07.09.2021

European Union comments

Circular Letter CL 2021/59/OCS - AMR

Request for comments at Step 3 on the proposed draft guidelines on integrated monitoring and surveillance of foodborne antimicrobial resistance (CX/AMR 21/8/6)

The EU and its Member States (EUMS) appreciate very much the hard work of the Chair and Co-chairs and the substantial improvements achieved since the previous TFAMR7 meeting and acknowledge the revised draft provided as Annex to the working document CX/AMR 21/8/6.

EUMS agree with the general concept in the guideline as explained by the Chair and Co-chairs, and as laid down in the terms of reference, namely to

- *include antimicrobial use within the scope of the document,*
- *introduce antimicrobial use in the introduction without bringing in a formal definition for the term, and*
- *introduce and apply the broad understanding of integrated monitoring and surveillance program(s)*

The EUMS agree with most of the revised wording and rearrangement of paragraphs, as this contributes to the clarification of the text. We also agree to not re-open discussions on the sections scope and definitions.

While reviewing the revised draft guidelines, EUMS took into account points requested specifically by the chair and co-chairs. They are addressed in the comments on the specific paragraphs. Additionally, only those paragraphs have been commented where adjustments are suggested.

APPENDIX I

GUIDELINES ON INTEGRATED MONITORING AND SURVEILLANCE OF FOODBORNE ANTIMICROBIAL RESISTANCE
(For comments at Step 3)

1. Introduction and purpose

1. World-wide recognition of the importance of antimicrobial resistance (AMR) as a public health threat has led to strong international calls for all countries to develop and implement national strategies and action plans within the framework of a "One Health" approach, including the design and implementation of national programs of monitoring and surveillance of foodborne AMR and antimicrobial use (AMU).

EUMS would like to emphasize the need to mention AMU in paragraph 1 and 2. This is unavoidable and needed since AMU is part of the scope of GLIS. The importance of AMU as an integral part of monitoring and surveillance program(s) within the One Health approach has also been underlined by the political declaration of the United Nations General Assembly (UNGA) in 2016.

2. For the purpose of these Guidelines "antimicrobial use" and its abbreviation "AMU" are used to refer to antimicrobials intended for use in animals or plants/crops, which may be obtained from data of antimicrobials sold and/or used in food-producing animals or plants/crops.

3. For the purpose of these Guidelines, monitoring refers to the collection and analysis of AMR and AMU related data and information. Surveillance is the systematic, continuous or repeated, measurement, collection, collation, validation, analysis and interpretation of AMR and AMU related data and trends from defined populations to inform actions that can be taken and to enable the measurement of their impact.

4. The integrated monitoring and surveillance program(s) includes the coordinated and systematic collection of data or samples at appropriate stages along the food chain and the testing, analysis and reporting of AMR and AMU. The integrated program(s) includes the alignment and harmonization of sampling, testing, analysis and reporting methodologies and practices as well as the integrated analysis of relevant epidemiological information from humans, animals, foods, plants/crops and the food production environment.

EUMS suggest adding "in a one health approach" *to the end of the second sentence. It would read as follows:* The integrated program(s) include(s) the alignment and harmonization of sampling, testing, analysis and reporting methodologies and practices as well as the integrated analysis of relevant epidemiological information from humans, animals, foods, plants/crops and the food production environment in a one health approach.

5. National priorities, AMR food safety issues and scientific evidence, capabilities and available resources should guide the development of integrated monitoring and surveillance program(s) which should undergo continuous improvement as resources permit. This does not imply that a country needs to implement both monitoring and surveillance in all stages or areas covered by the program(s).

6. The data generated by integrated monitoring and surveillance program(s) provide valuable information for the risk analysis (risk assessment, risk management and risk communication) of foodborne AMR. These data may also be useful for epidemiological studies, food source attribution studies and research. Additionally, these data provide information to risk managers about trends and may serve as inputs for the risk analysis processes including implementation and evaluation of risk mitigation measures to minimize the foodborne public health risk due to resistant microorganisms and resistance determinants.

7. While this document's focus is on foodborne AMR, there is an implicit connection between the goal of addressing foodborne AMR with the goal of reducing foodborne illness, and thus a connection to the national food safety control system.

8. These Guidelines are intended to assist governments in the design and implementation of integrated monitoring and surveillance program(s). They provide flexible options for implementation and expansion, considering resources, infrastructures, capacity, and priorities of countries. Each monitoring and surveillance program should be designed to be relevant for national, and when appropriate, regional circumstances. While these Guidelines are primarily aimed at action at the national level, countries may also consider creating or contributing to international, multinational or regional, monitoring and surveillance program(s) to share laboratory, data management and other necessary resources.

9. The design and implementation of monitoring and surveillance program(s) should be assessed based on their relevance to foodborne AMR priorities at the national and international level.

10. Continuous improvement of the monitoring and surveillance program(s) should take into account identified priorities and broader capacity issues. Continuous improvement includes: availability of information on AMU and AMR in humans, animals, plants/crops, availability of food consumption data, agriculture and aquaculture production data, and cross-sector laboratory proficiency and quality assurance and reporting.

11. Data generated from national monitoring and surveillance program(s) on AMR in food should not be used to generate unjustified barriers to trade.

12. These Guidelines should be applied in conjunction with the *Code of Practice to Minimize and Contain Antimicrobial Resistance* (CXC 61-2005) and the *Guidelines for Risk Analysis of Foodborne Antimicrobial Resistance* (CXG 77-2011). Design and implementation aspects of these Guidelines should specifically take into account the other relevant Codex texts including the *Principles and Guidelines for National Food Control Systems* (CXG 82-2013) or the *General Guidelines on Sampling* (CXG 50-2004).

13. Where appropriate, the standards of other international standard setting organizations, including the standards of the World Organization for Animal Health (OIE standards) should be considered. These Guidelines should also be used taking into consideration those already developed by other advisory bodies including the

World Health Organization (WHO) Advisory Group on Integrated Surveillance of AMR (WHO-AGISAR) Integrated Surveillance of Antimicrobial Resistance in Foodborne Bacteria: Application of a One Health Approach.

2. Scope

14. These Guidelines cover the design and implementation of integrated monitoring and surveillance program(s) for foodborne AMR and AMU along the food chain and the food production environment.

15. Although these Guidelines do not cover the design and implementation of monitoring and surveillance of AMR and AMU in humans, an integrated program within the context of overall risk management of AMR (One Health Approach) would be informed by data, trends, methodology and epidemiology regarding AMR and AMU in humans.

16. The microorganisms covered by these Guidelines are foodborne pathogens of public health relevance and indicator bacteria.

17. Antimicrobials used as biocides, including disinfectants, are excluded from the scope of these Guidelines.

3. Definitions

18. The definitions presented in the *Guidelines for Risk Analysis of Foodborne Antimicrobial Resistance* (CXG 77-2011) *and Code of Practice to Minimize and Contain Antimicrobial Resistance* (CXC 61-2005) are applicable to these Guidelines.

19. The following definitions are included to establish a common understanding of the terms used in these Guidelines.

Antimicrobial agent

Any substance of natural, semi-synthetic or synthetic origin that at in vivo concentrations kills or inhibits the growth of microorganisms by interacting with a specific target[1].

Antimicrobial resistance (AMR)

The ability of a microorganism to multiply or persist in the presence of an increased level of an antimicrobial agent relative to the susceptible counterpart of the same species[1].

Food chain

Production to consumption continuum including, primary production (food producing animals, plants/crops, feed), harvest/slaughter, packing, processing, storage, transport, and retail distribution to the point of consumption.

Foodborne pathogen

A pathogen present in food, which may cause human disease(s) or illness through consumption of food contaminated with the pathogen and/or the biological products produced by the pathogen[1].

Food production environment

The immediate vicinity of the food chain where there is relevant evidence that it could contribute to foodborne AMR.

Hazard

For the purpose of these Guidelines, the term “hazard” refers to antimicrobial resistant microorganism(s) and/or resistance determinant(s)[1].

One Health approach

A collaborative, multisectoral and trans-disciplinary approach working at the local, regional, national and global levels with the goal of achieving optimal health outcomes, recognizing the interconnection between humans, animals, plants and their shared environment.

[1] *Guidelines for Risk Analysis of Foodborne Antimicrobial Resistance (CXG 77-2011)*

Plants/Crops

A plant or crop that is cultivated or harvested as food or feed.

4. Principles

20.

- **Principle 1:** Monitoring and surveillance program(s) should follow a "One Health" approach.
- **Principle 2:** Monitoring and surveillance program(s) are an important part of national strategies to minimize and contain the risk of foodborne AMR.
- **Principle 3:** Risk analysis should guide the design, implementation and evaluation of monitoring and surveillance program(s).
- **Principle 4:** Monitoring and surveillance program(s) should include data on AMR and AMU, in relevant sectors as inputs into risk analysis.

EUMS suggest to replace wording "include" by the wording "generate", as new data should be "generated" either based on sampling + laboratory investigations + evaluation (AMR) and/or data collection + evaluation (AMU). The sentence should read as follows: **Principle 4:** Monitoring and surveillance program(s) should generate ~~include~~ data on AMR and AMU in relevant sectors as inputs into risk analysis.

- **Principle 5:** Monitoring and surveillance program(s) should be tailored to national priorities and may be designed and implemented with the objective of continuous improvement as resources permit.
- **Principle 6:** Priority for implementation should be given to the most relevant foodborne AMR issues ((combinations of the food commodities, the microorganism and resistance determinants and the antimicrobial agent(s)) to be analyzed from a public health perspective.

EUMS note that there is an extra parenthesis in principle 6 to be deleted.

- **Principle 7:** Monitoring and surveillance program(s) should incorporate to the extent practicable, the identification of new and emerging foodborne AMR or trends and to facilitate epidemiological investigation.
- **Principle 8:** Laboratories involved in monitoring and surveillance should have effective quality assurance systems in place.
- **Principle 9:** Monitoring and surveillance program(s) should strive to harmonize laboratory methodology, data collection, analysis and reporting across sectors according to national priorities and resources as part of an integrated approach. Use of internationally recognized, standardized and validated methods and harmonized interpretative criteria, where available, is essential to ensure that data are comparable, to facilitate sharing of data and to enhance an integrated approach to data management.

5. Risk-based approach

21. For the purpose of these Guidelines, a risk-based approach is the development and implementation of monitoring and surveillance program(s) informed by data and scientific knowledge on the likely occurrence of foodborne AMR hazards along the food chain and their potential to pose risks to human health.

22. Information from monitoring and surveillance program(s) including data from other sources when available, are important for risk assessment and risk management decision-making on the appropriateness of the control measures to minimize and contain foodborne AMR.

23. When knowledge of AMR within a country is limited, monitoring and surveillance program(s) may initially be designed according to the relevant evidence that is available on AMR hazards and their potential to result in public health risks. AMR food safety issues may be identified on the basis of information arising from a variety of sources, as described in the *Guidelines for Risk Analysis of Foodborne Antimicrobial Resistance (CXG 77-2011).*

24. The implementation and continuous improvement of an integrated monitoring and surveillance program(s) should improve the quality of data generated for risk analysis.

6. Regulatory framework, policy and roles

25. Integrated monitoring and surveillance program(s) requires good governance by the competent authorities. As part of national action plans (NAP) for AMR, the competent authorities responsible for the monitoring and surveillance activities along the food chain should ensure collaboration with human health, animal health, plant health, the environment and other relevant authorities.

26. Activities related to monitoring and surveillance of foodborne AMR and AMU should involve a wide range of relevant stakeholders who may contribute to the development, implementation and evaluation of integrated monitoring and surveillance program(s).

27. Sharing of knowledge and data internationally and with stakeholders should be encouraged since it may improve the global understanding of foodborne AMR and inform risk assessment and risk management decisions.

EUMS suggest to add the public as a separate stakeholder to emphasize that data should be made available for all. Furthermore, a slight amendment is proposed for clarity as regards to "inform risk assessment **as well as** risk management decisions"*. This should reflect the intended meaning, namely that conclusions are based on risk assessment and recommendations are leading to risk management decisions.*

The sentence should read: Sharing of knowledge and data internationally, with stakeholders and the public should be encouraged since it may improve the global understanding of foodborne AMR and inform risk assessment ~~and~~ as well as risk management decisions.

28. It is important for competent authorities to have access to all available sources of AMU data in their country.

7. Preliminary activities on the implementation of an integrated monitoring and surveillance program(s) for foodborne AMR

29. Preliminary activities, initiating monitoring and surveillance activities, evaluation and review are part of the framework for monitoring and surveillance program(s). The concept of continuous allows countries to carry out activities to progress according to country specific objectives, priorities, infrastructure, technical capability, resources and new scientific knowledge. Undertaking pilot studies and testing may provide valuable insights the design for monitoring and surveillance program(s).

EUMS agree with the revised ordering of sentences and wording of the paragraph, but the language needs to be improved. The second and third sentences may read as follows: The concept of continuous improvement allows countries to carry out activities to progress according to country specific objectives, priorities, infrastructure, technical capability, resources and new scientific knowledge. Undertaking pilot studies and testing may provide valuable insights into the design ~~for~~ of monitoring and surveillance program(s).

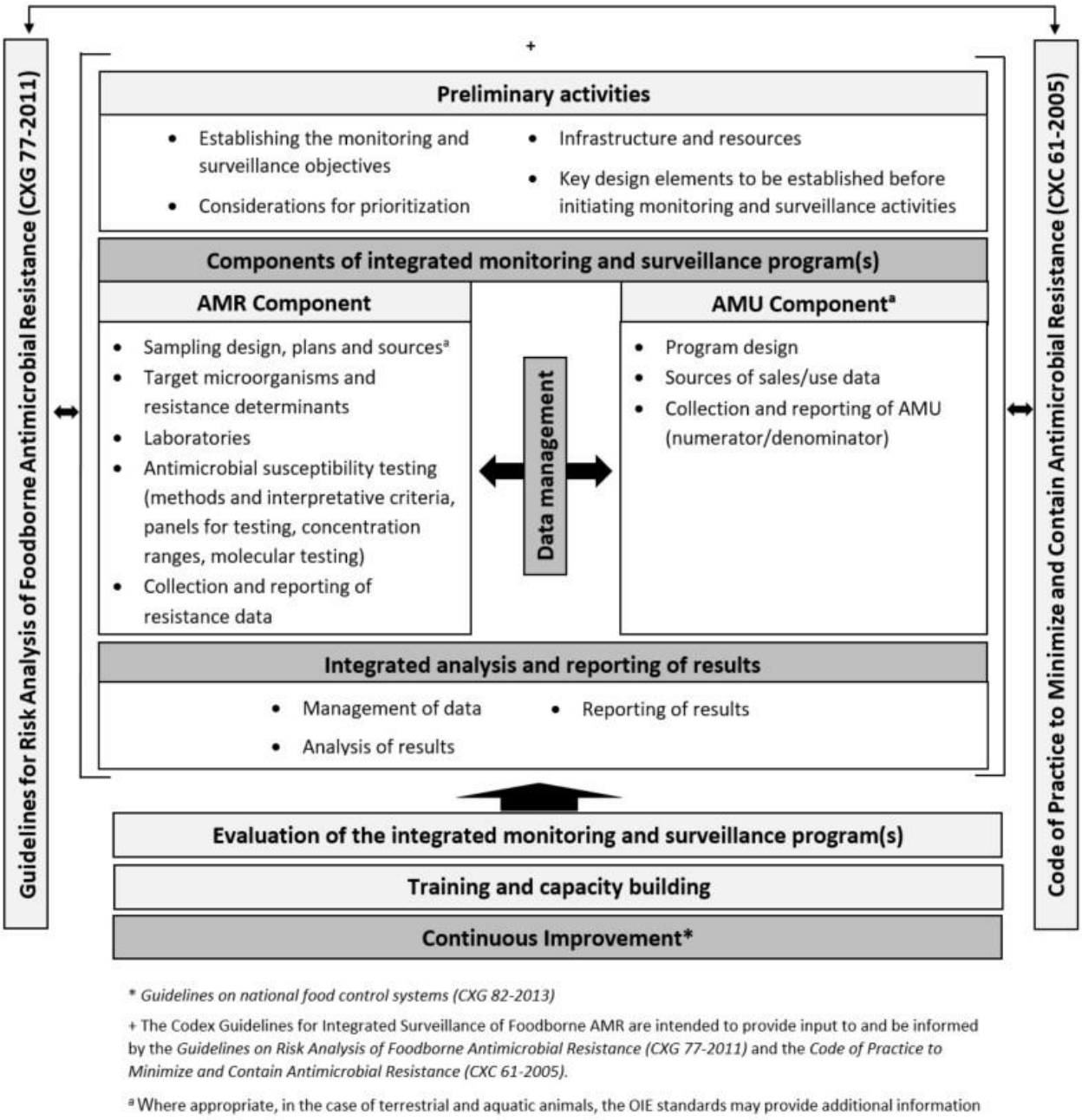

Figure 1. Framework for integrated monitoring and surveillance program(s) for foodborne AMR and AMU along the food chain.

EUMS consider figure 1 as essential in order to provide a visual summary of the whole GLIS within the framework of Codex Alimentarius and its most relevant texts. Moreover, this figure contributes to the understanding of the components of GLIS and the interaction between them.

7.1. Establishing the monitoring and surveillance objectives

30. The establishment of monitoring and surveillance objectives should be done in a consultative manner by the competent authorities and stakeholders and should take into consideration existing food safety programs, the AMR NAPs, relevant information on AMR and AMU in the country, as well as any existing activities to address AMR in the different sectors (human, animal, plant/crop and the environment). Competent authorities should identify the challenges they currently face during the implementation of these activities.

31. The following aspects should be considered:

- The primary reasons for the data collection (e.g., to evaluate trends over time and space, to provide
  data useful for risk assessments and risk management, to obtain baseline information).
- The representativeness of the data collection (e.g., random or systematic sampling).
- The setting of proposed timelines for sampling and reporting.
- A description of how the information will be reported and communicated (e.g., publication of report).

7.2. Considerations for prioritization

32. When establishing monitoring and surveillance priorities, competent authorities should consider the epidemiology and public health implications of foodborne AMR, AMU patterns, information on food production systems, food distribution, food consumption patterns and food exposure pathways.

33. Monitoring and surveillance priorities for microorganisms and resistance determinants, antimicrobial agents and sample sources should be informed by national, regional and international public health data and knowledge where it exists. Competent authorities should identify existing data sources and gaps on AMR and AMU including data required for risk analysis or results of risk analysis.

7.3. Infrastructure and resources

34. Once the objectives and priorities have been established, the competent authorities should determine the infrastructure, capacity and resources required to meet the objectives.

35. The evolution of integrated monitoring and surveillance program(s) does not need to strictly follow the order described in these Guidelines. Antimicrobial use monitoring and surveillance can proceed at a different rate than AMR monitoring and surveillance and vice versa. As both types of data benefit from a joint analysis, it is useful if the components of the program(s) are aligned during development to allow for integrated analysis.

EUMS suggest to replace antimicrobial use with AMU. The sentence would thus be: AMU monitoring and surveillance can proceed at a different rate than AMR monitoring and surveillance and vice versa.

36. As part of initial planning, the competent authorities should also consider where harmonization and standardization are required to meet monitoring and surveillance objectives. In order to optimize resources and efforts, the competent authorities should consider the possibilities of integration or expansion of the AMR or AMU monitoring and surveillance activities within other ongoing activities.

37. The competent authorities should also consider coordination of sampling and laboratory testing, collaboration with relevant stakeholders, and development of a plan for receiving, analyzing and when feasible reporting data in a central repository.

7.4. Key design elements to be established before initiating the monitoring and surveillance activities

38. When designing the monitoring and surveillance program(s), the following elements should be considered:

39. AMR:

- The highest priority microorganisms, panels of antimicrobials and sample sources to be targeted.
- Points in the food chain and frequency of sampling.
- Representative sampling methods, sampling plans, laboratory analysis and reporting protocols.
- Standardized and/or harmonized methodologies for sampling and testing.

40. AMU:

- Antimicrobial distribution chains from manufacturing or import to end-user including sales/use data providers.
- Identification of the sectors where collection of data would be most relevant and efficient to meet monitoring and surveillance objectives.

- An assessment of the need to establish a legal framework before initiating collection and reporting
  of antimicrobial sales and use data in food producing animals and plants/crops or to start the collection of AMU data on a voluntary basis in agreement with stakeholders that provide these data may be useful.

41. Consideration may be given to additional information provided in the OIE Terrestrial Animal and Aquatic Health Codes.

8. Components of integrated monitoring and surveillance program(s) for AMR

42. Integrated monitoring and surveillance program(s) for foodborne AMR should consider the following elements:

- Sampling design.
- Sampling plans.
- Sample sources.
- Target microorganisms and resistance determinants.
- Antimicrobials to be tested.
- Laboratory testing methodologies and quality assurance systems.
- Data management activities.

43. The initial scope and design of the monitoring and surveillance program(s) for AMR may be informed by previous research or surveillance findings, by national priorities or by national and international experience and recommendations. As the AMR program develops, the scope and design may be adjusted based on one or more of the following factors:

- Monitoring and surveillance findings.
- Epidemiology of antimicrobial-resistant microorganisms as available.
- Risk profile and risk assessment findings.

8.1. Sampling design

44. The design of monitoring and surveillance program(s) for AMR may build on or be integrated with existing monitoring and surveillance program(s), or may involve development of new infrastructures and activities only for the purpose of AMR data collection. If data are collected through existing programs designed for another purpose, this will need to be specified and the different methodologies and data interpretation methods should be described.

45. Sampling design should consider temporal and geographical coverage of data collection.

46. Once a sampling design is established, consistency in sample types and methodology is desirable to achieve longterm, comparability and accurate interpretation of results, especially when new methodologies are added and the program is adjusted.

8.2. Sampling plans

47. The sampling plan should describe the following:

- The procedure to collect a sample from the selected sample source(s) at the selected point(s) in the food chain.
- Sample size, statistical methods and underlying assumptions e.g., frequency of recovery, the initial or expected prevalence of AMR in that microorganism) of the data used to calculate the number of samples and isolates.
- Statistical power, precision and goals of testing.
- Limitations to data interpretation.

EUMS would like to thank for the proposed rewording, which needs some additional adjustment.

In the first bullet point, the aspect 'representative' should not be deleted as it is very important to collect representative samples for proper analysis and interpretation of data, as otherwise accuracy of the analysis can be compromised and biased or misinterpretation of the data can appear. As a compromise, the sentence may read as follows: The procedure to collect a sample from the selected sample source(s) at the selected point(s) in the food chain aiming for representativeness.

As regards the second bullet point, we can agree with most of the revised wording. The aspect of the population size to be monitored is missing now. This should be included again. Furthermore, there is a missing parenthesis. The sentence may read as follows: Sample size, statistical methods and underlying assumptions (e.g., frequency of recovery, the initial or expected prevalence of AMR in that microorganism and the size of the population to be monitored) of the data used to calculate the number of samples and isolates.

As regards the third bullet point, for reasons of consistency, EUMS propose to use the term 'objectives' instead of 'goals', as the term 'objectives' is already used several times throughout the whole document.

48. The following elements should be considered in the sampling plan:
    - Sampling strategy may be active (i.e. designed for AMR surveillance) or passive (i.e. using a system already in place).
    - Target animal or plant/crop species, food commodities or food production environment.
    - Point(s) in the food chain where the samples will be taken and sample type.
    - Selection of strata (levels) or risk clusters (groups) to best meet surveillance objectives.
    - Target microorganisms, resistance phenotypes and resistance determinants.
    - Frequency of sampling.
    - Prevalence and seasonality of the microorganisms under study.
    - Standard operating procedures for sample collection :
        - Who should be collecting the samples.
        - Procedures for collection of samples in accordance with the defined sampling strategy and to guarantee that traceability, security and quality assurance are maintained from collection through to analysis and storage.
        - Procedures for storing and transporting the samples in order to maintain sample integrity.
49. Initial implementation might include a limited selection of sample sources at one or more specific points along the food chain.
50. As the program(s) develop, and implementation advances according to priorities and resources, the sample sources within the sampling plan may be broadened. This may include additional animal or plant/crop species, production types, stages in eh food chain or food commodities to gradually be more representative of the population of interest.

*Regarding the second sentence, EUMS note that "*eh*" should read "*the*".*
In addition, 's' should be added to 'populations' (to change the word into plural) because in the first part of the sentence, different populations are listed.

8.3. Sample sources

51. When identifying the sample sources to be included in the monitoring and surveillance program(s), consideration should be given to the major direct and indirect food exposure pathways.

52. The selection of samples should reflect production and consumption patterns in the population and the likely prevalence of foodborne AMR.

53. The integrated program(s) should reflect the food production in the country and cover samples from relevant stages of the food chain where there is science-based evidence that they could contribute to foodborne AMR. Possible sample sources are:

EUMS acknowledge that this paragraph was under great debate during the virtual meetings in June. We are still concerned about the wording, but agree that "science-based" is better than "evidence based".
EUMS suggest to move the sentence "For integration, samples from food-producing animals should be collected from the same species at the different relevant points along the food chain". *highlighted below to up here since its content also reflects on food and food production environment and to delete the term 'from food-producing animals' and the word 'animal' in it in order to cover also plant/crops.*

- **Food producing animals**

  Samples should be, to the greatest extent possible, representative of the animal species and epidemiological unit being targeted.

  The prevalence of the bacterial species should be considered to maximize the likelihood of detection.

  Samples taken from healthy animals destined for slaughter may be collected on-farm, during lairage, or at the slaughter. Collection of samples from animals not immediately entering the food chain may provide additional information on foodborne AMR at the population-level but may be a lower priority than those animals directly entering the food supply.

  *EUMS note that the word "*the*" must be deleted. Thus the sentence is:* "during lairage, or at ~~the~~ slaughter."

  - At the farm-level, sample may include faeces, feed[2] and/or feed ingredients, water, litter or bedding or other relevant food production inputs.

    Consideration may be given to samples described in the OIE Terrestrial Animal and Aquatic Health Codes, specifically the chapters on Harmonisation of National AMR Surveillance and Monitoring Programmes as well as on the Development and Harmonisation of National Antimicrobial Resistance Surveillance and Monitoring Programmes for Aquatic animals.

  The word 'sample' should be in plural.

  - At lairage, sample may include rectal samples or fecal samples from pen floors or crates.
  - At slaughter, sample may include carcass swabs, caecal contents or lymph nodes. In some animal species, caecal contents or lymph nodes may be representative of the pre-slaughter environment and may or may not provide an estimate of AMR arising at the farm level. Samples collected after slaughter (e.g., carcass) may provide an estimate of contamination arising from the slaughterhouse.

  For integration, samples ~~from food-producing animals~~ should be collected from the same ~~animal~~ species at the different relevant points along the food chain.

*The EUMS fully agree with the proposal from the Chair and co-chairs to use "*should*" instead of "*may*" with regards to the sentence "for integration". To our understanding adequate and accurate integration is only possible when sampling is done from the same animal species along the food chain.*

For clarity and as already highlighted above, EUMS suggest to move the highlighted text to para 53, slightly amended.

- **Food**

  Food samples may be collected at processing, packaging, wholesale or retail. Sample may include both domestically-produced and imported food sources.

[2] The location of where the feed or feed ingredient is sampled, the manufacturing plant (feed mill), production site or farm, may provide additional information for understanding foodborne AMR.

The place where the food samples are collected should reflect the production system in the country and the purchasing habits of the consumer (e.g., sampling open markets or chain stores).

At the retail-level, food samples may include raw meat, fish or seafood, dairy products, other edible tissues, raw produce and other minimally processed animal products and produce. Food selection may be modified periodically in order to capture multiple commodities, seasonality, or where products have been identified as high risk.

- **Plants/crops**

  The selection of plants/crops should be risk-based and/or guided by the relevant standard setting bodies where available.

  Samples may be collected from farm, pre-harvest or post-harvest

- **Food production environment**

  The selection of samples from the food production environment should be risk- based and relevant to the food production system.

  Sample may include the environment of food producing animals and plants/crops, processing, wholesale facilities or retail outlets[3].

8.4. Target microorganisms and resistance determinants

54. Selection of the target microorganisms and resistance determinants should be considered based on their relevance to food safety and public health.

55. Bacterial species may include:

    - Foodborne pathogens such as *Salmonella*, *Campylobacter* or other food borne pathogens depending on national or regional epidemiology and risks.
    - Commensal bacteria such as *Escherichia coli* and enterococci (*Enterococcus faecium and Enterococcus faecalis)*, which can contaminate food and harbor transferable resistance genes.

56. Target microorganisms from aquatic animals and food of non-animal origin should be determined based on available scientific evidence and relevance to public health.

57. The selection of target microorganisms should consider the presence of high priority AMR genes or mobile genetic elements and horizontal gene transfer in a given bacterial population.

58. Monitoring and surveillance program(s) may begin with phenotypic susceptibility testing for AMR in representative foodborne pathogens and/or commensal bacteria. Options for expansion may include a broader range of foodborne pathogens, or commensal bacteria, testing for genetic determinants of resistance, virulence and mobile genetic elements.

59. Whenever possible the characterization of bacterial isolates to the species-level and as feasible, molecular analysis of particular isolates that may present a public health concern should be undertaken.

8.5. Laboratories

60. Laboratories participating in the monitoring and surveillance program(s) should consider:

    a. Bacterial isolation, identification (to species and serotype level), typing and antimicrobial susceptibility testing (AST) using standardized and validated methods performed by trained personnel.

    b. Accreditation in accordance with national or international guidance or have a quality management system in place.

EUMS suggest a minor alteration in order to promote the use of accredited methods. The sentence would thus be: Accreditation in accordance with national or international guidance or alternatively having a quality management system in place.

[3] Dust, soil, water, organic fertilizers, sewage or manure in the farm environment or in surfaces of processing areas.

c. Whenever possible participating in external quality assurance system testing including proficiency testing in identification, typing and AST of the microorganisms included in the monitoring and surveillance program(s).

d. Being equipped with facilities and having procedures to maintain sample integrity including appropriate storage temperatures and recording time between sample reception and analysis and traceability.

e. Storing isolates and reference strains using methods that ensure viability and absence of change in the characteristics and purity of the strain.

f. Access to a national reference laboratory or an international laboratory that can provide technical assistance if necessary and carry out molecular characterization where feasible.

8.6. Antimicrobial susceptibility testing

8.6.1. Methods and interpretative criteria

61. Susceptibility testing methods (minimum inhibitory concentration (MIC) methodologies or disk diffusion) that are standardized and validated by internationally recognized organizations should be used where available.

62. Either phenotypic or genotypic methodologies may be considered for susceptibility testing; and the methods need to be standardized and validated by internationally recognized organizations.

EUMS suggest merging and rearranging the two paragraphs for clarity and to avoid duplication of wording. Furthermore, currently there is a discrepancy between 61 and 62. In 61 standardized etc. should be used, in 62, methods need to be standardized.

The revised paragraph should read: ~~62.~~ 61. Either phenotypic or genotypic methodologies may be considered for ~~susceptibility testing~~ resistance determination; ~~and the methods need to be standardized and validated by internationally recognized organizations~~. ~~61.~~ Susceptibility testing methods (minimum inhibitory concentration (MIC) methodologies or disk diffusion) or genotypic methods that are standardized and validated by internationally recognized organizations should be used where available.

63. Quality control strains of bacteria should be included and used according to international standards where available to support validation of results.

64. Interpretation of results for MICs or disk diffusion, should be undertaken consistently according to European Committee on Antimicrobial Susceptibility Testing (EUCAST) tables or Clinical Laboratory Standards Institute (CLSI) standards, and should include quantitative results (i.e., inhibition zone diameters including the disk content or MIC values). When neither tables nor standards are available, program-specific interpretive criteria or categories may be used.

65. Categorization of the isolate and reporting of results may be undertaken based on the epidemiological cut off value (ECOFF) which should be reported as wild-type or non-wild type or clinical breakpoint which should be reported according to the interpretative category. The use of ECOFFs as interpretative criteria will allow for optimum sensitivity for detection of acquired resistance, temporal analysis of trends and comparability between isolates from different origins. Clinical breakpoints may differ between animal species and countries or regions. The interpretative criteria or category used should be included in the reporting, interpretation and analysis of data.

66. Raw quantitative data should be maintained in order to allow comparability of results, for early recognition of emerging AMR or reduced susceptibility in order to maximize the ability to analyze and compare results across sample sources.

67. Quantitative results are also necessary for the analysis of resistance patterns over time and when retrospective data analysis is needed due to changes in clinical breakpoints or ECOFFs. Quantitative results are also necessary for quantitative microbiological risk assessment.

8.6.2. The panel of antimicrobials for susceptibility testing

68. The panel of antimicrobials for phenotypic susceptibility testing should be harmonized across the monitoring and surveillance program(s) as to ensure continuity and comparability of data. Attempts should be

made to use the same antimicrobial class representatives across sample sources, geographic regions, and over time.

69. The antimicrobials included in the panel should depend on the target bacteria, the clinical or epidemiological relevance of these antimicrobials and should allow for the tracking of isolates with particular patterns of resistance.

70. The antimicrobials included may take into account the classes and uses in the relevant animal and plant/crop production sectors, as well as their influence in the selection or co-selection of resistance. Antimicrobials that would give the best selection of cross-resistance profiling should be selected. Other antimicrobials which have the potential for co-selection of resistance due to gene linkage may also be included even if they are not used in animal and plant/crop production sectors.

71. Antimicrobials to be tested may be prioritized based on those that have been ranked with higher priority for human health, based on national context and/or other relevant antimicrobials that have an influence on the selection or co-selection of resistance.

EUMS would like to suggest a slight editorial amendment to improve reading and clarity: Antimicrobials to be tested may be prioritized based on ~~antimicrobials those that have been ranked with~~ **their** higher priority **ranking** for human health, based on national context and/or other relevant ~~antimicrobials that have an~~ influence on the selection or co-selection of resistance.

8.6.3. Concentration ranges of antimicrobials

72. The concentration ranges used should ensure that both ECOFFs and clinical breakpoints, when available, are included to allow for the comparability of results with human data. The concentration range of each antimicrobial agent should also cover the full range of allowable results for the quality control strain(s) used for each antimicrobial agent.

8.6.4. Molecular testing

73. When possible, molecular testing should be used for the identification and detection of resistance determinants and for epidemiological analysis according to country specific scenarios and resources.

*EUMS agree with the changes made by the Chair and co-Chairs from "*may*" into "*should*" as molecular testing is recognized as the most valuable instrument for the identification and detection of resistance determinants and for epidemiological analysis. The flexibility which is needed to cover situations where molecular testing is not yet completely developed has been properly worded. To improve clarity, the following further amendments are suggested:* Whenever possible, molecular testing should be used for the ~~identification and~~ detection and characterization of resistance determinants and for epidemiological analysis according to country specific scenarios and resources.

74. Molecular characterization is a useful tool which may be used for the rapid identification of resistance clusters and outbreak investigations. Molecular characterization in conjunction with epidemiological information, may inform the determination of epidemic source and transmission chains, the detection of emergence and investigation of the spread of new resistant strains or resistance determinants, and source attribution by linking to molecular monitoring of pathogens or resistant microorganisms or resistance determinants across sectors.

*EUMS: Despite improvement of the text, which is acknowledged, we would prefer not to use the term "*may*" in both situations to better reflect the benefit of use of such techniques, namely for identification of clusters and understanding of the spread of AMR. The text should read as follows:* Molecular characterization is a useful tool ~~which may be used~~ for the rapid identification of resistance clusters and outbreak investigations. Molecular characterization in conjunction with epidemiological information ~~may~~ informs the determination of epidemic source and transmission chains, the detection of emergence and investigation of the spread of new resistant strains or resistance determinants, and source attribution by linking to molecular monitoring of pathogens or resistant microorganisms or resistance determinants across sectors.

75. Sequence data generated and stored with appropriate metadata may be used for retrospective and prospective surveillance.

76. Molecular testing may be useful in addressing or confirming inconclusive phenotypic results and may be used for the early detection or detection of resistant microorganisms of high public health importance.

77. Molecular methods may allow for the integration of resistance data with other relevant public health data (e.g., virulence determinants).

8.7. Collection and reporting of resistance data

78. The information collected and recorded may differ depending on the stage of sampling along the food chain, sampling design and the specific monitoring and surveillance objectives. To ensure consistency, sampling information should be recorded at the isolate and sample level.

79. Information for each individual sample should include:

    a. Reference to the general description of the sampling design and randomization procedure.

    b. Specific information about the origin of the sample such as from what, where and when the sample was collected.

    c. General information to identify the isolate, bacterial species, serovar, other subtyping information as appropriate.

    d. Specific information about the isolation of the bacteria and the AST (e.g., date of testing, method used, quantitative results). In the case of qualitative results interpretative criteria should be recorded.

80. Reporting of results from the monitoring and surveillance program should be timely.

81. Antimicrobial susceptibility testing methods, sample sources, analytical methods and interpretive criteria should be clearly described, and differences transparently explained to show where data may not be directly comparable.

9. Components of integrated monitoring and surveillance program(s) for AMU

EUMS support retaining the title of this section for the sake of consistency within the GLIS.
*Also deleting **old Paragraph 82** seems to be logical and at the same time avoids redundancy.*

9.1. Design of an integrated monitoring and surveillance program(s) for antimicrobial agents intended for use in food producing animals or plants/crops

82. Each country may decide to collect different types of data, sales and/or use, according to their monitoring and surveillance objectives. The antimicrobial sales data collection may evolve into the collection of use data. The competent authority should consider the limitations of each type of data. Some aspects of data collection or reporting need to be specified for sales versus other types of use data; this is reflected below.

83. Sales data may be a valuable indicator to monitor trends although it does not always reflect the actual use, administration or application.

84. The collection of use data from farms/producers may be challenging but provide valuable insight on the magnitude of use and species-specific information on how and why antimicrobials are being used.

85. The choice of units of measurement for AMU should be established depending on method and scope of the data collection and the monitoring and surveillance objectives.

86. The following elements should be considered when deciding on the approach to collect sales and/or use data.

    a. Identification of the scope of the data to be captured (e.g., the antimicrobial agents, classes or sub-classes). The scope may also consider mechanisms of antimicrobial action, relevant resistance data and reporting requirements.

    b. Identification of the most appropriate points of data collection and the stakeholders that can provide the data.

    c. Development of a protocol to collect qualitative (e.g., types of antimicrobials on farm) and quantitative information on the antimicrobials intended for use in food producing animals or plants/crops.

    d. Nomenclature of antimicrobial agents harmonized with international standards where available.

e. Identification, where possible, of the plant/crop type and species of food-producing animals for which the antimicrobials were intended to be used.

f. Identification of the level of detail required to meet the surveillance requirements (e.g., production type, route of administration or reason for use).

g. Information, where possible, on antimicrobial dose, dosing interval and duration.

h. Technical units of measurement for reporting antimicrobial sales or use.

EUMS acknowledge the aim for consistency with OIE wording when keeping "dose, dosing interval and duration" *in bullet g.*

9.2. Sources of sales/use data

87. Options for sources of data may include:

a) Sales data: may be collected from registration authorities, marketing authorization holders, wholesalers, veterinarians, retailers, pharmacies, feed mills, farm shops/agricultural suppliers, pharmaceutical associations, cooperatives or industry trade associations or any combination of these.

- Import data: may be collected from the competent authorities that are in charge of registration of medicinal products or customs. Care must be taken to avoid double counting with sales data in the country and those antimicrobials not intended for use within the country.

b) Use data: may be collected from farm/plant health professional records, livestock/plant production company records or estimated from veterinary prescriptions or farm surveys.

88. Data on quantities of antimicrobials sold or used within a country may differ. Differences may include loss during transport (pack damage), storage (due expiry date) and administration (whole package not administered), stock purchased and held for future use, and fluctuations in animal or plant/crop populations.

9.3. Collection and reporting of AMU

EUMS recognize that merging sections 9.3-9.5 has an added value in terms of joining actions pragmatically. Moreover, the current text keeps the balance between general advice for collection and reporting of AMU and the reference to OIE codes as the framework to be considered. Some further amendments are suggested below.

Collection of data

89. The data collection should cover the following elements:

The numerator

90. Antimicrobial quantities representing the amount of antimicrobial agents sold or used. This is normally expressed as the weight in kilograms of the antimicrobials active ingredient which was sold or used the monitoring and surveillance period. In some cases this may be based on estimates.

EUMS suggest to amend the first sentence. Furthermore, an editorial adjustment is suggested for the second sentence. The paragraph should read as follows: Antimicrobial quantities represent~~ing~~ the amount of antimicrobial agents sold or used in food producing animals or in plants. This is normally expressed as the weight in kilograms of the antimicrobials~~-~~ active ingredient which was sold or used during the monitoring and surveillance period. In some cases this may be based on estimates.

91. To calculate the numerator data should include identification of the antimicrobial product, the number of packs sold or used, the pack size and the strength per unit.

*EUMS do not consider it essential to collect information on number of packs sold or used and pack size. To allow different ways of collecting the information this can be replaced by '*amount sold and used*'. The sentence should read as follows:* To calculate the numerator, data should include identification of the antimicrobial product, and the amount ~~number of packs~~ sold or used ~~the pack size and the strength per unit~~.

The denominator

92. The total food producing animal population or plant/crop area or quantities harvested that may be exposed to the antimicrobials reported during the monitoring and surveillance period. The denominator provides the context for reporting and analyzing the sales and/or use data.

93. Characteristics of the population of food producing animals or plants/crops treated with the relevant antimicrobial during the monitoring and surveillance period (e.g. area or quantities harvested, number/percentage of farms included, species, type, number, body weight, age) may also be considered.

94. For collection of data in food-producing animals, the OIE's Terrestrial Animal Health and Aquatic Animal Health Codes should be considered.

Reporting of data

95. Multiple units of measurement for reporting of sales and/or use may be appropriate depending on the national situation and the monitoring and surveillance objectives.

96. For plants/crops, the information above is applicable and additional units of measurement may be established according to national priorities.

97. For reporting of data in food-producing animals, the OIE's Terrestrial Animal Health and Aquatic Animal Health Codes should be considered.

10. Integrated analysis and reporting of results

10.1. Management of data

98. To facilitate the management of data, database(s) should be structured, and where feasible, centralized to allow for the appropriate and easy extraction of data when required and to accommodate expansion as the integrated monitoring and surveillance program(s) improves.

99. A confidentiality and data management policy should be put in place. Data should be collected and stored to maintain data integrity and to protect the confidentiality of personal and proprietary information.

100. To facilitate the management of data, ongoing or regular validation of the data may be performed.

*EUMS suggest to replace "*may*" by "*should*" as unvalidated data has little value. The sentence should read:* To facilitate the management of data, ongoing or regular validation of the data ~~may~~ should be performed.

101. A description of sampling designs, stratification and randomization procedures per animal populations and plant/crop, food production environment or food categories should be recorded to link the data within and across monitoring and surveillance components.

10.2. Analysis of results

102. The data from the integrated monitoring and surveillance program(s) may be analyzed as described in CXG 772011 for risk assessment to then inform the development and implementation of risk management options and policies to drive responsible and prudent use of antimicrobials to address foodborne AMR.

103. Analysis of data from the integrated monitoring and surveillance of AMR and AMU may include the assessment within or between sectors across the One Health spectrum, to evaluate temporal or geographical trends over time, across host species, across bacterial species or antimicrobial classes. When available, other contextual information such as epidemiological data may be considered.

104. The detailed methodology and the epidemiological context of the monitoring and surveillance program(s) should be considered for the analysis. Where data are available, exposure pathways among people, food producing animals, plants/crops and their shared environment connecting resident bacterial populations may be incorporated into the analysis.

105. Data may originate from different monitoring and surveillance program(s), so comparability is an important consideration. The choice of analytical approaches should allow the investigation of any relationship

between AMU and AMR within or across the food producing animals, plants/crops and human populations, provided that AMR and AMU data are representative of the target population. Integrated monitoring and surveillance of foodborne AMR should be harmonized across these sectors to assist in the understanding, and the investigation of relationships between AMR and AMU, including other factors that may influence the emergence and spread of AMR.

*EUMS agree with the use of "*factors*" instead of "*drivers*" as proposed during the PWG, especially because of the alignment with existing Codex texts. Some editorial amendments are suggested: The paragraph should read as follows:* Data may originate from different monitoring and surveillance program(s), so comparability is an important consideration. The choice of analytical approaches should allow the investigation of any relationship between AMU and AMR within or across ~~the~~ food producing animals, plants/crops and human populations, provided that AMR and AMU data are representative of the target population. Integrated monitoring and surveillance of foodborne AMR should be harmonized across these sectors to assist in the understanding, and in the investigation of relationships between AMR and AMU, including other factors that may influence the emergence and spread of AMR.

106. AMR data from relevant human isolates may be considered for inclusion in the analysis and reporting based on information from significant foodborne pathogens according to national epidemiological information and, whenever possible, commensal flora.

107. Integration of data from surveillance of human clinical isolates should facilitate the ability to identify trends in resistance to specific antimicrobials important for use in human medicine, as well as to identify trends in the occurrence of resistance in humans, plants/crops and animals.

108. Statistical analysis should be used to ensure proper interpretation of results.

10.3. Reporting of results

109. Transparent and open communication for the reporting of the results between the competent authorities and the different stakeholders under the One Health approach should be encouraged.

EUMS believe that data results should be made publicly available and thus suggest the following change: Transparent and open communication for the reporting of the results between the competent authorities and the different stakeholders including the public under the One Health approach should be encouraged.

110. Results of integrated monitoring and surveillance program(s) should be reported regularly, where resources allow.

111. When available, summary reports on the integrated monitoring and surveillance program(s) data across humans, animals, plants/crops, food and the food production environment may be made publicly available.

11. Evaluation of the integrated monitoring and surveillance program(s)

112. Evaluation of the integrated monitoring and surveillance program(s) provides assurance that the data and information reported are robust and the program objectives are being met. The evaluation will also provide the best use of data collection resources.

113. Potential foodborne AMR risks to human health are subject to change over time. Evaluation and review should be undertaken at a frequency appropriate to integrate evolving monitoring and surveillance methodologies, identification of new resistance patterns, new exposure pathways along the food chain and changing patterns of AMU in humans, animals and plants/crops, and to respond to changing national needs.

114. Competent authorities should develop a framework and plan to facilitate the evaluation and review of monitoring and/or surveillance activities, which may include the following:

- Identify the skills needed by evaluators.
- Describe the monitoring and surveillance program(s) to be evaluated, including the objectives and desired outcomes. This may involve a subsection of the entire program(s) (e.g., the sample collection, laboratories, analysis and reporting).
- Identify key stakeholders for the evaluation.

- Identify key performance criteria to be evaluated.
- Collect data to facilitate evaluation based on the key performance criteria.
- Consider stakeholder input/feedback.
- Report results of evaluation.
- Draw conclusions on components of the evaluation.
- **I**dentify or provide identification of relevant monitoring and surveillance program adjustments.
- Share evaluation outcomes with stakeholders.

115. If the design of the monitoring and surveillance program(s) changes or expands, adjustments should ensure the ability of the program(s) to identify trends over-time remains, that historical data are maintained and that the program continues to meet the objectives.

12. Training and capacity building

116. Training and capacity building are important components of the integrated monitoring and surveillance program(s) and should be supported where possible, by the competent authorities.

117. Training of the relevant competent authorities should include different aspects of the monitoring and surveillance program(s): collection, analysis, interpretation and reporting of the data.

118. Training of relevant stakeholders at the national level is recommended.