Technical Contribution

December, 2017

Design and implementation of national antimicrobial resistance plans based on risk communication: from theory to action.

Bentancur A, Bennett N, Fernández F, Kurioka M.

1. Risk Communication

The Terrestrial Animal Health Code adopted by the World Organisation for Animal Health (OIE) defines communication as the discipline of "informing, guiding and motivating individual, institutional and public groups, ideally on the basis of interactive exchanges, about any issue under the competence of the Veterinary Services" (OIE 2014).

Codex Alimentarius defines risk as a "function of the probability of an adverse health effect and the severity of that effect, consequential to a hazard(s) in food," and risk as a "biological, chemical or physical agent in, or condition of, food with the potential to cause an adverse health effect" (Codex Alimentarius 2016, p. 131).

Risk communication is one of the three components of risk analysis (the other two are evaluation and management). The Joint FAO/WHO Expert Consultation held in 1998 defined it as "an interactive process of exchange of information and opinion on risk among risk assessors, risk managers, and other interested parties" (FAO 2005). In this case, "interested parties" means representatives of the public sector, the private sector, academia, research, producers, processors, consumers and other stakeholders in the agrifood system exposed to the risk in question.

The 25th edition of Codex Alimentarius' Procedural Manual added new elements to the definition of risk communication, defining it as the "interactive exchange of information and opinions throughout the risk analysis process concerning risk, risk-related factors and risk perceptions, among risk assessors, risk managers, consumers, industry, the academic community and other interested parties, including the explanation of risk assessment findings and the basis of risk management decisions." (Codex Alimentarius 2016).

Box 1 contains a list of the elements that should be included in effective risk communication, depending on what is to be communicated and to whom.

Box 1. Elements of effective risk communication

Nature of the risk

- The characteristics and importance of the hazard.
- The magnitude and severity of the risk.
- The urgency of the situation.
- Whether the risk is becoming greater or smaller (trends).
- The probability of exposure to the hazard.
- The distribution of exposure.
- The amount of exposure that constitutes a significant risk.
- The nature and size of the population at risk.
- Who is at greatest risk.

Nature of the benefits

- The actual or expected benefits associated with each risk.
- Who benefits and in what ways.
- Where the balance point is between risks and benefits.
- The magnitude and importance of the benefits.
- The total benefit to all affected populations combined.

Uncertainties in risk assessment

- The methods used to assess the risk.
- The importance of each of the uncertainties.
- The weaknesses of, or inaccuracies in, the available data.
- The assumptions on which estimates are based.
- The sensitivity of the estimates to changes in assumptions.
- The effect of changes in the estimates on risk management decisions.

Risk management options

- The action(s) taken to control or manage the risk.
- The action individuals may take to reduce personal risk.
- The justification for choosing a specific risk management option.
- The effectiveness of a specific option.
- The benefits of a specific option.
- The cost of managing the risk, and who pays for it.
- The risks that remain after a risk management option is implemented.

Source: FAO (2005).

The risk information exchanged will be about animal and plant health or food safety issues that could pose a threat to human, animal and plant health and/or the environment, with a view to fostering trust and confidence in the authorities spearheading the process and in the safety of the food being marketed/consumed.

Informing the public involves generating technical messages for specific groups of interested parties that convert complex, science-based information into targeted, clear and simple messages that take into account the groups' opinions, motivations, uses and customs and risk perceptions.

It is important that communication be a two-way process, because then the risk communicators receive feedback from the target groups that enables them to adjust the messages and be more specific about the measures available for managing the risk in question. Box 2 contains a list of different tactics that can be used to involve the interested parties in the process.

Box 2. Examples of tactics to engage stakeholders.

Meeting techniques

- Public hearings
- Public meetings
- Briefings
- Question and answer sessions
- Focus groups
- Workshops
- Inclusion of non-scientific stakeholder groups in scientific meetings.

Other techniques

- Interviews
- Hotlines and toll-free numbers
- Web sites
- Advertising and flyers
- Television and radio
- Reports, brochures and newsletters
- Booths, exhibits and displays
- Contests and events.

Source: FAO (2007).

Learning from other experiences

In response to the global emergency caused by the zika virus, the PAHO/WHO's Communicable Diseases and Health Analysis Department issued guidelines for providing technical support to the Member States in the region of the Americas affected by the public health emergency.

Although the material in question does not focus on communication during severe crises such as the outbreaks of zika and dengue that occurred, both the content and presentation of the PAHO/WHO document make it very applicable to other major international problems such as antimicrobial resistance (AMR), whose level of risk is increasing exponentially but is still not perceived as constituting a crisis by all stakeholders.

The abovementioned publication emphasizes that risk communication "is used to dialogue, listen to, and communicate with affected populations during an emergency or disaster with a public health impact in order to provide the information they need to make the best possible decisions to protect their health and prevent disease" (PAHO/WHO 2016). It outlines a response focused on four strategic lines of action: a) strengthening of the capacities of health authorities and design of risk communication strategies and plans; b) mobilization actions; c) social research; and, d) coordination.

The activities of the first strategic line of action were geared to the risk communication training for public authorities and key partners, and the design and implementation of risk communication strategies and plans, with direct technical support from experts in situ. Box 3 sets out the main recommendations that the experts made based on their missions to different countries in the Americas.

Box 3. Recommendations for zika and dengue made by the risk communication missions.

Standardize messages through official spokespersons and other information channels

- Develop technical contents that standardize concepts and the official position.
- Develop guidelines for regulating information and managing social and institutional networks.
- Provide ongoing training for ministry of health spokespersons and administrators.
- Upgrade ministry of health websites to facilitate zika information searches.

Improve internal and external coordination

- Establish information flows and monitor news to provide timely information at the local and community level.
- Systematically build relationships with journalists to hold information and training sessions on zika, dengue and chikungunya and their complications.
- Improve local and community response capacity.

Conduct social mobilization and community engagement activities to include the public in the response

- Observe Mosquito Awareness Week.
- Educate the public about preventing sexual transmission.
- Increase knowledge about microcephaly and other neurological disorders.

Coordinate activities with other sectors (prefectures and ministries of tourism, education, and labor through the office of the president etc.)

Prepare a health emergency communications policy (risk communication strategy) to:

- Organize communications intelligence in response to hard-to-manage events.
- Establish rules for the release of information.
- Develop risk maps and response plans for a public health emergency of international concern.
- Create and train multidisciplinary teams.
- Define and regulate information flows.
- Prepare a timetable (roadmap).
- Monitor and evaluate activities, results, lessons learned.

Source: PAHO/WHO (2016).

Under the second strategic line of action, aimed at social mobilization and community engagement, a continent-wide campaign was organized, whose focal point was an awareness week involving a wide range of educational and communication activities in 26 countries of the region.

With reference to social research, the publication explains that efforts were made to garner scientific information to support the authorities' decision-making. The factors affecting the public's behavior in response to the virus and the associated congenital syndrome were identified through analyses of knowledge, attitudes and practices, with the findings also providing feedback for the aforementioned communication strategy.

Finally, the chapter on coordination highlights the sustained transmission of information via a distribution list and a website; interagency coordination and coordination with donors; and the production of work manuals and informational and communications materials.

The PAHO/WHO document states that, before an emergency occurs and with a view to implementing successful communication prevention and control actions, it is essential to study the interested parties' risk perception with regard to the health event under analysis. In the case of the zika virus, PAHO/WHO recommends studying people's perception of the possibility of their contracting the disease and of its severity or scale, as well as the benefits of modifying their behavior versus the personal costs and their willingness to make the necessary changes (PAHO 2017).

Multidisciplinary work

The PAHO/WHO zika document also stimulates reflection on the multidisciplinary nature of risk communication, inasmuch as it brings together professionals from different backgrounds to construct a common strategy, ranging from scientific evidence to the communication of the interested parties, in a flow of information that will be repeated as knowledge of the risk analysis increases.

It is suggested that the capacities that risk communication strategies should define and identify are: Institutional communication and credibility management; Internal communication; Communication with partners; Political communication; Social mobilization and community engagement; Communication for behavioral change; Health promotion; Community awareness initiatives; and Communication with the media and social networks (PAHO/WHO 2016, p. 7).

With the exception of institutional (or corporate) communication and internal communication, all the elements mentioned are directly related to the concept of Communication for Development (C4D) defined in the Rome Consensus in 2006 as "a social process based on dialogue using a broad range of tools and methods. It is also about seeking change at different levels including listening, building trust, sharing knowledge and skills, building policies, debating and learning for sustained and meaningful change. It is not public relations or corporate communication." (United Nations Development Programme 2011).

United Nations agencies identify four interrelated trends in the overview of communication for development, which are summarized in the next box.

Box 4. Trends in communication for development.

Behavior change communication

This is an interactive process for developing messages and approaches using a mix of communication channels in order to encourage and sustain positive and appropriate behaviours… Since the 1990s, increasingly comprehensive communication strategies including community mobilization, client-centred counselling and social network interventions have been used to effect behaviour change. Recognizing that individual behaviour is shaped by social, cultural, economic and political contexts, these strategies may incorporate peer education, social marketing, entertainment education, public policy and media advocacy, personal and community empowerment, and public relations. This evolution has led to some organizations adopting the more encompassing term of Strategic Communication (SC).

Communication for social change

… focuses on dialogue processes through which people can overcome obstacles and identify ways to help them achieve the goals they set for themselves… Elements of the communication for social change process include catalyst, community problem recognition, community dialogue, planning and collective action… Ideally, this leads to collective action that can result in individual or social change, or both – and both are needed if there is to be long-term sustained societal impact.

Communication for advocacy

… involves organized actions aimed at influencing the political climate, policy and programme decisions, public perceptions of social norms, funding decisions and community support and empowerment regarding specific issues. It is a means of seeking change in governance, power relations, social relations, attitudes and even institutional functioning. Through ongoing advocacy processes, which should be built into an overall communication for development strategy, policy makers and political and social leaders at all levels are influenced to create and sustain enabling policy and legislative environments and to allocate resources equitably.

Source: United Nations Development Programme (2011).

2. Antimicrobial resistance and risk communication

Codex Alimentarius defines antimicrobial agents as "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," and antimicrobial resistance as "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" (Codex Alimentarius 2011).

AMR occurs naturally over time as microorganisms adapt to their environment. All microorganisms possess the capacity to develop resistance but bacteria are singled out, as they currently have the biggest impact on therapeutic treatments. There are different types of AMR, for which patients require different treatments: a) non-multidrug resistance; b) multidrug resistance, when there is resistance to more than three antimicrobials; c) extensive drug resistance, when most antimicrobials are involved; and d) pan drug resistance, when there is resistance to all existing antimicrobials.

The excessive and inappropriate use of antibiotics in humans, animals and plants has drastically accelerated the emergence of AMR. This means that certain antibiotics are becoming increasingly ineffective in treating infectious diseases, making it necessary to develop new active ingredients faster than is currently possible.

In 2017, in a bid to guide and promote research and development of new antibiotics, the WHO published a list of antibiotic-resistant priority pathogens, which includes the 12 families that pose the greatest threat to human health, divided into three categories: critical, high and medium priority. (WHO 2017, news release). But not every country possesses the processed national data about their antibiotic-resistant priority pathogens that is needed to monitor the evolution of susceptibility and compare it with the trend in the production, marketing and use of the respective antibiotics and, based on that, to make science-based decisions about risk management.

The next box highlights key facts about AMR that can be very useful in the production of key messages.

Box 5. WHO and FAO facts and figures.

WHO - Facts and figures

- Antimicrobial resistance threatens the effective prevention and treatment of an ever-increasing range of infections caused by bacteria, parasites, viruses and fungi.
- AMR is an increasingly serious threat to global public health that requires action across all government sectors and society.
- Without effective antibiotics, the success of major surgery and cancer chemotherapy would be compromised.
- Each year, 490,000 people develop multi-drug resistant TB globally, and drug resistance is starting to complicate the fight against HIV and malaria, as well.

FAO - Key facts

- There are around 700,000 human deaths each year related to antimicrobial resistance (United Kingdom's O'Neill Commission)
- 27 different antimicrobial classes are used in animals.
- The total global animal health market in 2011 was equivalent to USD 22 billion (OECD).
- Just 89 countries report having a system in place to collect data on the use of antimicrobial agents in animals (OIE 2015).
- There is no standardized data available on the global use of antimicrobials in livestock.

Source: WHO http://www.who.int/news-room/fact-sheets/detail/antimicrobial-resistance
FAO http://www.fao.org/antimicrobial-resistance/en/

AMR has both health-related and economic consequences. On the one hand, it compromises the treatment of infections and major procedures such as organ transplantation, chemotherapy and surgeries, meaning that more expensive drugs and longer treatments must be used. From the economic standpoint, resistance not only makes treatment costlier but also reduces animal, agricultural and human productivity.

The European Union estimates that AMR costs it 1.5 billion Euros per year in health costs and lost productivity (European Commission 2017), while the World Bank has warned that antimicrobial resistance could be as damaging to the global economy as the 2008 financial crisis (WHO Editorial 2017).

AMR respects neither species nor borders. The transfer of resistance genes to pathogenic microorganisms that could potentially affect humans is complex, and can occur from the environment, animals, food and even between humans. There is also a transboundary dimension, as genes can spread across the globe through tourism, the transfer of patients between different health care facilities and trade in animals and food.

AMR is a highly complex global problem that needs to be addressed with a "One Health" approach, i.e., holistically, dealing with all its components: public health, animal health, food production chains, biosecurity, the environment, research, innovation and international cooperation.

The biggest risk to consumer health from the use of antibiotics in animals is posed not by residues in food but by the development of resistance in bacteria found in animals. Such resistance creates the risk of resistant bacteria being transferred from animals to humans, or of genes encoding resistance in animal bacteria being transferred to human bacteria (FAO 2004).

However, integrated studies still need to be conducted focusing on the effects on human health, animal health and ecosystems, in order to develop interconnected surveillance and response systems (Menin 2017).

The issue of AMR has galvanized the international community into action at both the political and technical levels.

Over the last 15 years, scientific research findings have been used as the basis for technical documents and influenced agreements and political declarations at the highest level that have positioned the issue on the global political agenda as a problem that affects the entire society. The next box contains a summary of the principal milestones in this process.

Box 6. Milestones in the development of the global agenda.

2005 - Codex Alimentarius published its Code of Practice to minimize and contain antimicrobial resistance. CAC/RCP 61-2005.
2011 - Codex Alimentarius published its Guidelines for risk analysis of foodborne antimicrobial resistance. CAC/GL 77-2011.
2011 - The European Union published its Action Plan against the rising threats from antimicrobial for the period 2011–2016.
2014 - Codex Alimentarius published its Guidelines for the design and implementation of national regulatory food safety assurance programmes associated with the use of veterinary drugs in food producing animals. CAC/GL 712009.
2014 - Spain launched its Strategic Action Plan to reduce the risk of selection and dissemination of antibiotic resistance.
2014 - The United States published its National Strategy to Combat Antibiotic-Resistant Bacteria.
2014 - Canada published Antimicrobial Resistance and Use in Canada. A Federal Framework for Action.
2015 – The 68th World Health Assembly, held in Geneva, approved the Global Action Plan on Antimicrobial Resistance prepared by the World Health Organization, with contributions from FAO and the OIE. Resolution WHA68.7
2015 – The G7 and the G20 Declarations on Antimicrobial Resistance.
2015 - Argentina launched its National Strategy for the Control of Antimicrobial Resistance. Joint Resolution 834/2015 and 391/2015.
2015 - Australia issued its Response to the threat of antimicrobial resistance: The National Antimicrobial Resistance Strategy 2015-2019.
2015 - The United States launched its National Action Plan for Combatting Antibiotic-resistant Bacteria.
2015 - The European Union published its Guidelines for the prudent use of antimicrobials in veterinary medicine. 2015/C 299/04.
2016 - The FAO issued its Action Plan on Antimicrobial Resistance 2016-2020.
2016 - OIE Strategy on Antimicrobial Resistance and the Prudent Use of Antimicrobials.

2016 - Political Declaration of the high-level meeting of the General Assembly on antimicrobial resistance. Resolution A/RES/71/3.
2016 - World Bank publication: Drug-Resistant Infections A Threat to Our Economic Future (Discussion Draft).
2016 - Australia presented the Implementation Plan for the First National Antimicrobial Resistance Strategy 2015-2019.
2017 - Maximum Residue Limits (MRLs) and Risk Management Recommendations (RMRs) for Residues of Veterinary Drugs in Foods CAC/MRL 2.
2017 - The European Union published its new One Health Action Plan against Antimicrobial Resistance.
2017 - Peru issued its National Plan to combat Antimicrobial Resistance 2017-2021.
2017 - New Zealand launched its Antimicrobial Resistance Action Plan.

Source: prepared by the authors.

The increase in AMR poses a threat to the progress made in the areas of health and development (UN 2015). For that reason, the chief international health and food agencies, regional organizations and the countries themselves are addressing the issue of risk communication and AMR in their respective plans and strategies and producing technical documents on the subject.

Technical documents on risk communication and AMR

In one important technical document, the Guidelines for Risk Analysis of Foodborne Antimicrobial Resistance, Codex Alimentarius suggests that an open process in which the food safety issue is clearly identified and communicated by the risk managers to risk assessors as well as affected consumers and industry is essential to promote both an accurate definition and a well-understood and common perception of the issue (Codex Alimentarius, 2011 p. 18).

The publication further emphasizes the importance of guideline documents, training or educational programs that involve all interested parties, technical bulletins, public education programs, appropriate labelling, public interest messages and consumer outreach programs as tools that can help reduce foodborne AMR and, therefore, protect public health (Codex Alimentarius, 2011 p. 18).

Furthermore, the Code of practice to minimize and contain antimicrobial resistance makes reference to the responsibilities of the regulatory authorities, the veterinary pharmaceutical industry and veterinarians with regard to the training of users of antimicrobial veterinary drugs. It also lists the organizations that should take part in the training: all the relevant professional organizations, regulatory authorities, the pharmaceutical industry, veterinary schools, research institutes and professional associations; and adds farmers and producers of food animals. The topics that the training should cover are listed in Box 7.

Box 7. Topics on which the training should focus.

• Information on disease prevention and management strategies to reduce the need to use veterinary antimicrobial drugs;
• Relevant pharmacokinetic and pharmacodynamic information to enable the veterinarian to use veterinary antimicrobial drugs prudently;
• The ability of veterinary antimicrobial drugs to select for resistant microorganisms in food- producing animals that may contribute to animal or human health problems; and,
• The need to observe responsible use recommendations and using veterinary antimicrobial drugs in animal husbandry in agreement with the provisions of the marketing authorizations and veterinary advice.

Source: Codex Alimentarius (2005).

The document also makes specific reference to the control of antimicrobial drug advertising. The responsibilities of the regulatory authorities include ensuring that advertising complies with the marketing authorization granted (in particular with the content of the summary of product characteristics) and complies with each country's national legislation. The responsibilities of the veterinary pharmaceutical industry also include not inappropriately advertising antimicrobials directly among food animal producers.

In its Guidelines for the prudent use of antimicrobials in veterinary medicine (2015/C 299/04), the European Union states that "It is only possible to minimize the development of AMR through the prudent use of antimicrobials if all parties involved are well informed. Awareness campaigns

therefore play an important role and need to be regularly repeated and updated."

Communication in the Tripartite Partnership

In 2010, the WHO, OIE and FAO entered into a global Tripartite Partnership. The first objective of both the WHO Action Plan (2015) and the OIE Strategy (2016) concerns the need to improve awareness, information, and education and training for all interested parties.

The FAO Action Plan (2016) establishes four focus areas: Awareness, Evidence, Practices and Governance, which are aligned with the WHO's Global Action Plan. The first objective of the WHO Action Plan, 'Improve awareness and understanding of antimicrobial resistance through effective communication, education and training," corresponds to FAO's Awareness and Governance Focus Areas.

Box 8. Measures proposed by WHO for Member States and national partners.

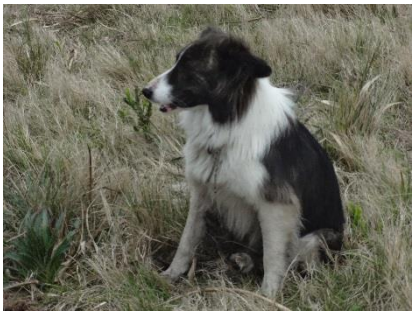
Member State actions

• Public communication programs to increase awareness and promote behavioral change.
• Annual antibiotic awareness campaign
• Establish AMR as a core component of professional education, training, certification and development and in agricultural practice.
• Include antimicrobial use and resistance in school curricula
• Provide the public media with accurate and relevant information to reinforce key messages.
Include AMR in the mechanisms that lead to cross-government commitment.
• Promote and support multisectoral (one-health) coalitions at national level that participate in such coalitions at regional and global levels.

National partner actions

• Professional organizations and societies should establish AMR as a core component of education, training, examination, professional registration or certification, and professional development.
• Interested parties should help to promote public awareness and understanding of infection prevention and use of antimicrobial medicines across all sectors.

Source: WHO Action Plan (2015).



With respect to the role of the institutions involved in the Tripartite Partnership, all three of the documents mentioned stress the need to coordinate communication and political advocacy actions to combat AMR. In the area of communication, they propose developing communication and promotion products and making them available to the Member States for adaptation to support their dissemination efforts, and organizing technical events on the subject.

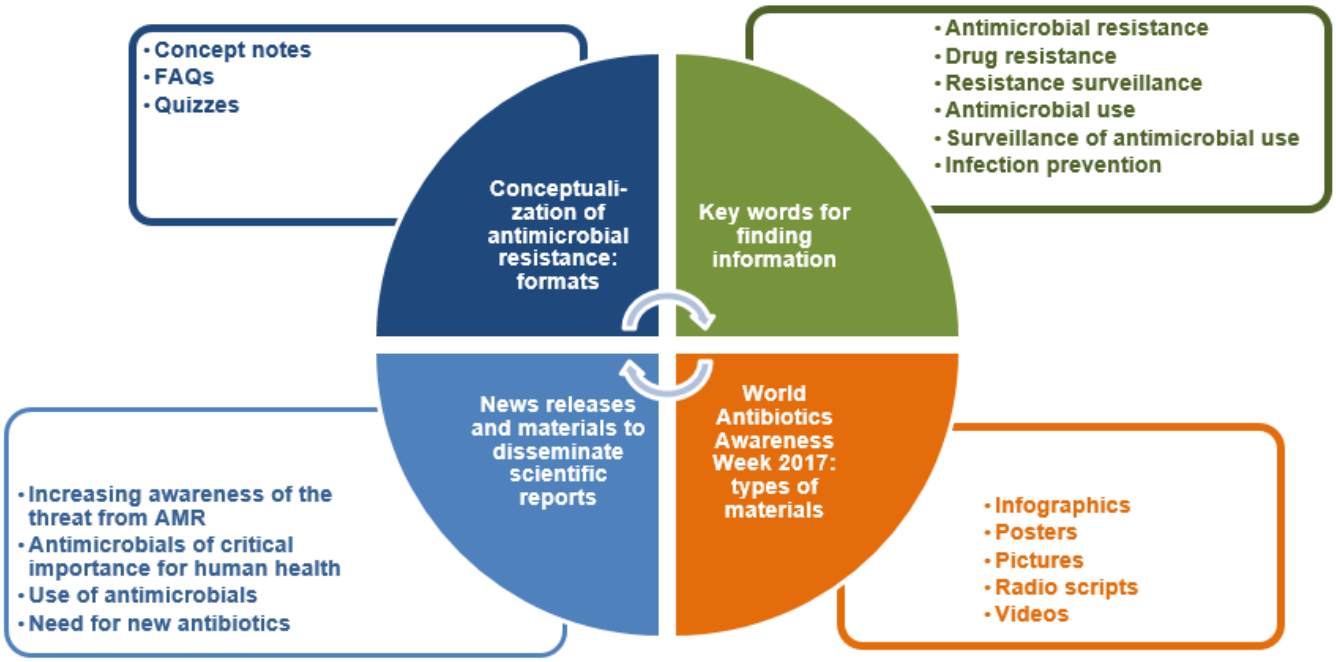
All three organizations agree that the subjects on which the communication, education and training materials should focus are: the conceptualization of AMR (understanding of the problem, its impact on the agrifood sector, the challenges and risks involved); the prudent and responsible use of antimicrobial drugs; the importance of infection prevention in human and animal health and agricultural practice; and measures to control the emergence and spread of resistant microorganisms.

The OIE emphasizes the need to encourage a professional culture that supports the responsible and ethical use of antimicrobial products in animals, which is in line with Communication for behavioral change.

In the area of Communication for advocacy, the partner institutions propose including and maintaining the AMR issue as a priority in regional and international debates, and publishing progress reports on plans and strategies to maintain the authorities' commitment. They also propose providing scientific and technical information to support public policy-making and the review of the national, regional and international regulatory frameworks.

The international standard-setting organizations have done an enormous amount of outstanding work, equipping the Member States with an array of tools and materials, as shown in Figure 1.

Figure 1. AMR communication tools available from the Tripartite Partnership.



Source: prepared by the authors based on information found on the WHO, FAO and OIE websites.

Risk Communication in the European Commission Plan

In June 2017, the European Union adopted a second Action Plan to tackle antimicrobial resistance, motivated by the need to provide leadership on the issue and to add value to the actions of its Member States (European Union, 2017).

The Plan is based on three pillars: to make the EU a best practice region; to foster research, development and innovation; and to shape the global agenda. A critical aspect of the first pillar is the inclusion of environmental aspects "as one of the major contributors to the development and spread of anti-microbial resistance" and, of the third pillar, it is the reference to promoting EU standards and measures for addressing antimicrobial resistance among its trade partners. (EU Press Release 2017).

As far as communication efforts are concerned, the Plan acknowledges that the level of awareness about the link between the use of antimicrobials and the development and spread of AMR continues to be low, which is one of the major reasons for their inappropriate use in humans and animals. Therefore, it proposes improved public and professional awareness about antimicrobial resistance, promoting prudent use and supporting more informed clinical decision-making and the judicious prescribing of these drugs.

The Commission will provide information about the public's use of and knowledge about antimicrobials through Eurobarometer surveys, will support national awareness-raising efforts within its Member States with specific communication tools that target key audiences, and will contribute to the annual Antibiotic Awareness Day.

The Plan indicates that to promote prudent use of antimicrobials, the Commission will assist Member States in implementing EU Guidelines for the prudent use of antimicrobials in veterinary medicine, including identifying and disseminating good practices. It will develop rules on reserving antimicrobials for human use.

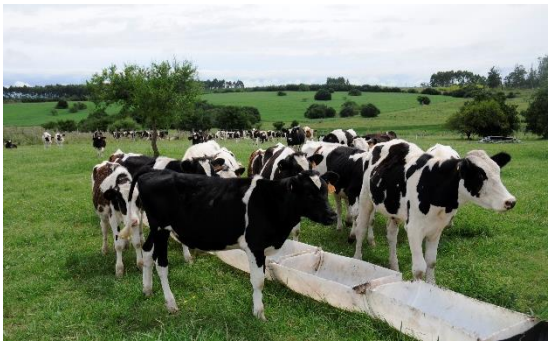
In the area of labelling, it will draw up a list of antimicrobials that cannot be used. Data will also be collected on the sale and use of antimicrobials; and the European Medicines Agency (EMA) will be encouraged to review information on the benefits and risks of older antimicrobial agents to determine whether any changes in their use are required.

In terms of coordinating Member States' response to AMR, while recognizing advances made in some regions and sectors to tackle AMR, it recommends that best practices and policies be shared to foster mutual learning, build consensus, compare advances made in key areas and produce national results more quickly. To achieve this, the Commission will provide information on the AMR epidemiological situation in the United States and in the EU; support the implementation of national plans; and will adopt joint measures to reinforce collaboration, policy-development, coordination and knowledge-sharing.

Moreover, it also prescribes stronger alliances between stakeholders in the human health, animal health, food, water and environmental sectors to tackle AMR, and thus it will participate in and support collaboration to foster responsible use of antimicrobials and proper handling of waste material; will work to guarantee availability of and access to legal antimicrobials rather than counterfeit antimicrobial drugs, and will also offer incentives to increase the use of alternative antimicrobials and vaccines.

At the level of cooperation and advocacy, given that AMR continues to rise and spread throughout the world, the EU will continue working with multilateral organizations to contribute to global action on AMR, in keeping with the "One Health" approach, and will work to sustain high-level political advocacy and commitment to AMR in forums like the United Nations, the G7 and the G20.

Similarly, it recognizes that the threat of AMR is even greater in developing countries due to political, social, epidemiological and economic factors and thus, the new Plan states that "the EU's development policy can play an important role in raising awareness, sharing experiences and supporting capacity building in developing countries in order for them to be better equipped to control infectious diseases and prevent AMR".



In the area of trade, the EU intends to facilitate increased opportunities for collaboration and closer ties with its trading partners to build consensual activities, share experiences and align approaches for the application of AMR-related EU legislation. The Commission will continue to support these countries through visits, best practice exchanges and capacity building.

However, it will also incorporate AMR-related standards into all new free trade agreements, to guarantee equal conditions for all producers of the EU and its trade partners, ensuring that efforts by EU farmers are not compromised by the non-prudent use of antimicrobials by these partners.

Finally, the new EU Plan includes the development of a global research agenda to create an AMR research environment that is stronger, more interconnected and globally-oriented. To facilitate this, the Commission will

improve global coordination of research activities, promoting dialogue and collaboration in international research initiatives. In terms of fostering international cooperation on AMR in the animal health sector, the document makes reference to STAR-IDAZ (International Research Consortium on Animal Health).

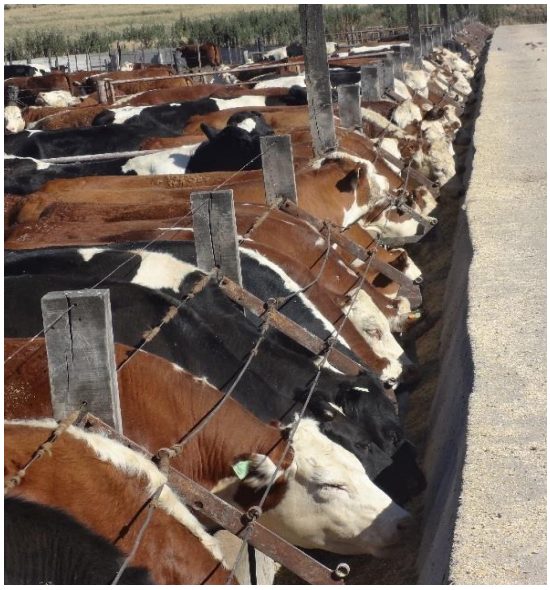
Risk-Communication elements in national Antimicrobial Resistance plans in three countries

As indicated above, the application of risk communication strategies involves a combination of disciplines that focus on: a) communication for behavioral and social change and public policy advocacy aimed at raising awareness, providing information and disseminating key messages to specific audiences within a diverse group of stakeholders; b) labelling and regulating publicity on antimicrobials; c) formal and informal education through training, professional development and certification; and d) social research to understand the factors affecting human behavior.

This section includes extracts from the Spanish, Australian and U.S. national plans that include various elements needed to formulate a strategic plan. They are relevant to themes discussed in this document and could serve as reference for countries that are designing their own national plans.

Spain

The 'Strategic Action Plan to reduce the risk of selection and dissemination of antibiotic resistance" was presented in 2014 and developed by a technical Coordination Group comprised of representatives from: a) the Ministries of Health, Social Services and Equality; Agriculture, Food and the Environment; Economy and Competitiveness; Education, Culture and Sports; Defense and Interior; b) the Spanish Antibiogram Committee (COESANT); c) Scientific Societies; d) Collegiate Organizations and e) Professional Associations. The Spanish Agency of Medicines and Medical Devices was the institution charged with coordinating the design of the Plan.



The overall objective of the plan is to "develop a series of necessary strategic lines and actions to reduce the risk of selection and dissemination of antimicrobial resistance in both human and veterinary medicine", and specifically to "reduce its consequences for the health of animals and humans", thus conserving the existing therapeutic arsenal in a sustainable manner". The strategy adopts a "joint focus from the sectors of both human and animal health" and also "bears in mind actions that are already underway".

Inset 9 identifies the strategic lines and direct or indirect Risk Communication measures. Actions for human health, animal health and "One Health" are included in the document.

Box 9. Risk Communication Measures and actions for animal health and for both human and animal health in the Spanish Plan.

I- Surveillance of antibiotic consumption and antimicrobial resistance
Measure: I.4. Participate in other European and international activities to exchange information

II- Control of bacterial resistance
Measure: II.2. Design and disseminate tools for the promotion of good practice in antibiotic use.
Measure: II.3. Prepare guidelines for exceptional antibiotic prescription.
Measure: II.4. Limit prophylactic use of antibiotics to those cases with defined clinical needs

III- Identification and spearheading of alternative and/or complementary measures of prevention and treatment
Measure III.1. Promote improved measures in animal hygiene, handling and well-being
Measure III.2. Promote the development and use of antimicrobial susceptibility testing and rapid diagnostic methods.
Measure III.4. Foster the adoption of measures to improve the administration conditions of old products that contain non-critical antibiotics.

IV- Defining research priorities
Measure IV.2. Develop epidemiological and socioeconomic research

V- Training and information for healthcare professionals
Measure V.1. Mobilize healthcare professionals
Measure V.2. Encourage training of healthcare professionals.
Measure V.3. Develop ongoing training programs for healthcare professionals according to uniformity criteria in those issues related to AMR
Measure V.4. Develop the self-evaluation of prescribers

VI- Communication and awareness-raising in the general population and in population sub-groups
Measure VI.1. Campaigns for the general public
Measure VI.2. Specific information for population sub-groups

Source: The Spanish Strategic Action Plan to Reduce the Risk of Selection and Dissemination of Antibiotic Resistance (2014).

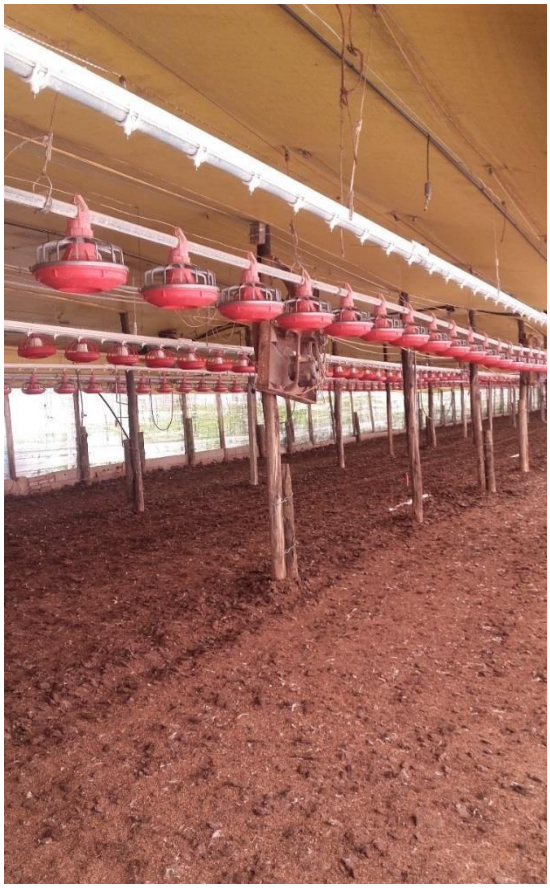
Australia

The terms of reference for the Australian Antimicrobial Resistance Prevention and Containment Steering Group (AMRPC) were defined in February 2014, with a view to providing governance and leadership and supervising the development and implementation of a coherent national framework for AMR efforts.

The Ministries of Health and Agriculture presented "Responding to the Threat of Antimicrobial Resistance: Australia's First National Antimicrobial Resistance Strategy (FNARS) 2015-2019" in June 2015.

Its vision is that of a "society in which antimicrobials are recognized and managed as a valuable shared resource, maintaining their efficacy so that infections in humans and animals remain treatable and communities continue to benefit from the advances that antimicrobials enable"; and its goal is to "minimize the development of antimicrobial resistance and ensure the continued availability of effective antimicrobials".

The term "antimicrobial stewardship" has no literal translation into Spanish. Some institutions translate it as the "optimized use of antimicrobials". In its "Guía para la implementación de un programa de optimización de antimicrobianos (PROA) a nivel hospitalario" ("Guide for the Implementation of a Program for Antimicrobial Optimization (AMS) at the Hospital Level"), The Argentine Society of Infectious Diseases proposes that AMS "should consider various interventions to reduce the inappropriate use of antibiotics, and in so doing to optimize antibiotic selection, dosage, route of administration and duration of therapy to achieve optimal clinical outcomes or to prevent infection, as well to limit the undesirable consequences of antibiotic therapy, such as resistance emergence, adverse effects and MDR pathogen selection".



The following inset outlines the Risk Communication-related objectives and priority lines of action. The priority areas for action can be found in the document.

Box 10. Risk Communication-related objectives and priority actions*.

Objective 1. To increase awareness and understanding of AMR, its implications and actions to combat it through effective communication, education and training.

Priority areas for action:
1.1. Strengthen consumer awareness initiatives to improve understanding of antimicrobial resistance and the importance of using antibiotics properly.
1.2. Increase support for human and animal health professionals in reinforcing key messages with patients and clients.
1.3. Strengthen communication and education initiatives for health professionals and health care team members.
1.4. Develop a stakeholder engagement and communication plan to support whole-of-society awareness of, and participation in implementing the Strategy.

Objective 2. To implement effective AMS practices across human health and animal care settings to ensure appropriate and judicious prescribing, dispensing and administering of antimicrobials.

Priority areas for action:
2.1. Ensure that tailored, evidence-based antibiotic prescribing guidelines are available for all sectors.
2.2. Ensure the availability of evidence-based, best-practice and nationally consistent approaches to AMS across human health and animal care settings.
2.3. Develop tailored, evidence-based resources to support the implementation of AMS programs.
2.4. Review existing accreditation and quality assurance programs to ensure they appropriately support and encourage compliance with best practice AMS approaches.
2.5. Strengthen existing measures to better support appropriate and judicious use.

Objective 4. Improve infection prevention and control measures across human health and animal care settings to help prevent infections and the spread of AMR.

Priority areas for action:
4.1. Ensure the availability of evidence-based, best-practice and nationally consistent standards for IPC across human health and animal care settings.
4.2. Review existing accreditation and quality assurance programmes to ensure they appropriately support and encourage compliance with best practice infection prevention and control (IPC) measures.
4.3. Develop additional initiatives and resources to strengthen IPC in all human health care settings.
4.4. Further develop initiatives and resources to strengthen IPC in the livestock industry.
4.5. Further develop resources to strengthen IPC in veterinary practice.
4.6. Encourage continued increases in vaccination rates to prevent infections.

Objective 6: Strengthen international partnerships and collaboration in regional and global efforts to respond to AMR.

Priority areas for action:
6.1. Active engagement with multilateral organisations and relevant forums to contribute to regional and global action on AMR.
6.2. Lead regional initiatives to increase capacity to respond to antimicrobial resistance.
6.3. Learn from international best practice.

6.4. Participate in international surveillance initiatives.
6.5. Establish closer ties with international collaborators to link Australia's national research agenda with what is happening internationally.

Objective 7. Establish and support clear governance arrangements at the local, jurisdictional, national and international levels to ensure leadership engagement and accountability for actions to combat antimicrobial resistance.

Priority areas for action:
7.1. Identify, establish and maintain linkages between implementation partners across all sectors.
7.2. Work with stakeholders to develop an Implementation Plan for the Strategy.
7.3. Establish baseline measures to inform monitoring and evaluation of the Strategy.
7.4. Review regulations (legislated and otherwise) relevant to antimicrobial resistance and antibiotic usage.

Source: Responding to the threat of Antimicrobial Resistance: Australia's First National Antimicrobial Resistance Strategy (FNARS) 2015-2019 (2015).

United States

In September 2014 the United States presented its "National Strategy for Combating Antibiotic Resistant Bacteria" with a vision to work "domestically and internationally to prevent, detect, and control illness and death related to infections caused by antibiotic-resistant bacteria, by implementing measures to mitigate the emergence and spread of antibiotic resistance and ensuring the continued availability of therapeutics for the treatment of bacterial infections". (The White House, 2014)

Thus, the document focuses on identifying priorities and coordinating investments to prevent, detect and control outbreaks of resistant pathogens, recognized by the Center for Disease Prevention (CDC) as urgent or serious threats.

The Strategy identifies five goals that should guide collaborative action by the United States Government in partnership with foreign governments, individuals and organizations, with a view to strengthening healthcare, public health, veterinary medicine, agriculture, food safety, and research and manufacturing.

These are to: 1. Slow the emergence of resistant bacteria and prevent the spread of resistant infections; 2. Strengthen national One-Health surveillance efforts to combat resistance; 3. Advance the development and use of rapid and innovative diagnostic tests for identification and characterization of resistant bacteria; 4. Accelerate basic and applied research and development of new antibiotics, other therapeutics, and vaccines; and 5. Improve international collaboration and capacities for antibiotic-resistance prevention, surveillance, control, and antibiotic research and development.

On the instructions of the President, the National Security Council (NSC) and the Office of Science and Technology Policy (OSTP) established an interagency policy committee with representatives from the Department of Health and Human Services, the Department of Agriculture, the Departments of Homeland Security, State, Defense, Veterans Affairs, the U.S. Agency for International Development, and the Environmental Protection Agency. The aim was to review past and present Federal efforts to tackle antibiotic resistance to subsequently inform the development of the National Strategy.

The implementation of the National Strategy was embodied in the 'National Action Plan for Combating Antibiotic Resistant Bacteria', published in 2015. This document outlined the sub-objectives and actions to be implemented over a one, three and five year period, on the understanding that this process "will require the sustained, coordinated, and complementary efforts of individuals and groups around the world, including many who will contribute to its development. These include public and private sector partners, healthcare providers, healthcare leaders, veterinarians, agriculture industry leaders, manufacturers, policymakers, and patients" (The White House, 2015).

The Risk Communication-related goals, objectives and sub-objectives are outlined in the following Inset. The actions may be found in the National Action Plan.

Box 11. Risk Communication-related goals, objectives and sub-objectives

Goal 1. To slow the development of resistant bacteria and prevent the spread of resistant infections.

Objective: 1.1. Implement public health programs and reporting policies that advance antibiotic resistance prevention and foster antibiotic stewardship in healthcare settings and the community.
Sub-objectives:
1.1.i.A: Strengthen antibiotic stewardship in inpatient, outpatient, and long-term care settings by expanding programs, developing new ones, and monitoring progress and efficacy.
1.1.i.B: Strengthen educational programs that inform physicians, veterinarians, agricultural workers and members of the public about good antibiotic stewardship.
1.1.ii: Expand collaborative efforts by groups of healthcare facilities that focus on preventing the spread of antibiotic resistant bacteria that pose a serious threat to public health (see Table 3 in the document).
1.1.iii. Implement annual reporting of antibiotic use in inpatient and outpatient settings and identify geographic variation and/or variations at the provider and/or patient level that can help guide interventions.
1.1.iv. Develop and pilot new interventions to address geographic, socio-cultural, policy, economic, and clinical drivers of the emergence and spread of antibiotic resistance and misuse or over-use of antibiotics.
1.1.v: Streamline the regulatory processes for updating and approving or eliminating antibiotic susceptibility testing devices, as appropriate, so that clinicians receive up-to-date interpretive criteria to guide antibacterial drug selection.

Objective: 1.2. Eliminate the use of medically important antibiotics for growth promotion in animals and resort to other in-feed uses of antibiotics, for treatment, control and prevention of disease, under veterinary oversight.
Sub-objectives:
1.2.i. Implement FDA Guidance for Industry #213 to eliminate the use of medically important antibiotics for growth promotion in animals and bring other therapeutic uses of medically important antibiotics under veterinary oversight. The FDA should evaluate the adoption of the proposed changes under GFI #213 during the three-year implementation period and take further action as appropriate.
1.2.ii. Assess progress toward eliminating the use of medically important antibiotics for growth promotion in food-producing animals through enhanced data collection on antibiotic sales and use.
1.2.iii. Develop and implement educational outreach efforts to ensure that veterinarians and animal producers receive information and training to support implementation of these changes.
1.2.iv: Optimize public awareness about the progress toward eliminating the use of medically important antibiotics for animal growth promotion.

Objective: 1.3. Identify and implement measures to foster stewardship of antibiotics in animals.
Sub-objectives:
1.3.i: Develop, implement, and measure the effectiveness of evidence-based educational outreach to veterinarians and animal producers to advance antibiotic stewardship and judicious use of antibiotics in agricultural settings.
1.3.ii. Foster collaboration and public-private partnerships with public health, pharmaceutical, and agricultural stakeholders to facilitate identification and implementation of interventions (e.g., good husbandry practices) to reduce the spread of antibiotic resistance.
1.3.iii. Identify, develop, and revise key agricultural practices that allow timely and effective implementation of interventions that improve animal health and efficient production.

1.3.iv. Develop appropriate metrics to gauge the success of stewardship efforts and guide their continued evolution and optimization.

Goal 5. Improve international collaboration and capacities for prevention, surveillance and research and development.

Objective: 5.3. Develop a mechanism for international communication of critical events that may signify new resistance trends with global public and animal health implications.

Objective: 5.4. Promote the generation and dissemination of information needed to effectively address antibiotic resistance.
Sub-objectives:
5.4.i. Support consistent international standards for determining whether bacteria are resistant to antibiotics.
5.4.ii. Develop international collaborations to gather specific regional information on drivers of antibiotic resistance, identify evidence-based interventions and adapt these strategies to new settings, and evaluate their effectiveness.
5.4.iii. Provide the necessary technical assistance to developing nations to improve their capacity to detect and respond effectively to antibiotic resistance.

Objective: 5.5. Establish and promote international collaboration and public-private partnerships to incentivize development of new therapeutics to counter antibiotic resistance including new, next-generation, and other alternatives to antibiotics; vaccines; and affordable, rapidly deployable, point-of-need diagnostics.

Objective: 5.6. Support countries to develop and implement national plans to combat antibiotic resistance and strategies to enhance antimicrobial stewardship.

Objective: 5.7 Partner with other nations to promote quality, safety, and efficacy of antibiotics and strengthen their pharmaceutical supply chains.

Objective: 5.8 Coordinate regulatory approaches by collaborating with international organizations such as FAO and OIE to harmonize international data submission requirements and risk assessment.

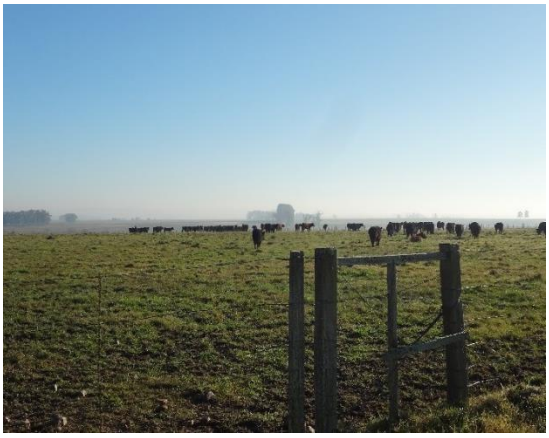
Conclusions

AMR is recognized as one of the most complex challenges facing the international community. It reduces the effectiveness of existing antimicrobial drugs and continues to develop and spread globally through the transfer of genes caused by human, animal and environmental interaction. Such is the magnitude of the AMR problem, that it threatens the achievement of several of the United Nations Sustainable Development Goals, in particular Goal 3 on 'Good Health and Well-being'.

Given the positioning of the issue in the global political agenda, each year, more and more countries are designing National Plans based on the WHO Global Action Plan. In order to meet the five objectives approved at the 68th World Health Assembly, Risk Communication and communication for development must of necessity guide the interactive exchange of scientific information with stakeholders with a view to increasing awareness and fostering cultural change.

In order to promote the appropriate, adequate and prudent use of antimicrobials, to help prevent resistant infections, adequately manage treatments with antimicrobials and control the spread of AMR, an interdisciplinary approach is required, that encompasses intersectoral and coordinated actions incorporated into in a common strategy and implemented through plans that call for high-level political and inter-agency commitment.

The AMR Plans analyzed in this document propose actions based on differing approaches to Risk Communication: a) communication for



behavioral change in antibiotic use for human and animal health; b) communication for social change to raise awareness in the overall society about the exponential increase in the risk of and factors associated with AMR, c) advocacy to maintain political attention at the highest level on the topic, in support of international cooperation efforts to achieve the desired results; d) better information in labeling antibiotics; e) regulation of publicity related to antimicrobial use; f) inclusion of the issue in professional development and training courses to increase knowledge of and the necessary expertise in AMR; and g) social research to understand factors that affect decisions in using and prescribing antimicrobials.

This study seeks to offer a technical contribution from both a theoretical and a practical perspective, citing examples and experiences that may prove valuable to those who are designing and implementing National AMR Plans.

BIBLIOGRAPHY

The Argentine Society of Infectious Diseases (SADI). *Guía para la implementación de un programa de optimización de antimicrobianos (PROA) a nivel hospitalario*. (*Guide for the Implementation of a Program for Antimicrobial Optimization (AMS) at the Hospital Level*). Argentina: 2016. Consulted on 01 December 2017. Available in Spanish only at: http://bit.ly/2nA9tDg

The Australian Antimicrobial Resistance Prevention and Containment Steering Group (AMPRC). *Terms of reference*. Australia: 2014. Consulted in October 2017. Available at: http://bit.ly/2BGtOJn

Australian Government, Department of Health/ Department of Agriculture. *Responding to the Threat of Antimicrobial Resistance: Australia's First National Antimicrobial Resistance Strategy 2015-2019*. Canberra, Australia: 2015. Consulted in August 2017. Available at: https://www.amr.gov.au/resources/national-amr-strategy

Codex Alimentarius. *Glossary of Terms and Definitions, for Residues of Veterinary Drugs in Foods*. CAC/MISC 5-1993. Italy: 2003. Consulted in September 2017. Available at: http://bit.ly/2FWBiJZ

_____. *Guidelines for the Conduct of Food Safety Assessment of Foods Produced Using Recombinant-DNA Microorganisms*. CAC/GL 46-2003. Italy: 2003. Consulted in October 2017. Available at: http://bit.ly/2K5ibji

_____. *Guidelines for the Design and Implementation of National Regulatory Food Safety Assurance Programs Associated with the Use of Veterinary Drugs in Food Producing Animals*. CAC/GL 71-2009. Italy: 2004. Consulted in August 2017. Available at: http://bit.ly/2Isrpco

_____. *Code of Practice to Minimize and Contain Antimicrobial Resistance*. CAC/RCP 61-2005. Italy: 2005. Consulted in September 2017. Available at: http://bit.ly/2Ilkkdz

_____. *Guidelines for Risk Analysis of Foodborne Antimicrobial Resistance*. CAC/GL 77-2011. Italy: 2011. Consulted on 8 November 2017. Available at: http://bit.ly/2KMM9tp

_____. *Procedural Manual*. 25th ed. Italy: 2016. Consulted in October 2017. Available at: http://bit.ly/2K5oVxI

_____. *Maximum Residue Limits (MRLs) and Risk Management Recommendations (RMRs) for Residues of Veterinary Drugs in Food*. CAC/MRL/2-2017. Italy: 2017. Consulted in September 2017. Available at: http://bit.ly/2I1U2xy

European Commission. *A European One Health Action Plan against Antimicrobial Resistance (AMR)*. Brussels, Belgium: 2017. Consulted in September 2017. Available at: http://bit.ly/2tnRUrT

European Commission. Website. *Antimicrobial Resistance*. Belgium: 2017. Consulted on 26 November 2017. Available at: http://bit.ly/2tsS4y9 .

European Union (EU). *Guidelines for the Prudent Use of Antimicrobials in Veterinary Medicine*. (2015/C 299/04). 2015. Consulted in September 2017. Available at: http://bit.ly/2wpuncE

_____. Press Release. *Antimicrobial resistance: Commission Steps Up the Fight with New Action Plan*. 29 June 2017. Consulted in September 2017. Available at: http://bit.ly/2I7F6Ke

_____. *Guidelines for the Prudent Use of Antimicrobials in Human Health*. Commission Notice. (2017/C 212/01). 2017. Consulted on

13 November 2017. Available at: http://bit.ly/2K63Djw

Food and Agriculture Organization of the United Nations (FAO). *Uso de antimicrobianos en animales de consumo. Incidencia del desarrollo de resistencias en salud pública*. (*Anti-Microbial Use in Food-Producing Animals. The Public Health Impact of Resistance* in English). Study 162. Errecalde J. O., Faculty of Veterinary Sciences, National University of La Plata, Argentina. Italy: 2004. Consulted in August 2017. Available in Spanish only at: http://bit.ly/2B9I0y4

_____. *Application of Risk Communication to Food Standards and Safety Matters. Report of a Joint FAO/WHO Expert Consultation Rome, 2–6 February 1998. FAO Food and Nutrition Paper 70*. Rome, Italy: 2005. Consulted in September 2017. Available at: http://bit.ly/2I705wO

_____. *FAO Biosecurity Toolkit*. Rome, Italy: 2007. Consulted in September 2017. Available at: http://bit.ly/2K4QnLR

_____. *The FAO Action Plan on Antimicrobial Resistance 2016-2020*. Rome, Italy: 2016. Consulted in September 2017. Available at: http://www.fao.org/3/a-i5996e.pdf

G7 (G7 Summit, Germany). *2015 Leaders' Declaration G7 Summit, 7-8 June 2015*. Germany: 2015. Consulted on 14 November 2017. Available at: http://bit.ly/1IMB6XG

Inoue H.; Minghui R. 2017. *Antimicrobial Resistance: Translating Political Commitment into National action*. Bulletin of the World Health Organization 95: 242 (2017). Available at: http://bit.ly/2BF7j7w

Menin, A. *Reflexión sobre Una Salud*. (*Reflections on One Health*). The Federal University of Santa Catarina, Brazil. 2017.

Pan American Health Organization (PAHO), USA; World Health Organization (WHO), Switzerland. *Risk Communication in the Age of Zika*. Washington, USA: 2016. Consulted in November 2017. Available at: http://bit.ly/2K4zUY0

_____. *Zika Virus Infection Step-by-Step Guide to Risk Communication and Community Engagement*. ISBN 978-92-75-31938-3 USA: 2017. Consulted in November 2017. Available at: http://bit.ly/2I7SRZx

Spanish Agency of Medicines and Medical Devices (AEMPS). *Strategic Action Plan to Reduce the Risk of Selection and Dissemination of Antibiotic resistance*. Madrid, Spain: 2014. Consulted in August 2017. Available at: http://bit.ly/2wslNdi

United Nations Development Program (UNDP). *Communication for Development: Strengthening the Effectiveness of the UN*. New York, USA: 2011. Consulted in November 2017. Available at: https://uni.cf/2rtew7V

United Nations (UN). *Resolution WHA68.7. Global Action Plan on Antimicrobial Resistance*. 68th World Health Assembly, Geneva, 18 – 26 May 2015. USA: 2015. Available at: http://bit.ly/2I8y73A

_____. *Resolution A/RES/71/3. Political Declaration of the High-level Meeting of the General Assembly on Antimicrobial resistanc*e. 71st session of the United Nations General Assembly. New York, U.S.A: 2016. Available at: http://bit.ly/2IpEaUI

The White House. *National Action Plan for Combating Antibiotic-Resistant Bacteria*. United States: 2015. Consulted in August 2015. Available at: http://bit.ly/2xlBfXi

World Bank Group. *Discussion Draft. Drug Resistant Infections. A Threat to our Economic Future*. Washington, USA: 2016. Consulted in October 2017. Available at: http://bit.ly/2d9BXOC

World Health Organization (WHO). *Global Action Plan on Antimicrobial Resistance*. Geneva, Switzerland: 2016. Consulted in August 2017. Available at: http://bit.ly/2IpKcF6

_____. Press Release. *WHO Publishes List of Bacteria for which New Antibiotics are Urgently Needed*. Switzerland: 27 February 2017. Consulted on 26 November 2017. Available at: http://bit.ly/2IrKiMr

World Organization for Animal Health(OIE), France. *Update. Terrestrial Animal Health Code. Chapter 3 – Art. 3.3.3. 2014*. France: 2014. Consulted in October 2017. Available at: http://bit.ly/2ru1Jl2

_____. The OIE Strategy on Antimicrobial Resistance and the Prudent Use of Antimicrobials. Paris, France: 2016. Consulted in August 2017. Available at: http://bit.ly/2IsZxox

UE (Unión Europea). 2017. Resistencia a los antimicrobianos: la Comisión intensifica la lucha mediante el nuevo plan de acción. Comunicado de prensa del 29 de junio de 2017. Consultado en setiembre 2017. Disponible http://bit.ly/2ACbDVP

UE (Unión Europea). 2015. Directrices para una utilización prudente de los antimicrobianos en la medicina veterinaria" (2015/C 299/04). Consultado en setiembre 2017. Disponible https://ec.europa.eu/health//sites/health/files/antimicrobial_resistance/docs/2015_prudent_use_guidelines_es.pdf

UE (Unión Europea). 2017. Comunicación de la Comisión. (2017/C 212/01). Consultado el 13 nov. 2017. Disponible en http://bit.ly/2iX4sTJ

This document was developed within the activities of the Rapid Response Action 'Support to the process of construction of the National Plan for the containment of Antimicrobial resistance of Uruguay.

Cra.Lic. Alejandra Bentancur, Project Management Specialist IICA Uruguay. alejandra.bentancur@iica.int

Dr. Norman Bennett, Food Safety Manager DIGECIA/MGAP. nbennett@mgap.gub.uy

Dr. Federico Fernández, Advisor to the General Direction of DGSG/MGAP. ffernandez@mgap.gub.uy

Ing. Alim. Marisa Kurioka, Technical Assistant of DIGECIA/MGAP. mkurioka@mgap.gub.uy