not Tested	0.4% (2)	1% (4)
Ceftiofur (MIC ≥ 8)	0% (0)	0% (0)	0% (0)
Ceftriaxone (MIC ≥ 64)	0% (0)	0% (0)	0% (0)

*Using only antimicrobial agents (n=15) tested in all three years
**ACSuTm=Ampicillin, Chloramphenicol, Sulfamethoxazole-Trimethoprim
***Amox-Clav=Amoxicillin-Clavulanic Acid
****Trimeth-Sulfa=Trimethoprim-Sulfamethoxazole

Table 26. Summary: Antimicrobial resistance of *Shigella* isolates, 1999-2001

	1999	2000	2001
Cephalothin (MIC ≥ 32)	3% (12)	8% (36)	9% (31)
Chloramphenicol (MIC ≥ 32)	17% (65)	14% (63)	21% (74)
Ciprofloxacin (MIC ≥ 0.25)	1% (3)	0.2% (1)	0.3% (1)
Ciprofloxacin (MIC ≥ 4)	0% (0)	0% (0)	0.3% (1)
Gentamicin (MIC ≥ 16)	0.3% (1)	0.2% (1)	0% (0)
Imipenem (MIC ≥ 16)	Not Tested	Not Tested	0% (0)
Kanamycin (MIC ≥ 64)	0.5% (2)	1% (6)	1% (2)
Nalidixic Acid (MIC ≥ 32)	2% (6)	1% (5)	2% (6)
Streptomycin (MIC ≥ 64)	56% (209)	57% (258)	53% (183)
Sulfamethoxazole (MIC ≥ 512)	56% (210)	56% (252)	56% (194)
Tetracycline (MIC ≥ 16)	57% (215)	45% (202)	59% (204)
Trimeth-Sulfa**** (MIC ≥ 4/76)	51% (193)	53% (239)	47% (161)

*Using only antimicrobial agents (n=15) tested in all three years
**ACSuTm=Ampicillin, Chloramphenicol, Sulfamethoxazole-Trimethoprim
***Amox-Clav=Amoxicillin-Clavulanic Acid
****Trimeth-Sulfa=Trimethoprim-Sulfamethoxazole

Table 31. Antimicrobial resistance of *Campylobacter* isolates, 1997-2001

Campylobacter	1997	1998	1999	2000	2001
Campylobacter isolates	217	310	318	324	384
Isolates resistant to ≥ 1 antimicrobial agents*	52% (113)	55% (170)	53% (169)	48% (155)	50% (193)
Isolates resistant to ≥ 2 antimicrobial agents*	16% (34)	18% (57)	21% (67)	16% (51)	21% (81)
Ciprofloxacin (MIC ≥ 4)	13% (28)	13% (42)	18% (58)	14% (46)	19% (75)
Nalidixic Acid (MIC ≥ 32)	14% (31)	17% (54)	21% (67)	17% (54)	20% (77)
Erythromycin (MIC ≥ 8)	2% (4)	3% (8)	2% (8)	1% (5)	2% (8)
Azithromycin (MIC ≥ 2)	Not Tested	2% (5)	3% (10)	2% (7)	2% (8)
Chloramphenicol (MIC ≥ 32)	1% (3)	2% (6)	0.3% (1)	0% (0)	0% (0)
Clindamycin (MIC ≥ 4)	2% (4)	1% (4)	2% (5)	1% (4)	2% (8)
Gentamicin (MIC ≥ 16)	Not Tested	0% (0)	0% (0)	0.3% (1)	0% (0)
Tetracycline (MIC ≥ 16)	47% (102)	45% (141)	44% (140)	38% (122)	41% (156)

*Using only *Campylobacter* antimicrobial agents (n=6) tested in all five years

Table 32. Antimicrobial resistance of *Campylobacter jejuni* isolates, 1997-2001

Campylobacter jejuni	1997	1998	1999	2000	2001
Campylobacter jejuni isolates	209	297	294	306	365
Isolates resistant to ≥ 1 antimicrobial agents*	51% (107)	54% (162)	53% (157)	49% (149)	50% (181)
Isolates resistant to ≥ 2 antimicrobial agents*	14% (30)	17% (50)	19% (57)	15% (45)	20% (73)
Ciprofloxacin (MIC ≥ 4)	12% (26)	14% (41)	18% (52)	14% (43)	18% (67)
Nalidixic Acid (MIC ≥ 32)	13% (28)	16% (47)	20% (59)	16% (49)	19% (69)
Erythromycin (MIC ≥ 8)	1% (3)	2% (7)	2% (6)	1% (4)	2% (7)
Azithromycin (MIC ≥ 2)	Not Tested	1% (4)	3% (8)	2% (6)	2% (7)
Chloramphenicol (MIC ≥ 32)	1% (2)	1% (2)	0.3% (1)	0% (0)	0% (0)
Clindamycin (MIC ≥ 4)	1% (2)	1% (3)	1% (3)	1% (3)	2% (7)
Gentamicin (MIC ≥ 16)	Not Tested	0% (0)	0% (0)	0% (0)	0% (0)
Tetracycline (MIC ≥ 16)	47% (98)	46% (137)	46% (134)	39% (118)	40% (146)

*Using only *Campylobacter* antimicrobial agents (n=6) tested in all five years

Table 33. Antimicrobial resistance of *Campylobacter coli* isolates, 1997-2001

Campylobacter coli	1997	1998	1999	2000	2001
Campylobacter coli isolates	6	8	20	12	17
Isolates resistant to ≥ 1 antimicrobial agents*	83% (5)	50% (4)	50% (10)	33% (4)	65% (11)
Isolates resistant to ≥ 2 antimicrobial agents*	50% (3)	50% (4)	35% (7)	25% (3)	47% (8)
Ciprofloxacin (MIC ≥ 4)	33% (2)	0% (0)	30% (6)	25% (3)	47% (8)
Nalidixic Acid (MIC ≥ 32)	50% (3)	50% (4)	30% (6)	25% (3)	41% (7)
Erythromycin (MIC ≥ 8)	0% (0)	12% (1)	10% (2)	8% (1)	6% (1)
Azithromycin (MIC ≥ 2)	Not Tested	12% (1)	10% (2)	8% (1)	6% (1)
Chloramphenicol (MIC ≥ 32)	17% (1)	25% (2)	0% (0)	0% (0)	0% (0)
Clindamycin (MIC ≥ 4)	17% (1)	12% (1)	10% (2)	8% (1)	6% (1)
Gentamicin (MIC ≥ 16)	Not Tested	0% (0)	0% (0)	8% (1)	0% (0)
Tetracycline (MIC ≥ 16)	67% (4)	50% (4)	30% (6)	25% (3)	59% (10)

*Using only *Campylobacter* antimicrobial agents (n=6) tested in all five years

Educational Activities to Promote Appropriate Use of Antimicrobials in Agriculture

1. Appropriate Use of Antibiotics: Course Materials for Veterinary Students and Veterinary Continuing Education

- Interactive web-based course modules to promote appropriate use of antibiotics by veterinarians.
- Focus on educating veterinarians regarding the use of antimicrobials in livestock and poultry and the connection to antimicrobial resistant foodborne infections in people.
- Background modules to provide a foundation in the global, ecological nature of the antimicrobial resistance problem.
- Species-specific modules containing interactive case scenarios to bring practical, clinical application to appropriate use guidelines as set forth by the WHO Global Principles for the Containment of Antimicrobial Resistance in Animals Intended for Food.
- Topics addressed will include:
    - Mechanisms of resistance
    - Diagnostic tools and tests
    - Guidelines for empirical treatment
    - Client education
    - Alternatives to antibiotics
    - Use of antimicrobials in companion animals
    - Public health risks of use of antibiotics in agriculture
    - Resistance in animals secondary to inappropriate antimicrobial use

2. Pilot Projects: Programs to Prevent the Emergence and Spread of Antimicrobial Resistance in Food Animals

Purpose: To develop, implement, and evaluate prudent antimicrobial use projects to reduce emergence, prevalence, and spread of antimicrobial resistance among target pathogens in food animals.

- Michigan State University, College of Veterinary Medicine – Dairy farming in the post-antibiotic era: The association between antibiotic usage and microbial resistance.
- University of California – Davis, Veterinary Medicine Teaching and Research Center – Managing Antimicrobials on Dairy and Calf Ranches.
- Tufts University School of Veterinary Medicine – Programs to Prevent the Emergence and Spread of Antimicrobial Resistance in Swine as Food Animals.
- The Ohio State University, College of Veterinary Medicine – Pre-harvest Control of Antimicrobial Resistance in Swine.

3. **State Demonstration Project: Collaborations between state public health and veterinary diagnostic laboratories**
    - To foster collaborations on antimicrobial resistance between state public health laboratories and state agriculture (veterinary diagnostic) laboratories.
    - To establish local surveillance of antimicrobial resistance among enteric bacteria from humans and animals.
    - To develop community-based programs on appropriate use of antimicrobials in animals.
    - CDC is currently supporting project a between Michigan Department of Community Health and the Diagnostic Center for Animal Population Health at Michigan State University.

NARMS Quarterly Conference Call Minutes
2/26/2003

Participants

Participating sites included: AL, AK, AZ, CO, DE, GA, ID, IA, KY, LA, ME, MA, MI, MN, MO, MT, NE, NH, NJ, NM, NY city, ND, OH, OK, PA, RI, SD, TX, UT, VA, WA, WI, and WY

Status of Manuscripts and Abstracts

Page two of the conference call packet is a list of the status of active manuscripts. We encourage anyone who is interested in writing an abstract or manuscript, using data from their site, to contact us. We will be happy to provide site-specific data and help facilitate the process in any way possible.

Three abstracts (page 3) using NARMS data were submitted to the American Society for Microbiology (Washington, DC, May 2003). One abstracts using NARMS data (page 4) was accepted as a poster at the 2003 EIS (Epidemic Intelligence Service) conference (Atlanta, GA, March 2003). All abstracts can be found on our website (www.cdc.gov/narms).

Status of 2002 Isolates

The NARMS lab is currently testing the 2002 isolates. The isolate receipt tables on pages 6-10 did not account for isolates recently submitted. These tables have been revised and are attached to this email. Please remember that there is a delay between when the lab receives and processes these isolates and when they are entered into the database. These tables should reflect all isolates that have been processed by our lab. Also, when examining these tables, keep in mind that the month of collection is determined by month of specimen collection.

For states that participated in NARMS in 2002, all isolates for 2002 should be submitted to the NARMS laboratory.

Annual Report

The 2001 annual report is currently in CDC clearance. After it has been cleared, any necessary changes will be made, it will be printed and distributed.

There are several new additions to this year's report. One addition is that this year's report will include a comparison of 2001 data to a baseline year (1996 for non-Typhi *Salmonella* and 1997 for *Campylobacter*), which will look at how our most important findings, such as fluoroquinolone resistant *Campylobacter,* have changed over time. Working through the methods of these analyses has taking some time and has created a delay in reporting of the 2001 results. Another delay is due to the scrutiny of NARMS *Campylobacter* data because of FDA's proposed withdrawal of enrofloxacin.

2001 Preliminary Results

Pages 12-22 in the conference call packet are preliminary data from 2001. Please note that all information is preliminary and is not to be distributed publicly. Some notable trends are:

*Decrease in resistance to one or more antimicrobial agents in *S.* Enteritidis isolates from 31% in 1996 to 14% in 2001, largely due to a decrease in gentamicin resistance.
*Increase in resistance to one or more antimicrobial agents in *S.* Newport isolates from 18% in 1996 to 35% in 2001, which is due to the emergence of *S.* Newport MDR Amp-C.
*Increase of nalidixic acid-resistant non-Typhi *Salmonella*, which has increased from 0.4% in 1996 to 3% in 2001.

*Fluoroquinolone-resistance among *Campylobacter* isolates continues to increase: 13% in 1997 to 19% in 2001, a trend that is statistically significant.
*The first case of ciprofloxacin-resistant *Shigella* was reported in 2001. The isolate was isolated in New York City from a child who had recently traveled to China.

Isolate Submission Guidelines
A copy of the NARMS isolate submission guidelines are on page 23. We now request that sites send every 20th non-Typhi *Salmonella, E. coli* O157 and *Shigella*; and every *Salmonella* Typhi, *Listeria*, and non-cholerae *Vibrio* (note: non-cholerae *Vibrio* should be sent to the NARMS lab, whereas *Vibrio cholerae* should be immediately sent to Cheryl Bopp's lab, as directed on the submission guidelines).

In addition to several states who indicated on the call that they have mandatory reporting of other non-*E. coli* O157 strains, Maine informed us that other hemorrhagic *E. coli* enteritis, shiga-toxin producing *E. coli* strains are reportable in their state.

Log Sheets
New log sheets, indicating the changes listed above, are included in the packet and will soon be posted on the NARMS secure website. If you do not have the login and password for this site, please contact Jennifer Nelson (zcn6@cdc.gov).

Please note that *S.* Paratyphi is considered a non-typhi *Salmonella* and should be included on the non-typhi *Salmonella* log sheet. Also, please submit serotypes as completely and legible as possible.

Salmonella QA/QC Testing
Many sites participated in the FDA-CVM funded *Salmonella* quality assurance/quality control program. The National *Salmonella* Reference Laboratory will be sending these results to those who participated. Also, they are now preparing for the second round of this program and we would encourage all to participate. If you have any additional questions regarding this program, please contact Jill Steigerwalt (zlq9@cdc.gov) or Patricia Fields (pif1@cdc.gov).

Veterinary School Curriculum
Jennifer Nunnery, a NARMS fellow, is working to develop a veterinary school curriculum to reduce inappropriate use of antimicrobial agents in veterinary medicine by teaching judicious use principles to fourth year veterinary students. The materials for this curriculum will be developed by subject matter experts and will receive input and comments from the veterinary community. The curriculum will focus on both small and large animals and will use web-based materials as well as some small group activities. The curriculum is in development at Michigan State University and will be pilot tested and presented to the American Association of Veterinary Medical Colleges (AAVMC) for adoption and use.

Upcoming conference calls, meetings, and deadlines
The National Foundation for Infectious Diseases will be holding their annual conference on antimicrobial resistance in Bethesda, Maryland from June 23-25, 2003. Those who are interested in submitting an abstract for this conference should note that the deadline for submission is April 1, 2003.

Contact information

Please inform us of any changes that you may have with personnel that work on NARMS so that we can keep our contact lists up-to-date.

The next Quarterly conference call is scheduled for May 28, 2003 (2:00PM EST). The telephone number is 1-800-311-3437 (conference code: 972537).

We sincerely appreciate your participation in these calls!