The International FAO Antimicrobial Resistance Monitoring (InFARM) system

Surveillance components and implementation questionnaire

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# **InFARM surveillance components and implementation questionnaire**

***NOTICE: This Word document is provided solely for informational and coordination purposes. The original contents are intended for reference and should not be modified or altered in any way. Please provide the final answers to the questions using the section “Surveillance questionnaire” of the web application of the InFARM-IT platform. In case of doubts, contact*** ***FAO-AMR-InFARM@fao.org***

## **Section A – Identification of InFARM focal point(s) (InFARM-FPs) providing information on AMR surveillance.**

**A1.** Name and contact details of the nominated InFARM national-FPs[[1]](#footnote-2) responsible for submitting AMR surveillance information and InFARM AMR data files, as per communicated through the enrolment questionnaire:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Surname, Name | Job position(Please include institution) | AMR Surveillance programme\*(Multiple selections is possible) | Email Address | Phone Number (If available) |
|  |  | *Select option from dropdown:**☐ Several or all surveillance programmes* *☐ Surveillance of healthy terrestrial animals (potentially expanded to cover their production environment)* *☐ Surveillance of healthy aquatic animals (potentially expanded to cover their production environment)**☐ Surveillance of food at processing and/or point of sale**☐ Surveillance of diseased terrestrial animals* *☐ Surveillance of diseased aquatic animals* |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

*\** *A single InFARM national focal point can be nominated to cover all or several AMR surveillance and monitoring programmes (e.g. healthy animals and food at processing and/or point of sale across the food chain). Several national focal points for InFARM can also be nominated for each specific AMR surveillance and monitoring program under FAO's remit, in accordance with the national surveillance network structure. There can also be multiple InFARM focal points within the same surveillance program or institution to distribute responsibilities. For example, one focal point may be responsible for preparing and submitting AMR data files in healthy animals, while another may focus solely on accessing data visualizations for validation of migration to the public interface and/or dissemination and action at the national level.*

**A2.** Name and contact details of the InFARM focal point filling the questionnaire:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Surname, Name | Job position(Please include institution) | AMR Surveillance programme(Multiple selection is possible) | Email Address | Phone Number (If available) |
|  |  | *Select option from dropdown:**☐ Several or all surveillance programmes* *☐ Surveillance of healthy terrestrial animals (potentially expanded to cover their production environment)* *☐ Surveillance of healthy aquatic animals (potentially expanded to cover their production environment)**☐ Surveillance of food at processing and/or point of sale**☐ Surveillance of diseased terrestrial animals* *☐ Surveillance of diseased aquatic animals* |  |  |

**A3.** For which AMR surveillance programme(s) would you like to answer this questionnaire? [[2]](#footnote-3) (*Multiple answers are possible)*

[ ]  Several or all surveillance programmes under the InFARM framework for which components and implementation are integrated (e.g. surveillance of healthy animals and food at processing and/or point of sale is conducted in an integrated manner at various steps of the food chain, including primary production, processing, and distribution) (Display Section B, **B1**)

[ ]  Surveillance of healthy terrestrial animals (potentially expanded to cover their production environment) (Display Section B, **B2**)

[ ]  Surveillance of healthy aquatic animals (potentially expanded to cover their production environment) (Display Section B, **B3**)

[ ]  Surveillance of food at processing and/or point of sale (Display Section B, **B4**)

[ ]  Surveillance of diseased terrestrial animals (Display Section B, **B5**)

[ ]  Surveillance of diseased aquatic animals (Display Section B, **B6**)

**A4.** Would you like to answer a question to identify if your country implements additional surveillance and monitoring of antimicrobial use (AMU) in agri-food systems, and/or AMR/AMU surveillance and monitoring in other sectors (human and/or environment)?

[ ] Yes (Display **Section C then Display Section D**)

[ ] No (Display Section D)

[ ] Don’t know (Display Section D)

## **Section B. Questions on components and implementation of antimicrobial resistance (AMR) surveillance in** **animals and food**

### **B1. Questionnaire for** **all or several AMR surveillance programmes under the InFARM framework whose components and implementation are integrated.**

#### **B1.1 Programming of integrated AMR surveillance in animals and food**

**B1.1.1** Is there a national AMR surveillance strategy/programme/plan integrating components and implementation of activities across different AMR surveillance programmes in animals and food (e.g. surveillance of healthy animals and food at processing and/or point of sale is conducted in an integrated manner at various steps of the food chain, including primary production, processing, and distribution)? *Select only one answer.*

 [ ] Yes (Display **B1.1.1a, B1.1.1b, B1.1.1c**)

 [ ] No

 [ ] Don’t know

**B1.1.1a** What is the status of development and implementation of this integrated strategy/programme/plan? *Select only one answer*

[ ] Under development

[ ] Finalized but waiting for final endorsement

[ ] Approved by Government but no funds allocated

[ ] Approved by Government with allocated funds, and under implementation

[ ] I don’t know

**B1.1.1b** Which specific surveillance programmes under the InFARM framework are covered by this integrated strategy/programme/plan? *Multiple answers are possible.*

[ ] Healthy terrestrial animals (potentially expanded to cover their production environment)

[ ] Diseased terrestrial animals

[ ] Healthy aquatic animals (potentially expanded to cover their production environment)

[ ] Diseased aquatic animals

[ ] Food at processing and/or point of sale

**B1.1**.**1c** Is surveillance and monitoring of antimicrobial use (AMU) in agri-food systems, and/or AMR/AMU surveillance and monitoring in other sectors (human and/or environment) also covered by this integrated strategy/programme/plan? *Multiple answers are possible.*

[ ] Yes, integrated with surveillance and monitoring of AMU in terrestrial animals

[ ] Yes, integrated with surveillance and monitoring of AMU in aquatic animals

[ ] Yes, integrated with surveillance and monitoring of AMU in plant production and protection

[ ] Yes, integrated with surveillance and monitoring of AMU in humans

[ ] Yes, integrated with surveillance and monitoring of AMR in humans

[ ] Yes, integrated with surveillance and monitoring of AMR in the wider environment

[ ] Yes, integrated with surveillance and monitoring of AMR/AMU in others, please specify

[ ] No

[ ] Don’t know

**B1.1.2** Is there any specific and independent national AMR surveillance strategy/programme/plan in any of the AMR surveillance programmes under the InFARM framework (i.e. components and implementation of surveillance in at least one of the programmes is compartmentalized and not integrated with the rest of programmes)? *Select only one answer*

[ ] Yes (Display **B1.1.2a**)

[ ] No

[ ] Don’t know

**B1.1.2a** Which specific surveillance programmes under the InFARM framework are compartmentalized and not integrated under a specific and independent national AMR surveillance strategy/programme/plan? *Multiple answers are possible.*

[ ] Healthy terrestrial animals (potentially expanded to cover their production environment)

[ ] Diseased terrestrial animals

[ ] Healthy aquatic animals (potentially expanded to cover their production environment)

[ ] Diseased aquatic animals

[ ] Food at processing and/or point of sale

**B1.1.3** Are there any additional AMR surveillance activities conducted in any of the specific surveillance programmes under the InFARM framework but without a strategy/programme/plan? *Select only one answer*

[ ] Yes (Display **B1.1.3a**)

[ ] No

[ ] Don’t know

**B1.1.3a** Which specific surveillance programmes under the InFARM framework conducted AMR surveillance activities without a strategy/programme/plan? *Multiple answers are possible.*

[ ] Healthy terrestrial animals (potentially expanded to cover their production environment)

[ ] Diseased terrestrial animals

[ ] Healthy aquatic animals (potentially expanded to cover their production environment)

[ ] Diseased aquatic animals

[ ] Food at processing and/or point of sale

#### **B1.2. Integrated national AMR Surveillance Network components in animals and food**

##### **Peripheral laboratories supporting integrated AMR surveillance in animals and food**

**B1.2.1** Has a national network of peripheral laboratories supporting integrated AMR surveillance in animals and food been established?[[3]](#footnote-4) *Select only one answer*

 [ ] Yes (Display **B1.2.1a, b, c, d**)

 [ ] No

 [ ] Don’t know

**B1.2.1a** Are these peripheral laboratories supporting the integration of components and implementation of activities across different AMR surveillance programmes under the InFARM framework (e.g. laboratories receiving samples from healthy animals and food taken at various steps of the food chain, including primary production, processing, and distribution)? *Select only one answer*

[ ] Yes

[ ] No

[ ] Don’t know

**B1.2.1b** Please provide the number of laboratories included in the network: ……..

**B1.2.1c** What are the responsibilities of the peripheral laboratories supporting integrated AMR surveillance in animals and food? *Multiple answers are possible.*

☐ Submission of bacterial isolates to National Reference Laboratory (NRL) for antimicrobial susceptibility testing (AST)

☐ Submission of bacterial isolates to NRL for further molecular characterization

☐ Perform AST and submission of bacterial isolates to NRL for confirmation of results

☐ Submission of written verification of performance of quality control procedures to NRL

☐ Provision of details of their performance in external quality assurance or proficiency testing (EQA/PT) schemes for bacterial isolation and/or AST

☐ Other, please specify …..

**B1.2.1d** What are the requirements for peripheral laboratories to participate in the integrated national surveillance network in animals and food? *Multiple answers are possible.*

[ ] Participation in EQA/PT for bacterial isolation and/or AST

[ ]  Shipment of bacterial isolates for confirmation or additional characterization

[ ]  Commitment on data quality of results (methods, format for data sharing)

[ ]  Implementation of quality assurance and/or accreditation of the laboratory

[ ]  No specific requirements, all interested laboratories can participate

##### **National Reference Laboratory (NRL) supporting integrated AMR surveillance in animals and food**

**B1.2.2** Has a National Reference Laboratory (NRL) been designated to support integrated AMR surveillance in animals and food?[[4]](#footnote-5) *Select only one answer*

 [ ] Yes (Display **B1.2.2a, b, c, d**)

 [ ] No (Display **B1.2.2e**)

 [ ] Don’t know

**B1.2.2a** Is the NRL supporting the integration across different AMR surveillance programmes in animals and food (e.g. supporting peripheral laboratories receiving samples from healthy animals and food taken at various steps of the food chain, including primary production, processing, and distribution)? *Select only one answer*

[ ] Yes

[ ] No

[ ] Don’t know

**B1.2.2b** Please indicate the responsibilities for the national reference laboratory (NRL) supporting integrated AMR surveillance in animals and food. *Multiple answers are possible.*

[ ]  Coordinate the national AMR laboratory network including peripheral laboratories

[ ]  Confirm results from peripheral laboratories (e.g., specific resistance phenotypes, molecular characterization)

[ ] Validate appropriate methods for defined surveillance programmes

[ ]  Provide guidance and reference material (e.g., protocols, reference strains)

[ ]  Provide external quality assurance/proficiency testing for antimicrobial susceptibility testing to national AMR laboratory network

[ ]  Collaborate and provide support to the NCC

[ ]  Collaborate and provide support to the designated unit/person to analyse AMR surveillance data

[ ]  Provide advice and expertise to risk managers and decision/policy makers

[ ]  Develop research programmes and international scientific collaborations on AMR

[ ]  other (please specify)

**B1.2.2c** Does the NRL supporting integrated AMR surveillance in animals and food participate in External Quality Assurance (EQA)/Proficiency Testing (PT) scheme for Antimicrobial Susceptibility Testing (AST)?

 [ ] Yes (Display i, ii, iii)

 [ ] No

 [ ] Don’t know

1. How often in months is the frequency of EQA/PT? …..
2. What are the microorganisms assessed: *Multiple answers are possible*

[ ]  *Acinetobacter baumanii*

[ ]  *Actinobacillus pleuropneumoniae*

[ ]  *Avibacterium paragallinarum*

[ ]  *Campylobacter* spp.

[ ]  *Campylobacter jejuni*

[ ]  *Campylobacter coli*

[ ] *Clostridium botulinum*

[ ] *Clostridium difficile*

[ ] *Clostridium perfringens*

[ ] *Clostridium* spp.

[ ]  *Enterococcus* spp*.*

[ ]  *Enterococcus faecium*

[ ]  *Enterococcus faecalis*

[ ]  *Escherichia coli*

[ ]  *Klebsiella pneumoniae*

[ ]  *Mannhemia haemolytica*

[ ]  *Pasteurella multocida*

[ ]  *Salmonella* spp*.*

[ ]  *Staphylococcus aureus*

[ ]  *Staphylococcus hyicus*

[ ]  *Streptococcus* spp*.*

[ ]  *Streptococcus dysagalactiae*

[ ]  *Streptococcus uberis*

[ ]  *Streptococcus suis*

[ ]  *Streptococcus agalactiae*

[ ]  *Streptococcus iniae*

[ ]  *Streptococcus phocae*

[ ]  *Mycobacterium spp.*

[ ]  *Mycoplasma* spp*.*

[ ]  *Mycoplasma hyopneumoniae*

[ ]  *Mycoplasma gallisepticum*

[ ]  *Aeromonas* spp*.*

[ ]  *Aeromonas caviae*

[ ]  *Aeromonas hydrophila*

[ ]  *Aeromonas sobria*

[ ]  *Aeromonas salmonicida*

[ ]  *Aeromonas veronii*

[ ]  *Vibrio* spp*.*

[ ]  *Vibrio anguillarum*

[ ]  *Vibrio cholerae*

[ ]  *Vibrio vulnificus*

[ ]  *Vibrio parahaemolyticus*

[ ]  *Vibrio alginolyticus*

[ ]  *Edwardsiella* spp*.*

[ ]  *Edwardsiella anguillarum*

[ ]  *Edwardsiella tarda*

[ ]  *Edwardsiella ictaluri*

[ ]  *Edwardsiella piscicida*

[ ]  *Listeria monocytogenesis*

[ ]  *Yersinia ruckeri*

[ ]  Others. Please specify:

1. Are corrective measures taken after EQA/PT? *Select only one answer*

[ ] Yes

[ ] No

[ ] Don’t know

**B1.2.2d** Does the NRL supporting integrated AMR surveillance in animals and food provide support to the peripheral labs on EQA for AST ?

 [ ] Yes (Display i, ii)

 [ ] No

 [ ] Don’t know

1. How often in months is the frequency of EQA/PT? …..

What are the microorganisms assessed: *Multiple answers are possible.* [ ]  *Acinetobacter baumanii*

[ ]  *Actinobacillus pleuropneumoniae*

[ ]  *Avibacterium paragallinarum*

[ ]  *Campylobacter* spp*.*

[ ]  *Campylobacter jejuni*

[ ]  *Campylobacter coli*

[ ]  *Clostridium botulinum*

[ ]  *Clostridium difficile*

[ ]  *Clostridium perfringens*

[ ]  *Clostridium spp.*

[ ]  *Enterococcus* spp.

[ ]  *Enterococcus faecium*

[ ]  *Enterococcus faecalis*

[ ]  *Escherichia coli*

[ ]  *Klebsiella pneumoniae*

[ ]  *Mannemia haemolytica*

[ ]  *Pasteurella multocida*

[ ]  *Salmonella* spp.

[ ]  *Staphylococcus aureus*

[ ]  *Staphylococcus hyicus*

[ ]  *Streptococcus* spp.

[ ]  *Streptococcus dysagalactiae*

[ ]  *Streptococcus uberis*

[ ]  *Streptococcus suis*

[ ]  *Streptococcus agalactiae*

[ ]  *Streptococcus iniae*

[ ]  *Streptococcus phocae*

[ ]  *Mycobacterium spp.*

[ ]  *Mycoplasma* spp*.*

[ ]  *Mycoplasma hyopneumoniae*

[ ]  *Mycoplasma gallisepticum*

[ ]  *Aeromonas* spp.

[ ]  *Aeromonas caviae*

[ ]  *Aeromonas hydrophila*

[ ]  *Aeromonas sobria*

[ ]  *Aeromonas salmonicida*

[ ]  *Aeromonas veronii*

[ ]  *Vibrio* spp.

[ ]  *Vibrio anguillarum*

[ ]  *Vibrio cholerae*

[ ]  *Vibrio vulnificus*

[ ]  *Vibrio parahaemolyticus*

[ ]  *Vibrio alginolyticus*

[ ]  *Edwardsiella* spp*.*

[ ]  *Edwardsiella anguillarum*

[ ]  *Edwardsiella tarda*

[ ]  *Edwardsiella ictaluri*

[ ]  *Edwardsiella piscicida*

[ ]  *Listeria monocytogenesis*

[ ]  *Yersinia ruckeri*

[ ]  Others. Please specify:

1. Are corrective measures taken after EQA/PT? *Select only one answer*

[ ] Yes

[ ] No

[ ] Don’t know

**B1.2.2e** Is there any institutional body that substitute the function or having equal function as NRL supporting integrated AMR surveillance in animals and food? *Select only one answer*

 [ ] Yes, please specify ……………

 [ ] No

##### **National coordinating centre (NCC) or a centralized surveillance team supporting integrated AMR surveillance in animals and food**

**B1.2.3** Has a national coordinating centre (NCC) or a centralized surveillance team overseeing integrated AMR surveillance and/or monitoring in animals and food been established? *Select only one answer*

[ ] Yes (Display **B1.2.1a, b, c, d**)

[ ] No (Display **B1.2.1e**)

[ ] Don’t know

**B1.2.3a** Is the NCC supporting the integration of components and implementation of surveillance activities across different AMR surveillance programmes under the InFARM framework (e.g. surveillance of healthy animals and food at processing and/or point of sale is conducted in an integrated manner at various steps of the food chain, including primary production, processing, and distribution) *Select only one answer*

[ ] Yes

[ ] No

[ ] Don’t know

**B1.2.3b** Please indicate the responsibilities for the NCC supporting integrated AMR surveillance in animals and food. *Multiple answers are possible.*

[ ]  Define objectives and methods for AMR surveillance programmes (e.g., risk-based prioritization, sampling schemes)

[ ]  Coordinate and evaluate implementation of surveillance programmes, collect, and analyse data

[ ]  Disseminate national surveillance protocols

[ ]  Coordination of data collection, collation, analysis, and dissemination of results on AMR prevalence and trends

[ ]  Disseminate surveillance reports

[ ]  Provide expert support to risk managers and decision/policy makers

[ ]  Develop research programmes and international collaboration on AMR

[ ]  Others (please specify)

**B1.2.3c** Who is represented in the NCC supporting integrated AMR surveillance in animals and food? *Multiple answers are possible.*

[ ] Centralized unit responsible for AMR data collection and analysis (epidemiology)

[ ] National reference laboratory (NRL)

[ ] National regulatory authorities in food and agriculture sectors

[ ] Public Health authorities

[ ] Governmental veterinary services

[ ] Veterinary practitioners’ organizations

[ ] Veterinary paraprofessionals/animal healthcare workers organizations

[ ] Public laboratories

[ ] Private laboratories

[ ] Food producers and/or farmers organizations

[ ] Pharmaceutical companies

[ ] Civil society representatives

[ ] Food industry

[ ] Plant health protection organizations

[ ] International institutions

[ ]  other (please specify)

**B1.2.3d** Please specify in which Institution is hosted the NCC supporting integrated AMR surveillance in animals and food. *Multiple answers are possible.*

[ ]  Ministry of Agriculture

[ ]  Ministry of Health

[ ]  Food Safety authority

[ ]  National Reference Laboratory

[ ]  Central Veterinary Laboratory

[ ]  Other (please specify)

**B1.2.3e** Is there any institutional body that substitute the function or having equal function as NCC supporting integrated AMR surveillance in animals and food? *Select only one answer*

 [ ] Yes, please specify ……………

 [ ] No

#### **B1.3. Epidemiological design elements for generation of AMR data from integrated surveillance in animals and food**

**B1.3.1.** How would you define the method(s) used in your country for collection of samples for integrated AMR surveillance in animals and food (e.g. samples from of healthy animals and food at processing and/or point of sale are collected at various steps of the food chain, including primary production, processing, and distribution)?

*Multiple answers are possible.*

☐ Active (with an epidemiologically defined sampling framework)

☐ Passive (from clinical samples submissions, “collect what is available”)

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☐ Comprehensive (all providers/laboratories)

☐ Sentinel/targeted (chosen to set of sites)

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☐ Continuous (ongoing)

☐ Episodic (limited period)

☐ Enhanced (specific data collection in addition to routine/continuous surveillance)

☐ Specific projects

**B1.3.2.** What is the scale of geographical representativeness of the data generated in your country from integrated AMR surveillance in animals and food? *Multiple answers are possible.*

[ ]  National surveillance (i.e. performed systematically and regularly) representing a national level population

[ ]  Pilot surveillance (e.g. point prevalence survey) representing a national level population

[ ]  Limited pilot surveillance activities (e.g. point prevalence survey) representing a local level population

**B1.3.3.** What microorganisms are included in your country for integrated AMR surveillance in animals and food? *Multiple answers are possible.*

[ ]  *Acinetobacter baumanii*

[ ]  *Actinobacillus pleuropneumoniae*

[ ]  *Avibacterium paragallinarum*

[ ]  *Campylobacter* spp*.*

[ ]  *Campylobacter jejuni*

[ ]  *Campylobacter coli*

[ ]  *Clostridium botulinum*

[ ]  *Clostridium difficile*

[ ]  *Clostridium perfringens*

[ ]  *Clostridium* spp.

[ ]  *Enterococcus* spp.

[ ]  *Enterococcus faecium*

[ ]  *Enterococcus faecalis*

[ ]  *Escherichia coli*

[ ]  *Klebsiella pneumoniae*

[ ]  *Mannemia haemolytica*

[ ]  *Pasteurella multocida*

[ ]  *Salmonella* spp.

[ ]  *Staphylococcus aureus*

[ ]  *Staphylococcus hyicus*

[ ]  *Streptococcus* spp*.*

[ ]  *Streptococcus dysagalactiae*

[ ]  *Streptococcus uberis*

[ ]  *Streptococcus suis*

[ ]  *Streptococcus agalactiae*

[ ]  *Streptococcus iniae*

[ ]  *Streptococcus phocae*

[ ]  *Mycobacterium* spp.

[ ]  *Mycoplasma* spp.

[ ]  *Mycoplasma hyopneumoniae*

[ ]  *Mycoplasma gallisepticum*

[ ]  *Aeromonas* spp*.*

[ ]  *Aeromonas caviae*

[ ]  *Aeromonas hydrophila*

[ ]  *Aeromonas sobria*

[ ]  *Aeromonas salmonicida*

[ ]  *Aeromonas veronii*

[ ]  *Vibrio* spp*.*

[ ]  *Vibrio anguillarum*

[ ]  *Vibrio cholerae*

[ ]  *Vibrio vulnificus*

[ ]  *Vibrio parahaemolyticus*

[ ]  *Vibrio alginolyticus*

[ ]  *Edwardsiella* spp.

[ ]  *Edwardsiella anguillarum*

[ ]  *Edwardsiella tarda*

[ ]  *Edwardsiella ictaluri*

[ ]  *Edwardsiella piscicida*

[ ]  *Listeria monocytogenesis*

[ ]  *Yersinia ruckeri*

[ ]  Others. Please specify:

**B1.3.4.** Have specific list(s) or panels of antibiotics been defined to be tested based on bacterial genus/species for integrated AMR surveillance in animals and food?

[ ] Yes (Display i)

[ ] No

[ ] Don’t know

1. List the classes of antibiotics represented by the antibiotic panel(s). *Multiple answers are possible.*

[ ]  1-gen cephalosporins

[ ]  2-gen cephalosporins

[ ]  3-gen cephalosporins

[ ]  4-gen cephalosporins

[ ]  Aminocyclitols

[ ]  Aminoglycosides

[ ]  Amphenicols

[ ]  Ansamycins

[ ]  Carbapenems

[ ]  Fluoroquinolones

[ ]  Glycylcyclines

[ ]  Glycopeptides

[ ]  Lincosamides

[ ]  Lipopeptides

[ ]  Macrolides

[ ]  Oxazolidinones

[ ]  Penicillins (aminopenicillins, aminopenicillins with beta-lactamase inhibitors))

[ ]  Phosphonic acid derivates

[ ]  Pleuromutilins

[ ]  Polymyxins

[ ]  Quinolones

[ ]  Streptogramins

[ ]  Sulfonamides, dihydrofolate reductase inhibitors and combinations

[ ]  Tetracyclines

#### **B1.4. Laboratory methodologies and standards for generation of AMR data from integrated surveillance in animals and food**

**B1.4.1** What is/are the method(s) used in your country for antimicrobial susceptibility testing (AST) of bacteria isolated across the integrated AMR surveillance in animals and food (e.g. samples from of healthy animals and food collected at various steps of the food chain, including primary production, processing, and distribution)? *Multiple answers are possible.*

[ ]  Agar gel dilution

[ ]  Disk diffusion

[ ]  Automated instruments (VITEK, Phoenix)

[ ]  Broth macrodilution

[ ]  Broth microdilution (Sensititre, MicroScan)

[ ]  Concentration gradient test (ETEST)

[ ]  Others, please specify

**B1.4.2** What are the guidelines/standards used in your country for interpretation of AST results across the integrated AMR surveillance in animals and food? *Multiple answers are possible.*

[ ]  EUCAST

[ ]  CLSI

[ ]  Others, please specify

**B1.4.3** What is the criteria used in your country for interpretation of AST results from integrated AMR surveillance in animals and food? *Multiple answers are possible.*

[ ] Epidemiological cut-off values

[ ] Animal clinical breakpoints

[ ] Human clinical breakpoints

**B1.4.4** Are molecular methods used in your country for AMR detection and/or characterization in bacteria isolated for integrated AMR surveillance in animals and food?

[ ] Yes (Display i)

[ ] No

[ ] Don’t know

1. Please specify molecular methods. Multiple answers are possible:

[ ] Polymerase Chain Reaction (PCR) for detection of specific resistance genes

[ ] Sequencing of specific resistance genes

[ ] Whole genome sequencing

[ ] Other (specify) ……

#### **B1.5. Reporting of integrated AMR surveillance results in animals and food**

**B1.5.1** Is there a responsible unit or person in your country designated to collect, analyze, and report AMR surveillance data (antimicrobial susceptibility testing - AST - data) in an integrated manner across different AMR surveillance programmes in animals and food (e.g. surveillance of healthy animals and food at processing and/or point of sale at various steps of the food chain, including primary production, processing, and distribution)? *Select only one answer*

 [ ] Yes (Display **B1.5.1a**)

 [ ] No

 [ ] Don’t know

**B1.5.1a** What is the type of AST data collected? *Multiple answers are possible*

[ ]  Raw quantitative AST results (i.e. inhibition zone diameters including the disk content or MIC values)

[ ] Interpreted AST results (i.e. isolates categorized as susceptible, intermediate, resistant for clinical breakpoint interpretation and wild type, non-wild type for epidemiological cutoff values interpretation)

[ ] Others. Please specify: \_\_\_\_\_\_\_\_\_\_

**B1.5.2** Are the laboratories supporting integrated AMR surveillance in animals and food using data management software (e.g. WHONET) or Laboratory Information Management Systems (LIMS)? *Select only one answer*

[ ] Yes, please specify …..

[ ] No

[ ] Don’t know

**B1.5.3** Are data from laboratories underperforming in EQA/PT excluded from the analysis and reporting of AMR data generated from integrated AMR surveillance in animals and food (e.g. surveillance of healthy animals and food at processing and/or point of sale at various steps of the food chain, including primary production, processing, and distribution)? *Select only one answer*

[ ] Yes

[ ] No

[ ] Don’t know

**B1.5.4** Are AMR surveillance reports produced periodically with integrated data across different AMR surveillance programmes in animals and food (e.g. surveillance of healthy animals and food at processing and/or point of sale at various steps of the food chain, including primary production, processing, and distribution)? *Select only one answer*

[ ] Yes (Display i)

[ ] No (Display ii)

[ ] Don’t know

1. What is the frequency of reporting in months? …..
2. How the data communicated? ……

**B1.5.5** Is the reporting of information from integrated AMR surveillance in animals and food further integrated with surveillance and monitoring of antimicrobial use (AMU) in agri-food systems, and/or AMR/AMU surveillance and monitoring in other sectors (human and/or environment)? *Multiple answers are possible.*

[ ] Yes, integrated with surveillance and monitoring of AMU in terrestrial animals

[ ] Yes, integrated with surveillance and monitoring of AMU in aquatic animals

[ ] Yes, integrated with surveillance and monitoring of AMU in plant production and protection

[ ] Yes, integrated with surveillance and monitoring of AMU/AMC in humans

[ ] Yes, integrated with surveillance and monitoring of AMR in humans

[ ] Yes, integrated with surveillance and monitoring of AMR in the wider environment

[ ] Yes, integrated with surveillance and monitoring of AMR/AMU in others, please specify…

[ ] No

[ ] Don’t know

### **B2. Questionnaire on components and implementation of AMR surveillance in healthy terrestrial animals (potentially expanded to cover their production environment) \***

\*To answer all questions in section B2, AMR surveillance in food production environments is not required as part of national activities for AMR surveillance of healthy terrestrial animals.

#### **B2.1 Programming of implementation of AMR surveillance in healthy terrestrial animals (potentially expanded to cover their production environment)**

**B2.1.1** Is there a national strategy/programme/plan specific for AMR surveillance in healthy terrestrial animals (live animals at farm and/or slaughterhouse level (potentially expanded to cover their production environment)? *Select only one answer*  [ ] Yes (Display **B2.1.1a**)

 [ ] No

 [ ] Don’t know

**B2.1.1a** What is the status of development and implementation of this national strategy/programme/plan specific for AMR surveillance in healthy terrestrial animals (potentially expanded to cover their production environment)? *Select only one answer*

[ ] Under development

[ ] Finalized but waiting for final endorsement

[ ] Approved by Government but no funds allocated

[ ] Approved by Government with allocated funds, and under implementation

[ ] I don’t know

**B2.1.2** Are there any AMR surveillance activities conducted specifically for AMR surveillance in healthy terrestrial animals (potentially expanded to cover their production environment) but without a strategy/programme/plan? *Select only one answer*

[ ] Yes. Please specify:

[ ] No

[ ] Don’t know

#### **B2.2. National AMR Surveillance Network components for AMR surveillance in healthy terrestrial animals (potentially expanded to cover their production environment)**

##### **Peripheral laboratories supporting surveillance of AMR in healthy animals (potentially expanded to cover their production environment)**

**B2.2.1** Has a national network of peripheral laboratories for AMR surveillance in healthy terrestrial animals (live animals at farm and/or slaughterhouse level) (potentially expanded to cover their production environment) been established?[[5]](#footnote-6) *Select only one answer*

 [ ] Yes (Display **B2.2.1a, b, c**)

 [ ] No

 [ ] Don’t know

**B2.2.1a** Please provide the number of laboratories included in the network: ……..

**B2.2.1b** What are the responsibilities of the peripheral laboratories supporting surveillance of AMR in healthy terrestrial animals (potentially expanded to cover their production environment)? *Multiple answers are possible.*

☐ Submission of bacterial isolates to National Reference Laboratory (NRL) for antimicrobial susceptibility testing (AST)

☐ Submission of bacterial isolates to NRL for further molecular characterization

☐ Perform AST and submission of bacterial isolates to NRL for confirmation of results

☐ Submission of written verification of performance of quality control procedures to NRL

☐ Provision of details of their performance in external quality assurance or proficiency testing (EQA/PT) schemes for bacterial isolation and/or AST

☐ Other, please specify …..

**B2.2.1c** What are the requirements for peripheral laboratories to participate in surveillance of AMR in healthy terrestrial animals (potentially expanded to cover their production environment)? *Multiple answers are possible.*

[ ] Participation in EQA/PT for bacterial isolation and/or AST

[ ]  Shipment of bacterial isolates for confirmation or additional characterization

[ ]  Commitment on data quality of results (methods, format for data sharing)

[ ]  Implementation of quality assurance and/or accreditation of the laboratory

[ ]  No specific requirements, all interested laboratories can participate

##### **National Reference Laboratory (NRL) supporting surveillance of AMR in healthy animals (potentially expanded to cover their production environment)**

**B2.2.2** Has a National Reference Laboratory (NRL) been designated to support AMR surveillance in healthy terrestrial animals (live animals at farm and/or slaughterhouse level) (potentially expanded to cover their production environment)?[[6]](#footnote-7) *Select only one answer*

 [ ] Yes (Display **B2.2.2a, b, c**)

 [ ] No (Display **B2.2.2d**)

 [ ] Don’t know

**B2.2.2a** Please indicate the responsibilities for this national reference laboratory (NRL) within your country’s surveillance network. *Multiple answers are possible.*

[ ]  Coordinate the national AMR laboratory network including peripheral laboratories

[ ]  Confirm results from peripheral laboratories (e.g., specific resistance phenotypes, molecular characterization)

[ ] Validate appropriate methods for defined surveillance programmes

[ ]  Provide guidance and reference material (e.g., protocols, reference strains)

[ ]  Provide external quality assurance/proficiency testing for antimicrobial susceptibility testing to national AMR laboratory network

[ ]  Collaborate and provide support to the NCC

[ ]  Collaborate and provide support to the designated unit/person to analyse AMR surveillance data

[ ]  Provide advice and expertise to risk managers and decision/policy makers

[ ]  Develop research programmes and international scientific collaborations on AMR

[ ]  other (please specify)

**B2.2.2b** Does this NRL participate in External Quality Assurance (EQA)/Proficiency Testing (PT) scheme for Antimicrobial Susceptibility Testing (AST)?

 [ ] Yes (Display i, ii)

 [ ] No

 [ ] Don’t know

1. How often in months is the frequency of EQA/PT? …..

What are the microorganisms assessed: *Multiple answers are possible.* [ ]  *Campylobacter* spp*.*

[ ]  *Campylobacter jejuni*

[ ]  *Campylobacter coli*

[ ]  *Enterococcus* spp*.*

[ ]  *Enterococcus faecium*

[ ]  *Enterococcus faecalis*

[ ]  *Escherichia coli*

[ ]  *Mycobacterium spp.*

[ ]  *Salmonella* spp.

[ ]  Others. Please specify:

1. Are corrective measures taken after EQA/PT? *Select only one answer*

[ ] Yes

[ ] No

[ ] Don’t know

**B2.2.2c** Does this NRL provide support to the peripheral labs on EQA for AST?

 [ ] Yes (Display i, ii, iii)

 [ ] No

 [ ] Don’t know

1. How often in months is the frequency of EQA/PT? …..
2. What are the microorganisms assessed: *Multiple answers are possible*

[ ]  *Campylobacter* spp.

[ ]  *Campylobacter jejuni*

[ ]  *Campylobacter coli*

[ ]  *Enterococcus* spp*.*

[ ]  *Enterococcus faecium*

[ ]  *Enterococcus faecalis*

[ ]  *Escherichia coli*

[ ]  *Mycobacterium spp.*

[ ]  *Salmonella* spp.

[ ]  Others. Please specify:

1. Are corrective measures taken after EQA/PT? *Select only one answer*

[ ] Yes

[ ] No

[ ] Don’t know

**B2.2.2d** Is there any institutional body that substitute the function or having equal function as NRL supporting surveillance of AMR in healthy terrestrial animals (potentially expanded to include their production environment)? *Select only one answer*

 [ ] Yes, please specify ……………

 [ ] No

##### **National coordinating centre (NCC) or a centralized surveillance team for AMR surveillance in healthy terrestrial animals (potentially expanded to cover their production environment)**

**B2.2.3** Has a national coordinating centre (NCC) or a centralized surveillance team overseeing AMR surveillance in healthy terrestrial animals (live animals at farm and/or slaughterhouse level) (potentially expanded to cover their production environment) been established? *Select only one answer*

[ ] Yes (Display **B2.2.3a, b, c**)

[ ] No (Display **B2.2.3d**)

[ ] Don’t know

**B2.2.3a** Please indicate the responsibilities for the NCC for AMR surveillance in healthy terrestrial animals (potentially expanded to cover their production environment) within your country’s surveillance network. *Multiple answers are possible.*

[ ]  Define objectives and methods for AMR surveillance programmes (e.g., risk-based prioritization, sampling schemes)

[ ]  Coordinate and evaluate implementation of surveillance programmes, collect, and analyse data

[ ]  Disseminate national surveillance protocols

[ ]  Coordination of data collection, collation, analysis, and dissemination of results on AMR prevalence and trends

[ ]  Disseminate surveillance reports

[ ]  Provide expert support to risk managers and decision/policy makers

[ ]  Develop research programmes and international collaboration on AMR

[ ]  Others (please specify)

**B2.2.3b** Who is represented in the NCC for AMR surveillance in healthy terrestrial animals (potentially expanded to cover their production environment)? *Multiple answers are possible.*

[ ] Centralized unit responsible for AMR data collection and analysis (epidemiology)

[ ] National reference laboratory (NRL)

[ ] National regulatory authorities in food and agriculture sectors

[ ] Public Health authorities

[ ] Governmental veterinary services

[ ] Veterinary practitioners’ organizations

[ ] Veterinary paraprofessionals/animal healthcare workers organizations

[ ] Public laboratories

[ ] Private laboratories

[ ] Food producers and/or farmers organizations

[ ] Pharmaceutical companies

[ ] Civil society representatives

[ ] Food industry

[ ] Plant health protection organizations

[ ] International institutions

[ ]  other (please specify)

**B2.2.3c** Please specify in which Institution is the NCC for AMR surveillance in healthy terrestrial animals (potentially expanded to cover their production environment) hosted. *Multiple answers are possible.*

[ ]  Ministry of Agriculture

[ ]  Ministry of Health

[ ]  Food Safety authority

[ ]  National Reference Laboratory

[ ]  Central Veterinary Laboratory

[ ]  Other (please specify)

**B2.2.3d** Is there any institutional body that substitute the function or having equal function as NCC for AMR surveillance in healthy terrestrial animals (potentially expanded to cover their production environment)? *Select only one answer*

 [ ] Yes, please specify ……………

 [ ] No

#### **B2.3. Epidemiological design elements for generation of AMR data in healthy terrestrial animals (potentially expanded to cover their production environment)**

**B2.3.1.** How would you define the method used in your country for collection of samples for AMR surveillance in healthy terrestrial (i.e. samples from live terrestrial animals at farm and/or slaughterhouse level) (potentially expanded to cover their production environment)? *Multiple answers are possible.*

☐ Active (with an epidemiologically defined sampling framework)

☐ Passive (from clinical samples submissions, “collect what is available”)

---------------------------------------------------------------------------------------------------

☐ Comprehensive (all providers/laboratories)

☐ Sentinel/targeted (chosen to set of sites)

---------------------------------------------------------------------------------------------------

☐ Continuous (ongoing)

☐ Episodic (limited period)

☐ Enhanced (specific data collection in addition to routine/continuous surveillance)

☐ Specific projects

**B2.3.2.** What is the scale of geographical representativeness of the AMR surveillance data generated in your country from healthy terrestrial animals (potentially expanded to cover their production environment)? *Multiple answers are possible.*

[ ]  National surveillance (i.e. performed systematically and regularly) representing a national level population

[ ]  Pilot surveillance (e.g. point prevalence survey) representing a national level population

[ ]  Limited pilot surveillance activities (e.g. point prevalence survey) representing a local level population

**B2.3.3.** What microorganisms are included in your country for AMR surveillance in healthy terrestrial animals (potentially expanded to cover their production environment)? *Multiple answers are possible.*

[ ]  *Campylobacter* spp.

[ ]  *Campylobacter jejuni*

[ ]  *Campylobacter coli*

[ ]  *Enterococcus* spp.

[ ]  *Enterococcus faecium*

[ ]  *Enterococcus faecalis*

[ ]  *Escherichia coli*

[ ]  *Mycobacterium spp.*

[ ]  *Salmonella* spp.

[ ]  Others. Please specify:

**B2.3.4.** Have specific list(s) or panels of antibiotics been defined to be tested based on bacterial genus/species for AMR surveillance in healthy terrestrial (potentially expanded to cover their production environment)?

[ ] Yes (Display i)

[ ] No

[ ] Don’t know

1. List the classes of antibiotics represented by the antibiotic panel(s). *Multiple answers are possible*

[ ]  1-gen cephalosporins

☐ 2-gen cephalosporins

☐ 3-gen cephalosporins

☐ 4-gen cephalosporins

☐ Aminocyclitols

☐ Aminoglycosides

☐ Amphenicols

☐ Ansamycins

☐ Carbapenems

☐ Fluoroquinolones

☐ Glycylcyclines

☐ Glycopeptides

☐ Lincosamides

☐ Lipopeptides

☐ Macrolides

☐ Oxazolidinones

☐ Penicillins (aminopenicillins, aminopenicillins with beta-lactamase inhibitors))

☐ Phosphonic acid derivates

☐ Pleuromutilins

☐ Polymyxins

☐ Quinolones

☐ Streptogramins

☐ Sulfonamides, dihydrofolate reductase inhibitors and combinations

☐ Tetracyclines

#### **B2.4. Laboratory methodologies and standards for generation of AMR data in healthy terrestrial animals (potentially expanded to cover their production environment)**

**B2.4.1** What is/are the method(s) used for antimicrobial susceptibility testing (AST) of bacteria isolated from healthy terrestrial animals (potentially expanded to cover their production environment) in your country? *Multiple answers are possible.*

[ ]  Agar gel dilution

[ ]  Disk diffusion

[ ]  Automated instruments (VITEK, Phoenix)

[ ]  Broth macrodilution

[ ]  Broth microdilution (Sensititre MicroScan)

[ ]  Concentration gradient test (ETEST)

[ ]  Others, please specify

**B2.4.2** What are the guidelines/standards used in your country for interpretation of AST results in healthy terrestrial animals (potentially expanded to cover their production environment)? *Multiple answers are possible.*

[ ]  EUCAST

[ ]  CLSI

[ ]  Others, please specify

**B2.4.3** What is the criteria used in your country for interpretation of AST results in healthy terrestrial animals (potentially expanded to cover their production environment)? *Multiple answers are possible.*

[ ] Epidemiological cut-off values

[ ] Animal clinical breakpoints

[ ] Human clinical breakpoints

**B2.4.4** Are molecular methods used in your country for AMR detection and/or characterization in healthy terrestrial animals (potentially expanded to cover their production environment)?

[ ] Yes (Display i)

[ ] No

[ ] Don’t know

1. Please specify molecular methods. Multiple answers are possible:

[ ] Polymerase Chain Reaction (PCR) for detection of specific resistance genes

[ ] Sequencing of specific resistance genes

[ ] Whole genome sequencing

[ ] Other (specify) ……

#### **B2.5. Reporting of results of AMR surveillance in healthy terrestrial animals (potentially expanded to cover their production environment)**

**B2.5.1** Is there a responsible unit or person designated to collect, analyze, and report AMR data (antimicrobial susceptibility testing - AST - data) from surveillance in healthy terrestrial animals (live animals at farm and/or slaughterhouse level) (potentially expanded to cover their production environment) in your country? *Select only one answer*

 [ ] Yes (Display **B2.3.1a**)

 [ ] No

 [ ] Don’t know

**B1.3.1a** What is the type of AST data collected from AMR surveillance in healthy terrestrial animals (potentially expanded to cover their production environment)? *Multiple answers are possible*

[ ]  Raw quantitative AST results (i.e. inhibition zone diameters including the disk content or MIC values)

[ ] Interpreted AST results (i.e. isolates categorized as susceptible, intermediate, resistant for clinical breakpoint interpretation and wild type, non-wild type for epidemiological cutoff values interpretation)

[ ] Others. Please specify: \_\_\_\_\_\_\_\_\_\_

**B2.5.2** Are the laboratories supporting AMR surveillance in healthy terrestrial animals (potentially expanded to cover their production environment) using data management softwares (e.g. WHONET) or Laboratory Information Management Systems (LIMS)? *Select only one answer*

[ ] Yes, please specify …..

[ ] No

[ ] Don’t know

**B2.5.3** Are data from laboratories underperforming in EQA/PT excluded from the analysis and reporting of AMR data from surveillance in healthy terrestrial animals (potentially expanded to cover their production environment)? *Select only one answer*

[ ] Yes

[ ] No

[ ] Don’t know

**B2.5.4** Are AMR surveillance reports with data from surveillance in healthy terrestrial animals (potentially expanded to cover their production environment) produced periodically in your country? *Select only one answer*

[ ] Yes (Display i)

[ ] No (Display ii)

[ ] Don’t know

1. What is the frequency of reporting in months? …..
2. How the data communicated? ……

**B2.5.5** Is the reporting of AMR data in healthy terrestrial animals integrated with surveillance and monitoring of antimicrobial use (AMU) in agri-food systems, and/or AMR/AMU surveillance and monitoring in other sectors (human and/or environment)? *Multiple answers are possible.*

[ ] Yes, integrated with surveillance and monitoring of AMU in terrestrial animals

[ ] Yes, integrated with surveillance and monitoring of AMU in aquatic animals

[ ] Yes, integrated with surveillance and monitoring of AMU in plant production and protection

[ ] Yes, integrated with surveillance and monitoring of AMR in humans

[ ] Yes, integrated with surveillance and monitoring of AMU/AMC in humans

[ ] Yes, integrated with surveillance and monitoring of AMR in the healthy terrestrial animal production environment

[ ] Yes, integrated with surveillance and monitoring of AMR in the wider environment

[ ] Yes, integrated with surveillance and monitoring of AMR/AMU in others, please specify

[ ] No

[ ] Don’t know

### **B3. Questionnaire on components and implementation of AMR surveillance in healthy aquatic animals (potentially expanded to cover their production environment) \***

\*To answer all questions in section B3, AMR surveillance in food production environments is not required as part of national activities for AMR surveillance of healthy aquatic animals.

#### **B3.1 Programming of implementation of AMR surveillance in healthy aquatic animals (potentially expanded to cover their production environment)**

**B3.1.1** Is there a national strategy/programme/plan specific for AMR surveillance in healthy aquatic animals (live aquatic animals and/or water at farm level) (potentially expanded to cover their production environment)? *Select only one answer*  [ ] Yes (Display **B3.1.1a**)

 [ ] No

 [ ] Don’t know

**B3.1.1a** What is the status of development and implementation of this national strategy/programme/plan specific for AMR surveillance in healthy aquatic animals (potentially expanded to cover their production environment)? *Select only one answer*

[ ] Under development

[ ] Finalized but waiting for final endorsement

[ ] Approved by Government but no funds allocated

[ ] Approved by Government with allocated funds, and under implementation

[ ] I don’t know

**B3.1.2** Are there any AMR surveillance activities conducted specifically for AMR surveillance in healthy aquatic animals (potentially expanded to cover their production environment) but without a strategy/programme/plan? *Select only one answer*

[ ] Yes. Please specify:

[ ] No

[ ] Don’t know

#### **B3.2. National AMR Surveillance Network components for AMR surveillance in healthy aquatic animals (potentially expanded to cover their production environment)**

##### **Peripheral laboratories supporting surveillance of AMR in healthy aquatic animals (potentially expanded to cover their production environment)**

**B3.2.1** Has a national network of peripheral laboratories for AMR surveillance in in healthy aquatic animals (live aquatic animals and/or water at farm level) (potentially expanded to cover their production environment) been established?[[7]](#footnote-8) *Select only one answer*

 [ ] Yes (Display **B3.2.1a, b, c**)

 [ ] No

 [ ] Don’t know

**B3.2.1a** Please provide the number of laboratories included in the network: ……..

**B3.2.1b** What are the responsibilities of the peripheral laboratories supporting surveillance of AMR in in healthy aquatic animals (potentially expanded to cover their production environment)? *Multiple answers are possible.*

☐ Submission of bacterial isolates to National Reference Laboratory (NRL) for antimicrobial susceptibility testing (AST)

☐ Submission of bacterial isolates to NRL for further molecular characterization

☐ Perform AST and submission of bacterial isolates to NRL for confirmation of results

☐ Submission of written verification of performance of quality control procedures to NRL

☐ Provision of details of their performance in external quality assurance or proficiency testing (EQA/PT) schemes for bacterial isolation and/or AST

☐ Other, please specify …..

**B3.2.1c** What are the requirements for peripheral laboratories to participate in surveillance of AMR in in healthy aquatic animals (potentially expanded to cover their production environment)? *Multiple answers are possible.*

[ ] Participation in EQA/PT for bacterial isolation and/or AST

[ ]  Shipment of bacterial isolates for confirmation or additional characterization

[ ]  Commitment on data quality of results (methods, format for data sharing)

[ ]  Implementation of quality assurance and/or accreditation of the laboratory

[ ]  No specific requirements, all interested laboratories can participate

##### **National Reference Laboratory (NRL) supporting surveillance of AMR in healthy aquatic animals (potentially expanded to cover their production environment)**

**B3.2.2** Has a National Reference Laboratory (NRL) been designated to support AMR surveillance in in healthy aquatic animals (live animals at farm level) (potentially expanded to cover their production environment)?[[8]](#footnote-9) *Select only one answer*

 [ ] Yes (Display **B3.2.2a, b, c**)

 [ ] No (Display **B3.2.2d**)

 [ ] Don’t know

**B3.2.2a** Please indicate the responsibilities for this national reference laboratory (NRL) within your country’s surveillance network. *Multiple answers are possible.*

[ ]  Coordinate the national AMR laboratory network including peripheral laboratories

[ ]  Confirm results from peripheral laboratories (e.g., specific resistance phenotypes, molecular characterization)

[ ] Validate appropriate methods for defined surveillance programmes

[ ]  Provide guidance and reference material (e.g., protocols, reference strains)

[ ]  Provide external quality assurance/proficiency testing for antimicrobial susceptibility testing to national AMR laboratory network

[ ]  Collaborate and provide support to the NCC

[ ]  Collaborate and provide support to the designated unit/person to analyse AMR surveillance data

[ ]  Provide advice and expertise to risk managers and decision/policy makers

[ ]  Develop research programmes and international scientific collaborations on AMR

[ ]  other (please specify)

**B3.2.2b** Does this NRL participate in External Quality Assurance (EQA)/Proficiency Testing (PT) scheme for Antimicrobial Susceptibility Testing (AST)?

 [ ] Yes (Display i, ii, iii)

 [ ] No

 [ ] Don’t know

1. How often in months is the frequency of EQA/PT? …..

What are the microorganisms assessed: *Multiple answers are possible.* [ ]  *Aeromonas* spp.

[ ]  *Aeromonas caviae*

[ ]  *Aeromonas hydrophila*

[ ]  *Aeromonas sobria*

[ ]  *Aeromonas salmonicida*

[ ]  *Aeromonas veronii*

[ ]  *Mycobacterium spp.*

[ ]  *Streptococcus* spp*.*

[ ]  *Streptococcus agalactiae*

[ ]  *Streptococcus iniae*

[ ]  *Vibrio* spp*.*

[ ]  *Vibrio cholerae*

[ ]  *Vibrio vulnificus*

[ ]  *Vibrio parahaemolyticus*

[ ]  *Listeria monocytogenesis*

[ ]  Others. Please specify:

1. Are corrective measures taken after EQA/PT? *Select only one answer*

[ ] Yes

[ ] No

[ ] Don’t know

**B3.2.2c** Does this NRL provide support to the peripheral labs on EQA for AST ?

 [ ] Yes (Display i, ii, iii)

 [ ] No

 [ ] Don’t know

1. How often in months is the frequency of EQA/PT? …..
2. What are the microorganisms assessed: *Multiple answers are possible*

[ ]  *Aeromonas* spp*.*

[ ]  *Aeromonas caviae*

[ ]  *Aeromonas hydrophila*

[ ]  *Aeromonas sobria*

[ ]  *Aeromonas salmonicida*

[ ]  *Aeromonas veronii*

[ ]  *Mycobacterium spp.*

[ ]  *Streptococcus* spp*.*

[ ]  *Streptococcus agalactiae*

[ ]  *Streptococcus iniae*

[ ]  *Vibrio* spp.

[ ]  *Vibrio cholerae*

[ ]  *Vibrio vulnificus*

[ ]  *Vibrio parahaemolyticus*

[ ]  *Listeria monocytogenesis*

[ ]  Others. Please specify:

1. Are corrective measures taken after EQA/PT? *Select only one answer*

[ ] Yes

[ ] No

[ ] Don’t know

**B3.2.2d** Is there any institutional body that substitute the function or having equal function as NRL supporting surveillance of AMR in healthy aquatic animals (potentially expanded to cover their production environment)? *Select only one answer*

 [ ] Yes, please specify ……………

 [ ] No

##### **National coordinating centre (NCC) or a centralized surveillance team for AMR surveillance in healthy aquatic animals (potentially expanded to cover their production environment)**

**B3.2.3** Has a national coordinating centre (NCC) or a centralized surveillance team overseeing AMR surveillance in healthy aquatic animals (live animals at farm level) (potentially expanded to cover their production environment) been established? *Select only one answer*

[ ] Yes (Display **B3.2.3a, b, c**)

[ ] No (Display **B3.2.3d**)

[ ] Don’t know

**B3.2.3a** Please indicate the responsibilities for the NCC for AMR surveillance in healthy aquatic animals (potentially expanded to cover their production environment) within your country’s surveillance network. *Multiple answers are possible.*

[ ]  Define objectives and methods for AMR surveillance programmes (e.g., risk-based prioritization, sampling schemes)

[ ]  Coordinate and evaluate implementation of surveillance programmes, collect, and analyse data

[ ]  Disseminate national surveillance protocols

[ ]  Coordination of data collection, collation, analysis, and dissemination of results on AMR prevalence and trends

[ ]  Disseminate surveillance reports

[ ]  Provide expert support to risk managers and decision/policy makers

[ ]  Develop research programmes and international collaboration on AMR

[ ]  Others (please specify)

**B3.2.3b** Who is represented in the NCC for AMR surveillance in healthy aquatic animals (potentially expanded to cover their production environment)? *Multiple answers are possible.*

[ ] Centralized unit responsible for AMR data collection and analysis (epidemiology)

[ ] National reference laboratory (NRL)

[ ] National regulatory authorities in food and agriculture sectors

[ ] Public Health authorities

[ ] Governmental veterinary services

[ ] Veterinary practitioners’ organizations

[ ] Veterinary paraprofessionals/animal healthcare workers organizations

[ ] Public laboratories

[ ] Private laboratories

[ ] Food producers and/or farmers organizations

[ ] Pharmaceutical companies

[ ] Civil society representatives

[ ] Food industry

[ ] Plant health protection organizations

[ ] International institutions

[ ]  other (please specify)

**B3.2.3c** Please specify in which Institution is the NCC for AMR surveillance in healthy aquatic animals (potentially expanded to cover their production environment) hosted. *Multiple answers are possible.*

[ ]  Ministry of Agriculture

[ ]  Ministry of Fisheries

[ ]  Ministry of Health

[ ]  Food Safety authority

[ ]  National Reference Laboratory

[ ]  Central Veterinary Laboratory

[ ]  Other (please specify)

**B3.2.3d** Is there any institutional body that substitute the function or having equal function as NCC for AMR surveillance in healthy aquatic animals (potentially expanded to cover their production environment)? *Select only one answer*

 [ ] Yes, please specify ……………

 [ ] No

#### **B3.3. Epidemiological design elements for generation of AMR data in healthy aquatic animals (potentially expanded to cover their production environment)**

**B3.3.1.** How would you define the method used in your country for collection of samples for AMR surveillance in healthy aquatic animals (i.e. samples from live aquatic animals and/or water at farm level) (potentially expanded to cover their production environment)? *Multiple answers are possible.*

☐ Active (with an epidemiologically defined sampling framework)

☐ Passive (from clinical samples submissions, “collect what is available”)

---------------------------------------------------------------------------------------------------

☐ Comprehensive (all providers/laboratories)

☐ Sentinel/targeted (chosen to set of sites)

---------------------------------------------------------------------------------------------------

☐ Continuous (ongoing)

☐ Episodic (limited period)

☐ Enhanced (specific data collection in addition to routine/continuous surveillance)

☐ Specific projects

**B3.3.2.** What is the scale of geographical representativeness of the AMR surveillance data generated in your country from healthy aquatic animals (potentially expanded to cover their production environment)? *Multiple answers are possible.*

[ ]  National surveillance (i.e. performed systematically and regularly) representing a national level population

[ ]  Pilot surveillance (e.g. point prevalence survey) representing a national level population

[ ]  Limited pilot surveillance activities (e.g. point prevalence survey) representing a local level population

**B3.3.3.** What microorganisms are included in your country for AMR surveillance in healthy aquatic animals (potentially expanded to cover their production environment)? *Multiple answers are possible.*

[ ]  *Aeromonas* spp*.*

[ ]  *Aeromonas caviae*

[ ]  *Aeromonas hydrophila*

[ ]  *Aeromonas sobria*

[ ]  *Aeromonas salmonicida*

[ ]  *Aeromonas veronii*

[ ]  *Mycobacterium spp.*

[ ]  *Streptococcus s*pp*.*

[ ]  *Streptococcus agalactiae*

[ ]  *Streptococcus iniae*

[ ]  *Vibrio* spp*.*

[ ]  *Vibrio cholerae*

[ ]  *Vibrio vulnificus*

[ ]  *Vibrio parahaemolyticus*

[ ]  *Listeria monocytogenesis*

[ ]  Others. Please specify:

**B3.3.4.** Have specific list(s) or panels of antibiotics been defined to be tested based on bacterial genus/species for AMR surveillance in healthy aquatic animals (potentially expanded to cover their production environment)?

[ ] Yes (Display i)

[ ] No

[ ] Don’t know

1. List the classes of antibiotics represented by the antibiotic panel(s). *Multiple answers are possible*

[ ]  1-gen cephalosporins

☐ 2-gen cephalosporins

☐ 3-gen cephalosporins

☐ 4-gen cephalosporins

☐ Aminocyclitols

☐ Aminoglycosides

☐ Amphenicols

☐ Ansamycins

☐ Carbapenems

☐ Fluoroquinolones

☐ Glycylcyclines

☐ Glycopeptides

☐ Lincosamides

☐ Lipopeptides

☐ Macrolides

☐ Oxazolidinones

☐ Penicillins (aminopenicillins, aminopenicillins with beta-lactamase inhibitors))

☐ Phosphonic acid derivates

☐ Pleuromutilins

☐ Polymyxins

☐ Quinolones

☐ Streptogramins

☐ Sulfonamides, dihydrofolate reductase inhibitors and combinations

☐ Tetracyclines

#### **B3.4. Laboratory methodologies and standards for generation of AMR data in healthy aquatic animals (potentially expanded to cover their production environment)**

**B3.4.1** What is/are the method(s) used for antimicrobial susceptibility testing (AST) of bacteria isolated from healthy aquatic animals (potentially expanded to cover their production environment) in your country? *Multiple answers are possible.*

[ ]  Agar gel dilution

[ ]  Disk diffusion

[ ]  Automated instruments (VITEK, Phoenix)

[ ]  Broth macrodilution

[ ]  Broth microdilution (Sensititre, MicroScan)

[ ]  Concentration gradient test (ETEST)

[ ]  Others, please specify

**B3.4.2** What are the guidelines/standards used in your country for interpretation of AST results in healthy aquatic animals (potentially expanded to cover their production environment)? *Multiple answers are possible.*

[ ]  EUCAST

[ ]  CLSI

[ ]  Others, please specify

**B3.4.3** What is the criteria used in your country for interpretation of AST results in healthy aquatic animals (potentially expanded to cover their production environment)? *Multiple answers are possible.*

[ ] Epidemiological cut-off values

[ ] Animal clinical breakpoints

[ ] Human clinical breakpoints

**B3.4.4** Are molecular methods used in your country for AMR detection and/or characterization in healthy aquatic animals (potentially expanded to cover their production environment)?

[ ] Yes (Display i)

[ ] No

[ ] Don’t know

1. Please specify molecular methods. Multiple answers are possible:

[ ] Polymerase Chain Reaction (PCR) for detection of specific resistance genes

[ ] Sequencing of specific resistance genes

[ ] Whole genome sequencing

[ ] Other (specify) ……

#### **B3.5. Reporting of results of AMR surveillance in healthy aquatic animals (potentially expanded to cover their production environment)**

**B3.5.1** Is there a responsible unit or person designated to collect, analyze, and report AMR data (antimicrobial susceptibility testing - AST - data) from surveillance in healthy aquatic animals (live aquatic animals and/or water at farm level) (potentially expanded to cover their production environment) in your country? *Select only one answer*

 [ ] Yes (Display **B3.3.1a**)

 [ ] No

 [ ] Don’t know

**B3.3.1a** What is the type of AST data collected from AMR surveillance in healthy aquatic animals (potentially expanded to cover their production environment)? *Multiple answers are possible*

[ ]  Raw quantitative AST results (i.e. inhibition zone diameters including the disk content or MIC values)

[ ] Interpreted AST results (i.e. isolates categorized as susceptible, intermediate, resistant for clinical breakpoint interpretation and wild type, non-wild type for epidemiological cutoff values interpretation)

[ ] Others. Please specify: \_\_\_\_\_\_\_\_\_\_

**B3.5.2** Are the laboratories supporting AMR surveillance in healthy aquatic animals (potentially expanded to cover their production environment) using data management softwares (e.g. WHONET) or Laboratory Information Management Systems (LIMS)? *Select only one answer*

[ ] Yes, please specify …..

[ ] No

[ ] Don’t know

**B3.5.3** Are data from laboratories underperforming in EQA/PT excluded from the analysis and reporting of AMR data from surveillance in healthy aquatic animals (potentially expanded to cover their production environment)? *Select only one answer*

[ ] Yes

[ ] No

[ ] Don’t know

**B3.5.4** Are AMR surveillance reports with data from surveillance in healthy aquatic animals (potentially expanded to cover their production environment) produced periodically in your country? *Select only one answer*

[ ] Yes (Display ii)

[ ] No (Display iii)

[ ] Don’t know

1. What is the frequency of reporting in months? …..
2. How the data communicated? ……

**B3.5.5** Is the reporting of AMR data in healthy aquatic animals integrated with surveillance and monitoring of antimicrobial use (AMU) in agri-food systems, and/or AMR/AMU surveillance and monitoring in other sectors (human and/or environment)? *Multiple answers are possible.*

[ ] Yes, integrated with surveillance and monitoring of AMU in terrestrial animals

[ ] Yes, integrated with surveillance and monitoring of AMU in aquatic animals

[ ] Yes, integrated with surveillance and monitoring of AMU in plant production and protection

[ ] Yes, integrated with surveillance and monitoring of AMU/AMC in humans

[ ] Yes, integrated with surveillance and monitoring of AMR in humans

[ ] Yes, integrated with surveillance and monitoring of AMR in the aquatic animal production environment

[ ] Yes, integrated with surveillance and monitoring of AMR in the wider environment

[ ] Yes, integrated with surveillance and monitoring of AMR/AMU in others, please specify

[ ] No

[ ] Don’t know

### **B4. Questionnaire on components and implementation of AMR surveillance in food at processing and/or point of sale**

#### **B4.1 Programming of implementation of AMR surveillance in food at processing and/or point of sale**

**B4.1.1** Is there a national strategy/programme/plan specific for AMR surveillance in food at processing and/or point of sale (foods of animal origin at processing –e.g. slaughterhouse- or distribution levels)? *Select only one answer*

 [ ] Yes (Display **B4.1.1a**)

 [ ] No

 [ ] Don’t know

**B4.1.1a** What is the status of development and implementation of this national strategy/programme/plan specific for AMR surveillance in food at processing and/or point of sale? *Select only one answer*

[ ] Under development

[ ] Finalized but waiting for final endorsement

[ ] Approved by Government but no funds allocated

[ ] Approved by Government with allocated funds, and under implementation

[ ] I don’t know

**B4.1.2** Are there any AMR surveillance activities conducted specifically for AMR surveillance food at processing and/or point of sale but without a strategy/programme/plan? *Select only one answer*

[ ] Yes. Please specify:

[ ] No

[ ] Don’t know

#### **B4.2. National AMR Surveillance Network components for AMR surveillance in food at processing and/or point of sale**

##### **Peripheral laboratories supporting surveillance of AMR in food at processing and/or point of sale**

**B4.2.1** Has a national network of peripheral laboratories for AMR surveillance in food at processing and/or point of sale (foods of animal origin at processing –e.g. slaughterhouse- or distribution levels) been established?[[9]](#footnote-10) *Select only one answer*

 [ ] Yes (Display **B4.2.1a, b, c**)

 [ ] No

 [ ] Don’t know

**B4.2.1a** Please provide the number of laboratories included in the network: ……..

**B4.2.1b** What are the responsibilities of the peripheral laboratories supporting surveillance of AMR in food at processing and/or point of sale? *Multiple answers are possible.*

☐ Submission of bacterial isolates to National Reference Laboratory (NRL) for antimicrobial susceptibility testing (AST)

☐ Submission of bacterial isolates to NRL for further molecular characterization

☐ Perform AST and submission of bacterial isolates to NRL for confirmation of results

☐ Submission of written verification of performance of quality control procedures to NRL

☐ Provision of details of their performance in external quality assurance or proficiency testing (EQA/PT) schemes for bacterial isolation and/or AST

☐ Other, please specify …..

**B4.2.1c** What are the requirements for peripheral laboratories to participate in surveillance of AMR in food at processing and/or point of sale? *Multiple answers are possible.*

[ ] Participation in EQA/PT for bacterial isolation and/or AST

[ ]  Shipment of bacterial isolates for confirmation or additional characterization

[ ]  Commitment on data quality of results (methods, format for data sharing)

[ ]  Implementation of quality assurance and/or accreditation of the laboratory

[ ]  No specific requirements, all interested laboratories can participate

##### **National Reference Laboratory (NRL) supporting surveillance of AMR in food at processing and/or point of sale**

**B4.2.2** Has a National Reference Laboratory (NRL) been designated to support AMR surveillance in food at processing and/or point of sale (foods of animal origin at processing –e.g. slaughterhouse- or distribution levels). *Select only one answer*

 [ ] Yes (Display **B4.2.2a, b, c**)

 [ ] No (Display **B4.2.2d**)

 [ ] Don’t know

**B4.2.2a** Please indicate the responsibilities for this national reference laboratory (NRL) within your country’s surveillance network. *Multiple answers are possible.*

[ ]  Coordinate the national AMR laboratory network including peripheral laboratories

[ ]  Confirm results from peripheral laboratories (e.g., specific resistance phenotypes, molecular characterization)

[ ] Validate appropriate methods for defined surveillance programmes

[ ]  Provide guidance and reference material (e.g., protocols, reference strains)

[ ]  Provide external quality assurance/proficiency testing for antimicrobial susceptibility testing to national AMR laboratory network

[ ]  Collaborate and provide support to the NCC

[ ]  Collaborate and provide support to the designated unit/person to analyse AMR surveillance data

[ ]  Provide advice and expertise to risk managers and decision/policy makers

[ ]  Develop research programmes and international scientific collaborations on AMR

[ ]  other (please specify)

**B4.2.2b** Does this NRL participate in External Quality Assurance (EQA)/Proficiency Testing (PT) scheme for Antimicrobial Susceptibility Testing (AST)?

 [ ] Yes (Display i, ii, iii)

 [ ] No

 [ ] Don’t know

1. How often in months is the frequency of EQA/PT? …..

What are the microorganisms assessed: *Multiple answers are possible.* [ ]  *Aeromonas caviae*

[ ]  *Aeromonas hydrophila.*

[ ]  *Aeromonas salmonicida*

[ ]  *Aeromonas sobria*

[ ]  *Aeromonas spp.*

[ ]  *Aeromonas veronii*

[ ]  *Campylobacter* spp*.*

[ ]  *Campylobacter jejuni*

[ ]  *Campylobacter coli*

[ ]  *Clostridium botulinum*

[ ]  *Clostridium perfringens*

[ ]  *Clostridium* spp.

[ ]  *Enterococcus* spp*.*

[ ]  *Enterococcus faecium*

[ ]  *Enterococcus faecalis*

[ ]  *Escherichia coli*

[ ]  *Listeria monocytogenes*

[ ]  *Mycobacterium spp.*

[ ]  *Salmonella* spp*.*

[ ]  *Vibrio cholerae*

[ ]  *Vibrio parahaemolyticus*

[ ]  *Vibrio* spp.

[ ]  *Vibrio vulnificus*

[ ]  Others. Please specify:

1. Are corrective measures taken after EQA/PT? *Select only one answer*

[ ] Yes

[ ] No

[ ] Don’t know

**B4.2.2c** Does this NRL provide support to the peripheral labs on EQA for AST ?

 [ ] Yes (Display i, ii, iii)

 [ ] No

 [ ] Don’t know

1. How often in months is the frequency of EQA/PT? …..
2. What are the microorganisms assessed: *Multiple answers are possible*

☐ *Aeromonas caviae*

☐ *Aeromonas hydrophila.*

☐ *Aeromonas salmonicida*

☐ *Aeromonas sobria*

☐ *Aeromonas spp.*

☐ *Aeromonas veronii*

[ ]  *Campylobacter* spp*.*

[ ]  *Campylobacter jejuni*

[ ]  *Campylobacter coli*

[ ]  *Clostridium botulinum*

[ ]  *Clostridium perfringens*

[ ]  *Clostridium* spp.

[ ]  *Enterococcus* spp*.*

[ ]  *Enterococcus faecium*

[ ]  *Enterococcus faecalis*

[ ]  *Escherichia coli*

[ ]  *Listeria monocytogenes*

[ ]  *Mycobacterium spp.*

[ ]  *Salmonella* spp*.*

[ ]  *Vibrio cholerae*

[ ]  *Vibrio parahaemolyticus*

[ ]  *Vibrio* spp*.*

[ ]  *Vibrio vulnificus*

[ ]  Others. Please specify:

1. Are corrective measures taken after EQA/PT? *Select only one answer*

[ ] Yes

[ ] No

[ ] Don’t know

**B4.2.2d** Is there any institutional body that substitute the function or having equal function as NRL supporting surveillance of AMR in food at processing and/or point of sale? *Select only one answer*

 [ ] Yes, please specify ……………

 [ ] No

##### **National coordinating centre (NCC) or a centralized surveillance team for AMR surveillance in food at processing and/or point of sale**

**B4.2.3** Has a national coordinating centre (NCC) or a centralized surveillance team overseeing AMR surveillance in food at processing and/or point of sale (foods of animal origin at processing –e.g. slaughterhouse- or distribution levels) been established? *Select only one answer*

[ ] Yes (Display **B4.2.3a, b, c**)

[ ] No (Display **B4.2.3d**)

[ ] Don’t know

**B4.2.3a** Please indicate the responsibilities for the NCC for AMR surveillance in food at processing and/or point of sale within your country’s surveillance network. *Multiple answers are possible.*

[ ]  Define objectives and methods for AMR surveillance programmes (e.g., risk-based prioritization, sampling schemes)

[ ]  Coordinate and evaluate implementation of surveillance programmes, collect, and analyse data

[ ]  Disseminate national surveillance protocols

[ ]  Coordination of data collection, collation, analysis, and dissemination of results on AMR prevalence and trends

[ ]  Disseminate surveillance reports

[ ]  Provide expert support to risk managers and decision/policy makers

[ ]  Develop research programmes and international collaboration on AMR

[ ]  Others (please specify)

**B4.2.3b** Who is represented in the NCC for AMR surveillance in food at processing and/or point of sale? *Multiple answers are possible.*

[ ] Centralized unit responsible for AMR data collection and analysis (epidemiology)

[ ] National reference laboratory (NRL)

[ ] National regulatory authorities in food and agriculture sectors

[ ] Public Health authorities

[ ] Governmental veterinary services

[ ] Veterinary practitioners’ organizations

[ ] Veterinary paraprofessionals/animal healthcare workers organizations

[ ] Public laboratories

[ ] Private laboratories

[ ] Food producers and/or farmers organizations

[ ] Pharmaceutical companies

[ ] Civil society representatives

[ ] Food industry

[ ] Plant health protection organizations

[ ] International institutions

[ ]  other (please specify)

**B4.2.3c** Please specify in which Institution is the NCC for AMR surveillance in food at processing and/or point of sale hosted. *Multiple answers are possible.*

[ ]  Ministry of Agriculture

[ ]  Ministry of Fisheries

[ ]  Ministry of Health

[ ]  Food Safety authority

[ ]  National Reference Laboratory

[ ]  Central Veterinary Laboratory

[ ]  Other (please specify)

**B4.2.3d** Is there any institutional body that substitute the function or having equal function as NCC for AMR surveillance in food at processing and/or point of sale? *Select only one answer*

 [ ] Yes, please specify ……………

 [ ] No

#### **B4.3. Epidemiological design elements for generation of AMR data in food at processing and/or point of sale**

**B4.3.1.** How would you define the method used in your country for collection of samples for AMR surveillance in food at processing and/or point of sale (i.e. samples from foods of animal origin at processing –e.g. slaughterhouse- or distribution levels)? *Multiple answers are possible.*

☐ Active (with an epidemiologically defined sampling framework)

☐ Passive (from clinical samples submissions, “collect what is available”)

---------------------------------------------------------------------------------------------------

☐ Comprehensive (all providers/laboratories)

☐ Sentinel/targeted (chosen to set of sites)

---------------------------------------------------------------------------------------------------

☐ Continuous (ongoing)

☐ Episodic (limited period)

☐ Enhanced (specific data collection in addition to routine/continuous surveillance)

☐ Specific projects

**B4.3.2.** What is the scale of geographical representativeness of the AMR surveillance data generated in your country from food at processing and/or point of sale? *Multiple answers are possible.*

[ ]  National surveillance (i.e. performed systematically and regularly) representing a national level population

[ ]  Pilot surveillance (e.g. point prevalence survey) representing a national level population

[ ]  Limited pilot surveillance activities (e.g. point prevalence survey) representing a local level population

**B4.3.3.** What microorganisms are included in your country for AMR surveillance in food at processing and/or point of sale? *Multiple answers are possible.*

☐ *Aeromonas caviae*

☐ *Aeromonas hydrophila.*

☐ *Aeromonas salmonicida*

☐ *Aeromonas sobria*

☐ *Aeromonas spp.*

☐ *Aeromonas veronii*

[ ]  *Campylobacter* spp*.*

[ ]  *Campylobacter jejuni*

[ ]  *Campylobacter coli*

[ ]  *Clostridium botulinum*

[ ]  *Clostridium perfringens*

[ ]  *Clostridium* spp.

[ ]  *Enterococcus s*pp.

[ ]  *Enterococcus faecium*

[ ]  *Enterococcus faecalis*

[ ]  *Escherichia coli*

[ ]  *Listeria monocytogenes*

[ ]  *Mycobacterium spp.*

[ ]  *Salmonella* spp.

[ ]  *Vibrio cholerae*

[ ]  *Vibrio parahaemolyticus*

[ ]  *Vibrio* spp.

[ ]  *Vibrio vulnificus*

[ ]  Others. Please specify:

**B4.3.4.** Have specific list(s) or panels of antibiotics been defined to be tested based on bacterial genus/species for AMR surveillance in food at processing and/or point of sale?

[ ] Yes (Display i)

[ ] No

[ ] Don’t know

1. List the classes of antibiotics represented by the antibiotic panel(s). *Multiple answers are possible*

[ ]  1-gen cephalosporins

☐ 2-gen cephalosporins

☐ 3-gen cephalosporins

☐ 4-gen cephalosporins

☐ Aminocyclitols

☐ Aminoglycosides

☐ Amphenicols

☐ Ansamycins

☐ Carbapenems

☐ Fluoroquinolones

☐ Glycylcyclines

☐ Glycopeptides

☐ Lincosamides

☐ Lipopeptides

☐ Macrolides

☐ Oxazolidinones

☐ Penicillins (aminopenicillins, aminopenicillins with beta-lactamase inhibitors))

☐ Phosphonic acid derivates

☐ Pleuromutilins

☐ Polymyxins

☐ Quinolones

☐ Streptogramins

☐ Sulfonamides, dihydrofolate reductase inhibitors and combinations

☐ Tetracyclines

#### **B4.4. Laboratory methodologies and standards for generation of AMR data food at processing and/or point of sale**

**B4.4.1** What is/are the method(s) used for antimicrobial susceptibility testing (AST) of bacteria isolated from food at processing and/or point of sale in your country? *Multiple answers are possible.*

[ ]  Agar gel dilution

[ ]  Disk diffusion

[ ]  Automated instruments (VITEK, Phoenix)

[ ]  Broth macrodilution

[ ]  Broth microdilution (Sensititre, MicroScan)

[ ]  Concentration gradient test (ETEST)

[ ]  Others, please specify

**B4.4.2** What are the guidelines/standards used in your country for interpretation of AST results in food at processing and/or point of sale? *Multiple answers are possible.*

[ ]  EUCAST

[ ]  CLSI

[ ]  Others, please specify

**B4.4.3** What is the criteria used in your country for interpretation of AST results in food at processing and/or point of sale? *Multiple answers are possible.*

[ ] Epidemiological cut-off values

[ ] Animal clinical breakpoints

[ ] Human clinical breakpoints

**B4.4.4** Are molecular methods used in your country for AMR detection and/or characterization in food at processing and/or point of sale?

[ ] Yes (Display i)

[ ] No

[ ] Don’t know

1. Please specify molecular methods. Multiple answers are possible:

[ ] Polymerase Chain Reaction (PCR) for detection of specific resistance genes

[ ] Sequencing of specific resistance genes

[ ] Whole genome sequencing

[ ] Other (specify) ……

#### **B4.5. Reporting of results of AMR surveillance in food at processing and/or point of sale**

**B4.5.1** Is there a responsible unit or person designated to collect, analyze, and report AMR data (antimicrobial susceptibility testing - AST - data) from surveillance in food at processing and/or point of sale (foods of animal origin at processing –e.g. slaughterhouse- or distribution levels) in your country? *Select only one answer*

 [ ] Yes (Display **B4.5.1a**)

 [ ] No

 [ ] Don’t know

**B4.5.1a** What is the type of AST data collected from AMR surveillance in food at processing and/or point of sale? *Multiple answers are possible*

[ ]  Raw quantitative AST results (i.e. inhibition zone diameters including the disk content or MIC values)

[ ] Interpreted AST results (i.e. isolates categorized as susceptible, intermediate, resistant for clinical breakpoint interpretation and wild type, non-wild type for epidemiological cutoff values interpretation)

[ ] Others. Please specify: \_\_\_\_\_\_\_\_\_\_

**B4.5.2** Are the laboratories supporting AMR surveillance in food at processing and/or point of sale using data management softwares (e.g. WHONET) or Laboratory Information Management Systems (LIMS)? *Select only one answer*

[ ] Yes, please specify …..

[ ] No

[ ] Don’t know

**B4.5.3** Are data from laboratories underperforming in EQA/PT excluded from the analysis and reporting of AMR data from surveillance in food at processing and/or point of sale? *Select only one answer*

[ ] Yes

[ ] No

[ ] Don’t know

**B4.5.4** Are AMR surveillance reports with data from surveillance in food at processing and/or point of sale produced periodically in your country? *Select only one answer*

[ ] Yes (Display ii)

[ ] No (Display iii)

[ ] Don’t know

1. What is the frequency of reporting in months? …..
2. How the data communicated? ……

**B4.5.5** Is the reporting of AMR data in food at processing and/or point of sale integrated with surveillance and monitoring of antimicrobial use (AMU) in agri-food systems, and/or AMR/AMU surveillance and monitoring in other sectors (human and/or environment)? *Multiple answers are possible.*

[ ] Yes, integrated with surveillance and monitoring of AMU in terrestrial animals

[ ] Yes, integrated with surveillance and monitoring of AMU in aquatic animals

[ ] Yes, integrated with surveillance and monitoring of AMU in plant production and protection

[ ] Yes, integrated with surveillance and monitoring of AMU/AMC in humans

[ ] Yes, integrated with surveillance and monitoring of AMR in humans

[ ] Yes, integrated with surveillance and monitoring of AMR in the wider environment

[ ] Yes, integrated with surveillance and monitoring of AMR/AMU in others, please specify

[ ] No

[ ] Don’t know

### **B5. Questionnaire on components and implementation of AMR surveillance in diseased terrestrial animals**

#### **B5.1 Programming of implementation of AMR surveillance in diseased terrestrial animals**

**B5.1.1** Is there a national strategy/programme/plan specific for AMR surveillance in diseased terrestrial animals (clinical samples from sick animals sent to diagnostic laboratories and/or veterinary clinic/hospital)? *Select only one answer*

 [ ] Yes (Display **B5.1.1a**)

 [ ] No

 [ ] Don’t know

**B5.1.1a** What is the status of development and implementation of this national strategy/programme/plan specific for AMR surveillance in diseased terrestrial animals? *Select only one answer*

[ ] Under development

[ ] Finalized but waiting for final endorsement

[ ] Approved by Government but no funds allocated

[ ] Approved by Government with allocated funds, and under implementation

[ ] I don’t know

**B5.1.2** Are there any AMR surveillance activities conducted specifically for AMR surveillance diseased terrestrial animals but without a strategy/programme/plan? *Select only one answer*

[ ] Yes. Please specify:

[ ] No

[ ] Don’t know

#### **B5.2. National AMR Surveillance Network components for AMR surveillance in diseased terrestrial animals**

##### **Peripheral laboratories supporting surveillance of AMR in diseased terrestrial animals**

**B5.2.1** Has a national network of peripheral laboratories for AMR surveillance in diseased terrestrial animals (clinical samples from sick animals sent to diagnostic laboratories and/or veterinary clinic/hospital)? been established?[[10]](#footnote-11) *Select only one answer*

 [ ] Yes (Display **B5.2.1a, b, c**)

 [ ] No

 [ ] Don’t know

**B5.2.1a** Please provide the number of laboratories included in the network: ……..

**B5.2.1b** What are the responsibilities of the peripheral laboratories supporting surveillance of AMR in diseased terrestrial animals? *Multiple answers are possible.*

☐ Submission of bacterial isolates to National Reference Laboratory (NRL) for antimicrobial susceptibility testing (AST)

☐ Submission of bacterial isolates to NRL for further molecular characterization

☐ Perform AST and submission of bacterial isolates to NRL for confirmation of results

☐ Submission of written verification of performance of quality control procedures to NRL

☐ Provision of details of their performance in external quality assurance or proficiency testing (EQA/PT) schemes for bacterial isolation and/or AST

☐ Other, please specify …..

**B5.2.1c** What are the requirements for peripheral laboratories to participate in surveillance of AMR in diseased terrestrial animals? *Multiple answers are possible.*

[ ] Participation in EQA/PT for bacterial isolation and/or AST

[ ]  Shipment of bacterial isolates for confirmation or additional characterization

[ ]  Commitment on data quality of results (methods, format for data sharing)

[ ]  Implementation of quality assurance and/or accreditation of the laboratory

[ ]  No specific requirements, all interested laboratories can participate

##### **National Reference Laboratory (NRL) supporting surveillance of AMR in diseased terrestrial animals**

**B5.2.2** Has a National Reference Laboratory (NRL) been designated to support AMR surveillance in diseased terrestrial animals (clinical samples from sick animals sent to diagnostic laboratories and/or veterinary clinic/hospital)?[[11]](#footnote-12) *Select only one answer*

 [ ] Yes (Display **B5.2.2a, b, c**)

 [ ] No (Display **B5.2.2d**)

 [ ] Don’t know

**B5.2.2a** Please indicate the responsibilities for this national reference laboratory (NRL) within your country’s surveillance network. *Multiple answers are possible.*

[ ]  Coordinate the national AMR laboratory network including peripheral laboratories

[ ]  Confirm results from peripheral laboratories (e.g., specific resistance phenotypes, molecular characterization)

[ ] Validate appropriate methods for defined surveillance programmes

[ ]  Provide guidance and reference material (e.g., protocols, reference strains)

[ ]  Provide external quality assurance/proficiency testing for antimicrobial susceptibility testing to national AMR laboratory network

[ ]  Collaborate and provide support to the NCC

[ ]  Collaborate and provide support to the designated unit/person to analyse AMR surveillance data

[ ]  Provide advice and expertise to risk managers and decision/policy makers

[ ]  Develop research programmes and international scientific collaborations on AMR

[ ]  other (please specify)

**B5.2.2b** Does this NRL participate in External Quality Assurance (EQA)/Proficiency Testing (PT) scheme for Antimicrobial Susceptibility Testing (AST)?

 [ ] Yes (Display i, ii, iii)

 [ ] No

 [ ] Don’t know

1. How often in months is the frequency of EQA/PT? …..

What are the microorganisms assessed: *Multiple answers are possible.* [ ]  *Acinetobacter baumanii*

[ ]  *Actinobacillus pleuropneumoniae*

[ ]  *Avibacterium paragallinarum*

[ ]  *Campylobacter* spp*.*

[ ]  *Campylobacter jejuni*

[ ]  *Campylobacter coli*

[ ]  *Clostridium botulinum*

[ ]  *Clostridium difficile*

[ ]  *Clostridium perfringens*

[ ]  *Clostridium* spp.

[ ]  *Enterococcus* spp*.*

[ ]  *Enterococcus faecium*

[ ]  *Enterococcus faecalis*

[ ]  *Escherichia coli*

[ ]  *Klebsiella pneumoniae*

[ ]  *Mannheimia haemolytica*

[ ]  *Mycobacterium* spp.

[ ]  *Pasteurella multocida*

[ ]  *Pseudomonas aeruginosa*

[ ]  *Salmonella* spp.

[ ]  *Staphylococcus aureus*

[ ]  *Staphylococcus hyicus*

[ ]  *Streptococcus* spp*.*

[ ]  *Streptococcus dysagalactiae*

[ ]  *Streptococcus agalactiae*

[ ]  *Streptococcus* spp*.*

[ ]  *Streptococcus uberis*

[ ]  *Streptococcus suis*

[ ]  *Mycoplasma* spp.

[ ]  *Mycoplasma hyopneumoniae*

[ ]  *Mycoplasma gallisepticum*

[ ]  Others. Please specify:

Are corrective measures taken after EQA/PT? *Select only one answer*

[ ] Yes

[ ] No

[ ] Don’t know

**B5.2.2c** Does this NRL provide support to the peripheral labs on EQA for AST ?

 [ ] Yes (Display i, ii, iii)

 [ ] No

 [ ] Don’t know

1. How often in months is the frequency of EQA/PT? …..
2. What are the microorganisms assessed: *Multiple answers are possible*

[ ]  *Acinetobacter baumanii*

[ ]  *Actinobacillus pleuropneumoniae*

[ ]  *Avibacterium paragallinarum*

[ ]  *Campylobacter* spp.

[ ]  *Campylobacter jejuni*

[ ]  *Campylobacter coli*

[ ]  *Clostridium botulinum*

[ ]  *Clostridium difficile*

[ ]  *Clostridium perfringens*

[ ]  *Clostridium* spp.

[ ]  *Enterococcus* spp*.*

[ ]  *Enterococcus faecium*

[ ]  *Enterococcus faecalis*

[ ]  *Escherichia coli*

[ ]  *Klebsiella pneumoniae*

[ ]  *Mannheimia haemolytica*

[ ]  *Mycobacterium* spp.

[ ]  *Pasteurella multocida*

[ ]  *Pseudomonas aeruginosa*

[ ]  *Salmonella* spp*.*

[ ]  *Staphylococcus aureus*

[ ]  *Staphylococcus hyicus*

[ ]  *Streptococcus* spp.

[ ]  *Streptococcus dysagalactiae*

[ ]  *Streptococcus agalactiae*

[ ]  *Streptococcus* spp.

[ ]  *Streptococcus uberis*

[ ]  *Streptococcus suis*

[ ]  *Mycoplasma* spp.

[ ]  *Mycoplasma hyopneumoniae*

[ ]  *Mycoplasma gallisepticum*

[ ]  Others. Please specify:

1. Are corrective measures taken after EQA/PT? *Select only one answer*

[ ] Yes

[ ] No

[ ] Don’t know

**B5.2.2d** Is there any institutional body that substitute the function or having equal function as NRL supporting surveillance of AMR in diseased terrestrial animals? *Select only one answer*

 [ ] Yes, please specify ……………

 [ ] No

##### **National coordinating centre (NCC) or a centralized surveillance team for AMR surveillance in diseased terrestrial animals**

**B5.2.3** Has a national coordinating centre (NCC) or a centralized surveillance team overseeing AMR surveillance in diseased terrestrial animals (clinical samples from sick animals sent to diagnostic laboratories and/or veterinary clinic/hospital) been established? *Select only one answer*

[ ] Yes (Display **B5.2.3a, b, c**)

[ ] No (Display **B5.2.3d**)

[ ] Don’t know

**B5.2.3a** Please indicate the responsibilities for the NCC for AMR surveillance in diseased terrestrial animals within your country’s surveillance network. *Multiple answers are possible.*

[ ]  Define objectives and methods for AMR surveillance programmes (e.g., risk-based prioritization, sampling schemes)

[ ]  Coordinate and evaluate implementation of surveillance programmes, collect, and analyse data

[ ]  Disseminate national surveillance protocols

[ ]  Coordination of data collection, collation, analysis, and dissemination of results on AMR prevalence and trends

[ ]  Disseminate surveillance reports

[ ]  Provide expert support to risk managers and decision/policy makers

[ ]  Develop research programmes and international collaboration on AMR

[ ]  Others (please specify)

**B5.2.3b** Who is represented in the NCC for AMR surveillance in diseased terrestrial animals? *Multiple answers are possible.*

[ ] Centralized unit responsible for AMR data collection and analysis (epidemiology)

[ ] National reference laboratory (NRL)

[ ] National regulatory authorities in food and agriculture sectors

[ ] Public Health authorities

[ ] Governmental veterinary services

[ ] Veterinary practitioners’ organizations

[ ] Veterinary paraprofessionals/animal healthcare workers organizations

[ ] Public laboratories

[ ] Private laboratories

[ ] Food producers and/or farmers organizations

[ ] Pharmaceutical companies

[ ] Civil society representatives

[ ] Food industry

[ ] Plant health protection organizations

[ ] International institutions

[ ]  other (please specify)

**B5.2.3c** Please specify in which Institution is the NCC for AMR surveillance in diseased terrestrial animals hosted. *Multiple answers are possible.*

[ ]  Ministry of Agriculture

[ ]  Ministry of Health

[ ]  Food Safety authority

[ ]  National Reference Laboratory

[ ]  Central Veterinary Laboratory

[ ]  Other (please specify)

**B5.2.3d** Is there any institutional body that substitute the function or having equal function as NCC for AMR surveillance in diseased terrestrial animals? *Select only one answer*

 [ ] Yes, please specify ……………

 [ ] No

#### **B5.3. Epidemiological design elements for generation of AMR data in diseased terrestrial animals**

**B5.3.1.** How would you define the method used in your country for collection of samples for AMR surveillance in diseased terrestrial animals (clinical samples from sick animals sent to diagnostic laboratories and/or veterinary clinic/hospital)? *Multiple answers are possible.*

☐ Passive (from clinical samples submissions, “collect what is available”)

---------------------------------------------------------------------------------------------------

☐ Comprehensive (all providers/laboratories)

☐ Sentinel/targeted (chosen to set of sites)

---------------------------------------------------------------------------------------------------

☐ Continuous (ongoing)

☐ Episodic (limited period)

☐ Enhanced (specific data collection in addition to routine/continuous surveillance)

☐ Specific projects

**B5.3.2.** What is the scale of geographical representativeness of the AMR surveillance data generated in your country from diseased terrestrial animals? *Multiple answers are possible.*

[ ]  National surveillance (i.e. performed systematically and regularly) representing a national level population

[ ]  Pilot surveillance (e.g. point prevalence survey) representing a national level population

[ ]  Limited pilot surveillance activities (e.g. point prevalence survey) representing a local level population

**B5.3.3.** What microorganisms are included in your country for AMR surveillance in diseased terrestrial animals? *Multiple answers are possible.*

[ ]  *Acinetobacter baumanii*

[ ]  *Actinobacillus pleuropneumoniae*

[ ]  *Avibacterium paragallinarum*

[ ]  *Campylobacter* spp*.*

[ ]  *Campylobacter jejuni*

[ ]  *Campylobacter coli*

[ ]  *Clostridium botulinum*

[ ]  *Clostridium difficile*

[ ]  *Clostridium perfringens*

[ ]  *Clostridium* spp.

[ ]  *Enterococcus* spp.

[ ]  *Enterococcus faecium*

[ ]  *Enterococcus faecalis*

[ ]  *Escherichia coli*

[ ]  *Klebsiella pneumoniae*

[ ]  *Mannheimia haemolytica*

[ ]  *Mycobacterium* spp.

[ ]  *Pasteurella multocida*

[ ]  *Pseudomonas aeruginosa*

[ ]  *Salmonella* spp.

[ ]  *Staphylococcus aureus*

[ ]  *Staphylococcus hyicus*

[ ]  *Streptococcus* spp.

[ ]  *Streptococcus dysagalactiae*

[ ]  *Streptococcus agalactiae*

[ ]  *Streptococcus* spp.

[ ]  *Streptococcus uberis*

[ ]  *Streptococcus suis*

[ ]  *Mycoplasma* spp*.*

[ ]  *Mycoplasma hyopneumoniae*

[ ]  *Mycoplasma gallisepticum*

[ ]  Others. Please specify:

**B5.3.4.** Have specific list(s) or panels of antibiotics been defined to be tested based on bacterial genus/species for AMR surveillance in diseased terrestrial animals?

[ ] Yes (Display i)

[ ] No

[ ] Don’t know

1. List the classes of antibiotics represented by the antibiotic panel(s). *Multiple answers are possible*

[ ]  1-gen cephalosporins

☐ 2-gen cephalosporins

☐ 3-gen cephalosporins

☐ 4-gen cephalosporins

☐ Aminocyclitols

☐ Aminoglycosides

☐ Amphenicols

☐ Ansamycins

☐ Carbapenems

☐ Fluoroquinolones

☐ Glycylcyclines

☐ Glycopeptides

☐ Lincosamides

☐ Lipopeptides

☐ Macrolides

☐ Oxazolidinones

☐ Penicillins (aminopenicillins, aminopenicillins with beta-lactamase inhibitors))

☐ Phosphonic acid derivates

☐ Pleuromutilins

☐ Polymyxins

☐ Quinolones

☐ Streptogramins

☐ Sulfonamides, dihydrofolate reductase inhibitors and combinations

☐ Tetracyclines

#### **B5.4. Laboratory methodologies and standards for generation of AMR data in diseased terrestrial animals**

**B5.4.1** What is/are the method(s) used for antimicrobial susceptibility testing (AST) of bacteria isolated from diseased terrestrial animals in your country? *Multiple answers are possible.*

[ ]  Agar gel dilution

[ ]  Disk diffusion

[ ]  Automated instruments (VITEK, Phoenix)

[ ]  Broth macrodilution

[ ]  Broth microdilution (Sensititre, MicroScan)

[ ]  Concentration gradient test (ETEST)

[ ]  Others, please specify

**B5.4.2** What are the guidelines/standards used in your country for interpretation of AST results in diseased terrestrial animals? *Multiple answers are possible.*

[ ]  EUCAST

[ ]  CLSI

[ ]  Others, please specify

**B5.4.3** What is the criteria used in your country for interpretation of AST results in diseased terrestrial animals? *Multiple answers are possible.*

[ ] Epidemiological cut-off values

[ ] Animal clinical breakpoints

[ ] Human clinical breakpoints

**B5.4.4** Are molecular methods used in your country for AMR detection and/or characterization in diseased terrestrial animals?

[ ] Yes (Display i)

[ ] No

[ ] Don’t know

1. Please specify molecular methods. Multiple answers are possible:

[ ] Polymerase Chain Reaction (PCR) for detection of specific resistance genes

[ ] Sequencing of specific resistance genes

[ ] Whole genome sequencing

[ ] Other (specify) ……

#### **B5.5. Reporting of results of AMR surveillance in diseased terrestrial animals**

**B5.5.1** Is there a responsible unit or person designated to collect, analyze, and report AMR data (antimicrobial susceptibility testing - AST - data) from surveillance in diseased terrestrial animals (clinical samples from sick animals sent to diagnostic laboratories and/or veterinary clinic/hospital) in your country? *Select only one answer*

 [ ] Yes (Display **B5.5.1a**)

 [ ] No

 [ ] Don’t know

**B5.5.1a** What is the type of AST data collected from AMR surveillance in diseased terrestrial animals? *Multiple answers are possible*

[ ]  Raw quantitative AST results (i.e. inhibition zone diameters including the disk content or MIC values)

[ ] Interpreted AST results (i.e. isolates categorized as susceptible, intermediate, resistant for clinical breakpoint interpretation and wild type, non-wild type for epidemiological cutoff values interpretation)

[ ] Others. Please specify: \_\_\_\_\_\_\_\_\_\_

**B5.5.2** Are the laboratories supporting AMR surveillance in diseased terrestrial animals using data management softwares (e.g. WHONET) or Laboratory Information Management Systems (LIMS)? *Select only one answer*

[ ] Yes, please specify …..

[ ] No

[ ] Don’t know

**B5.5.3** Are data from laboratories underperforming in EQA/PT excluded from the analysis and reporting of AMR data from surveillance in diseased terrestrial animals? *Select only one answer*

[ ] Yes

[ ] No

[ ] Don’t know

**B5.5.4** Are AMR surveillance reports with data from surveillance in diseased terrestrial animals produced periodically in your country? *Select only one answer*

[ ] Yes (Display ii)

[ ] No (Display iii)

[ ] Don’t know

1. What is the frequency of reporting in months? …..
2. How the data communicated? ……

**B5.5.5** Is the reporting of AMR data in diseased terrestrial animals integrated with surveillance and monitoring of antimicrobial use (AMU) in agri-food systems, and/or AMR/AMU surveillance and monitoring in other sectors (human and/or environment)? *Multiple answers are possible.*

[ ] Yes, integrated with surveillance and monitoring of AMU in terrestrial animals

[ ] Yes, integrated with surveillance and monitoring of AMU in aquatic animals

[ ] Yes, integrated with surveillance and monitoring of AMU in plant production and protection

[ ] Yes, integrated with surveillance and monitoring of AMU/AMC in humans

[ ] Yes, integrated with surveillance and monitoring of AMR in humans

[ ] Yes, integrated with surveillance and monitoring of AMR in the wider environment

[ ] Yes, integrated with surveillance and monitoring of AMR/AMU in others, please specify

[ ] No

[ ] Don’t know

### **B6. Questionnaire on components and implementation of AMR surveillance in diseased aquatic animals**

#### **B6.1 Programming of implementation of AMR surveillance in diseased aquatic animals**

**B6.1.1** Is there a national strategy/programme/plan specific for AMR surveillance in diseased aquatic animals (clinical samples from sick aquatic animals sent to diagnostic laboratories)? *Select only one answer*

 [ ] Yes (Display **B6.1.1a**)

 [ ] No

 [ ] Don’t know

**B6.1.1a** What is the status of development and implementation of this national strategy/programme/plan specific for AMR surveillance in diseased aquatic animals? *Select only one answer*

[ ] Under development

[ ] Finalized but waiting for final endorsement

[ ] Approved by Government but no funds allocated

[ ] Approved by Government with allocated funds, and under implementation

[ ] I don’t know

**B6.1.2** Are there any AMR surveillance activities conducted specifically for AMR surveillance diseased aquatic animals but without a strategy/programme/plan? *Select only one answer*

[ ] Yes. Please specify:

[ ] No

[ ] Don’t know

#### **B6.2. National AMR Surveillance Network components for AMR surveillance in diseased aquatic animals**

##### **Peripheral laboratories supporting surveillance of AMR in diseased aquatic animals**

**B6.2.1** Has a national network of peripheral laboratories for AMR surveillance diseased aquatic animals (clinical samples from sick aquatic animals sent to diagnostic laboratories) been established?[[12]](#footnote-13) *Select only one answer*

 [ ] Yes (Display **B6.2.1a, b, c**)

 [ ] No

 [ ] Don’t know

**B6.2.1a** Please provide the number of laboratories included in the network: ……..

**B6.2.1b** What are the responsibilities of the peripheral laboratories supporting surveillance of AMR in diseased aquatic animals? *Multiple answers are possible.*

☐ Submission of bacterial isolates to National Reference Laboratory (NRL) for antimicrobial susceptibility testing (AST)

☐ Submission of bacterial isolates to NRL for further molecular characterization

☐ Perform AST and submission of bacterial isolates to NRL for confirmation of results

☐ Submission of written verification of performance of quality control procedures to NRL

☐ Provision of details of their performance in external quality assurance or proficiency testing (EQA/PT) schemes for bacterial isolation and/or AST

☐ Other, please specify …..

**B6.2.1c** What are the requirements for peripheral laboratories to participate in surveillance of AMR in diseased aquatic animals? *Multiple answers are possible.*

[ ] Participation in EQA/PT for bacterial isolation and/or AST

[ ]  Shipment of bacterial isolates for confirmation or additional characterization

[ ]  Commitment on data quality of results (methods, format for data sharing)

[ ]  Implementation of quality assurance and/or accreditation of the laboratory

[ ]  No specific requirements, all interested laboratories can participate

##### **National Reference Laboratory (NRL) supporting surveillance of AMR in diseased aquatic animals**

**B6.2.2** Has a National Reference Laboratory (NRL) been designated to support AMR surveillance in diseased aquatic animals (clinical samples from sick aquatic animals sent to diagnostic laboratories)?[[13]](#footnote-14) *Select only one answer*

 [ ] Yes (Display **B6.2.2a, b, c**)

 [ ] No (Display **B6.2.2d**)

 [ ] Don’t know

**B6.2.2a** Please indicate the responsibilities for this national reference laboratory (NRL) within your country’s surveillance network. *Multiple answers are possible.*

[ ]  Coordinate the national AMR laboratory network including peripheral laboratories

[ ]  Confirm results from peripheral laboratories (e.g., specific resistance phenotypes, molecular characterization)

[ ] Validate appropriate methods for defined surveillance programmes

[ ]  Provide guidance and reference material (e.g., protocols, reference strains)

[ ]  Provide external quality assurance/proficiency testing for antimicrobial susceptibility testing to national AMR laboratory network

[ ]  Collaborate and provide support to the NCC

[ ]  Collaborate and provide support to the designated unit/person to analyse AMR surveillance data

[ ]  Provide advice and expertise to risk managers and decision/policy makers

[ ]  Develop research programmes and international scientific collaborations on AMR

[ ]  other (please specify)

**B6.2.2b** Does this NRL participate in External Quality Assurance (EQA)/Proficiency Testing (PT) scheme for Antimicrobial Susceptibility Testing (AST)?

 [ ] Yes (Display i, ii, iii)

 [ ] No

 [ ] Don’t know

1. How often in months is the frequency of EQA/PT? …..

What are the microorganisms assessed: *Multiple answers are possible.* [ ]  *Aeromonas* spp*.*

[ ]  *Aeromonas caviae*

[ ]  *Aeromonas hydrophila*

[ ]  *Aeromonas sobria*

[ ]  *Aeromonas salmonicida*

[ ]  *Aeromonas veronii*

[ ]  *Clostridium botulinum*

[ ]  *Clostridium* spp.

[ ]  *Escherichia coli*

[ ]  *Mycobacterium* spp.

[ ]  *Streptococcus agalactiae*

[ ]  *Streptococcus dysgalactiae*

[ ]  *Streptococcus phocae*

[ ]  *Streptococcus iniae*

[ ]  *Streptococcus spp.*

[ ]  *Vibrio* spp.

[ ]  *Vibrio anguillarum*

[ ]  *Vibrio cholerae*

[ ]  *Vibrio vulnificus*

[ ]  *Vibrio parahaemolyticus*

[ ]  *Vibrio alginolyticus*

[ ]  *Edwardsiella* spp*.*

[ ]  *Edwardsiella anguillarum*

[ ]  *Edwardsiella tarda*

[ ]  *Edwardsiella ictaluri*

[ ]  *Edwardsiella piscicida*

[ ]  *Yersinia ruckeri*

[ ]  Others. Please specify:

1. Are corrective measures taken after EQA/PT? *Select only one answer*

[ ] Yes

[ ] No

[ ] Don’t know

**B6.2.2c** Does this NRL provide support to the peripheral labs on EQA for AST?

 [ ] Yes (Display i, ii, iii)

 [ ] No

 [ ] Don’t know

1. How often in months is the frequency of EQA/PT? …..
2. What are the microorganisms assessed: *Multiple answers are possible*

[ ]  *Aeromonas spp.*

[ ]  *Aeromonas caviae*

[ ]  *Aeromonas hydrophila*

[ ]  *Aeromonas sobria*

[ ]  *Aeromonas salmonicida*

[ ]  *Aeromonas veronii*

[ ]  *Clostridium botulinum*

[ ]  *Clostridium* spp.

[ ]  *Escherichia coli*

[ ]  *Mycobacterium* spp.

[ ]  *Streptococcus agalactiae*

[ ]  *Streptococcus dysgalactiae*

[ ]  *Streptococcus phocae*

[ ]  *Streptococcus iniae*

[ ]  *Streptococcus spp.*

[ ]  *Vibrio* spp*.*

[ ]  *Vibrio anguillarum*

[ ]  *Vibrio cholerae*

[ ]  *Vibrio vulnificus*

[ ]  *Vibrio parahaemolyticus*

[ ]  *Vibrio alginolyticus*

[ ]  *Edwardsiella* spp.

[ ]  *Edwardsiella anguillarum*

[ ]  *Edwardsiella tarda*

[ ]  *Edwardsiella ictaluri*

[ ]  *Edwardsiella piscicida*

[ ]  *Yersinia ruckeri*

[ ]  Others. Please specify:

1. Are corrective measures taken after EQA/PT? *Select only one answer*

[ ] Yes

[ ] No

[ ] Don’t know

**B5.2.2d** Is there any institutional body that substitute the function or having equal function as NRL supporting surveillance of AMR in diseased aquatic animals? *Select only one answer*

 [ ] Yes, please specify ……………

 [ ] No

##### **National coordinating centre (NCC) or a centralized surveillance team for AMR surveillance in diseased aquatic animals**

**B6.2.3** Has a national coordinating centre (NCC) or a centralized surveillance team overseeing AMR surveillance in diseased aquatic animals (clinical samples from sick aquatic animals sent to diagnostic laboratories) been established? *Select only one answer*

[ ] Yes (Display **B6.2.3a, b, c**)

[ ] No (Display **B6.2.3d**)

[ ] Don’t know

**B6.2.3a** Please indicate the responsibilities for the NCC for AMR surveillance in diseased aquatic animals within your country’s surveillance network. *Multiple answers are possible.*

[ ]  Define objectives and methods for AMR surveillance programmes (e.g., risk-based prioritization, sampling schemes)

[ ]  Coordinate and evaluate implementation of surveillance programmes, collect, and analyse data

[ ]  Disseminate national surveillance protocols

[ ]  Coordination of data collection, collation, analysis, and dissemination of results on AMR prevalence and trends

[ ]  Disseminate surveillance reports

[ ]  Provide expert support to risk managers and decision/policy makers

[ ]  Develop research programmes and international collaboration on AMR

[ ]  Others (please specify)

**B6.2.3b** Who is represented in the NCC for AMR surveillance in diseased aquatic animals? *Multiple answers are possible.*

[ ] Centralized unit responsible for AMR data collection and analysis (epidemiology)

[ ] National reference laboratory (NRL)

[ ] National regulatory authorities in food and agriculture sectors

[ ] Public Health authorities

[ ] Governmental veterinary services

[ ] Veterinary practitioners’ organizations

[ ] Veterinary paraprofessionals/animal healthcare workers organizations

[ ] Public laboratories

[ ] Private laboratories

[ ] Food producers and/or farmers organizations

[ ] Pharmaceutical companies

[ ] Civil society representatives

[ ] Food industry

[ ] Plant health protection organizations

[ ] International institutions

[ ]  other (please specify)

**B6.2.3c** Please specify in which Institution is the NCC for AMR surveillance in diseased aquatic animals hosted. *Multiple answers are possible.*

[ ]  Ministry of Agriculture

[ ]  Ministry of Fisheries

[ ]  Ministry of Health

[ ]  Food Safety authority

[ ]  National Reference Laboratory

[ ]  Central Veterinary Laboratory

[ ]  Other (please specify)

**B6.2.3d** Is there any institutional body that substitute the function or having equal function as NCC for AMR surveillance in diseased aquatic animals? *Select only one answer*

 [ ] Yes, please specify ……………

 [ ] No

#### **B6.3. Epidemiological design elements for generation of AMR data in diseased aquatic animals**

**B6.3.1.** How would you define the method used in your country for collection of samples for AMR surveillance in diseased aquatic animals (clinical samples from sick aquatic animals sent to diagnostic laboratories)? *Multiple answers are possible.*

☐ Passive (from clinical samples submissions, “collect what is available”)

---------------------------------------------------------------------------------------------------

☐ Comprehensive (all providers/laboratories)

☐ Sentinel/targeted (chosen to set of sites)

---------------------------------------------------------------------------------------------------

☐ Continuous (ongoing)

☐ Episodic (limited period)

☐ Enhanced (specific data collection in addition to routine/continuous surveillance)

☐ Specific projects

**B6.3.2.** What is the scale of geographical representativeness of the AMR surveillance data generated in your country from diseased aquatic animals? *Multiple answers are possible.*

[ ]  National surveillance (i.e. performed systematically and regularly) representing a national level population

[ ]  Pilot surveillance (e.g. point prevalence survey) representing a national level population

[ ]  Limited pilot surveillance activities (e.g. point prevalence survey) representing a local level population

**B6.3.3.** What microorganisms are included in your country for AMR surveillance in diseased aquatic animals? *Multiple answers are possible.*

[ ]  *Aeromonas spp.*

[ ]  *Aeromonas caviae*

[ ]  *Aeromonas hydrophila*

[ ]  *Aeromonas sobria*

[ ]  *Aeromonas salmonicida*

[ ]  *Aeromonas veronii*

[ ]  *Clostridium botulinum*

[ ]  *Clostridium* spp.

[ ]  *Escherichia coli*

[ ]  *Mycobacterium* spp.

[ ]  *Streptococcus agalactiae*

[ ]  *Streptococcus dysgalactiae*

[ ]  *Streptococcus phocae*

[ ]  *Streptococcus iniae*

[ ]  *Streptococcus spp.*

[ ]  *Vibrio* spp.

[ ]  *Vibrio anguillarum*

[ ]  *Vibrio cholerae*

[ ]  *Vibrio vulnificus*

[ ]  *Vibrio parahaemolyticus*

[ ]  *Vibrio alginolyticus*

[ ]  *Edwardsiella* spp.

[ ]  *Edwardsiella anguillarum*

[ ]  *Edwardsiella tarda*

[ ]  *Edwardsiella ictaluri*

[ ]  *Edwardsiella piscicida*

[ ]  *Yersinia ruckeri*

[ ]  Others. Please specify:

**B6.3.4.** Have specific list(s) or panels of antibiotics been defined to be tested based on bacterial genus/species for AMR surveillance in diseased aquatic animals?

[ ] Yes (Display i)

[ ] No

[ ] Don’t know

1. List the classes of antibiotics represented by the antibiotic panel(s). *Multiple answers are possible*

[ ]  1-gen cephalosporins

☐ 2-gen cephalosporins

☐ 3-gen cephalosporins

☐ 4-gen cephalosporins

☐ Aminocyclitols

☐ Aminoglycosides

☐ Amphenicols

☐ Ansamycins

☐ Carbapenems

☐ Fluoroquinolones

☐ Glycylcyclines

☐ Glycopeptides

☐ Lincosamides

☐ Lipopeptides

☐ Macrolides

☐ Oxazolidinones

☐ Penicillins (aminopenicillins, aminopenicillins with beta-lactamase inhibitors))

☐ Phosphonic acid derivates

☐ Pleuromutilins

☐ Polymyxins

☐ Quinolones

☐ Streptogramins

☐ Sulfonamides, dihydrofolate reductase inhibitors and combinations

☐ Tetracyclines

#### **B6.4. Laboratory methodologies and standards for generation of AMR data in diseased aquatic animals**

**B6.4.1** What is/are the method(s) used for antimicrobial susceptibility testing (AST) of bacteria isolated from diseased aquatic animals in your country? *Multiple answers are possible.*

[ ]  Agar gel dilution

[ ]  Disk diffusion

[ ]  Automated instruments (VITEK, Phoenix)

[ ]  Broth macrodilution

[ ]  Broth microdilution (Sensititre, MicroScan)

[ ]  Concentration gradient test (ETEST)

[ ]  Others, please specify

**B6.4.2** What are the guidelines/standards used in your country for interpretation of AST results in diseased aquatic animals? *Multiple answers are possible.*

[ ]  EUCAST

[ ]  CLSI

[ ]  Others, please specify

**B6.4.3** What is the criteria used in your country for interpretation of AST results in diseased aquatic animals? *Multiple answers are possible.*

[ ] Epidemiological cut-off values

[ ] Animal clinical breakpoints

[ ] Human clinical breakpoints

**B6.4.4** Are molecular methods used in your country for AMR detection and/or characterization in diseased aquatic animals?

[ ] Yes (Display i)

[ ] No

[ ] Don’t know

1. Please specify molecular methods. Multiple answers are possible:

[ ] Polymerase Chain Reaction (PCR) for detection of specific resistance genes

[ ] Sequencing of specific resistance genes

[ ] Whole genome sequencing

[ ] Other (specify) ……

#### **B6.5. Reporting of results of AMR surveillance in diseased aquatic animals**

**B6.5.1** Is there a responsible unit or person designated to collect, analyze, and report AMR data (antimicrobial susceptibility testing - AST - data) from surveillance in diseased aquatic (clinical samples from sick aquatic animals sent to diagnostic laboratories) in your country? *Select only one answer*

 [ ] Yes (Display **B6.5.1a**)

 [ ] No

 [ ] Don’t know

**B6.5.1a** What is the type of AST data collected from AMR surveillance in diseased aquatic animals? *Multiple answers are possible*

[ ]  Raw quantitative AST results (i.e. inhibition zone diameters including the disk content or MIC values)

[ ] Interpreted AST results (i.e. isolates categorized as susceptible, intermediate, resistant for clinical breakpoint interpretation and wild type, non-wild type for epidemiological cutoff values interpretation)

[ ] Others. Please specify: \_\_\_\_\_\_\_\_\_\_

**B6.5.2** Are the laboratories supporting AMR surveillance in diseased aquatic animals using data management softwares (e.g. WHONET) or Laboratory Information Management Systems (LIMS)? *Select only one answer*

[ ] Yes, please specify …..

[ ] No

[ ] Don’t know

**B6.5.3** Are data from laboratories underperforming in EQA/PT excluded from the analysis and reporting of AMR data from surveillance in diseased aquatic animals? *Select only one answer*

[ ] Yes

[ ] No

[ ] Don’t know

**B6.5.4** Are AMR surveillance reports with data from surveillance in diseased aquatic animals produced periodically in your country? *Select only one answer*

[ ] Yes (Display i)

[ ] No (Display ii)

[ ] Don’t know

1. What is the frequency of reporting in months? …..
2. How the data communicated? ……

**B5.5.5** Is the reporting of AMR data in diseased aquatic animals integrated with surveillance and monitoring of antimicrobial use (AMU) in agri-food systems, and/or AMR/AMU surveillance and monitoring in other sectors (human and/or environment)? *Multiple answers are possible.*

[ ] Yes, integrated with surveillance and monitoring of AMU in terrestrial animals

[ ] Yes, integrated with surveillance and monitoring of AMU in aquatic animals

[ ] Yes, integrated with surveillance and monitoring of AMU in plant production and protection

[ ] Yes, integrated with surveillance and monitoring of AMU/AMC in humans

[ ] Yes, integrated with surveillance and monitoring of AMR in humans

[ ] Yes, integrated with surveillance and monitoring of AMR in the wider environment

[ ] Yes, integrated with surveillance and monitoring of AMR/AMU in others, please specify

[ ] No

[ ] Don’t know

## **Section C. Additional AMR/AMU surveillance activities across sectors**

**C1** Is surveillance and monitoring of antimicrobial use (AMU) in agri-food systems, and/or AMR/AMU surveillance and monitoring in other sectors (human and/or environment) implemented in your country? Please select the answers that apply. *Multiple answers are possible*

[ ]  Monitoring/ surveillance of the antimicrobial use (AMU) in terrestrial animals at the farm level producing national estimates

[ ]  Monitoring/ surveillance of the antimicrobial use (AMU) in aquatic animals at the farm level producing national estimates

[ ]  Pilot studies of AMU in terrestrial animals at local level

[ ]  Pilot studies of AMU in aquatic animals at local level

[ ]  Monitoring/ Surveillance of the use of antimicrobial agents as pesticides in plant production and protection

[ ]  Monitoring of quantities of antimicrobial agents in terrestrial animals at national level (e.g., from imports, wholesalers’ data, marketing authorization holder declarations, or veterinary prescription)

[ ]  Monitoring of quantities of antimicrobial agents in aquatic animals at national level (e.g., from imports, wholesalers’ data, marketing authorization holder declarations, or veterinary prescription)

[ ]  Monitoring/ Surveillance of AMR in humans

[ ]  Monitoring/ Surveillance of AMU/AMC in humans

[ ]  Monitoring/ Surveillance of AMR in isolates from the environment (sewage, water)

[ ]  Other, please specify\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

[ ]  Unknown

## **Section D. Additional information on AMR/AMU surveillance**

D1. Would you like to add any additional information not covered in the questionnaire to better contextualize AMR Surveillance in animals and food in your country? For instance, you can elaborate on elements of governance related to AMR surveillance, discuss different surveillance designs for priority animal species, or share your future plans for expansion, etc.

|  |
| --- |
| Free text: 10000 characters |

1. InFARM-FPs is/are nominated in coordination with the national bodies overseeing the development and implementation of AMR monitoring and surveillance in food and agriculture. InFARM-FPs is/are ideally national expert(s) with knowledge and/or experience in epidemiology, microbiology, and data management of antimicrobial susceptibility testing results (i.e., AMR data) originated from samples collected animals and food. A single InFARM-FP can be nominated to cover all AMR surveillance and monitoring programme. Alternatively, several InFARM-FPs can be nominated, one per each specific AMR surveillance and monitoring programme under FAO’s remit (i.e., healthy terrestrial animals, diseased terrestrial animals, healthy aquatic animals, diseased aquatic animals, food at processing and/or point of sale according to national surveillance network structure. [↑](#footnote-ref-2)
2. Please select the box(es) that are applicable according to A2. For example, if you are representing the surveillance programme for healthy terrestrial animals in A2, please select the corresponding programme when answering the questionnaire. If you are responsible for multiple surveillance programs in A2, please answer the questions specific to each program separately. Additionally, if there is integration between these programmes, please answer the questions regarding the integration if applicable. [↑](#footnote-ref-3)
3. Peripheral laboratories (e.g. veterinary diagnostic laboratories, public health or food safety laboratories, central veterinary laboratories) are processing samples received from the different surveillance sites (farms, slaughterhouse, food establishments) for isolation of bacteria. They can additionally conduct further molecular characterization and/or antimicrobial susceptibility testing of bacterial isolates. [↑](#footnote-ref-4)
4. The National Reference Laboratory (NRL) has expertise in methods for detection and characterization of AMR. The functions of the NRL for AMR may include the provision of guidance and technical support on antimicrobial susceptibility testing (AST) and quality management to peripheral laboratories in the laboratory network, including the confirmation of results, the validation and standardization of methods and results for surveillance programme(s), and the provision of external quality assurance schemes/proficiency testing to evaluate the quality of laboratory results and identify correction actions. [↑](#footnote-ref-5)
5. Peripheral laboratories (e.g. veterinary diagnostic laboratories, public health or food safety laboratories, central veterinary laboratories) are processing samples received from the different surveillance sites (farms, slaughterhouse, food establishments) for isolation of bacteria. They can additionally conduct further molecular characterization and/or antimicrobial susceptibility testing of bacterial isolates. [↑](#footnote-ref-6)
6. The National Reference Laboratory (NRL) has expertise in methods for detection and characterization of AMR. The functions of the NRL for AMR may include the provision of guidance and technical support on antimicrobial susceptibility testing (AST) and quality management to peripheral laboratories in the laboratory network, including the confirmation of results, the validation and standardization of methods and results for surveillance programme(s), and the provision of external quality assurance schemes/proficiency testing to evaluate the quality of laboratory results and identify correction actions. [↑](#footnote-ref-7)
7. Peripheral laboratories (e.g. veterinary diagnostic laboratories, public health or food safety laboratories, central veterinary laboratories) are processing samples received from the different surveillance sites (farms, slaughterhouse, food establishments) for isolation of bacteria. They can additionally conduct further molecular characterization and/or antimicrobial susceptibility testing of bacterial isolates. [↑](#footnote-ref-8)
8. The National Reference Laboratory (NRL) has expertise in methods for detection and characterization of AMR. The functions of the NRL for AMR may include the provision of guidance and technical support on antimicrobial susceptibility testing (AST) and quality management to peripheral laboratories in the laboratory network, including the confirmation of results, the validation and standardization of methods and results for surveillance programme(s), and the provision of external quality assurance schemes/proficiency testing to evaluate the quality of laboratory results and identify correction actions. [↑](#footnote-ref-9)
9. Peripheral laboratories (e.g. veterinary diagnostic laboratories, public health or food safety laboratories, central veterinary laboratories) are processing samples received from the different surveillance sites (farms, slaughterhouse, food establishments) for isolation of bacteria. They can additionally conduct further molecular characterization and/or antimicrobial susceptibility testing of bacterial isolates. [↑](#footnote-ref-10)
10. Peripheral laboratories (e.g. veterinary diagnostic laboratories, public health or food safety laboratories, central veterinary laboratories) are processing samples received from the different surveillance sites (farms, slaughterhouse, food establishments) for isolation of bacteria. They can additionally conduct further molecular characterization and/or antimicrobial susceptibility testing of bacterial isolates. [↑](#footnote-ref-11)
11. The National Reference Laboratory (NRL) has expertise in methods for detection and characterization of AMR. The functions of the NRL for AMR may include the provision of guidance and technical support on antimicrobial susceptibility testing (AST) and quality management to peripheral laboratories in the laboratory network, including the confirmation of results, the validation and standardization of methods and results for surveillance programme(s), and the provision of external quality assurance schemes/proficiency testing to evaluate the quality of laboratory results and identify correction actions. [↑](#footnote-ref-12)
12. Peripheral laboratories (e.g. veterinary diagnostic laboratories, public health or food safety laboratories, central veterinary laboratories) are processing samples received from the different surveillance sites (farms, slaughterhouse, food establishments) for isolation of bacteria. They can additionally conduct further molecular characterization and/or antimicrobial susceptibility testing of bacterial isolates. [↑](#footnote-ref-13)
13. The National Reference Laboratory (NRL) has expertise in methods for detection and characterization of AMR. The functions of the NRL for AMR may include the provision of guidance and technical support on antimicrobial susceptibility testing (AST) and quality management to peripheral laboratories in the laboratory network, including the confirmation of results, the validation and standardization of methods and results for surveillance programme(s), and the provision of external quality assurance schemes/proficiency testing to evaluate the quality of laboratory results and identify correction actions. [↑](#footnote-ref-14)