Report of the 7th meeting

WHO Advisory Group on Integrated Surveillance of Antimicrobial Resistance (AGISAR)

17-20 October 2016
Raleigh, United States of America
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The strategy will compile actions and achievements, including awareness raising, surveillance and research, support for good governance, capacity building, and the implementation of standards and guidelines. The OIE standards and guidelines relevant to AMR are updated and available on the OIE Website.

An OIE list of Antimicrobial Agents of Veterinary Importance was developed as a draft list in May 2006. The refined list was submitted to the 75th International Committee during the General Session in May 2007 and adopted unanimously by Resolution No. XXVIII.

This list identifies antimicrobial agents used in animals around the world, highlights where no or few alternatives for therapy of animal diseases exist, and provides guidance on the use of antimicrobial agents that are also of importance (including critical importance) in human medicine. The list was revised in December 2014 in light of technical comments received, and proposed for adoption in 2015. In May 2015, the updated version of the list was adopted by the OIE World Assembly of Delegates, and included recommendations on the use of fluoroquinolones and third and fourth generation cephalosporins.

Moving forward with Resolution No. 26 adopted by the World Assembly in May 2015 during the 83rd General Session, the OIE launched an annual collection of data in the last trimester of 2015 on the use of antimicrobial agents in animals in OIE Member States. The first phase of this new OIE activity has been completed in line with the global action plan on antimicrobial resistance. From mid-December 2015 to mid-May 2016, 72% (130/180) of OIE Member States submitted the completed template to OIE Headquarters. The template and guidance documents to complete the template were developed by the OIE ad hoc group on AMR, endorsed by the OIE Scientific Commission for Animal Diseases. It was tested by Member States through the training seminars for OIE National Focal Points for Veterinary Products, as well as through a regional survey. The ultimate aim is to publish an annual report on the worldwide distribution and use of antimicrobial agents in animals. The report and analysis of this first year of collected data were published at end of 2016.

For the second year of data, a refined template was sent to OIE Member Countries at the end of September 2016. The OIE ad hoc group continues to work in collaboration with FAO and WHO, and supports global efforts to prevent and combat AMR, in particular collecting data on the use of antimicrobial agents in animals worldwide for OIE and updating Chapter 6.7, Harmonization of national AMR surveillance and...
Acknowledgements

The World Health Organization (WHO) wishes to express its sincere thanks to all those who contributed to the success of the meeting, especially the members of the Advisory Group on Integrated Surveillance of Antimicrobial Resistance (AGISAR), resource advisers, and representatives from the Food and Agriculture Organization of the United Nations (FAO), and World Organisation for Animal Health (OIE) for their valuable technical input.

Sincere gratitude goes to Dean Paul Lunn of the College of Veterinary Medicine at North Carolina State University for hosting the meeting and for Dr Paula Cray of the College of Veterinary Medicine at North Carolina State University for chairing the meeting. Special gratitude also goes to Mr Dane Johnston and his team for their administrative support.

Declaration of interest

All experts and technical resource persons invited to participate in this meeting completed the WHO standard declaration of interests form prior to the meeting. Each Declaration received from meeting participants was reviewed within the context of the meeting objectives. No conflicts affecting the outcomes of the meeting were identified for any participating experts.
guidance on integrated surveillance of AMR be published. The process to revise this document, first published in 2013, is one of the main objectives of the 7th AGISAR meeting; publication of new guidance is expected in mid-2017.

A manual is being developed by the advising countries to strengthening surveillance and response to foodborne diseases, including AMR. This will take a stepwise approach to move towards a functional and sustainable surveillance system.

Additionally, a global curriculum is being developed on the use of whole genome sequencing in foodborne disease surveillance and AMR.

AGISAR works on capacity-building projects to strengthen integrated surveillance of AMR through pilot projects and laboratory training workshops. These individual projects have raised the need for a global surveillance mechanism to understand the magnitude of AMR along the food chain. They have led to the initiation of a project to develop a global protocol for the surveillance of ESBL-producing _E.coli_ in the food chain, using a "One Health" approach. The first expert meeting took place during the 7th AGISAR meeting and the details are captured in section 7 of this report.

Furthermore, in 2016, WHO initiated a process to develop guidelines on the use of antimicrobials in food-producing animals, based on the WHO list of critically important antimicrobials for human medicine.

The guidelines will include recommendations on the use of antimicrobials in food animals, based on systematic and literature reviews and other scientific evidence. Under the established rules and procedures for developing WHO guidelines, the relevant contributors to the guideline development processes have been selected and officially appointed by WHO. The members of the Guideline Development Group met for the first time in parallel with the 7th AGISAR meeting, and the final guidelines are expected to be publicly available in 2017.

WHO Director-General Dr Margaret Chan stated at the United Nations General Assembly in September 2016 that "[…] the food industry needs to reduce its massive use of antibiotics, at sub-therapeutic doses, as growth promoters. Specific antibiotics, listed by WHO as critically important for human medicine, should not be used in animal husbandry or agriculture. […] All of these actions are urgently needed."
1. Background and context

The World Health Organization (WHO) Advisory Group on Integrated Surveillance of Antimicrobial Resistance (AGISAR) was established in 2008 to support WHO minimize the public health impact of antimicrobial resistance (AMR) associated with the use of antimicrobials in food-producing animals. AGISAR consists of over 30 international experts who cover a broad range of disciplines relevant to AMR, including physicians, microbiologists, veterinarians, and epidemiologists. After the first group of AGISAR members served their terms from 2008-2014, members were renewed in 2015 for a new term from 2015-2019. In 2014, new members were selected through a transparent selection process, including a call for applications published online. Under the new terms of reference established in 2015, AGISAR members maintain communication through regular teleconferences, email exchanges, and face-to-face meetings. They advise WHO on aspects of AMR related to the food chain, including: advocating for improved control of antimicrobial use in the food chain using the ‘One Health’ approach; promoting and facilitating integrated surveillance for AMR through the development of guidance and national capacity-building projects; and maintaining the WHO list of critically important antimicrobials for human medicine (WHO CIA list).

The seventh face-to-face meeting of the WHO AGISAR was hosted by the College of Veterinary Medicine at North Carolina State University in Raleigh, United States of America (USA), on 17-20 October 2016 (see Annex A for meeting agenda). 59 participants were convened, including AGISAR members, technical resource persons, representatives from FAO and OIE, and observers (see Annex B for list of participants). Dr Randy Woodson, Chancellor of North Carolina State University, welcomed participants and Dr Paul Lunn, Dean of the College of Veterinary Medicine, added his welcome and expressed his enthusiasm for hosting the meeting and his awareness of global health issues caused by AMR.

Dr Awa Aidara-Kane, Coordinator of the Foodborne and Zoonotic Diseases unit at the Department of Food Safety and Zoonoses of the WHO, welcomed meeting participants and delivered opening remarks. She stated that antibiotic resistance was one of the greatest global threats to health, sustainable development and food safety. She noted that the excessive and inappropriate use of antibiotics was leading to growing resistance among bacteria, and that large quantities of antimicrobials continued to be used in food production. She went on to say that, while effective AMR containment presented a complex global challenge, it was essential to have a sustained and substantial multisectoral effort to combat this threat to the security, benefit, and welfare of future generations.

The meeting was organized separately, but in conjunction with, the first meeting of the WHO Guideline Development Group. This group is tasked with creating guidelines for WHO on the use of medically important antimicrobials in food-producing animals.
2. Objective of the meeting

The main objective of the meeting was to continue to implement the AGISAR 5-year strategic framework,¹ which was established at the 6th AGISAR meeting in Seoul in 2015, to support WHO in the implementation of the global action plan on antimicrobial resistance² at the human-animal ecosystem interface. The specific objectives were to:

I. revise the WHO list of critically important antimicrobials for human medicine (WHO CIA list);³
II. finalize a new edition of AGISAR guidance on integrated surveillance of AMR;
III. develop a global integrated surveillance protocol for extended-spectrum beta-lactamases (ESBL)-producing *E.coli* using a ‘One Health’ approach.

3. Keynote addresses and technical presentations

Dr Paula Cray gave a keynote address on *Antimicrobial resistance surveillance systems: evolution, current state, future considerations*. She highlighted the importance of integrated surveillance and the “One Health” approach, as well as current surveillance systems and related challenges. She also stressed the need for new data, analytics, and a real-time reporting system.

Dr Ellen Silbergeld’s keynote address *ESBL+ Enterobacteriaceae as a paradigm of animal/human interactions in the emergence and dissemination of AMR* focused on industrial food animal production, the drivers of such industrial food animal production from its origins to today, and the benefits and adverse impacts of industrial food animal production.

Dr Antoine Andremont, in his presentation *ESBL E.coli, our best enemy*, introduced the rationale behind and the potential significance of the development of the ESBL *E.coli* tricycle surveillance project. He outlined the global context for and impact of AMR, and stressed a need to have a simple and feasible surveillance system which would use a single indicator.

Dr Peter Collignon presented the *WHO CIA list and its importance in better control of antimicrobial resistance in One Health*. He presented the global context of AMR in the human-animal ecosystem interface and highlighted the major risks for spreading resistant bacteria. These can include not only food animals but also water (lake, river, aquaculture) and vegetables. He stressed the need for risk-reduction strategies, prudent antibiotic use, and a prominent role for the WHO CIA list.

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4. International activities to address AMR using a ‘One Health’ approach by tripartite organizations

A. Food and Agriculture Organization of the United Nations (FAO)

In recognition of the growing problem of AMR, the World Health Assembly adopted resolution 67/39 in May 2014. This called for the development of a global action plan on antimicrobial resistance and for strengthened collaboration between the FAO, the World Organisation for Animal Health (OIE) and WHO to address AMR within the context of ‘One Health’. Over the following year, FAO actively contributed to the development of the WHO-led global action plan on antimicrobial resistance, which was adopted by the 68th World Health Assembly in 2015. The global action plan on antimicrobial resistance calls upon FAO to support the implementation of measures in the food and agriculture sectors to combat AMR. The political commitment of FAO Member States to working on AMR was endorsed by the adoption of Resolution 4/2015 at the 39th Session of the FAO Conference. This resolution was a call to action to both FAO Member States and the organization itself to address the multi-faceted aspects of mitigating both the impact on, and contribution of, the food and agriculture sectors to the threat posed by AMR. The FAO Action Plan on AMR 2016-2020, which describes how FAO will implement the request of its Membership under Resolution 4/2105, was developed by a multidisciplinary FAO team to ensure that all relevant sectors, including terrestrial and aquatic animal health and production, crop production, food safety, standard setting, and legal aspects, were considered and that the Action Plan is embedded within the Strategic Programme of FAO. As well as framing FAO’s work on AMR, it serves as a means of communication for tripartite collaboration, FAO Member States, and existing and potential resource partners of the organization’s approach and goals over the next five years.

B. World Organisation for Animal Health (OIE)

OIE contributed to the development of the global action plan on antimicrobial resistance and the manual for developing national action plans, taking a ‘One Health’ approach, alongside FAO. Through Resolution No.26/2015 Combating AMR and Promoting the Prudent Use of Antimicrobial Agents in Animals, OIE Member States are encouraged to follow the guidance of the global action plan on antimicrobial resistance and to implement national action plans. In May 2016, OIE Member States

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adopted Resolution No. 36 **Combating AMR through a One Health Approach: Actions and OIE Strategy**.\(^{10}\)

The strategy will compile actions and achievements, including awareness raising, surveillance and research, support for good governance, capacity building, and the implementation of standards and guidelines. The OIE standards and guidelines relevant to AMR are updated and available on the OIE Website.\(^{11}\)

An OIE list of Antimicrobial Agents of Veterinary Importance was developed as a draft list in May 2006. The refined list was submitted to the 75\(^{th}\) International Committee during the General Session in May 2007 and adopted unanimously by Resolution No. XXVIII.\(^{12}\) This list identifies antimicrobial agents used in animals around the world, highlights where no or few alternatives for therapy of animal diseases exist, and provides guidance on the use of antimicrobial agents that are also of importance (including critical importance) in human medicine. The list was revised in December 2014 in light of technical comments received, and proposed for adoption in 2015. In May 2015, the updated version of the list\(^{13}\) was adopted by the OIE World Assembly of Delegates, and included recommendations on the use of fluoroquinolones and third and fourth generation cephalosporins.

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The OIE ad hoc group continues to work in collaboration with FAO and WHO, and supports global efforts to prevent and combat AMR, in particular collecting data on the use of antimicrobial agents in animals worldwide for OIE and updating Chapter 6.7, *Harmonization of national AMR surveillance and\(^{15}\)


monitoring programmes of the Terrestrial Code. The aim of the revision is to define selection criteria for animal pathogens for AMR surveillance and to have a table that provides examples of target animal species and animal bacterial pathogens that may be included in resistance surveillance and monitoring programmes. The ad hoc group meets twice a year and the next meeting will be held on 23-26 January 2017. Tripartite collaboration was instrumental for organizing High-level Dialogue on AMR in April at the United Nations in New York and the High-level meeting at the United Nations General Assembly meeting in September 2016.

C. World Health Organization (WHO)
Following the adoption of the global action plan on antimicrobial resistance at the World Health Assembly in 2015, WHO has been leading the global effort to implement the plan, in collaboration with FAO and OIE. Its goal is to ensure the continuity of the successful treatment of infectious diseases with effective and safe antimicrobial agents. All WHO Member States are urged to have multisectoral national action plans that are aligned with the global action plan on antimicrobial resistance in place by May 2017. These will be based on the guiding principles, including whole-of-society engagement and the ‘One Health’ approach, prevention first, access not excess, sustainability, and incremental targets for implementation. The global action plan on antimicrobial resistance sets out the framework for actions to be undertaken by Member States, by WHO as secretariat, and by international and national partners; this should help to achieve the five strategic objectives.

AGISAR has been playing an increasingly important role. It is comprised of a multidisciplinary group of experts on AMR along the food chain with longstanding experience on integrated surveillance of foodborne diseases. Particular expertise includes AMR and the ‘One Health’ approach through well-established FAO/OIE/WHO tripartite collaboration on AMR.

At the 6th AGISAR meeting in Seoul (Republic of Korea) in 2015, AGISAR established a five-year strategic framework based on the activities conducted by five thematic working groups:

1) Knowledge management and communication
2) Critically Important Antimicrobials (CIA) list
3) Optimal use of antimicrobial agents in food production
4) Laboratory methods in antimicrobial susceptibility testing
5) Data integration and analysis

Developing guidance for WHO Member States to strengthen foodborne disease surveillance, including AMR, is one of AGISAR’s most important outputs. At the Seoul meeting, it was decided that updated

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guidance on integrated surveillance of AMR be published. The process to revise this document, first published in 2013, is one of the main objectives of the 7th AGISAR meeting; publication of new guidance is expected in mid-2017. A manual is being developed by the advising countries to strengthening surveillance and response to foodborne diseases, including AMR. This will take a stepwise approach to move towards a functional and sustainable surveillance system. Additionally, a global curriculum is being developed on the use of whole genome sequencing in foodborne disease surveillance and AMR.

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5. Findings from ongoing literature and systematic reviews

In 2016, under another project managed separately from AGISAR, WHO commissioned literature and systematic reviews for the development of formal recommendations on the use of medically important antimicrobials in food-producing animals.

Dr Hattie Webb, a literature reviewer, presented Illustrative examples of probable transfer of antimicrobial resistance determinants from food animals to humans. This literature review\(^{24}\) was to summarize published evidence of probable transfers of resistance determinants for streptothricines, glycopeptides, and colistin from food-producing animals to humans.

Two systematic review teams were independently commissioned to address the same two questions using the population, intervention, comparison, outcome, time, setting (PICOTS) format. These two questions were:

1. For human populations of any age in any setting, does a limitation compared to not having that limitation of use of antimicrobial(s) in food-producing animals reduce the presence of antimicrobial-resistant genetic elements and/or antimicrobial-resistant bacteria in human populations?

2. For human populations of any age in any setting, does a limitation compared to not having that limitation of use of antimicrobial(s) in food-producing animals reduce the presence of antimicrobial-resistant genetic elements and/or antimicrobial-resistant bacteria in food-producing animals?

Two systematic review teams shared their preliminary findings at the meeting.

Dr Anna Mae Scott, on behalf of Bond University, shared the overview and preliminary results of her systematic reviews on Use in food animals of critically important antimicrobial agents for human medicine.\(^{25}\) The results of this work can be found in a journal publication (see footnote).

Dr Karen Tang shared, on behalf of the University of Calgary, presentations Restriction in the use of antibiotics in food animals and antibiotic resistance in food animals and humans: a systematic review and meta-analysis.\(^{26}\) The results of this work can be found in a journal publication (see footnote).

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\(^{24}\) The result of this work was later published: Webb HE, Angulo FJ, Granier SA, Morgan Scott H, Loneragan GH. Illustrative examples of probable transfer of resistance determinants from food animals to humans: Streptothricins, glycopeptides, and colistin [version 1; referees: 2 approved]. F1000Research 2017, 6:1805 (https://f1000research.com/articles/6-1805/v1, accessed 13 May 2018).

6. Implementation of the AGISAR 5-year strategic framework

A. National capacity-building projects

One of AGISAR’s critical activities is to build national capacity to implement integrated surveillance of AMR. AGISAR aims to achieve this objective by developing and disseminating technical guidance through:

- training workshops to strengthen the integrated surveillance of AMR by using the “One Health” approach;
- supporting pilot research projects at the country level.

Since 2010, a total of 26 projects in countries in all WHO regions have been selected and received technical and financial support from WHO. The aim was to strengthen capacity for implementing integrated surveillance of AMR at the national level. The objective and overview of these projects were presented, and the results from the preliminary analysis of data generated through these projects were also shared with the participants. WHO plans to publish a first global report on AGISAR’s pilot projects in 2018.

Dr Sid Thakur, a principal investigator of a project in India, presented Monitoring the antimicrobial resistance profile of bacterial foodborne pathogens in humans, food animals and retail meat in India.

Dr M. Aminul Islam, a principal investigator of a project in Bangladesh, gave a talk entitled Do foodborne pathogens Shigella and Salmonella spp share transferring antibiotic resistance with commensal E.coli in patients with diarrhoea in Bangladesh?

Dr Sam Kariuki, a coordinator of regional projects in Kenya, Rwanda and Tanzania, presented findings and experiences learned through the implementation of projects across the three countries.

B. Revision of the integrated surveillance guidance document

WHO published Integrated Surveillance of Antimicrobial Resistance: Guidance from a WHO Advisory Group in 2013\(^{27}\) to provide WHO Member States with key information on designing an integrated programme for AMR surveillance that includes surveillance of both AMR in foodborne bacteria and antimicrobial use. This guidance was an important output of the first AGISAR five-year strategy, which was created during the 1st AGISAR meeting in 2009.\(^{28}\) The guidance was developed through a four-year consultative process and finalized at the 4th AGISAR meeting in 2013. At the 6th AGISAR meeting in 2015, a second AGISAR five-year strategy was established;\(^{29}\) the central theme of this second AGISAR five-year strategy was to identify how AGISAR will support WHO and Member States in the implementation of the


WHO global action plan on antimicrobial resistance. Based on the five-year strategy, five AGISAR thematic working groups were identified at the 2015 AGISAR meeting. Updating and publishing a revised version of Integrated Surveillance of Antimicrobial Resistance: Guidance from a WHO Advisory Group was identified as a key action to be accomplished during this strategy for two of the AGISAR thematic working groups: Thematic working group #4 ‘Laboratory methods in antimicrobial susceptibility testing’ and thematic working group #5 ‘Data integration and analysis’. Members of these working groups began working on revising the guidance document via conference calls in 2015 and completed much of the revision at a meeting of the thematic working groups in Bangkok, Thailand, on 4-8 April 2016. At the 7th AGISAR meeting in October 2016, all AGISAR member participants further discussed and revised the document.

As with the 2013 guidance, this revised guidance document provides the basic information that countries need to establish an integrated programme for AMR surveillance with surveillance for both AMR and antimicrobial use, taking a step-by-step approach to design the program and use standardized and validated antimicrobial susceptibility testing methods, harmonized interpretive criteria, and standard antimicrobial consumption, and use data-collection and reporting approaches. Chapter 1 of the revised document provides guidance on surveillance approaches for AMR for foodborne bacteria, including minimum requirements for an integrated programme for AMR surveillance. Chapter 2 provides guidance on surveillance approaches for antimicrobial use. Chapter 3 provides guidance on integrated analysis and data reporting as part of an integrated programme for AMR surveillance, including data from all relevant sectors of the food chain and data on AMR in both foodborne bacteria and antimicrobial use. The finalized guidance document was published in July 2017.

C. Development of surveillance protocol on AMR focused on ESBL-producing E.coli ("Tricycle Project")

The first expert meeting for the development of a surveillance protocol for the WHO Integrated Global Survey on Extended Spectrum Beta-Lactamase (ESBL)-producing E.coli using a ‘One Health’ approach, “the Tricycle Project”, was organized on 18-19 October 2016 as a part of the 7th AGISAR meeting. The project, originally initiated by a small group of AGISAR members, aims to design surveillance protocols to understand the magnitude of AMR along the food chain in different countries and regions. This is done by comparing the frequency of a single and highly representative indicator, ESBL-producing E.coli, in humans, the food chain, and the environment. The goal is to develop epidemiological and microbiological methodologies that can be conducted in an identical manner in any country, even those with limited resources. It should be possible for results to be analyzed globally or by region and country; subsets of ESBL-producing E. coli isolates shall be archived for in-depth molecular analysis to characterize genetic properties and changes over time.

The main objective of this first expert meeting was to share the concept of the project more widely, and agree on the required actions and timeline to establish a roadmap for the finalization of the protocol by 2019. Specific objectives of the meeting included:

- Introduce the project concept, scope, and timeline;

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Discuss and agree on methodologies for sample collection, microbiological methods for isolation and identification of ESBL-producing *E. coli* in three sectors (human, food chain, and environment);

Establish working groups (‘Work Package’ (WP)) to will deal with surveillance in the human, food chain, and environmental sectors respectively.

To manage and implement the project, the following WPs were agreed upon and developed:

- WP 1: Surveillance in humans
- WP 2: Surveillance in the food chain
- WP 3: Surveillance in the environment
- WP 4: Molecular characterization
- WP 5: Epidemiology design and analysis
- WP 6: Antimicrobial usage
- WP 7: Management coordination

Dr Antoine Andremont introduced the concept of the project. During the break-out discussions for WPs 1, 2, and 3, the objectives for the surveillance areas, the sampling method (including size, location and characteristics,) microbiological requirements, and method of analysis were considered; some have been established. The group agreed that the process to define the methodological details would continue; the group will re-convene to finalize the draft protocol in the 2nd expert meeting planned in March 2017.

**D. Revision of the WHO list of critically important antimicrobials for human medicine**

An important aspect of AGISAR’s mandate is to review and maintain the WHO list of critically important antimicrobials for human medicine, also known as the WHO CIA list. Since its first publication in 2005, the WHO CIA list has been revised every two years to ensure it is up-to-date, based on newly collected evidence and scientific findings. At the 7th AGISAR meeting in October 2016, members of AGISAR thematic working group #2, ‘Critically important antimicrobials for human medicine’, reviewed and updated the list for the 5th time.31

31 The WHO CIA list 5th revision is available online: [http://www.who.int/foodsafety/publications/antimicrobials-fifth/en/](http://www.who.int/foodsafety/publications/antimicrobials-fifth/en/)
# 7. Annexes

## A. Meeting agenda

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<td>The role of food production in the global emergence and spread of ESBL mediated resistance in bacterial pathogens</td>
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<td>Antoine Andremont</td>
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<td><strong>Plenary session: Presentations from pilot projects</strong></td>
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<tr>
<td>14:45-15:30</td>
<td><strong>Working Group Sessions</strong></td>
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<td></td>
<td>WG 1: Updating WHO CIA list 5th revision</td>
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<td></td>
<td>WG 2: Finalizing the integrated surveillance guidance</td>
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<tr>
<td>15:30-15:50</td>
<td>Coffee break</td>
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<tr>
<td>15:50-17:30</td>
<td><strong>Working Group Sessions</strong> – developing a global integrated surveillance protocol for ESBL-producing <em>E.coli</em></td>
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<tr>
<td>Time</td>
<td>Event Description</td>
<td>Presenters</td>
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<tr>
<td>17:30</td>
<td>Day 1 adjourns</td>
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<tr>
<td>18:00</td>
<td>Reception at the Hunt Library</td>
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<tr>
<td>Day 2</td>
<td><strong>Tuesday, 18 October</strong></td>
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<tr>
<td>09:00-10:00</td>
<td><strong>Plenary session:</strong> International activities to address AMR using a ‘One Health’ approach by the tripartite organizations</td>
<td>Henk Ormel, Elisabeth Erlancher-Vindnel, Awa Aidara-Kane</td>
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<tr>
<td></td>
<td>– Food and Agriculture Organization of the UN</td>
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<td>– World Organisation for Animal Health</td>
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<td>– World Health Organization</td>
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<tr>
<td>10:00-10:30</td>
<td><strong>Plenary session</strong> The WHO ‘Critically Important Antimicrobial’ list and its importance in better control of antimicrobial resistance in ‘One Health’</td>
<td>Peter Collignon</td>
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<tr>
<td>10:30-11:00</td>
<td>Coffee break</td>
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<tr>
<td>11:00-11:30</td>
<td><strong>Plenary session</strong> Key findings from the literature review</td>
<td>Hattie Webb</td>
</tr>
<tr>
<td>11:30-12:30</td>
<td><strong>Plenary session</strong> Systematic Review Findings: Use in food animals of critically important antimicrobial agents for human medicine</td>
<td>Anna Scott on behalf of the systematic review team at Bond University</td>
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<tr>
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<td>– Discussions</td>
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<tr>
<td>12:30-13:30</td>
<td>Lunch</td>
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<tr>
<td>13:30-14:30</td>
<td><strong>Plenary session</strong> Systematic Review Findings: Restriction in the use of antibiotics in food animals and antibiotic resistance in food animals and humans: A Systematic Review and Meta-analysis</td>
<td>Karen Tang on behalf of the systematic review team at University of Calgary</td>
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<tr>
<td></td>
<td>– Discussions</td>
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<tr>
<td>14:30-15:00</td>
<td>Coffee break</td>
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<tr>
<td>15:30-17:30</td>
<td><strong>Working group session</strong> continued</td>
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<td>17:30</td>
<td>Day 2 adjourns</td>
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<tr>
<td>19:00</td>
<td>Social dinner at College of Veterinary Medicine Hearth</td>
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<td>Day 3</td>
<td><strong>Wednesday 19 October</strong></td>
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<td>09:00-10:00</td>
<td><strong>Working group session</strong> continued</td>
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<td>10:00-10:30</td>
<td>Coffee break</td>
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<tr>
<td>10:30-12:30</td>
<td><strong>Working group session</strong> continued</td>
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<td>12:30-13:30</td>
<td>Lunch</td>
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<tr>
<td>13:30-15:30</td>
<td><strong>Working group session</strong> continued</td>
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<td>Presenters</td>
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<td>15:30-16:00</td>
<td>Coffee break</td>
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<td>16:00-17:30</td>
<td><strong>Working group session</strong> continued</td>
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<td>17:30</td>
<td>Day 3 adjourns</td>
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<tr>
<td><strong>Day 4</strong></td>
<td><strong>Thursday, 20 October</strong></td>
<td><strong>Presenters</strong></td>
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<td>09:00-10:30</td>
<td><strong>Working group session</strong> continued</td>
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<td>10:30-11:00</td>
<td>Coffee break</td>
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<tr>
<td>11:00-12:30</td>
<td><strong>Closing remarks</strong></td>
<td>Peter Collignon</td>
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<td>– Report from working group sessions</td>
<td>Antoine Andremont</td>
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<td>– World Health Organization</td>
<td>Awa Aidara-Kane</td>
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<td></td>
<td>– North Carolina State University</td>
<td>Paula Cray</td>
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<tr>
<td>12:30</td>
<td>Day 4 adjourns</td>
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</table>
B. List of participants

AGISAR Members

Jacques ACAR
Professor
Senior expert at the World Organisation for Animal Health (OIE)
Paris
France

Antoine ANDREMONT
Bacteriology Laboratory
Bichat-Claude Bernard University-Hospital
Paris
France

Peter COLLIGNON
Executive Director
ACT Pathology
Woden
Australia

John CONLY
Professor, Faculty of Medicine
University of Calgary and AHS-Calgary and Area
Alberta
Canada

Pilar DONADO-GODOY
Senior Researcher
Corporación Colombiana de Agropecuaria
Bogota
Colombia

Paula FEDORKA-CRAY
Professor and Head, Department of Population Health and Pathobiology
College of Veterinary Medicine
North Carolina State University
Raleigh
USA

Cindy FRIEDMAN
Team lead
National Antimicrobial Monitoring System
Enteric Diseases Epidemiology Branch
U.S. Centers for Disease Control and Prevention
Atlanta
USA

Kari GRAVE
Professor
Norwegian Veterinary Institute
Department of Health Surveillance
Oslo
Norway

Rebecca IRWIN
Director
Surveillance Division
Laboratory for Foodborne Zoonoses
Public Health Agency of Canada
Ottawa
Canada

Mohammad Aminul ISLAM
Associate Scientist
Head, Food Safety Research Group & Food Microbiology Laboratory Unit
Centre for Food and Waterborne Diseases
International Centre for Diarrhoeal Disease Research
Bangladesh

Samuel KARIUKI
Centre for Microbiology Research
Kenya Medical Research Institute
Nairobi
Kenya

Hyo-Sun KWAK
Director
Division of Enteric Disease
Center for Infectious Disease
Korea National Institute of Health
Osong
Republic of Korea

Scott McEWEN
Professor
Department of Population Medicine
Ontario Veterinary College
University of Guelph
Guelph
Canada

Gérard MOULIN
Anses-Agence Nationale du Médicament Vétérinaire
Fougères
France

Antoinette NGANDJIO
Microbiologiste
Chef Service Hygiène et Environnement Section
Microbiologie
Centre Pasteur Cameroun
Yaounde
Cameroun

Ranjith PERERA
Head, Department of Medical Microbiology, Faculty of Medicine
University of Kelaniya
Rajagiriya
Sri Lanka
Thandavarayan RAMAMURTHY
Scientist, National Chair Translational Health Science and Technology Institute NCR Biotech Science Cluster
Haryana
India

Steven ROACH
Food Safety Program Director
Food Animal Concerns Trust (FACT)
Chicago
USA

Flavia ROSSI
Director, Microbiology Laboratory
Hospital das Clínicas, Pathology Department
Faculty of Medicine of the University of São Paulo Brazil
São Paulo
Brazil

Harvey Morgan SCOTT
Professor, Epidemiology
Department of Veterinary Pathobiology
College of Veterinary Medicine & Biomedical Sciences
Texas A&M University
Texas
USA

Ellen SILBERGELD
Johns Hopkins University
Bloomberg School of Public Health
615 North Wolfe Street
Baltimore MD 21218
USA

Ruby SINGH
Regulatory Review Microbiologist
Division Of Human Food Safety
Center for Veterinary Medicine
U. S. Food and Drug Administration
Rockville
USA

Mark D. SOBSEY
Kenan Distinguished Professor of Environmental Sciences and Engineering
Department of Environmental Sciences and Engineering
Gillings School of Global Public Health
University of North Carolina
Chapel Hill
USA

John STELLING
Co-Director, WHO Collaborating Centre for Surveillance of Antimicrobial Resistance
Brigham and Women’s Hospital
Boston
USA

Olivier VANDENBERG
Professor
Ecole de Santé Publique
Belgium

Jaap WAGENAAR
Department of Infectious Diseases and Immunology
Faculty of Veterinary Medicine
Utrecht University
Utrecht
Netherlands

Technical resource persons

Frederick J ANGULO
Acting Associate Director for Science
Center for Global Health
Centers for Disease Control and Prevention
Atlanta
USA

Herman BARKEMA
Professor, Epidemiology of Infectious Diseases
University of Calgary
Calgary
Canada

Niamh CAFFREY
Post-doctoral Scholar
University of Calgary
Calgary
Canada

Jorge PINTO FERREIRA
SAFOSO
Bern
Switzerland

William GHALI
Professor
Departments of Community Health Sciences and General Internal Medicine
University of Calgary
Calgary
Canada

Dick HEEDERIK
Institute for Risk Assessment Sciences Utrecht University
Division of Environmental Epidemiology
Utrecht
Netherlands

Lothar KREIENBROCK
Director, Department of Biometry, Epidemiology and Information Processing
University of Veterinary Medicine Hannover
Hannover
Germany
Simon LE HELLO  
Co-directeur Centre National de Référence E. coli/Shigella/Salmonella  
Unité de Recherche et d'Expertise des Bactéries Pathogènes Entériques  
Institut Pasteur  
Paris  
France

Ghassan M. MATAR  
Professor, Dept. of Experimental Pathology, Immunology & Microbiology Faculty of Medicine  
American University of Beirut  
Beirut  
Lebanon

Diego NOBREGA  
PhD. candidate at the Department of Production Animal Health  
University of Calgary  
Calgary  
Canada

Heike SCHMITT  
Centre for Zoonoses and Environmental Microbiology  
National Institute for Public Health and the Environment (RIVM)  
Bilthoven  
Netherlands

Anna SCOTT  
Senior Research Fellow  
Centre for Research in Evidence-based Practice  
Bond University Gold Coast  
Queensland  
Australia

Karen TANG  
Post-doctoral research fellow  
Department of Medicine  
University of Calgary  
Calgary  
Canada

Sid THACKUR  
Associate Professor, College of Veterinary Medicine  
North Carolina State University  
Raleigh  
USA

Garance Fannie UPHAM  
Vice President  
World Alliance Against Antibiotic Resistance  
France

Hattie WEBB  
Department of Animal and Food Sciences  
Texas Tech University  
Lubbock, Texas  
USA

Gun-Jo WOO  
Professor  
Department of Biotechnology  
College of Life Science  
Korea University  
Seoul  
Republic of Korea

Tomoyuki YAMAGUCHI  
PhD candidate, Division of bioresources,  
Hokkaido University Research Center for Zoonosis Control  
Sapporo  
Japan

FAO representatives

Sarah CAHILL  
Food and Agriculture Organization of the United Nations (FAO)  
Food Quality Liaison Group  
Nutrition and Consumer Protection Division  
Rome  
Italy

Hendrik Jan ORMEL  
Senior Veterinary Policy Advisor  
Animal Health Service  
FAO  
Rome  
Italy

OIE representative

Elisabeth ERLACHER-VINDEL  
Deputy Head  
Scientific and Technical Department  
World Organisation for Animal Health  
Paris  
France

OBSERVERS

Aidan HOLLIS  
Professor of Economics  
University of Calgary  
2500 University Drive  
Calgary, T2N 1N4  
Canada

Bernard E. ROLLIN  
Professor, Department of Philosophy  
Colorado State University  
Fort Collins, CO 80523-1781  
USA
Mauricio FERRI
Critical Care Medicine
Health Services Research
Princeton
USA

David Wallinga
Natural Resources Defense Council
San Francisco
USA

Neelam TANEJA
Department of Medical Microbiology Postgraduate Institute of Medical Education and Research
Chandigarh 160012
India

North Carolina State University

Takiyah BALL
North Carolina State University
USA

Benjamin CALLAHAN
North Carolina State University
USA

David DIXON
North Carolina State University
USA

Bailin LI
North Carolina State University
USA

Warwick ARDEN
North Carolina State University
USA

Paul LUNN
Dean
College of Veterinary Medicine
North Carolina State University
USA

Douglas MECKES
North Carolina State University
USA

Steve TROXLER
North Carolina State University
USA

Ajay UPADHYAY
North Carolina State University
USA

Randy WOODSON
North Carolina State University
USA

WHO SECRETARIAT
Awa AIDARA-KANE
Coordinator
Foodborne and Zoonotic Diseases
Department of Food Safety and Zoonoses
World Health Organization
1211 Geneva 27
Switzerland

Jorge MATHEU
Project Officer
Department of Food Safety and Zoonoses
World Health Organization
1211 Geneva 27
Switzerland

Arno MULLER
Technical Officer
Policy, Access and Use Team
Department of Essential Medicines and Health Products
World Health Organization
1211 Geneva 27
Switzerland

Yuki MINATO
Technical Officer
Foodborne and Zoonotic Diseases
Department of Food Safety and Zoonoses
World Health Organization
1211 Geneva 27
Switzerland

Sergey Romualdovich EREMIN
Department of Infection Control and Publications
World Health Organization
1211 Geneva 27
Switzerland

Enrique PEREZ-GUTIERREZ
Senior Advisor Foodborne Diseases and Zoonoses
Health Surveillance, Disease Prevention and Control (HSD/VPH)
Foodborne Diseases and Zoonosis
Washington DC
USA

Carmem PESSOA
a.i Coordinator,
Antimicrobial Drug Resistance
World Health Organization
1211 Geneva 27
Switzerland