

EQAS 2020 FOR SELECTIVE ISOLATION OF *E. COLI* WITH PRESUMPTIVE ESBL, AMPC PHENOTYPES OR CARBAPENEMASES FROM MEAT OR CAECAL SAMPLES

Matrix EQAS 2020

Jette Sejer Kjeldgaard

Description of the ESBL/AmpC Matrix EQAS

- 5 chicken meat samples & 3 chicken caecal samples inoculated with *E. coli*
- Sent out November 2020
 - 5 meat samples
 - M-6.1 Susceptible *E. coli*
 - M-6.2 ESBL +AmpC (TEM52C; AmpC mut)
 - M-6.3 ESBL (CTX-M-1)
 - M-6.4 ESBL (SHV12)
 - M-6.5 Carbapenemase (NDM-4)
 - 3 caecal samples (pooled)
 - M-6.6 Carbapenemase (VIM-1)
 - M-6.7 ESBL (CTX-M-15)
 - M-6.8 ESBL +AmpC (blaCMY2; blaCTX-M-1)

NB: This year: spiking of all three caecal samples

Participants

- 37 participating laboratories
 - Some handle only meat or caecal samples
- One dataset per country included in evaluation
 - 33 sets of data included from 31 countries

Challenges in this round of Matrix EQAS

- **M-6.8**

- 3 of 33 participants did not isolate the ESBL +AmpC strain from the caecal sample (*one isolated a non-related *E. coli* strain*)

- **M-6.6**

- 28 of 31 participants obtained MIC deviations in one or more carbapenems for the strain expected to be carbapenem resistant (VIM-1 gene)

- MERO MIC: 0.03 – 4 µg/mL

- ETP MIC: 0.03 – 1 µg/mL

- *M-6.6 was omitted from evaluation*

Challenges in this round of Matrix EQAS 2

- **M-6.2 (meat)**
 - Genotypical ESBL + AmpC
 - 55 % interpreted as AmpC – lack of synergy
- **M-6.7 (caecal)**
 - Genotypical ESBL
 - 45 % interpreted as ESBL+AmpC-phenotype – FOX MIC >8
- **M-6.8 (caecal)**
 - Genotypical ESBL + AmpC
 - 50 % interpreted as AmpC – lack of synergy

Deviations in ESBL /AmpC and carbapenemase phenotype identification

Strain	Expected phenotype*	Genetic basis	Deviations in %
M-6.1	Susceptible	-	0
M-6.2	ESBL + AmpC	TEM52C; AmpC mut	54.8
M-6.3	ESBL	CTX-M-1	6.5
M-6.4	ESBL	SHV12	3.2
M-6.5	Carbapenemase	NDM-4	0
M-6.6	Carbapenemase	VIM-1	19.4
M-6.7	ESBL	CTX-M-15	45.2
M-6.8	ESBL + AmpC	CMY2; CTX-M-1	50

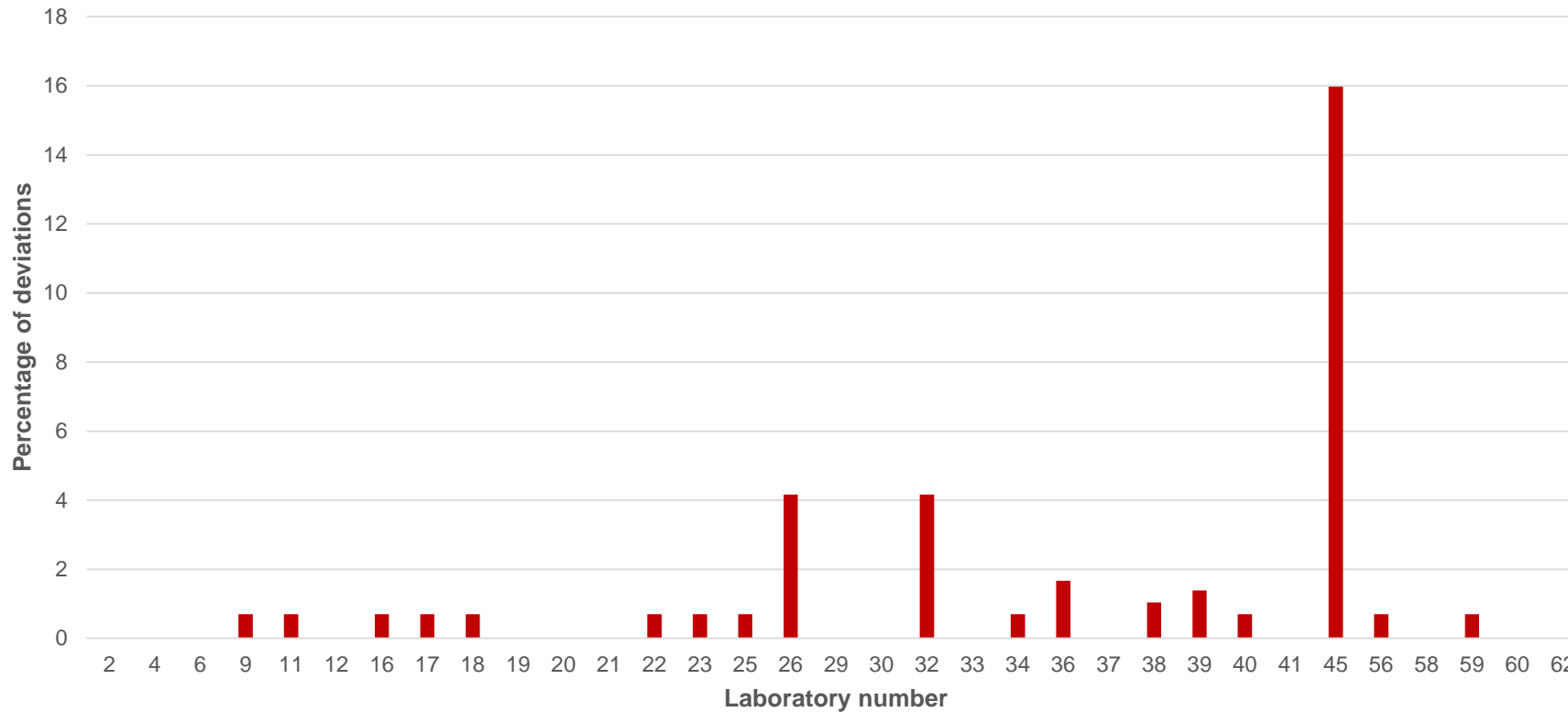
The overall performance of ESBL/AmpC isolation and identification, 2020

Isolation of ESBL/Carb/AmpC from samples		Correctly classified samples	
Number of test performed		Correctly classified samples	
N	%	N	%
216	100	212	98.1
Number of expected negative tests		Number of correctly identified negative tests	
N	%	N	%
31	14.4	31	100 %
Number of expected positive tests		Number of correctly identified positive tests	
N	%	N	%
185	85.6 %	179	96.8 %

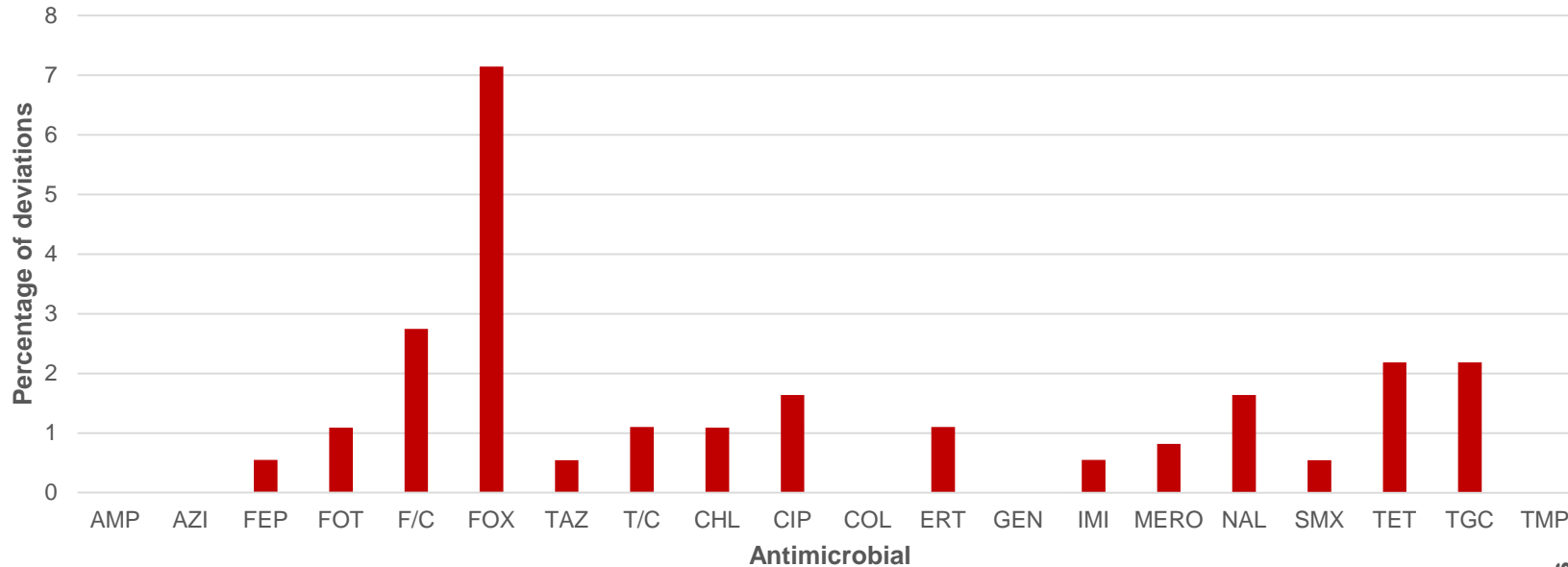
Overall 98 % correct results – 4 qualitative deviations

Deviations in AST results per lab

- Overall 98.9 % of AST results are correct (4,440 results)
- 48 % caused by mix of strains in one lab

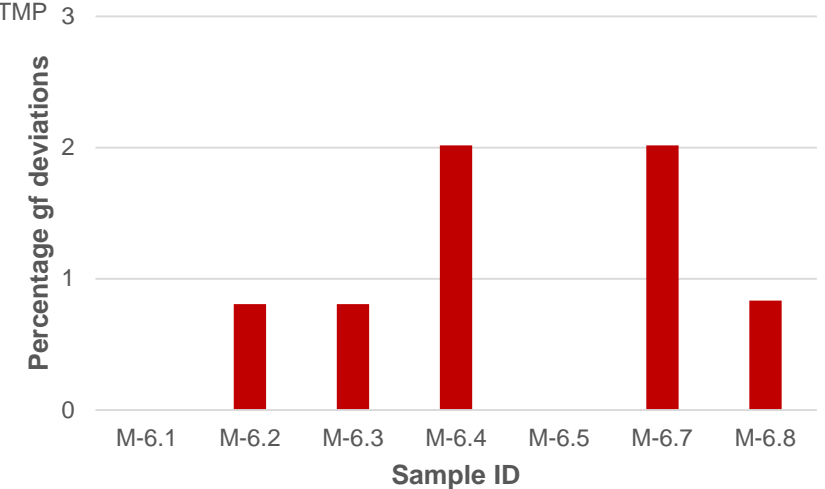


Deviations in AST results per antimicrobial and per sample



- Issue with FOX
- MIC 8/16
- Within acceptable deviation

No deviations for M-6.5 carbapenemase
 Majority of deviations due to mix of strains or other data handling errors, not MIC interpretation



ESBL/Carba/AmpC-producing test strains phenotypic conclusion

		M 6.1	M 6.2	M 6.3	M 6.4	M 6.5	M 6.6	M 6.7	M 6.8
ESBL-, AmpC- and carbapenemase-producing strain – expected results		Susc.	ESBL +AmpC	ESBL	ESBL	Carba	Carba	ESBL	ESBL +AmpC
Obtained results	Presumptive ESBL-producer			29/31	30/31		1/31	14/31	1/31
	Presumptive AmpC-producer		14/31				4/31		13/28
	Presumptive ESBL+AmpC		17/31	2/31				17/31	14/28
	Presumptive carbapenemase				1/31	31/31	25/31		
	Other phenotype						1/31		

Conclusions of *E. coli* Matrix EQAS 2020

- **Overall very good interpretation of phenotype**
 - 4 qualitative deviations – but not really
- **Overall very fine AST results**
 - 98.9 % of AST results correct
- **Severe challenges in maintaining clear phenotypes?**
 - Loss of synergy?!
 - Cefoxitin (FOX) remains an issue!
- **More ‘preventable errors’**
 - Possibly due to non-routine conditions in labs?

Interpretative criteria – Matrix EQAS protocol

EUVSEC 3

Table 1: Panel 1 antimicrobials recommended for AST of *E. coli* spp. and interpretative criteria (ECOFFs) according to latest updates from EUCAST (01.09.2021) supplemented with ECOFFs from the EFSA Technical Report 2021, Table B.1

Antimicrobial	MIC ($\mu\text{g/mL}$) (R>)
Amikacin (AMI)	8
Ampicillin (AMP)	8
Azithromycin (AZI)	16*
Cefotaxime (FOT or CTX)	0.25
Ceftazidime (TAZ or CAZ)	0.5
Chloramphenicol (CHL)	16
Ciprofloxacin (CIP)	0.064
Colistin (COL)	2
Gentamicin (GEN)	2
Meropenem (MERO or MEM)	0.06
Nalidixic acid (NAL)	8
Sulfonamides (SMX)	64*
Tetracycline (TET)	8
Tigecycline (TGC)	0.5
Trimethoprim (TMP)	2

* EFSA Technical Report (doi: 10.2903/sp.efsa.2021.EN-6652)

Interpretative criteria – Matrix EQAS protocol

EUVSEC 2

Table 2: Panel 2 antimicrobials recommended for AST of *E. coli* spp. resistant to cefotaxime, ceftazidime or meropenem in panel 1 antimicrobials and interpretative criteria (ECOFFs) according to latest updates from EUCAST (01.09.2021) supplemented with ECOFFs from the EFSA Technical Report 2021, Table B.1

Antimicrobial	MIC ($\mu\text{g/mL}$) (R>)
Cefepime (FEP)	0.25
Cefotaxime (FOT or CTX)	0.25
Cefotaxime + clavulanic acid (F/C or CTX/CLA)	0.25
Cefoxitin (FOX)	8
Ceftazidime (TAZ or CAZ)	0.5
Ceftazidime + clavulanic acid (T/C or CAZ/CLA)	0.5
Ertapenem (ETP)	0.06*
Imipenem (IMI)	0.5
Meropenem (MERO or MEM)	0.06
Temocillin (TRM)	16

* EFSA Technical Report (doi: 10.2903/sp.efsa.2021.EN-6652)

Protocol and testforms on website

Thank you for listening!

DTU



Questions?

Comments!