The 27th Proficiency Testing, 2019 – Salmonella and Campylobacter

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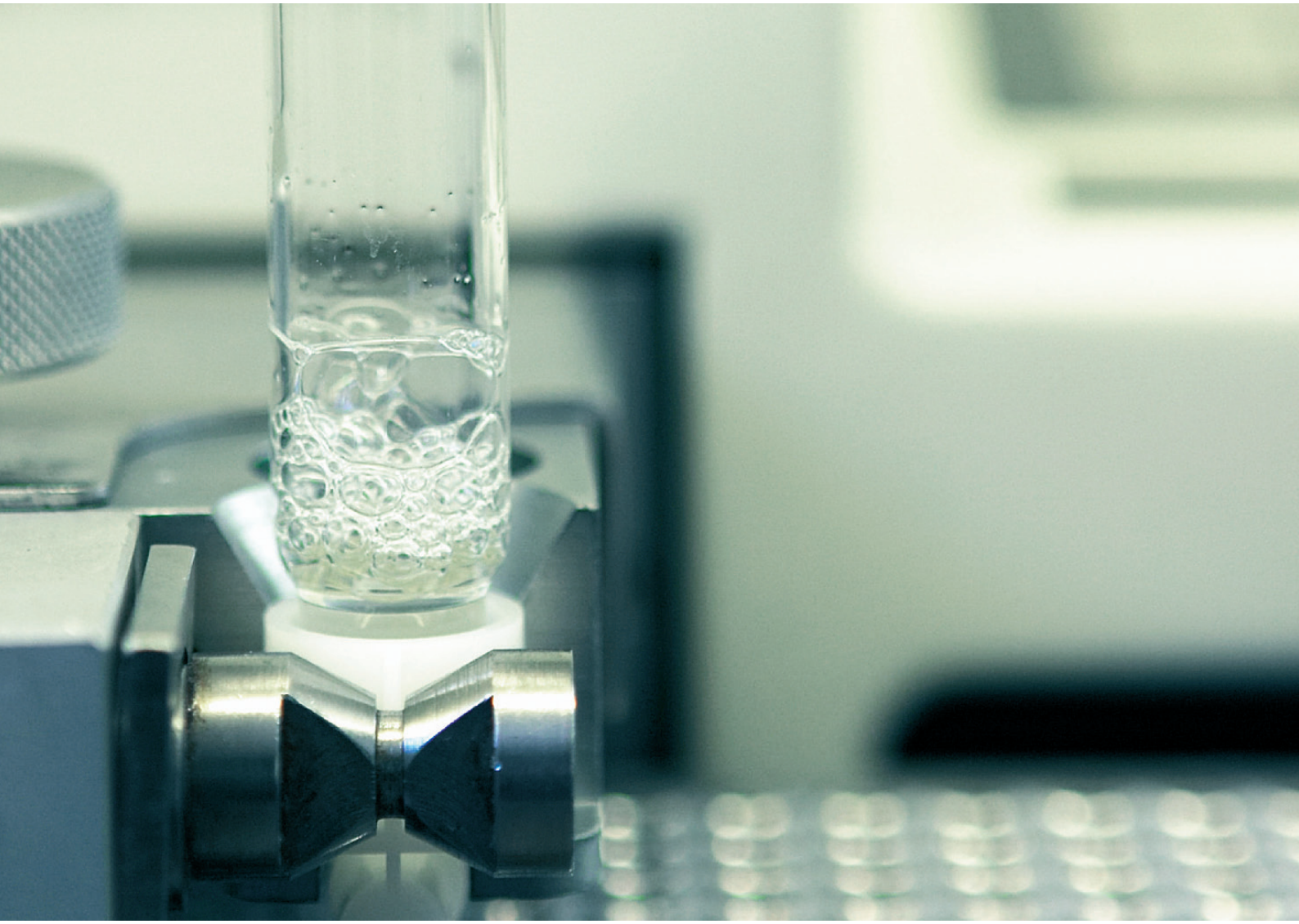
The 27th EURL-AR Proficiency Test *Salmonella* and *Campylobacter* 2019



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THE 27th EURL-AR PROFICIENCY TEST
***Salmonella and Campylobacter* 2019**

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Index

1. Introduction

This report describes and summarises results of the twenty-seventh proficiency test trial conducted by the National Food Institute (DTU Food) as the EU Reference Laboratory for Antimicrobial Resistance (EURL-AR). This proficiency test focuses on antimicrobial susceptibility testing (AST) of *Salmonella* and *Campylobacter* and is the thirteenth External Quality Assurance System (EQAS) conducted for these microorganisms (the first was EQAS 2006). In addition, the proficiency test includes categorisation of the relevant *Salmonella* strains as presumptive ESBL-, AmpC- and carbapenemase-producing organisms, and identification of the *Campylobacter* species as either *C. jejuni* or *C. coli*.

In 2019, no optional element consisting of genotypic characterization of antimicrobial resistance genes by PCR and/or sequencing in the current PT as this component was included in the DTU Genomic PT planned for launch in 2020 focusing at WGS of *Salmonella*, *E. coli* and *Campylobacter* and the identification of antimicrobial resistance genes, chromosomal mutations inducing antimicrobial resistance, upregulated AmpC (relevant for *E. coli*) and subsequently identification of the predicted phenotype of the culture/pre-prepared DNA.

The current EQAS aims to: i) monitor the quality of AST results produced by National Reference Laboratories (NRL-AR), ii) identify laboratories which may need assistance to improve their performance in AST, and iii) determine possible topics for further research or collaboration.

In reading this report, the following important considerations should be taken into account:

1) Expected results were generated by performing Minimum Inhibitory Concentration (MIC) determinations for all test strains in two different occasions at the Technical University of Denmark, National Food Institute (DTU Food). These results were then verified by the Centers for Disease Control and Prevention, Georgia, US (*Salmonella*) and the United States Food and Drug Administration (FDA), Centre for Veterinary Medicine, Maryland, US (*Salmonella* and *Campylobacter*). Finally, a MIC determination was performed at DTU Food after preparation of the agar stab culture/charcoal swab for shipment to participants to confirm that the vials contained the correct strains with the expected MIC values.

2) Evaluation is based on interpretations of AST values determined by the participants. This is in agreement with the method used by Member States (MS) to report AST data to the European Food Safety Authority (EFSA), and complies with the main objective of this EQAS, i.e. to evaluate and improve the comparability of surveillance data on antimicrobial susceptibility of *Salmonella* and *Campylobacter* reported to EFSA by different laboratories, as stated in the protocol.

3) The EURL-AR network agreed on setting the acceptable deviation level for laboratory performance on AST to 5%.

Evaluation of a result as “deviating from the expected interpretation” should be carefully analyzed in a self-evaluation procedure performed by the participant including also considerations related to any corrective actions introduced in the laboratory. Note that it is not considered a mistake to obtain a one-fold dilution difference in the MIC of a specific antimicrobial when testing the same strains since methods used for MIC determination have limitations. If, however, the expected MIC is close to the breakpoint value for categorising the strain as susceptible or resistant, a one-fold dilution difference - which is acceptable - may result in two different interpretations, i.e. the same strain can be categorised as susceptible or resistant. This result may be evaluated as correct based on the MIC-value produced but incorrect when the evaluation is based on the interpretation of the MIC value. This report is based on evaluation

of AST interpretations, therefore some participants may find their results classified as incorrect even though the actual MIC they reported is only a one-fold dilution away from the expected MIC. In these cases, the participants should be confident about the good quality of their performance of AST by MIC. In the organization of the EQAS, we try to avoid these situations by choosing test strains with MIC values distant from the cut offs for resistance, which is not always feasible for all strains and all antimicrobials. Therefore, the EURL-AR network unanimously established in 2008 that if there are less than 75% correct results for a specific strain/antimicrobial combination, the reasons for this situation must be further examined and, on selected occasions explained in details case by case, these results may subsequently be omitted from the evaluation report.

This report is approved in its final version by a technical advisory group composed by competent representatives from all NRL-ARs. This group meets annually at the EURL-AR workshop.

All conclusions presented in this report are publically available. Participating laboratories are identified by codes and each code is known only by the corresponding laboratory. The full list of laboratory codes is confidential and known only by relevant representatives of the EURL-AR and the EU Commission.

The EURL-AR is accredited by DANAK as provider of proficiency testing (accreditation no. 516); working with zoonotic pathogens and indicator organisms as bacterial isolates (identification, serotyping and antimicrobial susceptibility testing).

2. Materials and Methods

2.1 Participants in EQAS 2019

A pre-notification (Appendix 1) to announce the EURL-AR EQAS on AST of *Salmonella* and *Campylobacter* was distributed on the 11 September 2019 by e-mail to the 45 laboratories in the EURL-AR-network including all EU countries and, in addition, Iceland, North Macedonia, Norway, Switzerland and Turkey. All EU MS and also North Macedonia, Iceland, Norway, and Switzerland were represented as participants for both *Salmonella* and *Campylobacter,* Serbia was represented for *Salmonella* (see Appendix 2).

Participating laboratories from non EU countries or laboratories not designated as NRL-AR of their country were charged a fee for their participation in the EQAS, whereas the NRLs from EU Member States (one per MS) participated free of charge.

The results evaluated and presented in this report are from the NRLs designated by the MS (n=29) and NRLs in affiliated non-MS (n=5) (North Macedonia, Iceland, Norway, Serbia, and Switzerland). Figure 1 illustrates the 33 participating countries.

In total, this report evaluates 33 sets of results from the *Salmonella* AST component and 32 sets of results from the *Campylobacter* AST component.

Results from the laboratories not designated by the MS but enrolled in the EQAS are not further presented or evaluated in this report.

2.2 Strains

Eight *Salmonella* strains and eight *Campylobacter* strains were selected for this trial among isolates from the strain collection at DTU Food on the basis of antimicrobial resistance profiles and MIC values. For quality assurance purposes, one strain per bacterial species has been included in all EQAS iterations performed to date, representing an internal control.

Prior to distribution of the strains, DTU Food performed AST on the *Salmonella* and

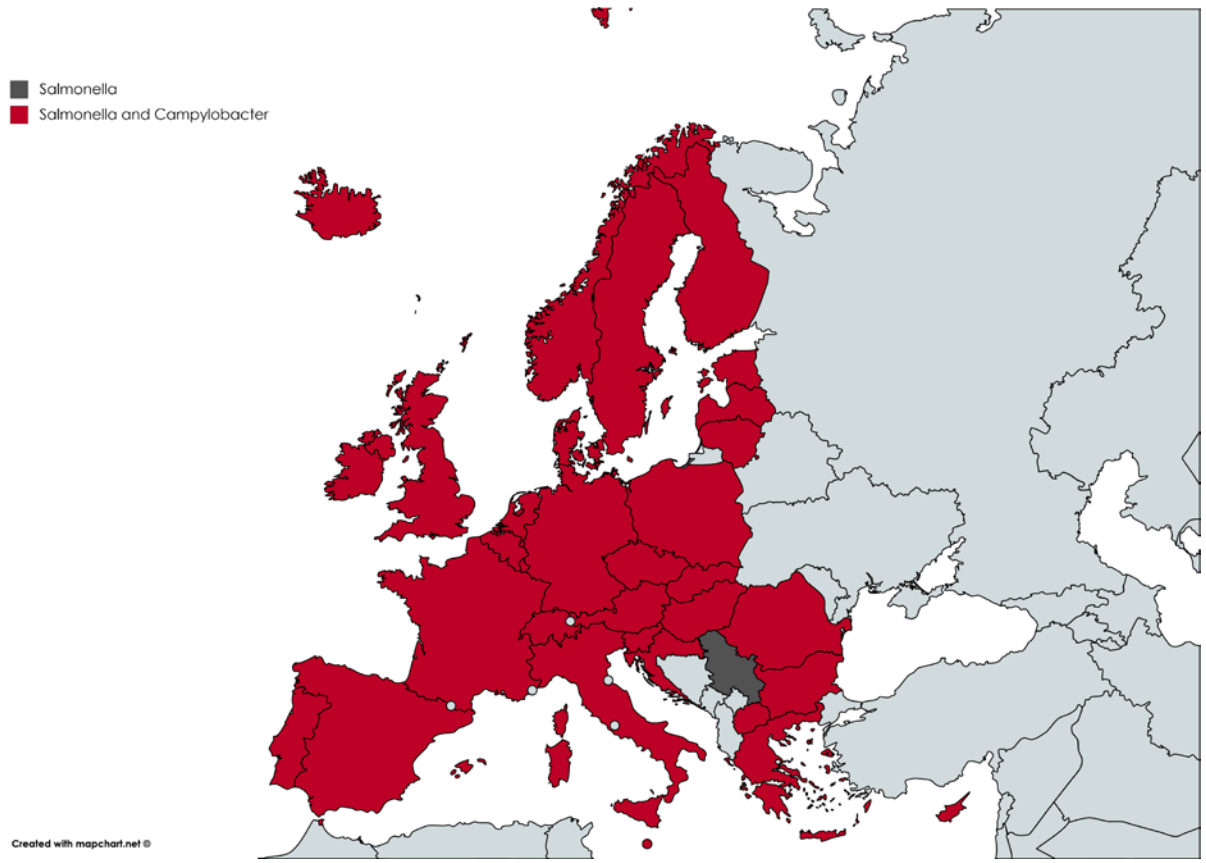

Figure 1: Participating countries that performed antimicrobial susceptibility testing of *Salmonella* and *Campylobacter* in 2019.

Campylobacter strains and the AST profiles were verified by the Centers for Disease Control and Prevention (CDC), Georgia, US (*Salmonella*) and the United States Food and Drug Administration (FDA), Centre for Veterinary Medicine, Maryland, US (*Salmonella* and *Campylobacter*). When MIC-values were not in agreement but varied +/- one dilution-step, the value obtained by DTU Food was selected as the reference value. The obtained MIC values served as reference for the test strains (Appendix 3a and 3b). Results for the following antimicrobials were not verified by CDC or FDA for *Salmonella:* cefepime, cefotaxime, cefotaxime/clavulanic acid, ceftazidime, ceftazidime/clavulanic acid, colistin, ertapenem, imipenem, temocillin, tigecycline and trimethoprim, and results for the following antimicrobials were not verified by FDA for *Campylobacter*: streptomycin.

Reference strains *Escherichia coli* CCM 3954 (ATCC 25922) and *Campylobacter jejuni* CCM 6214 (ATCC 33560) had been forwarded to all participating laboratories when they were new participants with instructions to store and maintain them for quality assurance purposes and future EQAS trials. Moreover, the EURL-AR has distributed *Acinetobacter baumannii* (2012-70-100-69) and *Campylobacter coli* (2012-70-443-2) for the purpose of performing internal method QC. The obtained results from the internal method QC strains were captured in the webtool and are presented in the laboratories' individual evaluation report. No further overall analysis of these results are performed for the purpose of this EQAS report.

2.3 Antimicrobials

The antimicrobials tested in this EQAS are listed in the protocol (Appendix 4b).

The antimicrobials tested correspond to the panel of antimicrobials listed in Decision 2013/652/EU.

The method applied for the AST was the ISO standard, ISO 20776-1 "Clinical laboratory testing and *in vitro* diagnostic test system – Susceptibility testing of infectious agents and evaluation of performance of antimicrobial susceptibility test devices", and, in addition, the following guidelines/standards from the Clinical and Laboratory Standards Institute (CLSI) were applied: Document M7-A11 (2018) "Methods for Dilution Antimicrobial Susceptibility Tests for Bacteria That Grow Aerobically; Eleventh Edition"; document M100, 29th ed. (2019) "Performance Standards for Antimicrobial Susceptibility Testing", document VET01 (2018) "Performance Standards for Antimicrobial Disk and Dilution Susceptibility Tests for Bacteria Isolated From Animals" – Fifth Edition; and document VET06 (2017) "Methods for Antimicrobial Susceptibility Testing of Infrequently Isolated or Fastidious Bacteria Isolated from Animals" – First Edition.

MIC results were interpreted by using the interpretative criteria listed in Decision 2013/652/EU. Where epidemiological cut-off values were not available, the list of interpretative criteria was supplemented either with CLSI-interpretative criteria or with tentative values as described in the protocol (Appendix 4). No interpretative criteria were available for cefepime. Results for presumptive beta-lactam resistance mechanisms were interpreted according to the most recent EFSA recommendations also included as an appendix in the EQAS protocol (Appendix 4).

The selection of antimicrobials used in the trial for *Salmonella* were: ampicillin (AMP), azithromycin (AZI), cefepime (FEP), cefotaxime (FOT), cefotaxime/clavulanic acid (FOT/Cl), cefoxitin (FOX), ceftazidime (TAZ), ceftazidime/clavulanic acid (TAZ/Cl), chloramphenicol (CHL), ciprofloxacin (CIP), colistin (COL), ertapenem (ERT), gentamicin (GEN), imipenem (IMI), meropenem (MER), nalidixic acid (NAL), sulfonamides (sulfamethoxazole) (SMX), tetracycline (TET), tigecycline (TGC), temocillin (TRM) and trimethoprim (TMP).

Minimum Inhibitory Concentration (MIC) determination of the *Salmonella* test strains was performed using the Sensititre system (EUVSEC and EUVSEC2) from Trek Diagnostic Systems Ltd, UK.

For *Campylobacter* the following antimicrobials were included: ciprofloxacin (CIP), erythromycin (ERY), gentamicin (GEN), nalidixic acid (NAL), streptomycin (STR), and tetracycline (TET).

MIC determination for the *Campylobacter* testing was performed using the Sensititre systems (EUCAMP2) from Trek Diagnostic Systems Ltd, UK. Participants of the *Campylobacter* EQAS were additionally requested to identify the species of the *Campylobacter* spp. as either *C. jejuni* or *C. coli*.

2.4 Distribution

On 22 October 2019, bacterial strains in agar stab cultures (*Salmonella* spp.) or charcoal swabs in transport media (Stuarts) (*Campylobacter* spp.) together with a welcome letter (Appendix 4a) were dispatched in double pack containers (class UN 6.2) to the participating laboratories. The shipment (UN3373, biological substances category B) was sent according to International Air Transport Association (IATA) regulations.

2.5 Procedure

Protocols and all relevant information were uploaded on the EURL-AR website (http://www.eurl-ar.eu), thereby EQAS participants could access necessary information

at any time.

Participants were instructed to subculture charcoal swabs immediately and store the agar stabs at 4ºC (dark) until performance of AST. Information related to the handling of the test strains and reference strains (Appendix 4b, c, d, e) was made available.

The participants were instructed to apply the interpretative criteria listed in the protocol (Appendix 4). Instructions for interpretation of AST results allowed for categorisation of strains as resistant or susceptible. Categorisation as 'intermediate' was not accepted.

The EURL-AR is aware that there are two different types of interpretative criteria of results, i.e clinical breakpoints and epidemiological cut-off values. The terms 'susceptible', 'intermediate' and 'resistant' should be reserved for classifications made in relation to the therapeutic application of antimicrobial agents. When reporting data using epidemiological cut-off values, bacteria should be reported as 'wild-type' or 'non-wild-type' (Schwarz *et al*., 2010). To simplify the interpretation of results, throughout this report, we will maintain the terms susceptible and resistant, even if referring to wild-type and non-wild-type strains, respectively.

As regards the method for performing the antimicrobial susceptibility testing, the protocol referred to Decision 2013/652/EU and instructed participants to perform the international reference method for antimicrobial susceptibility testing. I.e. dilution methods performed according to the methods described by the European Committee on Antimicrobial Susceptibility Testing (EUCAST) and the Clinical and Laboratory Standards Institute (CLSI), accepted as the international reference method (ISO standard 20776-1:2006).

A mandatory part of the proficiency test was to detect ESBL-, AmpC- and carbapenemase-producing strains and interpret results according to the most recent EFSA recommendations as described in the protocol.

Results for QC reference strains were MIC values for the reference strains *E. coli* (ATCC 25922) and *C. jejuni* (ATCC 33560). The results were evaluated towards the quality control ranges according to the relevant guidelines; i.e. the CLSI documents VET06 (2017) or M100S, 29th ed. (2019) (Appendix 5).

All participating laboratories were invited to enter the obtained results into an electronic record sheet at the EURL-AR web-based database through a secured individual login and password.

In addition, participants were encouraged to complete an evaluation form available at the EURL-AR database with the aim to improve future EQAS trials.

The database was finally closed and evaluations were made available to participants on 6 December 2019. After this date, the participants were invited to login to retrieve an individual, database-generated report which contained an evaluation of the submitted results including possible deviations from the expected interpretations. Deviations in interpretation (resistant or susceptible) were categorised as 'incorrect', as were also deviations concerning confirmation of an isolate as extended spectrum beta-lactamase- (ESBL-), AmpC- or carbapenemase-producer and deviations in relation to the species detection of *Campylobacter*.

3. Results

The participants were asked to report AST results, i.e. MIC values and the categorisation as resistant or susceptible. Only the categorisation was evaluated, whereas the MIC values were

used as supplementary information.

3.1 Data omitted from the report

As mentioned in the introduction, the EURL-AR network established that data should be examined and possibly omitted from the general analysis if there are less than 75% correct results based on strain/antimicrobial combination (see Appendix 7a and 7b for an overview of correct/incorrect results). In the present EQAS , no such problems specific for a strain/antimicrobial-combination were identified for either *Salmonella* or *Campylobacter*.

3.2 Methods

Results obtained by broth microdilution were accepted and evaluated. For both the *Salmonella* and the *Campylobacter* trial, all 33 and 32 laboratories, respectively, reported results obtained by broth microdilution.

With the aim to conclude on the strains' presumptive ESBL-, AmpC- and carbapenemase phenotype, two panels of antimicrobials were included in the testing of the *Salmonella* strains as also specified in the EU regulation 2013/652/EU. The test strains found resistant to cefotaxime, ceftazidime or meropenem on the first panel (see 2013/652/EU, Table 1) were additionally tested on the second panel (see 2013/652/EU, Table 4) according to the protocol indications.

3.3 Deviations, overall

The list of deviations is presented in Appendix 8a and 8b. Figure 2 and 3 show the total percentage of deviations from the expected results of AST performed by participating laboratories. Overall, the deviation levels in 2019 are acceptable for both the *Salmonella* and the *Campylobacter* trials.

The internal control strains mainly followed the trend in deviation level of the different EQAS trials (Figure 2 and 3).

3.3.1 *Salmonella* trial

For the *Salmonella* strains, 99.5% of the AST results were correct. The number of AST's performed and the percentage of correct results for the individual strains in the EQAS, are listed in Table 1. Variations of obtained correct results ranged from 98.3 to 100%. Table 2 illustrates the percentage of correct AST per antimicrobial by bacterial species. The level of correct AST was at 98.2% (cefoxitin) or above, for all the *Salmonella* test strains. For cefoxitin, the three deviations could be attributed to three different laboratories that all obtained MIC a value at 16, i.e. one two-fold dilution from the expected MIC value 8 (See Appendix 8a).

ESBL/AmpC/carbapenemase-producing *Salmonella* test strains

Confirmation of beta-lactamase production is a mandatory component of this EQAS.

According to the protocol, which was based on the EFSA recommendations, the confirmatory test for ESBL-, AmpC-, and carbapenemase-producing isolates requires use of both cefotaxime (FOT) and ceftazidime (TAZ) alone and in combination with a β-lactamase inhibitor. The MIC value for either antimicrobial agent (FOT or TAZ) tested in combination with clavulanic acid should be compared to the corresponding MIC when tested alone. Synergy is defined for one or both cephalosporins if a ≥ 3-dilution-step difference is observed between the two MIC values (i.e. if the FOT:FOT/Cl or TAZ:TAZ/Cl ratio ≥8) (CLSI M100S Table 2A; *Enterobacteriaceae*). Participants were instructed to use the second panel of antimicrobials to test strains presenting resistance to cefotaxime (FOT), ceftazidime (TAZ or meropenem (MERO) on panel 1.

The classification of the phenotypic results was based on the most recent EFSA recommendations as indicated in the protocol (Appendix 4).

In this EQAS, all laboratories uploaded results for the strains to be tested on panel 2.

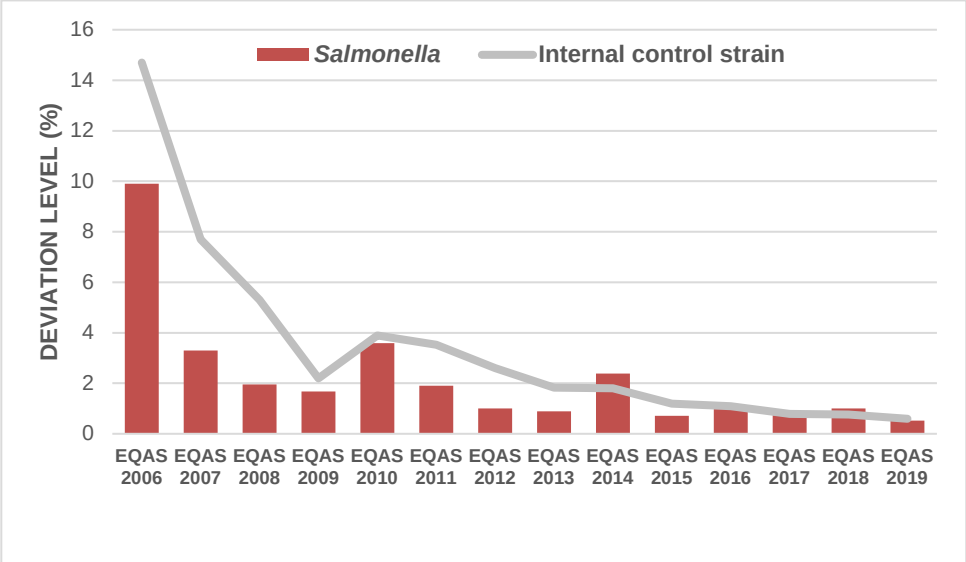

Figure 2: A comparison between the EURL-AR EQAS's since 2006, showing the total percentage of deviations for antimicrobial susceptibility testing for *Salmonella* performed by participating laboratories.

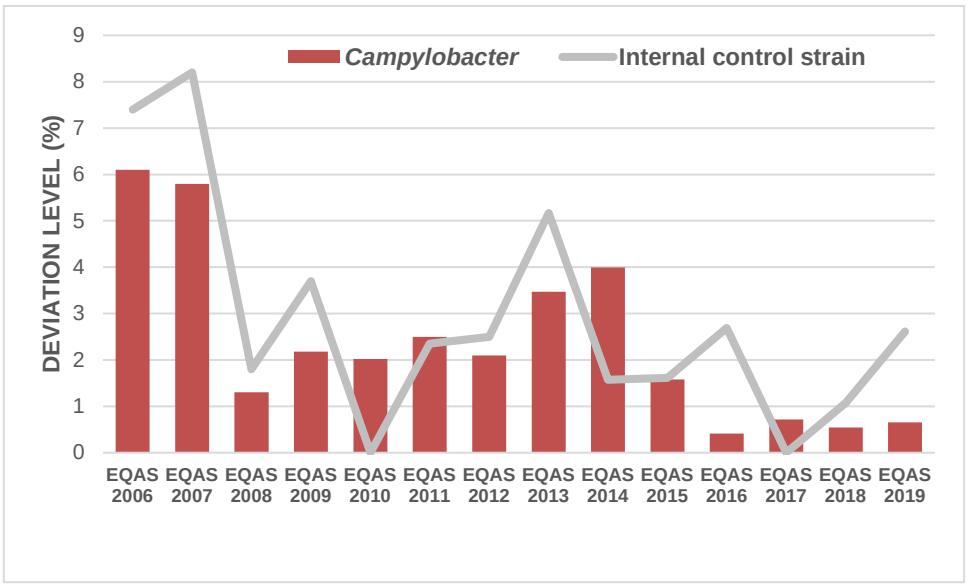

Figure 3: A comparison between the EURL-AR EQAS's since 2006, showing the total percentage of deviations for antimicrobial susceptibility testing for *Campylobacter* performed by participating laboratories.

Table 1. The number of AST performed and the percentage of correct results for each strain of *Salmonella* (panel 1 and panel 2) and *Campylobacter*.

EQAS 2019 – *Salmonella*			EQAS 2019 – *Campylobacter*		
Test strain	AST in total	% correct	Test strain	AST in total	% correct
S-14.1	467	100.0	C-14.1 (*C. jejuni*)	192	100.0
S-14.2	710	99.6	C-14.2 (*C. coli*)	192	100.0
S-14.3	712	99.3	C-14.3 (*C. jejuni*)	192	99.5
S-14.4	466	99.8	C-14.4 (*C. jejuni*)	192	99.5
S-14.5	467	99.6	C-14.5 (*C. coli*)	192	98.4
S-14.6	712	99.6	C-14.6 (*C. jejuni*)	192	100.0
S-14.7	712	100.0	C-14.7 (*C. jejuni*)	191	100.0
S-14.8	711	98.3	C-14.8 (*C. coli*)	191	97.4

Table 2: Percentage of correct antimicrobial susceptibility tests per antimicrobial by microorganism.

Antimicrobial	*Salmonella*	*Campylobacter*
Ampicillin	100.0	-
Azithromycin	100.0	-
Cefepime	98.5	-
Cefotaxime	100.0	-
Cefoxitin	98.2	-
Ceftazidime	98.9	-
Chloramphenicol	100.0	-
Ciprofloxacin	99.2	99.6
Colistin	98.5	-
Ertapenem	100.0	-
Erythromycin	-	98.0
Gentamicin	99.2	99.6
Imipenem	99.4	-
Meropenem	100.0	-
Nalidixic acid	100.0	100.0
Streptomycin	-	99.2
Sulphonamides	98.5	-
Temocillin	99.3	-
Tetracycline	99.2	99.6
Tigecycline	100.0	-
Trimethoprim	100.0	-

Table 3 presents that test strain S-14.2 was confirmed as an AmpC-producer, S-14.3 as a carbapenemase-producer and the strains S-14.6, S-14.7 and S-14.8 as ESBL producers. For strain S-14.8, an identified cefoxitin MIC-values at 16, i.e. one two-fold dilution higher than expected, caused 9% (3/33) of the laboratories to indicate the identification of an ESBL- and AmpC-producer (Table 3).

In total, the categorisation as ESBL-, AmpC- or carbapenemase-producer for the eight strains was correct in 162 out of 165 reported results. Of the results that were considered incorrect (N=3), three could be attributed to three different laboratories (#6, #36 and #45).

3.3.2 *Campylobacter* trial

For the *Campylobacter* strains, 99.3% of AST results were correct. Table 1 presents that the variation between the strains in the obtained correct results ranged from 97.4 to 100% and Table 2 illustrates that the percentage of correct AST per antimicrobial were all above or equal to 98.0%.

The participants were requested to identify the *Campylobacter* species as *C. jejuni* or *C. coli*. All 32 laboratories delivered in total 254 results (laboratory #18 and #19 were each missing a single result) of which 246 were in accordance with the expected. Laboratory (#64) delivered six results, whereas two laboratories (#11 and #21) each reported a single species identification which were not in accordance with the expected. In all cases of unexpected and missing results, none of the results were related to incorrect interpretation of the MIC criteria found in the EC regulation 652/2013.

Table 3: Overview of ESBL-, AmpC- and carbapenemase-producing *Salmonella* test strains and proportion of laboratories that obtained the expected result; number and percentages of laboratories which correctly detected and confirmed the ESBL-, AmpC- and carbapenemase-producing *Salmonella* strains.
Fields shaded in grey with numbers in *italics* indicate an unexpected result.

Strain code		S -14.2	S-14.3	S-14.6	S-14.7	S-14.8
ESBL/AmpC/carbapenemase-encoding genes harboured in the test strain		***bla*$_{CMY-2}$**	***bla*$_{CTX-M-15}$ *bla*$_{NDM-1}$ *bla*$_{oxa-1}$ *bla*$_{oxa-9}$ *bla*$_{oxa-10}$**	***bla*$_{CTX-M-9}$**	***bla*$_{SHV-12}$**	***bla*$_{CTX-M-9}$**
ESBL-, AmpC- and carbapenemase-producing strain – expected results		AmpC	carbapenemase	ESBL	ESBL	ESBL
Obtained results	Confirmed AmpC-producer	33/33 (100%)	-	-	-	-
	Confirmed carbapenemase-producer	-	33/33 (100%)	-	-	-
	Confirmed ESBL producer	-	-	33/33 (100%)	33/33 (100%)	30/33 (91%)
	Confirmed ESBL + AmpC-producer	-	-	-	-	*3/33(9%)*

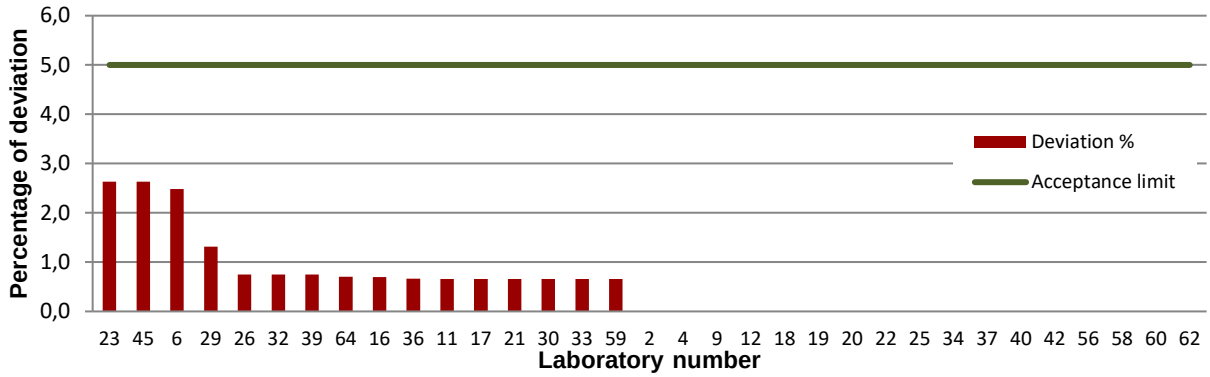

Figure 4: Individual participants' deviations in percent of their total number of *Salmonella* AST's.

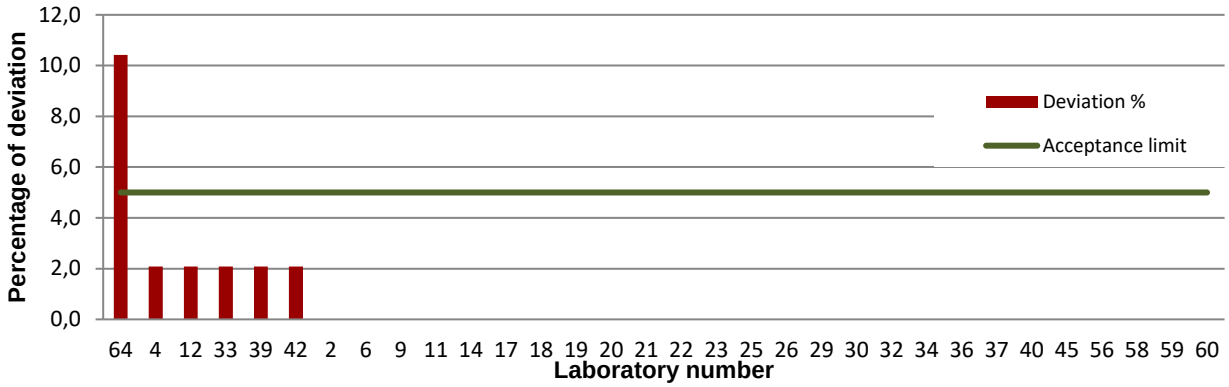

Figure 5: Individual participants' deviations in percent of their total number of *Campylobacter* AST's.

Table 4 Obtained values for AST of *E. coli* ATCC 25922. AMP; ampicillin, FEP; cefepime FOT; cefotaxime, FOX; cefoxitin, TAZ; ceftazidime, CHL; chloramphenicol, CIP; ciprofloxacin, COL; colistin, ERT: ertapenem, GEN; gentamicin, IMI; imipenem, MER; meropenem, NAL; nalidixic acid, SMX; sulphonamides, TET; tetracycline, TGC; tigecycline, TMP; trimethoprim.

MIC determination *E. coli* ATCC 25922			
Antimicrobial	Proportion outside QC range	Obtained values in MIC steps (min/max)	
		Below lower QC limit	Above upper QC limit
Panel 1, AMP	0/33 (0%)	-	-
Panel 1, FOT	0/32 (0%)	-	-
Panel 1, TAZ	0/33 (0%)	-	-
Panel 1, CHL	0/33 (0%)	-	-
Panel 1, CIP	0/33 (0%)	-	-
Panel 1, COL	0/33 (0%)	-	-
Panel 1, GEN	0/33 (0%)	-	-
Panel 1, MER	1/33 (3%)	*	-
Panel 1, NAL	0/33 (0%)	-	-
Panel 1, SMX	3/33 (9%)	4 steps	6 steps
Panel 1, TET	0/33 (0%)	-	-
Panel 1, TGC	0/32 (0%)	-	-
Panel 1, TMP	1/33 (3%)	1 step	-
Panel 2, FEP	0/30 (0%)	-	-
Panel 2, FOT	0/29 (0%)	-	-
Panel 2, FOX	1/30 (3%)	-	1 step
Panel 2, TAZ	0/30 (0%)	-	-
Panel 2, ETP	2/30 (6%)	-	*
Panel 2, IMI	0/30 (0%)	-	-
Panel 2, MER	0/30 (0%)	-	-

* appear to be typos

Table 5 Obtained values for AST of *C. jejuni* ATCC 33560. CIP; ciprofloxacin, ERY; erythromycin, GEN; gentamicin, NAL; nalidixic acid, TET; tetracycline.

MIC determination *C. jejuni* ATCC 33560			
Antimicrobial	Proportion outside QC range	Obtained values in MIC steps (min/max)	
		Below lower QC limit	Above upper QC limit
CIP	0/30 (0%)	-	-
ERY	0/30 (0%)	-	-
GEN	1/29 (3%)	1 step	-
NAL	1/30 (3%)	1 step	-
TET	2/30 (7%)	-	1 step

3.4 Deviations by laboratory

Figure 4 and 5 illustrate the percentage of deviations for each participating laboratory. The laboratories are ranked according to their performance determined by the percentage of deviating results in the antimicrobial susceptibility tests.

3.4.1 *Salmonella* trial

All 33 participating laboratories obtained a result within the acceptance limit (< 5% deviations) for the *Salmonella* strains. The maximum percentage of deviations was at 2.6%, presenting acceptable result across the EURL-AR network.

3.4.2 *Campylobacter* trial

In the Campylobacter trial, most laboratories performed very well. Applying the 5% acceptance threshold, 31 of 32 participating laboratories performed acceptably, with 26 laboratories having no deviations (Figure 5).

One laboratory presented a deviation level at 10.4%, i.e. above the 5% acceptance level (#64).

3.5 Deviations by reference strains

In the following section, deviations are defined as results of antimicrobial susceptibility tests on the reference strain that are outside the quality control (QC) acceptance intervals (Appendix 5).

Obtained values from the participants' testing of the QC strains are listed in Appendix 6a and 6b, and in Tables 4 and 5. For the *Salmonella* and *Campylobacter* trial, 33 and 30 laboratories, respectively, uploaded data from testing of the relevant QC strain.

Appendix 6a presents the results for the reference strain *E. coli* ATCC 25922. Seven laboratories produced in total eight values outside the acceptable range, three of these appear to be typos, though. Table 4 illustrates the obtained results which are fully presented in Appendix 6a.

Table 5 presents the proportion of the laboratories submitting AST-results for the *C.*

jejuni reference strain ATCC 33560 with results below or above the acceptable range. Four deviations were observed from four different laboratories.

4. Discussion

The number of participating laboratories was at comparable levels in 2019 as in 2018; for the *Salmonella* EQAS, 32 and 33 participated in 2018 and 2019, respectively, and for *Campylobacter* EQAS, 31 and 32 participated in 2018 and 2019. This allows for a fair comparison between the two EQAS periods for both organisms.

As also specified in the EU regulation 2013/652/EU, all participants in the present EQAS performed AST by broth microdilution.

This 2019 proficiency test was the sixth possibility of testing *Salmonella* and *Campylobacter* strains with the panels designed to follow the requirements of Decision 2013/652/EU.

4.1 *Salmonella* trial

Overall, the percentage of correct antimicrobial susceptibility test results of *Salmonella* was 99.5%. All (n=33) participants obtained satisfactory results according to the level of acceptance (<5% deviation) (Figure 4). When comparing between the antimicrobials, none of the antimicrobials appeared to cause any problems.

As indicated in Figure 2, the overall quality of the results in the 2019-EQAS would appear to be at the same high level as in 2018, also, when comparing results obtained from testing the internal control strain a steady and very good quality of *Salmonella* AST results was observed.

Based on these results, follow-up has not been necessary and none of the laboratories was defined as outlier.

For the *E. coli* reference strain, the obtained results were in general in agreement with the CLSI recommendations.

Follow up on previous EQAS results was not relevant as no laboratories had deviation levels for the AST results above the acceptance limit in EQAS 2018.

ESBL/AmpC/carbapenemase-producing *Salmonella* test strains

The phenotypic detection of ESBL-, AmpC- and carbapenemase-producing microorganisms remains to be important and is a mandatory part of this EQAS.

Of the five *Salmonella* test strains relevant for this component of the EQAS (S-14.2, S-14.3, S-14.6, S-14.7, and S-14.8), one was an AmpC-producer (S-14.2) another was a carbapenemase producer (S-14.3), and three were ESBL-producers. One of the ESBL-producing strain S-14.8 was also found to be an AmpC-producer by three of the 33 laboratories (9%) due to an MIC-value of cefoxitin one dilution step above the expected. In general, the testing and interpretation of results for the ESBL- and carbapenemase-producing strains appeared not to cause difficulties and even if no acceptance limit has been defined for this component of the EQAS, the overall result appears satisfactory.

4.2 *Campylobacter* trial

For the *Campylobacter* component of this year's EQAS, 32 laboratories submitted results leading to an overall percentage of correct AST results at 99.4%. The performance varied from no deviations to up to 10.4% deviations, with 31 laboratories performing satisfactorily according to the established acceptance range.

It appears that the level of deviations for the

overall AST results is similar to the EQAS 2018 though a minor increase (1.5%) in the deviation level for the internal control strain was observed. Also in relation to the results obtained from testing the internal control strain (Figure 3).

One laboratory (#64) obtained deviation levels above 5%. For this laboratory, the five obtained deviations that caused the 10.4% deviation were related to three strains (C-14.3, C-14.5 and C-14.8) and to the testing of ciprofloxacin, erythromycin, gentamicin and streptomycin.

All participating laboratories except two (#4 and #21) uploaded data for tests performed on the *C. jejuni* reference strain and the proportion of results within the acceptable range was 97.3%.

All four values outside the QC intervals were one step below or above the QC-limits. It is suggested that these values are monitored over time to ensure that the tests render a reliable result for the particular antimicrobial.

In 2018, one laboratory (#14) obtained AST results outside the acceptance limit (at 8.3%). The EURL-AR followed-up directly with this laboratory which performed trouble shooting to confirm the reason for the incorrect results. This year, laboratory #14 obtained no deviations when performing *Campylobacter* AST.

5. Conclusions

The goal of the EURL-AR EQAS is to have all participating NRLs performing antimicrobial susceptibility testing of *Salmonella* and *Campylobacter* with a deviation level below 5%. This year, this goal was reached for both *Salmonella* and *Campylobacter*.

Compared to the EQAS 2018, the performance of the NRL's in 2019 appears to be at the same high level for *Salmonella* AST's (99.5% in 2019 and 99.0% in 2018) as well as for *Campylobacter* (99.4% in 2019 and 99.5% in 2018) (Figure 2 and 3).

The test covering the identification of the phenotype of *Salmonella* test strains producing beta-lactamases of the ESBL-, AmpC, and carbapenemase type rendered three deviations (98.2% correct categorisations). This is a priority area within the EURL-AR activities, and the focus on identifying ESBL-, AmpC-, and carbapenemase-producing organisms is encouraged.

Finally, the EURL-AR is open to suggestions to improve future EQAS trials and invites the entire network to contribute with ideas for training courses and specific focus areas to expand the network's knowledge in antimicrobial resistance.

6. References

European Commission, 2013/652/EU: Commission Implementing Decision of 12 November 2013 on the monitoring and reporting of antimicrobial resistance in zoonotic and commensal bacteria.

Schwarz S, Silley P, Simjee S, Woodford N, van DE, Johnson AP & Gaastra W. (2010) Editorial: assessing the antimicrobial susceptibility of bacteria obtained from animals. J Antimicrob Chemother 65: 601-604

EU Reference Laboratory for Antimicrobial Resistance
External Quality Assurance System (EQAS) 2019

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G00-06-001/23.06.2017

EQAS 2019 FOR *SALMONELLA* AND *CAMPYLOBACTER*

The EURL-AR announces the launch of another EQAS, thus providing the opportunity for proficiency testing which is considered an essential tool for the generation of reliable laboratory results of consistently good quality.

This EQAS consists of antimicrobial susceptibility testing of eight *Salmonella* isolates and eight *Campylobacter* isolates. Additionally, quality control (QC) strains *E. coli* ATCC 25922 (CCM 3954) and *C. jejuni* ATCC 33560 (CCM 6214) will be distributed to new participants.

It is the recipients' responsibility to comply with national legislation, rules and regulation regarding the correct use and handling of the provided strains and to possess the proper equipment and protocols to handle these strains.

This EQAS is specifically for NRL's on antimicrobial resistance (NRL-AR). Laboratories designated to be NRL-AR do not need to sign up to participate but are automatically regarded as participants. You may contact the EQAS-Coordinator if you wish to inform of changes in relation to your level of participation in compared to previous years. The EURL-AR will be able to cover the expenses for one parcel, only, per EU Member State. Therefore, countries with more than one laboratory registered on the EURL-AR contact-list will be contacted directly to confirm which laboratory will be included for participation free of charge.

The invitation to participate in the proficiency test is extended to additional participants besides official NRLs and to participants from laboratories which are involved in the network but are not designated NRLs (cost for participation will be 100 EUR).

TO AVOID DELAY IN SHIPPING THE ISOLATES TO YOUR LABORATORY

The content of the parcel is "UN3373, Biological Substance Category B": Eight *Salmonella* strains, eight *Campylobacter* and for new participants also the QC strains mentioned above. Please provide the EQAS coordinator with documents or other information that can simplify customs procedures (e.g. specific text that should be written on the proforma invoice). To avoid delays, we kindly ask you to send this information already at this stage.

TIMELINE FOR RESULTS TO BE RETURNED TO THE NATIONAL FOOD INSTITUTE

Shipment of isolates and protocol: The isolates will be shipped in October 2019. The protocol for this proficiency test will be available for download from the website (www.eurl-ar.eu).

Submission of results: Results must be submitted to the National Food Institute **no later than December 6th 2019** via the password-protected website.
Upon reaching the deadline, each participating laboratory is kindly asked to enter the password-protected website once again to download an automatically generated evaluation report.

EQAS report: A report summarising and comparing results from all participants will be issued. In the report, laboratories will be presented coded, which ensures full anonymity as to the participants' obtained results. The EURL-AR and the EU Commission, only, will have access to un-coded results. The report will be publicly available.

EU Reference Laboratory for Antimicrobial Resistance
External Quality Assurance System (EQAS) 2019

DTU Food
National Food Institute

Next EQAS: The next EURL-AR EQAS that we will have is on antimicrobial susceptibility testing of *E. coli*, staphylococci and enterococci which will be carried out in June 2020.

Please contact me if you have comments or questions regarding the EQAS.

Sincerely,

Susanne Karlsmose Pedersen (suska@food.dtu.dk)
EURL-AR EQAS-Coordinator

Participant list

Salmonella	*Campylobacter*	Institute	Country
X	X	Austrian Agency for Health and Food Safety	Austria
X	X	Sciensano	Belgium
X	X	Nacional Diagnostic and Research Veterinary Institute	Bulgaria
X	X	Croatian Veterinary Institute	Croatia
X	X	Veterinary Services	Cyprus
X	X	State Veterinary Institute Praha	Czech Republic
X*	X*	National Food Institute	Denmark
X	X	Danish Veterinary and Food Administration, DVFA	Denmark
X	X	Estonian Veterinary and Food Laboratory	Estonia
X	X	Finnish Food Authority	Finland
-	X	Agence nationale de sécurité sanitaire ANSES - Ploufragan - LERAP	France
X	-	Agence nationale de sécurité sanitaire ANSES - Fougères LERMVD	France
X	X	Federal Institute for Risk Assessment	Germany
X	X	Veterinary Laboratory of Chalkis	Greece
X	X	Central Agricultural Office Veterinary Diagnostic Directorate	Hungary
X	X	Institute for Experimental Pathology at Keldur	Iceland
X	X	Central Veterinary Research Laboratory	Ireland
X	X	Istituto Zooprofilattico Sperimentale delle Regioni Lazio e Toscana	Italy
X	X	Institute of Food Safety, Animal Health and Enviroment "BIOR"	Latvia
X	X	National Food and Veterinary Risk Assessment Institute	Lithuania
X	X	Laboratoire national de Santé	Luxembourg
X	X	Public Health Laboratory	Malta
X*	X*	Food and Consumer Product Safety Authority (VWA)	Netherlands
X	X	Central Veterinary Institute of Wageningen UR	Netherlands
X	X	Faculty of Veterinary Medicine - Skopje	North Macedonia
X	X	Veterinærinstituttet	Norway
X	X	National Veterinary Research Institute	Poland
X	X	Instituto Nacional de Investigação Agrária e Veterinária	Portugal
X*	X*	Institute for Hygiene and Veterinary Public Health	Romania
X	X	Institute for Diagnosis and Animal Health	Romania
X	-	Scientific Veterinary Institute „Novi Sad“	Serbia
X	X	State Veterinary and Food Institute (SVFI)	Slovakia
X	X	National Veterinary Institute	Slovenia
X	X	Laboratorio Central de Sanidad, Animal de Algete	Spain
X*	X*	VISAVET Health Surveillance Center, Complutense University	Spain
X	X	National Veterinary Institute, SVA	Sweden
X	X	Vetsuisse faculty Bern, Institute of veterinary bacteriology	Switzerland
X*	X*	Agri-Food and Biosciences Institute (AFBI)	United Kingdom
X	X	Animal & Plant Health Agency	United Kingdom

Designated NRL-AR by the compentent authority of the member state
Non-NRL-AR enrolled by the EURL-AR
Not a Member State of the EU
* Submitted results were not included in the current report (allows for one dataset per country, only)

Reference values (MIC-value and interpretation) - *Salmonella*

	Ampicillin AMP		Azithromycin AZI		Cefepime FEP		Cefotaxime FOT		Cefotaxime/clav F/C	F:F/C ratio	Cefoxitin FOX		Ceftazidime TAZ		Ceftazidime/clav T/C	T:T/C ratio	Chloramphenicol CHL		Ciprofloxacin CIP		Colistin COL		Ertapenem ETP	
EURL 2019 S-14.1	>64	RESIST	4	SUSC			<=0.25	SUSC					<=0.5	SUSC			<=8	SUSC	0.03	SUSC	8	RESIST		
EURL 2019 S-14.2	>64	RESIST	4	SUSC	0.5	RESIST	32	RESIST	16	<8	64	RESIST	64	RESIST	32	<8	128	RESIST	<=0.015	SUSC	<=1	SUSC	0,03	SUSC
EURL 2019 S-14.3	>64	RESIST	>64	RESIST	>32	RESIST	64	RESIST	64	<8	>64	RESIST	>128	RESIST	128	<8	64	RESIST	>8	RESIST	2	SUSC	>2	RESIST
EURL 2019 S-14.4	>64	RESIST	<=2	SUSC			<=0.25	SUSC					<=0.5	SUSC			<=8	SUSC	<=0.015	SUSC	8	RESIST		
EURL 2019 S-14.5	2	SUSC	8	SUSC			<=0.25	SUSC					<=0.5	SUSC			<=8	SUSC	0.03	SUSC	<=1	SUSC		
EURL 2019 S-14.6	>64	RESIST	8	SUSC	2	RESIST	8	RESIST	0,06	>=8	4	SUSC	1	SUSC	0,25	<8	<=8	SUSC	0.5	RESIST	2	SUSC	<=0.015	SUSC
EURL 2019 S-14.7	>64	RESIST	8	SUSC	2	RESIST	16	RESIST	0,06	>=8	8	SUSC	>128	RESIST	0,5	>=8	<=8	SUSC	>8	RESIST	2	SUSC	<=0.015	SUSC
EURL 2019 S-14.8	>64	RESIST	16	SUSC	2	RESIST	16	RESIST	0,12	>=8	8	SUSC	2	SUSC	0,25	<8	16	SUSC	0.5	RESIST	2	SUSC	<=0.015	SUSC

	Gentamicin GEN		IMIPENEM IMI		MEROPENEM MER		Nalidixic acid NAL		Sulfamethoxazole SMX		TEMOCILLIN TRM		Tetracycline TETRA		TIGECYCLINE TGC		Trimethoprim TMP		ESBL-category	Relevant genes
EURL 2019 S-14.1	<=0.5	SUSC			0.6	SUSC	<=4	SUSC	>1024	RESIST			>64	RESIST	0.5	SUSC	<=0.25	SUSC	none	
EURL 2019 S-14.2	0.5	SUSC	0.25	SUSC	<=0.03	SUSC	<=4	SUSC	>1024	RESIST	8	SUSC	>64	RESIST	0.5	SUSC	<=0.25	SUSC	AmpC-phenotype	CMY-2
EURL 2019 S-14.3	>32	RESIST	8	RESIST	>16	RESIST	>128	RESIST	1024	RESIST	>128	RESIST	4	SUSC	0.5	SUSC	0.5	SUSC	carbapenemase-phenotype	NDM-1, OXA-1, OXA-9, OXA-10, CTX-M-15
EURL 2019 S-14.4	<=0.5	SUSC			0.06	SUSC	<=4	SUSC	1024	RESIST			64	RESIST	<=0.25	SUSC	>32	RESIST	none	
EURL 2019 S-14.5	<=0.5	SUSC			0.06	SUSC	<=4	SUSC	16	SUSC			<=2	SUSC	<=0.25	SUSC	<=0.25	SUSC	none	
EURL 2019 S-14.6	<=0.5	SUSC	<=0.12	SUSC	<=0.03	SUSC	>128	RESIST	<=8	SUSC	8	SUSC	64	RESIST	<=0.25	SUSC	<=0.25	SUSC	ESBL-phenotype	CTX-M-9
EURL 2019 S-14.7	16	RESIST	0.25	SUSC	<=0.03	SUSC	>128	RESIST	>1024	RESIST	16	SUSC	<=2	SUSC	<=0.25	SUSC	<=0.25	SUSC	ESBL-phenotype	SHV-12
EURL 2019 S-14.8	8	RESIST	<=0.12	SUSC	<=0.03	SUSC	>128	RESIST	>1024	RESIST	16	SUSC	4	SUSC	0.5	SUSC	<=0.25	SUSC	ESBL-phenotype	CTX-M-9

Resistant

Reference values (MIC-value and interpretation) - *Campylobacter*

Species	Code	Ciprofloxacin CIP		Erythromycin ERY		Gentamicin GEN		Nalidixic acid NAL		Streptomycin STR		Tetracycline TET	
C. jejuni	EURL 2019 S-14.1	<=0.12	SUSC	<=1	SUSC	>16	RESIST	4	SUSC	1	SUSC	>64	RESIST
C. coli	EURL 2019 S-14.2	16	RESIST	<=1	SUSC	>16	RESIST	>64	RESIST	2	SUSC	>64	RESIST
C. jejuni	EURL 2019 S-14.3	16	RESIST	<=1	SUSC	0.5	SUSC	>64	RESIST	1	SUSC	64	RESIST
C. jejuni	EURL 2019 S-14.4	0.25	SUSC	128	RESIST	>16	RESIST	4	SUSC	>16	RESIST	>64	RESIST
C. coli	EURL 2019 S-14.5	<=0.12	SUSC	<=1	SUSC	1	SUSC	4	SUSC	>16	RESIST	8	RESIST
C. jejuni	EURL 2019 S-14.6	<=0.12	SUSC	<=1	SUSC	0.5	SUSC	4	SUSC	1	SUSC	<=0.5	SUSC
C. jejuni	EURL 2019 S-14.7	>16	RESIST	<=1	SUSC	0.25	SUSC	>64	RESIST	1	SUSC	>64	RESIST
C. coli	EURL 2019 S-14.8	>16	RESIST	4	SUSC	1	SUSC	>64	RESIST	>16	RESIST	>64	RESIST

Resistant

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EURL-AR External Quality Assurance System 2019

- *Salmonella* and *Campylobacter*

Id: «Lab_no_»
«Name»
«Institute__»
«Country»

Kgs. Lyngby, October 2019

Dear «Nameall»,

Please find enclosed the bacterial strains for the EURL-AR EQAS 2019: eight *Salmonella spp.* and eight *Campylobacter* spp. Upon arrival to your laboratory, the strains should be stored in a dark place at 4°C for stabs, and in a dark and cool place for freeze-dried strains. Charcoal swabs must be subcultured upon arrival.

On the EURL-AR-website (https://www.eurl-ar.eu/eqas.aspx) the following documents relevant for this EURL-AR EQAS are available:

- Protocol for antimicrobial susceptibility testing of *Salmonella* and *Campylobacter* and test forms for reporting results
- Instructions for Opening and Reviving Lyophilised Cultures
- Subculture and Maintenance of Quality Control Strains
- Guideline for submission of results via the webtool

We ask you to test these *Salmonella* and *Campylobacter* strains for antimicrobial susceptibility. Detailed description of the procedures to follow for antimicrobial susceptibility testing and for submitting your results via the webtool can be found in the protocol.

Results should be submitted to the database no later than **6th December 2019**.

Please acknowledge receipt of this parcel immediately upon arrival (to suska@food.dtu.dk).
Do not hesitate to contact me for further information.

Yours sincerely,

Susanne Karlsmose Pedersen
EURL-AR EQAS-Coordinator

EU Reference Laboratory for Antimicrobial Resistance
External Quality Assurance System (EQAS) 2019

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PROTOCOL

For antimicrobial susceptibility testing of *Salmonella* and *Campylobacter*

1 INTRODUCTION

The organisation and implementation of an External Quality Assurance System (EQAS) on antimicrobial susceptibility testing (AST) of *Salmonella* and *Campylobacter* is among the tasks of the EU Reference Laboratory for Antimicrobial Resistance (EURL-AR). The *Salmonella*/*Campylobacter* EQAS 2019 will include AST of eight *Salmonella* and *Campylobacter* strains and AST of reference strains *E. coli* ATCC 25922 (CCM 3954) and *C. jejuni* ATCC 33560 (CCM 6214).

The reference strains are included in the parcel only for new participants of the EQAS who did not receive them previously. The reference strains are original CERTIFIED cultures provided free of charge, and should be used for future internal quality control for antimicrobial susceptibility testing in your laboratory. The reference strains will not be included in the years to come. Therefore, please take proper care of these strains. Handle and maintain them as suggested in the manual 'Subculture and Maintenance of QC Strains' available on the EURL-AR website (see www.eurl-ar.eu).

Various aspects of the proficiency test scheme may from time to time be subcontracted. When subcontracting occurs it is placed with a competent subcontractor and the National Food Institute is responsible to the scheme participants for the subcontractor's work.

2 OBJECTIVES

This EQAS aims to support laboratories to assess and, if necessary, to improve the quality of results obtained by AST of pathogens of food- and animal-origin, with special regard to *Salmonella* and *Campylobacter*. Further objectives are to evaluate and improve the comparability of surveillance data on antimicrobial susceptibility of *Salmonella* and *Campylobacter* reported to EFSA by different laboratories.

3 OUTLINE OF THE SALM/CAMP EQAS 2019

3.1 Shipping, receipt and storage of strains

In October 2019, the National Reference Laboratories for Antimicrobial Resistance (NRL-AR) will receive a parcel containing eight *Salmonella* and *Campylobacter* strains from the National Food Institute. This parcel will also contain reference strains, but only for participants who did not receive them previously.

All strains belong to UN3373, Biological substance, category B. Extended spectrum beta-lactamase (ESBL)-producing strains as well as carbapenemase producing strains are included in the selected material. It is the recipients' responsibility to comply with national legislation, rules and regulation regarding the correct use and handling of the provided strains and to possess the proper equipment and protocols to handle these strains.

The *Salmonella* test strains are shipped as stab cultures, the *Campylobacter* test strains are shipped as a charcoal swabs and the reference strains are shipped lyophilised. On arrival, the stab cultures and the charcoal swabs must be subcultured, and all cultures should be adequately stored until testing. A suggested procedure for reconstitution of the lyophilised reference strains is presented below.

3.2 QC reference strains

For a suggested procedure for reconstitution of the lyophilised, please refer to the document 'Instructions for opening and reviving lyophilised cultures' on the EURL-AR-website (see www.eurl-ar.eu).

Note that, for the testing of the *E. coli* ATCC25922 reference strain, the two compounds, sulfamethoxazole and sulfisoxazole, are regarded as comparable, i.e. the obtained MIC-value from the testing of sulfamethoxazole will be evaluated against the acceptance range listed in CLSI M100 for sulfisoxazole.

3.3 Antimicrobial susceptibility testing

The strains should be tested for susceptibility to the antimicrobials listed in Tables 1, 2 and 3, using the method implemented in your laboratory for performing monitoring for EFSA and applying the interpretative criteria listed below.

Participants should perform minimum inhibitory concentration (MIC) determination using the methods stated in the EC regulation EC 652/2013. For interpretation of the results, use the cut-off values listed in Tables 1, 2 and 3. Except where indicated, these represent the current epidemiological cut-off values developed by EUCAST (www.eucast.org), and allow categorisation of bacterial isolates into two categories; resistant or susceptible. A categorisation as intermediate is not accepted.

As the current regulation and recommendations focus on MIC testing only, results obtained by disk diffusion cannot be submitted.

3.3.1 *Salmonella*

The interpretative criteria that should be applied for categorizing the *Salmonella* test strain as resistant or susceptible are those listed in Tables 1 and 2.

Table 1: Antimicrobials recommended for AST of *Salmonella* spp. and interpretative criteria according to table 1 in EC regulation 652/2013

Antimicrobial	MIC (µg/mL) (R>)
Ampicillin (AMP)	8
Azithromycin (AZI)	16*
Cefotaxime (FOT)	0.5
Ceftazidime (TAZ)	2
Chloramphenicol (CHL)	16
Ciprofloxacin (CIP)	0.064
Colistin (COL)	2*
Gentamicin (GEN)	2
Meropenem (MERO)	0.125
Nalidixic acid (NAL)	8
Sulfonamides (SMX)	256*
Tetracycline (TET)	8
Tigecycline (TGC)	1*
Trimethoprim (TMP)	2

* Tentative value, ref.: EFSA Journal 2019;17 (2):5598, 278 pp

EU Reference Laboratory for Antimicrobial Resistance
External Quality Assurance System (EQAS) 2019

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Table 2: Antimicrobials recommended for additional AST of *Salmonella* spp. resistant to cefotaxime, ceftazidime or meropenem and interpretative criteria according to table 4 in EC regulation 652/2013

Antimicrobial	MIC (µg/mL) (R>)
Cefepime, FEP	0.125*
Cefotaxime, FOT	0.5
Cefotaxime + clavulanic acid (F/C)	Not applicable
Cefoxitin, FOX	8
Ceftazidime, TAZ	2
Ceftazidime+ clavulanic acid (T/C)	Not applicable
Ertapenem, ETP	0.06*
Imipenem, IMI	1
Meropenem, MERO	0.125
Temocillin, TRM	16*

* Tentative value, ref.: EFSA Journal 2019;17 (2):5598, 278 pp

Plasmid-mediated quinolone resistance

When performing antimicrobial susceptibility testing of the *Salmonella* test strains, the interpretative criteria listed in Table 1 for results obtained by MIC-determination should allow detection of plasmid-mediated quinolone resistant test strains.

Beta-lactam- and carbapenem resistance

Confirmatory tests for ESBL production are mandatory on all strains resistant to cefotaxime (FOT), ceftazidime (TAZ) and/or meropenem and should be performed by testing the second panel of antimicrobials (Table 2 in this document corresponding to Table 4 in Commission Implementing Decision 2013/652/EU).

Confirmatory test for AmpC-, ESBL- and carbapenemase production requires use of both cefotaxime (FOT) and ceftazidime (TAZ) alone and in combination with a β-lactamase inhibitor (clavulanic acid). Synergy is defined either as i) a ≥ 3 twofold concentration decrease in an MIC for either antimicrobial agent tested in combination with clavulanic acid vs. the MIC of the agent when tested alone (MIC FOT:FOT/Cl or TAZ:TAZ/Cl ratio ≥ 8) (CLSI M100 Table 3A, Tests for ESBLs). The presence of synergy indicates ESBL production.

Confirmatory test for carbapenemase production requires the testing of meropenem (MERO).

Detection of AmpC-type beta-lactamases can be performed by testing the bacterium for susceptibility to cefoxitin (FOX). Resistance to FOX could indicate the presence of an AmpC-type beta-lactamase.

The classification of the phenotypic results should be based on the most recent EFSA recommendations (see appendix to this protocol). It is important to notice that two cut-off values apply for cefotaxime and ceftazidime: the EUCAST cut-off values (ECOFFs: FOT>0.5 and

TAZ>2) which are those used to define R/S, and the screening cut-off values (FOT>1 and TAZ>1) which are those applied to categorise bacterial phenotypes as ESBL, AmpC, carbapenemase, etc., based on panel 2 results (see Appendix).

3.3.2 *Campylobacter*

The obtained values of the *C. jejuni* QC reference strain will be evaluated according to the values listed in the CLSI document VET06, 1st ed., i.e. based on incubation at 36-37ºC for 48 hours or 42ºC for 24 hours.

Table 3: Antimicrobials recommended for AST of *Campylobacter jejuni* and *C. coli* and interpretative criteria according to table 1 in EC regulation 652/2013

Antimicrobial	*C. jejuni*	*C. coli*
	MIC (µg/mL) (R>)	MIC (µg/mL) (R>)
Ciprofloxacin (CIP)	0.5	0.5
Erythromycin (ERY)	4	8
Gentamicin (GEN)	2	2
Nalidixic acid (NAL)	16	16
Streptomycin (STR)	4	4
Tetracycline (TET)	1	2

Identification of *Campylobacter* species

Species identification of the *Campylobacter* test strains must be performed by the NRLs using in-house methods or adopting the protocol available on the EURL-AR website under: http://eurl-ar.eu/233-protocols.htm.

4 REPORTING OF RESULTS AND EVALUATION

Test forms are available for recording your results before you enter them into the web tool.

We recommend reading carefully the web tool manual before submitting your results.

Results must be submitted no later than December 6th 2019.

After the deadline, when all participants have uploaded results, you will be able to login to the webtool once again to view and print an automatically generated report evaluating your results. Results in agreement with the expected interpretation are categorised as ‘correct’, while results deviating from the expected interpretation are categorised as ‘incorrect’.

All results will be summarized in a report which will be publicly available. The data in the report will be presented with laboratory codes. A laboratory code is known to the individual laboratory,

whereas the complete list of laboratories and their codes is confidential and known only to the EURL-AR and the EU Commission. All conclusions will be public.

If you have questions, please do not hesitate to contact the EQAS Coordinator:

Susanne Karlsmose Pedersen
National Food Institute,
Technical University of Denmark
Kemitorvet, Building 204, DK-2800 Lyngby
Denmark
Tel: +45 3588 6601
E-mail: suska@food.dtu.dk

5 HOW TO SUBMIT RESULTS VIA THE WEBTOOL

The 'guideline for submission of results via webtool' is available for download directly from the EURL-AR website (https://www.eurl-ar.eu/eqas.aspx).

Access the webtool using this address: https://amr-eqas.dtu.dk. Please follow the guideline carefully and **remember to access the webtool via an 'incognito' website** (about login to the webtool, see below).

When you submit your results, remember to have by your side the completed test forms.

Do not hesitate to contact us if you experience difficulties with the webtool.

Before finally submitting your input for *Salmonella* and *Campylobacter*, respectively, please ensure that you have filled in all the relevant fields as **you can only 'finally submit' once for each organism!** 'Final submit' blocks data entry.

⇨ About login to the webtool:

When first given access to login to the webtool, your **personal loginID and password** were sent to you by email. This is relevant for two email addresses connected to each NRL-AR (the EURL-AR defined a primary and a secondary contact).
Note that:

a) If the EURL-AR has only one contact person for an NRL, this person is registered both as primary and secondary contact. Should you like to add another person as the secondary contact, please contact suska@food.dtu.dk
b) If your laboratory has two or more contact points on the EURL-AR contact list, two have been defined as the primary and secondary contact. Should you like to make changes to the primary and secondary contact or should you like more than the two persons to be able to access the webtool, please contact suska@food.dtu.dk.

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APPENDIX

Criteria for interpretation of *Salmonella*, panel 2 results

1. ESBL–phenotype
– FOT or TAZ > 1 mg/L AND
– MERO ≤ 0.12 mg/L AND
– FOX ≤ 8 mg/L AND
– SYN FOT/CLV and/or TAZ/CLV

2. AmpC–phenotype
– FOT or TAZ > 1 mg/L AND
– MERO ≤ 0.12 mg/L AND
– FOX > 8 mg/L AND
– No SYN FOT/CLV nor TAZ/CLV
– (Not excluded presence of ESBLs)

3. ESBL + AmpC–phenotype
– FOT or TAZ > 1 mg/L AND
– MERO ≤ 0.12 mg/L AND
– FOX >8 mg/L AND
– SYN FOT/CLV and/or TAZ/CLV

4. Carbapenemase–phenotype
– MERO > 0.12 mg/L
– Needs confirmation
– (Not excluded presence of ESBLs or AmpC)

Susceptible
FOT-TAZ-FOX-MEM ≤ ECOFF

5. Other phenotypes

1) If FOT or TAZ > 1 mg/ml AND
– MEM ≤ 0.12 mg/L AND
– FOX ≤ 8 mg/L AND
– NO SYN FOT/CLV nor TAZ/CLV
– Not excluded CPs (consult EURL)

2) If FOT and/or TAZ ≤ 1 mg/L AND > ECOFF AND
– MERO ≤ 0.12 mg/L
– FOX ≤ 8 mg/L

3) If FOT and TAZ ≤ 1 mg/L
– MERO ≤ 0.12 mg/L
– FOX > 8 mg/L
*cAmpCs could be included here

4) If MERO ≤ 0.12 mg/L BUT
– ETP > ECOFF AND/OR
– IMI > ECOFF
– Not excluded CPs, needs confirmation (consult EURL)

5) Any other combinations not described in previous boxes (consult EURL)

Please refer to: EFSA (European Food Safety Authority) and ECDC (European Centre for Disease Prevention and Control), 2019. The European Union summary report on antimicrobial resistance in zoonotic and indicator bacteria from humans, animals and food in 2017. EFSA Journal 2019;17 (2):5598, 278 pp. https://doi.org/10.2903/j.efsa.2019.5598 (page 41).

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Salmonella and *Campylobacter*

TEST FORMS

Name:
Name of laboratory:
Name of institute:
City:
Country:
E-mail:
Fax:

Comments:

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TEST FORM

Which method did you use for antimicrobial susceptibility testing of *Salmonella* in this EQAS?

- ☐ MIC - Broth microdilution
- ☐ MIC – Agar dilution (note: not evaluated in the final report)

Which standard(s(/guideline(s) did you use when performing AST?

- ☐ CLSI
- ☐ EUCAST
- ☐ ISO 20776-1:2006
- ☐ TREK

Which incubation conditions did you use? °C/ h

Which solvent was used for the preparation of the 0.5 McFarland solution

- ☐ Water
- ☐ Saline
- ☐ Mueller Hinton broth

The inoculum was prepared by adding µl of 0.5 McFarland solution in mL MH broth

What was the expected inculum size? * ^ CFU/mL (indicate for example 5 times 10 to the power of 5 using this format '5 * 10 ^ 5')

Comments or additional information:

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TEST FORM

Which method did you use for antimicrobial susceptibility testing of *Campylobacter* in this EQAS?

- ☐ MIC - Broth microdilution
- ☐ MIC – Agar dilution (note: not evaluated in the final report)

Which standard(s(/guideline(s) did you use when performing AST?

- ☐ CLSI
- ☐ EUCAST
- ☐ ISO 20776-1:2006
- ☐ TREK

Which incubation conditions did you use?

- ☐ 36-37ºC, 48 hours
- ☐ 42ºC, 24 hours

Which solvent was used for the preparation of the 0.5 McFarland solution

- ☐ Water
- ☐ Saline
- ☐ Mueller Hinton broth

The inoculum was prepared by adding µl of 0.5 McFarland solution in mL cation-adjusted Mueller Hinton broth supplemented with lysed horse blood (CAMHB-LHB).

What was the expected inculum size? * ^ CFU/mL (indicate for example 5 times 10 to the power of 5 using this format '5 * 10 ^ 5')

Comments or additional information:

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TEST FORM

Strain	Antimicrobial	Results and interpretation		
		≤ / >	MIC-value (µg/ml)	S / R
Salmonella EURL S-14.X	Ampicillin, AMP			
	Azithromycin, AZI			
	Cefotaxime, FOT			
	Ceftazidime, TAZ			
	Chloramphenicol, CHL			
	Ciprofloxacin CIP			
	Colistin, COL			
	Gentamicin, GEN			
	Meropenem, MERO			
	Nalidixic acid, NAL			
	Sulfamethoxazole, SMX			
	Tetracycline, TET			
	Tigecycline, TGC			
	Trimethoprim, TMP			

All strains resistant to cefotaxime (FOT), ceftazidime (TAZ) or meropenem (MERO) must be included for testing in the second panel as part of confirmatory tests for ESBL-, AmpC or carbapenemase production. See further description in the protocol section '3.3.1 *Salmonella*'.

Strain	Antimicrobial	Results and interpretation		
		≤ / >	MIC-value (µg/ml)	S / R
Salmonella EURL S-14.X	Cefepime, FEP			
	Cefotaxime, FOT			
	Cefotaxime + clavulanic acid (F/C)			
	Cefoxitin, FOX			
	Ceftazidime, TAZ			
	Ceftazidime+ clavulanic acid (T/C)			
	Ertapenem, ETP			
	Imipenem, IMI			
	Meropenem, MERO			
	Temocillin, TRM			

Interpretation of PANEL 2 results:

☐ ESBL-phenotype
☐ ESBL+AmpC-phenotype
☐ AmpC-phenotype
☐ Carbapenemase-phenotype
☐ Other phenotype
☐ Susceptible (to panel 2 antimicrobials)

Comments:

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TEST FORM

AST of reference strain *E. coli* ATCC 25922

	Antimicrobial	MIC-value (µg/ml)
1st panel	Ampicillin, AMP	
	Azithromycin, AZI	
	Cefotaxime, FOT	
	Ceftazidime, TAZ	
	Chloramphenicol, CHL	
	Ciprofloxacin, CIP	
	Colistin, COL	
	Gentamicin, GEN	
	Meropenem, MERO	
	Nalidixic acid, NAL	
	Sulfamethoxazole, SMX*	
	Tetracycline, TET	
	Tigecycline, TGC	
	Trimethoprim, TMP	
2nd panel	Cefepime, FEP	
	Cefotaxime, FOT	
	Cefotaxime + clavulanic acid (F/C)	
	Cefoxitin, FOX	
	Ceftazidime, TAZ	
	Ceftazidime+ clavulanic acid (T/C)	
	Ertapenem, ETP	
	Imipenem, IMI	
	Meropenem, MERO	
	Temocillin, TRM	

* for the testing of the *E. coli* ATCC25922 reference strain, sulfamethoxazole and sulfisoxazole, are regarded as comparable, i.e. the obtained MIC-value from the testing of sulfamethoxazole will be evaluated against the acceptance range listed in CLSI M100 for sulfisoxazole (CLSI M100, Table 3).

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AST of reference strain *Acinetobacter baumannii* (2012-70-100-69)

	Antimicrobial	MIC-value (µg/ml)
1st panel	Ampicillin, AMP	
	Azithromycin, AZI	
	Cefotaxime, FOT	
	Ceftazidime, TAZ	
	Chloramphenicol, CHL	
	Ciprofloxacin, CIP	
	Colistin, COL	
	Gentamicin, GEN	
	Meropenem, MERO	
	Nalidixic acid, NAL	
	Sulfamethoxazole, SMX*	
	Tetracycline, TET	
	Tigecycline, TGC	
	Trimethoprim, TMP	
2nd panel	Cefepime, FEP	
	Cefotaxime, FOT	
	Cefotaxime + clavulanic acid (F/C)	
	Cefoxitin, FOX	
	Ceftazidime, TAZ	
	Ceftazidime+ clavulanic acid (T/C)	
	Ertapenem, ETP	
	Imipenem, IMI	
	Meropenem, MERO	
	Temocillin, TRM	

* Sulfamethoxazole and sulfisoxazole, are regarded as comparable, i.e. the obtained MIC-value from the testing of sulfamethoxazole will be evaluated against the acceptance range listed in CLSI M100 for sulfisoxazole (CLSI M100, Table 3).

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TEST FORM

Strain	Antimicrobial	Interpretation	
		MIC-value (µg/ml)	S / R
Campylobacter EURL C-14.X ☐ *C. jejuni* ☐ *C. coli*	Ciprofloxacin		
	Erythromycin		
	Gentamicin		
	Nalidixic acid		
	Streptomycin		
	Tetracycline		
Campylobacter EURL C-14.X ☐ *C. jejuni* ☐ *C. coli*	Ciprofloxacin		
	Erythromycin		
	Gentamicin		
	Nalidixic acid		
	Streptomycin		
	Tetracycline		
Campylobacter EURL C-14.X ☐ *C. jejuni* ☐ *C. coli*	Ciprofloxacin		
	Erythromycin		
	Gentamicin		
	Nalidixic acid		
	Streptomycin		
	Tetracycline		
Campylobacter EURL C-14.X ☐ *C. jejuni* ☐ *C. coli*	Ciprofloxacin		
	Erythromycin		
	Gentamicin		
	Nalidixic acid		
	Streptomycin		
	Tetracycline		

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TEST FORM

Susceptibility testing of *Campylobacter jejuni* reference strain ATCC 33560

Strain	Antimicrobial	MIC-value (µg/ml)	
		36 °C/48 hours	42 °C/24 hours
C. jejuni ATCC 33560	Ciprofloxacin		
	Erythromycin		
	Gentamicin		
	Nalidixic acid		
	Streptomycin		
	Tetracycline		

Susceptibility testing of *Campylobacter coli* reference strain (2012-70-443-2)

Strain	Antimicrobial	MIC-value (µg/ml)
C. coli (2012-70-443-2)	Ciprofloxacin	
	Erythromycin	
	Gentamicin	
	Nalidixic acid	
	Streptomycin	
	Tetracycline	

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INSTRUCTIONS FOR OPENING AND REVIVING LYOPHILISED CULTURES

Instructions adjusted from Czech Collection of Microorganisms (CCM) document 'Instructions for Opening and Reviving of Freeze-Dried Bacteria and Fungi' available on http://www.sci.muni.cz.

Lyophilised cultures are supplied in vacuum-sealed ampoules. Care should be taken in opening the ampoule. All instructions given below should be followed closely to ensure the safety of the person who opens the ampoule and to prevent contamination of the culture.

a. Check the number of the culture on the label inside the ampoule
b. Make a file cut on the ampoule near the middle of the plug (see Figure 1)
c. Disinfect the ampoule with alcohol-dampened gauze or alcohol-dampened cotton wool from just below the plug to the pointed end
d. Apply a red-hot glass rod to the file cut to crack the glass and allow air to enter slowly into the ampoule
e. Remove the pointed end of the ampoule into disinfectant
f. Add about 0.3 ml appropriate broth to the dried suspension using a sterile Pasteur pipette and mix carefully to avoid creating aerosols. Transfer the contents to one or more suitable solid and /or liquid media
g. Incubate the inoculated medium at appropriate conditions for several days
h. Autoclave or disinfect effectively the used Pasteur pipette, the plug and all the remains of the original ampoule before discarding

Notes:

- Cultures should be grown on media and under conditions as recommended in the CCM catalogue (see http://www.sci.muni.cz)
- Cultures may need at least one subculturing before they can be optimally used in experiments
- Unopened ampoules should be kept in a dark and cool place!

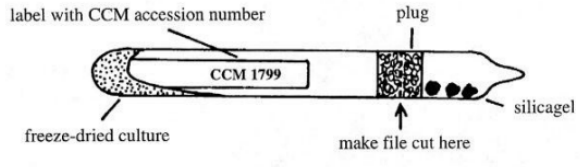

Figure 1: from CCM document 'Instructions for Opening and Reviving of Freeze-Dried Bacteria and Fungi' available on http://www.sci.muni.cz

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SUBCULTURE AND MAINTENANCE OF QUALITY CONTROL STRAINS

1 PURPOSE AND REFERENCES

Improper storage and repeated subculturing of bacteria can produce alterations in antimicrobial susceptibility test results. The Clinical and Laboratory Standards Institute (CLSI) has published guidelines for Quality Control (QC) stock culture maintenance to ensure consistent antimicrobial susceptibility test (AST) results.

The following can be regarded as a summary of information that should be followed for subculturing and maintaining QC-strains when performing AST by broth dilution methods. For full information related to this subject, the following standards are relevant: M100 (Performance Standards for Antimicrobial Susceptibility Testing) and M7 (Methods for Dilution Antimicrobial Susceptibility Test for Bacteria That Grow Aerobically; Approved Standard).

2 DEFINITION OF TERMS

Reference Culture: A reference culture is a microorganism preparation that is acquired from a culture type collection.

Reference Stock Culture: A reference stock culture is a microorganism preparation that is derived from a reference culture. Guidelines and standards outline how reference stock cultures must be processed and stored.

Working Stock Cultures: A working stock culture is growth derived from a reference stock culture. Guidelines and standards outline how working stock cultures must be processed and how often they can be subcultured.

Subcultures (Passages): A subculture is simply the transfer of established microorganism growth on media to fresh media. The subsequent growth on the fresh media constitutes a subculture or passage. Growing a reference culture or reference stock culture from its preserved status (frozen or lyophilized) is not a subculture. The preserved microorganism is not in a stage of established growth until it is thawed or hydrated and grown for the first time.

3 IMPORTANT CONSIDERATIONS

- Do not use disc diffusion strains for MIC determination.
- Obtain QC strains from a reliable source such as ATCC.
- CLSI requires that QC be performed either on the same day or weekly (after QC-validation).
- Any changes in materials or procedure must be validated with QC before implemented
- For example: Agar and broth methods may give different QC ranges for drugs such as glycopeptides, aminoglycosides and macrolides.

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- Periodically perform colony counts to check the inoculum preparation procedure.
- Ideally, test values should be in the middle of the acceptable range.
- Graphing QC data points over time can help identify changes in data helpful for troubleshooting problems.

4 STORAGE OF REFERENCE STRAINS

Preparation of stock cultures

- Use a suitable stabilizer such as 50% fetal calf serum in broth, 10-15% glycerol in tryptic soy broth, defibrinated sheep blood or skim milk to prepare multiple aliquots.
- Store at -20°C, -70°C or liquid nitrogen (alternatively, freeze dry.)
- Before using rejuvenated strains for QC, subculture to check for purity and viability.

Working cultures

- Set up on agar slants with appropriate medium, store at 4-8°C and subculture weekly.
- Replace the working strain with a stock culture at least monthly.
- If a change in the organisms inherent susceptibility occurs, obtain a fresh stock culture or a new strain from a reference culture collection e.g. ATCC.

5 FREQUENCY OF TESTING

Weekly vs. daily testing

Weekly testing is possible if the laboratory can demonstrate satisfactory performance with daily testing according to the descriptions in the CLSI guidelines.

- Documentation showing reference strain results from 20 or 30 consecutive test days were within the acceptable range.
- For each antimicrobial/organism combination, no more one out of 20 or three out of 30 MIC values may be outside the acceptable range.

When the above are fulfilled, each quality control strain may be tested once a week and whenever any reagent component is changed.

Corrective Actions

If an MIC is outside the range in weekly testing, corrective action is required as follows:

- Repeat the test if there is an obvious error e.g. wrong strain or incubation conditions used
- If there is no obvious error, return to daily control testing

If five acceptable QC results are available, no additional days of QC-testing are needed.

If the problem cannot be resolved, continue daily testing until the errors are identified.

Repeat the 30 days validation before resuming weekly testing.

Quality Control ranges for ATCC reference strains

E. coli ATCC 25922	
Antimicrobial	**MIC**
Ampicillin, AMP	2-8
Azithromycin, AZI	none
Cefepime, FEP	0.016-0.12
Cefotaxime, FOT	0.03-0.12
Cefotaxime + clavulanic acid, F/C	none
Cefoxitin, FOX	2-8
Ceftazidime, TAZ	0.06-0.5
Ceftazidime + clavulanic acid, T/C	none
Chloramphenicol, CHL	2-8
Ciprofloxacin, CIP	0.004-0.016
Colistin, COL	0.25-2
Ertapenem, ETP	0.004-0.016
Gentamicin, GEN	0.25-1
Imipenem, IMI	0.06-0.25
Meropenem, MERO	0.008-0.06
Nalidixic acid, NAL	1-4
Sulfamethoxazole, SMX	8-32
Temocillin, TRM	none
Tetracycline, TET	0.5-2
Tigecycline, TGC	0.03-0.25
Trimethoprim, TMP	0.5-2

MIC ranges and disc diffusion ranges are according to CLSI M100 29th edition

Campylobacter jejuni ATCC 33560				
Antimicrobial	**Microbroth (36-37°C/48h)**	**Microbroth (42°C/24h)**	**Agar dilution (36-37°C/48h)**	**Agar dilution (42°C/24h)**
Ciprofloxacin, CIP	0.06-0.25	0.03-0.12	0.12-1	0.06-0.5
Erythromycin, ERY	0.5-2	0.25-2	1-8	1-4
Gentamicin, GEN	0.5-2	0.25-2	0.5-2	0.5-4
Nalidixic acid, NAL	4-16	4-16	None	None
Tetracycline, TET	0.25-2	0.25-1	None	None

Ranges are according to CLSI (VET06, 1st ed.)

Test results from the reference strain *E. coli* ATCC 25922 obtained by microbroth dilution

Lab no.	Panel	Antimicrobial	Operator	Value	Low limit	High limit	Mark	Temperature	Time
2	1	Ampicillin	=	4	2	8	1	36±2	18-24
2	1	Cefotaxime	<=	0.25	0.03	0.12	1	36±2	18-24
2	1	Ceftazidime	<=	0.5	0.06	0.5	1	36±2	18-24
2	1	Chloramphenicol	<=	8	2	8	1	36±2	18-24
2	1	Ciprofloxacin	<=	0.015	0.004	0.016	1	36±2	18-24
2	1	Colistin	<=	1	0,25	2	1	36±2	18-24
2	1	Gentamicin	<=	0.5	0.25	1	1	36±2	18-24
2	1	Meropenem	<=	0.03	0.008	0.06	1	36±2	18-24
2	1	Nalidixic acid	<=	4	1	4	1	36±2	18-24
2	1	Sulfamethoxazole	=	16	8	32	1	36±2	18-24
2	1	Tetracycline	<=	2	0.5	2	1	36±2	18-24
2	1	Tigecycline	<=	0.25	0.03	0.25	1	36±2	18-24
2	1	Trimethoprim	=	0.5	0.5	2	1	36±2	18-24
2	2	Cefepime	<=	0.06	0.016	0.12	1	36±2	18-24
2	2	Cefotaxime	<=	0.25	0.03	0.12	1	36±2	18-24
2	2	Cefoxitin	=	2	2	8	1	36±2	18-24
2	2	Ceftazidime	=	0.5	0.06	0.5	1	36±2	18-24
2	2	Ertapenem	<=	0.015	0.004	0.016	1	36±2	18-24
2	2	Imipenem	=	0.25	0.06	0.25	1	36±2	18-24
2	2	Meropenem	<=	0.03	0.008	0.06	1	36±2	18-24
4	1	Ampicillin	=	4	2	8	1	37±1	22-24
4	1	Cefotaxime	<=	0.25	0.03	0.12	1	37±1	22-24
4	1	Ceftazidime	<=	0.5	0.06	0.5	1	37±1	22-24
4	1	Chloramphenicol	<=	8	2	8	1	37±1	22-24
4	1	Ciprofloxacin	<=	0.015	0.004	0.016	1	37±1	22-24
4	1	Colistin	<=	1	0.25	2	1	37±1	22-24
4	1	Gentamicin	<=	0.5	0.25	1	1	37±1	22-24
4	1	Meropenem	<=	0.03	0.008	0.06	1	37±1	22-24
4	1	Nalidixic acid	<=	4	1	4	1	37±1	22-24
4	1	Sulfamethoxazole	=	32	8	32	1	37±1	22-24
4	1	Tetracycline	<=	2	0.5	2	1	37±1	22-24
4	1	Tigecycline	<=	0.25	0.03	0.25	1	37±1	22-24
4	1	Trimethoprim	=	1	0.5	2	1	37±1	22-24
4	2	Cefepime	<=	0.06	0.016	0.12	1	37±1	22-24
4	2	Cefotaxime	<=	0.25	0.03	0.12	1	37±1	22-24
4	2	Cefoxitin	=	4	2	8	1	37±1	22-24
4	2	Ceftazidime	<=	0.25	0.06	0.5	1	37±1	22-24
4	2	Ertapenem	<=	0.015	0.004	0.016	1	37±1	22-24
4	2	Imipenem	<=	0.12	0.06	0.25	1	37±1	22-24
4	2	Meropenem	<=	0.03	0.008	0.06	1	37±1	22-24
6	1	Ampicillin	=	8	2	8	1	35±1	16-20
6	1	Cefotaxime	<=	0.25	0.03	0.12	1	35±1	16-20
6	1	Ceftazidime	<=	0.5	0.06	0.5	1	35±1	16-20
6	1	Chloramphenicol	<=	8	2	8	1	35±1	16-20
6	1	Ciprofloxacin	<=	0.015	0.004	0.016	1	35±1	16-20
6	1	Colistin	<=	1	0.25	2	1	35±1	16-20
6	1	Gentamicin	=	1	0.25	1	1	35±1	16-20
6	1	Meropenem	<=	0.03	0.008	0.06	1	35±1	16-20
6	1	Nalidixic acid	<=	4	1	4	1	35±1	16-20
6	1	Sulfamethoxazole	=	32	8	32	1	35±1	16-20
6	1	Tetracycline	<=	2	0.5	2	1	35±1	16-20
6	1	Tigecycline	<=	0.25	0.03	0.25	1	35±1	16-20
6	1	Trimethoprim	=	1	0.5	2	1	35±1	16-20
6	2	Cefepime	<=	0.06	0.016	0.12	1	35±1	16-20
6	2	Cefotaxime	<=	0.25	0.03	0.12	1	35±1	16-20
6	2	Cefoxitin	=	8	2	8	1	35±1	16-20
6	2	Ceftazidime	<=	0.25	0.06	0.5	1	35±1	16-20
6	2	Ertapenem	<=	0.15	0.004	0.016	**0**	35±1	16-20
6	2	Imipenem	<=	0.12	0.06	0.25	1	35±1	16-20
6	2	Meropenem	<=	0.03	0.008	0.06	1	35±1	16-20
9	1	Ampicillin	=	4	2	8	1	36±1	18
9	1	Ceftazidime	<=	0.5	0.06	0.5	1	36±1	18
9	1	Chloramphenicol	<=	8	2	8	1	36±1	18
9	1	Ciprofloxacin	<=	0.015	0.004	0.016	1	36±1	18
9	1	Colistin	<=	1	0.25	2	1	36±1	18
9	1	Gentamicin	<=	0.5	0.25	1	1	36±1	18
9	1	Meropenem	<=	0.03	0.008	0.06	1	36±1	18
9	1	Nalidixic acid	<=	4	1	4	1	36±1	18
9	1	Sulfamethoxazole	=	16	8	32	1	36±1	18
9	1	Tetracycline	<=	2	0.5	2	1	36±1	18
9	1	Tigecycline	<=	0.25	0.03	0.25	1	36±1	18
9	1	Trimethoprim	=	1	0.5	2	1	36±1	18
9	2	Cefepime	<=	0.06	0.016	0.12	1	36±1	18
9	2	Cefoxitin	=	4	2	8	1	36±1	18
9	2	Ceftazidime	<=	0.25	0.06	0.5	1	36±1	18
9	2	Ertapenem	<=	0.015	0.004	0.016	1	36±1	18
9	2	Imipenem	<=	0.12	0.06	0.25	1	36±1	18
9	2	Meropenem	<=	0.03	0.008	0.06	1	36±1	18

Lab no.	Panel	Antimicrobial	Operator	Value	Low limit	High limit	Mark	Temperature	Time
11	1	Ampicillin	=	2	2	8	1	35±1	20
11	1	Cefotaxime	<=	0.25	0.03	0.12	1	35±1	20
11	1	Ceftazidime	<=	0.5	0.06	0.5	1	35±1	20
11	1	Chloramphenicol	<=	8	2	8	1	35±1	20
11	1	Ciprofloxacin	<=	0.015	0.004	0.016	1	35±1	20
11	1	Colistin	=	2	0.25	2	1	35±1	20
11	1	Gentamicin	<=	0.5	0.25	1	1	35±1	20
11	1	Meropenem	<=	0.03	0.008	0.06	1	35±1	20
11	1	Nalidixic acid	<=	4	1	4	1	35±1	20
11	1	Sulfamethoxazole	=	16	8	32	1	35±1	20
11	1	Tetracycline	<=	2	0.5	2	1	35±1	20
11	1	Tigecycline	<=	0.25	0.03	0.25	1	35±1	20
11	1	Trimethoprim	=	0.5	0.5	2	1	35±1	20
11	2	Cefepime	<=	0.06	0.016	0.12	1	35±1	20
11	2	Cefotaxime	<=	0.25	0.03	0.12	1	35±1	20
11	2	Cefoxitin	=	2	2	8	1	35±1	20
11	2	Ceftazidime	<=	0.25	0.06	0.5	1	35±1	20
11	2	Ertapenem	<=	0.015	0.004	0.016	1	35±1	20
11	2	Imipenem	<=	0.12	0.06	0.25	1	35±1	20
11	2	Meropenem	<=	0.03	0.008	0.06	1	35±1	20
12	1	Ampicillin	=	8	2	8	1	35±1	18
12	1	Cefotaxime	<=	0.25	0.03	0.12	1	35±1	18
12	1	Ceftazidime	<=	0.5	0.06	0.5	1	35±1	18
12	1	Chloramphenicol	<=	8	2	8	1	35±1	18
12	1	Ciprofloxacin	<=	0.015	0.004	0.016	1	35±1	18
12	1	Colistin	=	2	0.25	2	1	35±1	18
12	1	Gentamicin	<=	0.5	0.25	1	1	35±1	18
12	1	Meropenem	<=	0.03	0.008	0.06	1	35±1	18
12	1	Nalidixic acid	<=	4	1	4	1	35±1	18
12	1	Sulfamethoxazole	=	0.5	8	32	**0**	35±1	18
12	1	Tetracycline	<=	2	0.5	2	1	35±1	18
12	1	Tigecycline	<=	0.25	0.03	0.25	1	35±1	18
12	1	Trimethoprim	=	0.5	0.5	2	1	35±1	18
12	2	Cefepime	<=	0.06	0.016	0.12	1	35±1	18
12	2	Cefotaxime	<=	0.25	0.03	0.12	1	35±1	18
12	2	Cefoxitin	=	4	2	8	1	35±1	18
12	2	Ceftazidime	<=	0.25	0.06	0.5	1	35±1	18
12	2	Ertapenem	<=	0.015	0.004	0.016	1	35±1	18
12	2	Imipenem	=	0.25	0.06	0.25	1	35±1	18
12	2	Meropenem	<=	0.03	0.008	0.06	1	35±1	18
16	1	Ampicillin	=	8	2	8	1	35±1	18-24
16	1	Cefotaxime	<=	0.25	0.03	0.12	1	35±1	18-24
16	1	Ceftazidime	<=	0.5	0.06	0.5	1	35±1	18-24
16	1	Chloramphenicol	<=	8	2	8	1	35±1	18-24
16	1	Ciprofloxacin	<=	0.015	0.004	0.016	1	35±1	18-24
16	1	Colistin	<=	1	0.25	2	1	35±1	18-24
16	1	Gentamicin	<=	0.5	0.25	1	1	35±1	18-24
16	1	Meropenem	<=	0.03	0.008	0.06	1	35±1	18-24
16	1	Nalidixic acid	<=	4	1	4	1	35±1	18-24
16	1	Sulfamethoxazole	=	32	8	32	1	35±1	18-24
16	1	Tetracycline	<=	2	0.5	2	1	35±1	18-24
16	1	Trimethoprim	=	1	0.5	2	1	35±1	18-24
16	2	Cefepime	<=	0.06	0.016	0.12	1	35±1	18-24
16	2	Cefotaxime	<=	0.25	0.03	0.12	1	35±1	18-24
16	2	Cefoxitin	=	4	2	8	1	35±1	18-24
16	2	Ceftazidime	<=	0.25	0.06	0.5	1	35±1	18-24
16	2	Ertapenem	<=	0.015	0.004	0.016	1	35±1	18-24
16	2	Imipenem	=	0.25	0.06	0.25	1	35±1	18-24
16	2	Meropenem	<=	0.03	0.008	0.06	1	35±1	18-24
17	1	Ampicillin	=	8	2	8	1	36±1	17
17	1	Cefotaxime	<=	0.25	0.03	0.12	1	36±1	17
17	1	Ceftazidime	<=	0.5	0.06	0.5	1	36±1	17
17	1	Chloramphenicol	<=	8	2	8	1	36±1	17
17	1	Ciprofloxacin	<=	0.015	0.004	0.016	1	36±1	17
17	1	Colistin	<=	1	0.25	2	1	36±1	17
17	1	Gentamicin	<=	0.5	0.25	1	1	36±1	17
17	1	Meropenem	<=	0.03	0.008	0.06	1	36±1	17
17	1	Nalidixic acid	<=	4	1	4	1	36±1	17
17	1	Sulfamethoxazole	<=	8	8	32	1	36±1	17
17	1	Tetracycline	<=	2	0.5	2	1	36±1	17
17	1	Tigecycline	=	0.25	0.03	0.25	1	36±1	17
17	1	Trimethoprim	<=	0.25	0.5	2	**0**	36±1	17
17	2	Cefepime	<=	0.06	0.016	0.12	1	36±1	17
17	2	Cefotaxime	<=	0.25	0.03	0.12	1	36±1	17
17	2	Cefoxitin	=	4	2	8	1	36±1	17
17	2	Ceftazidime	<=	0.25	0.06	0.5	1	36±1	17
17	2	Ertapenem	<=	15	0.004	0.016	**0**	36±1	17
17	2	Imipenem	=	0.25	0.06	0.25	1	36±1	17
17	2	Meropenem	<=	0.03	0.008	0.06	1	36±1	17

Lab no.	Panel	Antimicrobial	Operator	Value	Low limit	High limit	Mark	Temperature	Time
18	1	Ampicillin	=	4	2	8	1	35±1	18
18	1	Cefotaxime	<=	0.25	0.03	0.12	1	35±1	18
18	1	Ceftazidime	<=	0.5	0.06	0.5	1	35±1	18
18	1	Chloramphenicol	<=	8	2	8	1	35±1	18
18	1	Ciprofloxacin	<=	0.015	0.004	0.016	1	35±1	18
18	1	Colistin	<=	1	0.25	2	1	35±1	18
18	1	Gentamicin	<=	0.5	0.25	1	1	35±1	18
18	1	Meropenem	<=	0.03	0.008	0.06	1	35±1	18
18	1	Nalidixic acid	<=	4	1	4	1	35±1	18
18	1	Sulfamethoxazole	=	16	8	32	1	35±1	18
18	1	Tetracycline	<=	2	0.5	2	1	35±1	18
18	1	Tigecycline	<=	0.25	0.03	0.25	1	35±1	18
18	1	Trimethoprim	=	1	0.5	2	1	35±1	18
18	2	Cefepime	<=	FALSE	0.016	0.12	1	35±1	18
18	2	Cefotaxime	<=	0.25	0.03	0.12	1	35±1	18
18	2	Cefoxitin	=	4	2	8	1	35±1	18
18	2	Ceftazidime	=	0.5	0.06	0.5	1	35±1	18
18	2	Ertapenem	<=	0.015	0.004	0.016	1	35±1	18
18	2	Imipenem	<=	0.12	0.06	0.25	1	35±1	18
18	2	Meropenem	=	0.06	0.008	0.06	1	35±1	18
19	1	Ampicillin	=	4	2	8	1	35±1	18
19	1	Cefotaxime	<=	0.25	0.03	0.12	1	35±1	18
19	1	Ceftazidime	<=	0.5	0.06	0.5	1	35±1	18
19	1	Chloramphenicol	<=	8	2	8	1	35±1	18
19	1	Ciprofloxacin	<=	0.015	0.004	0.016	1	35±1	18
19	1	Colistin	<=	1	0.25	2	1	35±1	18
19	1	Gentamicin	<=	0.5	0.25	1	1	35±1	18
19	1	Meropenem	<=	0.03	0.008	0.06	1	35±1	18
19	1	Nalidixic acid	<=	4	1	4	1	35±1	18
19	1	Sulfamethoxazole	=	16	8	32	1	35±1	18
19	1	Tetracycline	<=	2	0.5	2	1	35±1	18
19	1	Tigecycline	<=	0.25	0.03	0.25	1	35±1	18
19	1	Trimethoprim	=	0.5	0.5	2	1	35±1	18
19	2	Cefepime	<=	0.06	0.016	0.12	1	35±1	18
19	2	Cefotaxime	<=	0.25	0.03	0.12	1	35±1	18
19	2	Cefoxitin	=	4	2	8	1	35±1	18
19	2	Ceftazidime	<=	0.25	0.06	0.5	1	35±1	18
19	2	Ertapenem	<=	0.015	0.004	0.016	1	35±1	18
19	2	Imipenem	<=	0.12	0.06	0.25	1	35±1	18
19	2	Meropenem	<=	0.03	0.008	0.06	1	35±1	18
20	1	Ampicillin	=	4	2	8	1	37±1	18-22
20	1	Cefotaxime	<=	0.25	0.03	0.12	1	37±1	18-22
20	1	Ceftazidime	<=	0.5	0.06	0.5	1	37±1	18-22
20	1	Chloramphenicol	<=	8	2	8	1	37±1	18-22
20	1	Ciprofloxacin	<=	0.015	0.004	0.016	1	37±1	18-22
20	1	Colistin	<=	1	0.25	2	1	37±1	18-22
20	1	Gentamicin	<=	0.5	0.25	1	1	37±1	18-22
20	1	Meropenem	<=	0.03	0.008	0.06	1	37±1	18-22
20	1	Nalidixic acid	<=	4	1	4	1	37±1	18-22
20	1	Sulfamethoxazole	=	16	8	32	1	37±1	18-22
20	1	Tetracycline	<=	2	0.5	2	1	37±1	18-22
20	1	Tigecycline	<=	0.25	0.03	0.25	1	37±1	18-22
20	1	Trimethoprim	=	0.5	0.5	2	1	37±1	18-22
20	2	Cefepime	<=	0.06	0.016	0.12	1	37±1	18-22
20	2	Cefotaxime	<=	0.25	0.03	0.12	1	37±1	18-22
20	2	Cefoxitin	=	2	2	8	1	37±1	18-22
20	2	Ceftazidime	<=	0.25	0.06	0.5	1	37±1	18-22
20	2	Ertapenem	<=	0.015	0.004	0.016	1	37±1	18-22
20	2	Imipenem	<=	0.12	0.06	0.25	1	37±1	18-22
20	2	Meropenem	<=	0.03	0.008	0.06	1	37±1	18-22

Lab no.	Panel	Antimicrobial	Operator	Value	Low limit	High limit	Mark	Temperature	Time
21	1	Ampicillin	=	4	2	8	1	35±1	20
21	1	Cefotaxime	<=	0.25	0.03	0.12	1	35±1	20
21	1	Ceftazidime	<=	0.5	0.06	0.5	1	35±1	20
21	1	Chloramphenicol	<=	8	2	8	1	35±1	20
21	1	Ciprofloxacin	<=	0.015	0.004	0.016	1	35±1	20
21	1	Colistin	<=	1	0.25	2	1	35±1	20
21	1	Gentamicin	<=	0.5	0.25	1	1	35±1	20
21	1	Meropenem	<=	0.03	0.008	0.06	1	35±1	20
21	1	Nalidixic acid	<=	4	1	4	1	35±1	20
21	1	Sulfamethoxazole	=	32	8	32	1	35±1	20
21	1	Tetracycline	<=	2	0.5	2	1	35±1	20
21	1	Tigecycline	<=	0.25	0.03	0.25	1	35±1	20
21	1	Trimethoprim	=	0.5	0.5	2	1	35±1	20
21	2	Cefepime	<=	0.06	0.016	0.12	1	35±1	20
21	2	Cefotaxime	<=	0.25	0.03	0.12	1	35±1	20
21	2	Cefoxitin	=	4	2	8	1	35±1	20
21	2	Ceftazidime	<=	0.25	0.06	0.5	1	35±1	20
21	2	Ertapenem	<=	0.015	0.004	0.016	1	35±1	20
21	2	Imipenem	<=	0.12	0.06	0.25	1	35±1	20
21	2	Meropenem	<=	0.03	0.008	0.06	1	35±1	20
22	1	Ampicillin	=	4	2	8	1	36±1	20
22	1	Cefotaxime	<=	0.25	0.03	0.12	1	36±1	20
22	1	Ceftazidime	<=	0.5	0.06	0.5	1	36±1	20
22	1	Chloramphenicol	<=	8	2	8	1	36±1	20
22	1	Ciprofloxacin	<=	0.015	0.004	0.016	1	36±1	20
22	1	Colistin	<=	1	0.25	2	1	36±1	20
22	1	Gentamicin	=	1	0.25	1	1	36±1	20
22	1	Meropenem	<=	0.03	0.008	0.06	1	36±1	20
22	1	Nalidixic acid	<=	4	1	4	1	36±1	20
22	1	Sulfamethoxazole	=	64	8	32	**0**	36±1	20
22	1	Tetracycline	<=	2	0.5	2	1	36±1	20
22	1	Tigecycline	<=	0.25	0.03	0.25	1	36±1	20
22	1	Trimethoprim	=	0.5	0.5	2	1	36±1	20
22	2	Cefepime	<=	0.06	0.016	0.12	1	36±1	20
22	2	Cefotaxime	<=	0.25	0.03	0.12	1	36±1	20
22	2	Cefoxitin	=	2	2	8	1	36±1	20
22	2	Ceftazidime	<=	0.25	0.06	0.5	1	36±1	20
22	2	Ertapenem	<=	0.015	0.004	0.016	1	36±1	20
22	2	Imipenem	<=	0.12	0.06	0.25	1	36±1	20
22	2	Meropenem	<=	0.03	0.008	0.06	1	36±1	20
23	1	Ampicillin	=	4	2	8	1	35±1	20
23	1	Cefotaxime	<=	0.25	0.03	0.12	1	35±1	20
23	1	Ceftazidime	<=	0.5	0.06	0.5	1	35±1	20
23	1	Chloramphenicol	<=	8	2	8	1	35±1	20
23	1	Ciprofloxacin	<=	0.015	0.004	0.016	1	35±1	20
23	1	Colistin	<=	1	0.25	2	1	35±1	20
23	1	Gentamicin	<=	0.5	0.25	1	1	35±1	20
23	1	Meropenem	<=	0.03	0.008	0.06	1	35±1	20
23	1	Nalidixic acid	<=	4	1	4	1	35±1	20
23	1	Sulfamethoxazole	=	16	8	32	1	35±1	20
23	1	Tetracycline	<=	2	0.5	2	1	35±1	20
23	1	Tigecycline	<=	0.25	0.03	0.25	1	35±1	20
23	1	Trimethoprim	=	0.5	0.5	2	1	35±1	20
23	2	Cefepime	<=	0.06	0.016	0.12	1	35±1	20
23	2	Cefotaxime	<=	0.25	0.03	0.12	1	35±1	20
23	2	Cefoxitin	=	2	2	8	1	35±1	20
23	2	Ceftazidime	<=	0.25	0.06	0.5	1	35±1	20
23	2	Ertapenem	<=	0.015	0.004	0.016	1	35±1	20
23	2	Imipenem	<=	0.12	0.06	0.25	1	35±1	20
23	2	Meropenem	<=	0.03	0.008	0.06	1	35±1	20
25	1	Ampicillin	=	4	2	8	1	35±1	18-24
25	1	Cefotaxime	<=	0.25	0.03	0.12	1	35±1	18-24
25	1	Ceftazidime	<=	0.5	0.06	0.5	1	35±1	18-24
25	1	Chloramphenicol	<=	8	2	8	1	35±1	18-24
25	1	Ciprofloxacin	<=	0.015	0.004	0.016	1	35±1	18-24
25	1	Colistin	<=	1	0.25	2	1	35±1	18-24
25	1	Gentamicin	=	1	0.25	1	1	35±1	18-24
25	1	Meropenem	<=	0.03	0.008	0.06	1	35±1	18-24
25	1	Nalidixic acid	<=	4	1	4	1	35±1	18-24
25	1	Sulfamethoxazole	<=	8	8	32	1	35±1	18-24
25	1	Tetracycline	<=	2	0.5	2	1	35±1	18-24
25	1	Tigecycline	<=	0.25	0,03	0.25	1	35±1	18-24
25	1	Trimethoprim	=	0.5	0.5	2	1	35±1	18-24
25	2	Cefepime	<=	0.06	0.016	0.12	1	35±1	18-24
25	2	Cefotaxime	<=	0.25	0.03	0.12	1	35±1	18-24
25	2	Cefoxitin	=	4	2	8	1	35±1	18-24
25	2	Ceftazidime	=	0.5	0.06	0.5	1	35±1	18-24
25	2	Ertapenem	<=	0.015	0.004	0.016	1	35±1	18-24
25	2	Imipenem	=	0.25	0.06	0.25	1	35±1	18-24
25	2	Meropenem	<=	0.03	0.008	0.06	1	35±1	18-24

Lab no.	Panel	Antimicrobial	Operator	Value	Low limit	High limit	Mark	Temperature	Time
26	1	Ampicillin	=	4	2	8	1	37±1	16-20
26	1	Cefotaxime	<=	0.25	0.03	0.12	1	37±1	16-20
26	1	Ceftazidime	<=	0.5	0.06	0.5	1	37±1	16-20
26	1	Chloramphenicol	<=	8	2	8	1	37±1	16-20
26	1	Ciprofloxacin	<=	0.015	0.004	0.016	1	37±1	16-20
26	1	Colistin	<=	1	0.25	2	1	37±1	16-20
26	1	Gentamicin	<=	0.5	0.25	1	1	37±1	16-20
26	1	Meropenem	<=	0.003	0.008	0.06	**0**	37±1	16-20
26	1	Nalidixic acid	<=	4	1	4	1	37±1	16-20
26	1	Sulfamethoxazole	=	16	8	32	1	37±1	16-20
26	1	Tetracycline	<=	2	0.5	2	1	37±1	16-20
26	1	Tigecycline	<=	0.25	0.03	0.25	1	37±1	16-20
26	1	Trimethoprim	=	0.5	0.5	2	1	37±1	16-20
29	1	Ampicillin	=	8	2	8	1	36±1	18-20
29	1	Cefotaxime	<=	0.25	0.03	0.12	1	36±1	18-20
29	1	Ceftazidime	<=	0.5	0.06	0.5	1	36±1	18-20
29	1	Chloramphenicol	=	8	2	8	1	36±1	18-20
29	1	Ciprofloxacin	<=	0.015	0.004	0.016	1	36±1	18-20
29	1	Colistin	<=	1	0.25	2	1	36±1	18-20
29	1	Gentamicin	<=	0.5	0.25	1	1	36±1	18-20
29	1	Meropenem	<=	0.03	0.008	0.06	1	36±1	18-20
29	1	Nalidixic acid	<=	4	1	4	1	36±1	18-20
29	1	Sulfamethoxazole	=	32	8	32	1	36±1	18-20
29	1	Tetracycline	<=	2	0.5	2	1	36±1	18-20
29	1	Tigecycline	<=	0.25	0.03	0.25	1	36±1	18-20
29	1	Trimethoprim	=	0.5	0.5	2	1	36±1	18-20
29	2	Cefepime	<=	0.06	0.016	0.12	1	36±1	18-20
29	2	Cefotaxime	<=	0.25	0.03	0.12	1	36±1	18-20
29	2	Cefoxitin	=	4	2	8	1	36±1	18-20
29	2	Ceftazidime	<=	0.25	0.06	0.5	1	36±1	18-20
29	2	Ertapenem	<=	0.015	0.004	0.016	1	36±1	18-20
29	2	Imipenem	<=	0.12	0.06	0.25	1	36±1	18-20
29	2	Meropenem	<=	0.03	0.008	0.06	1	36±1	18-20
30	1	Ampicillin	=	4	2	8	1	35±1	20
30	1	Cefotaxime	<=	0.25	0.03	0.12	1	35±1	20
30	1	Ceftazidime	<=	0.5	0.06	0.5	1	35±1	20
30	1	Chloramphenicol	<=	8	2	8	1	35±1	20
30	1	Ciprofloxacin	<=	0.015	0.004	0.016	1	35±1	20
30	1	Colistin	<=	1	0.25	2	1	35±1	20
30	1	Gentamicin	<=	0.5	0.25	1	1	35±1	20
30	1	Meropenem	<=	0.03	0.008	0.06	1	35±1	20
30	1	Nalidixic acid	<=	4	1	4	1	35±1	20
30	1	Sulfamethoxazole	=	16	8	32	1	35±1	20
30	1	Tetracycline	<=	2	0.5	2	1	35±1	20
30	1	Tigecycline	<=	0.25	0.03	0.25	1	35±1	20
30	1	Trimethoprim	=	0.5	0.5	2	1	35±1	20
30	2	Cefepime	<=	0.06	0.016	0.12	1	35±1	20
30	2	Cefotaxime	<=	0.25	0.03	0.12	1	35±1	20
30	2	Cefoxitin	=	2	2	8	1	35±1	20
30	2	Ceftazidime	<=	0.25	0.06	0.5	1	35±1	20
30	2	Ertapenem	<=	0.015	0.004	0.016	1	35±1	20
30	2	Imipenem	=	0.25	0.06	0.25	1	35±1	20
30	2	Meropenem	<=	0.03	0.008	0.06	1	35±1	20
32	1	Ampicillin	=	4	2	8	1	37±1	18
32	1	Cefotaxime	<=	0.25	0.03	0.12	1	37±1	18
32	1	Ceftazidime	<=	0.5	0.06	0.5	1	37±1	18
32	1	Chloramphenicol	<=	8	2	8	1	37±1	18
32	1	Ciprofloxacin	<=	0.015	0.004	0.016	1	37±1	18
32	1	Colistin	<=	1	0.25	2	1	37±1	18
32	1	Gentamicin	<=	0.5	0.25	1	1	37±1	18
32	1	Meropenem	<=	0.03	0.008	0.06	1	37±1	18
32	1	Nalidixic acid	<=	4	1	4	1	37±1	18
32	1	Sulfamethoxazole	=	32	8	32	1	37±1	18
32	1	Tetracycline	<=	2	0.5	2	1	37±1	18
32	1	Tigecycline	<=	0.25	0.03	0.25	1	37±1	18
32	1	Trimethoprim	=	0.5	0.5	2	1	37±1	18
32	2	Cefepime	<=	0.06	0.016	0.12	1	37±1	18
32	2	Cefotaxime	<=	0.25	0.03	0.12	1	37±1	18
32	2	Cefoxitin	=	8	2	8	1	37±1	18
32	2	Ceftazidime	<=	0.25	0.06	0.5	1	37±1	18
32	2	Ertapenem	<=	0.015	0.004	0.016	1	37±1	18
32	2	Imipenem	<=	0.12	0.06	0.25	1	37±1	18
32	2	Meropenem	<=	0.03	0.008	0.06	1	35±1	20

Lab no.	Panel	Antimicrobial	Operator	Value	Low limit	High limit	Mark	Temperature	Time
33	1	Ampicillin	=	4	2	8	1	35±1	16-18
33	1	Cefotaxime	<=	0.25	0.03	0.12	1	35±1	16-18
33	1	Ceftazidime	<=	0.5	0.06	0.5	1	35±1	16-18
33	1	Chloramphenicol	<=	8	2	8	1	35±1	16-18
33	1	Ciprofloxacin	<=	0.015	0.004	0.016	1	35±1	16-18
33	1	Colistin	<=	1	0.25	2	1	35±1	16-18
33	1	Gentamicin	=	1	0.25	1	1	35±1	16-18
33	1	Meropenem	<=	0.03	0.008	0.06	1	35±1	16-18
33	1	Nalidixic acid	<=	4	1	4	1	35±1	16-18
33	1	Sulfamethoxazole	=	32	8	32	1	35±1	16-18
33	1	Tetracycline	<=	2	0.5	2	1	35±1	16-18
33	1	Tigecycline	<=	0.25	0.03	0.25	1	35±1	16-18
33	1	Trimethoprim	=	0.5	0.5	2	1	35±1	16-18
33	2	Cefepime	<=	0.06	0.016	0.12	1	35±1	16-18
33	2	Cefotaxime	<=	0.25	0.03	0.12	1	35±1	16-18
33	2	Cefoxitin	=	2	2	8	1	35±1	16-18
33	2	Ceftazidime	<=	0.25	0.06	0.5	1	35±1	16-18
33	2	Ertapenem	<=	0.015	0.004	0.016	1	35±1	16-18
33	2	Imipenem	<=	0.125	0.06	0.25	1	35±1	16-18
33	2	Meropenem	<=	0.03	0.008	0.06	1	35±1	16-18
34	1	Ampicillin	=	8	2	8	1	35±1	18-24
34	1	Cefotaxime	<=	0.25	0.03	0.12	1	35±1	18-24
34	1	Ceftazidime	<=	0.5	0.06	0.5	1	35±1	18-24
34	1	Chloramphenicol	<=	8	2	8	1	35±1	18-24
34	1	Ciprofloxacin	<=	0.015	0.004	0.016	1	35±1	18-24
34	1	Colistin	<=	1	0.25	2	1	35±1	18-24
34	1	Gentamicin	<=	0.5	0.25	1	1	35±1	18-24
34	1	Meropenem	<=	0.03	0.008	0.06	1	35±1	18-24
34	1	Nalidixic acid	<=	4	1	4	1	35±1	18-24
34	1	Sulfamethoxazole	=	16	8	32	1	35±1	18-24
34	1	Tetracycline	<=	2	0.5	2	1	35±1	18-24
34	1	Tigecycline	<=	0.25	0.03	0.25	1	35±1	18-24
34	1	Trimethoprim	=	0.5	0.5	2	1	35±1	18-24
34	2	Cefepime	<=	0.06	0.016	0.12	1	35±1	18-24
34	2	Cefotaxime	<=	0.25	0.03	0.12	1	35±1	18-24
34	2	Cefoxitin	=	2	2	8	1	35±1	18-24
34	2	Ceftazidime	<=	0.25	0.06	0.5	1	35±1	18-24
34	2	Ertapenem	<=	0.015	0.004	0.016	1	35±1	18-24
34	2	Imipenem	=	0.25	0.06	0.25	1	35±1	18-24
34	2	Meropenem	<=	0.03	0.008	0.06	1	35±1	18-24
36	1	Ampicillin	=	8	2	8	1	34±2	18-24
36	1	Cefotaxime	<=	0.25	0.03	0.12	1	34±2	18-24
36	1	Ceftazidime	<=	0.5	0.06	0.5	1	34±2	18-24
36	1	Chloramphenicol	<=	8	2	8	1	34±2	18-24
36	1	Ciprofloxacin	<=	0.015	0.004	0.016	1	34±2	18-24
36	1	Colistin	<=	1	0.25	2	1	34±2	18-24
36	1	Gentamicin	<=	0.5	0.25	1	1	34±2	18-24
36	1	Meropenem	<=	0.03	0.008	0.06	1	34±2	18-24
36	1	Nalidixic acid	<=	4	1	4	1	34±2	18-24
36	1	Sulfamethoxazole	<=	8	8	32	1	34±2	18-24
36	1	Tetracycline	<=	2	0.5	2	1	34±2	18-24
36	1	Tigecycline	<=	0.25	0.03	0.25	1	34±2	18-24
36	1	Trimethoprim	=	1	0.5	2	1	34±2	18-24
36	2	Cefepime	<=	0.06	0.016	0.12	1	34±2	18-24
36	2	Cefotaxime	<=	0.25	0.03	0.12	1	34±2	18-24
36	2	Cefoxitin	=	4	2	8	1	34±2	18-24
36	2	Ceftazidime	<=	0.25	0.06	0.5	1	34±2	18-24
36	2	Ertapenem	<=	0.015	0.004	0.016	1	34±2	18-24
36	2	Imipenem	=	0.25	0.06	0.25	1	34±2	18-24
36	2	Meropenem	<=	0.03	0.008	0.06	1	34±2	18-24
37	1	Ampicillin	=	8	2	8	1	36±1	22
37	1	Cefotaxime	<=	0.25	0.03	0.12	1	36±1	22
37	1	Ceftazidime	<=	0.5	0.06	0.5	1	36±1	22
37	1	Chloramphenicol	<=	8	2	8	1	36±1	22
37	1	Ciprofloxacin	<=	0.015	0.004	0.016	1	36±1	22
37	1	Colistin	<=	1	0.25	2	1	36±1	22
37	1	Gentamicin	<=	0.5	0.25	1	1	36±1	22
37	1	Meropenem	<=	0.03	0.008	0.06	1	36±1	22
37	1	Nalidixic acid	<=	4	1	4	1	36±1	22
37	1	Sulfamethoxazole	=	16	8	32	1	36±1	22
37	1	Tetracycline	<=	2	0.5	2	1	36±1	22
37	1	Tigecycline	<=	0.25	0.03	0.25	1	36±1	22
37	1	Trimethoprim	=	0.5	0.5	2	1	36±1	22

Lab no.	Panel	Antimicrobial	Operator	Value	Low limit	High limit	Mark	Temperature	Time
39	1	Ampicillin	=	4	2	8	1	35±1	24
39	1	Cefotaxime	<=	0.25	0.03	0.12	1	35±1	24
39	1	Ceftazidime	<=	0.5	0.06	0.5	1	35±1	24
39	1	Chloramphenicol	<=	8	2	8	1	35±1	24
39	1	Ciprofloxacin	<=	0.015	0.004	0.016	1	35±1	24
39	1	Colistin	<=	1	0.25	2	1	35±1	24
39	1	Gentamicin	=	1	0.25	1	1	35±1	24
39	1	Meropenem	<=	0.03	0.008	0.06	1	35±1	24
39	1	Nalidixic acid	<=	4	1	4	1	35±1	24
39	1	Sulfamethoxazole	=	32	8	32	1	35±1	24
39	1	Tetracycline	=	2	0.5	2	1	35±1	24
39	1	Tigecycline	<=	0.25	0.03	0.25	1	35±1	24
39	1	Trimethoprim	=	0.5	0.5	2	1	35±1	24
39	2	Cefepime	<=	0.06	0.016	0.12	1	35±1	24
39	2	Cefotaxime	<=	0.25	0.03	0.12	1	35±1	24
39	2	Cefoxitin	=	4	2	8	1	35±1	24
39	2	Ceftazidime	<=	0.05	0.06	0.5	1	35±1	24
39	2	Ertapenem	<=	0.015	0.004	0.016	1	35±1	24
39	2	Imipenem	<=	0.12	0.06	0.25	1	35±1	24
39	2	Meropenem	<=	0.03	0.008	0.06	1	35±1	24
40	1	Ampicillin	=	2	2	8	1	37±1	20
40	1	Cefotaxime	=	0.12	0.03	0.12	1	37±1	20
40	1	Ceftazidime	=	0.5	0.06	0.5	1	37±1	20
40	1	Chloramphenicol	=	8	2	8	1	37±1	20
40	1	Ciprofloxacin	=	0.015	0.004	0.016	1	37±1	20
40	1	Colistin	=	1	0.25	2	1	37±1	20
40	1	Gentamicin	=	0.5	0.25	1	1	37±1	20
40	1	Meropenem	=	0.03	0.008	0.06	1	37±1	20
40	1	Nalidixic acid	=	4	1	4	1	37±1	20
40	1	Sulfamethoxazole	=	16	8	32	1	37±1	20
40	1	Tetracycline	=	2	0.5	2	1	37±1	20
40	1	Tigecycline	=	0.25	0.03	0.25	1	37±1	20
40	1	Trimethoprim	=	0.5	0.5	2	1	37±1	20
40	2	Cefepime	=	0.06	0.016	0.12	1	37±1	20
40	2	Cefotaxime	=	0.12	0.03	0.12	1	37±1	20
40	2	Cefoxitin	=	4	2	8	1	37±1	20
40	2	Ceftazidime	=	0.5	0.06	0.5	1	37±1	20
40	2	Ertapenem	=	0.015	0.004	0.016	1	37±1	20
40	2	Imipenem	=	0.25	0.06	0.25	1	37±1	20
40	2	Meropenem	=	0.03	0.008	0.06	1	37±1	20
42	1	Ampicillin	=	4	2	8	1	33±4	16-20
42	1	Cefotaxime	<=	0.25	0.03	0.12	1	33±4	16-20
42	1	Ceftazidime	<=	0.5	0.06	0.5	1	33±4	16-20
42	1	Chloramphenicol	<=	8	2	8	1	33±4	16-20
42	1	Ciprofloxacin	<=	0.015	0.004	0.016	1	33±4	16-20
42	1	Colistin	<=	1	0.25	2	1	33±4	16-20
42	1	Gentamicin	<=	0.5	0.25	1	1	33±4	16-20
42	1	Meropenem	<=	0.03	0.008	0.06	1	33±4	16-20
42	1	Nalidixic acid	<=	4	1	4	1	33±4	16-20
42	1	Sulfamethoxazole	=	16	8	32	1	33±4	16-20
42	1	Tetracycline	<=	2	0.5	2	1	33±4	16-20
42	1	Tigecycline	<=	0.25	0.03	0.25	1	33±4	16-20
42	1	Trimethoprim	=	0.5	0.5	2	1	33±4	16-20
42	2	Cefepime	<=	0.06	0.016	0.12	1	33±4	16-20
42	2	Cefotaxime	<=	0.25	0.03	0.12	1	33±4	16-20
42	2	Cefoxitin	=	2	2	8	1	33±4	16-20
42	2	Ceftazidime	<=	0.25	0.06	0.5	1	33±4	16-20
42	2	Ertapenem	<=	0.015	0.004	0.016	1	33±4	16-20
42	2	Imipenem	=	0.25	0.06	0.25	1	33±4	16-20
42	2	Meropenem	<=	0.03	0.008	0.06	1	33±4	16-20
45	1	Ampicillin	=	4	2	8	1	36±1	18-24
45	1	Cefotaxime	<=	0.25	0.03	0.12	1	36±1	18-24
45	1	Ceftazidime	<=	0.5	0.06	0.5	1	36±1	18-24
45	1	Chloramphenicol	<=	8	2	8	1	36±1	18-24
45	1	Ciprofloxacin	<=	0.015	0.004	0.016	1	36±1	18-24
45	1	Colistin	<=	1	0.25	2	1	36±1	18-24
45	1	Gentamicin	<=	0.5	0.25	1	1	36±1	18-24
45	1	Meropenem	<=	0.03	0.008	0.06	1	36±1	18-24
45	1	Nalidixic acid	<=	4	1	4	1	36±1	18-24
45	1	Sulfamethoxazole	=	16	8	32	1	36±1	18-24
45	1	Tetracycline	<=	2	0.5	2	1	36±1	18-24
45	1	Tigecycline	<=	0.25	0.03	0.25	1	36±1	18-24
45	1	Trimethoprim	=	1	0.5	2	1	36±1	18-24
45	2	Cefepime	<=	0.06	0.016	0.12	1	36±1	18-24
45	2	Cefotaxime	<=	0.25	0.03	0.12	1	36±1	18-24
45	2	Cefoxitin	=	4	2	8	1	36±1	18-24
45	2	Ceftazidime	<=	0.25	0.06	0.5	1	36±1	18-24
45	2	Ertapenem	<=	0.015	0.004	0.016	1	36±1	18-24
45	2	Imipenem	<=	0.12	0.06	0.25	1	36±1	18-24
45	2	Meropenem	<=	0.03	0.008	0.06	1	36±1	18-24

Lab no.	Panel	Antimicrobial	Operator	Value	Low limit	High limit	Mark	Temperature	Time
56	1	Ampicillin	=	2	2	8	1	35±1	20
56	1	Cefotaxime	<=	0.25	0.03	0.12	1	35±1	20
56	1	Ceftazidime	<=	0.5	0.06	0.5	1	35±1	20
56	1	Chloramphenicol	<=	8	2	8	1	35±1	20
56	1	Ciprofloxacin	<=	0.015	0.004	0.016	1	35±1	20
56	1	Colistin	<=	1	0.25	2	1	35±1	20
56	1	Gentamicin	<=	0.5	0.25	1	1	35±1	20
56	1	Meropenem	<=	0.03	0.008	0.06	1	35±1	20
56	1	Nalidixic acid	<=	4	1	4	1	35±1	20
56	1	Sulfamethoxazole	=	16	8	32	1	35±1	20
56	1	Tetracycline	<=	2	0.5	2	1	35±1	20
56	1	Tigecycline	<=	0.25	0.03	0.25	1	35±1	20
56	1	Trimethoprim	=	0.5	0.5	2	1	35±1	20
56	2	Cefepime	<=	0.06	0.016	0.12	1	35±1	20
56	2	Cefotaxime	<=	0.25	0.03	0.12	1	35±1	20
56	2	Cefoxitin	=	2	2	8	1	35±1	20
56	2	Ceftazidime	<=	0.25	0.06	0.5	1	35±1	20
56	2	Ertapenem	<=	0.015	0.004	0.016	1	35±1	20
56	2	Imipenem	<=	0.12	0.06	0.25	1	35±1	20
56	2	Meropenem	<=	0.03	0.008	0.06	1	35±1	20
58	1	Ampicillin	=	4	2	8	1	37±1	20
58	1	Cefotaxime	<=	0.25	0.03	0.12	1	37±1	20
58	1	Ceftazidime	<=	0.5	0.06	0.5	1	37±1	20
58	1	Chloramphenicol	<=	8	2	8	1	37±1	20
58	1	Ciprofloxacin	<=	0.015	0.004	0.016	1	37±1	20
58	1	Colistin	=	2	0.25	2	1	37±1	20
58	1	Gentamicin	<=	0.5	0.25	1	1	37±1	20
58	1	Meropenem	<=	0.03	0.008	0.06	1	37±1	20
58	1	Nalidixic acid	<=	4	1	4	1	37±1	20
58	1	Sulfamethoxazole	=	32	8	32	1	37±1	20
58	1	Tetracycline	<=	2	0.5	2	1	37±1	20
58	1	Tigecycline	<=	0.25	0.03	0.25	1	37±1	20
58	1	Trimethoprim	=	0.5	0.5	2	**1**	37±1	20
58	2	Cefepime	<=	0.06	0.016	0.12	1	37±1	20
58	2	Cefotaxime	<=	0.25	0.03	0.12	1	37±1	20
58	2	Cefoxitin	=	4	2	8	1	37±1	20
58	2	Ceftazidime	<=	0.25	0.06	0.5	1	37±1	20
58	2	Ertapenem	<=	0.015	0.004	0.016	1	37±1	20
58	2	Imipenem	=	0.25	0.06	0.25	1	37±1	20
58	2	Meropenem	<=	0.03	0.008	0.06	1	37±1	20
59	1	Ampicillin	=	2	2	8	1	35±1	18-24
59	1	Cefotaxime	<=	0.25	0.03	0.12	1	35±1	18-24
59	1	Ceftazidime	<=	0.5	0.06	0.5	1	35±1	18-24
59	1	Chloramphenicol	<=	8	2	8	1	35±1	18-24
59	1	Ciprofloxacin	<=	0.015	0.004	0.016	1	35±1	18-24
59	1	Colistin	<=	1	0.25	2	1	35±1	18-24
59	1	Gentamicin	=	1	0.25	1	1	35±1	18-24
59	1	Meropenem	<=	0.03	0.008	0.06	1	35±1	18-24
59	1	Nalidixic acid	<=	4	1	4	1	35±1	18-24
59	1	Sulfamethoxazole	>	1024	8	32	**0**	35±1	18-24
59	1	Tetracycline	<=	2	0.5	2	1	35±1	18-24
59	1	Tigecycline	<=	0.25	0.03	0.25	1	35±1	18-24
59	1	Trimethoprim	=	0.5	0.5	2	1	35±1	18-24
60	1	Ampicillin	=	8	2	8	1	37±1	18-20
60	1	Cefotaxime	<=	0.25	0.03	0.12	1	37±1	18-20
60	1	Ceftazidime	<=	0.5	0.06	0.5	1	37±1	18-20
60	1	Chloramphenicol	<=	8	2	8	1	37±1	18-20
60	1	Ciprofloxacin	<=	0.015	0.004	0.016	1	37±1	18-20
60	1	Colistin	<=	1	0.25	2	1	37±1	18-20
60	1	Gentamicin	<=	0.5	0.25	1	1	37±1	18-20
60	1	Meropenem	<=	0.03	0.008	0.06	1	37±1	18-20
60	1	Nalidixic acid	<=	4	1	4	1	37±1	18-20
60	1	Sulfamethoxazole	=	32	8	32	1	37±1	18-20
60	1	Tetracycline	<=	2	0.5	2	1	37±1	18-20
60	1	Tigecycline	<=	0.25	0.03	0.25	1	37±1	18-20
60	1	Trimethoprim	=	0.5	0.5	2	1	37±1	18-20
60	2	Cefepime	<=	0.06	0.016	0.12	1	37±1	18-20
60	2	Cefotaxime	<=	0.25	0.03	0.12	1	37±1	18-20
60	2	Cefoxitin	=	4	2	8	1	37±1	18-20
60	2	Ceftazidime	<=	0.25	0.06	0.5	1	37±1	18-20
60	2	Ertapenem	<=	0.015	0.004	0.016	1	37±1	18-20
60	2	Imipenem	=	0.25	0.06	0.25	1	37±1	18-20
60	2	Meropenem	<=	0.03	0.008	0.06	1	37±1	18-20

Lab no.	Panel	Antimicrobial	Operator	Value	Low limit	High limit	Mark	Temperature	Time
62	1	Ampicillin	=	4	2	8	1	34±3	18-24
62	1	Cefotaxime	<=	0.25	0.03	0.12	1	34±3	18-24
62	1	Ceftazidime	<=	0.5	0.06	0.5	1	34±3	18-24
62	1	Chloramphenicol	<=	8	2	8	1	34±3	18-24
62	1	Ciprofloxacin	<=	0.015	0.004	0.016	1	34±3	18-24
62	1	Colistin	<=	1	0.25	2	1	34±3	18-24
62	1	Gentamicin	=	0.5	0.25	1	1	34±3	18-24
62	1	Meropenem	<=	0.03	0.008	0.06	1	34±3	18-24
62	1	Nalidixic acid	<=	4	1	4	1	34±3	18-24
62	1	Sulfamethoxazole	=	16	8	32	1	34±3	18-24
62	1	Tetracycline	<=	2	0.5	2	1	34±3	18-24
62	1	Tigecycline	<=	0.25	0.03	0.25	1	34±3	18-24
62	1	Trimethoprim	=	0.5	0.5	2	1	34±3	18-24
62	2	Cefepime	<=	0.06	0.016	0.12	1	34±3	18-24
62	2	Cefotaxime	<=	0.25	0.03	0.12	1	34±3	18-24
62	2	Cefoxitin	=	2	2	8	1	34±3	18-24
62	2	Ceftazidime	<=	0.25	0.06	0.5	1	34±3	18-24
62	2	Ertapenem	<=	0.015	0.004	0.016	1	34±3	18-24
62	2	Imipenem	<=	0.12	0.06	0.25	1	34±3	18-24
62	2	Meropenem	<=	0.03	0.008	0.06	1	34±3	18-24
64	1	Ampicillin	=	4	2	8	1	37±1	18-20
64	1	Cefotaxime	<=	0.25	0.03	0.12	1	37±1	18-20
64	1	Ceftazidime	<=	0.5	0.06	0.5	1	37±1	18-20
64	1	Chloramphenicol	<=	8	2	8	1	37±1	18-20
64	1	Ciprofloxacin	<=	0.015	0.004	0.016	1	37±1	18-20
64	1	Colistin	<=	1	0.25	2	1	37±1	18-20
64	1	Gentamicin	=	1	0.25	1	1	37±1	18-20
64	1	Meropenem	<=	0.03	0.008	0.06	1	37±1	18-20
64	1	Nalidixic acid	<=	4	1	4	1	37±1	18-20
64	1	Sulfamethoxazole	=	32	8	32	1	37±1	18-20
64	1	Tetracycline	<=	2	0.5	2	1	37±1	18-20
64	1	Tigecycline	<=	0.25	0.03	0.25	1	37±1	18-20
64	1	Trimethoprim	=	1	0.5	2	1	37±1	18-20
64	2	Cefepime	<=	0.06	0.016	0.12	1	37±1	18-20
64	2	Cefotaxime	<=	0.25	0.03	0.12	1	37±1	18-20
64	2	Cefoxitin	=	16	2	8	**0**	37±1	18-20
64	2	Ceftazidime	<=	0.25	0.06	0.5	1	37±1	18-20
64	2	Ertapenem	<=	0.015	0.004	0.016	1	37±1	18-20
64	2	Imipenem	<=	0.12	0.06	0.25	1	37±1	18-20
64	2	Meropenem	<=	0.03	0.008	0.06	1	37±1	18-20

Lab no.	Antimicrobial	Operator	Value	Low limit	High limit	Mark	Method	36-37ºC/48h	42ºC/24h
2	Ciprofloxacin	=	0.25	0.06	0.25	1	MIC	X	
2	Erythromycin	=	1	0.5	2	1	MIC	X	
2	Gentamicin	=	0.5	0.5	2	1	MIC	X	
2	Nalidixic acid	=	4	4	16	1	MIC	X	
2	Tetracycline	=	2	0.25	2	1	MIC	X	
6	Ciprofloxacin	<=	0.12	0.06	0.25	1	MIC		X
6	Erythromycin	<=	1	0.25	2	1	MIC		X
6	Gentamicin	=	1	0.25	2	1	MIC		X
6	Nalidixic acid	=	4	4	16	1	MIC		X
6	Tetracycline	<=	0.5	0.25	1	1	MIC		X
9	Ciprofloxacin	<=	0.12	0.06	0.25	1	MIC	X	
9	Erythromycin	<=	1	0.5	2	1	MIC	X	
9	Gentamicin	=	1	0.5	2	1	MIC	X	
9	Nalidixic acid	=	8	4	16	1	MIC	X	
9	Tetracycline	=	1	0.25	2	1	MIC	X	
11	Ciprofloxacin	=	0.25	0.06	0.25	1	MIC	X	
11	Erythromycin	<=	1	0.5	2	1	MIC	X	
11	Gentamicin	=	2	0.5	2	1	MIC	X	
11	Nalidixic acid	=	8	4	16	1	MIC	X	
11	Tetracycline	=	2	0.25	2	1	MIC	X	
12	Ciprofloxacin	=	0.25	0.06	0.25	1	MIC	X	
12	Erythromycin	<=	1	0.5	2	1	MIC	X	
12	Gentamicin	=	1	0.5	2	1	MIC	X	
12	Nalidixic acid	=	8	4	16	1	MIC	X	
12	Tetracycline	=	1	0.25	2	1	MIC	X	
14	Ciprofloxacin	<=	0.125	0.06	0.25	1	MIC		X
14	Erythromycin	<=	1	0.25	2	1	MIC		X
14	Gentamicin	=	0.5	0.25	2	1	MIC		X
14	Nalidixic acid	=	8	4	16	1	MIC		X
14	Tetracycline	<=	0.5	0.25	1	1	MIC		X
17	Ciprofloxacin	=	0.25	0.06	0.25	1	MIC	X	
17	Erythromycin	<=	1	0.5	2	1	MIC	X	
17	Gentamicin	=	1	0.5	2	1	MIC	X	
17	Nalidixic acid	=	8	4	16	1	MIC	X	
17	Tetracycline	=	1	0.25	2	1	MIC	X	
18	Ciprofloxacin	<=	0.12	0.06	0.25	1	MIC		X
18	Erythromycin	<=	1	0.25	2	1	MIC		X
18	Gentamicin	=	0.5	0.25	2	1	MIC		X
18	Nalidixic acid	=	8	4	16	1	MIC		X
18	Tetracycline	<=	0.5	0.25	1	1	MIC		X
19	Ciprofloxacin	<=	0.12	0.06	0.25	1	MIC		X
19	Erythromycin	<=	1	0.25	2	1	MIC		X
19	Gentamicin	=	1	0.25	2	1	MIC		X
19	Nalidixic acid	=	8	4	16	1	MIC		X
19	Tetracycline	<=	0.5	0.25	1	1	MIC		X
20	Ciprofloxacin	<=	0.12	0.06	0.25	1	MIC	X	
20	Erythromycin	<=	1	0.5	2	1	MIC	X	
20	Gentamicin	=	0.5	0.5	2	1	MIC	X	
20	Nalidixic acid	=	4	4	16	1	MIC	X	
20	Tetracycline	<=	0.5	0.25	2	1	MIC	X	
22	Ciprofloxacin	<=	0.125	0.06	0.25	1	MIC		X
22	Erythromycin	<=	1	0.25	2	1	MIC		X
22	Gentamicin	=	1	0.25	2	1	MIC		X
22	Nalidixic acid	=	8	4	16	1	MIC		X
22	Tetracycline	=	2	0.25	1	0	MIC		X

Lab no.	Antimicrobial	Operator	Value	Low limit	High limit	Mark	Method	36-37ºC/48h	42ºC/24h
23	Ciprofloxacin	=	0.12	0.06	0.25	1	MIC		X
23	Erythromycin	<=	1	0.25	2	1	MIC		X
23	Gentamicin	=	1	0.25	2	1	MIC		X
23	Nalidixic acid	=	4	4	16	1	MIC		X
23	Tetracycline	=	1	0.25	1	1	MIC		X
25	Ciprofloxacin	=	0.25	0.06	0.25	1	MIC	X	
25	Erythromycin	=	2	0.5	2	1	MIC	X	
25	Gentamicin	=	0.25	0.5	2	0	MIC	X	
25	Nalidixic acid	=	8	4	16	1	MIC	X	
25	Tetracycline	=	2	0.25	2	1	MIC	X	
26	Ciprofloxacin	<=	0.12	0.06	0.25	1	MIC	X	
26	Erythromycin	<=	1	0.5	2	1	MIC	X	
26	Gentamicin	=	1	0.5	2	1	MIC	X	
26	Nalidixic acid	=	8	4	16	1	MIC	X	
26	Tetracycline	=	1	0.25	2	1	MIC	X	
29	Ciprofloxacin	=	0.12	0.06	0.25	1	MIC	X	
29	Erythromycin	<=	1	0.5	2	1	MIC	X	
29	Gentamicin	=	0.5	0.5	2	1	MIC	X	
29	Nalidixic acid	=	8	4	16	1	MIC	X	
29	Tetracycline	=	1	0.25	2	1	MIC	X	
30	Ciprofloxacin	<=	0.12	0.06	0.25	1	MIC	X	
30	Erythromycin	<=	1	0.5	2	1	MIC	X	
30	Gentamicin	=	1	0.5	2	1	MIC	X	
30	Nalidixic acid	=	8	4	16	1	MIC	X	
30	Tetracycline	<=	0.5	0.25	2	1	MIC	X	
32	Ciprofloxacin	<=	0.12	0.06	0.25	1	MIC	X	
32	Erythromycin	<=	1	0.5	2	1	MIC	X	
32	Gentamicin	=	1	0.5	2	1	MIC	X	
32	Nalidixic acid	=	4	4	16	1	MIC	X	
32	Tetracycline	<=	0.5	0.25	2	1	MIC	X	
33	Ciprofloxacin	=	0.25	0.06	0.25	1	MIC	X	
33	Erythromycin	<=	1	0.5	2	1	MIC	X	
33	Gentamicin	=	1	0.5	2	1	MIC	X	
33	Nalidixic acid	=	16	4	16	1	MIC	X	
33	Tetracycline	<=	0.5	0.25	2	1	MIC	X	
34	Ciprofloxacin	<=	0.12	0.06	0.25	1	MIC	X	
34	Erythromycin	<=	1	0.5	2	1	MIC	X	
34	Gentamicin	=	1	0.5	2	1	MIC	X	
34	Nalidixic acid	=	8	4	16	1	MIC	X	
34	Tetracycline	=	4	0.25	2	0	MIC	X	
36	Ciprofloxacin	<=	0.12	0.06	0.25	1	MIC		X
36	Erythromycin	<=	1	0.25	2	1	MIC		X
36	Gentamicin	=	1	0.25	2	1	MIC		X
36	Nalidixic acid	=	8	4	16	1	MIC		X
36	Tetracycline	=	1	0.25	1	1	MIC		X
37	Ciprofloxacin	<=	0.12	0.06	0.25	1	MIC	X	
37	Erythromycin	<=	1	0.5	2	1	MIC	X	
37	Gentamicin	=	1	0.5	2	1	MIC	X	
37	Nalidixic acid	=	8	4	16	1	MIC	X	
37	Tetracycline	=	1	0.25	2	1	MIC	X	
39	Ciprofloxacin	<=	0.12	0.06	0.25	1	MIC	X	
39	Erythromycin	<=	1	0.5	2	1	MIC	X	
39	Gentamicin	=	0.5	0.5	2	1	MIC	X	
39	Nalidixic acid	=	2	4	16	0	MIC	X	
39	Tetracycline	=	1	0.25	2	1	MIC	X	
40	Ciprofloxacin	=	0.12	0.06	0.25	1	MIC		X
40	Erythromycin	=	1	0.25	2	1	MIC		X
40	Nalidixic acid	=	8	4	16	1	MIC		X

Lab no.	Antimicrobial	Operator	Value	Low limit	High limit	Mark	Method	36-37ºC/48h	42ºC/24h
40	Tetracycline	=	0.5	0.25	1	1	MIC	Appendix 6b, page 3 of 3	X
42	Ciprofloxacin	=	0.25	0.06	0.25	1	MIC	X	
42	Erythromycin	=	2	0.5	2	1	MIC	X	
42	Gentamicin	=	0.5	0.5	2	1	MIC	X	
42	Nalidixic acid	=	8	4	16	1	MIC	X	
42	Tetracycline	=	2	0.25	2	1	MIC	X	
45	Ciprofloxacin	<=	0.12	0.06	0.25	1	MIC	X	
45	Erythromycin	<=	1	0.5	2	1	MIC	X	
45	Gentamicin	=	0.5	0.5	2	1	MIC	X	
45	Nalidixic acid	=	4	4	16	1	MIC	X	
45	Tetracycline	<=	0.5	0.25	2	1	MIC	X	
56	Ciprofloxacin	<=	0.12	0.06	0.25	1	MIC		X
56	Erythromycin	<=	1	0.25	2	1	MIC		X
56	Gentamicin	=	0.5	0.25	2	1	MIC		X
56	Nalidixic acid	=	4	4	16	1	MIC		X
56	Tetracycline	<=	0.5	0.25	1	1	MIC		X
58	Ciprofloxacin	<=	0.12	0.06	0.25	1	MIC	X	
58	Erythromycin	<=	1	0.5	2	1	MIC	X	
58	Gentamicin	=	1	0.5	2	1	MIC	X	
58	Nalidixic acid	=	8	4	16	1	MIC	X	
58	Tetracycline	=	1	0.25	2	1	MIC	X	
59	Ciprofloxacin	=	0.25	0.06	0.25	1	MIC	X	
59	Erythromycin	<=	1	0.5	2	1	MIC	X	
59	Gentamicin	=	1	0.5	2	1	MIC	X	
59	Nalidixic acid	=	8	4	16	1	MIC	X	
59	Tetracycline	=	1	0.25	2	1	MIC	X	
60	Ciprofloxacin	=	0.25	0.06	0.25	1	MIC	X	
60	Erythromycin	<=	1	0.5	2	1	MIC	X	
60	Gentamicin	=	1	0.5	2	1	MIC	X	
60	Nalidixic acid	=	8	4	16	1	MIC	X	
60	Tetracycline	=	1	0.25	2	1	MIC	X	
64	Ciprofloxacin	<=	0.12	0.06	0.25	1	MIC	X	
64	Erythromycin	<=	1	0.5	2	1	MIC	X	
64	Gentamicin	=	0.5	0.5	2	1	MIC	X	
64	Nalidixic acid	=	4	4	16	1	MIC	X	
64	Tetracycline	=	1	0.25	2	1	MIC	X	

MIC: Microbroth dilution

Salmonella - expected and obtained interpretation

Antimicrobial	Strain	Panel	Expected	% R	% S	No. correct	No. incorrect
Ampicillin AMP	EURL S-14.1	Panel 1	R	100	0	33	0
	EURL S-14.2	Panel 1	R	100	0	33	0
	EURL S-14.3	Panel 1	R	100	0	33	0
	EURL S-14.4	Panel 1	R	100	0	33	0
	EURL S-14.5	Panel 1	S	0	100	33	0
	EURL S-14.6	Panel 1	R	100	0	33	0
	EURL S-14.7	Panel 1	R	100	0	33	0
	EURL S-14.8	Panel 1	R	100	0	33	0
Azithromycin AZI	EURL S-14.1	Panel 1	S	0	100	30	0
	EURL S-14.2	Panel 1	S	0	100	30	0
	EURL S-14.3	Panel 1	R	100	0	31	0
	EURL S-14.4	Panel 1	S	0	100	30	0
	EURL S-14.5	Panel 1	S	0	100	30	0
	EURL S-14.6	Panel 1	S	0	100	30	0
	EURL S-14.7	Panel 1	S	0	100	30	0
	EURL S-14.8	Panel 1	S	0	100	30	0
Cefepime FEP	EURL S-14.2	Panel 2	R	96,2	3,8	25	1
	EURL S-14.3	Panel 2	R	100	0	28	0
	EURL S-14.6	Panel 2	R	100	0	27	0
	EURL S-14.7	Panel 2	R	100	0	27	0
	EURL S-14.8	Panel 2	R	96,3	3,7	26	1
Cefotaxime FOT	EURL S-14.2	Panel 1	R	100	0	33	0
	EURL S-14.3	Panel 1	R	100	0	33	0
	EURL S-14.6	Panel 1	R	100	0	33	0
	EURL S-14.7	Panel 1	R	100	0	33	0
	EURL S-14.8	Panel 1	R	100	0	33	0
	EURL S-14.1	Panel 1	S	0	100	33	0
	EURL S-14.2	Panel 1	R	100	0	33	0
	EURL S-14.3	Panel 1	R	100	0	33	0
	EURL S-14.4	Panel 2	S	0	100	33	0
	EURL S-14.5	Panel 2	S	0	100	33	0
	EURL S-14.6	Panel 2	R	100	0	33	0
	EURL S-14.7	Panel 2	R	100	0	33	0
	EURL S-14.8	Panel 2	R	100	0	33	0
Cefoxitin FOX	EURL S-14.2	Panel 2	R	100	0	33	0
	EURL S-14.3	Panel 2	R	100	0	33	0
	EURL S-14.6	Panel 2	S	0	100	33	0
	EURL S-14.7	Panel 2	S	0	100	33	0
	EURL S-14.8	Panel 2	S	9,1	90,9	30	3
Ceftazidime TAZ	EURL S-14.2	Panel 1	R	100	0	33	0
	EURL S-14.3	Panel 1	R	100	0	33	0
	EURL S-14.6	Panel 1	S	0	100	33	0
	EURL S-14.7	Panel 1	R	100	0	33	0
	EURL S-14.8	Panel 1	S	9,1	90,9	30	3
	EURL S-14.1	Panel 1	S	0	100	33	0
	EURL S-14.2	Panel 1	R	100	0	33	0
	EURL S-14.3	Panel 1	R	100	0	33	0
	EURL S-14.4	Panel 2	S	0	100	33	0
	EURL S-14.5	Panel 2	S	0	100	33	0
	EURL S-14.6	Panel 2	S	0	100	33	0
	EURL S-14.7	Panel 2	R	100	0	33	0
	EURL S-14.8	Panel 2	S	6,1	93,9	31	2

Antimicrobial	Strain	Panel	Expected	% R	% S	No. correct	No. incorrect
Chloramphenicol CHL	EURL S-14.1	Panel 1	S	0	100	33	0
	EURL S-14.2	Panel 1	R	100	0	33	0
	EURL S-14.3	Panel 1	R	100	0	33	0
	EURL S-14.4	Panel 1	S	0	100	33	0
	EURL S-14.5	Panel 1	S	0	100	33	0
	EURL S-14.6	Panel 1	S	0	100	33	0
	EURL S-14.7	Panel 1	S	0	100	33	0
	EURL S-14.8	Panel 1	S	0	100	33	0
Ciprofloxacin CIP	EURL S-14.1	Panel 1	S	0	100	33	0
	EURL S-14.2	Panel 1	S	0	100	33	0
	EURL S-14.3	Panel 1	R	100	0	33	0
	EURL S-14.4	Panel 1	S	0	100	33	0
	EURL S-14.5	Panel 1	S	0	100	33	0
	EURL S-14.6	Panel 1	R	93,9	6,1	31	2
	EURL S-14.7	Panel 1	R	100	0	33	0
	EURL S-14.8	Panel 1	R	100	0	33	0
Colistin COL	EURL S-14.1	Panel 1	R	100	0	33	0
	EURL S-14.2	Panel 1	S	3	97	32	1
	EURL S-14.3	Panel 1	S	3	97	32	1
	EURL S-14.4	Panel 1	R	97	3	32	1
	EURL S-14.5	Panel 1	S	0	100	33	0
	EURL S-14.6	Panel 1	S	3	97	32	1
	EURL S-14.7	Panel 1	S	0	100	33	0
	EURL S-14.8	Panel 1	S	0	100	33	0
Ertapenem ETP	EURL S-14.2	Panel 2	S	0	100	33	0
	EURL S-14.3	Panel 2	R	100	0	33	0
	EURL S-14.6	Panel 2	S	0	100	33	0
	EURL S-14.7	Panel 2	S	0	100	33	0
	EURL S-14.8	Panel 2	S	0	100	33	0
Gentamicin GEN	EURL S-14.1	Panel 1	S	0	100	33	0
	EURL S-14.2	Panel 1	S	0	100	33	0
	EURL S-14.3	Panel 1	R	100	0	33	0
	EURL S-14.4	Panel 1	S	0	100	33	0
	EURL S-14.5	Panel 1	S	0	100	33	0
	EURL S-14.6	Panel 1	S	0	100	33	0
	EURL S-14.7	Panel 1	R	100	0	33	0
	EURL S-14.8	Panel 1	R	93,9	6,1	31	2
Imipenem IMI	EURL S-14.2	Panel 2	S	0	100	33	0
	EURL S-14.3	Panel 2	R	96,9	3,1	31	1
	EURL S-14.6	Panel 2	S	0	100	33	0
	EURL S-14.7	Panel 2	S	0	100	33	0
	EURL S-14.8	Panel 2	S	0	100	33	0
Meropenem MER	EURL S-14.2	Panel 1	S	0	100	33	0
	EURL S-14.3	Panel 1	R	100	0	33	0
	EURL S-14.6	Panel 1	S	0	100	33	0
	EURL S-14.7	Panel 1	S	0	100	33	0
	EURL S-14.8	Panel 1	S	9,1	90,9	30	3
	EURL S-14.1	Panel 1	S	0	100	33	0
	EURL S-14.2	Panel 1	S	0	100	33	0
	EURL S-14.3	Panel 1	R	100	0	33	0
	EURL S-14.4	Panel 2	S	0	100	33	0
	EURL S-14.5	Panel 2	S	0	100	33	0
	EURL S-14.6	Panel 2	S	0	100	33	0
	EURL S-14.7	Panel 2	S	0	100	33	0
	EURL S-14.8	Panel 2	S	0	100	33	0

Antimicrobial	Strain	Panel	Expected	% R	% S	No. correct	No. incorrect
Nalidixic acid NAL	EURL S-14.1	Panel 1	S	0	100	33	0
	EURL S-14.2	Panel 1	S	0	100	33	0
	EURL S-14.3	Panel 1	R	100	0	33	0
	EURL S-14.4	Panel 1	S	0	100	33	0
	EURL S-14.5	Panel 1	S	0	100	33	0
	EURL S-14.6	Panel 1	S	0	100	33	0
	EURL S-14.7	Panel 1	S	0	100	33	0
	EURL S-14.8	Panel 1	S	0	100	33	0
Sulfamethoxazole SMX	EURL S-14.1	Panel 1	R	100	0	33	0
	EURL S-14.2	Panel 1	R	100	0	33	0
	EURL S-14.3	Panel 1	R	100	0	33	0
	EURL S-14.4	Panel 1	R	100	0	33	0
	EURL S-14.5	Panel 1	S	0	100	33	0
	EURL S-14.6	Panel 1	S	0	100	33	0
	EURL S-14.7	Panel 1	R	100	0	33	0
	EURL S-14.8	Panel 1	R	100	0	33	0
Temocillin TRM	EURL S-14.2	Panel 2	S	3,6	96,4	27	1
	EURL S-14.3	Panel 2	R	100	0	29	0
	EURL S-14.6	Panel 2	S	0	100	29	0
	EURL S-14.7	Panel 2	S	0	100	29	0
	EURL S-14.8	Panel 2	S	0	100	29	0
Tetracycline TET	EURL S-14.1	Panel 1	R	100	0	33	0
	EURL S-14.2	Panel 1	R	100	0	33	0
	EURL S-14.3	Panel 1	S	3	97	32	1
	EURL S-14.4	Panel 1	R	100	0	33	0
	EURL S-14.5	Panel 1	S	0	100	33	0
	EURL S-14.6	Panel 1	R	100	0	33	0
	EURL S-14.7	Panel 1	S	0	100	33	0
	EURL S-14.8	Panel 1	S	3	97	32	1
Tigecycline TGC	EURL S-14.1	Panel 1	R	100	0	32	0
	EURL S-14.2	Panel 1	R	100	0	32	0
	EURL S-14.3	Panel 1	S	0	100	32	0
	EURL S-14.4	Panel 1	R	100	0	32	0
	EURL S-14.5	Panel 1	S	0	100	32	0
	EURL S-14.6	Panel 1	R	100	0	32	0
	EURL S-14.7	Panel 1	S	0	100	32	0
	EURL S-14.8	Panel 1	S	0	100	32	0
Trimethoprim TMP	EURL S-14.1	Panel 1	S	0	100	33	0
	EURL S-14.2	Panel 1	S	0	100	33	0
	EURL S-14.3	Panel 1	S	0	100	33	0
	EURL S-14.4	Panel 1	R	100	0	33	0
	EURL S-14.5	Panel 1	S	0	100	33	0
	EURL S-14.6	Panel 1	S	0	100	33	0
	EURL S-14.7	Panel 1	S	0	100	33	0
	EURL S-14.8	Panel 1	S	0	100	33	0

Campylobacter - expected and obtained interpretation

Antimicrobial	Strain	Expected	% R	% S	No. correct	No. incorrect
Ciprofloxacin, CIP	EURL C-14.1	S	0	100	32	0
	EURL C-14.2	R	100	0	32	0
	EURL C-14.3	R	100	0	32	0
	EURL C-14.4	S	0	100	32	0
	EURL C-14.5	S	3	97	31	1
	EURL C-14.6	S	0	100	32	0
	EURL C-14.7	R	100	0	32	0
	EURL C-14.8	R	100	0	32	0
Erythromycin, ERY	EURL C-14.1	S	0	100	32	0
	EURL C-14.2	S	0	100	32	0
	EURL C-14.3	S	0	100	32	0
	EURL C-14.4	R	100	0	32	0
	EURL C-14.5	S	3	97	31	1
	EURL C-14.6	S	0	100	32	0
	EURL C-14.7	S	0	100	32	0
	EURL C-14.8	S	13	87	27	4
Gentamicin, GEN	EURL C-14.1	R	100	0	32	0
	EURL C-14.2	R	100	0	32	0
	EURL C-14.3	S	0	100	32	0
	EURL C-14.4	R	100	0	32	0
	EURL C-14.5	S	0	100	32	0
	EURL C-14.6	S	0	100	32	0
	EURL C-14.7	S	0	100	32	0
	EURL C-14.8	S	3	97	31	1
Nalidixic acid, NAL	EURL C-14.1	S	0	100	32	0
	EURL C-14.2	R	100	0	32	0
	EURL C-14.3	R	100	0	32	0
	EURL C-14.4	S	0	100	32	0
	EURL C-14.5	S	0	100	32	0
	EURL C-14.6	S	0	100	32	0
	EURL C-14.7	R	100	0	31	0
	EURL C-14.8	R	100	0	32	0
Streptomycin, STR	EURL C-14.1	S	0	100	32	0
	EURL C-14.2	S	0	100	32	0
	EURL C-14.3	S	3	97	31	1
	EURL C-14.4	R	97	3	31	1
	EURL C-14.5	R	100	0	32	0
	EURL C-14.6	S	0	100	32	0
	EURL C-14.7	S	0	100	32	0
	EURL C-14.8	R	100	0	32	0
Tetracycline, TET	EURL C-14.1	R	100	0	32	0
	EURL C-14.2	R	100	0	32	0
	EURL C-14.3	R	100	0	32	0
	EURL C-14.4	R	100	0	32	0
	EURL C-14.5	R	97	3	31	1
	EURL C-14.6	S	0	100	32	0
	EURL C-14.7	R	100	0	32	0
	EURL C-14.8	R	100	0	32	0

Deviations - *Salmonella*

Lab no.	Strain	Panel	Antimicrobial	Obtained MIC value	Expected MIC-value	Obtained interpretation	Expected interpretation
6	EURL S-14.2	2	Temocillin TRM	32	8	R	S
6	EURL S-14.8	1	Ceftazidime TAZ	4	2	R	S
6	EURL S-14.8	2	Cefoxitin FOX	16	8	R	S
6	EURL S-14.8	2	Ceftazidime TAZ	4	2	R	S
11	EURL S-14.3	1	Sulfamethoxazole SMX	256	1024	S	R
16	EURL S-14.8	2	Ceftazidime TAZ	4	2	R	S
17	EURL S-14.3	1	Sulfamethoxazole SMX	256	1024	S	R
21	EURL S-14.2	2	Cefepime	0,5	0.5	S	R
23	EURL S-14.2	1	Colistin COL	4	<=1	R	S
23	EURL S-14.3	1	Colistin COL	4	2	R	S
23	EURL S-14.8	1	Ceftazidime TAZ	2	2	R	S
23	EURL S-14.8	2	Ceftazidime TAZ	2	2	R	S
26	EURL S-14.4	1	Colistin COL	2	8	S	R
29	EURL S-14.5	1	Sulfamethoxazole SMX	64	16	R	S
29	EURL S-14.8	1	Tetracycline TET	32	4	R	S
30	EURL S-14.6	1	Ciprofloxacin CIP	0,25	0,5	S	R
32	EURL S-14.3	1	Tetracycline TET	4	4	R	S
33	EURL S-14.8	1	Gentamicin	2	8	S	R
36	EURL S-14.8	2	Cefoxitin FOX	16	8	R	S
39	EURL S-14.5	1	Sulfamethoxazole SMX	>1024	16	R	S
45	EURL S-14.6	1	Colistin COL	4	2	R	S
45	EURL S-14.8	1	Gentamicin	2	8	S	R
45	EURL S-14.8	2	Cefoxitin FOX	16	8	R	S
45	EURL S-14.8	2	Cefepime	1	2	S	R
59	EURL S-14.6	1	Ciprofloxacin CIP	0,25	0,5	S	R
64	EURL S-14.3	2	Imipenem IMI	1	8	S	R

Deviations - *Campylobacter*

Lab no.	Strain	Antimicrobial	Obtained MIC value	Expected MIC-value	Obtained interpretation	Expected interpretation
4	EURL C-14.4	Streptomycin STR	<=0.25	>16	S	R
12	EURL C-14.5	Tetracycline TET	2	8	S	R
33	EURL C-14.8	Erythromycin ERY	16	4	R	S
39	EURL C-14.8	Erythromycin ERY	16	4	R	S
42	EURL C-14.8	Erythromycin ERY	16	4	R	S
64	EURL C-14.3	Streptomycin STR	8	1	R	S
64	EURL C-14.5	Ciprofloxacin CIP	16	<=0.12	R	S
64	EURL C-14.5	Erythromycin ERY	128	<=1	R	S
64	EURL C-14.8	Erythromycin ERY	>128	4	R	S
64	EURL C-14.8	Gentamicin GEN	4	1	R	S

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