HADEA SERVICE CONTRACT 20197409

Provision of EU networking and support for public health reference laboratory functions for antimicrobial resistance in *Salmonella* species and *Campylobacter* species in human samples

FWD AMR·
RefLabCap

TODAY

STATENS SERUM INSTITUT

EU protocol for harmonised monitoring of antimicrobial resistance in human Salmonella and Campylobacter isolates.

EUCAST protocols, guidelines, clinical/epidemiological breakpoints, interpretation and website.

EQA-AST 6

Jeppe Boel
Statens Serum Institut
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EUROPEAN CENTRE FOR DISEASE PREVENTION AND CONTROL - ECDC

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- Has a mandate to gather and analyse data and information on emerging public health threats
- The collection antimicrobial resistance (AMR) data is included as part of the European Surveillance System (TESSy) through several networks:
- EARS-Net (S. pneumoniae, S aureus, E. faecalis, E. faecium, E. coli, Klebsiella pneumoniae, P. aeruginosa, and Acinetobacter spp.).
- • HAI-Net collects data on AMR in selected pathogens associated with healthcare-associated infections.
- • ESAC-Net collects data on the consumption of antimicrobial agents in humans.
- **• FWD-Net collects data on AMR in Salmonella spp., Campylobacter spp. and Shiga toxin/verocytotoxin-producing Escherichia coli (STEC/VTEC)**

AMR MONITORING - ZOONOSES IN ANIMALS AND FOOD

- Directive 2003/99/EC requires Member States to monitor and report comparable data on AMR in zoonoses and zoonotic agents in food-producing animals and food

- Commission Implementing Decision (EU) 2020/1729 of 17 November 2020 on the monitoring and reporting of antimicrobial resistance in zoonotic and commensal bacteria

COMMON ECDC – EFSA REPORT

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Read the report

Publication

The European Union Summary Report on Antimicrobial Resistance in zoonotic and indicator bacteria from humans, animals and food in 2019–2020

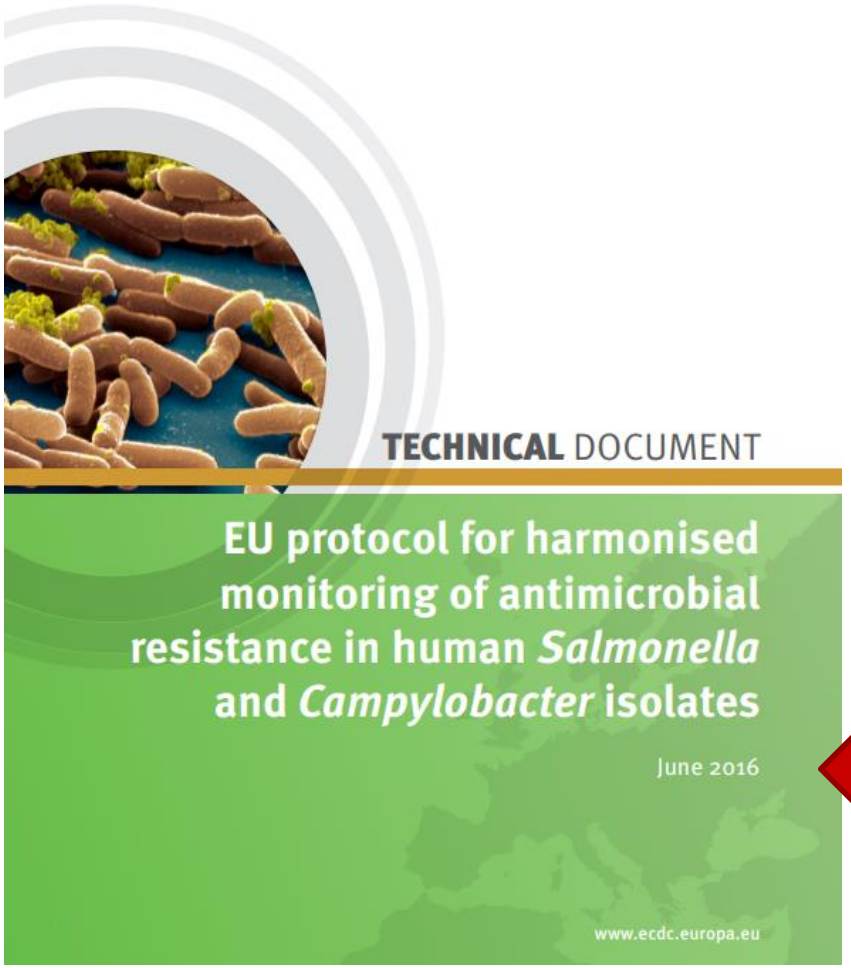
Technical report - 29 Mar 2022

Data on antimicrobial resistance (AMR) in zoonotic and indicator bacteria from humans, animals and food are collected annually by the EU Member States (MSs), jointly analysed by the EFSA and the ECDC and reported in a yearly EU Summary Report.

The European Union Summary Report on Antimicrobial Resistance in zoonotic and indicator bacteria from humans, animals and food in 2019–2020 - EN - [PDF-67.39 MB]

Antimicrobial consumption | Antimicrobial resistance | Antimicrobial stewardship |

EU PROTOCOL FOR HARMONIZED AMR TESTING



"The content of this report was developed at three expert workshops arranged by ECDC. The report was sent for consultation to the Food- and Waterborne Diseases and Zoonoses network."

EU HARMONIZED PROTOCOL FOR AMR TESTING OF SALMONELLA AND CAMPYLOBACTER

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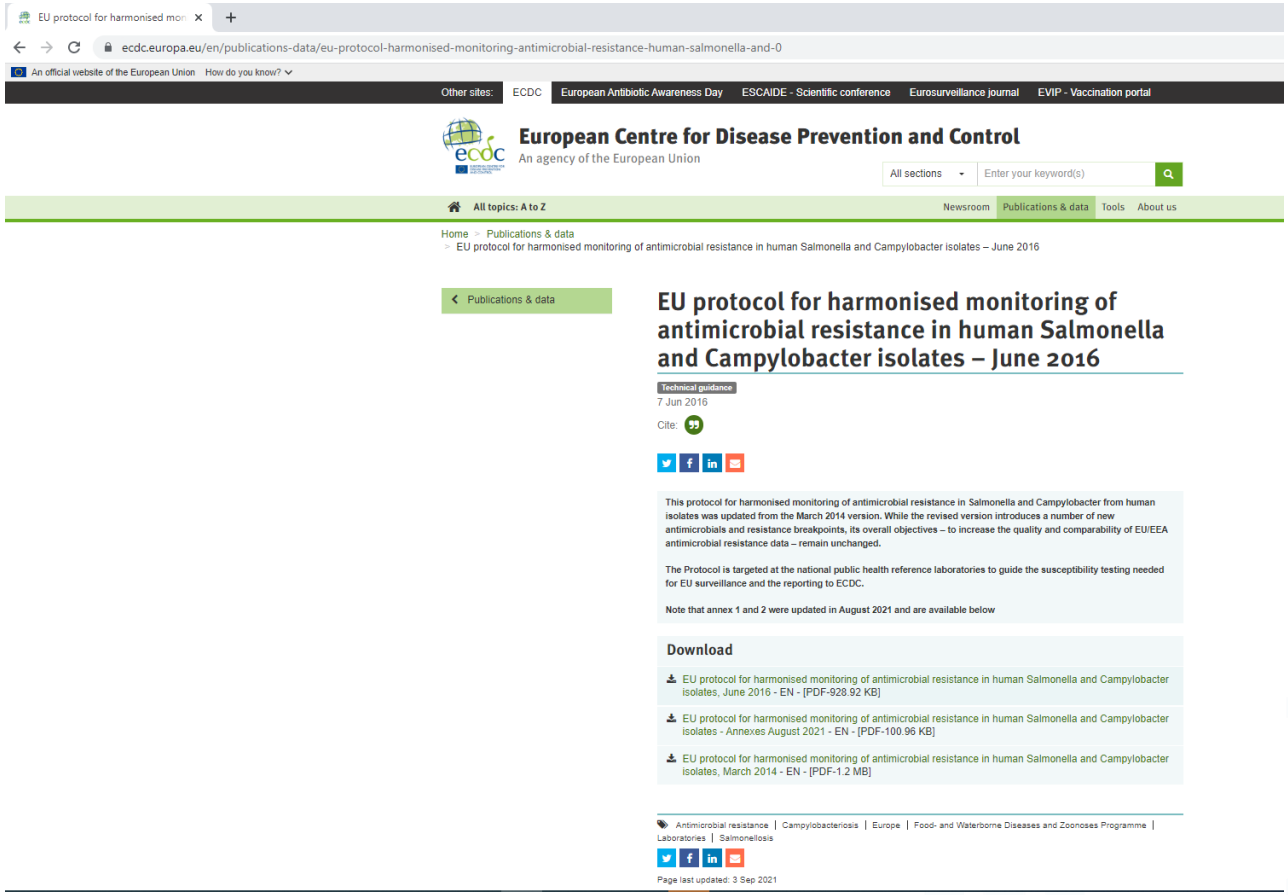

https://www.ecdc.europa.eu/en/publications-data/eu-protocol-harmonised-monitoring-antimicrobial-resistance-human-salmonella-and-0

HARMONIZED EU PROTOCOL FOR DOWNLOAD

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Note that annex 1 and 2 were updated in August 2021 and are available below

Download

- EU protocol for harmonised monitoring of antimicrobial resistance in human Salmonella and Campylobacter isolates, June 2016 - EN - [PDF-928.92 KB]
- EU protocol for harmonised monitoring of antimicrobial resistance in human Salmonella and Campylobacter isolates - Annexes August 2021 - EN - [PDF-100.96 KB]
- EU protocol for harmonised monitoring of antimicrobial resistance in human Salmonella and Campylobacter isolates, March 2014 - EN - [PDF-1.2 MB]

EU SURVEILLANCE OBJECTIVES (1)

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- a) To monitor, in human clinical isolates, trends in the occurrence of resistance to antimicrobial agents **relevant for treatment of human** Salmonella and Campylobacter infections, including comparison with food/animal isolates
- b) To monitor, in human clinical isolates, trends in the occurrence of resistance to **other antimicrobial agents** of public and animal health importance, including comparison with food/animal isolates
- c) To monitor, in human clinical isolates, the prevalence of ESBL, plasmid-encoded Ambler class C βlactamases (pAmpC) and carbapenemase phenotypes
- d) To use antimicrobial resistance patterns to characterise human clinical isolates, i.e. as an epidemiological marker, to **support identification of** outbreaks and related cases

EU SURVEILLANCE OBJECTIVES (2)

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- e) To identify and monitor, in human clinical isolates, genetic determinants of resistance that are important for public health e.g. to aid recognition of epidemic cross-border spread of multi-drug resistant Salmonella strains
- f) To monitor, in human clinical isolates, trends in the occurrence of resistance to antimicrobial agents that may be needed for **future therapeutic** use

Data should be reported quantitatively (mm or mg/l)

REQUIREMENTS FOR SURVEILLANCE

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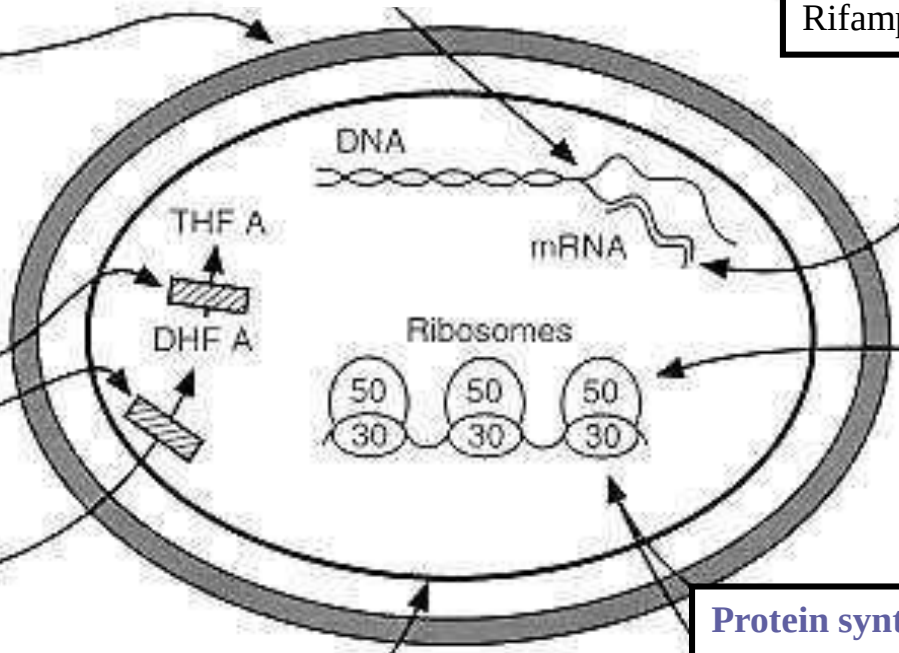
- No specific requirements for the extent of surveillance/monitoring are defined in the EU harmonized protocol
- One of the tasks for the FVD AMR-RefLabCap project is to propose minimum requirements for national AMR surveillance
- How many strains should be included ?
- Which methodology's should be used ?
- How much additional typing are needed

Antibiotics

Cell wall synthesis
β-lactams:
Penicillin
Cephalosporins
Monobaktams
Carbapenems

DNA replication
Fluoquinolones
Metronidazole

RNA-polymerase
Rifampicin



Protein syntese Inhibitors (50s)
Macrolides
chloramphenikol
Clindamycin

Anti metabolittes
Sulfonamides
Trimethroprim

Protein syntese Inhibitors (30s)
Tetracyclines
Aminoglykocides
Fucidinic acid

Cell membrane
Polymyxin
Amphotericin

Mechanisms of antibiotics

- Bacteriostatic

Stops growth of the infectious agent but does not kill it

The immune system has to kill the bug

- Bactericidal

Actively kills the infectious agent (some only growing bacteria)

Bacteriostatic antibiotic classes

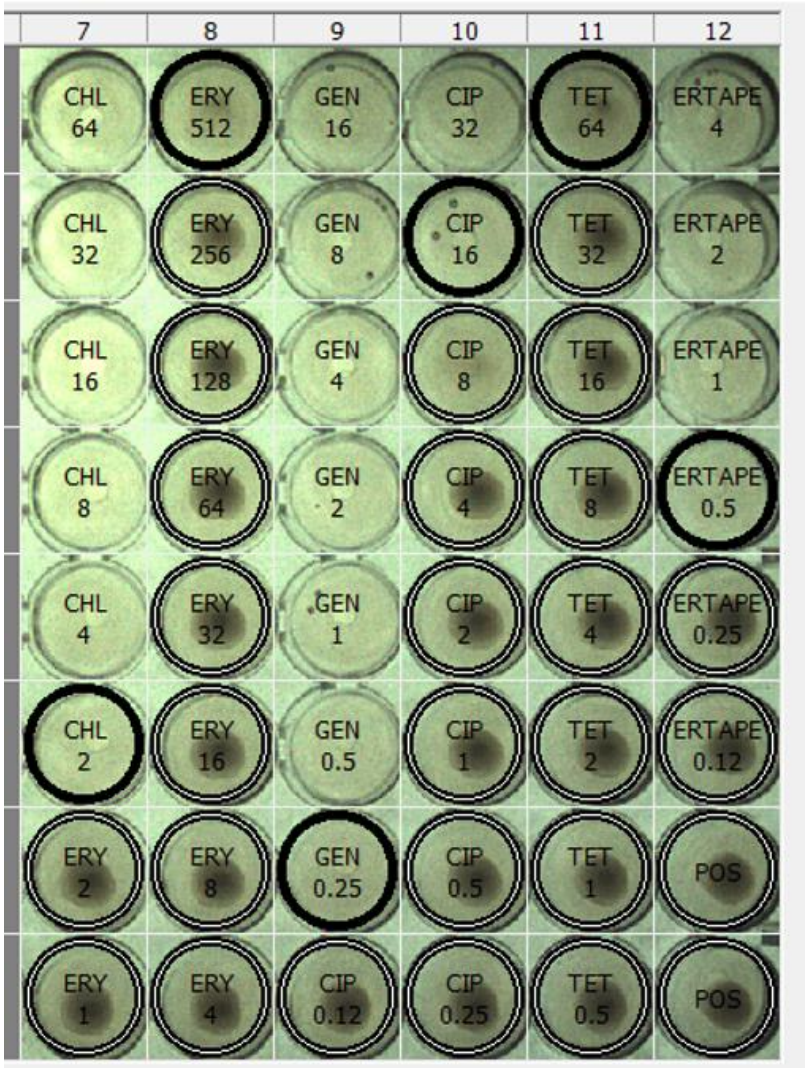
- **Tetracyclines**
- **Aminoglycosides** (Gentamicin, Apramycin, Neomycin, Spectinomycin, Streptomycin)
- **Sulphonamides** (Sulphamethoxazole)
- **Macrolides** (Erythromycin)
- **Amphenicols** (Chlorphenicol, Florphenicol)
- **Trimethoprim**

Bactericidal antibiotics classes

Beta-lactams

- **Penicillins** (ampicillin, methicillin)
- **Cephalosporins** (Cefotaxime, Ceftazidime, Ceftiofur)
- **Monobactams** (Aztreonam)
- **Carbapenems** (Imipenem, Meropenem, Ertapenem)
- **Quinolones** (Nalidixan)
- **Fluoroquinolones** (Ciprofloxacin)
- **Polymoxins** (Colistin)

CAMPYLOBACTER JEJUNI ON EUVSEC3



New 2021 EUCAMP panel

Chloramphenicol
Ciprofloxacin
Ertapenem
Erythromycin
Gentamicin
Tetracycline

Streptomycin
Nalicixan

ANTIMICROBIALS FOR HUMAN CAMPYLOBACTER ISOLATES

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Class	Name (abbreviation*)	Surveillance objectives	Comments
First priority			
Aminoglycosides	Gentamicin (GEN)	a, b	Included for invasive disease monitoring.
Macrolides	Erythromycin (ERY)	a, b	
Quinolones	Ciprofloxacin (CIP)	a, b	
Tetracyclines	Tetracycline (TCY)	a, b	
Optional			
Carbapenems	Meropenem (MEM) Ertapenem (ETP) Imipenem (IPM)	a, c	Include for invasive disease monitoring when MIC values are available. Encourage MSs to send their data (MIC) to EUCAST for the determination of ECOFFs. CLSI criteria exists. Both testing method and related quality control range are needed for disk diffusion.
Combination drug	Amoxicillin + clavulanic acid (AMC)		Currently no standardised method available.
Macrolides	Azithromycin (AZM)	f	Not included at this stage. Option for future.

** Abbreviations/antibiotic codes as used in EARS-Net and based on WHONET 5.3*

What is antimicrobial resistance I?

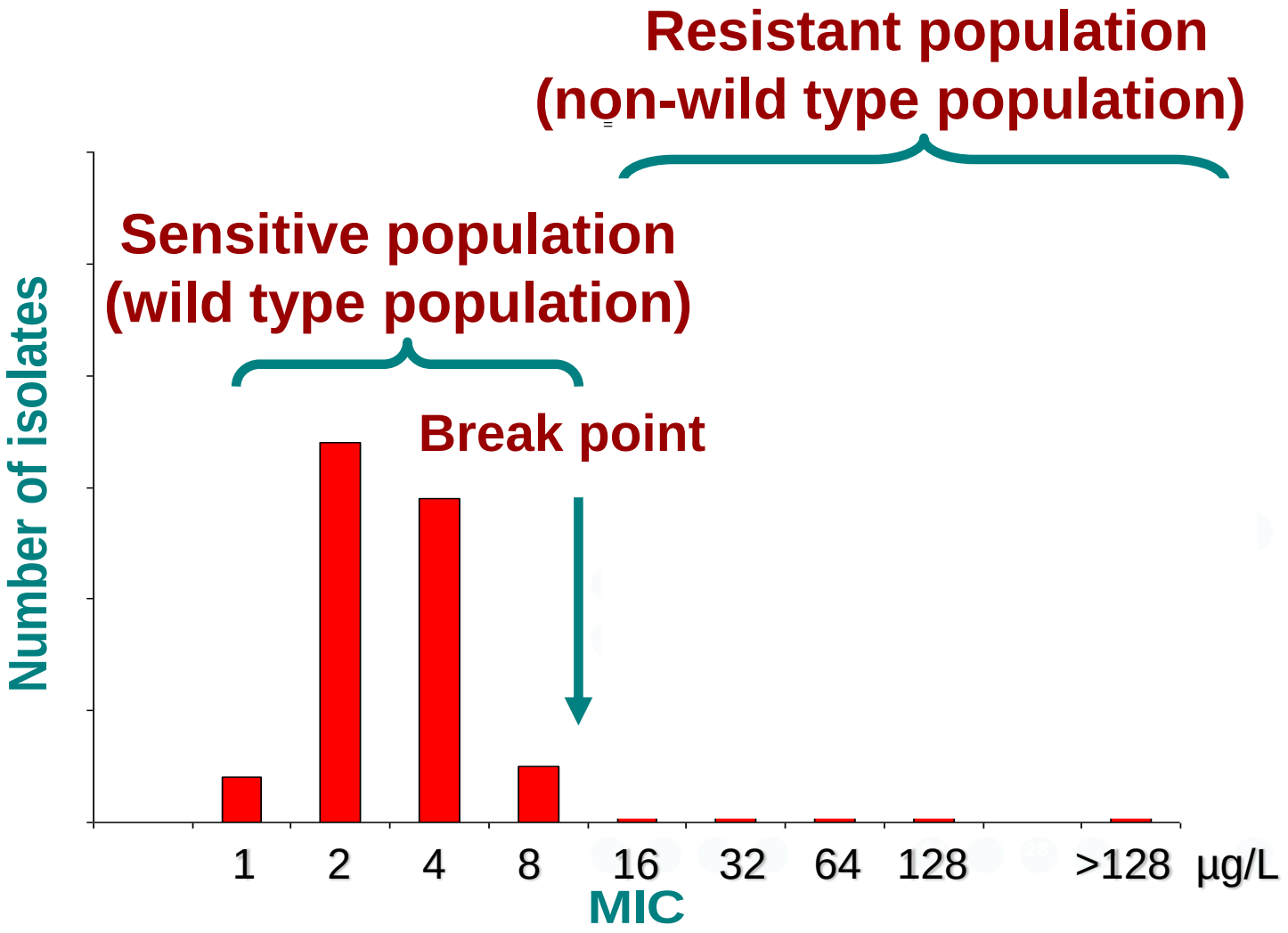
The ability of a microorganism to survive at a given concentration of an antimicrobial agent at which the wild type population of the microorganism would be killed

This is called the
“epidemiological/microbiological breakpoint”.

EUCAST* defines epidemiological breakpoints – ECOFFs

*European Committee on Antimicrobial Susceptibility Testing

Population distribution



MIC > Breakpoint → Resistant (R > 8 or R ≥ 16)

What is antimicrobial resistance II?

The ability of a microorganism to survive treatment with a clinical concentration of an antimicrobial agent in the body.

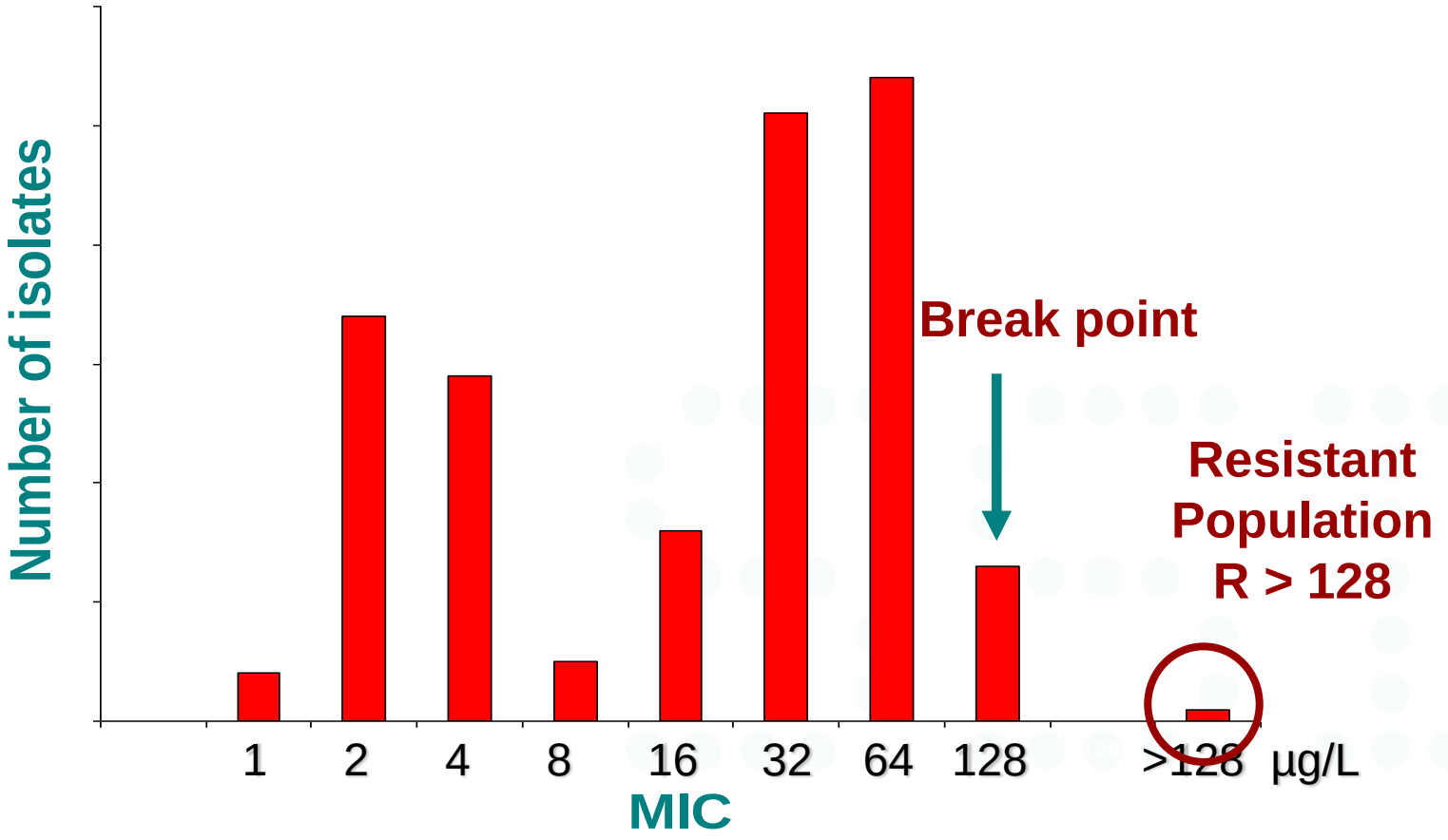
This is called the
“Clinical breakpoint”.

EUCAST and CLSI* is defining the clinical breakpoints**.**

* Clinical Laboratory Standards Institute)

Population distribution

Drug concentration in infection site: 128 µg/L



MIC > Breakpoint → Resistant (R > 128)

EUCAST DISTRIBUTIONS

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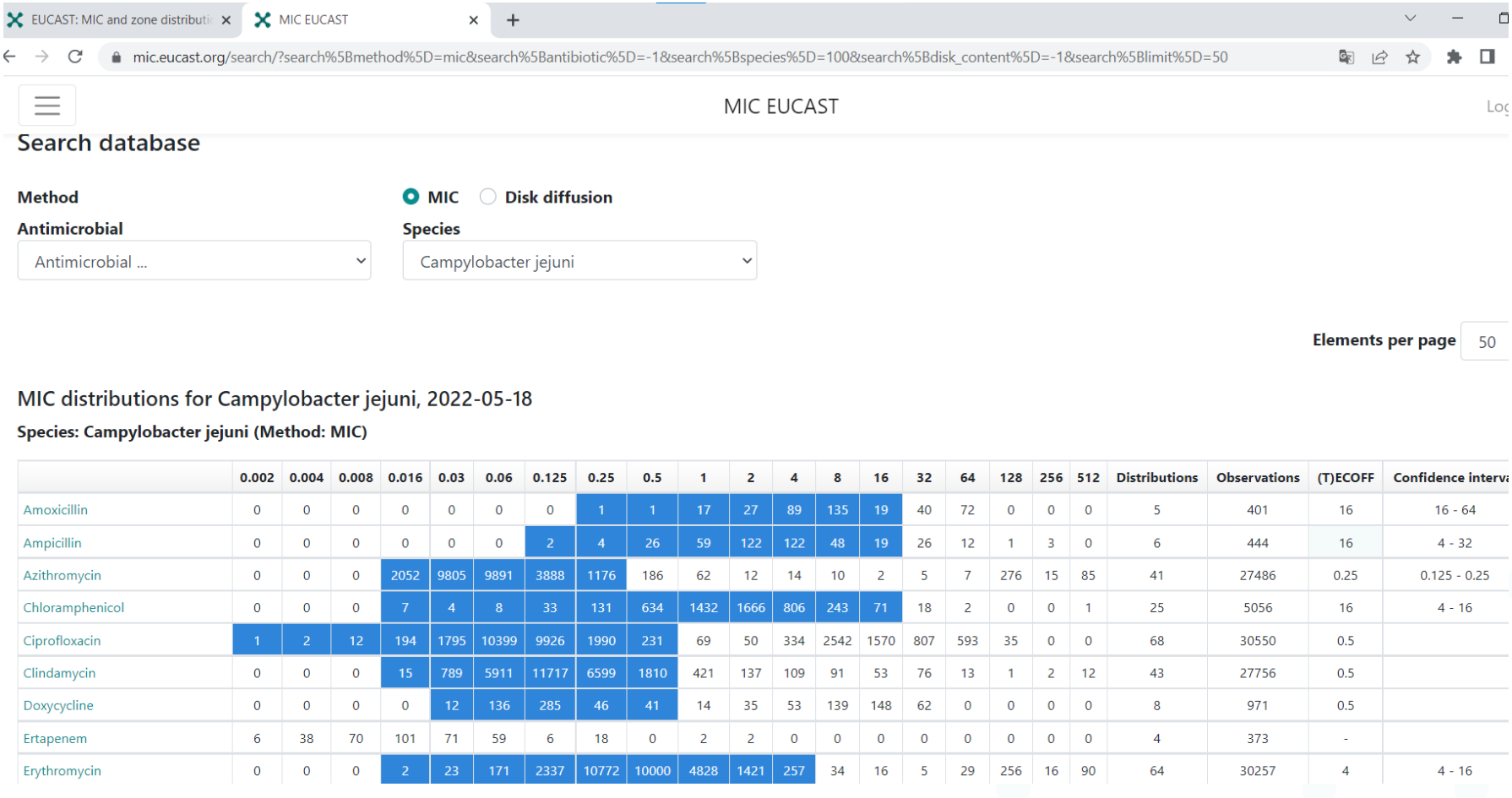

	0.002	0.004	0.008	0.016	0.03	0.06	0.125	0.25	0.5	1	2	4	8	16	32	64	128	256	512	Distributions	Observations	(T)ECOFF	Confidence interva
Amoxicillin	0	0	0	0	0	0	0	1	1	17	27	89	135	19	40	72	0	0	0	5	401	16	16 - 64
Ampicillin	0	0	0	0	0	0	2	4	26	59	122	122	48	19	26	12	1	3	0	6	444	16	4 - 32
Azithromycin	0	0	0	2052	9805	9891	3888	1176	186	62	12	14	10	2	5	7	276	15	85	41	27486	0.25	0.125 - 0.25
Chloramphenicol	0	0	0	7	4	8	33	131	634	1432	1666	806	243	71	18	2	0	0	1	25	5056	16	4 - 16
Ciprofloxacin	1	2	12	194	1795	10399	9926	1990	231	69	50	334	2542	1570	807	593	35	0	0	68	30550	0.5	
Clindamycin	0	0	0	15	789	5911	11717	6599	1810	421	137	109	91	53	76	13	1	2	12	43	27756	0.5	
Doxycycline	0	0	0	0	12	136	285	46	41	14	35	53	139	148	62	0	0	0	0	8	971	0.5	
Ertapenem	6	38	70	101	71	59	6	18	0	2	2	0	0	0	0	0	0	0	0	4	373	-	
Erythromycin	0	0	0	2	23	171	2337	10772	10000	4828	1421	257	34	16	5	29	256	16	90	64	30257	4	4 - 16

[Antimicrobial wild type distributions]

C. JEJUNI ERY AND AZI MIC DISTRIBUTIONS

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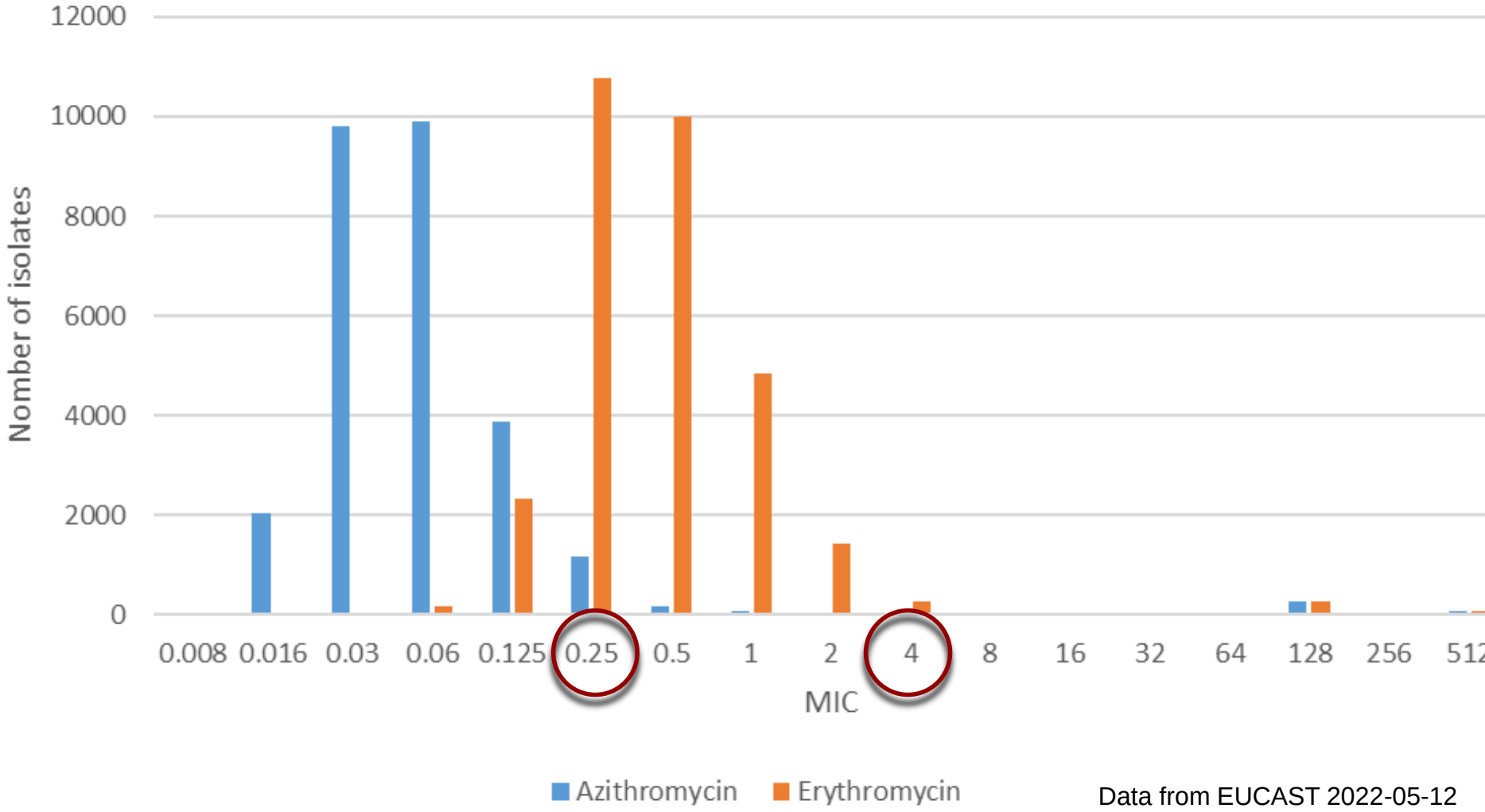
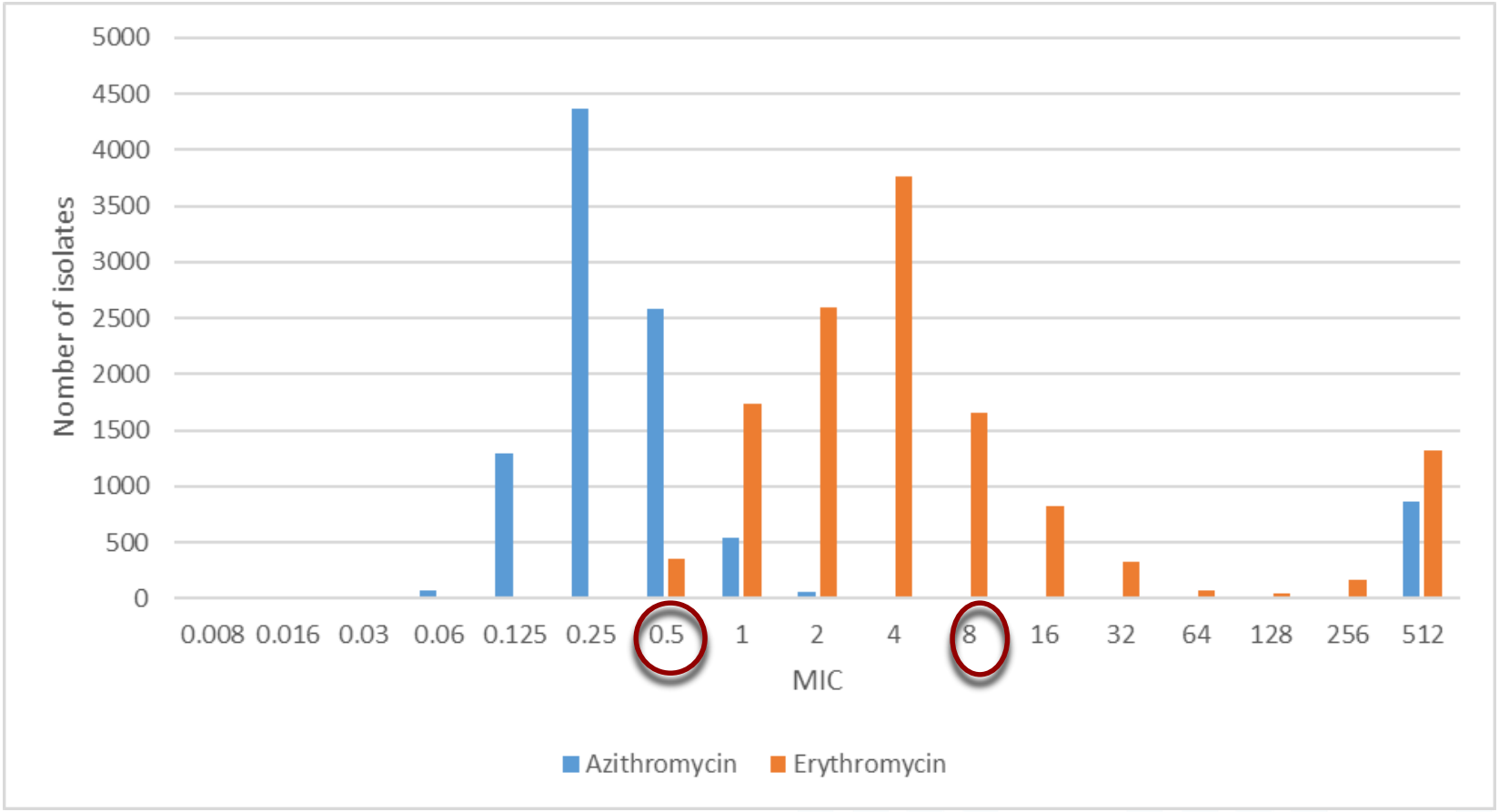


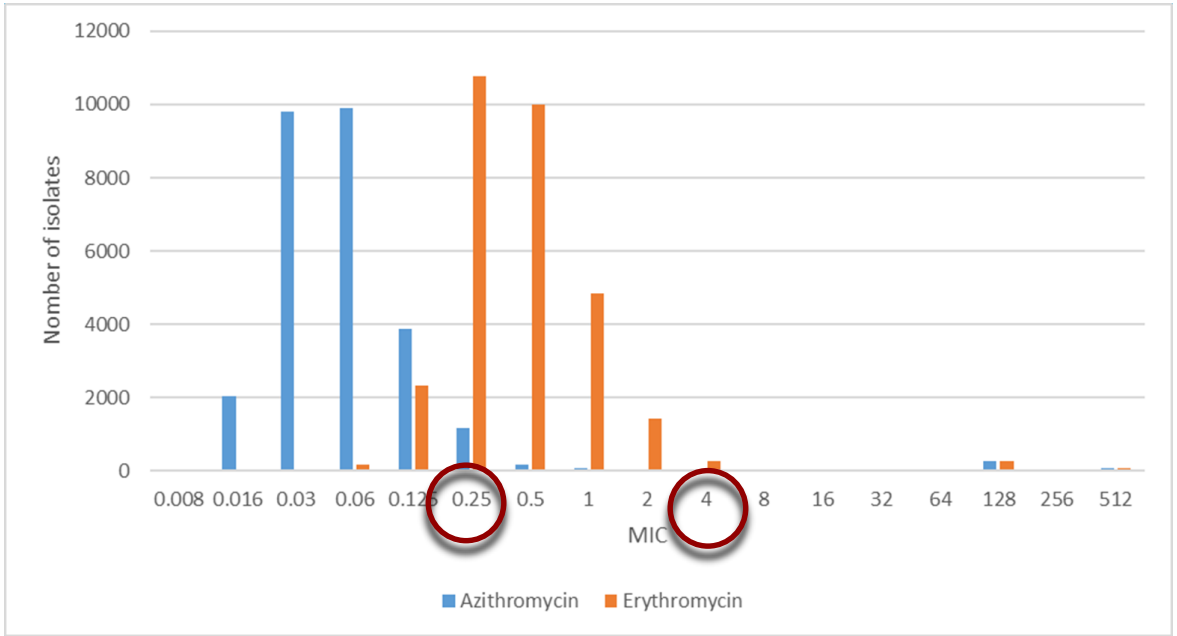
Data from EUCAST 2022-05-12

C. COLI ERY AND AZI MIC DISTRIBUTIONS

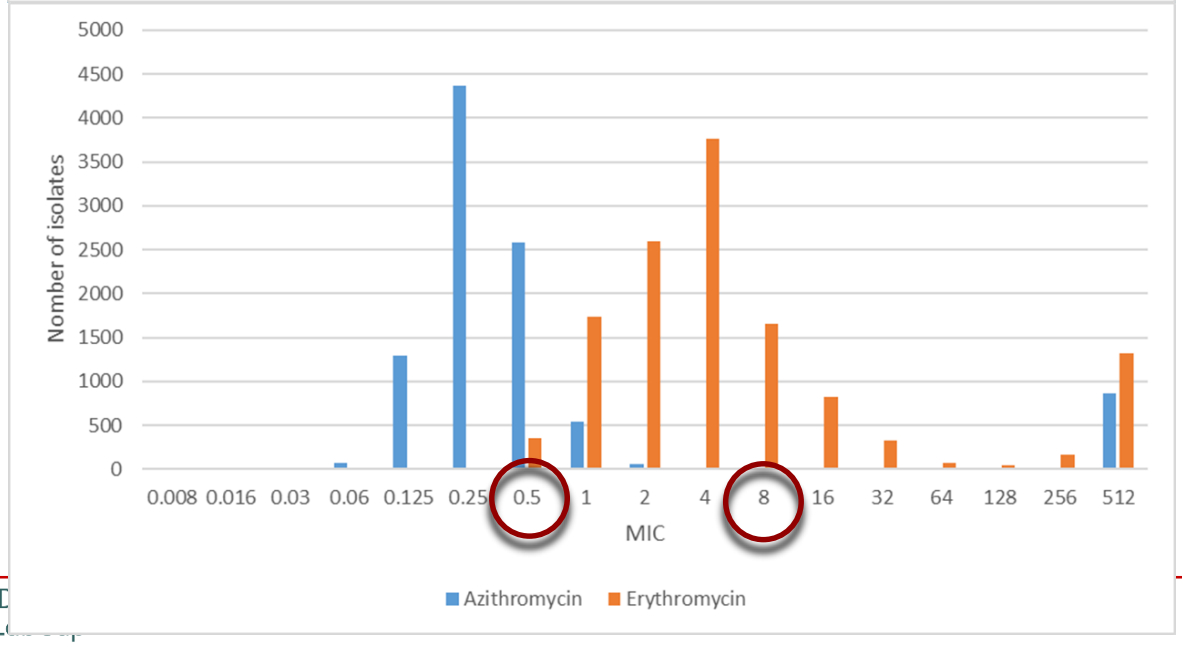


Data from EUCAST 2022-05-12

C. JEJUNI AND C. COLI MIC DISTRIBUTIONS



C. jejuni



C. coli

Data from EUCAST 2022-05-12

EUCAST CLINICAL BREAKPOINTS: NEW DEFINITIONS OF S, I AND R FROM 2019

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- S - Susceptible, standard dosing regimen: A microorganism is categorised as "Susceptible, standard dosing regimen", when there is a high likelihood of therapeutic success using a standard dosing regimen of the agent.
- I - Susceptible, increased exposure*: A microorganism is categorised as "Susceptible, Increased exposure*" when there is a high likelihood of therapeutic success because exposure to the agent is increased by adjusting the dosing regimen or by its concentration at the site of infection.
- R - Resistant: A microorganism is categorised as "Resistant" when there is a high likelihood of therapeutic failure even when there is increased exposure.
- ATU: The Area of Technical Uncertainty

EUCAST CLINICAL BREAKPOINTS AND EPIDEMIOLOGICAL CUT-OFF VALUES FOR THE PRIORITY LIST OF ANTIMICROBIALS TO BE TESTED FOR CAMPYLOBACTER JEJUNI AND C. COLI AS OF 31 AUGUST 2021

Antimicrobial	Criteria based on MIC dilution (mg/L)			Recommended concentration range[1] (mg/L) (number of wells)	Criteria based on disk diffusion (mm)			Disk load (µg)
	S≤	R>	NWT >		S≥	R<	NWT<	
First priority								
Ciprofloxacin (CIP)	0.001	0.5	0.5	0.12-32 (9)	50	26	26	5
Erythromycin (ERY) *C. jejuni*	4.0	4.0	4.0	1-512 (10)	20	20	22	15
Erythromycin (ERY) *C. coli*	8.0	8.0	8.0	1-512 (10)	24	24	24	15
Gentamicin (GEN)	ND	ND	1.0	0.25-16 (7)	ND	ND	20	10
Tetracycline (TCY) *C. jejuni*	2.0	2.0	1.0	0.5-64 (8)	30	30	30	30
Tetracycline (TCY) *C. coli*	2.0	2.0	2.0	0.5-64 (8)	30	30	30	30
Optional								
Amoxicillin + clavulanic acid (AMC)	ND	ND	ND		ND	ND	ND	30
Azithromycin (AZM) *C. jejuni*	ND	ND	0.25		ND	ND	ND	
Azithromycin (AZM) *C. coli*	ND	ND	0.5		ND	ND	ND	
Ertapenem (ETP)	ND	ND	ND	0.125-4 (6)[1]	ND	ND	ND	
Imipenem (IMP)	ND	ND	ND		ND	ND	ND	
Meropenem (MEM)	ND	ND	ND		ND	ND	ND	10

HOW DO WE MEASURE ANTIMICROBIAL SUSCEPTIBILITY *IN VITRO*?

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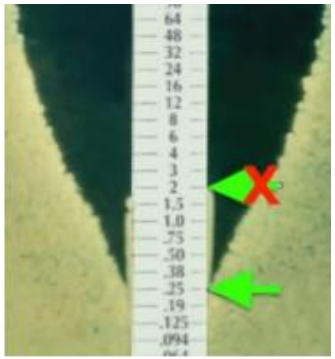
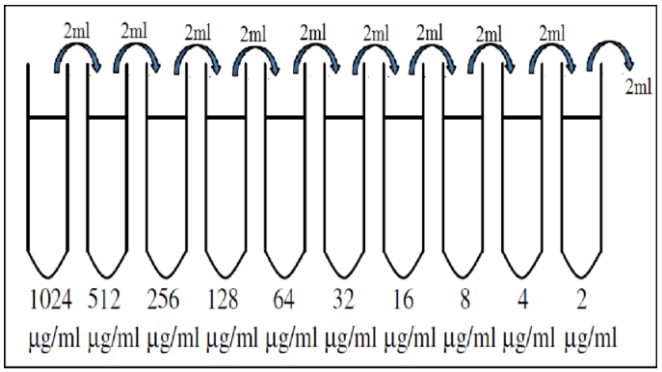
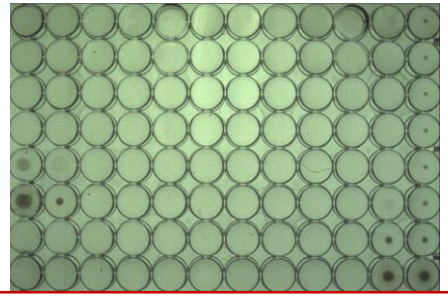
Phenotypic methods



- Agar diffusion method
  - Disks (tablet) mm
  - Gradient strips quantitative

- Dilution methods (quantitative)
  - Liquid media
  - MicroBrothDilution
  - Solid media





CAMPYLOBACTER: METHODS TO TEST FOR SUSCEPTIBILITY – EUCAST RECCOMENDATIONS

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- Disk diffusion is widely used for measurement of antimicrobial activity against Campylobacter – expressed in inhibition zone diameters (IZD) expressed in mm
- Dilution methods, where the minimum inhibitory concentration (MIC) is determined (value expressed in mg/L), is a more accurate than disk diffusion and is considered the gold standard for AST of CAMPY
- Good/excellent correlation between the values obtained in mm and in mg/L are observed
- Micro-broth dilution is recommended as the preferred testing method for monitoring purposes
- Validated methods of gradient strip diffusion are accepted.
- MIC - The concentration ranges to be tested for each antimicrobial should include a span large enough to encompass both the clinical breakpoints and the ECOFF-values, to facilitate comparison with the animal and food data.

“OPEN” AST TESTING METHODS

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- Dilution methods - minimum inhibitory concentration (MIC) is determined (mg/L) is considered the gold standard for AST by EUCAST.
- Fastidious organisms (including Campylobacter spp, and others), EUCAST recommends the same methodology but with the use of MH-F broth (MH broth with lysed horse blood and beta-NAD)

ICS › 11 › 11.100 › 11.100.20

ISO 20776-1:2019

Susceptibility testing of infectious agents and evaluation of performance of antimicrobial susceptibility test devices — Part 1: Broth micro-dilution reference method for testing the in vitro activity of antimicrobial agents against rapidly growing aerobic bacteria involved in infectious diseases

- Disk diffusion – inhibition zones in mm - according to EUCAST guidelines v10 (1 January 2022)

AST TESTING WITH PROPRIETARY METHODS

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- Gradient strips (MIC) – according to EUCAST and producer – should be validated

- Other methods, e.g. Trek sensititre, Vitek should be validated

Validation protocol:

ICS › 11 › 11.100 › 11.100.20

ISO 20776-2:2021

Clinical laboratory testing and in vitro diagnostic test systems — Susceptibility testing of infectious agents and evaluation of performance of antimicrobial susceptibility test devices — Part 2: Evaluation of performance of antimicrobial susceptibility test devices against reference broth micro-dilution

https://www.thermofisher.com/order/catalog/product/CAMPY

EUCAST – WEB PAGE – USE IT

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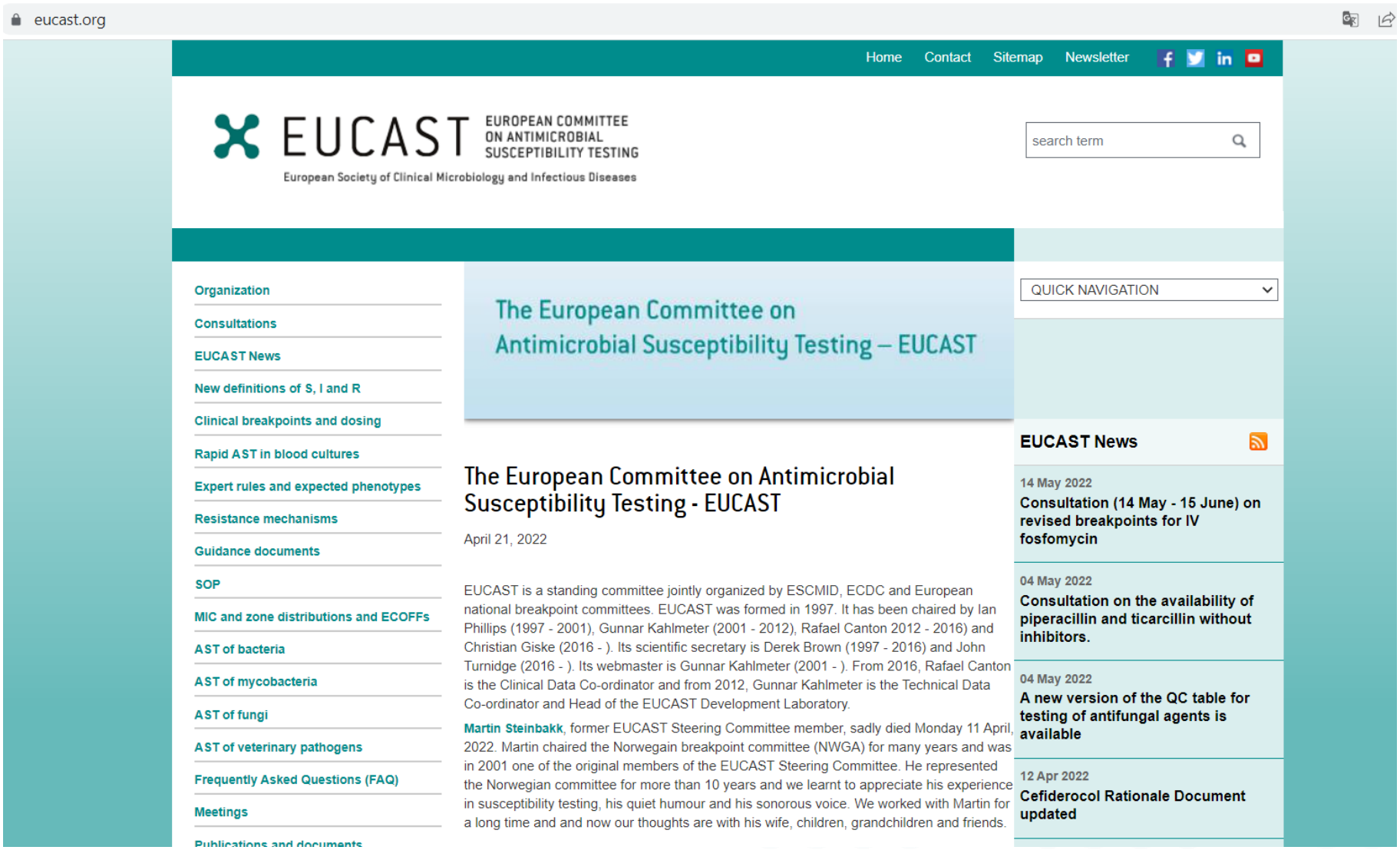

LINKS TO EUCAST

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- **Website** EUCAST: EUCAST
- **Disk diffusion methodology** EUCAST: Disk diffusion methodology
- **Broth microdilution reading guide** EUCAST: MIC determination
- **QC tables** EUCASTQuality: Control
- **Breakpoint table**
  - EUCAST: Clinical breakpoints and dosing of antibiotics
  - V. 12 v_12.0_Breakpoint_Tables.xlsx (live.com)
- **ECOFFS** EUCAST: MIC and zone distributions and ECOFFs
- **Warnings** EUCAST: Warnings!
- **Instruction videos** Instruction videos

ECDC AST EQA on Campylobacter

ECDC EQA-AST's -Objectives/aims of the

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Aims:

- support the implementation of the harmonized EU AST protocol for *Salmonella* and *Campylobacter*
- assess the quality of the AST data obtained using MIC and/or DD methods in NPHRLs across Europe
- allow evaluation of new molecular based methodologies (WGS, PCR etc.)
- evaluation of serotyping of Salmonella and species identification of Campylobacter

Objectives:

- identify common laboratory problem(s)
- assess the overall comparability of routinely collected AST results from European NPHRLs

EQA6-AST, 2020 – CAMPYLOBACTER

STATENS SERUM INSTITUT

- Five strains included for AST testing and species determination
- Three mandatory antimicrobials, ampicillin, ciprofloxacin and tetracycline
- Gentamicin optional
- Possible to report predicted results (WT or NWT) from molecular analysis

Participation – and organisation

- Laboratories in the FWD-Net and laboratories from “enlargement” countries were invited to participate:
- Participation:
  - Campylobacter: 21 EU/EEA - and 6 “enlargement” countries
- Participants submitted results using an online platform
- Individual feedback was provided

Testing and reporting

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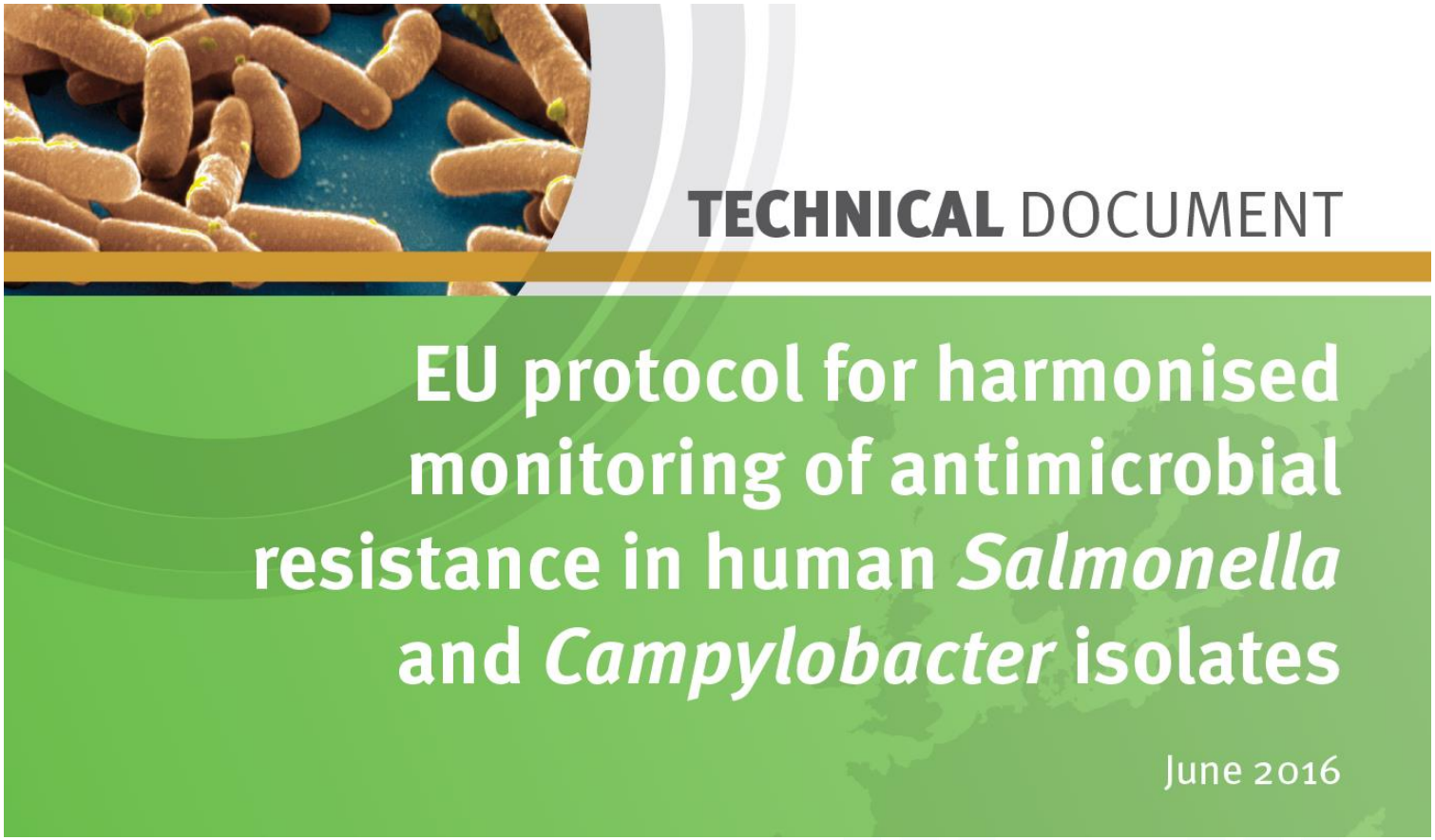
- Laboratories were asked to follow the harmonised EU AST protocol Otherwise use the routine methods of the laboratory
- Report Information on method and materials

Protocol



https://www.ecdc.europa.eu/sites/default/files/media/en/publications/Publications/antimicrobial-resistance-Salmonella-Campylobacter-harmonised-monitoring.pdf

Campylobacter test strains

- Represented commonly reported human strains in the EU/EEA
- Were stable during the testing period in the organising laboratory
- Expected MIC and DD results were established by the EQA provider following the harmonized EU AST protocol
- DD results established using disks from Oxoid
- MIC values established using the micro-broth dilution based MIC system from TREK diagnostic systems© from Thermo Scientific

Data analysis

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- Test results were compared to the expected results
  - *Campylobacter*: MIC results within +/- one dilution difference and DD results within +/- 4 mm difference were evaluated as correct
- MIC results that were not in the relevant concentration range for comparison with expected results were not evaluated (ND)
- Qualitative results interpreted using EUCAST ECOFF and clinical breakpoints
- Predicted genotypic results evaluated against phenotypic qualitative results using ECOFF's

Important to notice!!

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The following slides are based on results submitted by EU/EEA laboratories only

Campylobacter

21 EU/EEA countries

- 13 reported disk diffusion results
- 12 reported MIC results, broth dilution or gradient strip
- 4 reported predicted results based on WGS

Campylobacter test strains by species and resistance profile

Strain	Species	Resistance profile[1] (NWT)
EQA_AST.C20.0001	C. coli	Ciprofloxacin, erythromycin, tetracycline, gentamicin
EQA_AST.C20.0002	C. jejuni	
EQA_AST.C20.0003	C. coli	Ciprofloxacin, erythromycin
EQA_AST.C20.0004	C. coli	Ciprofloxacin, erythromycin, tetracycline
EQA_AST.C20.0005	C. jejuni	Tetracycline

[1] Based on MIC values and according to EUCAST ECOFFs.

- All reported species results were correct
- One laboratory did not report the species of the test strains

Antimicrobials *Campylobacter*

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EUCAST clinical breakpoints and epidemiological cut-off values for the priority list of antimicrobials to be tested for *Campylobacter jejuni* and *coli* as of 15 Mar 2016

Antimicrobial	Criteria based on MIC dilution (mg/L)			Recommended concentration range[1] (mg/L) (number of wells)	Criteria based on disk diffusion (mm)			Disk load (µg)
	S≤	R>	ECOFF ≤		S≥	R<	ECOFF≥	
	First priority							
Ciprofloxacin (CIP)	0.5	0.5	0.5	0.12-16 (8)	26	26	26	5
Erythromycin (ERY) *C. jejuni*	4.0	4.0	4.0	1-128 (8)	20	20	22	15
Erythromycin (ERY) *C. coli*	8.0	8.0	8.0	1-128 (8)	24	24	24	15
Gentamicin (GEN)	ND	ND	2.0	0.12-16 (8)	ND	ND	20[2]	10
Tetracycline (TCY) *C. jejuni*	2.0	2.0	1.0	0.5-64 (8)	30	30	30	30
Tetracycline (TCY) *C. coli*	2.0	2.0	2.0	0.5-64 (8)	30	30	30	30
	Optional							
Amoxicillin + clavulanic acid (AMC)	ND	ND	ND		ND	ND	ND	20-10
Azithromycin (AZM) *C. jejuni*	ND	ND	0.25		ND	ND	ND	
Azithromycin (AZM) *C. coli*	ND	ND	0.5		ND	ND	ND	
Ertapenem (ETP)	ND	ND	ND		ND	ND	ND	
Imipenem (IMP)	ND	ND	ND		ND	ND	ND	
Meropenem (MEM)	ND	ND	ND		ND	ND	ND	10

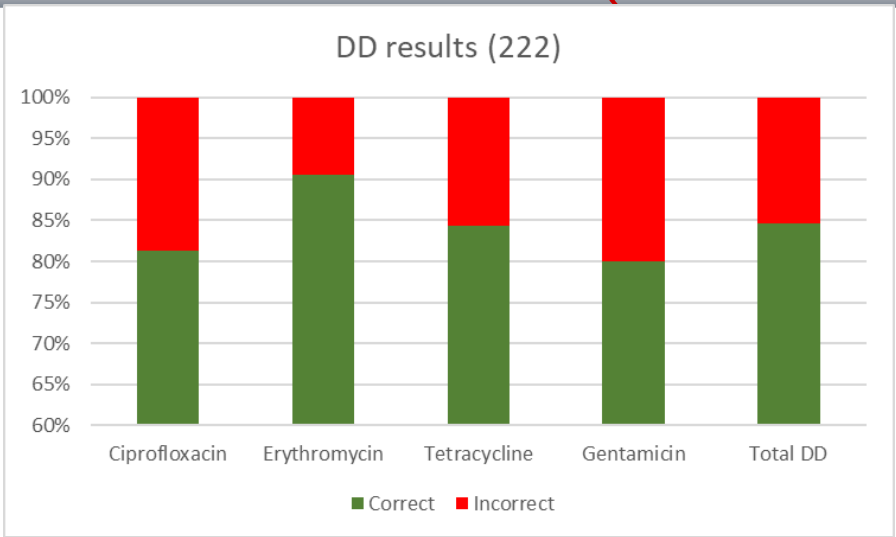
EQA6 AST CAMPYLOBCATER OVERALL RESULTS

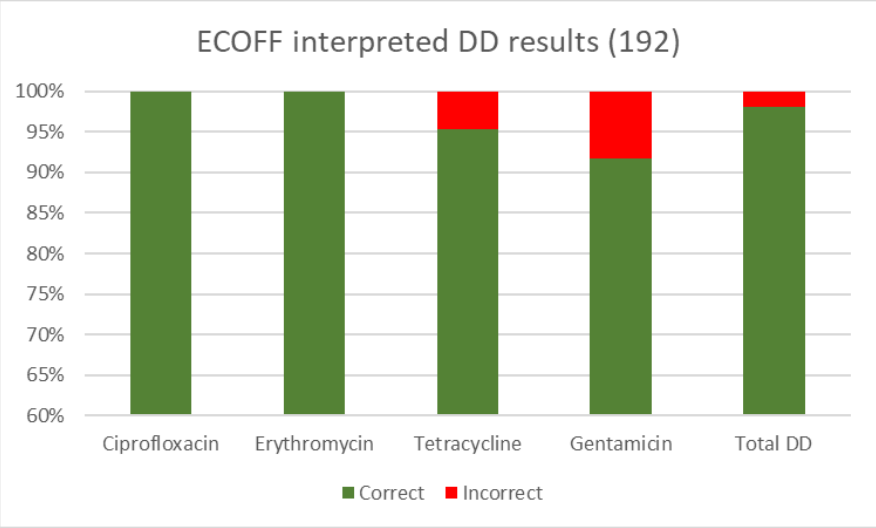
Results by DD assay	All antimicrobials	Mandatory	Gentamicin (Optional)
Expected value	188/222 (85%)	164/192 (85%)	24/30 (80%)
ECOFF	200/204 (98%)	189/192 (98%)	11/12 (92%)
NA (ECOFF)	18		18
Clinical breakpoint	189/192 (98%)	189/192 (98%)	
NA - Clinical breakpoint	30		30
Total	222	192	30
Results by MIC determination	**All antimicrobials**	**Mandatory**	**Optional**
Expected value	168/214 (79%)	130/166 (78%)	38/48 (79%)
ND	16	14	2
ECOFF	222/230 (97%)	172/180 (96%)	50/50 (100%)
Clinical breakpoint	173/180 (96%)	173/180 (96%)	
NA-clinical breakpoint			50
Total	230	180	50
Results by WGS (predicted)	**All antimicrobials**	**Mandatory**	**Optional**
ECOFF	48/75 (64%)	40/55 (73%)	7/13 (54%)

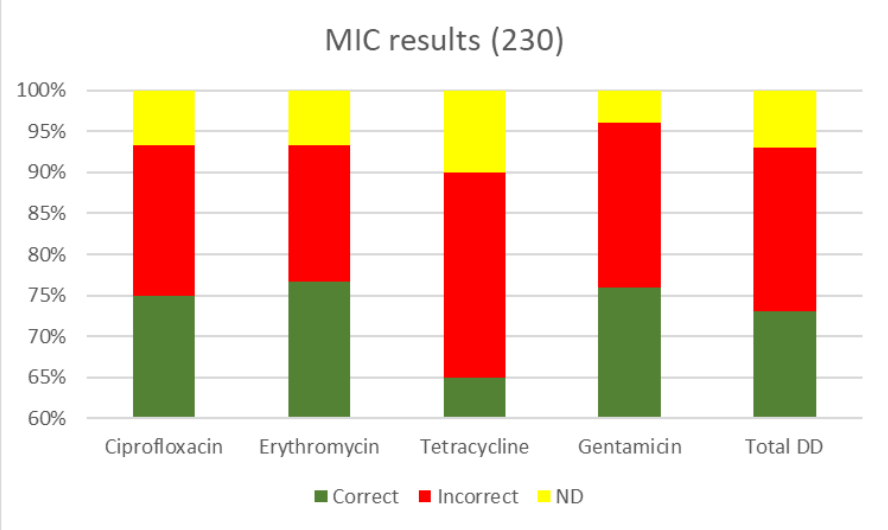
NA: Not analyzed, no EUCAST breakpoints

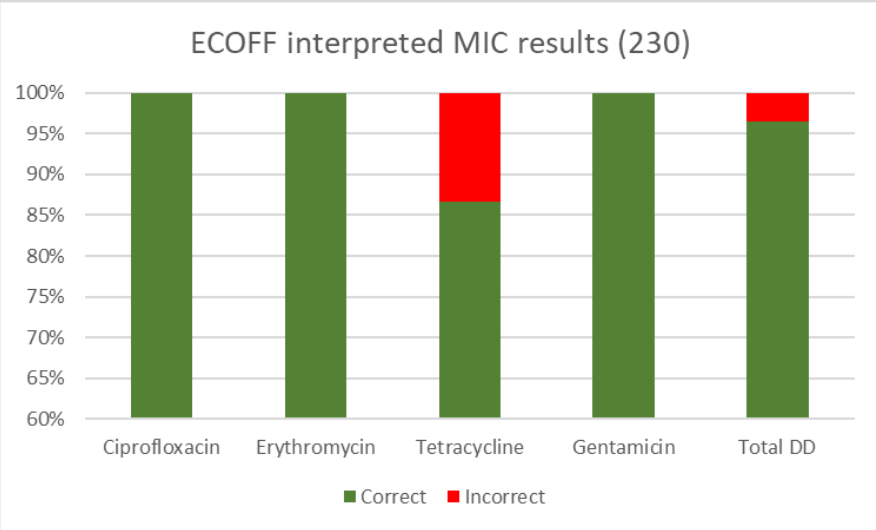
ND: MIC results that were not in the relevant range for comparison with expected results

CAMPYLOBACTER QUANTITATIVE AND QUALITATIVE DD AND MIC RESULTS (NOTE THE SCALE ON THE Y-AXIS)









Campylobacter – performance by antimicrobial

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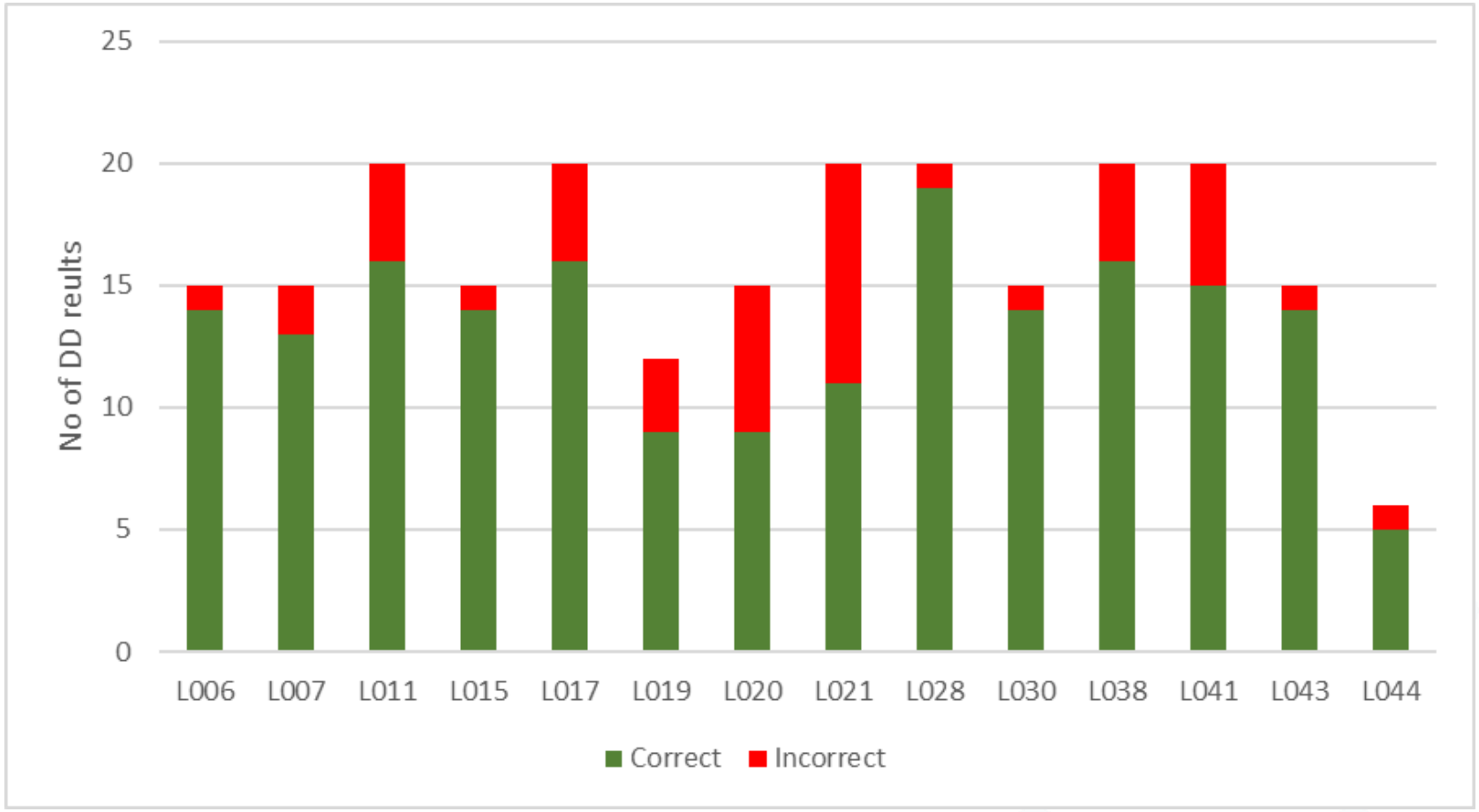
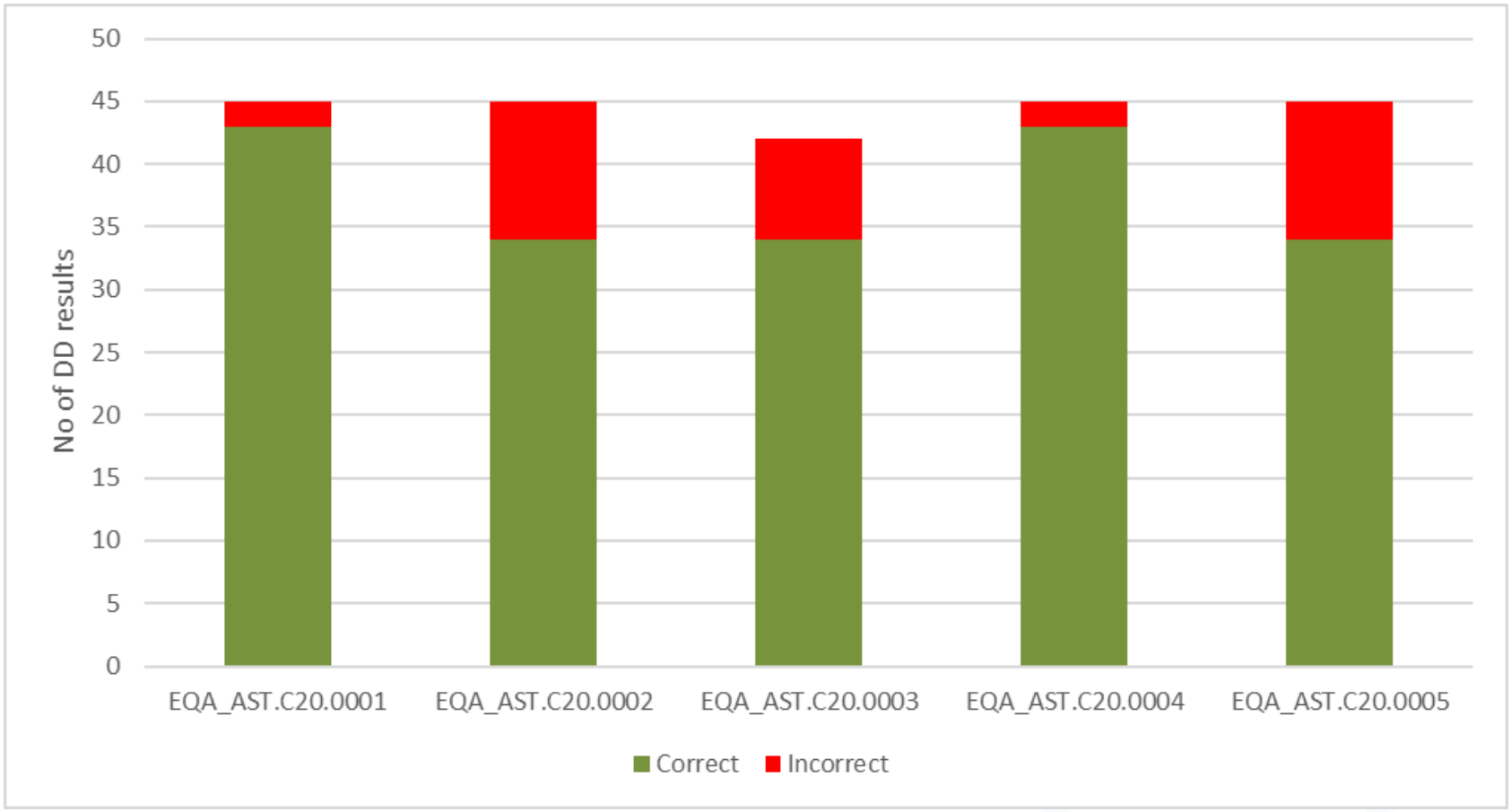
Antimicrobial	Number of laboratories performing DD	Numbers of DD results within the accepted four mm difference out of the total tested	Number of correct results when using EUCAST ECOFF
Disk diffusion			
Ciprofloxacin	13	52/64 (81%)	64/64 (100%)
Erythromycin	13	58/64 (91%)	64/64 (100%)
Tetracycline	13	54/64 (84%)	61/64 (95%)
Gentamicin	6	24/30 (80%)	11/12 (92%)
Total DD		188/222 (85%)	200/204 (98%)
	Number of laboratories performing MIC (both gradient strips and broth-dilution)	Numbers of MIC results within the accepted one dilution difference out of the total tested	Number of correct results when using EUCAST ECOFF
MIC total*			
Ciprofloxacin	12	45/56 (80%)	60/60 (100%)
Erythromycin	12	46/56 (82%)	60/60 (100%)
Tetracycline	12	39/54 (72%)	52/60 (87%)
Gentamicin**	10	38/48 (79%)	50/50 (100%)
Total MIC		168/214 (79%)	222/230 (97%)

Campylobacter quantitative DD results (222) – all antimicrobials by laboratory



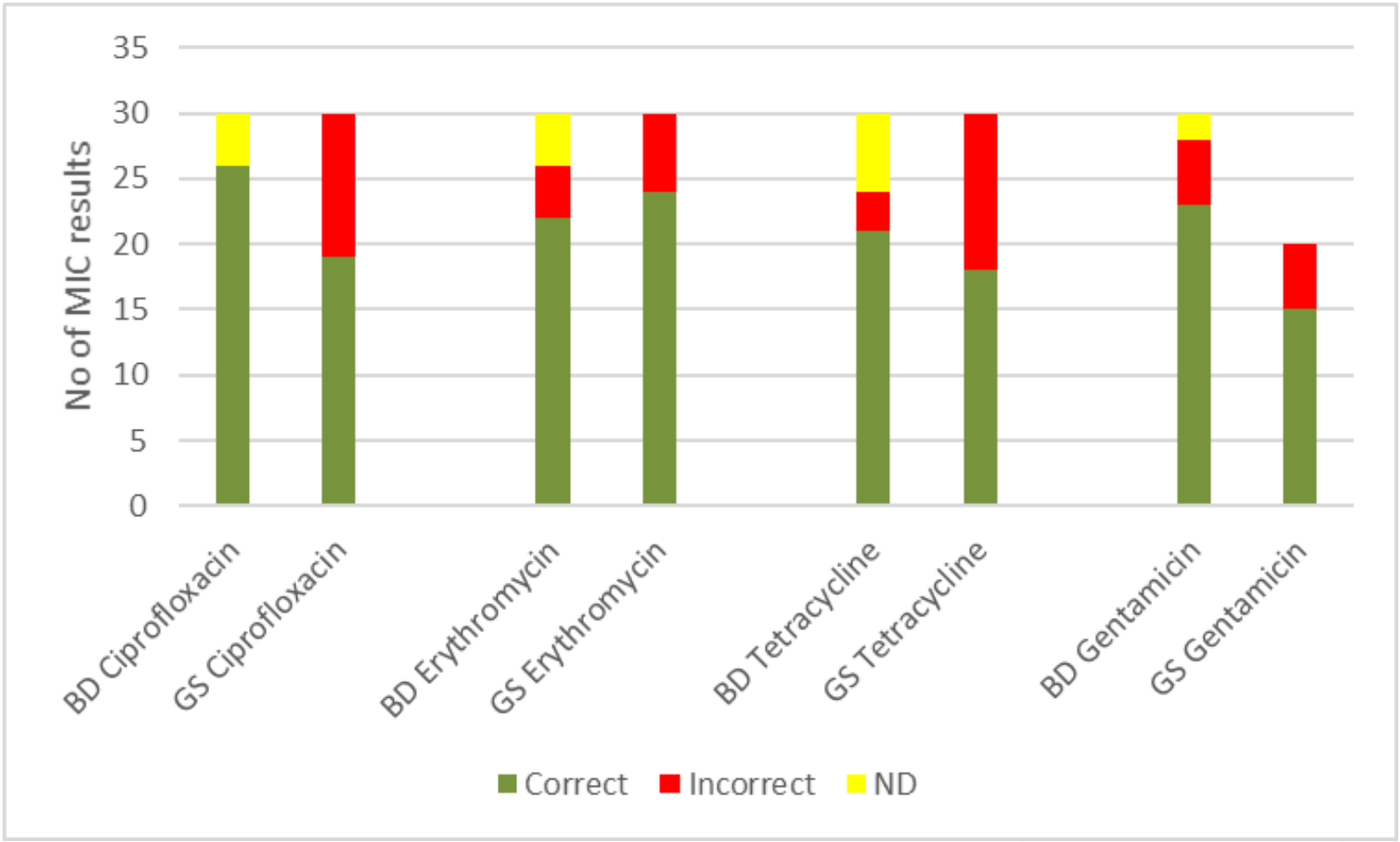
85% of the results evaluated as correct

Campylobacter quantative DD results (222) all antimicrobials by strain



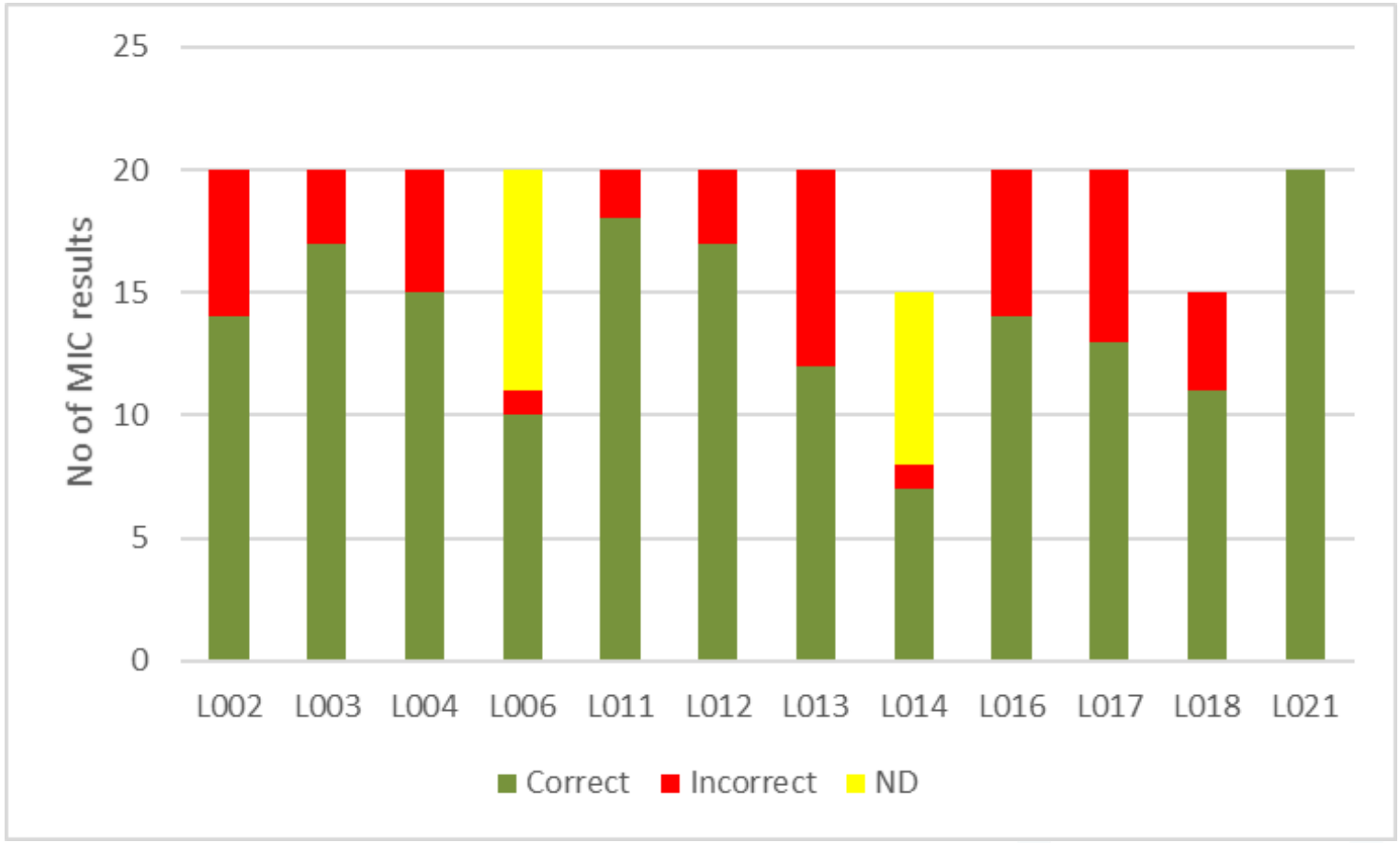
85% of the results evaluated as correct

Campylobacter quantitative MIC result (230) by antimicrobial and method



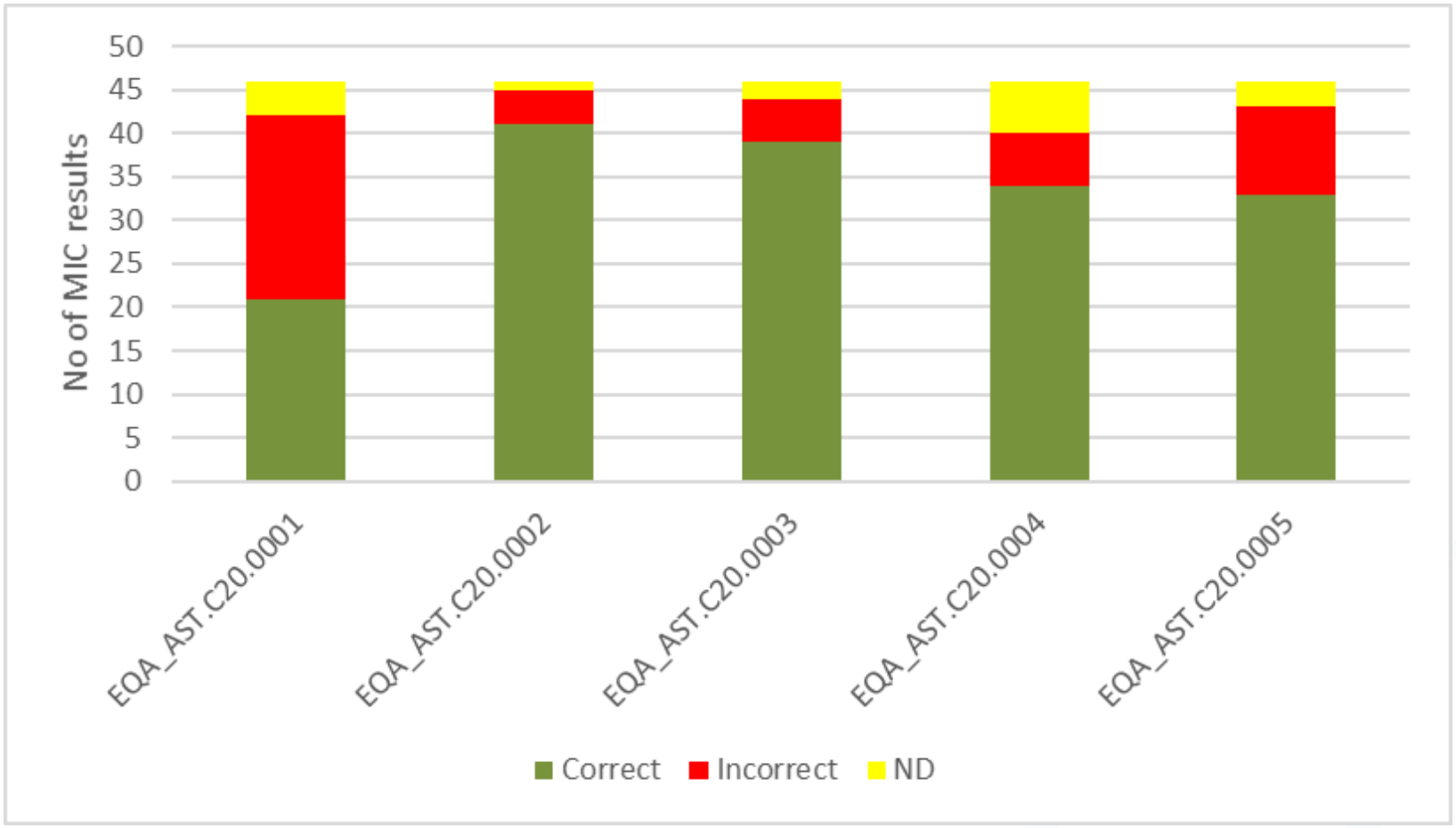
Overall no of correct: GS 69% BD: 88% (ex ND´s)

Campylobacter quantitative MIC results (230) all antimicrobials by laboratory



Overall no of correct: GS 69% BD: 88% (ex ND's)

Campylobacter quantitative MIC results (230), all antimicrobials by strain



Overall no of correct: GS 69% BD: 88% (ex ND's)

EQA6 CAMPYLOBACTER PREDICTED PHENOTYPES FROM WGS

Predicted phenotypes from WGS data by antimicrobial					
	Correct	Incorrect	Incorrect NWT	Incorrect WT	Total
Ciprofloxacin	15	5	3	2	15
Erythromycin	16	4	4		15
Tetracycline	9	6	6		15
Gentamicin	7	13	1	12	15
Total	47	28	14/37	14/38	75

Predicted phenotype from WGS data by antimicrobial			
EQA_AST.C20.0001	13	2	15
EQA_AST.C20.0002	14	1	15
EQA_AST.C20.0003	8	7	15
EQA_AST.C20.0004	5	10	15
EQA_AST.C20.0005	7	8	15
Predicted phenotype from WGS data by laboratory			
L004	15	5	20
L005	8	7	15
L006	9	11	20
L012	15	5	20
Total	47	28	75

EQA7 CAMPYLOBACTER WGS PREDICTED PHENOTYPES- BY ANTIMICROBIAL

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Predicted phenotypes from WGS data by antimicrobial					
	Correct	Incorrect	Incorrect NWT	Incorrect WT	Total
Ciprofloxacin	26	4	4		30
Erythromycin	25	5	4	1	30
Tetracycline	24	6	2	4	30
Gentamicin	23	2		2	25
Total	98 (85%)	17 (15%)	10/76	7/39	115

EQA7 CAMPYLOBACTER WGS PREDICTED PHENOTYPES- BY STRAIN AND LABORATORY

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Predicted phenotype from WGS data by antimicrobial			
Strain	**Correct**	**Incorrect**	**Total**
EQA_AST.C21.0001	21	2	23
EQA_AST.C21.0002	22	1	23
EQA_AST.C21.0003	20	3	23
EQA_AST.C21.0004	18	5	23
EQA_AST.C21.0005	17	6	23

Predicted phenotype from WGS data by laboratory			
Strain	**Correct**	**Incorrect**	**Total**
1	19	1	20
2	14	6	20
3	13	7	20
4	19	1	20
5	18	2	20
6	15		15
Total	98 (85%)	17 (15%)	115

Conclusions *Campylobacter* EQA-AST

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- Laboratories fulfilled the requirements for participation
- Overall correspondence between expected and reported results both for DD and MIC
- Some variation between laboratories observed
- Results indicate that BD MIC methods are better than GS MIC methods
- Four laboratories used WGS to predict resistance – with moderate success om the EQA6 and good success in the EQA7 !!
- **Results indicate that it is possible to compare phenotypic DD and MIC AST Campylobacter results from NPHRLs across Europe**

Thank you for your attention !!