Minutes – EURL-AR Workshop, Kgs. Lyngby, April/2012

The minutes are listed according to the agenda

Participants:

All member states (MS) with NRL-AR, except Cyprus, took part in the meeting. Luxembourg has not appointed an NRL-AR and did not take part.

Participating non-MS were Croatia, Norway, Switzerland and Turkey.

Monday, April 23th 2012

Welcome (Rene Hendriksen, EURL-AR)

Rene Hendriksen welcomed the EURL-AR-network to the facilities of the Technical University of Denmark (DTU) in Kgs. Lyngby. The invited speakers were introduced and the agenda presented.

Update from the EURL-AR (Frank Aarestrup, EURL-AR)

The EQAS's are an important part of the collaboration with the phenotypic testing still being important even though we foresee that sequencing will take over in some years.

We conducted a training course in genotypic characterisation in November 2011 for which experts from the network as teachers, which is likely also to be the case in the future. Also, the EURL-AR conducted a site-visit to an NRL-AR.

During 2011, we looked into the following issues: methods and breakpoints concerning quinopristin-dalfopristin, colistin and florfenicol. ESBL-producers were monitored as previously done for PMQRs with collaborators from the NRLs.

The EURL-AR has provided ad hoc advice to NRLs and the EU Commission, also in connection to Denmark's EU Presidency this spring. Our collaboration with WHO also influences internationally, e.g. as regards CLSI on breakpoint setting (ciprofloxacin/enterobacteriaceae)

Update from the EU Commission (Rosa Peran, EU Commission)

Rosa Peran described the activities of the EC in relation to antimicrobial resistance and focused on the action plan and five-year strategy has been prepared and is presented on the Internet: http://ec.europa.eu/food/food/biosafety/antimicrobial_resistance/index_en.htm

The 5-year action plan is based in the holistic approach and describes 12 detailed concrete key actions in 7 different attention areas, both in the human and veterinarian field, including:

- The promotion of the appropriate use of antimicrobial agents in human and veterinary medicines. For the veterinary sector in particular, most of these actions will be explored and implemented in the context of the review of the legal framework for veterinary medicines and medicated feeding stuffs.

- The prevention of microbial infections and their spread both in human and animal field. The introduction of the new Animal Health Law based will focus on prevention of diseases and will replace the current Animal Health provisions based on disease control.

- Strengthen surveillance systems on AMR and antimicrobial consumption in animal and humane medicine.

- Research and innovation

Summary of the plenary discussion:

- Prudent use of antimicrobials is one of the key elements of the action plan of the Commission.

- As regards of monitoring and surveillance systems on AMR, EFSA, on request of the Commission, will publish the Scientific Report on 'Technical specifications on the harmonised monitoring and reporting of AMR' (end of May 2012). It is not excluded that baseline studies could be proposed.
- The new animal health law will provide the legal basis for monitoring of AMR in other than zoonotic agents.

Update from EFSA (Pierre-Alexandre Beloeil, EFSA)

Regarding the mandate from European Commission on 'Harmonised monitoring of AMR in bacteria transmitted through food' the terms of reference are to make proposals to update the current technical specifications and to ensure comparability of results with human monitoring by:

(1) Providing detailed guidance on the monitoring of bacterial species, food animal species and/or food products and methodologies which should be considered as most relevant for AMR monitoring from a public health perspective, taking into account AMR mechanisms;

(2) Reconsidering the antimicrobials, epidemiological cut-offs values and recommended optimum concentration range to be tested at least for the combination selected under Terms of Reference 1;

(3) Assessing the need and, if considered relevant, propose harmonised parameters for the specific monitoring of shiga-toxin producing *Escherichia coli* and ESBLs;

(4) Indicating the best format for the collection and reporting of data.

Summary of the plenary discussion:

- For harmonization purposes to the human sector, ceftazidime and cefotaxime was included for ESBL-detection and not ceftriaxone. For work with carbapenem resistant organisms, the EFSA proposal includes ertapenem in the 3rd panel together with meropenem and imipenem. In this context EFSA proposes ertapenem, but the use of this drug is not mandatory.
- Meropenem was included on the second panel (and not ertapenem) due to the fact that ertapenem is a very sensitive substance which also means that too many strains would be detected. Imipenem was not found to be a good choice because of lack of stability. Meropenem was therefore chosen. Maybe in the coming years, this will be changed.
- There is a low prevalence of carbapenemase-producers, and therefore a need for the best and most sensitive method. Including ceftazdime gives information on the phenotype, but no confirmatory tests appear to be included. ESBL screening needs molecular testing to determine the specific types. However, the proposal by EFSA is a compromise.
- With Carbapenem resistant enterobacteriaceae (CPE) emerging in the veterinary sector and with a low sensitivity we might miss the beginning of the epidemic, so it could be argued that some false positives are acceptable. There might be a need for analytic developments that the EURL-AR network could take on.
- After revision of the legislation according to changes from EUCAST, new epidemiological cut off values (ECOFF's) or breakpoints are introduced in the monitoring programme. The introduction into the monitoring programme could be further discussed, but the objective is to analyze next year's data using new cut-off values. However, as we MIC-values are collected, we would have the relevant information even if ECOFF's change. The guidance document is revised in second part of this year.
- As for molecular analysis, a proposal is being drafted. Discussions will continue and technical specifications will be revised in the 2nd part of this year. The proposal must be considered as a baseline document from where we can elaborate.

The EU presidency and the conference 'Combating Antimicrobial Resistance' (Annette Cleveland, Danish Veterinary and Food Administration)

See presentation (link or http://www.eurl-ar.eu/146-presentations.htm)

On March 14-15, the Danish EU Presidency hosted the 'Combating Antimicrobial Resistance'-conference in Copenhagen. The conference gathered 300 scientists and officials in order to discuss and share knowledge and best practice on combating antimicrobial resistance.

The focus points of the conference were: (1) Data collection and monitoring of antibiotic consumption and resistance for both animals and people throughout the EU; (2) Stop overuse of antibiotics in humans and animals - focus on rational use; (3) Reduce use of critically important antibiotics (CIA's) in humans and animals.

On this website: http://www.fvm.dk/antibicrobial_resistance.aspx?ID=50647 the conference presentations are available for download. In May 2012, a conference report collecting the intelligent and feasible ideas will be published and also available for download.

Presentation and discussion of EQAS results – Methicillin-resistant *Staphylococcus aureus* (MRSA) (Lina Cavaco, EURL-AR)

See presentation (link or http://www.eurl-ar.eu/146-presentations.htm)

Samples were spiked to contain about 10^5 or 10^3 CFU of MRSA or other staphylococci (MSSA, MRCNS, CNS test strain, and added background flora containing *Staphylococcus* spp, *Enterococcus faecalis* and *Escherichia coli.* Performing the isolation procedure immediately after the reception of the samples is critical.

This year, 24 laboratories from 21 European countries participated (17 for *spa* typing) and results showed good specificity, however, low sensitivity was observed for the two low-inoculum samples. In addition, in some laboratories recovery of MRSA from samples was not achieved.

In the 2012-iteration, the $mecA_{LGA251}$-variant will also be included. The PCR to detect this should therefore be set up in the participating laboratories which have the possibility of doing so.

Summary of the plenary discussion:

- As for conclusions on the sensitivity, neither sensitivity tests nor stability tests were quantified. We tested other media and selected the better one, still, this iteration of the MRSA EQAS shows that apparently, some strains tolerate more than others.
- Information uploaded to the database should also include the date of reception of samples and the date of starting the analysis.

Acceptance of the report: The draft report was approved without changes.

Update on Colistin cutoff values (Yvonne Agersø, EURL-AR)

At the EURL-AR workshop in 2011, we discussed the information regarding colistin ECOFF's for *Salmonella* presented at the EUCAST website, and discussed the need to have these defined on serovar level, as differences are seen for Enteritidis, Typhimurium and Dublin. Nornally data from at least three sources on species level and a high number of isolates are required for EUCAST to define an ECOFF, but the data the ECOFF on colistin presented on the EUCAST homepage was defined for *Salmonella* spp. based on a low number of isolates from one source. The discussion at the workshop 2011 lead to collection of data on serovar level in the EURL-AR network, with 14 countries replying and 12 of these sending data.

In the EURL-AR network, the typical range used is narrow, so data from this can only be used to compare serovar distributions and not to define ECOFF's on serovar level. But UK tested a number of strains in a very broad range, and this set of data can therefore be included as EUCAST-dataset. This will then be included as background for publishing new ECOFFs. Testing *Salmonella* against colistin

by E-test gives a lower MIC-value than the dilution test. Dilution tests should be the reference, as this is the golden standard for AST.

Moreover, a short communication in Foodborne Pathogens and Diseases was published based on Danish isolates, and since increased MIC seemed linked to serotype, it was recommended that isolates with MIC >2 mg/L for colistin in *Salmonella* spp. are evaluated on serotype level.

Presentation and discussion of EQAS results, *Salmonella*, *Campylobacter* and optional genotypic characterization (Susanne Karlsmose, EURL-AR)

See presentation (link or http://www.eurl-ar.eu/146-presentations.htm)

In 2011, laboratories from 30 countries participated with 34 sets of *Salmonella* results and 26 sets of *Campylobacter* results. For the genotypic characterization 4 and 6 laboratories submitted results for the Gram-positive and the Gram-negative test strain, respectively.

For the *Salmonella* trial, 29 labs performed with deviation levels < 5% and no outliers were identified. Challenges appear to be the interpretation of ciprofloxacin (when performing disk diffusion) and the detection and confirmation of ESBL-producers. For the *Campylobacter* trial, 23 labs performed with deviation levels < 5% and three outliers were defined.

Summary of the plenary discussion:

- Discussions of how to improve the participation in the optional genotypic testing revealed that since it is optional it is not prioritized. It was stated that instead of a very long list of genes, a shorter list of relevant, mandatory genes could be defined (e.g. ESBL-genes, MRSA, *qnr*) and suggested that PCR-protocols for the genes in question be supplied and controls distributed. Sequencing point mutations is, however, probably out of scope.
- When a deviation is caused by the expected MIC within one fold dilution step from the ECOFF, this is the limitation of the method, therefore this should not be regarded as a mistake. In the preparations of the EQAS, we tried to select strains that would not give us these problems, but it turned out to be very difficult. Therefore, data from the two strain/antimicrobial combinations with this problem have been omitted.
- For reading/measuring the end point of zone diameters of sulphonamide, please refer to the small presentation from the workshop in 2010 (http://eurl-ar.eu/146-presentations.htm). It was suggested to look at distributions and define cut-offs.
- Deviating QC-data do not cause the organizers to omit test results of that laboratory because the last step when submitting data is to approve the uploaded data. All submitted data are therefore included in the analysis.
- CLSI have issued a new breakpoint in 2012 that can be a solution for avoiding the problems with interpretation of ciprofloxacin results. However, the new CLSI breakpoints are for *S.* Typhi and extraintestinal *Salmonella*, only. The publication by Lina Cavaco and Frank Aarestrup still appears to be the best reference (Cavaco and Aarestrup, J Clin Microbiol. 2009 Sep;47(9):2751-8).

Acceptance of the report: The draft report was approved without changes.

Presentation and discussion of EQAS results - *Escherichia coli*, *Staphylococcus* spp. and *Enterococcus* spp. (Valeria Bortolaia, EURL-AR)

See presentation (link or http://www.eurl-ar.eu/146-presentations.htm)

In 2011, 27, 32 and 32 laboratories participated in the *Enterococcus*, *Staphylococcus* and *E. coli* trial, respectively.

For the *Enterococcus* trial, 21 labs performed with deviation levels < 5% and one outliers was identified. For the *Stapylococcus* trial, 28 labs performed with deviation levels < 5% and no outliers

were defined. For the *E. coli* trial, 25 labs performed with deviation levels < 5% and one outlier was defined.

Summary of the plenary discussion:

- The CLSI-guidelines describe how to deal with the QC-strain values. It is a good idea to save data from QC strains and use this for checking variation over time. If you need control strains, let the EURL-AR know, and we might be able to send it to you.
- Suggestions on how to maintain the QC strains and how to store them will soon be ready for upload on the EURL-AR website.
- It was raised that it is surprising to see deviations for trimethoprim, and asked whether this could be caused by an unstable plasmid. If someone has one of the test strains that showed a resistant phenotype, you are welcome to send it to the EURL-AR for reference testing.
- One of the omitted sets of data was EC 5.4/ceftazidime. It is important to stress that this strain is CTX-M15 and has a very specific phenotype. If data of this type is still omitted, a specific explanation is necessary.

Acceptance of the report: The draft report was approved after addition of a comment on the strain/antimicrobial-combination including ceftazidime that was left out.

Results from ECDC-participating in the *Salmonella* spp. and *Campylobacter* EQAS (Johanna Takkinen, ECDC)

See presentation (link or http://www.eurl-ar.eu/146-presentations.htm)

ECDC objective with participating in this EQAS is to enable comparison between public health and veterinary laboratories and to identify general problematic areas. Ten countries participated with 10 laboratories for *Campylobacter* and 9 laboratories for *Salmonella.* Note: The expected results were interpreted with ECOFF values whereas ECDC-laboratories mainly used clinical break points.

Obtained results for *Campylobacter* were very good; no general problem was detected. For *Salmonella*, standardisation is needed for AST of ciprofloxacin when performing DD, also the streptomycin, the DD method requires further assessment.

Summary of the plenary discussion:

- Many laboratories use disk diffusion for AST of *Campylobacter*, but the results are in surprisingly good agreement with the expected. EURL-AR: There are no guidelines for DD of *Campylobacter*.
- EUCAST are working performing DD for AST of *Campylobacter*.
- The interpretative criteria varied a lot between the laboratories.
- Streptomycin is mainly tested as an epidemiological marker as it is not used for human treatment.

Activities of the National Reference Laboratory in UK (HPA) (Daniele Meunier, NRL-AR (HPA)):

See presentation (link or http://www.eurl-ar.eu/146-presentations.htm)

Activities include AST on isolates, confirmation of unusual resistances and therapeutic guidance. Also, molecular detection of carbapenemases production in *Pseudomonas* spp, *Acinetobacter* spp and *Enterobacteriaceae* and of cephalosporinases in *Enterobacteriaceae*. NRL-AR (HPA) performs the detection of *mecA* and *mupA* in staphylococci by real-time PCR and the detection of a G2576T linezolid resistance mutation in the 23S rRNA genes of enterococci or staphylococci by PCR.

Summary of the plenary discussion:

- Arrays and PCRs are expensive and time consuming, however, whole genome sequencing (WGS) would be too expensive for us. We are improving our methods to reduce our turnaround times. The hospitals need a result in a short time that is why we will be switching soon from PCR to arrays.

Comparison of NRL-AR-results and ECDC-network-results for AST of *Salmonella* spp. and *Campylobacter* EQAS (Susanne Karlsmose, EURL-AR)

See presentation (link or http://www.eurl-ar.eu/146-presentations.htm)

Objective was to assess and compare the quality of AST-data and to identify areas which would require attention.

For the *Salmonella*, within each network, a chi-square test revealed significant difference between results obtained by MIC and DD, and between results obtained by E-test and DD. Detection of ESBL-producing *Salmonella* is critically relevant. While this test was mandatory for the NRL-AR's, it was optional for the ECDC-FWD-laboratories. All FWD-laboratories tested at least one cephalosporin.

For the *Campylobacter*, a chi-square test (across networks) showed no significant difference between results obtained by MIC and DD or by MIC and E-test. However, international references for QA and interpretative criteria are not available for tests performed by DD or E-test.

The EURL-AR aim to include the ECDC-network in the 2012-iteration, also.

Tuesday, April 24th 2012

Antimicrobial resistance from WHO EURO-perspective (Danilo Lo Fo Wong, WHO EURO)

See presentation (link or http://www.eurl-ar.eu/146-presentations.htm)

Antimicrobial resistance is an important issue in the WHO and has been included in several World Health Assembly resolutions since 1984. Currently, the 'European strategic action plan on antibiotic resistance 2011–2016', which is comprehensive and coherent with global plans, is being carried out.

The WHO/Europe Regional Office provides strategic leadership, guidance and tools for implementing the strategic action plan, supports Member States in implementing national plans, creates platforms for sharing and analysing data and experience, engages in broad regional and global partnerships and promotes innovation and research.

Whereas EU Member States have AMR surveillance systems in place, from the remaining part of the WHO European Region, little data is available on AMR in pathogens or on consumption of antimicrobials. This is why WHO/Europe will focus most of their efforts in awareness raising and setting up similar surveillance structures in non-EU countries.

Summary of the plenary discussion:

- Regarding the '-Stan'-countries, there is now political commitment for the resolution. The intention is to build up stepwise in small successes. The timeline it is not strictly defined but there seems to be a momentum that we are thankful for and need to utilize.
- Part of the plan is to build up on both the human and veterinary side; i.e. laboratories from EARS-Net and the veterinary sector, and integrate the work from the beginning. There is indeed a different level of ambition in EARS-Net and the veterinary sector but collaboration has been started, including sharing of information from other areas and sectors. At the moment guidelines are being drafted.

The U.S. NARMS monitoring system (Patrick McDermott, US-FDA)

The U.S. NARMS program monitors antimicrobial resistance in foodborne bacteria as one means to assess the relationships between antimicrobial use in agriculture and potential human health consequences. NARMS is collaboration between CDC, FDA and USDA and collects data from humans, from retail meat and from the animal population.

Summary of the plenary discussion:

- NARMS was designed for monitoring susceptibility changes, rather than detecting rare events. MRSA was included as a project last year, and 3-4% was found in retail meat (including ST398). With new partners in the primary sector we plan to do more of this sort of projects, e.g. focusing at ESBL-producers.
- The use of ceftriaxone for detection of ESBL-producers is a CDC-recommendation.

Identification of *Enterococcus faecalis* and *E. faecium* (Pascal Sanders, NRL-AR (France))

See presentation (link or http://www.eurl-ar.eu/146-presentations.htm)

Monitoring of antimicrobial resistance in *Enterococcus faecium* and *E. faecalis* is not mandatory. However, if done, correct species identification is necessary due to different sets of ECOFFs. Methodologies for speciation is different in the laboratories of the EURL-AR network therefore harmonization is brought up for discussion.

Summary of the plenary discussion:

- The suggestion to include this as part of the EQAS together with a harmonised protocol for both biochemical ID and PCR was brought up.
- It was discussed whether the same strains should be used for testing AMR as well as ID, of if extra strains should be added to the panel. In case we do this for Enterococci, it would make sense to introduce the same for *Campylobacter*. The AST interpretation is the target for the EQAS, and the conclusion to this discussion was that it needs some more consideration.

Activities of the national reference laboratory in Switzerland (Gudrun Overesch, NRL-AR (Switzerland)

See presentation (link or http://www.eurl-ar.eu/146-presentations.htm)

Among other activities, the ZOBA performs annual monitoring of antimicrobial resistance and reports to EFSA. In addition, diagnostic submissions are tested, and work is being conducted as regards creating representative MIC data for relevant veterinary pathogens (and submitting relevant data to EUCAST).

Summary of the plenary discussion:

- In Switzerland there is no MLST data registered for the human cases of MRSA. From typing studies of human *S. aureus* isolates in Switzerland there is neither ST49 nor t208 reported so far. But the *spa* type t208 is widespread as MSSA in pigs there. It is a closed pig population and import is not common, but still, ST398 has entered somehow.

Isolation of MRSA from pig breeding farms in Croatia (Gordan Kompes, NRL-AR, Croatia)

See presentation (link or http://www.eurl-ar.eu/146-presentations.htm)

A baseline study for MRSA was carried out in pig breeding farms and the prevalence was found to be 17.5% with most MRSA from the biggest pig farms belonging to t011 *spa*-type.

Summary of the plenary discussion:

- Little is known of the human situation in Croatia in relation to MRSA as it until now has not been possible to collaborate with the human side in this context. But the project in the pig breeding farms will be repeated in the coming years.

Methods for isolating ESBL-producing *Enterobacteriaceae* (Dik Mevius, NRL-AR, the Netherlands)

See presentation (link or http://www.eurl-ar.eu/146-presentations.htm)

The isolation and confirmation of ESBL-/ampC-producing *Enterobacteriaceae* methods used in the EURL-AR network were collected in a survey with the aim to work towards harmonization in this

context. Internationally, no harmonized method is available, however, in an EFSA document, advice is presented

The method used by CVI (NRL-AR, the Netherlands) was presented as a suggestion for a harmonized method. It is not validated, but is common sense and used in different variants by many laboratories.

Summary of the plenary discussion:

- During the panel discussion it was suggested that selective pre-enrichment might stimulate plasmid transfer during isolation. However, this was not considered relevant for the isolation result since the ESBL-carrying plasmid is the target of the examination. Enrichment without antibiotics may affect the sensitivity.
- *E. coli* is the best indicator of plasmid-mediated ESBL/AmpC-resistance. Other Enterobacteriaceae as Hafnia or Citrobacter may also be present. These subtypes harbour chromosomal AmpCs and may conflict the workload and should not be included in the reportage.
- Different chromogenic agars can be used, however, Oxoid brilliance agar has the advantage that different Enterobacteriaceae can be identified, however the growth of pAmpC's like CMY is inhibited. McConkey is normally OK.
- The possible changes in regulations on the use of cephalosporins should induce pre-intervention monitoring of resistance to be performed to verify the effect of any type of withdrawal. To initiate a baseline study, however, political commitment is necessary because the costs may be substantial.
- At this point of time, a perfect protocol is not available (however, the ECDC have an STEC-protocol), but recommendations for a method (work-charts) will be made available on the EURL-AR website.

EUCAST epidemiological cut off values and expert rules (Gunnar Kahlmeter, EUCAST)

See presentation (link or http://www.eurl-ar.eu/146-presentations.htm)

Methods for susceptibility testing are phenotypic, genotypic and 'expert rules'. EUCAST subcommittees work with various issues within these areas. In addition, National AST Committees (NAC's) have been formed in several countries.

Summary of the plenary discussion:

- The EUCAST clinical breakpoints are mostly different than the recommendations from CLSI and FDA. EUCAST publishes epidemiological cut-off values (ECOFFs), whereas neither CLSI nor FDA defines ECOFFs.
- Distributions submitted for EUCAST are only made public as aggregated distributions. EUCAST encourages investigators and laboratories to submit data on more unusual agents and/or species.
- EUCAST have recently recommended guidelines for MIC- and Disk diffusion of *Salmonella* and *Listeria* and is currently working on recommendations for DD of *Campylobacter, Yersinia and Pasteurella.*

Perspectives in total-sequencing and ResFinder-database (Frank Aarestrup, EURL-AR)

See presentation (link or http://www.eurl-ar.eu/146-presentations.htm)

The Center for Genomic Epidemiology seeks to provide a proof of concept of combining bioinformatics with global epidemiology in real-time, and to provide a useful facility for frontline users. Proof of concept by applications and projects (e.g. hospital diagnostics, *V. cholerae* from Nepal, MRSA CC398 phylo-evolution and evaluation on *Campylobacter*, *E. coli*, *Salmonella*).

Concerning price, whole-genome-sequencing is already competitive.

The task as database curator for virulence genes in Gram-positives is unoccupied.

Summary of the plenary discussion:

- At the moment no data is stored, however, in the future safe storage of data must be considered.
- Even if sequence-based methods are the way forward, and there is a possibility to leapfrog, it must be taken into account that hospitals typically perform AST by DD and do not use PCR.

Survey of MIC panels and rare phenotypes (Lina Cavaco, EURL-AR):

See presentation (link or http://www.eurl-ar.eu/146-presentations.htm)

Harmonization of methods is ongoing in the EURL-AR network; MIC is performed routinely as an alternative to MIC, DD is mostly performed, followed by E-test and agar dilution. Occasionally, unusual phenotypes are observed and follow up is generally done.

Summary of the plenary discussion:

- It is not always possible to purchase small numbers of TREK-panels, however, Vet-MIC panels can be purchased in small numbers.
- It could be interesting to follow-up on some of these unusual phenotypes, the EURL-AR will store the collected data and will communicate to the network, when new projects are initiated.

Break-out session:

The break-out session focussed at suggestions for future research and training courses in the EURL-AR network.

Suggestions from group #1

- Molecular typing training course
- Training courses focusing on one main subject (e.g. MRSA, ESBL/carbapenemases, *Campylobacter*, AST of anaerobic and veterinary pathogens)
- Exchange training programs where one NRL-AR visits another NRL-AR.
- Online training platform (e.g. video presentations, demos)
- Common plate formats corresponding to EFSA-requirements.
- Isolation/ID/AST of *Ps. aeruginosa* from clinical samples, pet animals
- Clinical breakpoints, *Listeria monocytogenes*

Suggestions from group #2

- Characteristics and molecular profile of multi-resistant isolates from some zoonotic pathogens
- Discussion on best methods for estimation of AR
- Determination of clinical breakpoints of other zoonotic bacteria, important for veterinary practice – *Trueperella pyogenes* (formerly *A. pyogenes*), *P. multocida*, *Listeria*, and anaerobes.
- Isolates from companion animals, and relationship with pathogens form clinical cases in humans.
- The network's 10 year's history should be described for giving new network members the advantage of our experiences.
- Need of clinical breakpoint for specific veterinary pathogens and antimicrobials (maybe prioritize this area to get funding)
- As a network we create a lot of data. Data management could be an issue to focus at.

Suggestions from group #3

- Training course on phenotypic and genotypic detection of carbepenemase-producers.
- Method for ESBL detection in different kinds of samples. Validation of methods in order to harmonize. Maybe an ESBL proficiency test.
- Reference function for (typing of isolates) for laboratories with limited resources.
- Focus on companion animals, e.g. MRSP clinical breakpoints and ID

– Clinical breakpoints for veterinary pathogens

Suggestions from group #4

– In view of the 'Animal Health Law':
  - Harmonization of AST for animal pathogens (ECOFFs, clinical breakpoints)
  - Guidelines for minimum panels in the EU and affiliated countries
– Colistin "affair"
  - Distributions (within minimum ranges)
  - ECOFFs and clinical breakpoints
  - Mechanisms of resistance, e.g. by WGS
– Campylobacter (*jejuni/coli*)
  - Mechanisms of resistance in *C. jejuni* and *C. coli*, prioritizing CIA (FQ, macrolides and cephalosporins)
  - Share more background information
– NRLs in the veterinary sector
  - How to interact with the human sector at the MS level. Interaction should be carried out for monitoring purposes and possible future "surveillance"
– Laboratory capacity 'issue'
  - The requirements for laboratory work following compliance with the EU monitoring scheme (n^o of isolates x animal species x agent)

Summary of main follow-up items:

- ♦ It will be considered how to make protocols for available for speciation of enterococcus and *Campylobacter*, and to include this test as part of the EQAS.
- ♦ For isolation and ID of ESBL- and carbapenemase-producing organisms, flow charts will be posted on the EURL-AR website.
- ♦ The optional genotypic characterization will aim at selected genes, e.g. ESBL-genes.
- ♦ The data collected in the survey will be used for relevant follow-up.
- ♦ The EURL-AR network will try to work together to produce and submit data for EUCAST.
- ♦ The EURL-AR will continue collaborating with ECDC as regards EQAS, and possibly also workshops.
- ♦ Note that rare phenotypes can always be sent to the EURL-AR for reference testing.

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