

**GLOBAL ACTION TO ALLEVIATE THE THREAT OF ANTIMICROBIAL RESISTANCE:
PROGRESS AND OPPORTUNITIES FOR FUTURE ACTIVITIES
UNDER THE 'ONE HEALTH' INITIATIVE**

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Summary: The World Organisation for Animal Health (OIE) is actively working on the topic of antimicrobial resistance (AMR) and has developed a coherent strategy for its activities in this field. As AMR is both an animal health and human health issue, the OIE works closely with its Member Countries, the World Health Organization (WHO), the Food and Agriculture Organization of the United Nations (FAO) and the Codex Alimentarius Commission. A questionnaire was prepared on global action to alleviate the threat of AMR, the progress already achieved and future prospects. The questionnaire was sent to the OIE Delegates and national Focal Points for Veterinary Products of the OIE's 180 Member Countries. The questionnaire was in four sections, corresponding to the four main objectives of the OIE Strategy on AMR and the Prudent Use of Antimicrobials. The first section of the questionnaire was aimed at obtaining information on AMR awareness-raising activities, including through raising awareness among stakeholders. The second section dealt with AMR surveillance and research. The third section concerned good governance and capacity building. The fourth and last section covered implementation of international standards. In addition to conducting a survey to evaluate the progress achieved by Member Countries in their approach to preventing AMR, the questionnaire also sought to strengthen the OIE's involvement in this approach and identify possible areas of action for targeting interventions.

Overall, the survey and the resulting descriptive analysis have demonstrated the great interest shown by Member Countries in the topic of global action to alleviate the threat posed by AMR.

The results revealed sometimes quite substantial variations between the regions, a change in practices and ambitious objectives in the medium term. To enable these objectives to be achieved, concrete proposals were evaluated as likely to have a large impact on reducing the risk of resistance within the framework of the Global Action Plan on Antimicrobial Resistance (GAP) (6). There were differences between regions, however, regarding the perceived feasibility of these actions.

Several recommendations have been made, the first of which is to continue to support, within the framework of the GAP, the intersectoral aspect, which does not yet seem to be sufficiently well-established. Measures in this regard would help to guide countries and facilitate the 'One Health' approach advocated by the GAP. The second recommendation is to place the emphasis on teaching about risks related to AMR in the core training curriculum and in continuing education for all those involved in the veterinary sector, using suitably adapted and updated teaching materials and tools. The third recommendation is to encourage the implementation of existing OIE standards. The fourth is to complete the framework of standards by developing and making available to Member Countries standards for the analysis of samples and the interpretation of results in the context of AMR. This measure would give access to harmonised tools that would allow meaningful comparison of the results obtained. The fifth recommendation is to place the emphasis on consolidating certain specific points of regulatory control, such as the requirement for a prescription before delivery of any antibiotic. A sixth recommendation is to capitalise on the progress achieved with data collection on antimicrobial use in order to fine-tune the available tools. The final recommendation is to continue the programmes of regional workshops on these themes for Member Countries' national Focal Points for Veterinary Products. Lastly, some of the Member Countries have suggested changes that could be made to the questionnaire with a view to its future use to evaluate subsequent trends.

Key words: Antimicrobial agents; Global survey; Progress; Prospects; Resistance.

1. Introduction

At the 83rd General Session of the OIE, held in Paris in May 2015, the World Assembly of Delegates of the OIE confirmed that the first Technical Item of the 85th General Session, in May 2017 would be on ‘global action to alleviate the threat of antimicrobial resistance: progress and opportunities under the One Health initiative’.

Antibiotics are widely used to treat bacterial infections, in both human and veterinary medicine and in the phytosanitary field. Yet, although antibiotics destroy or inhibit susceptible strains, they paradoxically lead to the selection of resistant bacteria capable of surviving, multiplying and spreading. Antimicrobial resistance (AMR) is a global human and animal health problem that is accentuated by the improper use of antimicrobial agents in human and veterinary medicine as well as in other sectors (1).

As early as 1999, the World Organisation for Animal Health (OIE) developed standards on antimicrobial resistance. These international standards were adopted by the OIE in May 2003 (2) and have been extended and updated ever since. They are published in the *Terrestrial Animal Health Code* (3), the *Manual of Diagnostic Tests and Vaccines for Terrestrial Animals* (4) and the *Aquatic Animal Health Code* (5). For a number of years, countries importing animals and animal products have been able to use these standards as a legal basis to check whether exporting countries are complying with these new requirements.

It is now acknowledged that the human medical sector, the veterinary sector and the phytosanitary sector have a shared responsibility to prevent or minimise antimicrobial resistance selection pressures on bacteria affecting humans and/or animals. Consequently, the Global Action Plan on Antimicrobial Resistance was adopted in 2015 by all countries, through the decisions of the WHO World Health Assembly, the FAO Conference and the World Assembly of OIE Delegates. Countries thus agreed to develop a national action plan on AMR in line with the GAP and to implement policies and plans aimed at preventing, combatting and monitoring AMR (6).

In November 2016, the OIE published its Strategy on Antimicrobial Resistance and the Prudent Use of Antimicrobials, in accordance with the resolutions adopted at the 84th General Session of the OIE (7). This strategy is aligned with the WHO GAP (6) and recognises the importance of a ‘One Health’ approach – involving human and animal health, and agricultural and environmental needs. It describes the goals and the tools put in place to support Member Countries and to encourage their ownership and implementation at a national level. This strategy, which supports the objectives established in the Global Action Plan, is structured around four main objectives (7).

2. Questionnaire

A questionnaire was designed with the main objectives of conducting a survey to evaluate the progress made by Member Countries and identifying possible areas of action for targeting interventions. The questionnaire was in four sections corresponding to the four main objectives of the OIE strategy:

- The 1st section was on improving awareness and understanding of AMR.
- The 2nd section was on strengthening knowledge of AMR through surveillance and research.
- The 3rd section was on supporting good governance and capacity building.
- The 4th section was on implementation of international standards.

The questionnaire was designed to evaluate the present situation and the progress made. The questionnaire also made provision for prospects in the short and medium term to be taken into account. In each section, the last question provided a list of proposals to be assessed in terms of their impact and feasibility.

Table 1 illustrates the structure of the responses. For each topic, several proposals are listed (column on the left) describing possible situations in a country with regard to this topic. When one of these proposals corresponds to the situation in the country, the respondent ticks the appropriate box(s) to indicate if this situation existed before 2015 and/or from 2015. When the proposal corresponds to a short-term objective, the respondent ticks the column “Objective for 2017”; if it corresponds to a medium-term objective, the respondent ticks the column “Objective for 2017-2020”.

Table 1: Example illustrating the structure of responses

<i>Question No. 1-1: Choose the level of advancement that best corresponds to your situation in terms of awareness</i>	<i>Before 2015</i>	<i>From 2015</i>	<i>Objective for 2017</i>	<i>Objective for 2017-2020</i>
<i>No significant activities have been carried out to raise awareness of risks relating to antimicrobial resistance for animal health or risks of transmission of resistant pathogens in the food chain.</i>	X	X		
<i>There are activities in some sectors aimed at raising awareness of the AMR problem and measures to combat it.</i>			X	
<i>Awareness campaigns on the issue of antimicrobials are being conducted, targeting food producers, farmers and animal producers, with the participation of public authorities.</i>				X

The data collected between 5 January and 27 February 2017 were compiled in an Excel database. The descriptive analysis was performed using Excel.

3. Responses from OIE Member Countries¹

Of the 180 Members Countries that were sent the questionnaire, 135 responded, giving an overall response rate of over 75%. Figure 1 shows the geographical distribution of the countries that responded to the questionnaire; the complete list of responding countries is given in Annex 2.

The response rates were significantly higher in the Americas, Europe and Africa, with over 70% of countries having responded to the questionnaire. The lowest response rate was in Asia, the Far East and Asia, with 59% of countries responding.

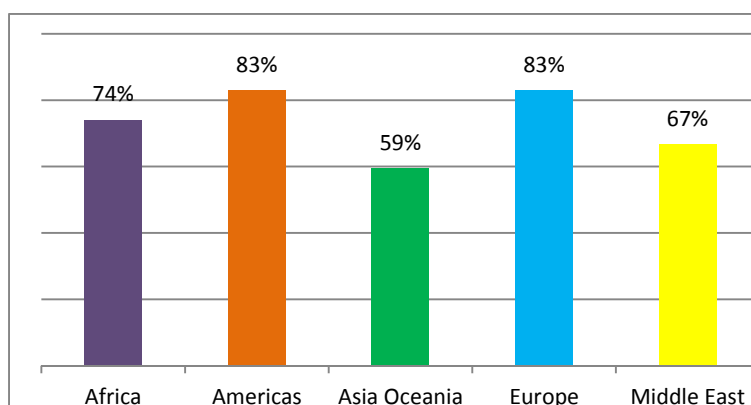


Figure 1: Percentage of Member Countries that replied to the questionnaire, by region

3.1. Current situation and progress achieved

The current situation was evaluated by counting, for each line, the countries that ticked the columns “Before 2015” and/or “From 2015”. The progress achieved was measured by comparing the quantitative data for the period “before 2015” and those for the period “from 2015”.

The first section of the questionnaire was aimed at collecting data on activities carried out by Member Countries to improve awareness and understanding of AMR.

Globally, only 22% of responding countries indicated that no significant activities had been carried out to raise awareness of risks relating to AMR for animal health or risks of transmission of resistant pathogens in the food chain. The percentage was quite variable between the different regions, with approximately 10% for Europe and Asia, the Far East and Oceania, and 25% to 30% for the Americas and Africa. It is worth noting

¹ Data from one country were not included due to late receipt of the questionnaire

that the percentage of countries declaring no significant awareness-raising activity fell from 46% (before 2015) to 22% (from 2015). This improvement was noted for all regions. Figure 2 summarises the data relating to the improvement observed between the period “before 2015” and the period “from 2015” in the proportion of countries lacking each of the listed measures for the fields covered by the questionnaire.

Among the countries that have carried out awareness activities, the majority (63%) declared having carried out only a few activities. Approximately 40% of countries declared having carried out targeted awareness campaigns and/or campaigns at national level.

Similarly, the percentage of countries that declared having no system of communication with stakeholders in the field of animal health and agricultural production fell from 35% before 2015 to 17% after 2015 (Figure 2), with a percentage reduction that ranged from 25% (Americas and Middle East) to 80% (Asia, the Far East and Oceania). For the period from 2015, this figure ranged from 7% (Europe, Asia, the Far East and Oceania) to 37.5% (Middle East). The majority of countries that have put in place a system (54%) have at least a framework for communication with stakeholders. In 42% of countries, discussions are organised periodically with the various stakeholders. Thirty-six percent of countries have set up working groups or a coordinating committee on AMR. Only 23% of countries indicated that these working groups have given rise to coordinated activities in the field of combatting AMR.

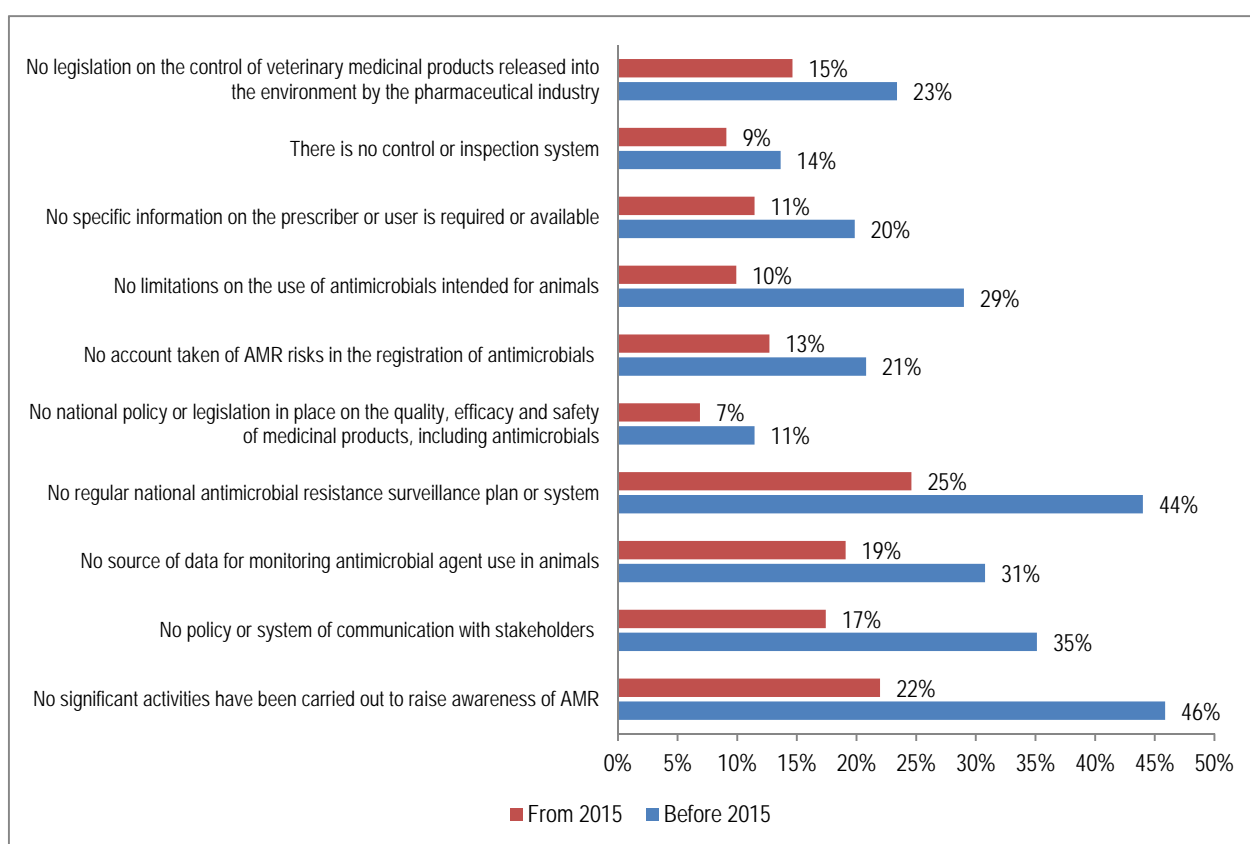


Figure 2: Improvement between the periods “before 2015” and “from 2015” in the proportion of countries lacking each of the listed measures

In terms of training and professional education on AMR in the veterinary sector, it should be noted that 16 responding countries did not answer this part of the questionnaire. Some of these countries indicated that they did not have a veterinary school. Fewer than 5% of reporting countries indicated that the core training curriculum for veterinarians provides no information on AMR. In contrast, a large majority of countries (70%) have included AMR in the core training curriculum for veterinarians. The level of inclusion before 2015 was highest in Europe (62%), Africa (56%) and the Americas (48%). From 2015, the level for all regions was between 62% and 77%, with the exception of Asia, the Far East and Oceania (50%). These findings reflect interesting progress. Of note, however, only 25% of countries stated that this training is regularly updated to take account of advances in this field. The implementation of continuing training was mentioned by only 23% of countries, yet this is an essential component to enable professionals in the field of animal health and the food chain to become actors of change.

As an illustration, Figure 3 below indicates, for each of the three most representative topics in this section, the current levels and future objectives.

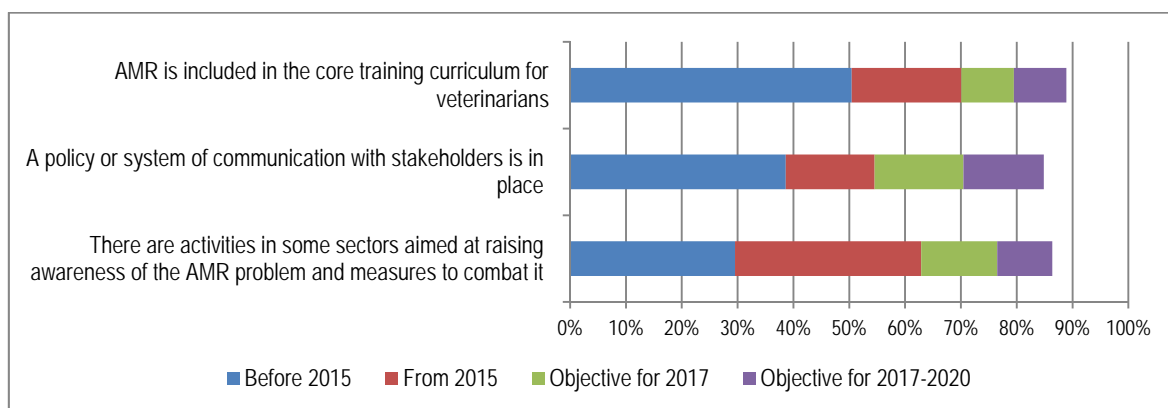


Figure 3: Progression in the percentage of reporting countries having put in place actions on the most representative topics in terms of awareness, communication and training and an indication of their objectives in the short and medium term

The second section of the questionnaire was aimed at evaluating action to strengthen knowledge of AMR through surveillance and research.

The introduction of a global database on the use of antimicrobial agents in animals began in 2015, marking a positive development in this field. Thus, the proportion of countries declaring that they have a data collection system for monitoring the use of antimicrobial agents in animals, the results of which are exploited, rose from 32% for the period before 2015 to 42% for the period from 2015 (Figure 4). Nearly 40% noted that these data are available even if they are not yet exploited. Fewer than 20% declared that they have no source of data. The rate was less than 10% for countries in the Europe and Asia, the Far East and Oceania regions and between 25% and 30% for the other regions. The proportion of countries declaring that they have no data fell from 31% before 2015 to 19% after 2015.

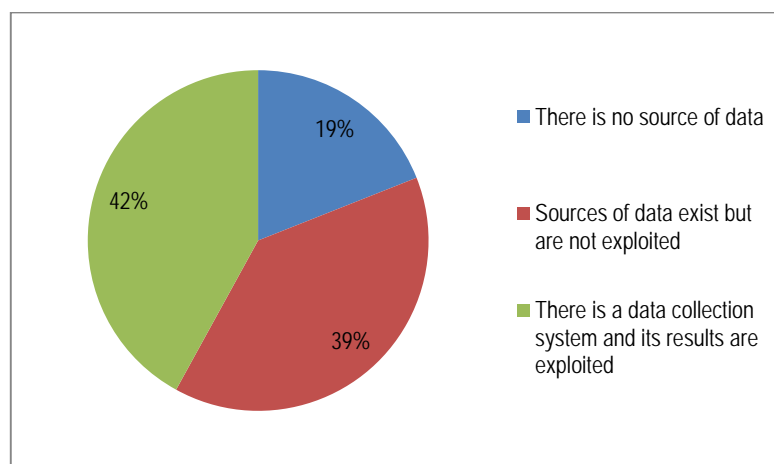


Figure 4: Proportion of reporting countries having set up a data collection system for monitoring the use of antimicrobial agents

With regard to surveillance for antimicrobial resistance, 34% of responses mentioned the existence of a national surveillance system at targeted intervals or ongoing monitoring of the prevalence of resistance in bacteria of animal, food or environmental origin. The Europe region stands out in particular, with 78% of reporting countries having an ongoing monitoring programme. Nevertheless, at global level, nearly a quarter of countries (23.4%) declared that they do not have a regular national surveillance system or plan for AMR. In this respect, major disparities were noted between the different regions: fewer than 10% of responding countries in Europe and Asia, the Far East and Oceania have no regular surveillance system, between 35% and 39% of countries in the Americas and Africa, and 50% of countries in the Middle East. In addition to this, the data on the reliability of the systems indicate that nearly 30% of national AMR surveillance and monitoring systems are based on statistically significant methods of sampling. Unfortunately, fewer than 20% of countries declared that these data are used to prepare control plans for priority sectors or to monitor

them over time in order to issue recommendations and conditions on the use of antimicrobial agents. These figures reveal a remarkable change. The proportion of countries without a regular national AMR surveillance system or plan has fallen from 44% to 25%, namely a reduction of 45% (Figure 2). This progression has occurred in all regions, with a reduction of 80% for Asia, the Far East and Oceania, 40% for Africa and Europe and approximately 30% for the Middle East and the Americas. This progression is above all reflected in terms of “establishment of surveillance programmes not covering all production sectors” but is nevertheless encouraging.

A fundamental tool for surveillance is access to laboratories capable of carrying out tests relating to AMR surveillance. Seventy-six percent (76%) of countries declared having this tool, compared to 55% before 2015. This progression has occurred in all regions. Harmonisation is crucial to ensuring that the data produced are comparable. This point has been examined and less than a quarter of countries declared having deployed resources to harmonise AMR laboratory detection techniques. This result is fairly homogeneous between the regions, except for Africa and the Middle East (fewer than 10% of countries, respectively). The proportion of countries deploying resources for harmonisation progressed from 19% of countries before 2015 to 24% from 2015; however, this progression occurred above all in the Americas and Asia, the Far East and Oceania.

The third section of the questionnaire concerned good governance and capacity building.

One of the fundamental elements of global action to alleviate the threat of AMR is good governance of veterinary medicinal products, which depends on the legislation in place.

Only 7% of reporting countries declared not having put in place any policy or legislation on the quality, efficacy and safety of medicinal products. The proportion was reported to be 9% in 2013 (8). Most aspects are covered by legislation in a large majority of countries, such as importation (88%), marketing authorisation of veterinary medicinal products (83%), distribution (74%), local production (77%) and system of inspection of the whole of the drug chain (73%). However, the requirement of a prescription for delivery of antimicrobial agents and of compliance with biosecurity rules in animal production and the food chain was cited by only 63% of countries. Yet this is one of the most important measures of good governance, notably in terms of traceability and proper usage. For these aspects, we see quite similar results for all regions except Europe. The sale of antimicrobial medicines without a prescription is also reported in the human domain, though the data are difficult to compare at regional level (9). It is notable that the questions relating to governance showed little change, compared to the other domains (Figure 5). Incidentally, this aspect of good governance has, since 2009, been included in training for OIE national Focal Points for Veterinary Products.

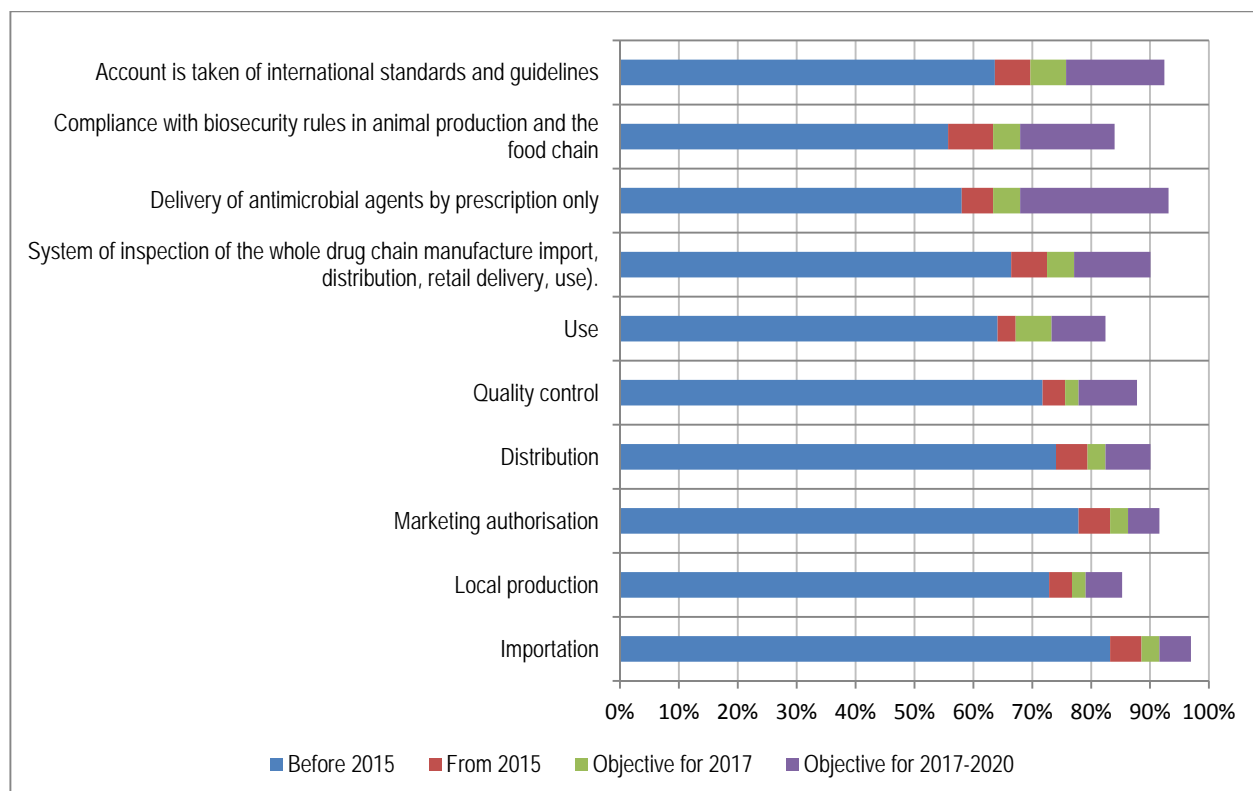


Figure 5: Change in the proportion of Member Countries having put in place actions relating to good governance

With regard to the question of whether potential resistance risks are taken into account during the processing of marketing authorisation applications for antimicrobial agents, the results are quite variable from one region to another. In Europe and the Middle East, 88% and 75% of reporting countries, respectively, report that during the evaluation of new registration applications, there is a requirement for studies or data characterising the potential evolution of resistance, compared to 53% in Asia, the Far East and Oceania and 30% in both Africa and the Americas. This could be due to the fact that this topic and the standards relating to it are relatively recent. On this aspect, an overall progression was noted. The proportion of countries not taking this aspect into account fell from 21% to 13% (Figure 2).

The conditions of use of antimicrobial agents in animals were evaluated, including by asking countries about the use of antimicrobial agents as growth promoters. Among the countries that answered this question, 54% declared having prohibited the use of antibiotics as growth promoters in animals, and 14% indicated that this practice is gradually being phased out. It is difficult to interpret the results for the Americas and the Middle East, since 50% of countries did not respond to this question. For the other three regions, the percentage of countries declaring that this usage has been abandoned was 91% for Europe, 50% for Africa and 22% for Asia, the Far East and Oceania. In addition, a further 21% of reporting countries in Africa and 28% in Asia, the Far East and Oceania declared that this usage is gradually being phased out.

As a general rule, information tools relating to conditions for using antimicrobials are widely employed by Member Countries. However, fewer than 50% of countries report updating the data of documents such as marketing authorisations, summaries of product characteristics and/or the insert/label of older products. Furthermore, performing an antibiogram before antibiotics are prescribed is a practice not reported by many countries (13% to 28% depending on the region, with the exception of Europe [72%]). A significant overall progression was noted for this practice (from 27% before 2015 to 40% from 2015), which was essentially due to the results for the countries of Europe. The other notable change relates to a positive list of authorised users being made available to users, which was reported to be the case by 42% of reporting countries for the period from 2015 compared to 31% before 2015. Africa and Asia, the Far East and Oceania showed a marked progression in this respect.

In the field of surveillance and quality control of veterinary medicinal products, fewer than 10% of countries indicated a total absence of any control or inspection system. Seventy percent (70%) of countries declared that these systems cover compliance with conditions relating to delivery, importation, inspections of veterinary pharmaceutical establishments and retail distribution channels. These figures are quite similar between countries. The control system includes inspections of medicated feed manufacturers in only 59% of cases. The percentage of countries implementing monitoring and surveillance plans (quality of veterinary medicinal products; residues; pharmacovigilance), including for antimicrobials, does not exceed 50%. The figure varies markedly from one region to another: on average, nearly 80% for Europe, 46% for the Americas, 36% for Asia, the Far East and Oceania, 21% for Africa and 12.5% for the Middle East.

The proportion of countries that take environmental impact into account, by controlling veterinary medicinal products released into the environment by the pharmaceutical industry or veterinary practices, is quite similar between the regions. Thus, there was no legislation regarding evaluation of environmental risk before the granting of planning approval in 23% of countries before 2015 compared to 14% from 2015. Overall, the rate of increase is 40% and is at least above 20% for each of the regions. It was particularly marked in the case of Africa. Furthermore, unused or expired medicines at the level of veterinary practices or livestock farms are considered as hazardous waste by 56% of countries and are either incinerated or disposed of through a specific and controlled disposal process. The figure is 90% in Europe and varies little between the other regions (between 33% and 44%).

Fourth section: Encouraging the implementation of international standards.

Harmonisation between sectors, countries and regions enables us to generate comparable data, transform them into information, which improves our understanding of risks and opportunities, and report on progress with achieving the objectives of the GAP. This need has been highlighted by the organisations but also by various stakeholders (10). The OIE promotes this harmonisation by encouraging implementation of the standards and guidelines that it makes available to Member Countries. The analysis of the collected data reveals, however, for the various categories of standards (OIE standards, VICH), excluding Good Manufacturing Practice, a difference between the use of standards from one region to another: an average of 66% of countries for the Europe region, 44% for the Americas, 30% for Asia, the Far East and Oceania and

for Africa, and 16% for the Middle East. There has been a change in the use of standards. The strongest progression is recorded for the recommendations in the OIE List of Antimicrobial Agents of Veterinary Importance (11), implemented by 36% of countries from 2015 compared to 21% before 2015. Use of OIE standards for the collection of data on the marketing, usage and quantities of antimicrobials used in animals was reported by 49% of countries for the period from 2015 compared to 37% before 2015; those on the establishment of AMR surveillance programmes are now taken into account by 34% of countries compared to 25% before 2015.

3.2. Future prospects

Future prospects have been studied with regard to short-term (for 2017) and medium-term objectives (2017-2020) and by analysing the responses to the proposals put forward in the questionnaire for each strategic objective in terms of both impact and feasibility. Figure 6 shows by means of examples that, as a rule, countries have ambitious objectives in both the short and medium term. This is the case for all regions.

Over 90% of countries expressed a view on the proposals aimed at improving awareness and understanding of AMR. All the proposals were assessed as capable of having a large impact on reducing the risk of AMR, on average by over 70% of countries, compared to 20% and 5% that judged their impact to be small or nil, respectively. Organisation of awareness-raising days, forums or seminars on the subject of AMR in the presence of all stakeholders was the proposal that achieved the highest score in terms of feasibility, with 70% of countries considering this activity to be very easy or easy to apply, followed by the organisation of practical workshops targeting 'at risk' regions, zones or sectors (64%). The organisation of multisectoral working or coordination groups gave the most divided results, with percentages of 56% for 'very easy' or 'easy', compared to 33% that considered it would be difficult to organise. Eleven (11%) of countries did not provide an assessment.

On the topic of strengthening knowledge of AMR through surveillance and research, all the proposals put forward were assessed by a very large majority of countries (90%) as capable of having a large impact on reducing the risk of AMR. Participation in hands-on training workshops on AMR surveillance received the highest score in terms of feasibility, with 70.5% of countries considering this activity as very easy/easy to apply; this was followed by the organisation of harmonisation workshops for laboratories participating in AMR surveillance in the veterinary sector, which was judged by approximately 60% of countries to be easy/very easy to implement. The organisation of workshops to interpret the results derived from various type of surveillance (collection of data on antimicrobial use and AMR surveillance) was judged by the same proportion of countries to be easy/very easy to implement. However, the organisation of harmonisation workshops at intersectoral level (human and animal) gave more divided results, with percentages of 48% for very easy/easy to implement compared to 40% for difficult, and 12% of countries not providing an assessment.

In terms of good governance and capacity building, all the proposals put forward were assessed by a very large majority of countries (80%) as capable of having a large impact on reducing the risk of resistance. Providing access to a standardised guide to good practice in the use of antimicrobials was judged to be an easy/very easy proposal to implement by 68% of countries, compared to 15% that considered it difficult; 17% did not provide an assessment. However, providing access to a model of data requirements for a study on the environmental impact of industrial establishments, veterinary practices and livestock production was judged by 48.5% of countries to be difficult to implement.

On the subject of encouraging implementation of international standards, all of the proposals put forward were assessed by a very large majority of countries (over 88%) as capable of having a large impact on reducing the risk of AMR. The provision of access to standardised methods for the analysis of samples collected in the context of AMR surveillance and for interpreting the results gave the best scores in terms of feasibility, with more than 60% of countries considering these actions easy or very easy to implement. However, the proposal relating to participation in international inter-laboratory comparisons on detection of AMR gave the most divided results, with percentages of 51% for very easy or easy compared to 31% for difficult; 19% of countries did not provide an assessment.

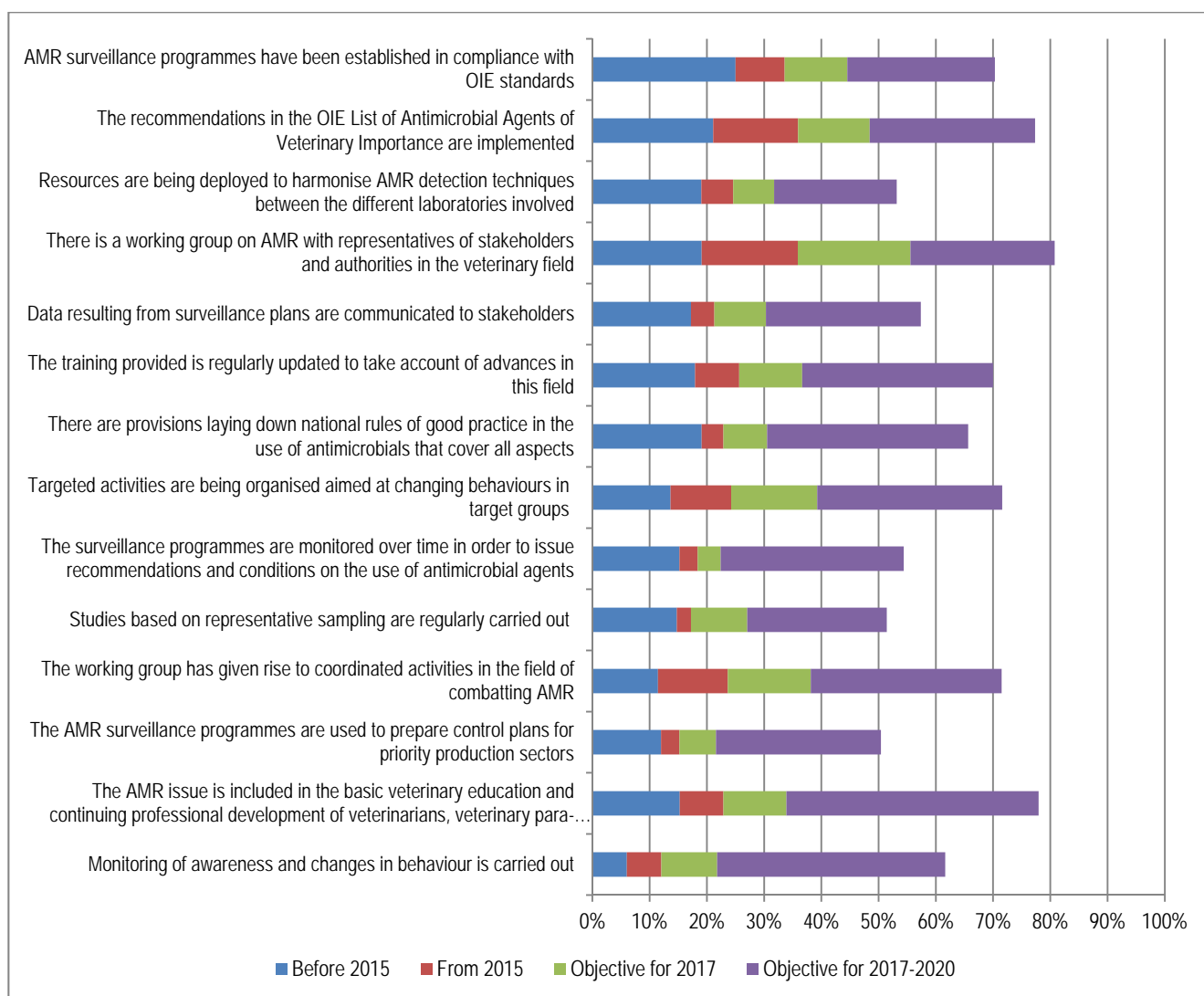


Figure 6: Some examples of short-term and medium-term objectives

4. Conclusions

Overall, the survey and the resulting descriptive analysis revealed Member Countries' great interest in the topic of global action to alleviate the threat of AMR, 134 of the OIE's 180 Member Countries having responded.

The descriptive analysis provides a fairly complete 'snapshot' of the current situation and the sometimes quite marked differences between regions. Even if, for certain major themes, the level in countries and regions is not always as advanced as one might wish, significant progress has been noted on all themes and in all regions, irrespective of the level reported for the period before 2015. Although very few similar studies have been done, it has been possible to compare some of the data with previous findings (8), which support the positive trends. The responding countries have also announced often ambitious objectives for the short and medium term.

To enable these objectives to be achieved, concrete proposals were evaluated as having a large impact on reducing the risk of resistance within the framework of the GAP. There were differences between regions, however, regarding the assessed feasibility of these actions. It is important to note that intersectoral activities were the ones that produced the most divided results in terms of their assessed feasibility.

We are also able to put forward some recommendations, the first being to continue to support, under the GAP, the intersectoral aspect, which still seems to lack cohesion. Measures in this regard would help to guide countries and facilitate the 'One Health' approach advocated by the GAP (6). The second recommendation is to place the emphasis on teaching about risks related to AMR in the core training curriculum and in continuing education for all those involved in the veterinary sector, using suitably adapted and updated teaching materials and tools. The third recommendation is to encourage the implementation of existing OIE standards. The fourth is to complete the framework of standards by developing and making available to Member Countries standards for the analysis of

samples and the interpretation of the results on AMR. This measure would give access to harmonised tools to allow meaningful comparison of the results obtained. The fifth is to place the emphasis on certain areas where governance and regulatory oversight needs to be consolidated, such as the requirement for a prescription before delivery of any antibiotic. A sixth recommendation is to capitalise on the progress achieved with data collection on antimicrobial use in order to fine-tune the available tools. The final recommendation is to continue the programmes of regional workshops on these themes for Member Countries' national Focal Points for Veterinary Products, given that the results for some of these themes show a positive trend that could be related to the workshops that have already been carried out. Lastly, some of the Member Countries suggested changes that could be made to the questionnaire with a view to its future use to evaluate subsequent trends.

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ANNEXES

Annex 1: Definitions

Antimicrobial agent (*Terrestrial Animal Health Code 2016*):

Means a naturally occurring, semi-synthetic or synthetic substance that exhibits antimicrobial activity (kill or inhibit the growth of micro-organisms) at concentrations obtainable in vivo. Anthelmintics and substances classed as disinfectants or antiseptics are excluded from this definition.

Veterinary para-professional (*Terrestrial Animal Health Code 2016*):

Means a person who, for the purposes of the *Terrestrial Code*, is authorised by the veterinary statutory body to carry out certain designated tasks (dependent on the category of veterinary para-professional) in a territory, and delegated to them under the responsibility and direction of a veterinarian. The tasks for each category of veterinary para-professional should be defined by the veterinary statutory body depending on qualifications and training, and in accordance with need.

Annex 2: List of the OIE Member Countries that replied to the questionnaire

Afghanistan, Algeria, Argentina, Armenia, Australia, Austria, Azerbaijan, Bahrain, Barbados, Belgium, Bhutan, Bolivia, Bosnia and Herzegovina, Botswana, Brazil, Brunei, Bulgaria, Burkina Faso, Cabo Verde, Cameroon, Canada, Chad, Chile, Chinese Taipei, Colombia, Congo (Dem. Rep. of the), Costa Rica, Côte d'Ivoire, Croatia, Cuba, Cyprus, Czech Republic, Denmark, Djibouti, Dominican Republic, Ecuador, Egypt, Estonia, Ethiopia, Fiji, Finland, Former Yug. Rep. of Macedonia, France, Gabon, Gambia, Georgia, Germany, Ghana, Greece, Guatemala, Guinea, Guinea Bissau, Guyana, Haiti, Honduras, Hungary, Iceland, India, Iran, Iraq, Ireland, Israel, Italy, Japan, Jordan, Kazakhstan, Kenya, Kuwait, Laos, Latvia, Lesotho, Liberia, Liechtenstein, Lithuania, Luxembourg, Madagascar, Malawi, Mali, Malta, Mauritius, Micronesia (Federated States of), Mexico, Moldova, Montenegro², Morocco, Mozambique, Myanmar, Nepal, Netherlands, New Caledonia, New Zealand, Nicaragua, Niger, Nigeria, Norway, Panama, Paraguay, Peru, Philippines, Poland, Portugal, Qatar, Romania, São Tomé and Príncipe, Senegal, Serbia, Singapore, Slovakia, Slovenia, Somalia, South Africa, South Sudan, Spain, Sri Lanka, Sudan, Suriname, Swaziland, Sweden, Switzerland, Syria, Tanzania, Thailand, Togo, Trinidad and Tobago, Tunisia, Turkey, Uganda, Ukraine, United Arab Emirates, United Kingdom, United States of America, Uruguay, Vanuatu, Zambia, Zimbabwe.

² Data received belatedly and not taken into account in the report

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