# *Supplementary Material 1:* *Scoring grid of the OASIS evaluation of RESAPATH performed in 2018.*

We recommend readers to refer to the OASIS scoring guide when consulting the following table (available on <https://www.plateforme-esa.fr/article/l-outil-d-evaluation-oasis>).

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| **Sections and questions** | **Score (0 to 3)  or NA** | **Comments** |
| **Section 1: Objectives and scope of surveillance** |  | |
| 1.1 Relevance of surveillance objectives | 3 | Objectives are assessed as relevant. |
| 1.2 Level of detail, accuracy, and formalization of objectives | 2 | Be more specific in the formulation of objectives and distinguish a general objective from complementary objectives:  General objective: It corresponds to the objective to “follow AMR trends in pathogenic bacteria of animals”. It is suggested to reformulate it as « describe the current situation and trends of antimicrobial resistance in bacterial pathogens of animals in France ».  Complementary objectives:  - Suggestion of reformulation regarding the scientific and technical support: « Provide participating laboratories with technical and scientific support on the antimicrobial susceptibility testing method, as well as on its interpretation ».  - Objective to « enable comparisons of animal / human antimicrobial resistance data through the French national observatory for epidemiology of bacterial resistance to antimicrobials (ONERBA), to which RESAPATH is federated »: better to state that the objective is to provide quality information to actors of both animal and human health.  - Regarding the objective to « collect and store a panel of isolates which can be needed for in-depth molecular investigations»: say « which are used for » instead of « which can be needed for ». |
| 1.3 Taking partners’ expectations into account | 2 | The organizations represented in the steering committee are defined. The expectations of laboratories (public and private) and of the General Directorate for Food, French Ministry of Agriculture and Food, are taken into account. However, representatives of doctors working in public health should be present in the steering committee, so that their expectations can be better considered and to benefit from their general expertise on AMR surveillance (this opinion is also shared by the Ministerial delegate for AMR and ONERBA).  More integrated analyses between the animal and human sectors, and between the antimicrobial consumption and AMR monitoring would be welcome according to several interviewed people from the French Ministry of Agriculture and Food, ONERBA and ANSES.  RESAPATH being a laboratory network, veterinary practitioners are not *de facto* direct partners, despite being represented in the steering committee. The expectations of veterinary practitioners sometimes go beyond the scope of RESAPATH (they would appreciate receiving pharmacokinetics data, data on the usage and efficiency of antimicrobials in the field, AMR data per French administrative region etc.). However, more discussions with veterinary practitioners could enable further development of possible evolutions for RESAPATH, to clarify their partnership with RESAPATH and to inform them on the information that RESAPATH can and cannot provide. |
| 1.4 Coherence of the diseases under surveillance with the sanitary situation (existing / exotic diseases or threats) | 3 | AMR is a major issue for veterinarians and doctors. |
| **Total** | **10** | |  | | --- | |  | |
| **Maximum score possible** | **12** |  |
| **Comments / general recommendation** | | The objectives are relevant and satisfactory. It is suggested to distinguish a general objective from complementary objectives and to clarify the formulation of some of them. The expectations of most partners are taken into account, but those of human health actors could be better taken into account.  Veterinary practitioners are not currently considered as direct partners of the network and are expecting information that RESAPATH cannot provide. A dialogue with veterinarians could enable to clarify the partnership between them and RESAPATH and to inform them on what RESAPATH can and cannot provide in terms of data. It could also enable to think of possible evolutions of RESAPATH which could better meet their expectations in the field and integrate them in the surveillance system. |
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| **Section 2: Central institutional organization** |  | |
| 2.1 Existence of an operational management structure (coordination team) | 3 | A coordination team is in place and its composition is sufficient to conduct its essential missions in an efficient way. However, the human resources do not enable the integration of additional laboratories (whereas Action 14 of the French national action plan, ECOANTIBIO 2, requests development of communication activities, respond more quickly to questions arising from laboratories, organize more in-depth discussions on results... etc.). |
| 2.2 Existence of an operational steering structure that is representative of the partners (steering committee) | 2 | There is a steering committee who meets annually. It gathers representatives of most RESAPATH partners (General Directorate for Food, French Ministry of Agriculture and Food, ANSES, participating laboratories and veterinarians). However, doctors are absent and interviews highlighted the need to integrate one of them in the steering committee. It should also include regional reference veterinary practitioners for antimicrobials, as well as veterinarians working with companion animals and horses (to be determined by their respective professional veterinary organizations). |
| 2.3 Existence of a scientific and technical committee for the system | 3 | The coordination team fulfils this role. Considering the skills of its members, it appears as an efficient and appropriate solution. |
| 2.4 Organization and operations of the system laid down in regulations, a charter, or a convention established between the partners | 3 | A mutual agreement exists and defines the roles and duties of the coordination team and participating laboratories. |
| 2.5 Frequency of meetings of the central coordinating body | NA |  |
| 2.6 Supervision of intermediary units by the central level | NA |  |
| 2.7 Adequacy of the central level’s material and financial resources | 3 | Material resources are sufficient. Although human resources enable the conduct of main missions by the coordination team, they do not enable the development of other activities to address Action 14 of the French national action plan, ECOANTIBIO 2. It will also be important to make sure that the development of some activities of ANSES (e.g. reference activities for the Food and Agriculture Organization of the United Nations) does not reduce the time that the coordination team members can dedicate to RESAPATH. If this occurs, necessary resources would need to be re-assessed. |
| **Total** | **14** | |  | | --- | |  | |
| **Maximum score possible** | **15** |  |
| **Comments / general recommendation** | | Overall, the central institutional organization performs very well, but it appears necessary to include in the steering committee doctors, regional reference veterinary practitioners for antimicrobials and veterinarians working in other animal species than those already represented. More human resources are needed to address Action 14 of the French national action plan ECOANTIBIO 2 and develop other activities. |
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| **Section 3: Field institutional organization** |  | |
| 3.1 Existence of formal intermediary units covering the entire territory | NA |  |
| 3.2 Active role of intermediary units in the functioning of the system (validation, management, feedback) | NA |  |
| 3.3 Implementation of supervision by the intermediary level | NA |  |
| 3.4 Harmonization of intermediary units’ activities | NA |  |
| 3.5 Adequacy of material and financial resources of intermediary units | NA |  |
| 3.6 Existence of coordination meetings at the intermediate level | NA |  |
| 3.7 Exhaustiveness or representativeness of the field agents’ coverage of the target population | 2 | A study on 2015 RESAPATH data showed a good overlap between the distributions of animal population and AST data on the French territory, per animal species1.Participating laboratories cover all administrative regions and there is at least one of them in most French departments. Moreover, some laboratories collect samples from several departments. |
| 3.8 Adequacy of material and financial resources at the field level | 2 | Here, we interpreted the « field level » as both veterinary practitioners and animal owners/farmers. The submission of samples for AST is challenged by practical constraints (e.g. distance from the laboratory, delay in obtaining results or, difficulty in collecting samples from the field conditions) and financial constraints for the animal owners/farmers, thereby reducing the number of data that RESAPATH can collect. |
| **Total** | **4** | |  | | --- | |  | |
| **Maximum score possible** | **6** |  |
| **Comments / general recommendation** | | The geographical coverage and representativeness of RESAPATH are good. Practical and financial constraints limit the number of sample submissions. The collection of a larger number of AST results could enable more precise information on AMR levels and allow the investigation of spatial AMR distributions. |
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| **Section 4: Laboratory** |  | |
| 4.1 Effective integration of laboratories in the surveillance system | 3 | RESAPATH is a laboratory network, so laboratories are fully integrated. |
| 4.2 Adequacy of human, material, and financial resources for diagnostic needs | 2 | Diagnostic laboratories work on a « just-in-time » basis and are sometimes understaffed. Veterinary bacteriology is not the most profitable area for a diagnostic laboratory and the participation in RESAPATH can take time. |
| 4.3 Application of quality assurance for the tests undertaken | 2 | Few laboratories are accredited by the French accreditation committee (Cofrac) for the AST method, but most laboratories are already accredited for other diagnostic methods and are used to applying quality assurance. The majority of them perform regular auto-controls. Quality assurance is often followed but according to procedures which may vary between laboratories. |
| 4.4 Level of standardization between the different laboratories | 3 | Here, we evaluated the standardization of laboratory work and not the standardization of the reporting of AST results to the coordination team.  Standardization of the AST method is requested in the mutual agreement. It is checked and validated each year *via* proficiency testing (all member laboratories participate). All laboratories must follow the NF U47-1072 standard and the veterinary recommendations of the Antibiogram Committee of the French Society of Microbiology (CA-SFM) for the interpretation of results (and, when necessary, the human recommendations of the CA-SFM). However, the antibiotics tested in routine on field isolates are not exactly the same for all laboratories. Interviewed laboratories would be in favour of the definition (in consensus with veterinarians and laboratories) of a minimum list of antibiotics to be tested according to the animal and bacterial species. Veterinarians would still have the possibility to request the testing of different antibiotics. |
| 4.5 Proportion of tests submitted to inter-laboratory trials | 3 | All member laboratories participate in annual proficiency testing for the AST method according to the NF U47-1072 standard. |
| 4.6 Existence of an investigation team to support field agents | NA |  |
| 4.7 Relevance of diagnostic techniques | 2 | Disk diffusion methods (as in the NF U47-1072 standard) have some limitations. For example, the diffusion of colistin in agar medium is not optimal, leading to interpretation difficulties when the inhibition diameter falls within a certain (admittedly small) range. Therefore, for colistin, some laboratories use an alternative technique called Colispot which provides satisfactory results3. However, the proportion of these laboratories is not known and the transmission of Colispot results to RESAPATH is not systematic due to technical difficulties linked to certain Laboratory Information Management Systems (LIMS). Another limitation is the overestimation of the proportion of methicillin-resistant *Staphylococcus aureus*. There are other methods (measuring minimum inhibitory concentrations) enabling to overcome these limitations, but introducing other constraints (e.g. flexibility and cost).  Moreover, many interpretation criteria (i.e. reference diameters) have not yet been established for fish pathogens.  Despite these limitations, the disk diffusion method seems to be the most suitable in the RESAPATH context. If other techniques were to develop in member laboratories, such as those measuring minimum inhibitory concentrations, RESAPATH would have to adapt and be able to integrate these data. |
| 4.8 Sensitivity of diagnostic techniques | 2 | The laboratories use the NF U47-1072 standard method which is considered good in terms of sensitivity and specificity. However, these parameters are not precisely known and may vary at the level of the bacteria / antibiotic combination. |
| 4.9 Specificity of diagnostic techniques | 2 | See 4.8. |
| 4.10 Control of laboratory reagents | 3 | The control of reagents is good, carried out batch by batch. Even if not accredited for AST, laboratories have overall a strong quality assurance approach. |
| 4.11 Data management capacities of laboratories | 2 | Data management in member laboratories is good. However, some laboratories have to enter manually their results into their LIMS, due to a lack of communication between certain devices. Moreover, laboratories also sometimes have to re-type their data in the RESAPATH Excel® file before sending it to ANSES. |
| 4.12 Compliance with deadlines at the laboratory level regarding data analysis and reporting | 2 | We have scored here the existence of a time limit to be complied with between the receipt of a sample at a field laboratory and the submission of its corresponding AST result to the coordination team, as well as the existence of procedures to check that this time limit is respected.  The required frequency of data submission to ANSES (quarterly) is set in the mutual agreement, but non-compliance of individual laboratories is not routinely measured. Failure to respect this frequency leads to delayed requests of field isolates by ANSES. However, all laboratories send their data at least once a year, which is a requirement if they wish to continue to be a RESAPATH member.  Standardization of data reporting to ANSES is assessed in 5.2 and compliance with reporting deadlines is assessed in 5.11. |
| 4.13 Quality of results delivered | 2 | Laboratories send their data to the coordination team in different formats and, for the same laboratory, the format may change over time. The coordination team therefore needs to check the structure of the data files and spot entry errors when receiving laboratory files. The team also checks for missing data. When essential information is missing, such as animal species, AST results are deleted. Some laboratories do not send an AST result when a single piece of information is missing, even if this information is not considered essential (such as production type). It is necessary to remind laboratories that they should not discard any AST result themselves before sending their data to ANSES. It would be interesting to explore for each laboratory if some data cleaning is performed before sending their results to ANSES and how, to understand if it could represent an additional source of bias. |
| **Total** | **28** | |  | | --- | |  | |
| **Maximum score possible** | **36** |  |
| **Comments / general recommendation** | | The quality of the laboratory work and AST method are satisfactory. The main limitations relate to data management in some laboratories, the variability of the data file formats sent to ANSES and the failure to respect reporting deadlines. |
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| **Section 5: Surveillance tools** |  | |
| 5.1 Existence of a formalized surveillance protocol for each disease or threat under surveillance | 3 | The mutual agreement serves as the surveillance protocol. It refers to the NF U47-1072 standard and recommendations of the CA-SFM. |
| 5.2 Standardization of data collected | 2 | The data collection involves veterinarians, diagnostic laboratories and ANSES.  Data provided by veterinarians: There is no standardized sample form. It would be desirable for all laboratories to agree on a common form to collect the epidemiological data of relevance to RESAPATH, in a very simple way, and to communicate with veterinarians so that they systematically use this form when submitting samples.  Data provided by laboratories: ANSES provides a data reporting template to the RESAPATH laboratories in order to standardize the reporting of AST results. However, a significant proportion of laboratories do not comply with it. The standardization of these data also depends on the standardization of the data provided by veterinarians.  Data management at ANSES: Significant efforts have been made to standardize more efficiently the data submitted by the laboratories (development of individual macros for each laboratory taking into account their usual data reporting file format, setup of a self-learning system to clean and standardize files, etc.). However, despite the use of these tools, the standardization work still requires almost a full-time position at ANSES. |
| 5.3 Relevance of measurement tools (excluding laboratory tools) | NA |  |
| 5.4 Sensitivity of the case or threat definition | NA |  |
| 5.5 Specificity of the case or threat definition | NA |  |
| 5.6 Simplicity of the case or threat definition | NA |  |
| 5.7 Quality of the filling out of investigation forms | 2 | Here, we assessed the quality of the data provided by veterinarians and the member laboratories for the following essential pieces of information: animal species, bacterial species, antibiotic and diameter. Other pieces of information, such as the age of the animal and the clinical condition, are missing too often despite their usefulness. |
| 5.8 Relevance of collected samples | 3 | In this item and the next one, it is the overall relevance of the samples taken by veterinarians that was evaluated. The score is due to field samples being taken in the right body locations. See score 5.9 regarding the sampling technique.  A rating “not applicable” could have been attributed considering the veterinarians outside of the surveillance system, but we considered it important to evaluate RESAPATH according to its objective of monitoring resistance (which depends on the data collected) and not only according to its current operations. |
| 5.9 Standardization of collected samples | 0 | This score is linked to the current lack of knowledge of the level of standardization of the sampling techniques. However, although RESAPATH does not give recommendations on sampling procedures (considering veterinarians are outside the surveillance system...), such procedures exist in the veterinary literature and it is likely that veterinarians respect them most of the time.  A rating “not applicable” could have been attributed considering the veterinarians outside of the surveillance system, but we considered it important to evaluate RESAPATH according to its objective of monitoring resistance (which depends on the data collected) and not only according to its current operations. |
| 5.10 Quality of samples collected | 2 | It was estimated that around 80% of samples received by laboratories are suitable for analysis. |
| 5.11 Compliance with the time frame between the detection of a case or threat and the delivery of results | 1 | Here, we did not assess the presence of a time frame to be met (see criterion 4.12), but the compliance with this time frame.  Laboratory data must be sent to ANSES quarterly. We estimated that approximately half of the laboratories fail to comply with it. Nevertheless, all laboratories report their data to RESAPATH at least once a year, which allows them to be taken into account in the annual report. However, it induces a significant workload for the coordination team when a lot of data arrive at the same time. |
| 5.12 Simplicity of the notification procedure | 2 | Data are directly reported from laboratories to ANSES and all laboratories have access to the data collection template. |
| 5.13 Simplicity of the data collection procedure | 2 | Here, we scored the submission of data from veterinarians to laboratories and from laboratories to the coordination team.  From veterinarians to laboratories: Sample forms are not always provided by laboratories or used by veterinarians and are not standardized between laboratories.  From laboratories to the coordination team: Some laboratories do not use the RESAPATH Excel® template because they have difficulties adapting their data to this format (they do not always have control over the data file format that they can export from their LIMS). These laboratories may have to perform primary data cleaning before sending their data to RESAPATH, which can also take time. |
| 5.14 Acceptability of the consequences of a suspicion or case by the data source or data collector | 3 |  |
| **Total** | **20** | |  | | --- | |  | |
| **Maximum score possible** | **30** |  |
| **Comments / general recommendation** | | The surveillance protocol is satisfactory but does not include the veterinary level, hence potential weaknesses in the standardization of samples and information submitted to laboratories. The sending of laboratory data to ANSES could be made more efficient with an electronic data interchange including automated data quality controls and facilitating a more frequent data reporting. |
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| **Section 6: Surveillance procedures** |  | |
| 6.1 Adequacy of surveillance procedures with surveillance objectives | 3 | All objectives of the surveillance system are met by surveillance procedures and all surveillance procedures correspond to a well identified surveillance objective. |
| 6.2 Existence of passive (event-based) surveillance whose results are exhaustive or representative | 2 | RESAPATH does not aim to be exhaustive, but this is almost reached in the pig industry where 90% of ASTs carried out in France are collected. It is for companion animals that this proportion is the lowest, but still corresponding to 50% of all ASTs carried out in France. The geographical representativeness of animal populations is also satisfactory1.  However, the representativeness of pathogenic bacterial populations raises issues. Indeed, except in certain animal species (i.e. poultry and swine), sampling is only carried out in very specific clinical contexts inducing a likely sampling bias. Since RESAPATH reports provide many proportions of resistance, the reader should not lose sight of this likely bias. By considering this bias as constant, RESAPATH can meet its objective of following resistance.  A solution to improve representativeness would be to assess the proportions of resistance from isolates only sampled from animals that have not yet received an antibiotic treatment, which would require the collection of this information.  The annual surveillance report refers to this bias in the section « Organization and key figures »: *Member laboratories join the RESAPATH on a voluntary basis and data collected depend on the initial decision of veterinary practitioners. Hence, those data cannot be considered as perfectly representative of the global resistance of pathogenic bacteria but are a good indicator of their resistance rates in field conditions.* This claim would need to be supported by publications.  Moreover, the functioning of RESAPATH makes it possible to capture the most resistant bacteria of veterinary interest, which is particularly important for surveillance. |
| 6.3 Existence of awareness building programmes for data sources in a passive network | 3 | Awareness building activities for laboratories are strong due to numerous direct communications with the coordination team (e.g. by email on the submission of data files, or at the annual RESAPATH meeting).  In relation to veterinarians, member laboratories raise their awareness on the need to submit samples of good quality. |
| 6.4 Relevance and suitability of active surveillance protocols | NA |  |
| 6.5 Surveillance of susceptible wild animals | NA |  |
| 6.6 Vector surveillance and control | NA |  |
| 6.7 Representativeness of the populations targeted by sampling in active surveillance | NA |  |
| 6.8 Sampling precision in active surveillance | NA |  |
| 6.9 Completeness of the active sampling protocol | NA |  |
| **Total** | **8** | |  | | --- | |  | |
| **Maximum score possible** | **9** |  |
| **Comments / general recommendation** | | The surveillance procedures are adapted to the objectives. A good geographic and animal population representativeness has been achieved. However, the current sampling frame presents a risk of bias in estimating prevalence of resistance and the values of the report should therefore be interpreted with care. Collecting additional information such as on the administration of an antibiotic treatment prior to sampling (for the same infection) could make it possible to reduce this bias, by calculating the proportion of resistance only on samples taken before antibiotic treatment. |
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| **Section 7: Data management** |  | |
| 7.1 Adequacy of the data management system with the needs of the system (relational database, etc.) | 2 | The RESAPATH database is split into two databases whereas it would be more appropriate to merge them while guaranteeing access to all data by all members of the coordination team (at the ANSES laboratories of Lyon and Ploufragan-Plouzané-Niort).  The current system for receiving and managing data from the member laboratories works well but is very time-consuming and does not allow to manage larger volumes of data, preventing the integration of new member laboratories. |
| 7.2 Adequacy of the data entry frequency with the objectives and use of surveillance results | 3 | The frequency of data integration into the RESAPATH database is compatible with the monitoring objectives. |
| 7.3 Designated staff available and trained in data entry, management and analysis. | 2 | The score was assigned taking into account not only ANSES but also member laboratories for the data entry. The people responsible for these missions are well identified but there may be time constraints for the laboratories. Regarding the coordination team, the contribution of an additional biostatistician / data scientist would be useful to help with data management and analysis. |
| 7.4 Adequacy of material and financial resources with the needs in data management and analysis | 3 | ANSES laboratories in Lyon and Ploufragan-Plouzané-Niort have the material and financial resources to achieve the data management and analysis tasks necessary to meet RESAPATH surveillance objectives. |
| 7.5 Data verification and validation procedures formalized and operational | 2 | At ANSES (Lyon and Ploufragan-Plouzané-Niort laboratories), there is a semi-automated data verification and validation procedure. However, all missing data are no longer systematically sought in order to save time and given the limited expected benefit. When major data are missing for an AST result, it was decided to delete the whole AST result, but this does not impair surveillance as their number is negligible.  Some laboratories do not send an AST result when a single piece of information is missing, even if this information is not considered essential (such as production type). |
| 7.6 Complete descriptive analysis | 2 | The descriptive data analysis could be improved and made more efficient due to automated programs.  There is an expectation from field veterinarians to get regional AMR surveillance information, but RESAPATH currently does not collect enough data to show statistically significant differences in resistance rates between regions. |
| 7.7 Adequancy between the data analysis (if possible, regular and multi-disciplinary) and the needs of the system | 3 | Data analysis is carried out in a multidisciplinary way by a team of epidemiologists and bacteriologists. The report provides an analysis of the RESAPATH data and covers specific topics including molecular information from research activities carried out by ANSES on isolates collected by RESAPATH.  However, RESAPATH could contribute more, along with other actors, to a global analysis including AMR surveillance data from the human sector and data on the consumption of antibiotics. |
| **Total** | **17** | |  | | --- | |  | |
| **Maximum score possible** | **21** |  |
| **Comments / general recommendation** | | Data management is generally satisfactory, but improvements can be made by (i) merging the two databases and (ii) facilitating the data entry and verification thanks to a more efficient electronic data interchange between the laboratories and ANSES. This would leave more time for other missions and enable the integration of additional laboratories (currently on a waiting list), and thus enable to meet Action 14 of the French national action plan, ECOANTIBIO 2. In addition, RESAPATH could contribute more, along with other actors, to broader analyses including AMR surveillance data from the human sector and data on the consumption of antibiotics. |
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| **Section 8: Training** |  | |
| 8.1 Epidemiological skills of the coordination team members | 3 | The level of competence of the coordination team is satisfactory in epidemiology and bacteriology. |
| 8.2 Initial training implemented for all field agents when joining the system | NA | Here, member laboratories are considered as the "field agents”. It is not the role of RESAPATH to train new technicians from member laboratories or the technicians of new member laboratories. However, member laboratories would still be interested by online tutorials, in particular to train new technicians in performing AST according to the NF U47-1072 standard, and to provide them with general information on AMR (see 8.4). |
| 8.3 Adequacy between the objectives and content of the initial training of field actors with the surveillance needs | NA |  |
| 8.4 Regular advanced training | 3 | ANSES is not responsible for the training of the technicians of member laboratories. However, to guarantee the production of AST results of good quality, ANSES provides free training to the laboratories that obtain unsatisfactory scores at the annual proficiency testing, as well as to any laboratory wishing to improve the skills of its staff on the AST technique and its interpretation (at its premises or at ANSES). Laboratories that have already benefited from this training were very satisfied. However, some laboratories may be hesitant at requesting such training. A session or a few training sessions offered annually at defined dates could work for more laboratories (feasibility to be studied).  Publishing video tutorials on the RESAPATH website on how to perform an AST according to the NF U47-1072 standard would be useful to laboratories (when they hire new technicians who are often not yet trained on AST techniques) and also consequently for new member laboratories (see 8.2). |
| 8.5 Sufficient material and financial resources for training | 2 | Given the low number of training requests by member laboratories (at ANSES or in their laboratory), current resources are sufficient. However, human resources are lacking for the development of web training through webinars and tutorials. |
| **Total** | **8** | |  | | --- | |  | |
| **Maximum score possible** | **9** |  |
| **Comments / general recommendation** | | The skills of member laboratories and ANSES epidemiologists / bacteriologists are satisfactory. The technical and scientific support provided by ANSES is one of the main motivations for laboratories to be members of the network and this support currently meets most of their expectations (via proficiency testing, face-to-face training and daily support). However, a need for online training materials has been identified (webinars, tutorials, etc.) as well as annual training sessions at fixed dates at ANSES on the AST technique and its interpretation. The human resources of the two ANSES laboratories do not currently seem sufficient to develop online materials. |
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| **Section 9: Communication** |  | |
| 9.1 Regular release of reports and scientific articles on surveillance results | 3 | Every year, a RESAPATH report is written, as well as scientific articles. These articles focus on molecular mechanisms of AMR, studied on isolates collected by RESAPATH. Other articles, more focused on epidemiological aspects, are also regularly published.  The RESAPATH report is sent in hard copy to all laboratories as well as to other partners. The hard copy is generally preferred to the digital one, which is publicly accessible online. An English version of the report (although less complete) is also available online.  The annual publication frequency of the report corresponds to the expectations of the different RESAPATH partners. The veterinarians, however, raised the potential benefit for them to have more frequent reports (two to four a year) including results at both national and regional levels. It would be sensible to inform them on the analyses that can and cannot be carried out using the current surveillance data of RESAPATH. |
| 9.2 Reporting of individual test results to field actors | NA | Individual test results are sent to veterinarians and farmers / animal owners, who are considered as the field actors here. The reporting of these results is a task that laboratories must perform regardless of their membership to RESAPATH, so it does not strictly fall within the scope of surveillance activities.  Note on the return of AST results by ANSES to member laboratories: Some laboratories would like to receive feedback on the AST results performed by ANSES on the isolates they send to ANSES to find out if their results are correct ("continuous quality control"). This process would be very tedious to put in place, bearing in mind that the samples requested by ANSES are sometimes analysed several months after receipt. Again, in order to address certain misunderstandings or (legitimate) frustrations, the coordination team should communicate more with the laboratories on the processing of isolates requested of them. Given that these ASTs are carried out only on some isolates (those requested and received by ANSES) and that they are therefore not part of the surveillance procedure *sensu stricto* (but for complementary research activities), this criterion was considered as Not Applicable. |
| 9.3 Regular dissemination of a newsletter with relevant content | 0 | The publication of a newsletter for laboratories is requested in the mutual agreement and was carried out from 1999 to 2009 (14 issues). It stopped due to a lack of time when other communication activities developed in parallel, i.e. the annual report (1st edition in 2008) and the annual one-day RESAPATH meeting (1st edition in 2006).  Laboratories (and some veterinarians) would like to receive general information from RESAPATH on scientific and regulatory news related to AMR, but this partly exceeds its missions. More frequent communications in the form of quarterly newsletters on scientific / regulatory news and on the research work that ANSES carries out on RESAPATH isolates, in a short and easily understandable way, would be greatly appreciated in addition to the annual one-day RESAPATH meeting and surveillance report. |
| 9.4 Systematic reporting of results to field actors | 3 | The annual surveillance report and the one-day RESAPATH meeting report are sent to all members of the network and of the steering committee. The distribution is easily verified and all interviewed laboratory technicians / directors confirmed that they receive a hard-copy of the annual report, which is a highly appreciated format. |
| 9.5 Horizontal and vertical communication tools | 2 | The spirit of collaboration within the RESAPATH network forms the basis of efficient communication. Thus, the network has an email address dedicated to inquiries of member laboratories to ANSES. The number of these inquiries has been constantly increasing. However, response delays vary depending on the workload of the coordination team. Regarding vertical communication, the website would benefit from being enriched with more easily accessible documentation (webinars, tutorials, technical documents, health and regulatory news). A newsletter would improve communication. According to interviews, the most popular format for the newsletter would be digital (shared by internet).  There may be a lack of transversal communication tools between laboratories, who appreciate exchange between each other. |
| 9.6 Solid external communication | 2 | The network coordinator carries out a lot of external communication, in France and abroad, with veterinarians, the medical sector, ministries, research institutes and other international institutions. ANSES also organizes an annual one-day AMR meeting (different from the one-day RESAPATH meeting), which is open to all upon registration.  Interviews with representatives of human health, however, revealed that external communication would benefit from being further strengthened with public health actors. The recent distribution of an information leaflet in partnership with Public Health France is a step in this direction.  Interviewed veterinarians think that RESAPATH is not very well known by veterinary practitioners, but that this is not due to a lack of communication from RESAPATH, as its results are often presented at congresses of veterinary professional organizations, in professional journals and as it is clearly identified in the French national action plan, ECOANTIBIO 2. |
| 9.7 Sufficient material and financial resources for communication | 2 | The human resources of the coordination team make it possible to ensure essential communication activities, but are insufficient to develop them, such as the newsletter. |
| **Total** | **12** | |  | | --- | |  | |
| **Maximum score possible** | **18** |  |
| **Comments / general recommendation** | | Essential communication is ensured through the annual report and the one-day RESAPATH meeting, but reinforcement would be useful internally (newsletter, webinars, tutorials for laboratories, etc.) and externally (towards veterinarians and medical professionals), in particular through the development of digital material. More human resources are necessary to achieve these objectives. |
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| **Section 10: Evaluation and performance indicators** |  | |
| 10.1 Performance indicators developed and validated by the directors of the network | 3 | Performance indicators2 exist and cover most RESAPATH activities. Yet, we suggest adding two performance indicators: one on the submission of laboratory data to ANSES every three months as requested by the mutual agreement, and another one on the proportion of isolates for which a list of epidemiological data (to be determined) are received by ANSES. |
| 10.2 Regular measurement, interpretation and dissemination of performance indicators | 3 | Existing indicators are calculated, interpreted and disseminated annually in the report (French version of the report only). |
| 10.3 Undertaking of external evaluations | 3 | An OASIS evaluation already took place in 2010. The current evaluation frequency is considered sufficient because RESAPATH has been in place for a long time and has relative stability. |
| 10.4 Implementation of the recommendations for improvement identified during evaluations | 2 | Several important recommendations resulting from the 2010 evaluation were implemented, such as recruiting more laboratories to improve the geographic and animal population representativeness, improving data standardization (semi-automation at ANSES) and improved communications to members of the steering committee on their steering roles and duties.  However, some recommendations have not been taken into account: (i) clarifying the expectations of the various partners, (ii) carrying out a survey on the implementation of a quality assurance system by the laboratories, (iii) formalizing the technical documents to be sent to new member laboratories, (iv) merging the two RESAPATH databases and (v) developing transversal communication between laboratories, for example with a forum. The first and fourth recommendations are again made in this evaluation. |
| **Total** | **11** | |  | | --- | |  | |
| **Maximum score possible** | **12** |  |
| **Comments / general recommendation** | | The evaluation tools and their implementation are satisfactory. RESAPATH is undergoing its second evaluation (first one in 2010) and has developed performance indicators which are calculated and analysed each year. However, the implementation of some recommendations originating from evaluations is challenged by the lack of human resources. It is proposed to add two new performance indicators: one on the submission of laboratory data to ANSES every three months and another one on the proportion of isolates for which a list of epidemiological data (to be determined) are received by ANSES. |

AMR : antimicrobial resistance ; ANSES : French Agency for Food, Environmental and Occupational Health & Safety ; AST : Antimicrobial Susceptibility Testing ; CA-SFM: Antibiogram Committee of the French Society of Microbiology ; LIMS : Laboratory Information Management System ; ONERBA: French national observatory for epidemiology of bacterial resistance to antimicrobials.

1**Boireau C**, et al. Représentativité et couverture du Résapath, le réseau d’épidémiosurveillance de l’antibiorésistance des bactéries pathogènes animales. *Bulletin épidémiologique santé animale et alimentation* 2018; **80**: 10–14.

2Association française de normalisation. Méthodes d'analyse en santé animale - Guide de réalisation des antibiogrammes par la méthode de diffusion en milieu gélosé. Norme française NF U47-107, December 2012.2Performance indicators of RESAPATH are listed in Supplementary Material 2, available on the Cambridge Core website.

3**Jouy E, *et al.*** Improvement in routine detection of colistin resistance in E. coli isolated in veterinary diagnostic laboratories. *Journal of Microbiological Methods* 2017; **132**: 125–127.