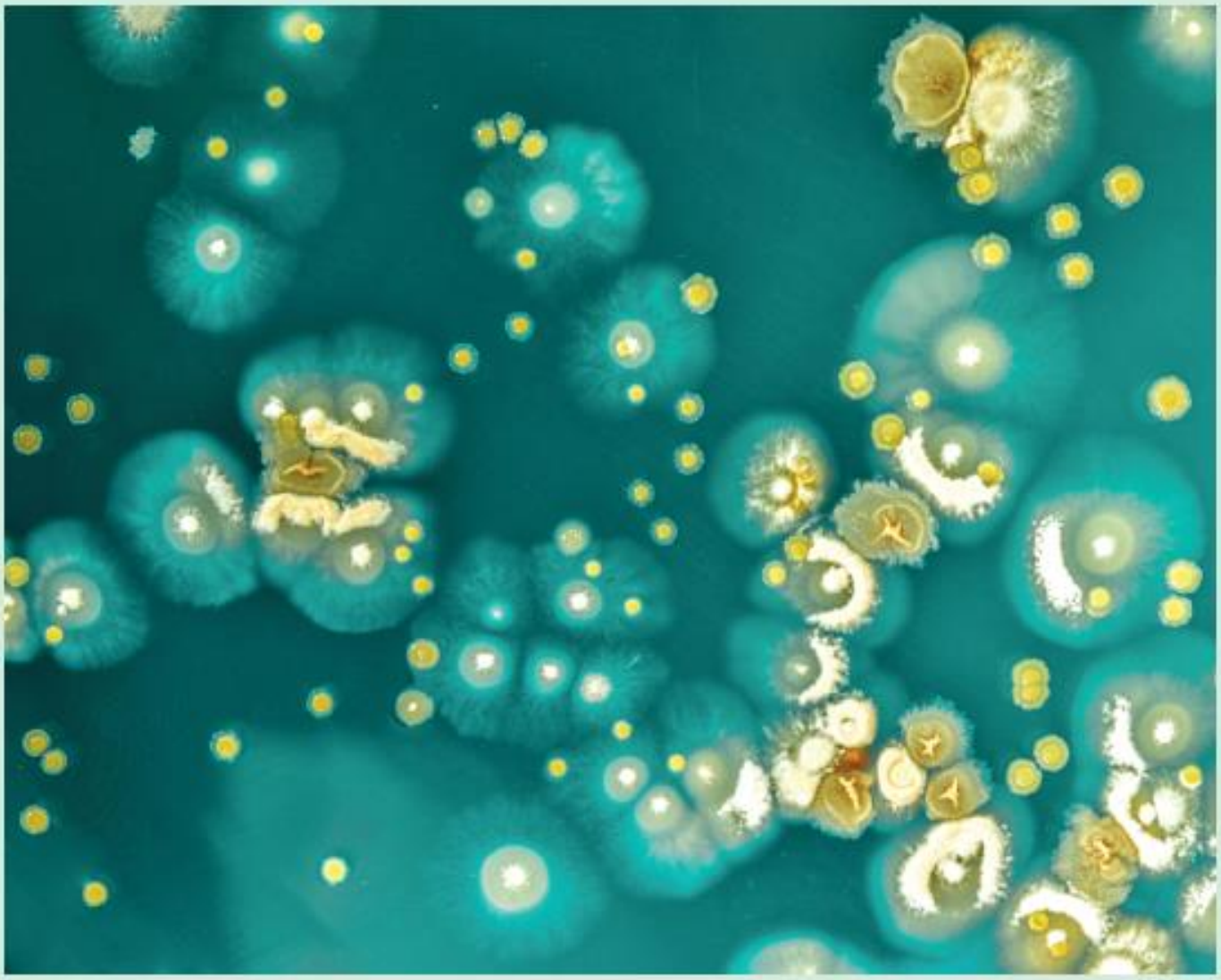
Annual Report on Antimicrobial Agents intended for Use in Animals

7th Report



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Foreword

Dr Monique Éloit
WOAH Director General

It is already seven years since September 2016, when I had the honour and privilege of representing our Organisation in addressing the 71st United Nations General Assembly regarding the global threat that antimicrobial resistance (AMR) poses to animals, plants, humans and the environment. Together, with our Quadripartite partners, the Food and Agriculture Organization of the United Nations (FAO), the United Nations Environment Programme (UNEP) and the World Health Organization (WHO), we continue to be highly mobilised and actively engaged to support all our Members in the implementation of One Health-based strategies to curb AMR, at the global, regional and local level. Our commitment remains intact and, as the global authority on animal health and welfare, we are proud to have published, last November 2022, in close collaboration with the Global Leaders Group on Antimicrobial Resistance, a technical note on this matter, emphasizing the importance of having robust animal health systems, including resilient biosecurity, prevention, infection control measures and good husbandry practices. All are fundamental prerequisites to reduce the burden of infectious disease in animal populations, their dependency on antimicrobials, and the risk of emergence and spread of antimicrobial resistance.

As reiterated in the global action plan on AMR, WOAH is requested to 'build and maintain a global database on the use of antimicrobial medicines in animals'. As a result of the immense efforts of its Members, WOAH's *Annual Report on Antimicrobial Agents Intended for Use in Animals* (AMU) maintains a consistent level of participation year after year, since its first publication in 2016. This seventh report presents the progress achieved by 157 participants, 155 WOAH Members and two non-WOAH Members. We recognise the efforts of Delegates and National Focal Points for Veterinary Products in their contribution to this extraordinary undertaking.

This year, WOAH has launched its customised and interactive online Global Database for **ANI**mal anti**M**icrobial **USE**, or ANIMUSE. The system aims to facilitate Members' instant access to their data, contributing evidenced based guidance for decisions making at the national level. Since the Third Global High-Level Ministerial Conference on Antimicrobial Resistance (Muscat, Oman, November 2022), where ministers of Health, Agriculture, and policymakers from all over the world gathered, 47 countries have committed to reduce the total amount of antimicrobials used in animals and agriculture by at least 30-50% by 2030. Therefore, ANIMUSE plays a key role in supporting Members' actions to achieve this target, helping veterinary workforces to understand and monitor AMU in a harmonised and comparable way.

Lastly, and following our engagement to maintain *WOAH's* up to date *List of Antimicrobial Agents of Veterinary Importance*, we have recently released the sub-division for swine and aquatic animals, key contributions to treatment guidelines and tools for risk management and risk prioritisation to minimise and contain AMR at the national level.

I hope this report will further encourage Members and non-Members alike to continue their participation. Your constant support and involvement will not only increase data accuracy and robustness when understanding the global use of antimicrobial agents in animals, it will allow you to use solid evidence-based data for the successful implementation of your national action plans on AMR.

Executive summary

WOAH's *Annual Report on Antimicrobial Agents Intended for Use in Animals* gathers data provided, on a voluntarily basis, by Veterinary Services on the use of antimicrobial agents in animals. The present report has three main sections: (1) interpretation of the overall findings of the seventh annual data collection round (global and regional situations); (2) detailed analyses for 2019 (total amount of antimicrobial agents, as well as normalised using an estimated animal biomass indicator); (3) trend analyses for 2017 to 2019, after adjustment to the estimated animal biomass indicator.

Methods

In September 2021, WOAH invited its 182 Members and 11 non-Members to participate in its seventh annual round of data collection on antimicrobial agents intended for use in animals. A Microsoft Excel template form was sent by email, with a series of accompanying guidance documents. This template included four worksheets, in which participants were invited to provide Baseline Information or quantitative data. The template allows the reporting of data by type of use[1], animal groups[2] and routes of administration[3]. In addition to this form, a complementary tool was provided (i.e., Excel Calculation Tool), to ease reporting of comprehensive quantitative data sets.

Data come mainly from sales and import figures of antimicrobial agents, being reported at the class or subclass level, following the recommendations specified by the *Terrestrial Animal Health Code* ('Monitoring of the quantities and usage patterns of antimicrobial agents used in food-producing animals') [1] and of the *Aquatic Animal Health Code* ('Monitoring of the quantities and usage patterns of antimicrobial agents used in aquatic animals') [2].

For the purpose of reporting and comparing data across participants, among different sectors and over time, antimicrobial quantities are normalised by the use of an estimated animal biomass indicator, which can vary in size and composition over time. This indicator represents the total weight of live domestic animals in a given population present during a year in a specific area, being used as a proxy to represent those likely exposed to the quantities of antimicrobial agents reported. Animal biomass was calculated for food-producing species of participants reporting quantitative data for 2019, primarily using data from our World Animal Health Information System (WAHIS) and the Food and Agriculture Organization of the United Nations Statistical Database (FAOSTAT). Normalised results are expressed in milligrams of antimicrobial quantities reported per kilogram of estimated animal biomass. Further details on the methodologies used for this report are available in different published references [3] [4].

For the purpose of this report, all invited Veterinary Services reporting their antimicrobial usage, whether they are WOAH Members or not, are referred throughout this document as 'Participants'. It is important to note that information provided belongs to Participants, and is made available to us for the purpose of better understanding the global and regional situations. No individual Participant level data are presented in this report. Notwithstanding, individual Participants data are systematically sent back after validation and analysis by WOAH staff, for their own monitoring and surveillance purposes, including suggested areas to explore for evidence-based evolutions of National Action Plans on AMR. A number of Participants make those data publicly available, as indicated in chapter 6.9 from the *Terrestrial Animal Health Code [1], and are* listed in Section 10 of this report.

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[1] 'Veterinary medical use' - treat, control, or prevent disease; 'non-veterinary medical use' - which includes use for growth promotion.

[2] Terrestrial food-producing, aquatic food-producing, or companion animals.

[3] Oral, injection and others.

Overall findings of the seventh data collection round

As during the previous round, a total of **157 reports were submitted** during the seventh round of data collection: 155 Members (155 out of 182; 85%), one non-contiguous territory[4] of a WOAH Member with its own reporting mechanism, and one non-WOAH Member. One hundred and twenty-one reports (121 out of 157; 77%) included quantitative data for at least one reported year within the time frame from 2019 to 2021.

Seventy-four reports (74 out of 121; 61%) reported antimicrobial quantities by type of use and route of administration (Reporting Option 3), which represents a 5.7% increase from the previous annual report, confirming the useful assistance provided by the Excel Calculation Tool developed by WOAH. It is worth emphasising that while all WOAH regions have made progress on the number of Participants reporting antimicrobial quantities and the use of Reporting Option 3, Americas and Africa have shown the most significant progress in recent years.

Thirty-eight Participants (38 out of 121; 31%) make their **reports publicly available**, the vast majority (32 out of 38; 84%) being European Participants. This figure has remained relatively steady over the years, despite best practice guidance in our international standards to transparently report data.

One out of five Participants provided Baseline Information only (32 out of 157; 20%). Seventeen Participants provided further information on the barriers faced to collect and report quantitative data, the two most common being lack of IT tools and a lack of coordination/cooperation between national authorities, particularly the Ministry of Health. The launch of ANIMUSE together with joint actions with other Quadripartite partners including the WHO, are expected to provide the necessary support to overcome reported barriers and increase accuracy and quality of reported data.

In 2021, the use of antimicrobial agents in animals **for growth promotion** is no longer a practice in nearly three-quarters of Participants (107 out of 157; 68%), either with or without legislation/regulation provision around their use. However, the use of growth promoters is still reported by one quarter of Participants to this seventh round of data collection (41 out of 157; 26%), with 54% of those concentrated in two regions: the Americas and Asia Far East and Oceania. Twenty-four Participants provided data on which antimicrobial agents were used as growth promoters. The three molecules most frequently listed were flavomycin (n=18 Participants), bacitracin and avilamycin (n = 12 Participants for both). Flavomycin and avilamycin are not used in humans according to the Critically Important Antimicrobials for Human Medicine (CIA list from World Health Organization) [5], while bacitracin is not classified as critically important for use in humans. Colistin, considered as Highest Priority Critically Important Antimicrobial for use in humans, is still reported to be used by four Participants. It is important to note that the number of those reporting the use of colistin as a growth promoter has been reduced by more than half over the five years up to 2021, confirming the progressive implementation of our recommendations to prohibit its use as a growth promoter.

Focused analyses for 2019

The seventh report presents analyses with a special focus on the **antimicrobial quantities reported to be used in 2019** by 110 Participants. According to, in most of the cases, sales and import data reported, WOAH estimates that a total of 77,086 tonnes of antimicrobial agents intended for use in animals were used in 2019. Acknowledging the different data sources, data coverage was on average 91% of the total amount of antimicrobials present in the field (as estimated by each Participant), we estimate that the adjusted total amount could be 84,398 tonnes. Almost half of these are tetracyclines, which remain the most utilised antimicrobial agent in animal health globally (35.6% of the total amount), and

[4] For the purpose of the WOAH AMU Data Collection, '**non-contiguous territory**' means: an insular territory separated from the mainland but affiliated to a WOAH Member, with its own AMU monitoring system.

penicillins (13.3% of the total amount). Both are part of the Veterinary Critically Important Antimicrobial (VCIA) classes in WOAH's list of antimicrobials of veterinary importance [14], while they are not part of the highest priority critically important antimicrobial agents for human health according to WHO [5]. Among those who are part of this latter list, fluoroquinolones and third and fourth generation cephalosporins represent 3.4% and only 0.6% of the total amount, respectively.

The analysis of antimicrobial agents normalised by estimated animal biomass was performed on data provided by 108 participant Participants (80% higher than the initial analysis back in 2014). This is considered to represent 70% of the total animal biomass around the globe (50% higher than in 2014), encompassing terrestrial and aquatic food-producing animals, with companion animals excluded from the analyses. Bovine species account for 42% of the total coverage, followed by swine (19%) and poultry (19%). Aquatic animals account for 8% of the total coverage, being almost two-thirds represented by farmed fishes. With all this taken into consideration, WOAH estimates that, in 2019 a total of 99.09 to 108.49 milligrams of antimicrobial agents were used per kilogram of animal biomass, depending on how coverage estimates were adjusted among the 108 Participants.

Trends (2017-2019)

Analysis of these data over time could be performed with data from 80 Participants having consistently provided quantitative information since 2017 to 2019, using the normalised amount of milligrams of antimicrobials used per kilogram of estimated animal biomass. Collected data, representing 65% of the global animal biomass, show an **overall decrease of 13%** in the mg/kg at the global level, moving from 111.45 mg/kg in 2017 to 96.73 mg/kg, in 2019. While a decrease is observed in regions like Europe (-15%) and Asia, Far East and Oceania (-25%), an increase is observed in Africa (+45%) and Americas (+5%). When looking at this trend by antimicrobial class, it is worth noting that a reduction is observed for tetracyclines (19%, the most used antimicrobial class in animal health), as well as in polypeptides (29%, VHIA within WOAH's list and split in two categories within the CIA WHO list: bacitracin - important and colistin - high priority).

Conclusions and perspectives

Participants' commitment to providing information on the use of antimicrobials represents a remarkable achievement since 2015. The overall **participation** rate in the current seventh data collection round has barely changed with regard to previous years, despite all the resilience challenges associated of the COVID-19 pandemic. With the commitment made by 47 countries at the Third High Level Inter-Ministerial Conference on AMR, held in Oman in November 2022, by signing the Muscat Manifesto, WOAH is providing an invaluable set of validated and analysed data back to Participants, including trends over time, for their own utilisation in monitoring and surveillance programs around AMR. Moreover, WOAH is again this year able to provide the most comprehensive and reliable representation of the global situation in the utilisation of antimicrobial agents intended for use in animals, based on real data representing more than 80% of the global geography and 70% of the total animal biomass on earth.

Tetracyclines remain the most **utilised antimicrobial** class globally in animal health, and while some antimicrobial classes considered as critically important for use in humans are still utilised, they represent a small part of the global picture in food producing animals. Sixty-eight percent of the Participants report not using antimicrobial agents for growth promotion. Important progress has been made, even though further engagement is still needed to phase out such utilisation in the absence of risk analysis, and therefore fully comply with WOAH international standards and the Global Action Plan on AMR. When assessed per kilogram of estimated animal biomass, antimicrobial use in food-producing animals continues its global reduction over time, even though some increasing trends are observed in regions like Africa and Americas. While these could be linked to a significant improvement in the accuracy of collected data over time, deeper analyses are needed to understand root causes.

WOAH remains committed to Members in supporting those analyses, as well as appropriate actions to achieve an optimized use of antimicrobials, by following our international standards on responsible and prudent use of antimicrobials.

In September 2022, WOAH launched its ANIMUSE system, a customized online tool for Participants to complete data-entry requirements, calculate antimicrobial quantities, and have their animal biomass estimated through secure confidential access to a central database. Members and non-Members invited to participate already have functional access to the database to review, analyse, present and use their own data. WOAH is currently supporting the deployment, adoption and integration of this new tool, seeking to help to overcome the lack of an IT tool to provide antimicrobial quantities, as reported by Participants during this seventh round of data collection.

Acknowledgements

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WOAH would like to thank the staff from its Antimicrobial Resistance and Veterinary Products Department (Ben Davies and Dante Mateo) who contributed to the report.

WOAH acknowledges the continuous support provided by its Technical Officers from WOAH Regional and Sub-regional Representations during the WOAH AMU Data Collection rounds and in maintaining relationships with its Members.

WOAH would also like to thank all its Members, Delegates, National Focal Points for Veterinary Products and other governmental officials who contributed to the seventh annual collection of data on antimicrobial agents used in animals, without which the knowledge and insight presented in this report on the global use of antimicrobial agents in animals could not have been gained.

Finally, WOAH would like to thank its Working Group on Antimicrobial Resistance for its guidance in the development of the global database and methodology for the calculation of animal biomass for the seventh round of the global data collection on antimicrobial agents intended for use in animals.

This annual report has been developed with the financial assistance of the UK Government Fleming Fund; however, the views expressed herein do not necessarily reflect the UK Government's official policies.

Acronyms and abbreviations

AMR	Antimicrobial resistance
AMU	Antimicrobial use
ANIMUSE	**ANI**mal anti**M**icrobial **USE** Global Database
CIPARS	Canadian Integrated Program for Antimicrobial Resistance Surveillance
ESVAC	European Surveillance of Veterinary Antimicrobial Consumption
FAO	Food and Agriculture Organization of the United Nations
FDA	United States Food and Drug Administration
JVARM	Japanese Veterinary Antimicrobial Resistance Monitoring System
LSU	Livestock unit
NAP	National action plan
WOAH	World Organisation for Animal Health
WAHIS	World Animal Health Information System
WHO	World Health Organization

WOAH Glossary[5]

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

Aquatic Animal Health Services[6]: means the combination of governmental and non-governmental individuals and organisations that perform activities to implement the standards of the Aquatic Code.

Growth promotion, growth promoters: means the administration of antimicrobial agents to animals only to increase the rate of weight gain or the efficiency of feed utilisation.

Monitoring: means the intermittent performance and analysis of routine measurements and observations, aimed at detecting changes in the environment or health status of a population.

Surveillance: means the systematic ongoing collection, collation, and analysis of information related to animal health and the timely dissemination of information so that action can be taken.

Veterinary Authority: means the Governmental Authority of a Member Participant having the primary responsibility in the whole territory for coordinating the implementation of the standards of the Terrestrial Code.

Veterinary legislation: means laws, regulations and all associated legal instruments that pertain to the veterinary domain.

Veterinary medicinal product: means any product with approved claims to having a prophylactic, therapeutic or diagnostic effect or to alter physiological functions when administered or applied to an animal.

Veterinary medical use: Means the administration of an antimicrobial agent to an individual or a group of animals to treat, control or prevent disease:

- to treat means to administer an antimicrobial agent to an individual or a group of animals showing clinical signs of an infectious disease;
- to control means to administer an antimicrobial agent to a group of animals containing sick animals and healthy animals (presumed to be infected), to minimise or resolve clinical signs and to prevent further spread of the disease;
- to prevent means to administer an antimicrobial agent to an individual or a group of animals at risk of acquiring a specific infection or in a specific situation where infectious disease is likely to occur if the drug is not administered.

Veterinary Services: means the combination of governmental and non-governmental individuals and organisations that perform activities to implement the standards of the Terrestrial Code.

[5] For the purposes of the WOAH *Terrestrial Animal Health Code* [6].

[6] For the purposes of this report, when Veterinary Services is mentioned, this includes the definitions for Veterinary Services and Aquatic Animal Health Services.

1. Introduction

1.1. Background

WOAH activities on antimicrobial resistance

In May 2015, during the 83rd General Session of the World Assembly of WOAH Delegates, WOAH Members officially committed to combatting antimicrobial resistance (AMR) and promoting the prudent use of antimicrobials in animals. Moreover, they stated their full support for the Global Action Plan on AMR, developed by the World Health Organization (WHO) in close collaboration with WOAH and the Food and Agriculture Organization of the United Nations (FAO) [7]. One year later, during the 84th General Session, the World Assembly of Delegates directed WOAH to compile and consolidate all the actions to combat AMR [8], leading to the establishment of WOAH's Strategy on AMR and the Prudent Use of Antimicrobials, which was published in November 2016 [9].

Its structure supports objectives established in the Global Action Plan, and reflects the mandate of WOAH as described in its Basic Texts and Strategic Plans through four main objectives:

(1) Improve awareness and understanding.

(2) Strengthen knowledge through surveillance and research.

(3) Support good governance and capacity building.

(4) Encourage implementation of international standards.

With the aim of achieving these objectives, WOAH engages with its Members, through National Focal Points for Veterinary Products, responsible for providing technical assistance on improving and harmonising national policies for the control of veterinary products at the national level. Moreover, WOAH regularly organises seminars to support good governance and capacity building, and the harmonised implementation of our international standards on responsible and prudent use of antimicrobials:

- *Terrestrial Animal Health Code* (*Terrestrial Code*), Chapter 6.8. 'Harmonisation of national antimicrobial resistance surveillance and monitoring programmes', includes examples of target animal species and animal bacterial pathogens that may be included in resistance surveillance and monitoring programmes [10].
- *Aquatic Animal Health Code* (*Aquatic Code*) includes a corresponding chapter, Chapter 6.4. 'Development and harmonisation of national antimicrobial resistance surveillance and monitoring programmes for aquatic animals' [11].
- *Manual of Diagnostic Tests and Vaccines for Terrestrial Animals*, Chapter 2.1.1. 'Laboratory methodologies for bacterial antimicrobial susceptibility testing' provides the laboratory methods supporting surveillance and monitoring [12].

WOAH activities on antimicrobial use

Monitoring of antimicrobial use is critical to understand possible areas of risk for the development of resistance. Moreover, it links with objective number four within the Global Action Plan on AMR, 'Optimize the use of antimicrobial medicines in human and animal health' [7].

In 2012, WOAH developed a questionnaire with the aim to enhance its engagement in the initiative to prevent antimicrobial resistance; to understand Members implementation of WOAH *Terrestrial Code* chapter on 'Monitoring of the quantities and usage patterns of antimicrobial agents used in food

producing animals' [1]; to improve awareness of antimicrobial use in animals by its Members; and to determine what actions were needed to help WOAH to develop its strategy in this field. A total of 152 of 178 (85%) WOAH Members completed the questionnaire. The answers received showed that, in 2012, only 27% of responding Members had an official system in place for collecting quantitative data on antimicrobial agents used in animals.

The results were presented at the first WOAH Global Conference on the Responsible and Prudent Use of Antimicrobial Agents for Animals held in March 2013 in Paris, France. The recommendations to WOAH Members resulting from the conference included:

- To establish an official harmonised national system for collecting data on the monitoring of antimicrobial resistance in relevant animal pathogens and quantities of antimicrobial agents used in food-producing animals at the national level based on WOAH standards.
- To contribute to the WOAH initiative to collect data on the antimicrobial agents used in food-producing animals (including through medicated feed) with the ultimate aim of creating a global database hosted by the WOAH.

Following these recommendations, in 2015, WOAH's World Assembly unanimously adopted Resolution No. 26 during the 83rd General Session, officially mandating WOAH to gather data on the use of antimicrobial agents in animals worldwide [13]. As a result, this global database was created in compliance with chapters of the *Terrestrial Code* [1] and of the *Aquatic Code* [2].

In the framework of the Global Action Plan on Antimicrobial Resistance [7], WOAH leads the building and maintenance of the global database on antimicrobial agents intended for use in animals, since 2015, supported by FAO, WHO, being recently joined by UNEP, within the Quadripartite collaboration.

For the eighth round of data collection, currently under way, WOAH has launched its **ANI**mal anti**M**icrobial **USE** Global Database (**ANIMUSE**); moreover, WOAH has requested quantitative data for 2021 (the target year of that round), but will also accept data for 2020 and 2022. Over time, WOAH will request data for one specific calendar year.

1.2. Scope

This report presents the results of the seventh round of the annual collection of data on antimicrobial agents intended for use in animals. The data collection highlights the current situation of governance of veterinary antimicrobials in responding WOAH Members and participating non-contiguous territories, and includes submissions of quantitative data where participants are able to provide them for inclusion in the global database. The report also highlights the barriers participants face that impede data collection, analysis and reporting.

In addition to the descriptive analysis of the seventh round of data collection, this report includes a global analysis of quantitative data on antimicrobial agents intended for use in animals adjusted by animal biomass. The focus year of this quantitative analysis is 2019; additionally, previous years data sets are updated in this report based on participants historical updates.

Currently, participants report data mainly from sales or imports of antimicrobial agents from *WOAH List of Antimicrobial Agents of Veterinary Importance*[7], which prioritises antimicrobials crucial to maintaining the health and welfare of animals worldwide. The data collection template and resulting

[7] https://www.woah.org/en/document/list-of-antimicrobial-agents-of-veterinary-importance/

report were prepared, taking into account the differences between WOAH Members in their governance and surveillance of veterinary antimicrobials.

For participants reporting quantitative data, the amounts of antimicrobial agents intended for use in animals that were sold, purchased or imported were provided to WOAH in kilograms (kg) of antimicrobial agent (chemical compound as declared on the product label). These reported figures were calculated according to the guidance provided (Annex 9).

Information provided belong to countries, being reported to WOAH in confidence for the purpose of better understanding the global and regional situation related to the use of antimicrobial agents in animals. Therefore, this report does not present data at national level. At the same time, WOAH encourages all countries to generate a national report for their own utilisation in the implementation and adaptation of their National Action Plans on AMR. Moreover, we also emphasize the importance and value to publish national reports. The list of countries with national reports on veterinary antimicrobial usage that can be accessed publicly is found in Section 10 of this report, together with relevant links.

2. Results of the seventh round of data collection

2.1. General information

In this seventh round of data collection, launched in September 2021, 157 reports were submitted to WOAH Headquarters: 155 from WOAH Members (n = 182; 85%), one from a non-contiguous territory of a WOAH Member and one from a non-WOAH Member. The proportion of responses received from the different WOAH regions varied from 67% to 96% (Table 1). The responses from the non-contiguous territory and non-WOAH Member were included in the analysis of the Americas for geographical reasons.

For simplicity when reporting results, this section refers to the 155 WOAH Members, one non-contiguous territory and one non-WOAH Member as the 157 'Participants' that responded to the questionnaire during the seventh round of data collection.

For specific information on WOAH regions, refer to the Annexes of this report available in a separate document.

Table 1. Number of Participants that responded to WOAH survey in the seventh round of data collection, by WOAH region

WOAH region	Number of Participants that submitted reports by WOAH region	Number of WOAH Members*	Proportion of response (%)
Africa	41	54	76%
Americas**			
WOAH Members	28	31	90%
Non-contiguous territories	1	n/a	n/a
Non-WOAH Members	1	n/a	n/a
Asia, Far East and Oceania	27	32	84%
Europe	51	53	96%
Middle East	8	12	67%
Total	**157**	**182**	**85%*** **

* *Distribution of Members by WOAH region is in accordance with the OIE Note de Service 2010/22 (available in the annex 10 of this report).*
** *Due to geographical distribution, non-contiguous territories were included in the Americas.*
*** *Non-contiguous territories and non-WOAH Members are excluded from the ratio.*
n/a: Not applicable

Figure 1. Geographical distribution of participants that responded to WOAH survey in the seventh round of data collection

Profile of the contact person

For the seventh round of antimicrobial use data collection, WOAH template was most frequently completed by the Member's National Focal Point for Veterinary Products (84 out of 155 Members) (Figure 2). WOAH recognises the efforts of National Focal Points for Veterinary Products. In Europe, the Focal Points were less often responsible for responding to the survey, with another national Competent Authority supplying the data. This result may be linked to differing levels of progress in the development of data collection systems, where a specific institution may already be mandated to undertake this responsibility (Figure 3).

Figure 2. Contact person profile of 155 Members that submitted a WOAH report in 2021

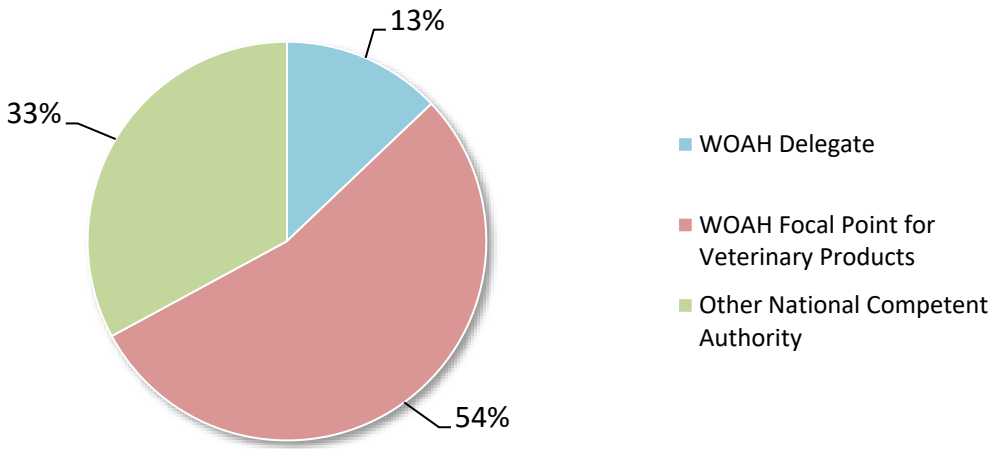
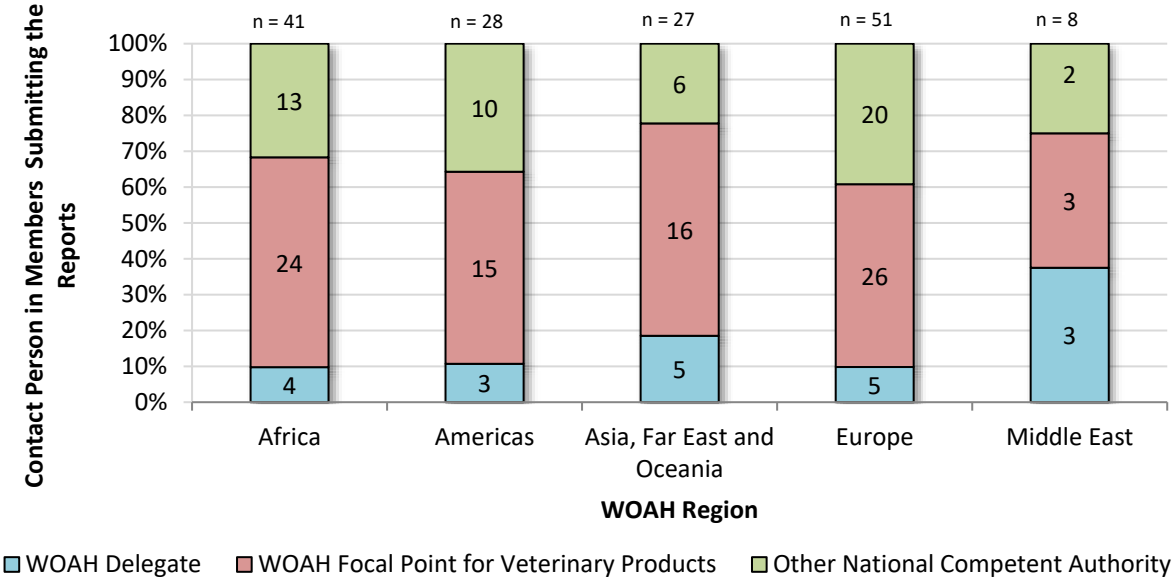


Figure 3. Regional proportion of contact persons of 155 Members that submitted a response to WOAH survey in the seventh round of data collection



2.2. Reporting options

Corrections made to data reported in the previous rounds of data collection

Data from previous rounds have been updated based on new information and corrections reported by the participants in the seventh round, and therefore may differ from the results of the previous reports.

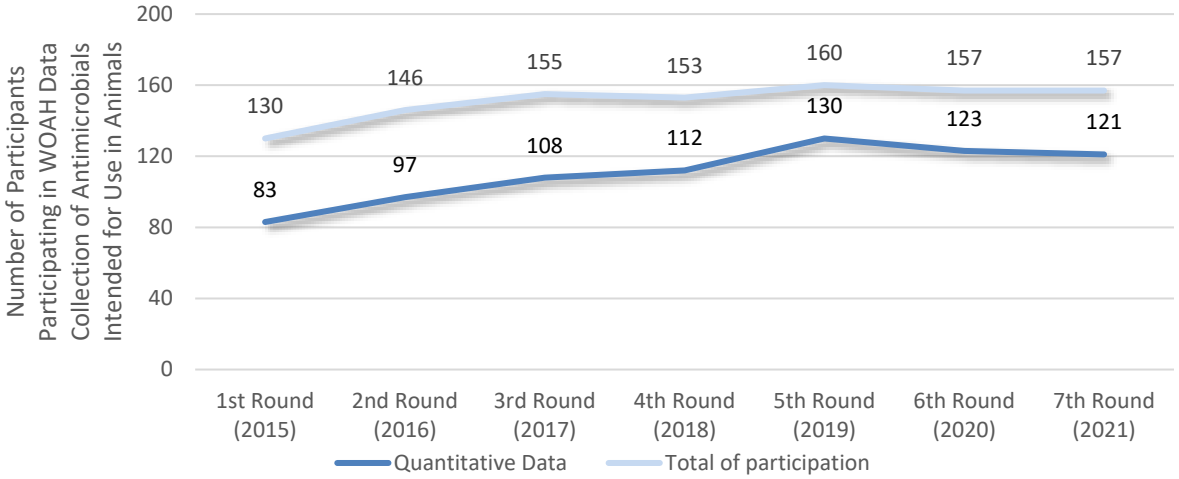
A participant, where critical errors in the data were identified, was retrospectively removed from previous rounds. As a result, the antimicrobial quantities of the participant have been removed, but its responses related to growth promoters and barriers to the collection of data were retained. WOAH supports these participants in identifying possible data points and provides tools to calculate the amounts of active ingredients of antimicrobial veterinary products.

Results of the seventh round – reporting options

In the seventh round of data collection, Baseline Information (parts A and B of WOAH's questionnaire) was completed by 157 participants (155 Members, one non-contiguous territory and one non-WOAH Member). Of these, one participant submitted data for the first time, and 14 participants, that missed the sixth-round reporting, renewed their participation in this seventh round. Ninety participants have consistently participated in all cycles since the first cycle was launched in 2015.

The ability of a participant to provide quantitative information reflects its capacity to collect detailed data on antimicrobial agents intended for use in animals. For the first round of data collection, 84 Members reported quantities of antimicrobial agents intended for use in animals (n = 130; 64%). In this seventh round, 121 participants (n = 157; 77%) reported quantitative data, demonstrating growing commitment to the development of monitoring systems for veterinary antimicrobial agents (Figure 4).

Figure 4. Number of participants over different data collection rounds



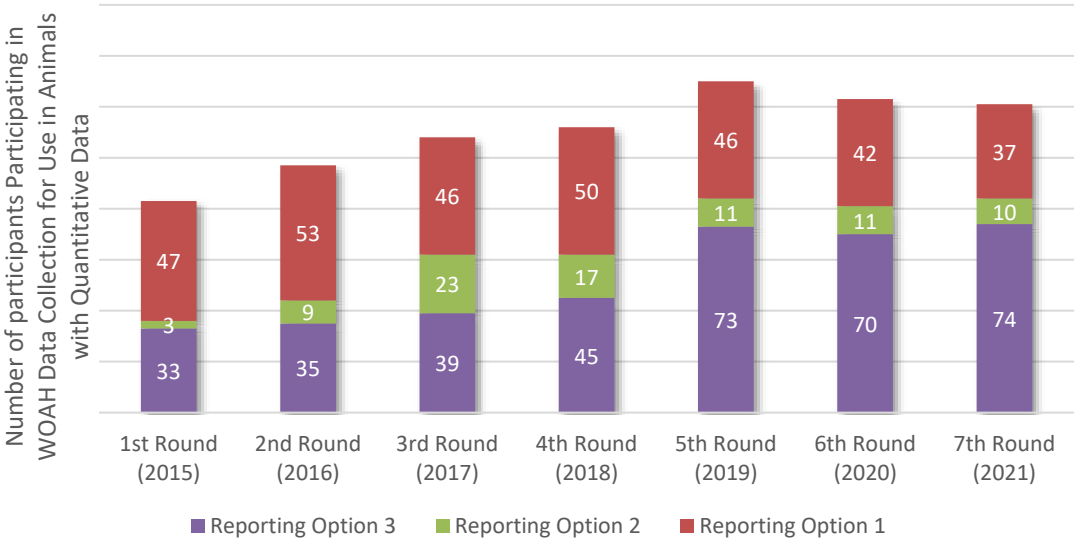
Reporting Option 3 allows Participants to distinguish antimicrobial quantities by type of use and route of administration (distinguishing by group of animals is optional) and this option was the one chosen most frequently by respondents (74 out of 121 Participants). For the third time in a row, this highest-level reporting option was the predominant one; facilitated through an Excel Calculation Tool WOAH has developed. Twenty-nine percent of the Participants providing antimicrobial quantities during the seventh round used WOAH's Tool. Reporting Option 1, which allows Participants to distinguish antimicrobial quantities by antimicrobial class and provides them with the possibility of separating by type of use (veterinary medical use or growth promotion [1]), was chosen by 37 Participants. Finally, Reporting Option 2, which allows Participants to distinguish quantities of antimicrobial agents by type of use and animal group (food-producing terrestrial and aquatic species and companion animals), was chosen by ten Participants (Figure 5).

For the seventh round, while all WOAH regions have made progress on the number of Participants reporting antimicrobial quantities and the use of Reporting Option 3, Americas and Africa have shown significant progress in recent years and they are only surpassed by Europe, in which many Participants are part of the European Surveillance of Veterinary Antimicrobial Consumption (ESVAC) project that was established in 2008 (Table 3).

Table 2. Participants with quantitative data (Reporting Options) in the first and seventh round of the data collection by WOAH region

WOAH Region	Number of Participants per WOAH Region	First Round		Seventh Round	
		Number of Participants Reporting Antimicrobial Quantities (%)	Number of Participants Using Reporting Option 3 (%)	Number of Participants Reporting Antimicrobial Quantities (%)	Number of Participants Using Reporting Option 3 (%)
Africa	54	24 (44%)	3 (13%)	27 (55%)	18 (66%)
Americas	31	8 (26%)	1 (13%)	21 (65%)	16 (76%)
Asia, Far East and Oceania	32	15 (47%)	4 (25%)	26 (81%)	11 (42%)
Europe	53	33 (62%)	24 (72%)	46 (85%)	28 (61%)
Middle East	12	2 (17%)	1 (50%)	4 (33%)	3 (75%)
Global	182	82 (47%)	33 (40%)	121 (67%)	70 (56%)

Figure 5. Number of Participants with quantitative data (Reporting Options) in all rounds of the data collection



2.3. Years of quantitative data reported

Table 3. Breakdown of Participant response types in the seventh round of data collection

Number of Participants that responded to WOAH questionnaire	**157**
Number of Participants that provided quantities of antimicrobial agents	**121**
- Number of Participants that provided quantitative data for only one year between 2019 and 2021	109
- Number of Participants that provided quantitative data for more than one year between 2019 and 2021	14

Most Participants providing antimicrobial quantities submitted data for only one year between 2019 and 2021 (109 out of 121 Participants; 90%). Fourteen Participants submitted quantitative data for more than one year within this time frame, this particular situation was observed in many European Participants, particularly those reporting data to ESVAC as, when the seventh round took place ESVAC produced a report that moved ahead one year and presented data for both 2019 and 2020. Given these multiple submissions, 138 responses were provided by 121 Participants (Table 3) in the seventh round of data collection.

Forty-eight responses (n = 138; 35%) provided data for 2019 (the target year) during the seventh round of data collection (Figure 6). For the first time, the years reported were equally presented to WOAH, this could indicate that in the near future, Participants could submit data only for two years (Figure 7).

Figure 6. Years of quantitative data reported in the seventh round of data collection, from 138 responses provided by 121 Participants

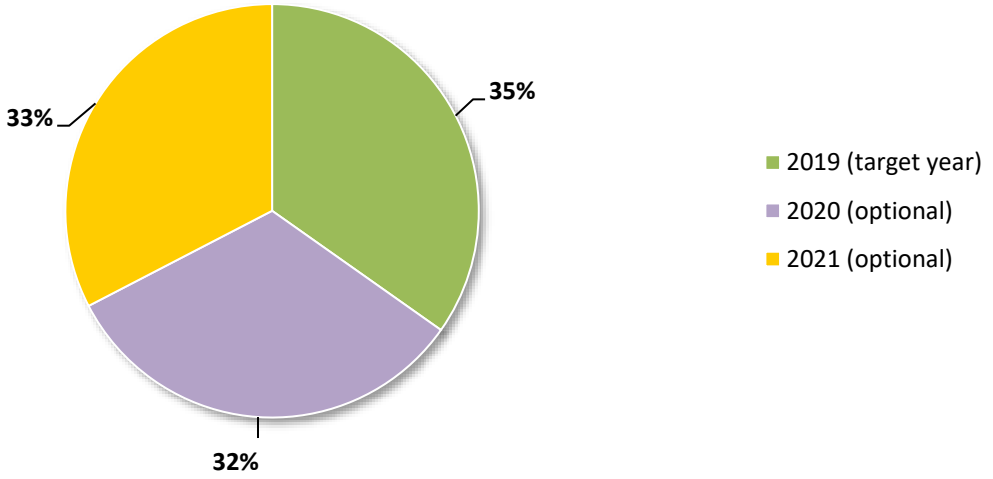
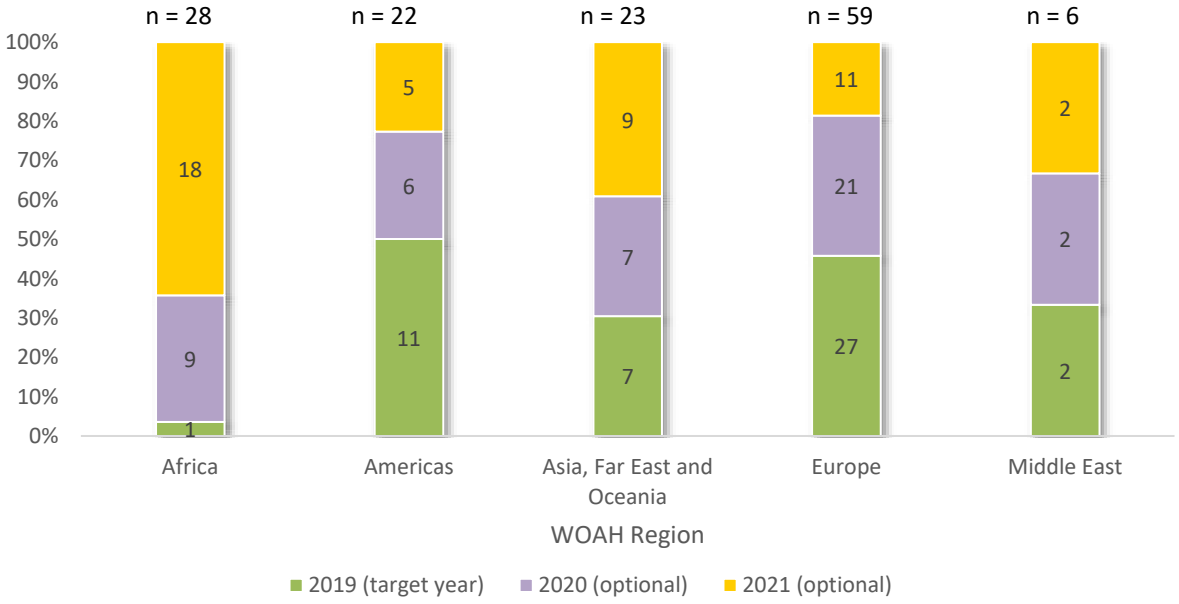


Figure 7. Years of quantitative data reported in the seventh round of data collection, from 138 responses provided by 121 Participants by WOAH region



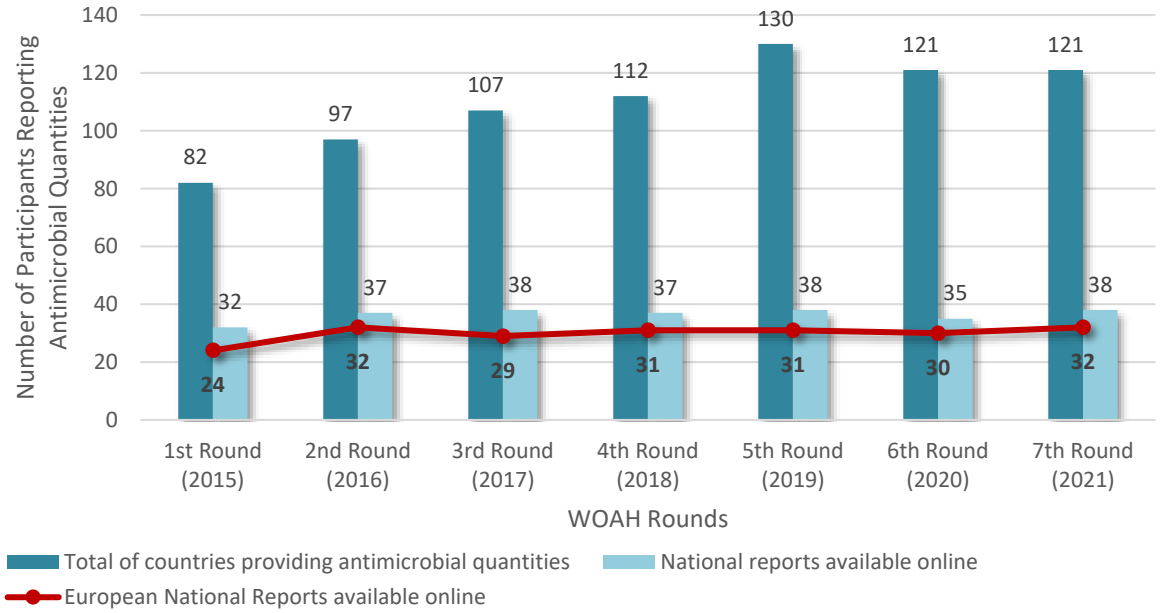
2.4. National reports available online

In the WOAH template, Participants were asked if a national report on the antimicrobial agents used in animals was available online. In the seventh round of data collection, 83 Participants (n = 121; 69%) did not publish online national reports, Europe is the only region where more than 50% of Participants' national reports are available online (Figure 8).

WOAH encourages all Participants to publish their own national reports on the sale or use of antimicrobial agents in animals, to ensure transparency and to assess trends.

The list of Participants with public national reports for the antimicrobial agents intended for use in animals can be found in Section 10 of this report, along with the relevant links.

Figure 8. Number of Participants to all rounds of WOAH data collection with national reports available online



2.5. Use of data at national level

During the seventh round, some Participants were asked how the data reported to WOAH was being used at national level. This additional question was asked to those who did not had a national report available online. A total of 27 Participants provided an answer.

While nine Participants informed that the data had not been used yet; three of them expressed that prior to the use or their data; they would like to keep improving their data collection systems.

Eighteen Participants informed that they were using the data reported to WOAH (n = 27; 67%) and listed different activities and reports; they were grouped as public or private. Seven Participants produced a public report communicated at national and international levels; the most common types were: scientific articles (n = 4) and communication materials targeting the World AMR Awareness Week (n = 4); it has to be noted that five of the seven Participants also produced a private report. Sixteen Participants used their data for internal purposes, the most frequently reported uses were

those to feed their national AMU/AMR surveillance systems for internal analysis (n = 5) and updates to their national policies for the use of antimicrobials in animals (n = 5).

With the launch of ANIMUSE in September 2022; we hope more Participants will be using their data at national levels, while progressing in their transparency.

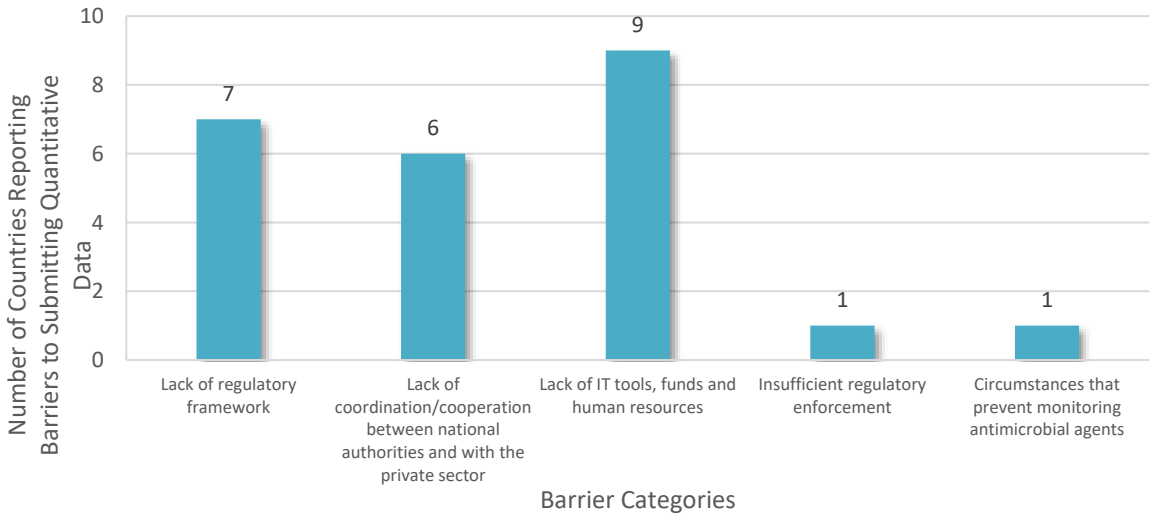
2.6. Participant barriers to providing quantities of antimicrobial agents in animals

In the seventh round, some Participants that reported barriers during the sixth round were seen to have made progress. Three of these Participants progressed from reporting Baseline Information to reporting antimicrobial quantities. Of these three Participants, two had previously reported a lack of regulatory framework and one indicated that a lack of IT tools impeded their progress to report antimicrobial quantities. During the seventh round, these Participants made progress using the Calculation Tool to report their quantities.

Thirty-two of the Participants to the seventh round (n = 157; 20%) provided Baseline Information only. Of these, 17 Participants (n = 32; 53%) outlined their barriers to reporting antimicrobial quantities. The barriers have been grouped into five categories (Figure 9). Eleven Participants reported one main barrier, and five Participants reported two and the rest three. The relative importance of these categories may change when analysing the results on a regional level.

For a description of the barrier grouping categories, see the following explanatory section for each category.

Figure 9. Participant barriers to reporting quantitative data on antimicrobial agents intended for use in animals in 17 Participants during the seventh round of data collection



Lack of regulatory framework

Three Participants indicated regulatory framework limitations or absence for the manufacture, registration, distribution, commercialisation and pharmacovigilance of veterinary products.

Two Participants' legislation did not provide a legal basis for collecting data on antimicrobial agents intended for use in animals, and two indicated that data collection mechanisms did not exist.

Lack of coordination/cooperation between national authorities and with the private sector

Within this category, six Participants reported that the relevant data were held by a national authority outside of the Veterinary Authority. All of these Participants indicated that the quantities of antimicrobial agents intended for use in animals were under the legal authority of the Ministry of Health explaining that the Ministry of Health had the legal competency for the authorisation and importation of veterinary medicinal products, and that the data were not shared with them, even if the Veterinary Authority was in charge of their responsible use on the field.

One Participant reported a lack of collaboration or coordination with the private veterinarians.

Lack of IT tools, funds and human resources

Eight Participants described as their main problem in data collection that records (mainly imports of veterinary products and the information related to their authorisation) were not yet digitised or needed an evolution in their systems to connect the information of the veterinary products with customs offices. For these Participants, the time burden would be too high to calculate the amounts of active ingredients for veterinary products.

Four Participants explained that additional staff resources are needed to collect and collate the data; three of them mentioned the lack of an IT tool.

Insufficient regulatory enforcement

One Participant explained that permit imports are manually authorised and that they do not systematically report that into a database that is supposed to track the imports of veterinary products.

Circumstances that prevent the monitoring of antimicrobial agents

One Participant reported the national political instability as the main reason that prevented them from reporting antimicrobial quantities in animals.

Summary on barriers

Most of the barriers for the seventh round were due to a lack of an IT tool that allows the data collection of the imports or sales of veterinary products. It is expected that the launch of the ANIMUSE Global Database, which has a special module for helping with the calculations, will provide the support Participants need to overcome this barrier.

A significant barrier reported by several Participants was the lack of cooperation with other national authorities, particularly the Ministry of Health which was described as the institution with the legal authority on the veterinary products' registration. In the future, it is expected that WOAH and WHO address this barrier of lack of collaboration through joint integrated regional workshops.

Many of the respondents who communicated barriers to WOAH, faced compliance and structural barriers with the application of WOAH standards and weak enforcement of regulatory frameworks for veterinary products. The development of a robust regulatory framework for importation, manufacture, registration, distribution, commercialisation and use of veterinary products – and capability for effective enforcement – within these Participants the facilitation of the monitoring of the use of antimicrobial agents in animals should be prioritised.

2.7. Antimicrobial agents used for growth promotion

During the 2016 WOAH General Session, WOAH Members adopted Resolution No. 36, 'Combating Antimicrobial Resistance through a One Health Approach: Actions and OIE Strategy' agreeing to the recommendation that:

> 'OIE Member Countries fulfil their commitment under the Global Action Plan to implement policies on the use of antimicrobials in terrestrial and aquatic animals, respecting OIE intergovernmental standards and guidelines on the use of critically important antimicrobial agents, and the phasing out of the use of antibiotics for growth promotion in the absence of risk analysis'. [8]

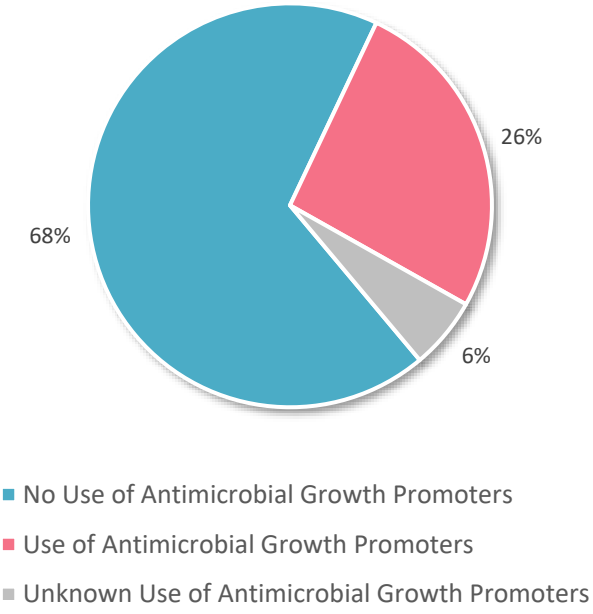
The *WOAH List of Antimicrobial Agents of Veterinary Importance* also states that the **'responsible and prudent use of antimicrobial agents does not include the use of antimicrobial agents for growth promotion in the absence of risk analysis'** [14]. The risk analysis is defined as the 'process composed of hazard identification, risk assessment, risk management and risk communication' and should follow the procedure specified in *Chapter 6.11* of the *Terrestrial Animal Health Code*[8].

The Baseline Information section of the WOAH template includes a question for Participants to report any antimicrobial agent authorised or used in animals as growth promoters. Ionophores were excluded from reporting as they are mostly used for parasite control and have different regulatory classifications in different countries; however, ten Participants reported the use of these molecules as growth promoters; and salinomycin and monensin (two specific ionophores) were mentioned by seven and five Participants, accordingly. According to the WHO list of critically important antimicrobials, ionophores are currently not used in humans.

In this seventh round of data collection, and as presented in Figure 10, a total of 107 (n = 157; 68%) responding Participants did not use antimicrobial agents for growth promotion in animals, either with or without legislation or regulations. Forty-one Participants (n = 157; 26%) reported use of antimicrobials for growth promotion. The nine remaining Participants indicated that they were unsure if antibiotics were being used in the field or not. Seven of them did not have legislation related to growth promotion.

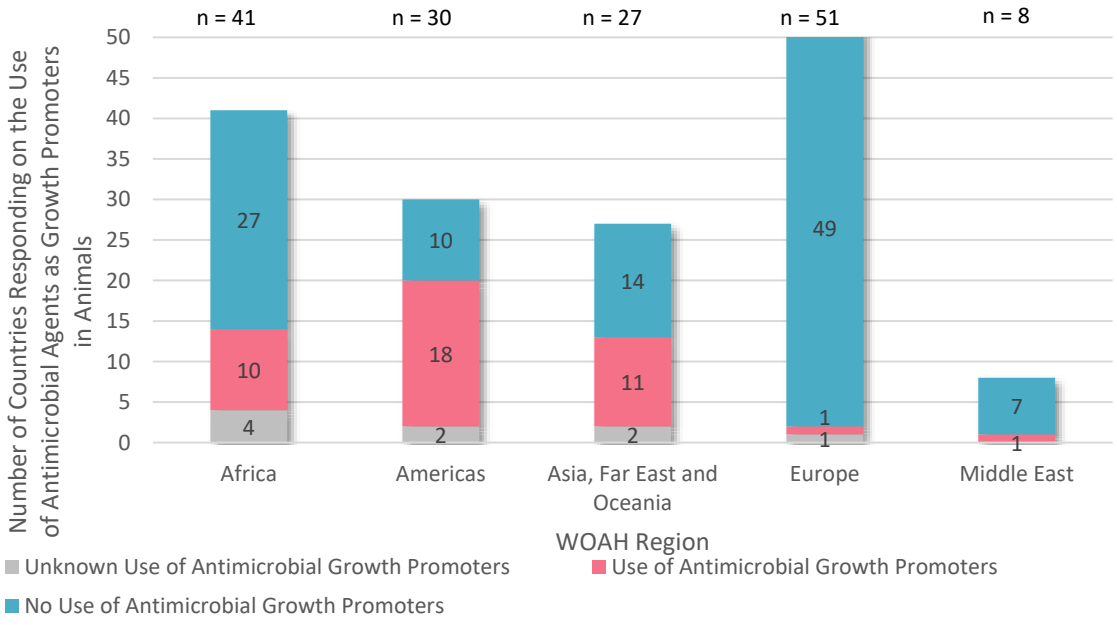
[8] https://www.woah.org/fileadmin/Home/eng/Health_standards/tahc/current/chapitre_antibio_risk_ass.pdf

Figure 10. Use of antimicrobial growth promoters in 157 Participants in 2021



When differentiated by WOAH region, the Americas has the highest proportion of Participants using antimicrobials as growth promoters (Figure 11). Europe has been working on this issue for many years and this is reflected in the responses provided, with Europe being one of the regions with the lowest percentage of use and authorisation of antimicrobial growth promoters.

Figure 11. Number of Participants using antimicrobial agents for growth promotion in animals in 2021, of 157 responding Participants, by WOAH region



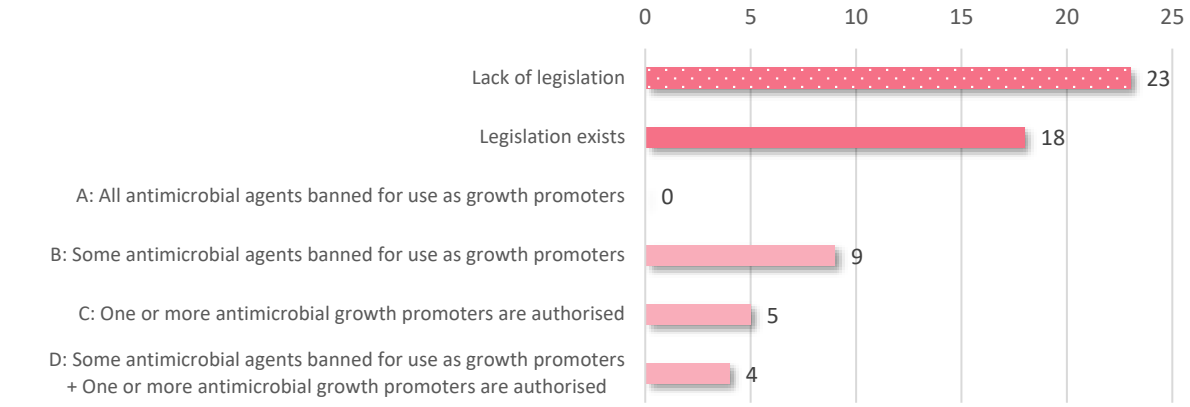
Regulatory framework for antimicrobial agents used as growth promoters

In the WOAH template and guidance sent for the seventh round, all Participants, regardless of their response to the question relating to the use or otherwise of antimicrobials as growth promoters, were asked to respond to the following question: 'Does your Participant have legislation/regulations on the use of antimicrobial growth promoters in animals?'

All 92 Participants that answered 'Yes' to this question were asked to indicate which type of legislation/regulations existed. In most cases, when legislation/regulation exists, the regulatory framework bans the use of antimicrobials as growth promoters (Figure 12).

As presented in Figure 12, 32 Participants stated that they did not use antimicrobials as growth promoters even though no regulatory framework exists.

Figure 12. Use of antimicrobial growth promoters by legislation, in 157 Participants in 2021



More than half of the Participants reporting the use of antimicrobials as growth promoters do not have a regulatory framework (23 out of 41 Participants; 56%).

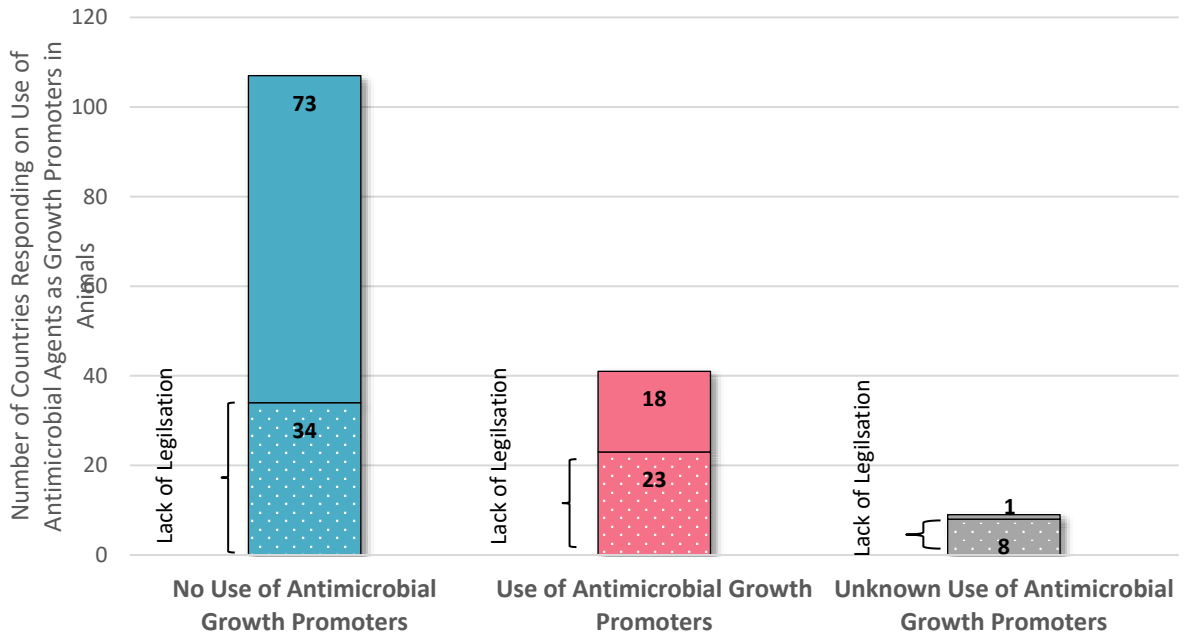
Of those 18 Participants using antimicrobials as growth promoters within a regulatory framework (n = 41; 44%), the legislation in place either provides a list of molecules that should not be used as growth promoters (n = 9) or provides a list of antimicrobials that can be used as growth promoters (n =5), while in other cases, both types of lists have been established (n = 4) (Figure 13).

Among the 23 Participants using growth promoters within a regulatory framework, some stated that they had partially or completely banned all growth promoters for certain animals.

Of those 23 Participants using growth promoters without a regulatory framework, the majority were located in Africa and the Americas; nine and 12 Participants respectively.

For specific information on WOAH regions, refer to the Annexes of this report.

Figure 13. Type of legislation for growth promotion in 41 Participants that reported the use of growth promoters in 2021



List of antimicrobial agents used for growth promotion

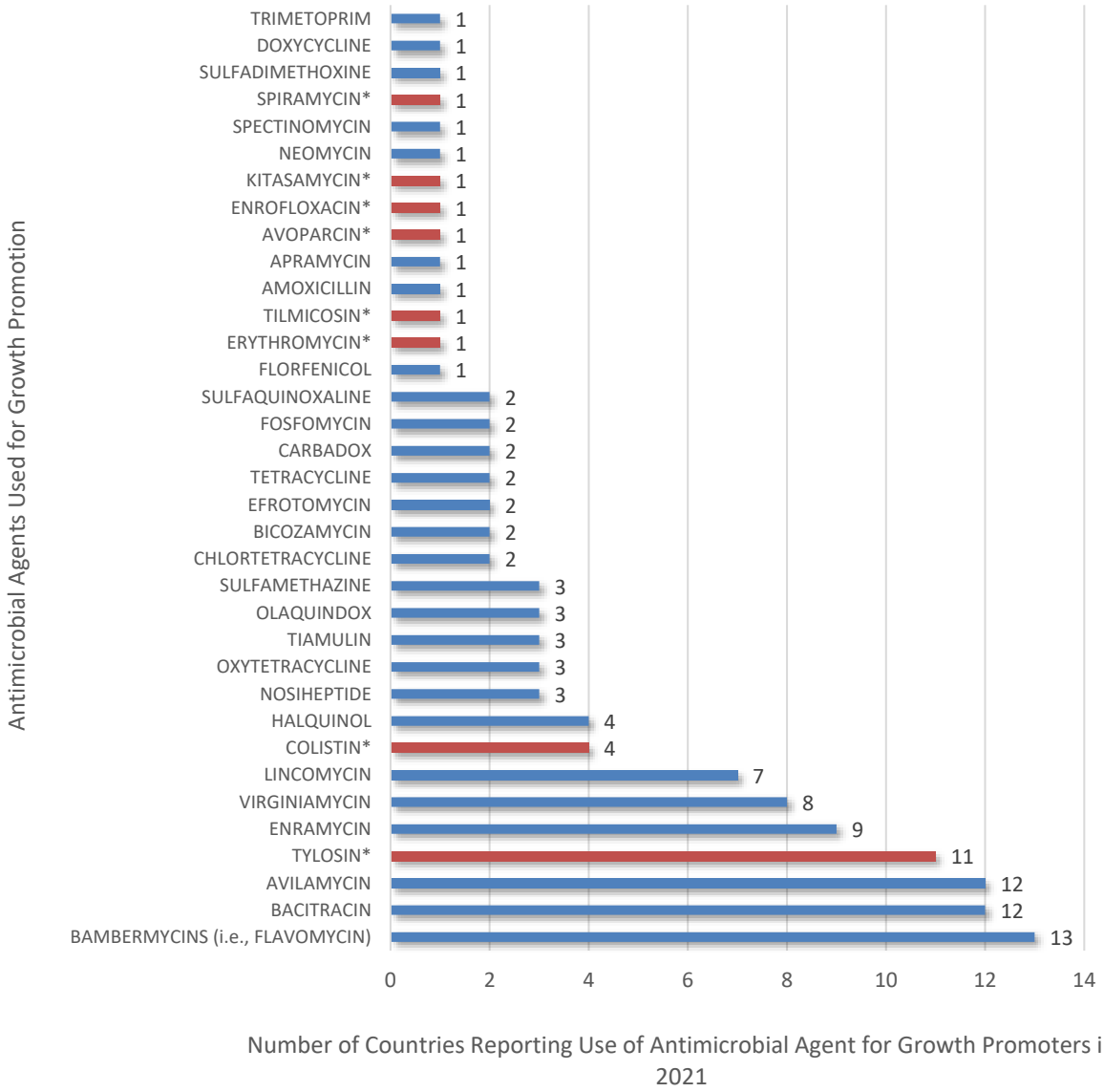
The 41 Participants reporting the use of antimicrobial agents for growth promotion were further asked for a list of antimicrobial agents (by active ingredient) either authorised as growth promoters or known to be used in cases where legislation on this issue did not exist.

Twenty-four Participants (n = 41; 59%) responded with a list of antimicrobial agents used for growth promotion. The most frequently listed antimicrobial agent was flavomycin (currently not used in humans according to the WHO *List of Critically Important Antimicrobials for Human Medicine*), followed by bacitracin and tylosin. Colistin was mentioned by four Participants (Figure 14); based on this result and compared with the second round of data collection in 2016 where 13 Participants reported colistin, the Participants are making efforts to phase out molecules that are important for human medicine.

The *WOAH List of Antimicrobial Agents of Veterinary Importance* [14] recommends the urgent prohibition of the use of colistin, fluoroquinolones and third and fourth generation cephalosporins as growth promoters.

Analyses at WOAH regional level by antimicrobial class are presented in the Annexes of this report.

Figure 14. Antimicrobial agents used for growth promotion in animals in 24 Participants in 2021



* The classes in the WHO category of Highest Priority Critically Important Antimicrobials should be the highest priority for Participants when phasing out the use of antimicrobial agents as growth promoters.

Thirty-five Participants using antimicrobial agents as growth promoters (n = 41; 85%) provided quantitative data on antimicrobial agents intended for use in animals. Eighteen of these Participants (n = 35; 51%) could distinguish these quantities by use (i.e. for growth promotion or veterinary medical purposes). During the seventh round, most of the Participants using the Calculation Tool and using growth promoters, indicated the use of veterinary products for both veterinary medical use and growth promotion purposes; those products with dual indications provided different dosage instructions according to the type of use. As Participants are still using mainly sales and imports as data sources, it would be difficult for them to distinguish the quantities by type of use for these products, unless data at the field level are collected.

3. 2019 analysis of antimicrobial quantities

This section provides an analysis of globally reported quantitative data on antimicrobial agents intended for use in animals adjusted by animal biomass, focusing on 2019.

This analysis has been undertaken on the understanding that many Participants contributing to the WOAH database are continuously progressing in the development of national monitoring systems on antimicrobial use in animals. Even for those Participants able to provide quantitative information, some data resources may be currently inaccessible, and calculation errors, where present, are still being resolved by the Participants. Simultaneously, data collection on animal populations is also progressing on the global level. *It is expected that these first estimates will be refined over time, and therefore, should be interpreted with caution.*

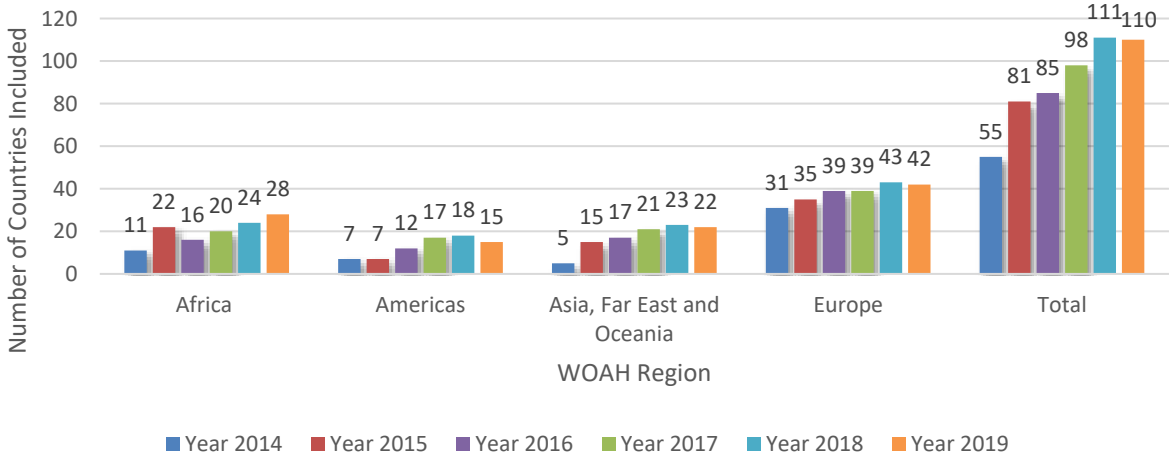
3.1. Antimicrobial quantities

Regional representation of Participants included in the 2019 analysis

The focus of this section is covering all 2019 data provided during any round of data collection; therefore, the results presented in this section differ from those presented in Section 2 in which the data provided during the seventh round only is included.

For all rounds of data collection compiled, 110 Participants provided validated antimicrobial quantities intended for use in animals for 2019. The regional distribution of Participants included in the 2019 analysis is shown in Figure 15. Due to geographical considerations, quantitative data for 2019 of one non-contiguous territory was included in the Americas for this analysis.

Figure 15. Number of Participants included in the antimicrobial quantities analysis by WOAH region, from 2014 to 2019



A lack of validated data from the Middle East did not allow for the inclusion of this WOAH region in the regional 2019 analysis, but the validated data submitted by this region's Participants have been included in the global analysis. Future data submissions from this WOAH region may permit an analysis of antimicrobial quantities adjusted by animal biomass in subsequent reports.

Period of time covered

Participants were asked to specify the period of the calendar year covered by their data (e.g. 1 January to 31 December).

The average time period covered was 356 days for 110 Participants; this information shows that most Participants are providing quantitative data for most of a calendar year. Information by the WOAH region is shown in Table 4.

Table 4. Reported period of time covered by the antimicrobial quantities by WOAH region, 2019

WOAH region*	Number of Participants	Mean (days)	Standard deviation (days)	Maximum (days)	Minimum (days)
Africa	28	349	21	361	90
Americas	15	360	19	360	360
Asia, Far East and Oceania	22	357	11	360	329
Europe	42	359	13	360	300
Global	110	356	18	361	90

*Due to confidentiality issues, the regional data for the Middle East were excluded.

Quantitative data sources captured

The WOAH template includes an exhaustive list of possible quantitative data sources, in accordance with Chapter 6.9. of the *Terrestrial Code* (Monitoring of the quantities and usage patterns of antimicrobial agents used in food-producing animals) and with Chapter 6.3. of the *Aquatic Code* (Monitoring of the quantities and usage patterns of antimicrobial agents used in aquatic animals). Multiple choices were possible in responding to this question, including the option 'other'.

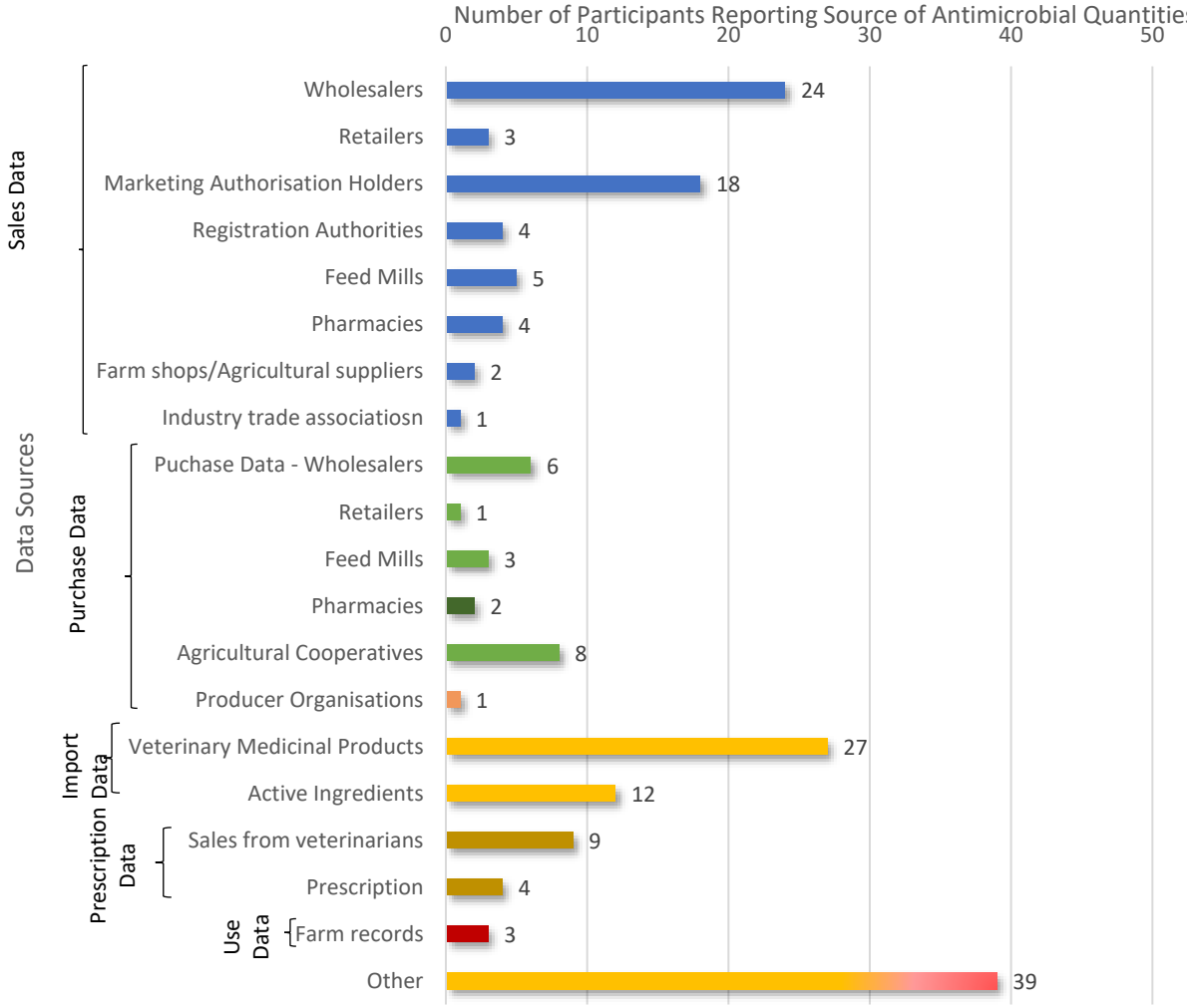
All Participants' data sources were analysed, and all Participants where the duplication was considered to be a risk were asked to provide clarification on their answers and/or data collection systems. Twenty-two Participants' data sources were considered to present a risk of duplication (n = 110; 20%). Following these clarifications, 19 Participants (n = 22; 86%) either changed their answers or demonstrated that there was no risk of duplication or overlapping data sources. The remaining Participants (three out of 22; 14%) that did not respond with clarification and were excluded from the analysis in Figure 16.

In the Guidance for Completing the WOAH Template for the Collection of Data, Participants were asked to provide data as close to the point of use (i.e. administration) as possible. However, among the 107 Participants that reported validated quantitative data, 'Antimicrobial use data – Farm records' – the category representing on-farm administration of antimicrobials – was only selected as a data source by three Participants that accompanied those quantities with sales and import data (Figure 16). All other data sources represent use through what was sold, imported or manufactured for intended administration to animals.

Sources of quantitative data were most commonly sales data, particularly from wholesalers, selected by 49 Participants. After sales data, import data declared by customs authorities was the next most common source of reported quantities of antimicrobial agents intended for use in animals.

For a full explanation of quantitative data sources, see the Guidance for Completing the WOAH Template for the Collection of Data on Annex 8 of this report.

Figure 16. Validated data sources selected by 107 Participants reporting quantitative data in 2019

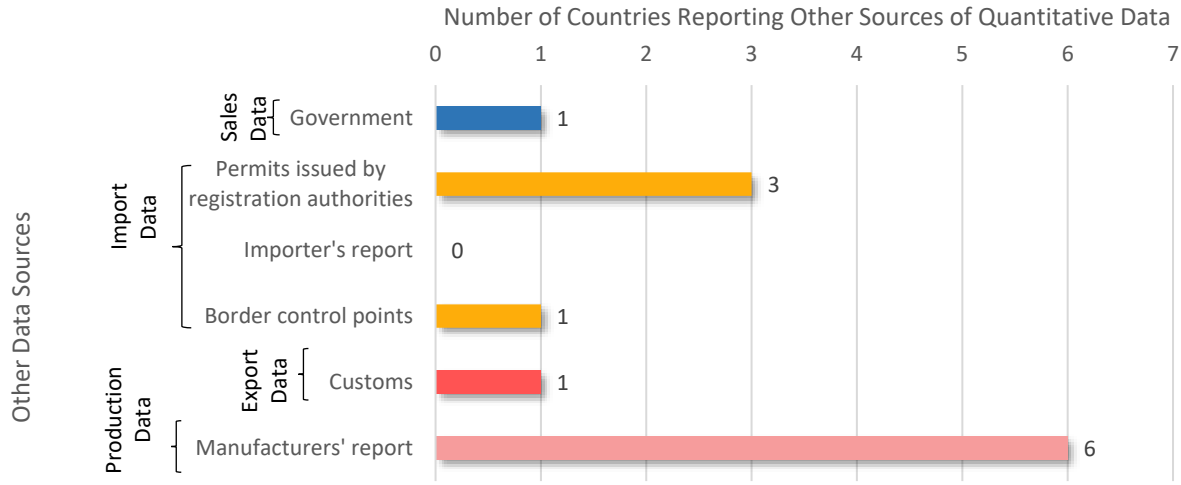


Other data sources reported

Thirty-nine Participants (n = 107; 36%) reported 'other' sources of quantitative data from the provided options. When this response was selected, Participants were asked to describe these other data sources. The responses from 12 participants were grouped by category.

Other sources of quantitative data commonly reported were from manufacturers' report and other import control systems apart from customs declarations (Figure 17). In some Participants where the importation of a product is not confirmed following issue of a permit, these quantities may not represent antimicrobial agents actually entering the Participant and used in the animal population.

Figure 17. 'Other' source of data described by 12 Participants reporting quantitative data in 2019



Data coverage

In the WOAH template for quantitative data collection, Participants are asked to estimate the extent to which their data represented overall sales of antimicrobial agents intended for use in animals, as a percentage of the total estimated sales in their Participant. For example, a hypothetical Participant may report that the quantitative data reported covers only 80% of all estimated national sales of antimicrobial agents used in animals based on known sources of missing data. All 107 Participants that provided quantitative data with validated data responded to this question.

The global average for quantitative data coverage achieved was 91% (Table 5). This average quantitative data coverage shows that in a number of Participants, surveillance systems do not capture the totality of antimicrobial agents intended for use in animals. **However, this figure should be interpreted with caution, as data coverage estimations are made subjectively by each Participant.** By definition, this question aims to identify quantitative data that are inaccessible, and therefore the responses can vary in accuracy.

Table 5. Reported percentage of antimicrobial quantity coverage by WOAH region, 2019

WOAH region	Number of Participants	Mean (%)	Median (%)	Standard deviation (%)	Minimum (%)	Maximum (%)
Africa	27	86	90	21	20	100+30*
Americas	15	86	98	19	40	100
Asia, Far East and Oceania	21	92	95	10	70	100
Europe	42	95	100	13	23	100
Global	**107**	**91**	**99**	**16**	20	100+30*

* Some Participants export veterinary products to foreign Participants. Therefore, to minimise the impact of these products that were not used at a national level; these Participants estimated more than 100% coverage, with the understanding that the quantities reported overestimate the national antimicrobial usage.

Sources not captured by the data

Of the 107 Participants estimating the coverage of their data with validated data sources, 52 Participants stated that they covered 100% of the data source used to report the data. The 55 Participants that did not cover 100% of available quantitative data were asked to provide further information on uncaptured data sources.

Fifty Participants (n = 55; 91%) responded with an explanation on uncaptured data sources. Responses were grouped by category. All Participants' uncaptured data sources were analysed and, if needed, further questions were asked on their data collection systems. After the analysis, the uncaptured data sources were validated for all 50 Participants. Participants could have reported more than one uncaptured data source.

Most uncaptured data sources derive from sales data not provided, particularly those from relevant stakeholders, reported by 16 Participants. The provision of illegal or unofficial veterinary products for import data that enter a Participant was also a significant contributor, reported by 12 Participants.

Table 6 describes the quantitative data coverage lost due to a lack of access to data sources, as estimated by 50 Participants. This question allows Participants to self-report which type of data they were unable to access, and what percentage of total possible available data was estimated to be lost due to this inaccessibility. For Participants naming an uncaptured data source, the mean, minimum and maximum reported estimates of related coverage lost are shown. The information in Table 6 highlights which data sources Participants consider necessary in order to provide complete coverage. However, these categories may not be relevant for all Participants.

Table 6. Estimation of quantitative data not captured based on a lack of access to sources, as reported by 50 Participants in 2019

Sources estimated not captured in quantitative data	Number of Participants naming uncaptured data source	Estimated data coverage lost		
		Mean	Minimum	Maximum
Sales data				
Partial response from relevant stakeholders	16	25%	5%	77%
Antibiotics authorised for humans that are used in companion animals	4	3%	1 %	5%
Illegal or unofficial veterinary products	4	16%	2%	50%
Medicated feed	2	6%	1%	10%
Certain food-producing animal species	1	10%	10%	10%
Partial data, not from a whole calendar year	1	30%	30%	30%
Selected regions in the country	1	50%	50%	50%
Veterinary products with special licence*	1	10%	10%	10%
Purchase data				
Partial response from relevant stakeholders	2	43%	10%	75%
Illegal or unofficial veterinary products	1	35%	35%	35%
Import data				
Illegal or unofficial veterinary products	12	19%	5%	30%
Active ingredients used to manufacture veterinary products	3	25%	15%	30%
Data from the drug agency under the Ministry of Health	3	12%	5%	20%
Companion animals	2	8%	5%	10%
Partial data, not from a whole calendar year	2	9%	8%	10%
Medicated feed	1	1%	1%	1%
Veterinary data				
Partial response from relevant stakeholders	1	50%	50%	50%
Production data				
Partial response from relevant stakeholders	2	15%	10%	20%
Manufacturer's report	1	20%	20%	20%
Veterinary products with special licence*	1	2%	2%	2%

Antimicrobial quantities reported in 2019

Table 7 shows the total tonnage of antimicrobial agents intended for use in animals for 2019, as reported to WOAH during different rounds of data collection.

When the antimicrobial quantities reported adjusted for these coverage estimates (i.e. extrapolation to annual coverage from all data sources to account for partial temporal coverage or missing data sources), the quantities shown in Table 7 were obtained. *These coverage-adjusted figures should be interpreted with caution, as data coverage estimations are made subjectively by each Participant.* By definition, this question aims to identify quantitative data that is inaccessible, and therefore the responses can vary in accuracy. However, these coverage-adjusted quantities can be considered an upper-level estimate of antimicrobial use in animals.

In order to properly interpret tonnage of antimicrobials reported, the size and composition of each Participant's animal populations must be considered. For this reason, we refer the reader to Section 3.3, Antimicrobial Quantities Adjusted for Animal Biomass, to interpret differences in regional quantities of antimicrobial agents intended for use in animals.

These regional totals **should not be considered representative of the total amounts of antimicrobials consumed in any WOAH region, or in any particular country**.

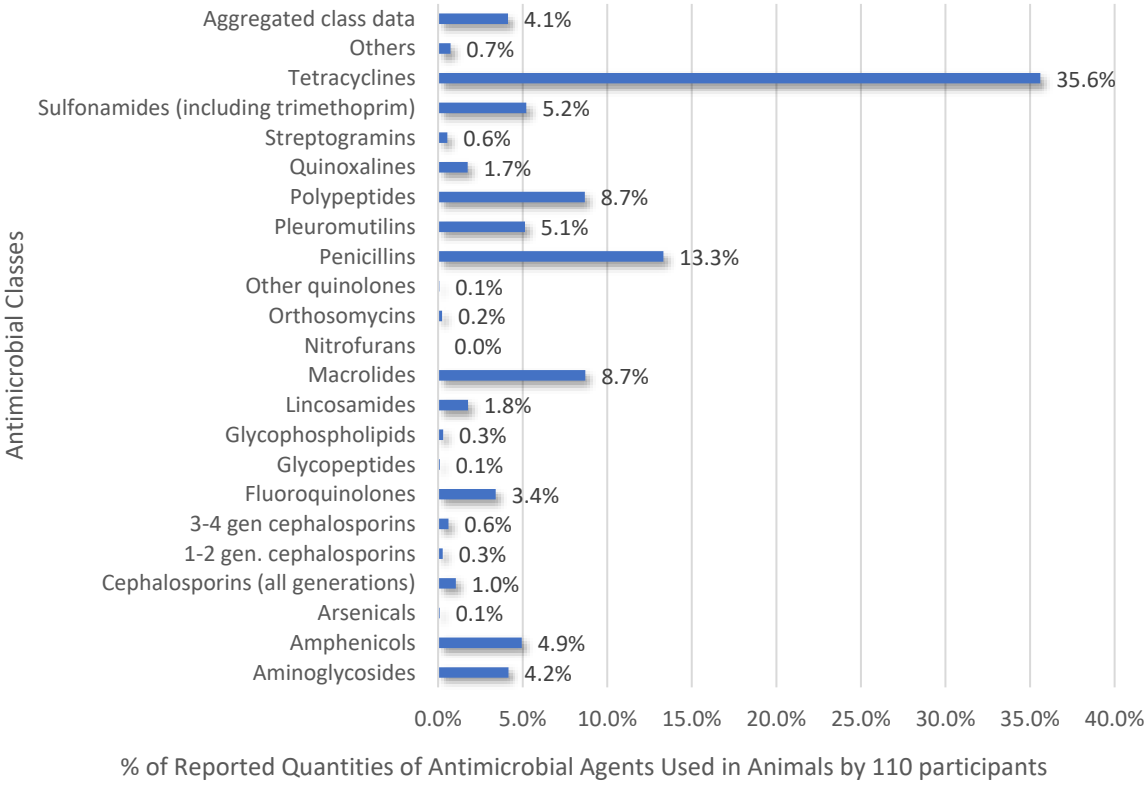
Table 7. Reported quantity of antimicrobial agents intended for use in animals by WOAH region, 2019

WOAH region	Number of Participants included in analysis of 2019 quantitative data	Quantities reported (in tonnes)	Quantities reported adjusted by estimated coverage* (in tonnes)
Africa	28	2,154	2,441
Americas	15	25,821	31,216
Asia, Far East and Oceania	22	42,771	44,228
Europe	42	6,330	6,501
Total	110	77,086	84,398

* *Estimated coverage: this refers to the subjective estimates Participants made with respect to the extent to which their data represented overall sales of antimicrobial agents intended for use in animals. In this column, the figures were adjusted to represent 100% of the total estimated amount (as further explained in the Section Data Coverage).*

Among the 110 Participants that provided quantitative data on antimicrobial agents intended for use in animals, tetracyclines were the most commonly reported antimicrobial class (Figure 18).

Figure 18. Proportion of antimicrobial classes reported for use in animals by 110 Participants in 2019



High use of antimicrobial classes

For 2019 data, it was noted that eight Participants (n = 110; 7%) allocated more than 70% of their total amount of antimicrobials intended for use in animals to one antimicrobial class (Table 8). Globally, it was observed that those Participants with high use of one antimicrobial class usually share the same economic status and, additionally, the high rates of the class are mainly link to economic factors.

Three of these Participants (n = 8; 38%) were from Africa and all of them were classified as least developed Participants according to the Development Assistance Committee (DAC) List of Official Development Assistance (ODA) Recipients effective for 2019 and 2020 from the Organisation for Economic Co-operation and Development (OECD).Participants reporting more than 70% of their amounts for one antimicrobial class were further asked to explain any known reason for the high levels of use for a single antimicrobial class. Three Participants provided explanations, with two Participants mentioning that tetracyclines were favoured because of a low financial cost or control of certain diseases. A Participant with high levels of other penicillins, explained that this was mainly attributed to the medicinal policy of the national veterinary association that stated that penicillin is the first choice when selecting antimicrobials.

Table 8. Antimicrobial classes with more than 70% of the total amount of antimicrobials intended for use in animals, by eight Participants in 2019

Antimicrobial class	Number of Participants with high levels of use in a specific antimicrobial class	Antimicrobial quantities allocated in the antimicrobial class (tonnes)	Use of the antimicrobial class compared to the total amount reported (% - mean)
Penicillins	1	0.4	74.8%
Tetracyclines	7	1934	80.4%

Food-producing target species on the label of reported veterinary products

Irrespective of whether the data could be differentiated by animal groups, all 110 Participants that provided quantitative data were asked to identify the food-producing animal species covered by their data, according to the product's target species label, from a list supplied in the WOAH template. The breakdown of food-producing species included in the reporting Participants' data sets is shown in Figure 19.

For descriptive purposes, species from the list of options provided in the WOAH template were grouped according to the following categories:

A. POULTRY
- *a.* Layers – commercial production for eggs
- *b.* Broilers – commercial productions for meat
- *c.* Other commercial poultry
- *d.* Poultry – backyard

B. BOVINES
- *a.* Cattle
- *b.* Buffaloes (not *Syncerus caffer*)

C. PIGS

a. Pigs – commercial
b. Pigs – backyard

D. SHEEP AND GOATS

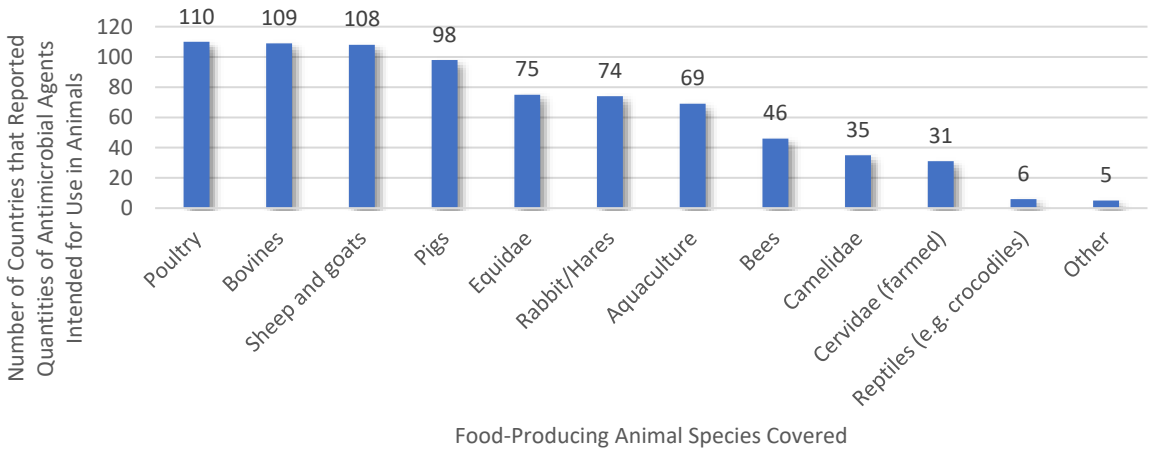
a. Sheep
b. Goats
c. Sheep and goats (mixed flocks)

E. AQUACULTURE

a. Fish – aquaculture
b. Crustaceans – aquaculture
c. Mollusc – aquaculture
d. Amphibians

In 2019, poultry was mentioned by all 110 Participants reporting quantitative data for food-producing species. Bovines, sheep and goats were also included by most Participants (Figure 19).

Figure 19. Food-producing animal species included in quantitative data reported by 110 Participants in 2019



Quantitative data differentiation by animal group

For the purposes of the WOAH survey, animal groups are separated into: 'Terrestrial food-producing animals', 'Aquatic food-producing animals' and 'Companion animals'. Multiple choices were possible in responding to this question.

For 2019, 67 Participants (n = 110; 61%) provided data differentiated by animal group (Figure 20), this corresponds to the number of Participants reporting their antimicrobial quantities through Reporting Options 2 and 3. Further information on WOAH Reporting Options can be found in the Annex 7 of this report.

Figure 21 shows that more Participants were able to report data separated by food-producing animal group. Usually, Participants used more than one animal group to report their antimicrobial quantities.

Most of the data came from sales and imports, and the attribution of antimicrobial quantities by animal group was based on the species types listed on product labels, where this was available and specified. For Participants where product labels covered a wide variety of species, it would be more difficult to

report quantitative data differentiated by animal group. For 2019, 26% of the Participants started to use the Calculation Tool which assisted in allocating the quantities in the different groups.

Figure 20. Differentiation by animal groups among 110 Participants reporting quantitative data in 2019

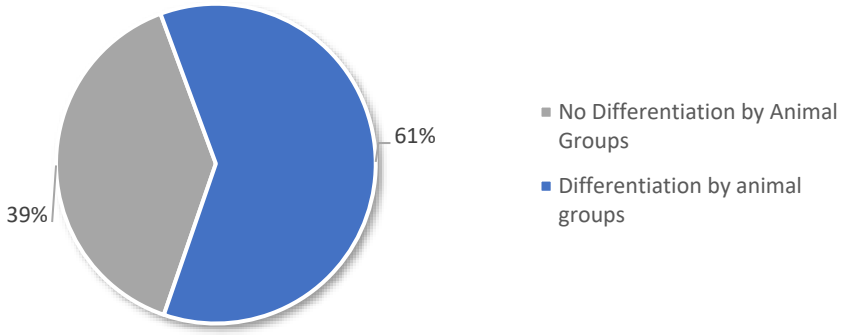
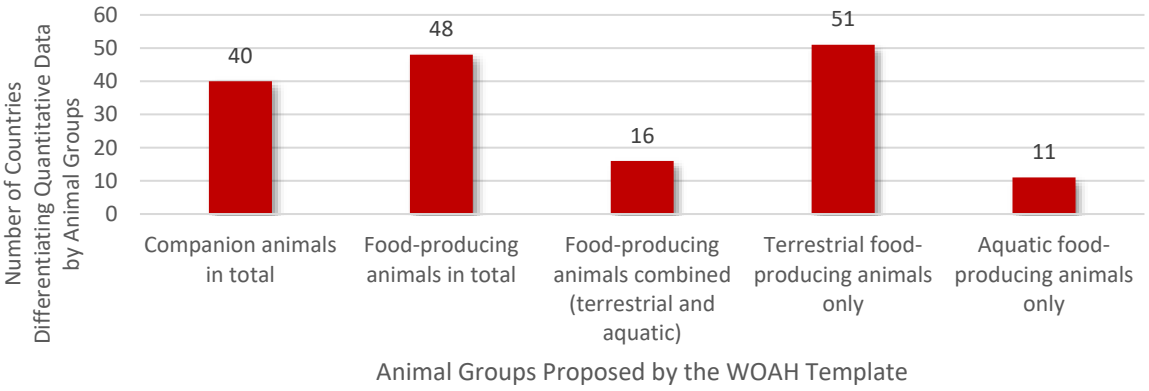


Figure 21. Representation of quantitative data from 67 Participants able to separate by animal group in 2019[9]



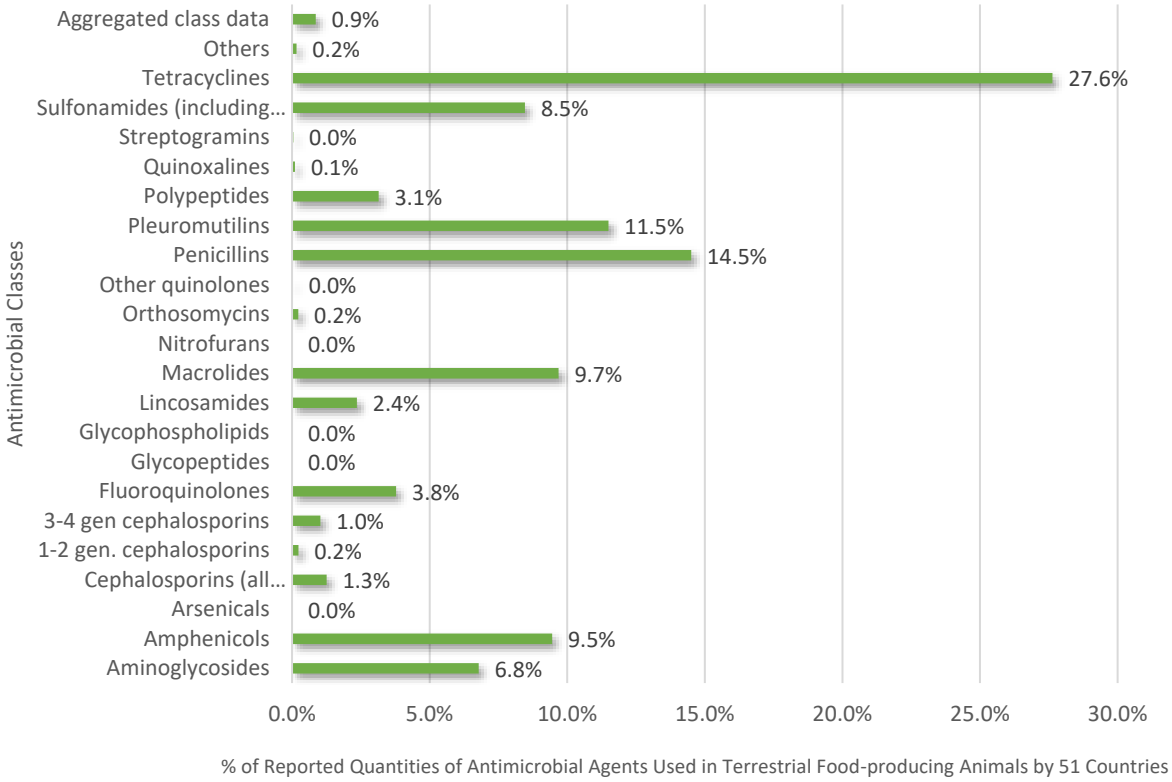
Forty-three of those Participants reporting quantitative data (n = 110; 39%) were not able to distinguish the amounts of antimicrobial agents by groups of animals. Of these, the majority (31 out of 43; 72%) reported antimicrobial quantities through Reporting Option 1, which allows reporting for all animal species combined, and distinguishes quantities only by purpose of use (veterinary medical use or growth promotion [1]). Twelve of these Participants (n = 43; 28%) used Reporting Option 3, which allows for distinction by type of use, animal groups and route of administration, but provided data only separated by type of use and/or route of administration. This suggests that the labelling of veterinary products in these Participants clearly separates out the route of administration but may cover a wide variety of species.

[9] For WOAH AMU Database purposes the animal groups proposed to allocate antimicrobial quantities for food-producing animals in Reporting Options 2 and 3 are: aquatic food-producing animals, terrestrial food-producing animals and food-producing animals combined (terrestrial and aquatic). Ideally, the data for the group of food-producing animals combined should be equal to the sum of the quantities provided for the terrestrial and the aquatic food-producing animals; however, there were cases where participants were not able to distinguish between these two animal groups due to veterinary products being labelled for use in both terrestrial and aquatic animals. As a result of this, the participants only used the group of food-producing animals combined to report quantities. The group of aquatic food-producing animals was only provided if quantities for terrestrial food-producing animals were also reported.

Terrestrial food-producing animals

Some Participants reported quantities of antimicrobial agents differentiated by group of animals using Reporting Options 2 or 3. Among these Participants, tetracyclines, followed by penicillins were the most commonly reported antimicrobial class used in terrestrial food-producing animals (Figure 22).

Figure 22. Proportion of antimicrobial classes by terrestrial food-producing animals as reported by 51 Participants in 2019



Aquatic food-producing animals

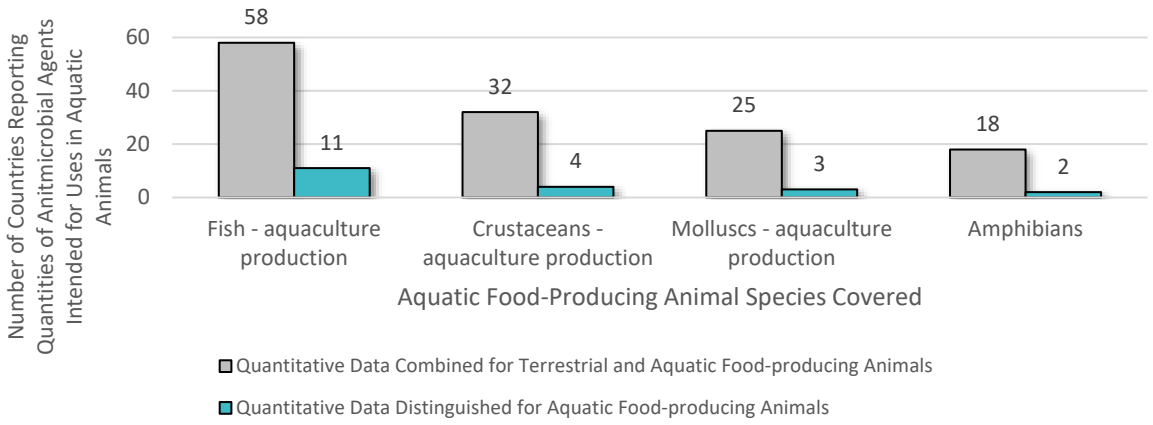
Of the 110 Participants that provided quantitative data for food-producing animals in 2019, 69 Participants stated that their labelled products also targeted aquatic food-producing animals (n= 110; 63%).

When aquatic food-producing animals were covered, in most cases, quantitative data for aquaculture represented farmed fish. Of the 69 Participants that provided amounts of antimicrobial agents under the Aquatic food-producing animals group, 'Crustaceans – aquaculture production', 'Molluscs – aquaculture production' and 'Amphibians' were reported mainly when data for 'Fish – aquaculture production' were also available. Figure 23 highlights the animals included in aquaculture covered by Participants reporting quantitative data for aquatic food-producing animals, separated by capacity to distinguish data for terrestrial and aquatic food-producing animals.

Of the 69 Participants providing antimicrobial quantities that covered aquatic animals, 11 Participants were able to report quantitative data under the Aquatic food-producing animals group separately from other animal groups using mainly Reporting Option 3 (11 out of 69; 16%). During the seventh round, WOAH started to ask Participants on their sub-group of fish covered by the data. For 2019, 30 Participants listed the new fish-categories proposed by WOAH as follows: 23 for Salmonids; 20 for Cichlids; 19 for Siluriformes; 18 for Cyprinids and; six for marine fish. It is worth to note that 22 out of

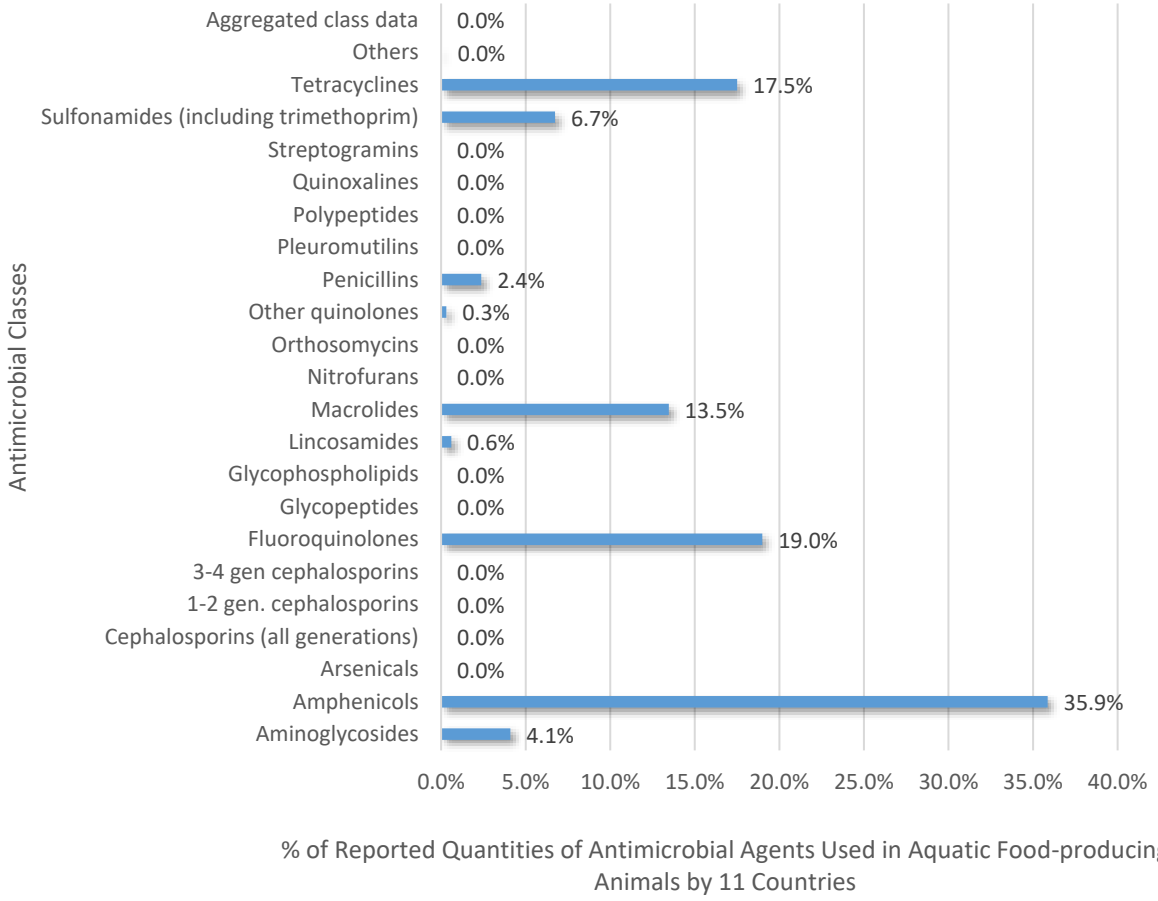
the 30 Participants were from Europe, A more robust analysis of these categories might take place in upcoming reports.

Figure 23. Animals included in aquaculture covered in the quantitative data reported by 69 Participants in 2019



Of the 11 Participants reporting quantitative data under the Aquatic food-producing animals group, amphenicols were most commonly reported (Figure 24).

Figure 24. Proportion of antimicrobial classes by aquatic food-producing animals as reported by 11 Participants in 2019

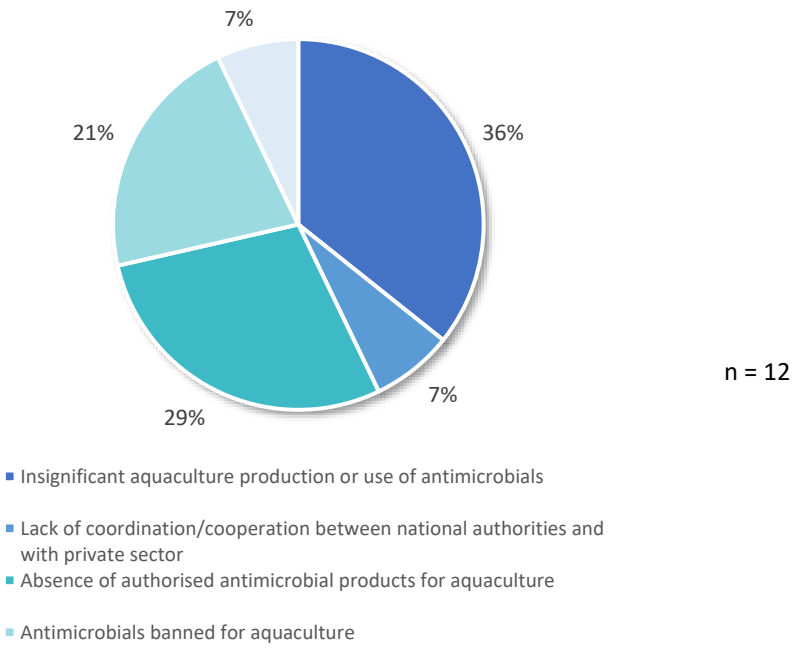


During the seventh round of the data collection, WOAH's Antimicrobial Use Team observed that 21 Participants with aquaculture production communicated through WAHIS, or the FAO Fisheries Division, did not report antimicrobial quantities for aquatic animals to WOAH (21 out of the 41 Participants that did not include aquaculture; 51%). Consequently, some of these Participants were asked to clarify if antibiotics were not used in the Participant's aquaculture sector.

Of the 12 Participants that provided an explanation, the majority of them indicated that aquatic production was insignificant compared to the terrestrial food-producing animals and most often for rudimentary subsistence level. Four Participants explained that their lists of authorised antimicrobial products for animals did not include any product for aquaculture; however, in some cases, it was said that the use of antimicrobials at field level may occur (Figure 25).

WOAH will continue to work to understand the barriers that impede Participants' data collection provision for aquatic food-producing animals.

Figure 25. Explanations provided by 12 Participants for not covering aquaculture in their antimicrobial quantities' reports in 2019

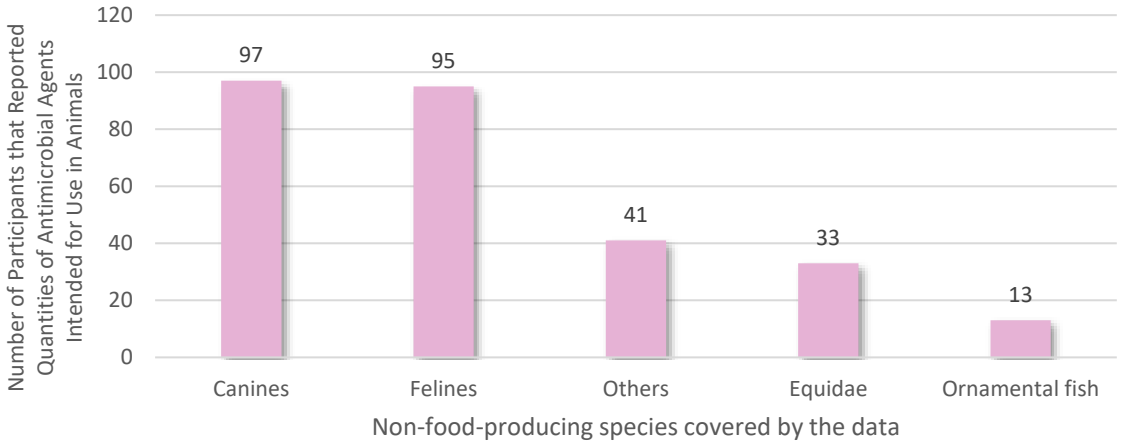


Non-food-producing animals

In the first year of the global AMU data collection, Participants were asked to provide antimicrobial quantities for food-producing animals only. However, some Participants additionally reported their data for non-food-producing animals. In response to this, WOAH modified its questionnaire to include this group. Since the fourth round of data collection, Participants have been asked to specify the non-food-producing animals.

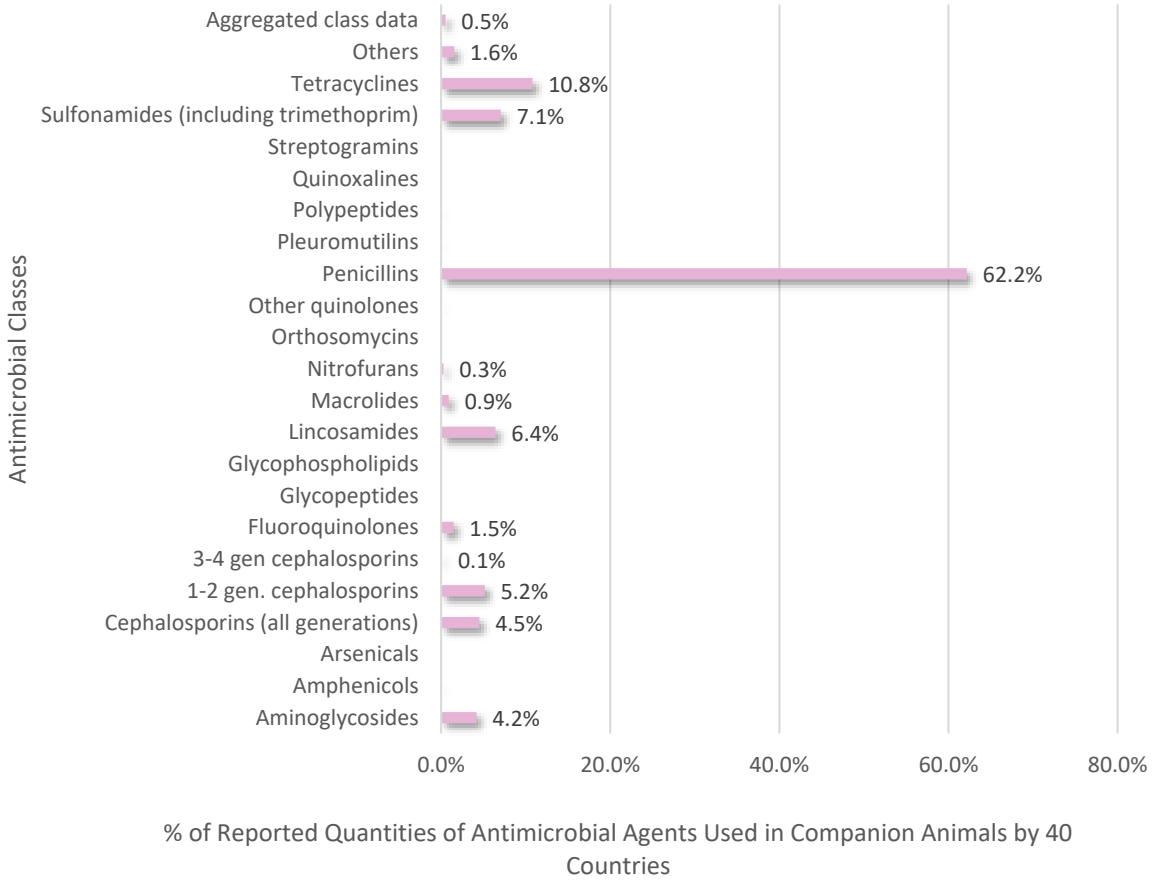
Of the 110 Participants which provided quantitative data in 2019, 97 stated that product labels targeted non-food-producing animals (n= 110; 88%). Of these 97 Participants, all provided an answer related to the animals under this group. These 97 Participants considered canines, followed by felines; of these, 41 Participants declared additional species; the most cited being ornamental birds and rabbits (Figure 26). Some Participants reporting equines as non-food-producing animals, also reported them as food-producing animals, therefore WOAH further asked where equine antimicrobial quantities were allocated. Most of the Participants reported the equine quantities under non-food-producing animals.

Figure 26. Animals included in non-food-producing animals covered in the quantitative data reported by 97 Participants in 2019



Forty Participants reported quantities of antimicrobial agents differentiated by the group of non-food-producing animals using Reporting Options 2 or 3. Among these Participants, penicillins were more commonly reported for non-food-producing animals (Figure 27).

Figure 27. Proportion of antimicrobial classes in companion animals as reported by 40 Participants in 2019



Routes of administration

For 2019, 71 Participants chose to report their quantitative data through Reporting Option 3, the only option which allows for disaggregation of data by route of administration. Among these 71 Participants, the majority reported higher amounts of antimicrobial agents used via the oral route, especially for tetracyclines (Figure 28). For the injection route (parenteral route) and other routes, penicillin was more often reported (Figures 29 and 30).

Reporting Option 3 allows for distinction of the data by type of use (veterinary medical use vs growth promotion [1]) and by animal group in addition to route of administration. However, six Participants (n = 71; 8%) using this option distinguished data only by type of use and route of administration, indicating that they were not able to identify which animal groups the agents were being used in. Of the 65 Participants (n = 71; 92%) able to distinguish quantitative data by animal group using Reporting Option 3, oral administration was most commonly reported for use in all animal groups.

Figure 28. Proportion of antimicrobial quantities (by antimicrobial class) reported for use in animals by the oral route, aggregated by 71 Participants in 2019

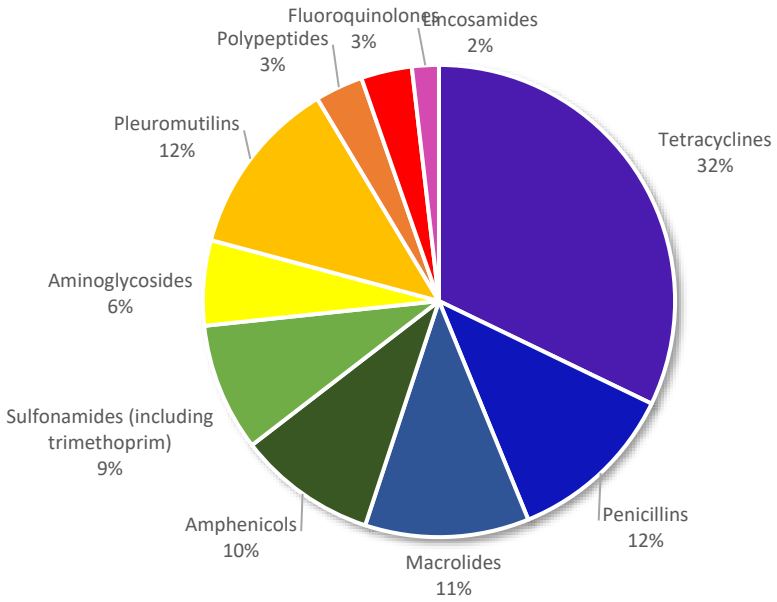


Figure 29. Proportion of antimicrobial quantities (by antimicrobial class) reported for use in animals by the injection route, aggregated by 71 Participants in 2019

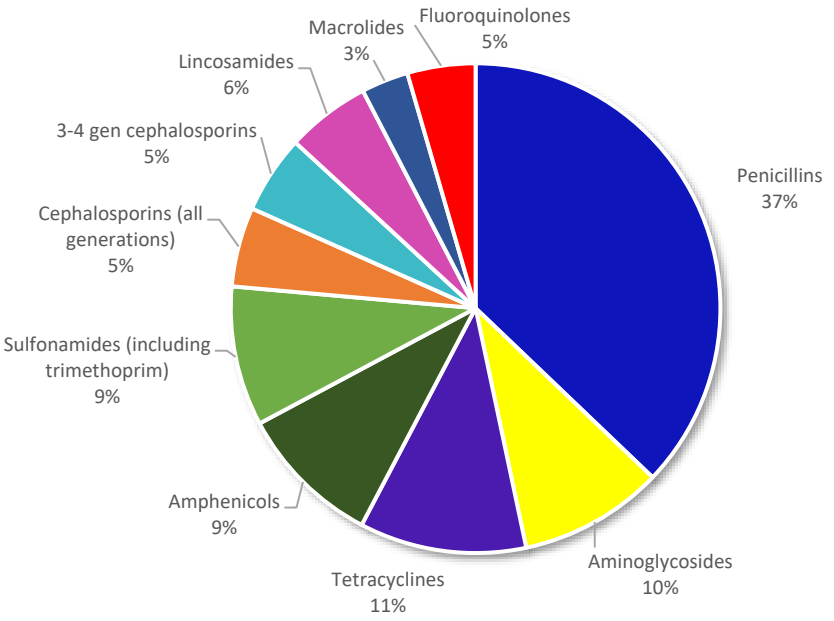
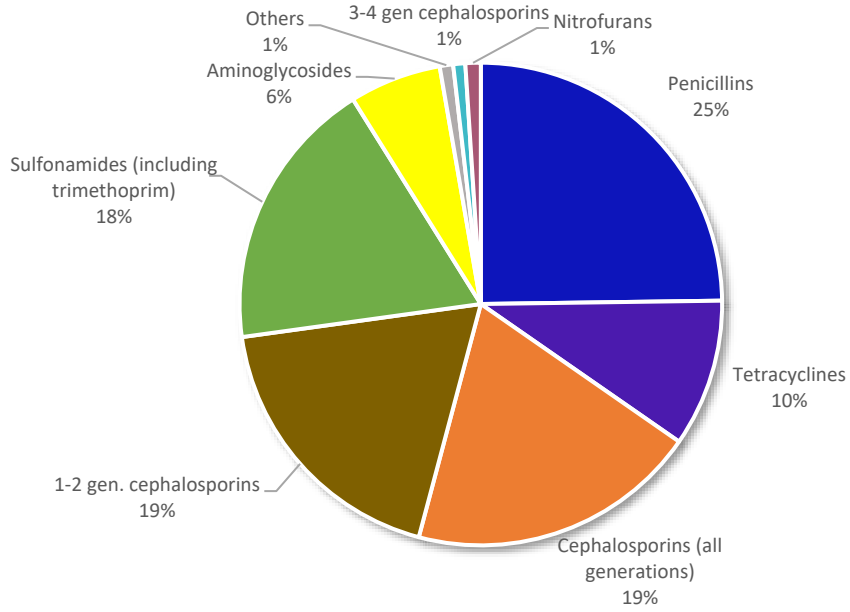


Figure 30. Proportion of antimicrobial quantities (by antimicrobial class) reported for use in animals by other routes, aggregated by 71 Participants in 2019



3.2. Animal biomass

Populations represented in the animal biomass analysis reflect the number, size and animal population dynamics of the Participants reporting data to WOAH during the given year of analysis. Animal biomass was calculated for 108 Participants providing quantitative data for 2019 during all rounds of data collection. Two Participants that provided data for companion animals only were excluded from the analysis. Aquaculture was included in the biomass for Participants reporting that their data covered aquaculture, or could not be distinguished by animal group (64 out of 109; 59%).

The following figures represent only those countries participating in reporting of quantitative data on antimicrobial agents intended for use in animals and should not be considered representative of global animal populations or biomass, or of any particular WOAH region.

Animal population covered by 2019 data

Figure 31 shows the estimated percentage of the total regional animal biomass covered by the 108 Participants included in the analysis of antimicrobial quantities for 2019, compared to the coverage achieved in the previous years' analysis. These estimates were made by calculating the ratio of the animal biomass for the reporting Participants relative to the estimated regional total. The animal biomass coverage estimates where calculated, using live animal population data following the animal biomass methodology described in the Annex 1 of this report. The number of Participants in each WOAH region contributing to this coverage is also included (in brackets).

Globally, the estimated biomass coverage of the responding Participants has increased from 29% in 2014 to 70% in 2019. The Americas and Europe have particularly high animal population coverage for 2019, with responding Participants representing 94% and 77%, respectively, of the regions' total animal biomass.

Figure 31. Estimated percentage of total regional and global biomass covered by Participants reporting quantitative data from 2014 to 2019

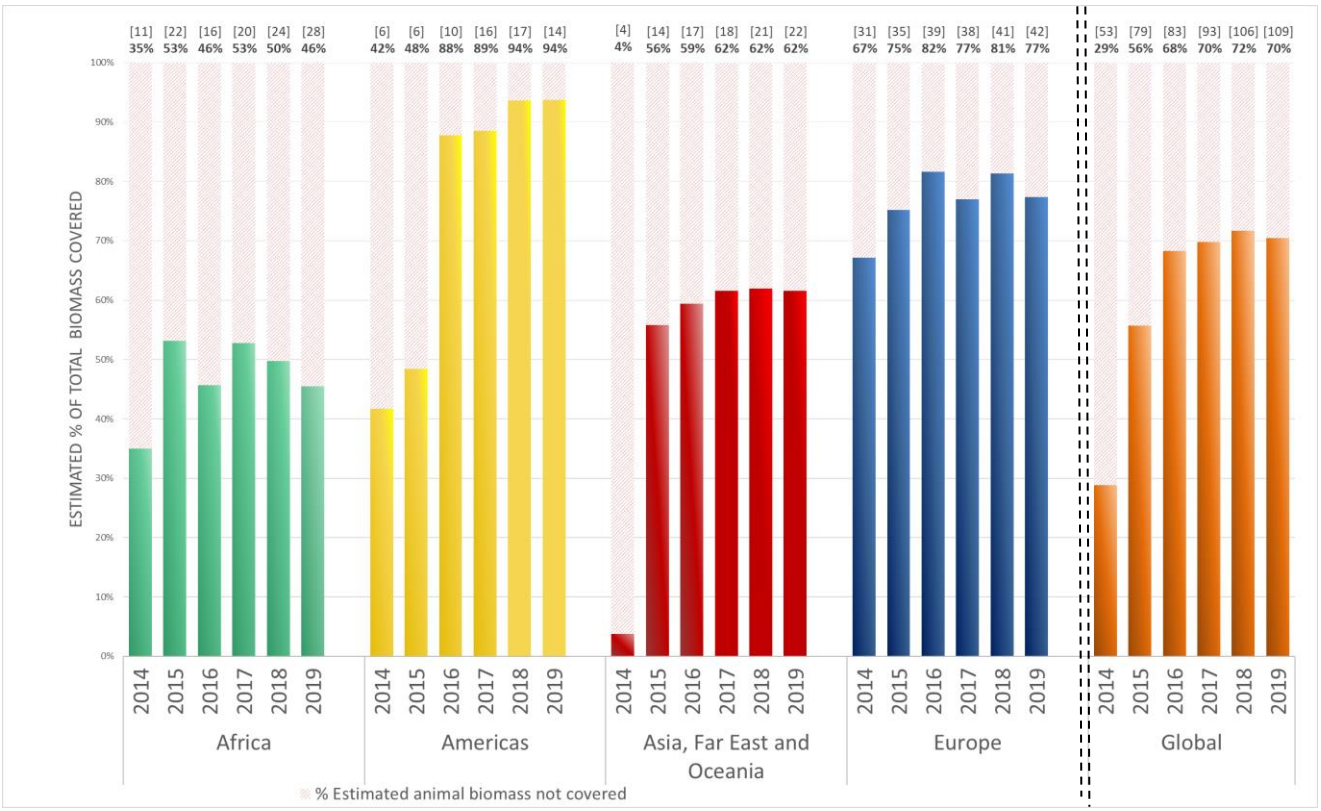
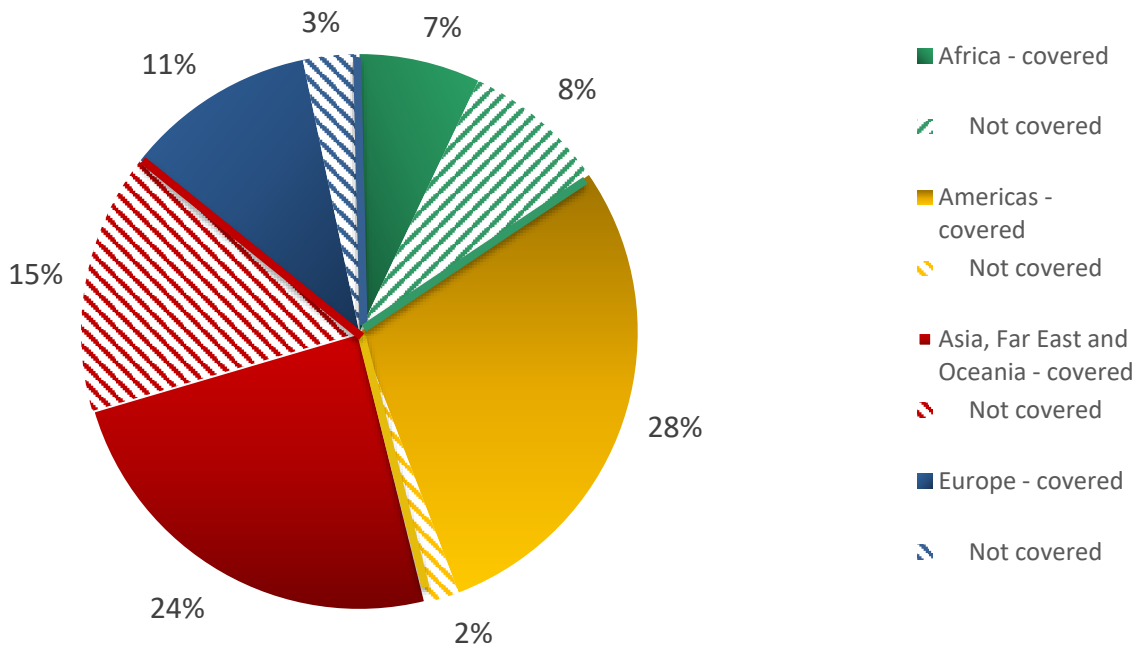


Figure 32 shows the regional distribution of the estimated percentages of regional biomass covered by the 108 Participants included in the analysis of antimicrobial quantities for 2019, in comparison to the global biomass estimate. The Americas and Asia, Far East and Oceania regions represent a particularly high proportion of the global biomass estimate.

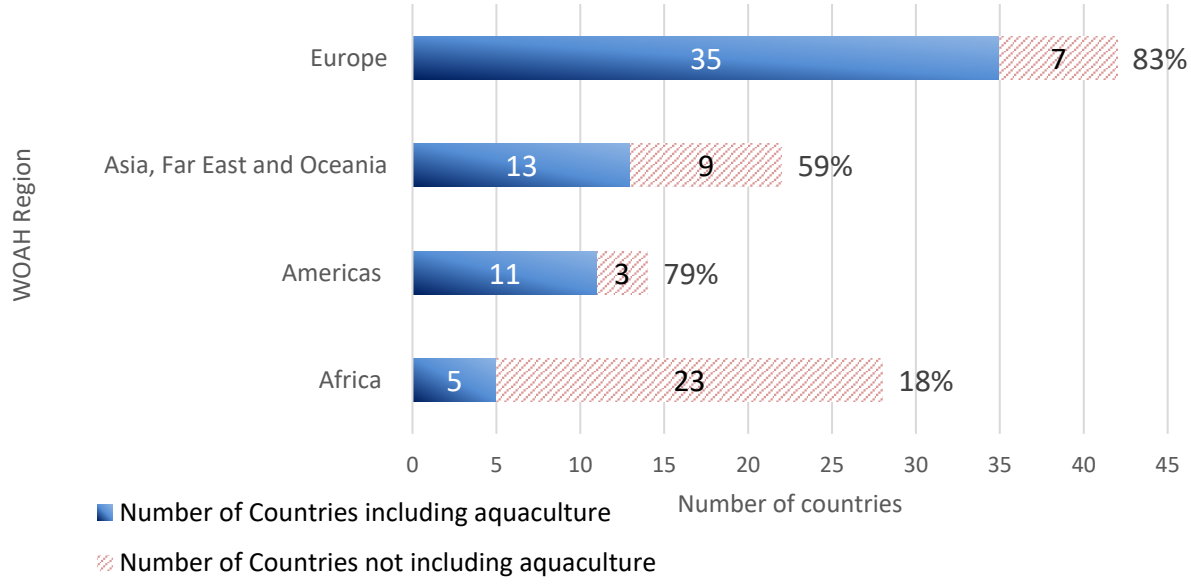
Figure 32. Regional percentages of estimated biomass covered by Participants reporting quantitative data for 2019*



* The Middle East was not included in the visual, but the region's coverage is included at the global level.

Aquaculture was included in the biomass estimation for Participants reporting that their data covered aquaculture, or could not be distinguished by animal group (64 out of 108; 59%). As shown in Figure 33, the highest proportion of Participants including aquatic food-producing animals in the reported quantitative data on antimicrobial agents was in Europe (83%; 35 of 42). Fifty-nine percent of Participants in Asia, Far East and Oceania (13/22), 79% of Participants in the Americas (11/14), and 18% of Participants in Africa (5/28) reported quantitative data that included aquatic food-producing animals.

Figure 33. Participants Including aquatic food-producing animal species in quantitative data for 2019



Animal biomass covered by the 2019 additional analysis: global view

Table 9 shows the animal biomass (in million kilograms) of farmed animals covered by 2019 quantitative data.

The figures reported in this table reflect the number of Participants that provided quantitative data, and the relative size and average weights of their animal populations in 2019.

Table 9. Animal biomass covered by the quantitative data reported to WOAH for 2019 obtained by the accumulation of information from all rounds of data collection, results for 108 Participants

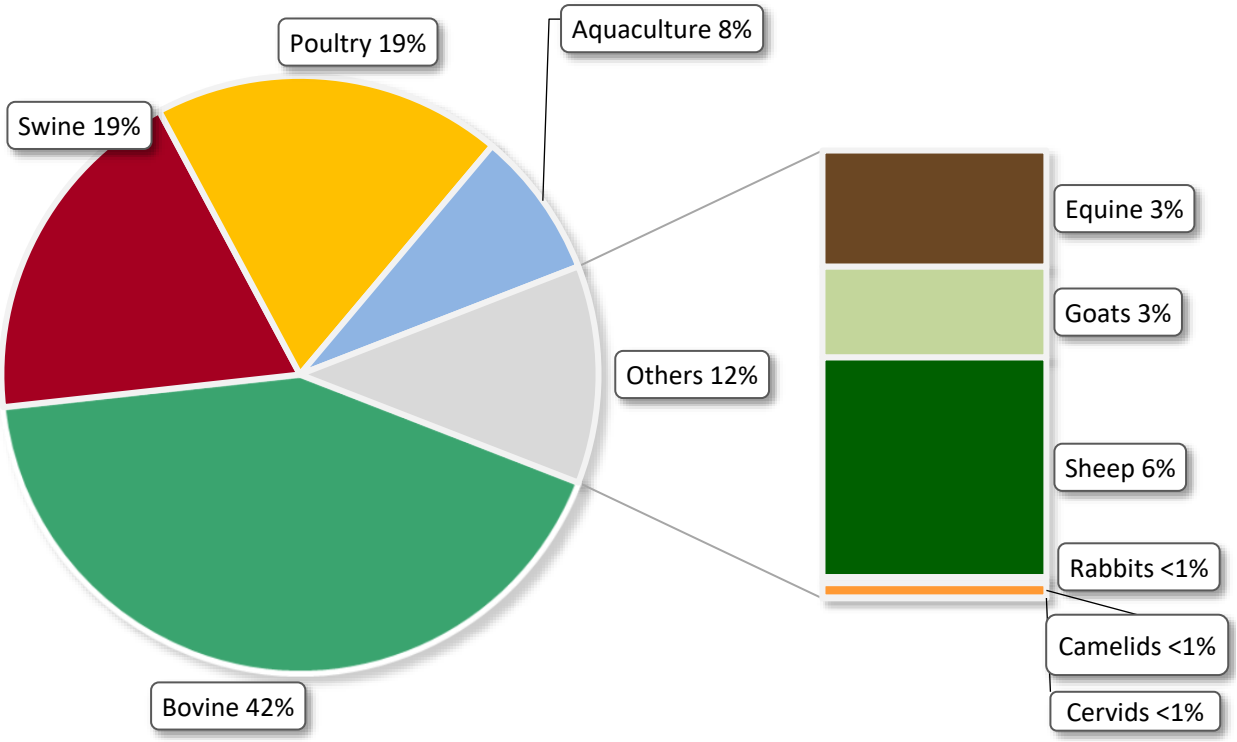
2019		Africa	Americas	Asia, Far East and Oceania	Europe	Global
Number of Participants		28	14	22	42	109
Bovine biomass	(in million kg)	41 411	185 054	54 244	46 390	327 099
	(relative proportion)	*54,0%*	*59,0%*	*20,4%*	*38,2%*	*42,1%*
Swine biomass	(in million kg)	2 109	33 110	75 051	35 943	146 214
	(relative proportion)	*2,8%*	*10,6%*	*28,3%*	*29,6%*	*18,8%*
Poultry biomass	(in million kg)	3 218	70 714	46 186	25 981	146 099
	(relative proportion)	*4,2%*	*22,5%*	*17,4%*	*21,4%*	*18,8%*
Equine biomass	(in million kg)	5 257	13 503	3 230	1 614	23 604
	(relative proportion)	*6,9%*	*4,3%*	*1,2%*	*1,3%*	*3,0%*
Goat Biomass	(in million kg)	8 866	1 246	7 720	467	18 298
	(relative proportion)	*11,6%*	*0,4%*	*2,9%*	*0,4%*	*2,4%*
Sheep biomass	(in million kg)	13 093	5 830	17 877	7 648	44 448
	(relative proportion)	*17,1%*	*1,9%*	*6,7%*	*6,3%*	*5,7%*
Rabbit biomass	(in million kg)	21	17	1 003	191	1 233
	(relative proportion)	*0,03%*	*0,01%*	*0,38%*	*0,16%*	*0,16%*
Camelid biomass	(in million kg)	2 205	35	395	58	2 694
	(relative proportion)	*2,9%*	*0,0%*	*0,1%*	*0,0%*	*0,3%*
Cervid biomass	(in million kg)	0	30	75	65	169
	(relative proportion)	*0,00%*	*0,01%*	*0,03%*	*0,05%*	*0,02%*
Terrestrial animal	(in million kg)	76 181	309 538	205 781	118 358	709 858
	(relative proportion)	*99,4%*	*98,6%*	*77,6%*	*97,5%*	*91,3%*
Aquaculture biomass	(in million kg)	473	4 256	59 506	3 041	67 275
	(relative proportion)	*0,6%*	*1,4%*	*22,4%*	*2,5%*	*8,7%*
All species biomass	(in million kg)	76 653	313 794	265 287	121 399	777 133
	(relative proportion)	*100%*	*100%*	*100%*	*100%*	*100%*

Figure 34 shows the global species composition of animals potentially exposed to the antimicrobial quantities reported to WOAH for 2019. These percentages are a function of animal populations in the reporting Participants, as well as their average weights.

Across the four WOAH regions covered by the analysis, bovines (42%) make up the largest contribution to animal biomass for the quantitative data reported. Swine (19%) and poultry (19%) also play a significant role, with aquaculture (8%), sheep (6%), equines (3%), and goats (3%) playing relatively minor roles in this analysis. The contributions of rabbits (0.2%), camelids (0.3%) and cervids (0.02%) are negligible globally for the covered Participants.

These percentages may change significantly over time if the numbers or composition of Participants in the WOAH regions providing quantitative data changes. This is expected to occur as data reporting capacity of Participants increases.

Figure 34. Species composition of animal biomass for 108 Participants included in 2019 quantitative data analysis

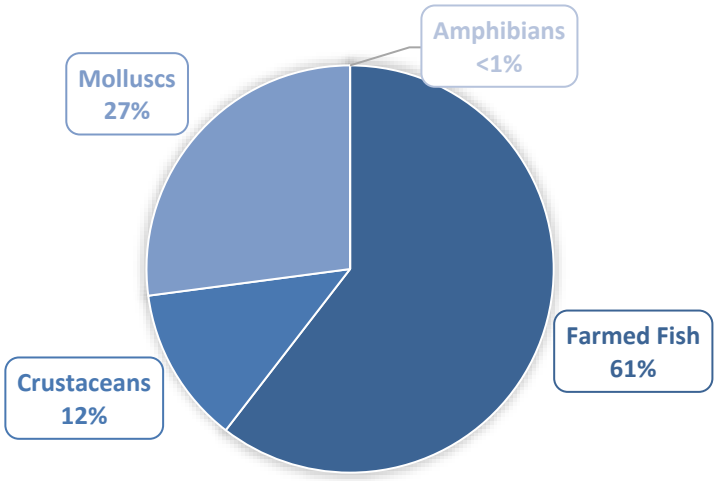


These results should be interpreted with caution for all species for which slaughter data predominantly contributed to the calculation of biomass (swine, poultry, sheep and goats and rabbits). These percentages may underestimate the significance of species that are often slaughtered at places other than slaughterhouses for personal consumption. The amount of slaughter undertaken elsewhere and the extent to which this population is captured in slaughter data is expected to vary significantly between countries and regions.

Aquaculture

Figure 345 shows the global composition of aquaculture for the 64 Participants reporting antimicrobial quantities for 2019 and in addition to terrestrial animals, their data covered aquatic food-producing animal species or could not be distinguished by animal group.

Figure 35. Composition of aquaculture animal biomass for 64 Participants included in 2019 quantitative data analysis covering aquatic food producing animals



Percentages of aquaculture biomass should also be interpreted with caution as it was only included where Participants either reported that their data on antimicrobial agents covered aquaculture, or that they could not distinguish between animal groups. Therefore, the effect of aquaculture on biomass is skewed by the number of Participants in that WOAH region for which antimicrobials used in aquaculture were included. **These percentages should not be considered representative of global aquaculture production.**

For the purposes of the 2019 analysis of quantitative data, aquaculture was most significant in Asia, Far East and Oceania, where aquaculture made up 23% of the covered animal biomass. In Africa, the Americas, and Europe, aquaculture made up 0.6%, 1.4% and 2.5%, respectively, of the covered animal biomass.

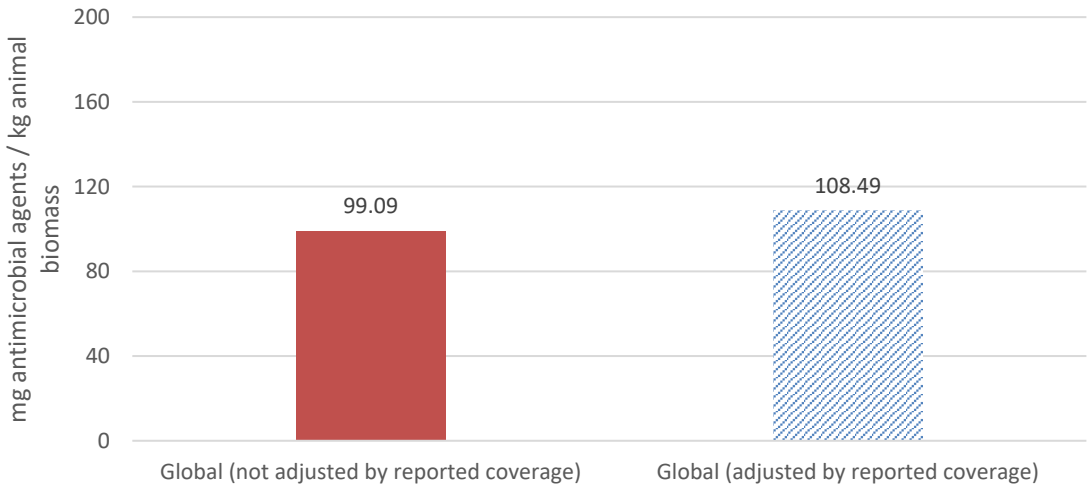
3.3. Antimicrobial quantities adjusted by animal biomass

2019 Antimicrobial quantities adjusted by animal biomass, global view

Figure 36 provides an overview of antimicrobial agents intended for use in animals adjusted by animal biomass. The estimates compile the data of 108 Participants providing data for food-producing animals in all rounds of data collection for 2019, from all WOAH Regions. Two Participants that did not have data on WAHIS nor FAOSTAT were excluded from this section.

Using this rate (antimicrobial agents reported (mg)/animal biomass (kg)) provides an indicator that remains relevant for the purposes of comparison (e.g. over time and between regions). The first estimate of 99.09 mg/kg represents a global estimate of antimicrobial agents used in animals adjusted by animal biomass, as represented by the quantitative data reported to WOAH from 110 Participants during all rounds of data collection. The second estimate of 108.49 mg/kg represents the same quantitative data, additionally adjusted by Participant-level estimates of how much data on antimicrobial agents intended for use in animals they covered in 2019. These coverage estimates are subjective for each reporting Participant, but can provide an upper-level estimate of global antimicrobial use in animals. For more detail of coverage estimates, see Section 3.2, Animal population covered by 2019 .

Figure 36. Global quantities of antimicrobial agents intended for use in animals based on data reported by 108 Participants for 2019, adjusted by animal biomass (mg/kg)



2019 Antimicrobial quantities adjusted by animal biomass, regional view

Figure 37 provides a regional view of antimicrobial agents intended for use in animals adjusted by animal biomass of Participants within that region. Both estimates for each WOAH region incorporate the data of all Participants providing data in all rounds of data collection for 2019.

The lower estimate for each WOAH region represents the quantitative data reported to WOAH from that region during all rounds of data collection for 2019, adjusted by animal biomass. The high estimate for each WOAH region represents the same quantitative data, additionally adjusted by Participant-level estimates of how much data on antimicrobial agents intended for use in animals they covered in 2019. These coverage estimates are subjective for each reporting Participant, but can provide an upper-level approach to global antimicrobial use, including unregulated sources.

Estimates of data coverage were lowest in the Americas, leading to the widest variation between antimicrobial quantities reported and those adjusted by Participants' estimates of data coverage. Participants in Europe and Africa were the most confident of their data coverage.

Figure 37. Quantities of antimicrobial agents intended for use in animals adjusted by animal biomass, 2019 regional comparison (mg/kg)

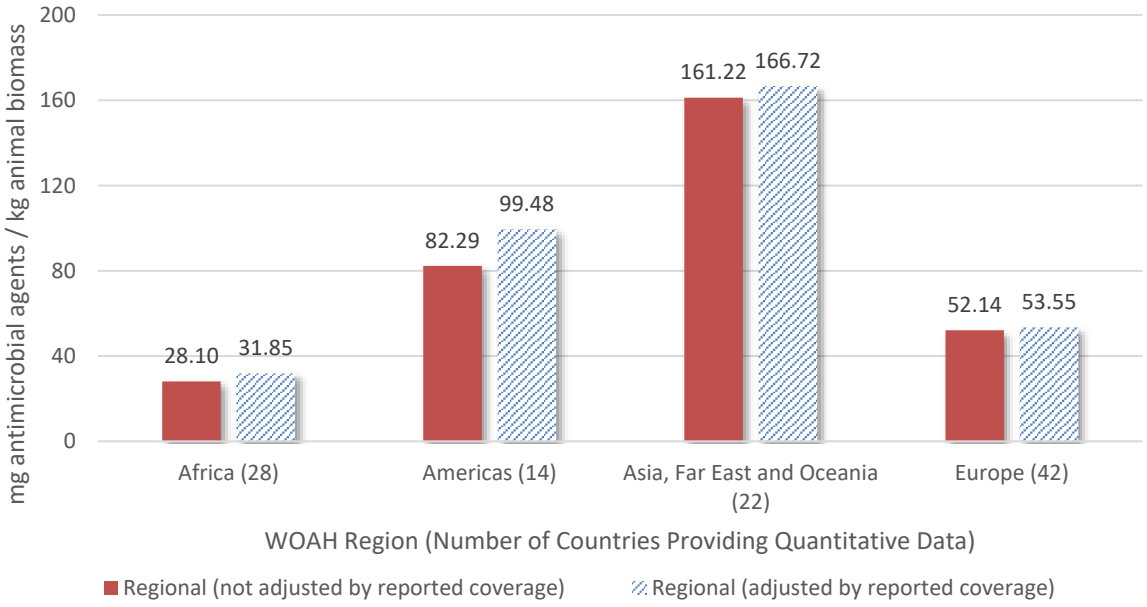


Table 10 displays the same regional figures of antimicrobial quantities adjusted by animal biomass (with the upper-level estimates adjusted by Participant estimates of data coverage in parentheses). Additionally, some characteristics of the data distribution by WOAH region are provided, including the median, standard deviation and range.

These results show that in 2019, Asia, Far East and Oceania reported the most antimicrobial agents intended for use in animals among the four regions. However, this region also displayed the most variation between individual Participants and the highest decrease in antimicrobial quantities used over the years.

Table 10. Antimicrobial Quantities Adjusted by Animal Biomass, by WOAH Region, 2019

WOAH region	Number of Participants	% Covered of total regional estimated biomass	Antimicrobial quantities adjusted by animal biomass (and estimated data coverage) (mg/kg)	Descriptive statistics		
				Median (mg/kg)	Standard deviation (mg/kg)	Range (mg/kg)
Africa	28	46%	28.10 (31.85)	9.10 (12.41)	49.63 (84.75)	217.95 (436.00)
Americas	14	94%	82.29 (99.48)	75.80 (92.48)	79.24 (112.56)	277.19 (353.57)
Asia, Far East and Oceania	22	62%	161.22 (166.72)	17.99 (22.52)	179.34 (190.75)	711.66 (765.26)
Europe	41	77%	52.14 (53.55)	29.78 (30.08)	62.93 (69.71)	318.56 (342.68)

It is important to interpret the estimates of antimicrobial quantities adjusted by animal biomass (mg/kg) in the context of animal biomass coverage for the region. Estimates for the total estimated regional animal biomass covered by the quantitative data reported for 2019 were calculated and explained in Section 3.2. Changes in reporting Participants and in regional animal biomass coverage across years of analysis may significantly change the results. WOAH is working with Participants to continue to improve and maintain data coverage in order to allow for an evaluation of trends over time.

Furthermore, since antimicrobial usage differs for different species (as a result of disease burden and husbandry practices), the species composition of regional animal biomass (Table 9) is an additional factor to be taken into account when considering the differences between regions.

Overall, while noting the need for caution in comparison of 2014 to 2019 results at global and regional levels due to the differences in the contributing Participants, the trends between regions have been maintained. Europe's reported antimicrobial quantities adjusted by animal biomass reduced from 91.53 mg/kg in 2014 to 52.15 mg/kg in 2019. These reductions are in line with the results reported by ESVAC for the same years, for those Participants that provide it with data.

2019 Antimicrobial Quantities Adjusted by Animal Biomass: Distinctions Between Terrestrial and Aquatic Animals

Of the 110 Participants that provided quantitative data for food-producing animals in 2019, 11 Participants were able to report quantitative data under the Aquatic food-producing animals group separately from other animal groups.

These 11 Participants were able to report their antimicrobial quantities for the group of terrestrial animals separately from the aquatic animals; enabling WOAH to perform a separate analysis of the mg/kg by animal groups. It was observed that in three Participants, the mg/kg ratios were higher for the aquatic animals group than the terrestrial animals group. Table 11 presents some characteristics of the data distribution by animal group, including the median, standard deviation and range (with the upper-level estimates adjusted by Participant estimates of data coverage in parentheses). *It is expected that these first figures will be refined over time and should therefore be interpreted with caution and should not be considered representative of global aquaculture production.*

Table 11. Antimicrobial quantities adjusted by animal biomass, by 11 Participants by terrestrial and aquatic animal groups, 2019

Animal Group	Number of Participants	Descriptive Statistics			
		Mean (mg/kg)	Median (mg/kg)	Standard deviation (mg/kg)	Range (mg/kg)
Terrestrial food-producing animals	11	121.72 (133.54)	27.32 (27.32)	223.97 (170.43)	754.18 (245.25)
Aquatic food-producing animals	11	109.45 (114.10	15.31 (15.31)	188.29 (199.33)	545.77 (593.24)

4. Updates of Historical Data

Previous data entries were updated based on new information and corrections reported by Participants in the seventh round of data collection, and therefore may differ from the results of the previous reports.

Changes in the antimicrobial quantities

Corrections to previous antimicrobial quantitative data included recalculations due to identified errors, the addition of previously inaccessible data, and corrections of the calendar year covered by the data submission. For some Participants, where errors in calculations were discovered, their data were retrospectively removed from the 2014, 2015, 2016 and 2017 analysis pending validation. Three Participants updated data for 2018 and one Participant for 2014, 2015 and 2017 and 2018.

Changes in the animal biomass

For the purpose of supporting comparison, all animal biomass figures for previous years (2014 to 2018) have been recalculated using currently available slaughter and live animal data, as these may be retrospectively updated in the databases. All analyses for previous years (2014 to 2018) included in this report reflect the most current information at the time of writing. The updates for those years can also be consulted in ANIMUSE public platform[10].

Globally, the percentage of variation of the recalculated animal biomass for previous years compared to the previous report is less than 1%. These variations can be explained by the updates in the number of reporting Participants and their respective animal biomass data included in the analysis for previous years. WOAH is working with Participants to continue to improve and maintain data coverage in order to allow for an evaluation of trends over time.

[10] **AN**imal ant**IM**icrobial **USE** (**ANIMUSE)** Global Database, public interface available at: https://amu.woah.org/amu-system-portal/home

5. Trends from 2017 to 2019

This section presents the changes of the mg/kg, antimicrobial classes and animal biomass in the Participants that reported data to WOAH each year from 2017 to 2019 for 80 Participants. Table 12 presents the number of Participants by each WOAH Region considered for this analysis. The years 2015 and 2016 were not included in the following table and figures due to insufficient representativeness of Participants from the different WOAH Regions; however, and for readers interested on these years, the trends from those periods can be consulted in ANIMUSE public interface[11]. The period of 2017 to 2019 should not be compared to the trends provided in the previous WOAH annual reports, as it includes different Participants in the analysis.

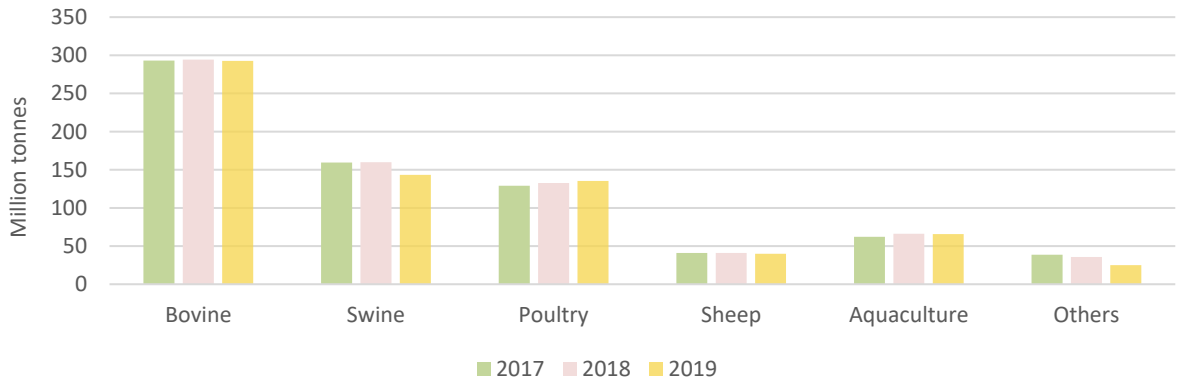
Table 12. Number of Participants that Reported Data to WOAH for Each Year from 2017 to 2019

WOAH Region	Number of Participants that Submitted Quantities from 2017 to 2019	Number of WOAH Members	Proportion of response (%)
Africa	14	54	26%
Americas			
WOAH Members	9	31	29%
Non-contiguous territories	0	n/a	n/a
Asia, Far East and Oceania	18	32	56%
Europe	38	53	72%
Middle East	1	12	8%

Figure 38 presents the evolution of the calculated animal biomass by species for the 80 Participants which have reported antimicrobial quantities from 2017 to 2019. Globally, the animal biomass for these Participants was relatively stable and has slightly decreased of 0.6% from 2017 to 2019. This decrease is mostly imputable to a decrease of the swine biomass (-10%) over these three years. In terms of coverage, the animal biomass for these 80 Participants is estimated to represent 65% of the global animal biomass. WOAH is continuously working with Participants to continue to improve and maintain data coverage in order to allow evaluation of trends over time for a greater number of Participants.

[11] https://amu.woah.org/amu-system-portal/home

Figure 38. Trends on Time for the Animal Biomass calculated for 80 Participants by species, from 2017 to 2019



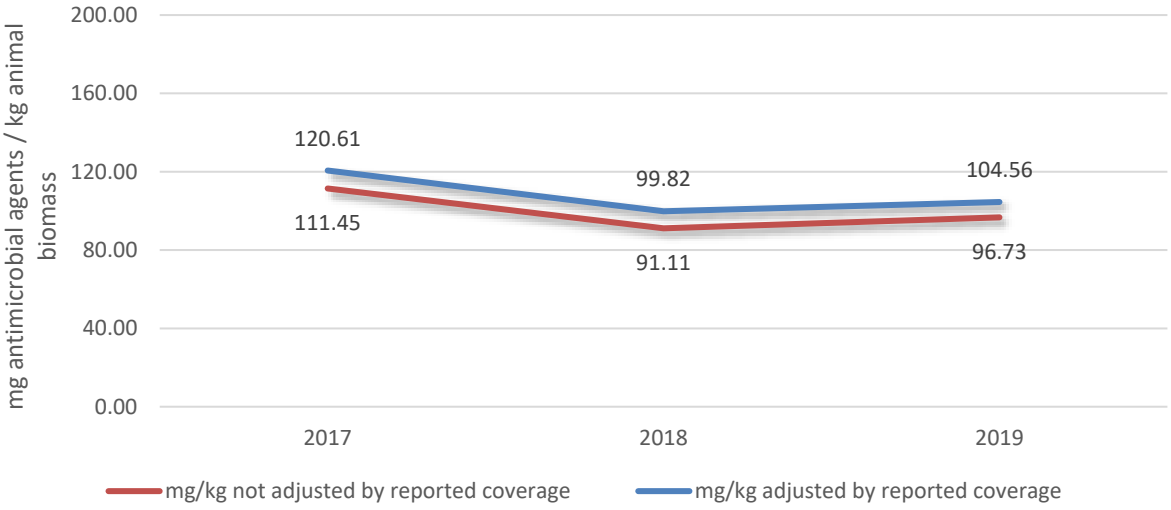
Figures 39 and 40 present the mg/kg for all WOAH antimicrobial classes reported for the 80 Participants[12].

For the 80 Participants that reported data to WOAH each year from 2017 to 2019, an overall decrease of 13% in the mg/kg was observed. From the 80 Participants, the following situations were observed.

- A decrease in mg/kg in 49 Participants: 33 reporting a decline greater than 10% and 16 ranging between 1% and 10%.
- An increase in mg/kg in 31 Participants: 21 reporting an increase greater than 10% and 10 ranging between 1% and 10%.

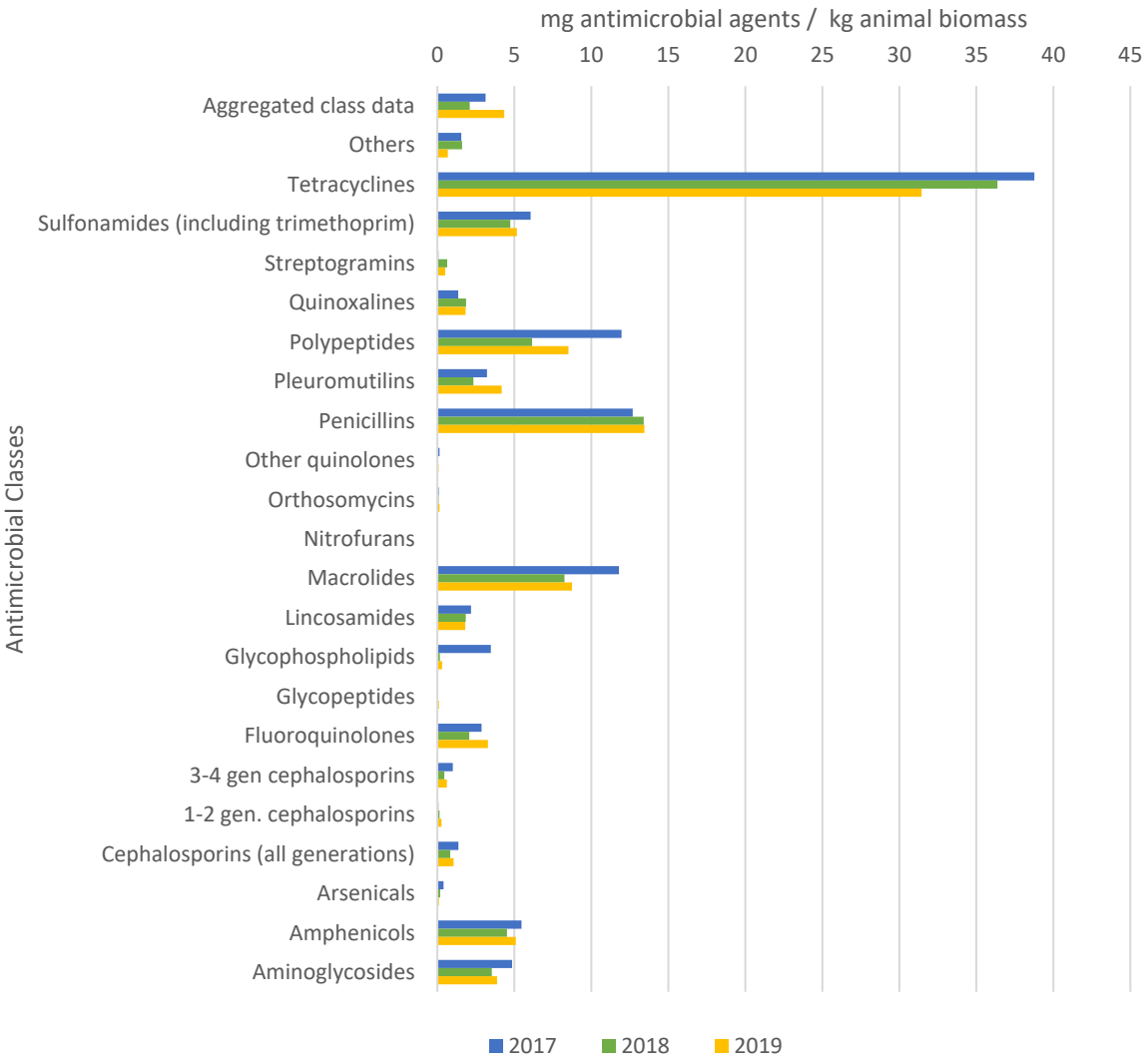
WOAH Regions that presented a decrease were: 25% in Asia, Far East and Oceania; and 15% in Europe. Those that presented an increase were: 45% in Africa; 5% in the Americas.

Figure 39. Trends on Time for the Global Quantities of Antimicrobial Agents Intended for Use in Animals Based on Data Reported by 80 Participants from 2017 to 2019, Adjusted by Animal Biomass (mg/kg)



[12] Antimicrobial quantities intended for use in animals from participants reporting data to WOAH each year from 2017 to 2019 were adjusted for animal biomass (mg/kg). For the regional analyses, participant data for both the numerator and the denominator, respectively, were summed according to WOAH Regions before the rate was calculated.

Figure 40. Trends over Time for the Antimicrobial Classes Reported by 80 Participants from 2017 to 2019, Adjusted by Animal Biomass (mg/kg)*



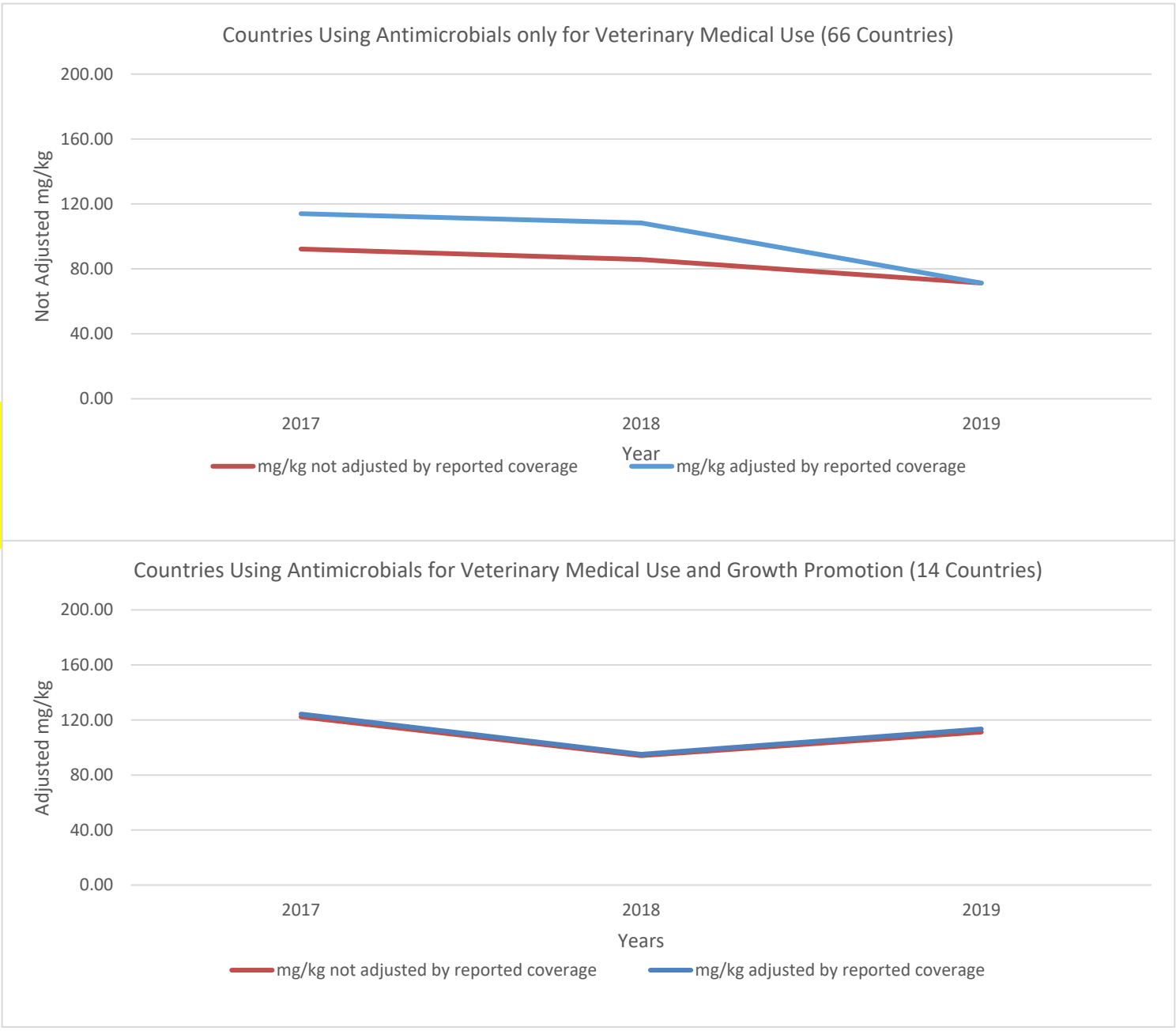
* For each antimicrobial class, the summed antimicrobial quantities reported (in mg) in all WOAH Regions are divided by the total animal biomass (in kg)

Figure 41 presents the antimicrobial quantities adjusted by animal biomass (mg/kg) by type of use. For the 80 Participants, 66 had reported the antimicrobials only for veterinary medical use and 14 the use of veterinary medical use and growth promotion.

- The 66 Participants reporting antimicrobials only for veterinary medical use experienced an overall decrease of 37%. This group represents 36% of the animal biomass among the 80 Participants.
- The 14 Participants reporting antimicrobials for veterinary medical use and growth promotion experienced an overall decrease of 9%. This group represents 64% of the animal biomass among the 80 Participants.

These results may suggest that Participants are committed to the objective on the Global Action Plan on AMR that advised Participants to phase out the use of antibiotics for growth promotion in the absence of risk analysis.

Figure 41. Trends on Time for the Type of Use of the Global Quantities of Antimicrobial Agents Intended for Use in Animals on Data Reported by 80 Participants from 2017 to 2019, Adjusted by Animal Biomass (mg/kg)*



6. Discussion

6.1. Progress Made by Members

During the seventh round of data collection, a high number of Members remain engaged in data reporting demonstrating willingness from Members to respond to actions under the Global Action Plan on AMR.

Of the 155 Members that submitted reports in the seventh round, 143 also participated during the sixth round of data collection. Among these 143 Members, the following progress was noted:

- Five Members graduated from reporting Baseline Information in the sixth round (n = 23; 22%) to reporting quantitative data on antimicrobial agents used in the animals for the first time. Two Members used Reporting Option 2 which allows distinction by antimicrobial class and by type of use (veterinary medical use or growth promotion) and animal groups. Three Members used Reporting Option 3, which allows for distinction of the quantitative data by type of use, animal groups and routes of administration; all these three Members used the Calculation Tool.
- Seven Members that had previously reported quantitative data through Reporting Option 1 or 2 (n = 50; 14%) and progressed to more detailed reporting in this round. Five Members moved from reporting quantities through Reporting Option 1 to one of the two higher-level options: two were found to have switched to Reporting Option 2, and three switched to Reporting Option 3. Two Members that had previously reported through Option 2, reported against Option 3.

It is important to note that for this seventh round, all regions showed continued progress on the Reporting Options; with Africa (18 out of 27) and the Americas (15 out of 20) showing the highest number of Members progressing to more detailed reporting levels of their quantitative data. During the seventh round, 29% of the 124 Members providing quantities used the Calculation Tool that WOAH developed and introduced in the fifth round. This tool assisted the Members in collecting product information and calculating amounts of active ingredients. Most of the progress demonstrated by Members can be attributed to their use of this tool.

6.2. Limitations in the Analysis of Antimicrobial Quantities

All the Participants that reported quantities of antimicrobial agents intended for use in animals did so using the template that WOAH created. This document collects essential information to analyse the amounts of antimicrobials (Baseline information, part C, as described in the Annex 1 of this report). In addition to this document, Annex 9 provides instructions to perform the calculations to report kilograms per active ingredient.

Data sources

During the seventh round of data collection, 26 Participants reporting quantitative data (n = 124; 21%) reported data sources indicating the possibility of over-estimated, duplicated or overlapping data (see examples below).

Data duplication or over-estimation is considered a risk where the following situations are reported in a Participant's data sources:

- Import data of active ingredients or manufacturing data reported without taking into account the potential for re-exports;
- Import data of veterinary products reported by a Participant also providing data on sales of veterinary products (domestic and imported);
- Import, sales or purchase data of veterinary products reported in addition to usage data at farm level;
- Data from wholesalers or Marketing Authorisation Holders in addition to data from retailers, prescriptions, pharmacies or farm records.

Participants where these possible situations were identified were present in all WOAH Regions, however, they were predominant in Europe (n = 9), followed by the Americas (n = 7).

WOAH engages with Participants where these risks exist to highlight and clarify possible areas of data duplication or over-estimation. As most of these Participants are in the s process of developing their data collection systems, it is expected that it will take time to develop and implement official processes that provide more accurate data. WOAH continues to work closely with these Participants to understand their systems and approach and support them to address limitations in their data.

Calculation of quantitative data

Wherever possible, the data reported by Participants were checked by WOAH against existing reference sources, either using the previous year's reported data or national reports available online. The indicator for this comparison was a calculated 'percentage of change'.

During the seventh round, this analysis could be conducted for 111 Participants where data from previous years were available for comparison. In 24 Participants (n= 111; 22%), the data varied more than 25% from one year to another, in some Participants reaching 100-200% variation, and in others, an even higher percentage of change was observed. Such changes were considered unlikely to reflect the true situation.

In Participants with high percentages of unexplained change (>25%), WOAH inquired how the calculations to obtain kg of antimicrobial agents were carried out. Through this process, errors in the calculations were discovered where Participants did not follow or misinterpreted the procedure stated in the Annex of this report Errors in the calculations occurred in all WOAH Regions. However, Africa and Asia, Far East and Oceania presented the highest number of Participants experiencing challenges (n = 8 for both regions); followed by the Americas (n =7), typically among Participants new to participation in data collection.

In addition to the analysis of the percentages of change, WOAH developed a tool to assist Participants in performing calculations to obtain amounts of active ingredients. The tool takes into account the different rules when reporting to WOAH: it includes different units of measurement (mg, g, ml, IU, etc.); provides conversion factors; identifies the product data (e.g. molecules names, purpose of use, target animals and routes of administration as declared on the product label); and allocates them to the different antimicrobial classes of the Reporting Options 1, 2 and 3. Of the 124 Participants reporting antimicrobial quantities in the seventh round, 29% used the tool for calculating amounts of active ingredients. While using the tool, WOAH noted that in some cases, Participants declaring wrong concentration for veterinary products due to errors while entering the information (e.g. enrofloxacin 250g/g; instead of enrofloxacin 250mg/g); all Participants with these errors did not realised of these

situations even if visuals were provided to them through the Calculation Tool; as a result; WOAH will try to introduce a component for data visualisation and data interpretation in upcoming regional workshops.

Development of antimicrobial monitoring systems

During the sixth round of data collection, 127 Participants reported quantitative data on antimicrobial agents intended for use in animals, and 120 of these also participated in the seventh round of data collection. Nine Participants reverted to not reporting quantitative data, only three of them provided an answer on why this had occurred mentioning political instability, bugs in their IT system and lack of collaboration with the Ministry of Health despite several approaches.

In the seventh round of data collection, ten Participants (n = 120; 8%) made amendments to the quantitative data they had reported in previous rounds. These amendments corresponded to errors noted in the calculations, or availability of new data, including additional data for months in the year previously not covered, or data from wholesalers or pharmacists newly participating in the data collection.

Considering that many Participants worldwide are still beginning to report quantitative data on antimicrobials intended for use in animals and that errors in data sources have already been noted that may result in instances of data duplication, *caution is necessary in the interpretation of the results*. As stated in the annual ESVAC report:

> *'It is generally agreed that it usually takes at least three to four years to establish a valid baseline for the data on sales of veterinary antimicrobial agents. Consequently, the data from countries that have collected such data for the first or even second time should be interpreted with due caution'*.

6.3. Limitations in the Estimation of Animal Biomass

The animal biomass methodology was developed with the goal of best representing animal biomass in all WOAH Regions, with different animal populations and data collection systems. The biomass figures obtained from this methodology reflect a margin of error, which will be reduced over time as data collection is further refined (see Section 7, Future Developments). Further information can be found in the 'OIE Annual Report on Antimicrobial Agents Intended for Use in Animals: Methods Used' article published in *Frontiers in Veterinary Medicine* in September 2019 [3].

Calculation methodology of average animal weights

Different antimicrobial use surveillance programmes have used various methodologies for the determination of average animal weights to use in the calculation of total biomass. In the ESVAC report [18], estimated average weights at time of treatment are used. The Canadian Integrated Surveillance Program for Antimicrobial Resistance (CIPARS) [22] uses the same standard weights at time of treatment, as well as Canadian standard weights. The surveillance programmes of Japan [23] and the United States of America [24] take a different approach, instead using estimates of average animal weights by production category, rather than focusing the estimates on the time of treatment.

For the purposes of this report, it was determined that the latter approach, using estimates of live average weight without focus on time of treatment, would be most appropriate. The antimicrobial

compounds used and their labelling, including target species and production class, varied widely on a global scale, with data on these differences not available. Given these variations, it is not feasible to estimate weights at time of treatment for all Participants reporting data to WOAH. Instead, average weights were calculated using globally available slaughter data as reported by FAOSTAT, for all species and regions where these data were available.

The average weights calculated for this report are therefore larger than estimated weights at the time of treatment, resulting in a larger denominator and a decreased relative mg/kg estimate of antimicrobial agents intended for use in animals. Therefore, the results reported in WOAH analyses of antimicrobial quantities adjusted by animal biomass are not directly comparable to those of ESVAC or the CIPARS estimates, which are based on treatment weights.

Specificity of data

As described in the methodology, the globally available data sources on animal population, FAOSTAT and WAHIS, were not systematically reported by production class for 2019. However, it is necessary to stratify species population by production class to better assign average weights, for example, to separate veal calves from adult cattle. The methodology for calculation of biomass therefore utilises some necessary standard animal reproduction rates to extract a best estimate of the population breakdown by production class. These rates will vary between species, countries and production systems, and therefore, are not fully representative of the animal populations of any one country or region.

Animals imported and exported

Imported and exported animals are commonly subtracted and added, respectively, from animal populations when calculating animal biomass, as done by ESVAC and CIPARS. This occurs so that only animals raised in the country, the time during which they would have been treated with antibiotics, are considered. An effort was made to minimise the effect of animals imported/exported by using the FAOSTAT 'trade of live animals' dataset for the bovine species.

Extrapolations within the methodology

Carcass conversion factors: The methodology for the calculation of average animal weight from slaughter data necessitates a conversion factor from carcass weight to live weight at time of slaughter (Annex 1). Presently, these conversion factors are only available for Europe. It is not currently known how well European conversion factors apply to other countries that may have different breeds, husbandry and slaughter practices, but it is likely that they differ. The significance of this difference and its impact on the accuracy of the biomass calculation for all countries cannot be estimated.

Reproduction rates and weights: Data on reproduction rates were not collected at the time of reporting, nor was slaughter data for cervids, camelids or equids in some regions. Therefore, this information was taken from literature where necessary, or extrapolated from regions where data is available. The extent to which these literature and extrapolated weights and reproduction rates represent the true situation in any country is expected to vary.

Animal species not retained in denominator

In the development of the current denominator methodology, it was decided not to include companion animals in the calculation of animal biomass. Data on populations of cats and dogs are available in WAHIS, and not in FAOSTAT. However, many countries do not report these figures, or report them inconsistently. Another consideration is the need to better understand whether reported

cat and dog populations represent owned or stray animals, as this would affect the likelihood of their treatment with antimicrobials.

For the Participants where cat and dog populations were available, it was seen that their contribution to overall biomass was minor (<0.5%). However, as some Participants do include antimicrobials used in companion animals in their reported quantitative data, there is expected to be a small effect on results by excluding these species. As excluding them decreases the denominator, the effect, if any, would be a minor increase in antimicrobial quantities adjusted for animal biomass.

In the future, a goal of the AMU data collection would be to provide separate analysis for antimicrobial agents used in companion animals, as more Participants are able to report these population data and distinguish antimicrobial quantities by animal group.

6.4. Barriers to Collect Antimicrobial Quantities

For the Participants unable to report antimicrobial quantities, the main barriers reported was the lack of coordination and collaboration with Ministries of Health in charge of authorisation for veterinary products at national level. This despite a One Health approach to tackle AMR and approaches from the Veterinary Services to strengthen collaboration with Health Ministries on AMR.

Some participants continue to report a lack of structure or enforcement of their regulatory framework for veterinary products. To ensure data quality, investment will be required in prioritised activities supporting the removal of those barriers.

7. Future Developments for the Antimicrobial Use Survey

Interactive information technology (IT) system for WOAH AMU Data Collection

In 2021, WOAH initiated the process of developing an interactive online Global Database for **ANI**mal anti**M**icrobial **USE** (ANIMUSE) and finished the two-years-process of gathering Member's user requirements and piloting the system with selected Members and experts. In September 2022, WOAH launched ANIMUSE for the use of its Members during the eighth round of the data collection and the submission of data. During this transitioning period, WOAH is committed to providing training to all WOAH Members through physical workshops targeting each of WOAH's region. By the time this report publication, Africa; Asia, Far East and Oceania; and the Middle East will have received ANIMUSE training. Feedback from Members have complimented the ANIMUSE systems provision of historical data, animal biomass data, the integrated Calculation Module, and the different data visualisation dashboards performed with Power Bi.

With the deployment and adoption of ANIMUSE, we are planning to support Members in the uptake and institutionalisation of data collection, analysis and reporting, supporting them to write and publish national reports to support national decision making. ANIMUSE also has a public portal that presents data at global and regional levels (available at: https://amu.woah.org/amu-system-portal/home). National data will only be made publicly available in the portal, if WOAH's Delegates or CVO's decide (at any time) to make the national data publicly available in the platform. By the time of this report publication three European Members have so far made their data publicly available under the eighth round. Other Members are encouraged to do the same.

Reported Years

For the eighth round of data collection currently under way, WOAH has requested quantitative data for 2021 (the target year of that round), but will also accept data for 2020 and 2022. Accepting some repeated years of quantitative data from previous rounds provides an opportunity for Participants to correct and enrich the quality of these data sets where relevant. Over time, and once the reporting of data has become more routine, WOAH will request data for one specific calendar year. This way, WOAH reporting will progress in parallel with the development of data collection systems from its Members, as global monitoring on the use of antimicrobial agents becomes more routine, systematic and reliable.

Animal biomass

WOAH will continue work closely with Members to support them in calculating the amounts of active ingredients of antimicrobials. WOAH will continue to support improvements to AMU and animal population data quality and refine its methodology for the calculation of animal biomass based on globally available data, in communication with its Members through its regional offices.

An important step in this process will be achieved through the interface with WAHIS. In consultation with the previous WOAH *ad hoc* Group on Antimicrobial Resistance, new species and animal sub-categories have been added to the WAHIS data collection guidelines. These new population sub-categories are now being implemented in WAHIS and will allow the data on animal biomass to be refined over time.

The next generation of the WAHIS data collection interface was launched in March 2021 and will incorporate further updates to the collection of global animal population data. In addition to more sub-categories representing detailed production data where Members can supply it, it will also support the reporting of data on average live weights and the number of animals slaughtered.

Aside from the collection of more detailed global animal population data, additional work is needed to validate some of the conversion factors used in the methodology, which have been frequently extrapolated from European data. Particularly, a better understanding potential regional variation in carcass conversion factors (for estimating live weights) and annual multiplication rates of species living less than one year (i.e. 'cycle factor') are necessary to refine the current methodology.

8. Conclusions

During the past seven years, and despite COVID-19 pandemic, WOAH Members have proven that they are highly engaged in the reporting of data related to the antimicrobial use in animals, as well committed to decreasing the use of antimicrobials in the animal health sector. With more Participants having access to AMU trends over time and enhanced visual presentation of data (through ANIMUSE), WOAH has observed during the different exchanges that Members are willing to start taking decisions at national level to strengthen response against AMR. Moreover, it is expected that in the following years, Members will increasingly develop their own national reports and/or make their data publicly available through the public portal of ANIMUSE.

This report aims to provide a comprehensive and reliable representation of the global situation in the utilisation of antimicrobial agents intended for use in animals. Its publication aims to complete the information published by WOAH Members at the national level. With 38 Members today making national data publicly available, WOAH continues to encourage the creation and publication of national reports. As stated in chapters 6.9 and 6.3 from the Terrestrial and Aquatic Animals Codes, respectively, this is an important measure to ensure **transparency**, allowing all interested parties to assess trends, to perform risk assessments, as well as for risk communication purposes. We also seek to strengthen communication with other national agencies outside Veterinary Services involved in antimicrobial use data collection in the animal health sector, in collaboration with WHO.

In 2021, the use of antimicrobial agents for growth promotion in animals is no longer a practise in nearly three-quarters of the participant Participants, either with or without legislation/regulation provision for their use. The use of growth promoters is still reported by a quarter of the 157 Participants to this seventh round of data collection. Under the auspices of the Global Action Plan, WOAH encourage Members to continue their efforts to implement policies on the use of antimicrobials in terrestrial and aquatic animals, respecting WOAH intergovernmental standards, including recommendations for the phasing out of the use of antibiotics for growth promotion in the absence of risk analysis.

Data presented in this report estimate that, **in 2019**, the total **amount of antimicrobial agents** intended for use in animals oscillates between 77,086 and 84,398 tonnes (110 Participants to this seventh annual report). Overall, tetracyclines remained the most utilised antimicrobial agent in animal health globally (35.6% of the total amount), followed by penicillins (13.3% of the total amount). Participants providing data by antimicrobial class and per animal groups has increased over time, with 71 Participants providing this level of data for 2019. When looking at terrestrial food-producing animals, tetracyclines and penicillins remain the most used (27.6% and 14.5% of the total amount respectively) among the 51 Participants providing data. When focusing on the 11 Participants providing specific data for aquaculture, tetracyclines become second after amphenicols (35.9% and 17.5% of the total amounts, respectively), also considered as VCIA. Ninety-eight Participants reported use of antimicrobial agents in companion animals, mainly canines and felines, followed by ornamental birds, rabbits and equines. Penicillins were the most reported antimicrobial class (62.2% of the total amount), closely followed by tetracyclines, sulfonamides and lincosamides. All of them VCIA but the latter one, considered as Veterinary Highly Important Antimicrobial (VHIA) classes. The implementation of a calculation tool in previous years has positively contributed to the higher number of detailed returns, and WOAH would like to encourage Participants to continue providing such level of accurate reporting.

These absolute numbers around quantities of antimicrobial agents are also analysed in relation to the animal population concerned, by normalisation with the use of WOAH animal biomass denominator, estimated to be the best indicator for global monitoring of antimicrobial sales in food-producing

animals by an independent review[13]. This allows data comparison across sectors, regions and over time. In this seventh report, WOAH covers 70% of the total animal biomass for the year 2019, representing 108 Participants around the globe. This encompasses terrestrial and aquatic food-producing animals, with companion animals excluded from the analyses. Bovine species account for 42% of the total coverage, followed by swine (19%) and poultry (19%). Aquatic animals account for 8% of the total coverage, being almost 2/3 represented by farmed fishes. Taking all this into consideration, WOAH estimates that, in 2019 a total of 99.09 to 108.49 mg of antimicrobial agents were used per kg of animal biomass, depending on how coverage estimations were adjusted among the 108 Participants. Analysis of these data over time, shows that, amongst the 80 Participants that have consistently provided data from 2017 to 2019, a decrease of 13% has been observed in the normalized amount of antimicrobial agents used in animals (from 111.45 mg/Kg to 96.73 mg/Kg, respectively). This confirms trend already reported in the fifth report, suggesting the continuous global decrease in the utilisation of antimicrobial agents for intended use in animals.

Since the beginning of the WOAH AMU data collection, Participants have demonstrated their commitment to engage in this global activity. The report transparently describes collected data and reasons for a certain level of uncertainty associated with both the complex and simple estimates presented. The limitations of this analysis include quantitative data source errors, which may lead to overcounting of antimicrobial amounts by some Participants new to the process of data collection. Participants are encouraged to consider these potential limitations when interpreting their national AMU data for decision making. We anticipate that data quality will improve over time through continued Participant commitment to national AMU data collection and ANIMUSE.

On an annual basis, the WOAH highlights not only the reported quantitative data for Participants currently able to provide it, but also reflects the current situation of governance of veterinary antimicrobials worldwide, and barriers to quantitative data collection. WOAH will continue analysing the barriers related to the lack of regulatory framework to seek for solutions to the Participants that reported these barriers (Veterinary Legislation Support Program within the Performance Veterinary Services tool, PVS, provided by WOAH). Moreover, WOAH remains strongly committed to supporting its Members in developing robust and transparent measurement reporting mechanisms for antimicrobial use. Concurrent to engagement with Participants to improve these data, the methodology for calculating animal biomass will continue to be refined. As data collection systems develop further (i.e. soon available customised interactive online system, exploration of tools enabling data collection at the farm level, etc.), this annual report will continue to provide an essential global and regional analysis of antibiotic use in animals, and changes over time.

[13] Ece Bulut, Renata Ivanek, Comparison of different biomass methodologies to adjust sales data on veterinary antimicrobials in the USA, Journal of Antimicrobial Chemotherapy, 2021; https://doi.org/10.1093/jac/dkab441

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ANIMUSE GLOBAL DATABASE - WOAH

ONLY FOR THOSE PARTICIPANTS DECIDING TO MAKE THEIR DATA PUBLICLY AVAILABLE

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ANNEXES[14]

[14] The World Organisation for Animal Health has launched a new brand identity, including a new acronym, in May 2022. Annexes 7, 8 and 9 were developed before the changes took place. Therefore, they do not reflect the new brand image of the Organisation.

Annex 1 Materials and Methods

Every September, the World Organisation for Animal Health (WOAH, founded as OIE) invites its Members and certain non-contiguous territories and non-WOAH Members to participate in its annual data collection on antimicrobial agents intended for use in animals. In order to analyse the antimicrobial quantities reported, WOAH Headquarters developed a formula to calculate animal biomass. The materials and methods for reporting antimicrobial quantities and estimating animal biomass are summarised in Annex 1 of this document. More information can be found in the 'OIE Annual Report on Antimicrobial Agents Intended for Use in Animals: Methods Used' article published in *Frontiers in Veterinary Science* in September 2019 [3].

Antimicrobial quantities reported

WOAH's Resolution

Resolution No. 26 of the 83rd General Session in 2015, 'Combating Antimicrobial Resistance and Promoting the Prudent Use of Antimicrobial Agents in Animals', included recommendations that:

- 'The OIE develop a procedure and standards for data quality for collecting data annually from OIE Member Countries on the use of antimicrobial agents in food-producing animals with the aim of creating an OIE global database to be managed in parallel with the World Animal Health Information System (WAHIS).
- OIE Member Countries set up an official harmonised national system, based on OIE standards, for the surveillance of antimicrobial resistance and the collection of data on the use of antimicrobial agents in food-producing animals, and actively participate in the development of the OIE global database'.

Invitation to Countries

WOAH maintains Regional offices globally covering Africa; the Americas; Asia, Far East and Oceania; Europe and the Middle East. WOAH's template (Annex 7) and accompanying guidance documents (Annex 8 and 9) were sent to all WOAH Members in all WOAH regions by e-mail in September 2021. In addition, they were sent to four non-contiguous territories and five non-WOAH Members that asked to be part of the survey. (The list of all WOAH Members is provided in Annex 10).

Invitation letters were sent to all WOAH Delegate and WOAH National Focal Points for Veterinary Products. At WOAH, each Member designates a Delegate to WOAH, the person most commonly selected generally leads the Country's official Veterinary Services. At the 76th General Session, held in May 2008, the World Assembly of Delegates to WOAH determined that WOAH Delegates should also nominate National Focal Points to assist them in their work on specific topics. Of these, the designated National Focal Points for Veterinary Products are responsible for any information relating to veterinary medical products in the Country. Since 2008, WOAH has been training and supporting the Focal Points for Veterinary Products through regional or sub-regional seminars.

WOAH Template

In response to these recommendations, the previous WOAH *ad hoc* Group on Antimicrobial Resistance developed a template for harmonised data collection, as well as guidance for its completion. This WOAH template was translated and is available in the three WOAH official languages (i.e. English, French and Spanish).

An annex to the guidance provides more detailed instructions on mathematical calculations to obtain quantities of active ingredients from veterinary medicinal products containing antimicrobial agents sold. All antimicrobial agents destined for use in animals and contained in *WOAH List of Antimicrobial Agents of Veterinary Importance* [14], in addition to certain antimicrobial agents used only for growth promotion, were reportable. For this seventh round, the conversion factors for some international units (IU) and for certain derivates or compounds were updated in the annex to assist with calculations (Annex 9, Tables 2 and 3).

As with previous rounds of data collection, Countries responded to the questionnaire through an Excel spreadsheet, using predefined conditional formulas and analysis tools. This spreadsheet, referred to as the 'WOAH template' contains four worksheets labelled 'Baseline Information', 'Reporting Option 1', 'Reporting Option 2' and 'Reporting Option 3'.

Part A (Contact Person for Antimicrobial Agents Use Data Collection) and Part B (General Information) of the 'Baseline Information' sheet can be completed by any Country, and collects information on the current situation of governance of veterinary antimicrobials, including the Competent Authority for regulation of antimicrobial use in animals, use of growth promoters, and barriers to reporting quantitative data on antimicrobial agents used in animals, if any. For Countries able to provide quantitative data on antimicrobial agents intended for use in animals, the 'Baseline Information' sheet also contains questions relevant to data collection in Part C (Data Collection of Antimicrobial Agents Intended for Use in Animals), including year covered, data sources and food-producing species included. Countries providing multiple years of quantitative data are asked to provide a single template for every year of data, with Part C modified, if necessary, to reflect the reported quantitative data.

WOAH template was designed to allow all Countries to participate in the annual data collection even if the quantitative data on antimicrobial agents intended for use in animals were not nationally available. Even if no quantitative data collection system exists in the Country, the template section titled 'Baseline Information' can still be completed. This section contains three parts (A, B and C), as described in Table A1.

Quantitative data collection (Part C) is further broken down into three sections: 'Reporting Options' 1, 2 and 3, where the actual quantities of antimicrobial agents for use in animals are reported with increasing specificity.

Table A1. WOAH Template sections and how Countries respond based on available data

WOAH Template Sections	Countries not able to provide antimicrobial quantities	Countries able to provide antimicrobial quantities		
		By antimicrobial class only	By antimicrobial class and animal groups	By antimicrobial class, animal groups and route of administration
Baseline Information				
Part A. Contact Person for Antimicrobial Agents Use Data Collection	✓	✓	✓	✓
Part B. General Information	✓	✓	✓	✓
Part C. Data Collection on the Use of Antimicrobial Agents in Animals		✓	✓	✓
Reporting Option 1		✓		
Reporting Option 2			✓	
Reporting Option 3				✓

Following completion of the Baseline Information, the template either directs Countries to submit the questionnaire if no quantitative data were available, or to complete one of the three 'Reporting Options' if quantitative data were available. The three reporting options represent increasing levels of detail of quantitative data on antimicrobial classes used in animals, with the possibility of separating amounts reported by type of use: Veterinary medical use, which includes use to treat, control or prevent disease; and non-veterinary medical use, which includes use for growth promotion; animal groups (Terrestrial, Aquatic or Companion); and routes of administration.

Data validation

All responses submitted by the designated contact person for a WOAH Member were validated by the Country's Delegate. Member responses were compiled and analysed at WOAH Headquarters.

Whenever necessary, staff from WOAH Headquarters engaged with respondents to clarify and validate responses. These questions were addressed to the contact person listed, who was usually WOAH's National Focal Point for Veterinary Products.

Reported years

During this seventh round, WOAH requested quantitative data on antimicrobials used in animals for the 2019 calendar year, accepting also data from 2020 and 2021. Present report would focus on analyses of antimicrobial quantities for 2019, enabling greater level of data comparison, as well as favouring comprehensive assessments of trends.

Comparison of quantitative data requires the use of a denominator with which to interpret the antimicrobial quantities reported, in the context of relevant animal populations and includes an analysis of antimicrobial quantities adjusted for animal biomass on a global and regional level by year. The focus year of this additional analysis is 2019, using quantitative data reported to WOAH by 109 participants during all rounds of data collection.

Animal biomass estimation methodology

Background

To compare quantitative data reported on antimicrobial agents intended for use in animals between regions and over time, a rate is necessary to evaluate these data in the context of associated animal populations, which vary in size and composition. To this end, and in conjunction with the development of the antimicrobial use database, the previous WOAH *ad hoc* Group on Antimicrobial Resistance agreed to analyse the antimicrobial quantities reported using animal biomass as a denominator.

Animal biomass is calculated as the total weight of the live domestic animals in a given population and year, used as a proxy to represent those likely exposed to the quantities of antimicrobial agents reported. As data on antimicrobial agents are reported by the Country.

Data collected by global animal surveillance databases (WAHIS, FAOSTAT) are point-in-time species-level census data[15] with little-to-no detail relating to production class. Such data are difficult to interpret given that production classes within a species can have very different average weights, such as beef cattle and veal calves. Additionally, given that census data are collected at a specific time of the year, the total annual population is not known for production groups which are slaughtered and

[15] Point in time census data represents the number of living animals in a country at the time of survey.

repopulated a certain number of times within one year (this multiplication factor is hereafter referred to as the 'cycle factor').

The development of the methodology for the calculation of an annual animal biomass utilised globally available census data from the WAHIS interface. WAHIS data are reported by national Veterinary Services through WOAH's Delegate, with the active support of WOAH Focal Points for Animal Disease Notification, and the figures are subsequently validated by WOAH staff. When an animal population figure is not reported to WAHIS, the data point is left blank.

FAOSTAT animal population data were used as a complementary data set. FAOSTAT data are similarly primarily obtained from national governments, but sources expand beyond national Veterinary Services to national statistics offices and other relevant agencies. When a national government does not report a figure to FAOSTAT, FAO uses local expert resources to estimate a figure, or imputation of a data point by its statistical team. [16] The two data sets are therefore similar but can display variation.

Where census data were used, WAHIS and FAOSTAT figures were first cross-referenced with each other, and then with national reports or literature when necessary. FAOSTAT data were utilised when a WAHIS data point was not available or was outside of expected variation without explanation.

In addition to census data, FAOSTAT also reports numbers and tonnes of production animal species slaughtered by Country each year, similarly undifferentiated by production class. As WAHIS does not collect this information, FAOSTAT slaughter data was used exclusively when these data were needed. For species living less than one year, it was necessary to use data on a number of animals slaughtered to represent an annual population, as this information cannot be extrapolated from point-in-time census data without a cycle factor.

The formulas for calculating biomass by species were developed with these considerations in mind using the two globally available datasets, WAHIS and FAOSTAT, and the results compared to references from Participants where more detailed animal population data by production class were available. These references include animal biomass figures either directly supplied by countries, or calculated from animal population data in Eurostat, the statistical office of the European Union.

The formulas chosen for the calculation of WOAH's denominator reflect the best-fit estimations using the more general global animal population data (WAHIS, FAOSTAT) when compared to these available reference figures. The derived formulas were then applied to all Countries providing quantitative data for the target year.

The methodology for calculation of animal biomass was developed with the support and validation of the previous WOAH *ad hoc* Group on Antimicrobial Resistance, shared with Members in the report of WOAH's Scientific Commission for Animal Diseases meeting of September 2017 and published in *Frontiers in Veterinary Science* in September 2019 [3]. The potential for inaccuracies in the estimation of animal biomass, in particular from extrapolating data available for one region of the world to other regions, is further discussed in Section 6.3 of the report.

Year of analysis

The target year of the seventh round of data collection, 2019, is the focus of the additional analysis of antimicrobial quantities adjusted for the animal biomass denominator. Countries providing

[16] According to the *OECD Glossary of Statistical Terms* imputation is the process used to determine and assign replacement values for missing, invalid or inconsistent data that have failed edits' (https://stats.oecd.org/glossary/detail.asp?ID=3462).

quantitative data on antimicrobial agents intended for use in animals for 2019 during all rounds of data collection were included in this additional analysis.

Calculations of live weights for all species

Live weights of animals were calculated using FAOSTAT slaughter data, where available, using the following two formulas:

$$carcass\ weight\ (kg) = \frac{weight\ of\ species\ slaughtered\ (kg)}{number\ of\ species\ slaughtered\ (heads)}$$

Carcass weights were converted to live weights from the animal at time of slaughter using conversion coefficients (k) as defined by Eurostat [15]. Conversion coefficients represent the difference between a processed carcass weight and the expected live weight of that animal species before slaughter, expressed as a fraction.

$$live\ weight\ (kg) = \frac{carcass\ weight\ (kg)}{conversion\ coefficient\ (k)}$$

For the purposes of this report, 'live weight' refers to the calculated weight (in kg) of an animal before slaughter, unless otherwise specified.

Countries were grouped by sub-region as defined by WOAH, also taking into account livestock unit (LSU) classifications.[17] Mean sub-regional live weights were then determined by calculating the average live weight of a given species for Participants within the sub-regional grouping.

Methodology for calculating species biomass by country

As animal population data are collected at the country level, animal biomass was calculated for each of the following species for each Participant that reported quantitative data to WOAH for 2019.

All weights and biomass figures are measured in kilograms.

Bovine (including cattle and domestic buffalo) biomass was calculated according to the following principles:

1. From the calculated sub-regional mean live weight, the weights of the different bovine production categories [adults, young (between 1 and 2 years of age), calves (<1 year of age)] were determined by applying relevant weight proportions standards, originating from livestock unit ratios as defined by Eurostat [17].
2. Consecutively, the weight of each bovine production category was then multiplied by a predicted population ratio resulting in a representative weight for bovines for the sub-region. The applied population ratios were calculated in the reference Eurostat database and consider an anticipated renewal rate of 30%.

Bovine biomass was calculated by multiplying the representative weight determined for each sub-region by the census population of bovines for each Country within the sub-region, according to the following formula:

[17] Livestock units (LSU) [16], used for aggregating the numbers of different categories of livestock, are usually derived in terms of relative feed requirements. Conversion ratios are generally based on metabolisable energy requirements, with one unit being considered as the needs for maintenance and production of a typical dairy cow and calf.

$$census\ population \times [(sub-regional\ mean\ live\ weight \times LSU_{calves} \times P.pop_{calves}) + (sub-regional\ mean\ live\ weight \times LSU_{young\ 1-2yrs} \times P.pop_{young\ 1-2yrs}) + (sub-regional\ mean\ live\ weight \times LSU_{adults} \times P.pop_{adults})\ ]$$

Whereby,

$P.pop_{calves}$, $P.pop_{young\ 1\text{-}2yrs}$, and $P.pop_{adults}$ represents the proportion (P.pop) of calves (less than 1 year), young (between 1 to 2 years of age) and adults (over 2 years of age) in the total living cattle population, respectively, considering an anticipated renewal rate of 30%.

LSU_{calves}, $LSU_{young\ 1\text{-}2yrs}$, and LSU_{adults} represents the livestock unit ratios for calves, young and adults, respectively, as defined by Eurostat [17].

And, *sub-regional mean live weight* represents the calculated mean live weight for adult cattle at the sub-regional level.

Swine biomass was calculated according to the following formula:

$$(live\ weight \times number\ slaughtered) + (census\ population \times sow\ weight \times 0.09)$$

Whereby,

$live\ weight \times number\ slaughtered$ represents the expected biomass of fattening pigs slaughtered in a Country in one year,

And $census\ population \times sow\ weight \times 0.09$ represents the expected biomass of pigs retained for breeding purposes, calculated with the following considerations:

- sow weight: the standard weight of a sow in Europe is 240 kg [6]. This weight was adapted by region using livestock unit ratios (Americas = 240 kg, Asia, Far East and Oceania = 240 kg, Africa = 192 kg);
- 0.09 is the expected percentage of sows in a given swine population, as calculated using Eurostat animal population data.

Poultry biomass was calculated according to the following formula:

$$(live\ weight\ chicken \times number\ of\ chicken\ slaughtered) + (live\ weight\ turkey \times number\ of\ turkey\ slaughtered) + (live\ weight\ ducks \times number\ of\ ducks\ slaughtered) + (live\ weight\ geese \times number\ of\ geese\ slaughtered)$$

Equidae biomass was calculated according to the following formula:

$$(live\ weight\ horse \times horse\ census\ population) + (live\ weight\ donkey \times donkey\ census\ population) + (live\ weight\ mules \times mule\ census\ population)$$

The live weight of horses, donkeys and mules was calculated for sub-regions where equine slaughter is common and data were available. For sub-regions where equine slaughter is not practised and/or where data were unavailable, regional average live weights were applied.

Sheep and goat biomass were calculated according to the following formula:

$$(live\ weight\ \times\ number\ slaughtered) + \left(census\ population - \frac{number\ slaughtered}{1.5}\right) \times\ standard\ adult\ weight$$

Whereby,

$(live\ weight\ \times\ number\ slaughtered)$ represents the expected biomass of sheep and goats slaughtered in a Country in one year,

And $\left(census\ population - \frac{number\ slaughtered}{1.5}\right) \times standard\ adult\ weight$ represents the expected biomass of animals retained for breeding purposes, calculated with the following considerations:

- 1.5 is the average number of breeding cycles per year;
- the standard weight of a breeding sheep in Europe is 75 kg [6]. This weight was used globally based on livestock unit ratios;
- the standard weight of breeding goats was adapted regionally according to bibliographical reviews [19].

Rabbit biomass was calculated according to the following formula:

$$(live\ weight\ \times\ number\ slaughtered)\ + \left(census\ population - \frac{number\ slaughtered}{5}\right) \times\ 4.5\ kg$$

Whereby,

$(live\ weight\ \times\ number\ slaughtered)$ represents the expected biomass of rabbits slaughtered in a Country in one year,

And $\left(census\ population - \frac{number\ slaughtered}{5}\right) \times\ 4.5\ kg$ represents the expected biomass of animals retained for breeding purposes, calculated with the following considerations:

- five is the average number of breeding cycles per year;
- the standard weight of a breeding doe is 4.5 kg [20].

Camelid and cervid biomass were calculated according to the following formula:

$$standard\ weight\ \times\ census\ population$$

According to the following considerations [21]:

- standard weight cervid: 80 kg
- standard weight camel: 450 kg
- standard weight llama/alpaca: 100 kg

Aquaculture biomass was only included in the total biomass for Participants that included aquaculture in their reported data on intended antimicrobials use in animals. Aquaculture data are collected in WAHIS and FAO as tonnes of farmed aquatic food-producing animals produced annually.

The aquaculture biomass for aquatic food-producing animals is essentially composed of farmed fish but this annual report also includes data on farmed crustaceans, molluscs and amphibians.

Cats and dogs were not included in the calculation of animal biomass at this time due to inconsistency in reporting of their populations, and lack of information on average weights. For the Countries where companion animal data were available, their contribution to overall animal biomass was found to be relatively minor (<1%). In the future, an analysis of companion animal data will hopefully become feasible.

Changes in the methodology for the calculation of animal biomass

The results for animal biomass from previous years analysis (2014, 2015, 2016 and 2017) shown in this report may differ from the results of published previous reports as they have been recalculated using the latest updated data sets to support comparison. More information on the impact of the updated animal biomass analysis is provided in Section 4 Updates of Historical Data.

Antimicrobial quantities adjusted for animal biomass

Quantitative data reported on antimicrobial agents intended for use in animals was adjusted for animal biomass according to the following calculation:

$$\frac{antimicrobial\ agents\ reported\ (mg)}{animal\ biomass\ (kg)}$$

For regional and global analyses, Country data for both the numerator and denominator for each WOAH Region, were summed before the rate was calculated.

Annex 2 Africa, Regional Focus

Table A2. General Information for Africa during the Seventh Round of Data Collection

General Information for Africa	
Number of WOAH Members	54
Number of WOAH Members responding to the questionnaire	41 (76%)
Number of WOAH Members providing qualitative data only	14 (34%)
Number of WOAH Members providing quantitative data	27 (66%)

Barriers to Providing Quantities of Antimicrobial Agents in Animals

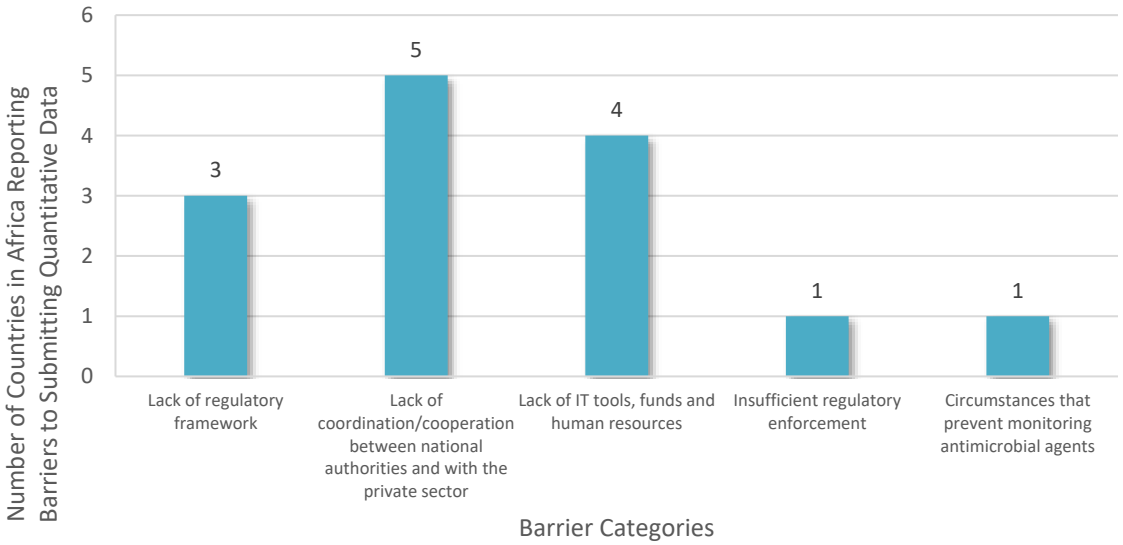
Fourteen WOAH Members (n= 41; 34%) responded with Baseline Information (qualitative data) and did not provide quantitative data on antimicrobial agents used in animals (Table A2). Seven out of 14 explained their barriers to reporting quantities of antimicrobial agents used in animals. Participants can report more than one barrier relevant to their situation, and responses for this reporting year were grouped by category (Figure A1). For further information on the category groupings, please refer to Section 2.6 of this report.

Three Participants cited the main impediment to reporting antimicrobial quantities as the lack of a regulatory framework. Of these, two Members mentioned that there was no official procedure to collect these data; one of them reported their intention to develop a procedure and the other one described that the data collection was not mandatory.

Five Members described a lack of coordination/cooperation with the Ministry of Health. Two cited difficulties in coordinating with pharmaceuticals.

Four Participants mentioned that the lack of staff impacted on their ability to collate and analyse the data. Three also raised the lack of tools and software to analyse and report antimicrobial quantities.

Figure A1. Barriers to Reporting Quantitative Data on Antimicrobial Agents Intended for Use in Animals in Seven Participants from Africa During the Seventh Round of Data Collection

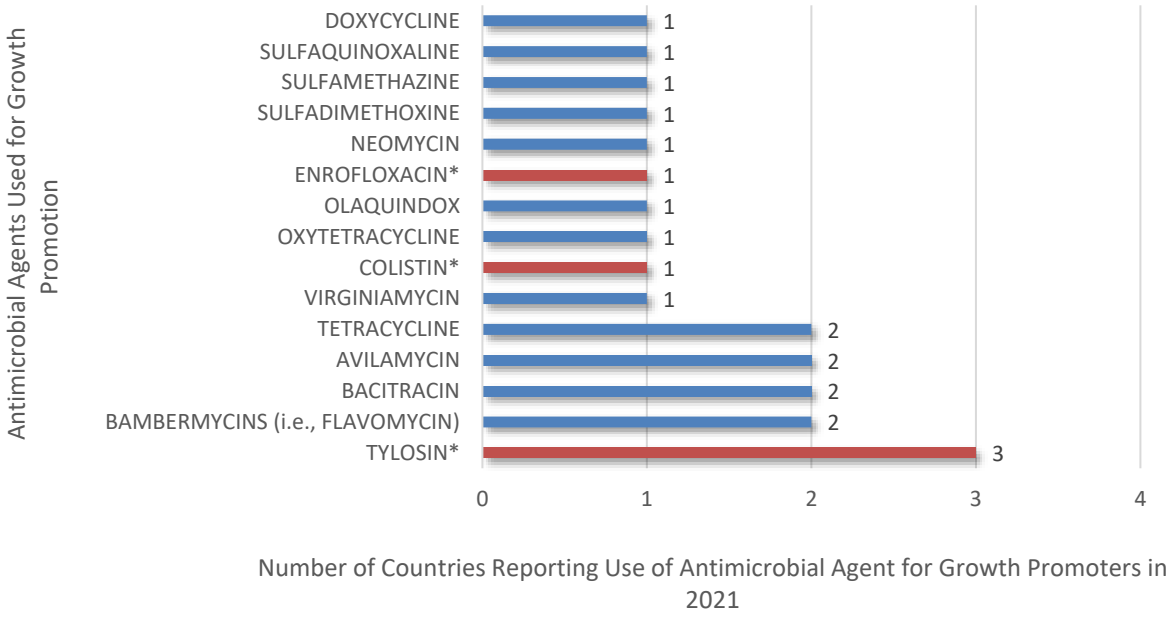


Antimicrobial Agents Used for Growth Promotion

During 2021, ten Participants (n = 41; 24%) used antimicrobial agents as growth promoters. Of these, five Members (n = 10; 50%) provided a list of antimicrobials used for growth promotion, with tylosin being the most frequently named (Figure A2). It was noted that of these five Members, only one had a regulatory framework for growth promotion. It was also observed that of the 27 Members stating they did not use antimicrobials as growth promoters, 19 did not have any legislation or regulation banning the use of these molecules (n = 27; 70%). Four Members reported that the use of growth promoters in the field was unknown and three of them experienced a lack of regulatory framework for this type of use. For the seventh round, Africa is WOAH's Region with most Participants reporting a lack of legislation or regulation for antimicrobials used as growth promoters (nine out of ten; 90%).

Ionophores were excluded from reporting as they are mostly used for parasite control and have different regulatory classifications in different countries; however, two Participants in Africa reported the use of these molecules as growth promoters. Salinomycin was reported in both Members.

Figure A2. Antimicrobial Growth Promoters Used in Animals in Five Countries in Africa in 2021



* The classes in the WHO category of Highest Priority Critically Important Antimicrobials should be the highest priority for Countries when phasing out the use of antimicrobial agents as growth promoters.

2019 Analysis of Antimicrobial Quantities

This section provides additional analysis of reported quantitative data on antimicrobial agents intended for use in animals adjusted by animal biomass, focusing on 2019. This analysis represents the antimicrobial quantities reported to WOAH from 28 Members in Africa during different rounds of data collection.

QUANTITATIVE DATA SOURCES CAPTURED

All African Countries' data sources were analysed, and all Countries where data duplication was considered to be a risk were asked for clarification of their answers and/or data collection systems. Eight Countries' data sources were considered to present a risk of duplication (n = 28; 29%); after clarifications, seven Countries (n = 8; 88%) changed their answers or proved there was no duplication or overlapping of data sources. Only the remaining Country (one out of 8; 12%) that did not provide clarifications were excluded from the analysis in Figure A3. For a full explanation of quantitative data sources, see the Guidance for Completing WOAH's Template for the Collection of Data (Annex 8).

From the list of data source options provided in WOAH's template, import data for veterinary products as declared by customs authorities was most commonly chosen. In addition, four Members described other data sources not included in WOAH List, relating to Import data (Figure A4).

Figure A3. Data Sources Selected by 27 African WOAH Members Reporting Quantitative Information for 2019

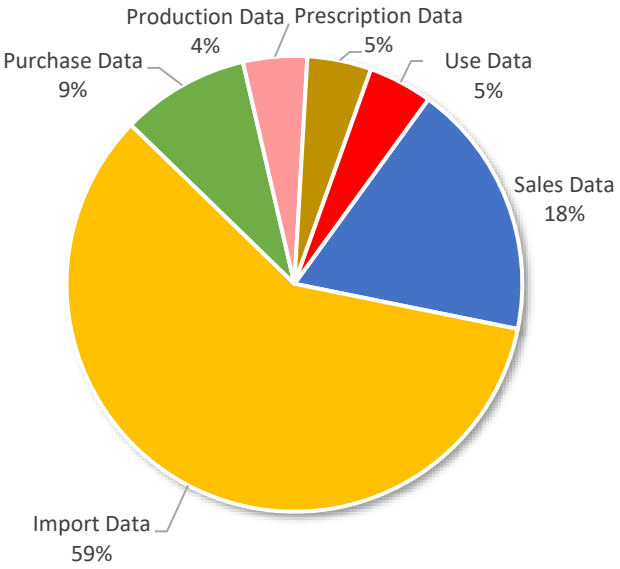
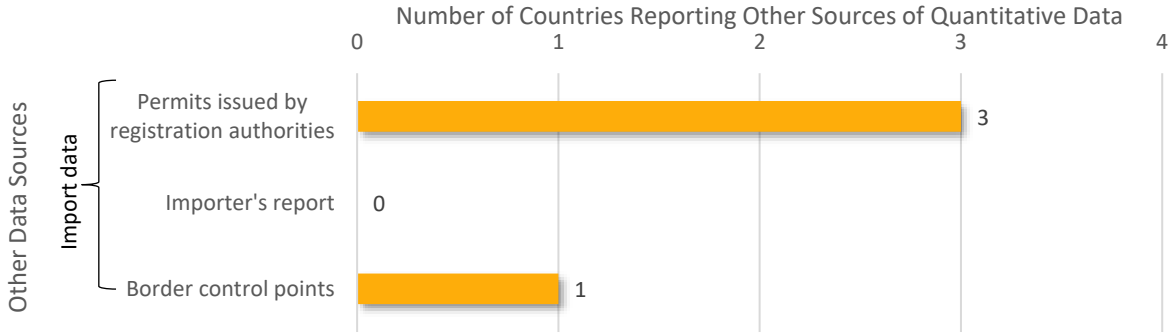


Figure A4. 'Other' Sources of Data as Explained by Four Members in Africa Reporting Quantitative Information for 2019

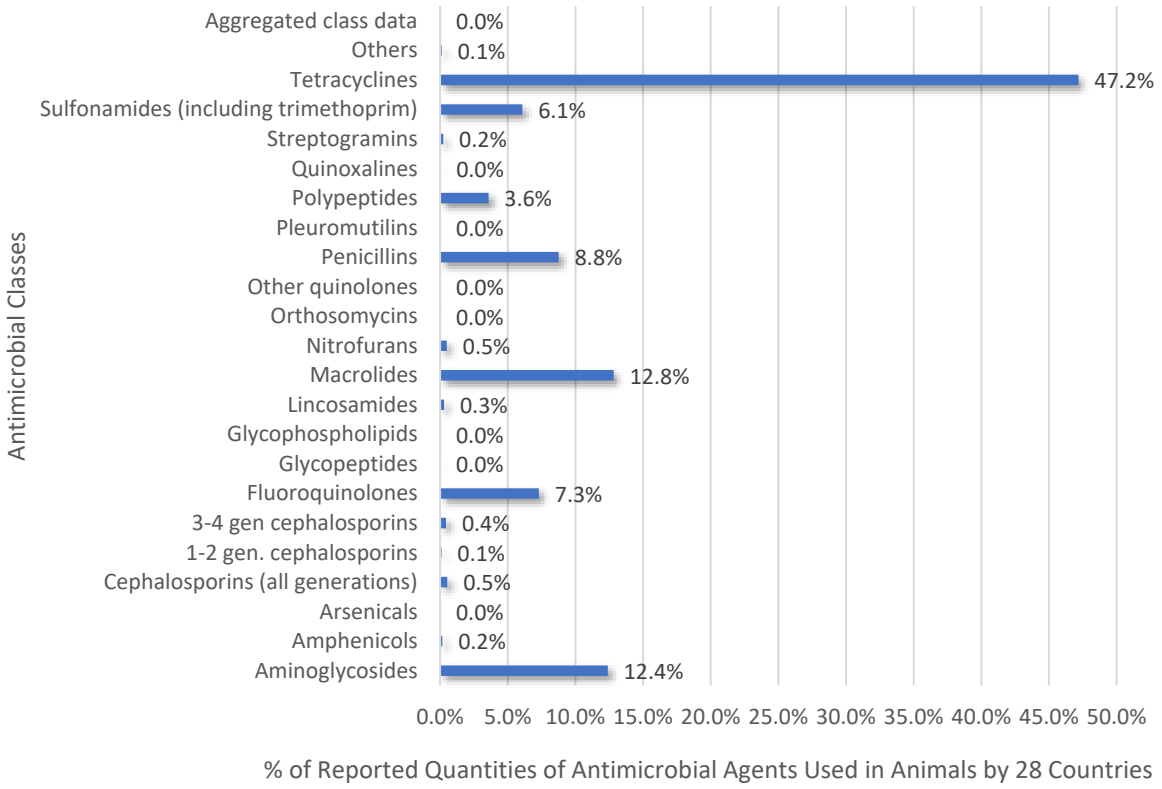


ANTIMICROBIAL QUANTITIES REPORTED IN 2019

For 2019, 28 African Members provided validated antimicrobial quantities intended for use in animals. Of the 28 Members, eight stated a 100% coverage of the data source used to report the data and one Country estimated 130% coverage as all import data were covered, but 30% of their total imports were planned for re-exportation to neighbouring countries. The 19 Members that did not cover 100% of available antimicrobial quantity data sources were asked to provide further information on uncaptured data sources. For the 28 Countries, the estimated data coverage was 86%. More information on the data coverage for Africa is available in Table 5 of this report.

In Africa, the largest proportion of all reported antimicrobial classes was tetracyclines, followed by macrolides and aminoglycosides (Figure A5). Six Members reported antimicrobials under 'others' category. Under the group of 'others' most of the Participants reported fosfomycin.

Figure A5. Proportion of Antimicrobial Classes Reported for Use in Animals by 28 African Members in 2019

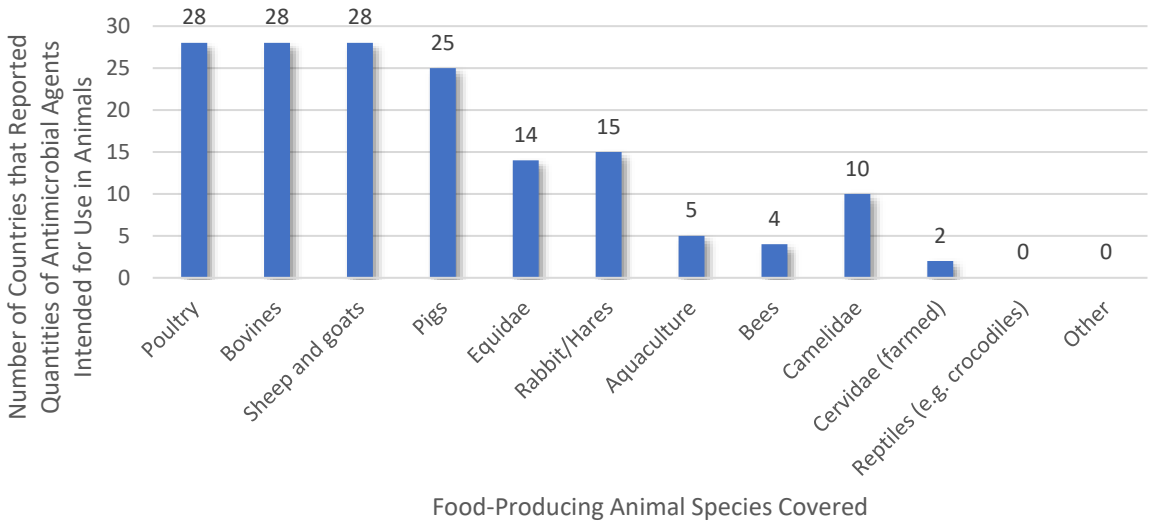


FOOD-PRODUCING TARGET SPECIES ON THE LABEL OF REPORTED VETERINARY PRODUCTS

Irrespective of whether the data could be differentiated by animal groups, all 28 Countries were asked to select the food producing animal species covered by their data from a list supplied in WOAH's template and according to the products target species label. For descriptive purposes, some animals were grouped in categories, for more information on the grouping of animals see page 38 of this report.

In all 28 African Members that reported quantitative data on antimicrobial agents intended for use in animals for 2019, the food-producing species most frequently covered by the data were poultry, bovine, sheep and goats (Figure A6). Within the four regions analysed, Africa is one of the regions where Camelidae were more commonly named by Members.

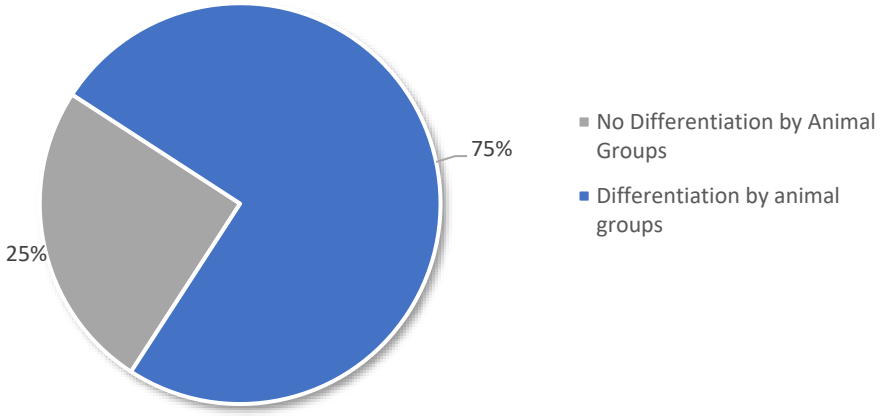
Figure A6. Food-Producing Animal Species Included in Quantitative Data Reported by 28 African Members in 2019



QUANTITATIVE DATA DIFFERENTIATION BY ANIMAL GROUP

Most of the quantitative data from the African Members can be differentiated by animal group. This result corresponds with the African Region's predominant use of Reporting Option 3, which sallow for differentiation by animal group (Fig. A7). For the 21 African Members (n = 28; 75%) that were able to distinguish antimicrobial quantities by animal groups, data were mainly provided for terrestrial food-producing animals and non-food-producing animals.

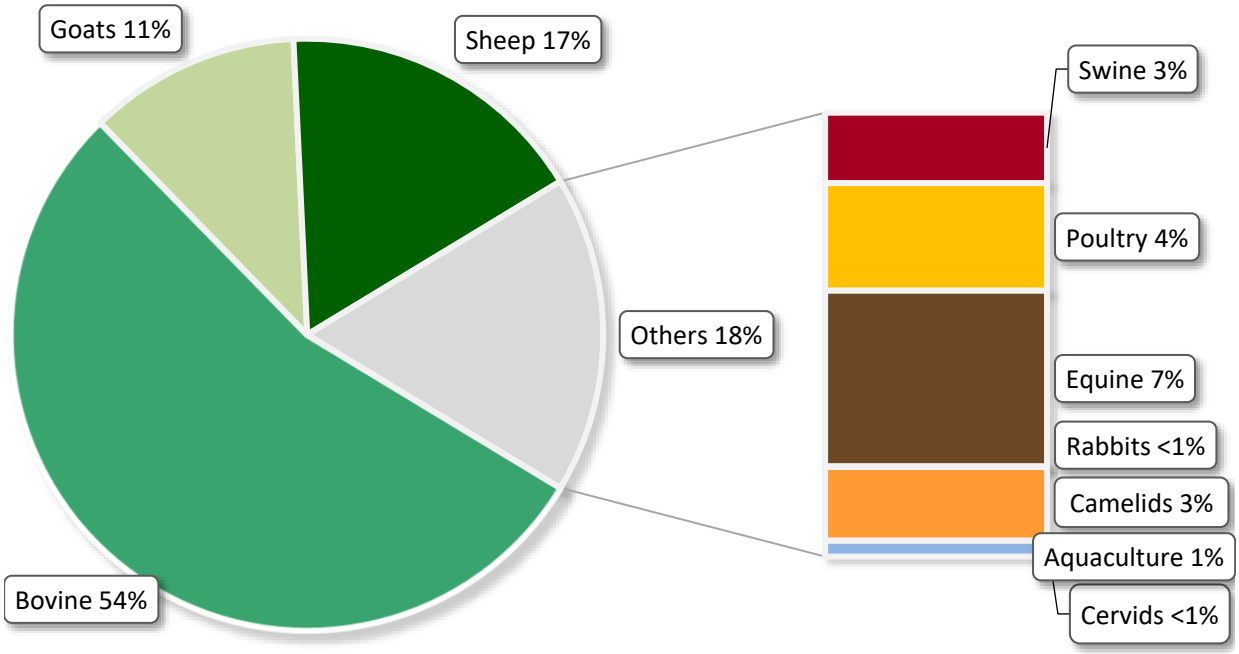
Figure A7. Differentiation by Animal Group among 28 Members in Africa Reporting Quantitative Data in 2019



ANIMAL BIOMASS

In Africa, sheep, goat and equine biomass are relatively more significant, compared to the other regions, contributing 17%, 11% and 7%, respectively, to the total biomass. In contrast, the proportions of swine and poultry, 3% and 4%, respectively, are the lowest among all regions. It can be underlined that camelids, totalling 3%, are also proportionally more significant in Africa than in other regions.

Figure A8. Species Composition of Animal Biomass for the 28 Countries in Africa Included in 2019 Quantitative Data Analysis



ANTIMICROBIAL QUANTITIES ADJUSTED BY ANIMAL BIOMASS

In Africa, the mg/kg estimate for 2019 for 28 Members is 28.10 mg/kg, with an upper-level estimate of 31.85 mg/kg when adjusted by estimated coverage. From all WOAH Regions, Africa has the lowest mg/kg estimate.

Changes in mg/kg results from 2014 to 2018

The updated mg/kg estimate for 2014 for 11 African Members is 36.68 mg/kg, with an upper-level estimate of 41.68 mg/kg when adjusted by estimate coverage.

The updated mg/kg estimate for 2015 for 22 African Members is 31.96 mg/kg, with an upper-level estimate of 37.33 mg/kg when adjusted by estimate coverage.

The updated mg/kg estimate for 2016 for 16 African Members is 34.18 mg/kg, with an upper-level estimate of 40.62 mg/kg when adjusted by estimate coverage.

The updated mg/kg estimate for 2017 for 20 African Members is 24.92 mg/kg, with an upper-level estimate of 28.93 mg/kg when adjusted by estimate coverage.

The updated mg/kg estimate for 2018 for 24 African Members is 17.39 mg/kg, with an upper-level estimate of 18.22 mg/kg when adjusted by estimate coverage

Annex 3 Americas, Regional Focus

Table A3. General Information for the Americas during the Seventh Round of Data Collection

General Information for the Americas	
Number of Participants*	32
Number of Participants responding to the questionnaire	30 (94%)
Number of Participants providing qualitative data only	10 (33%)
Number of Participants providing quantitative data	20 (66%)

*31 WOAH Members, one non-contiguous territory and one non-WOAH Member

Since the second round of the data collection, WOAH's questionnaire has been sent to non-WOAH Members and non-contiguous territories that have asked to participate in the data collection survey.

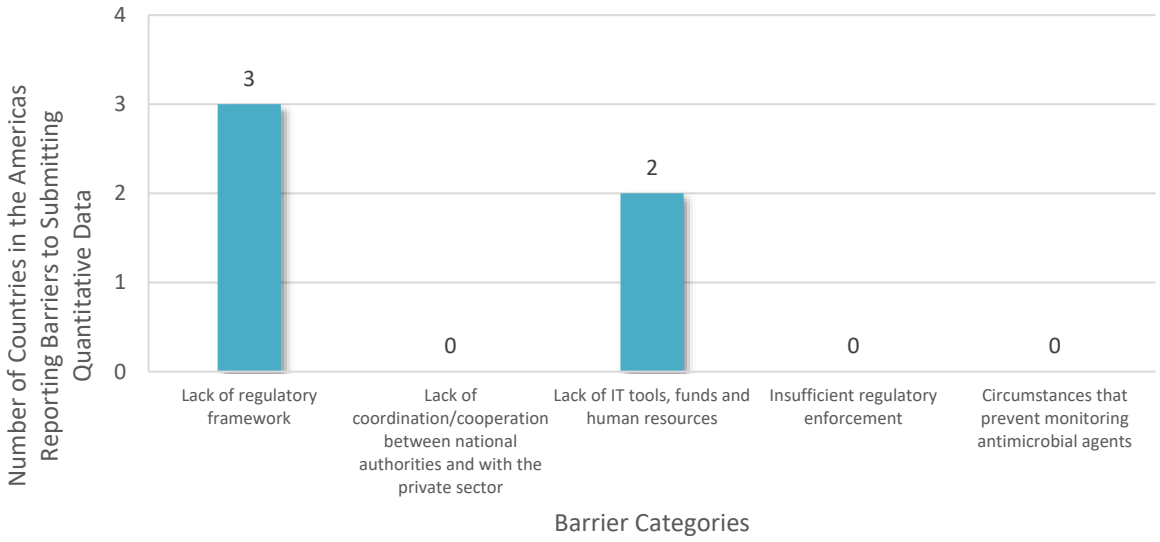
In the Americas, 30 Participants (n = 32; 94%) submitted completed reports to WOAH Headquarters: 28 from WOAH Members, one non-contiguous territory and one non-WOAH Member. The response from the non-contiguous territory was included in the analysis of the Americas for geographical reasons (Table A3).

Barriers to Providing Quantities of Antimicrobial Agents in Animals

Ten Participants (n = 30; 33%) responded with Baseline Information (qualitative data) with no quantitative data on antimicrobial agents used in animals. Five out of ten Participants explained their barriers to reporting antimicrobial quantities. Participants can report more than one barrier relevant to their situation, and responses were grouped by category (Figure A9). For further information on the category groupings, please refer to Section 3.6 of this report.

Three Participants in the Americas (three out of five; 60%) mentioned that the main impediment to reporting antimicrobial quantities was the lack of regulatory frameworks. Two Participants explained that the main barrier was the lack of tool or software to collect and analyse AMU data.

Figure A9. Barriers to Reporting Quantitative Data on Antimicrobial Agents Intended for Use in Animals in Five Participants in the Americas during the Seventh Round of Data Collection

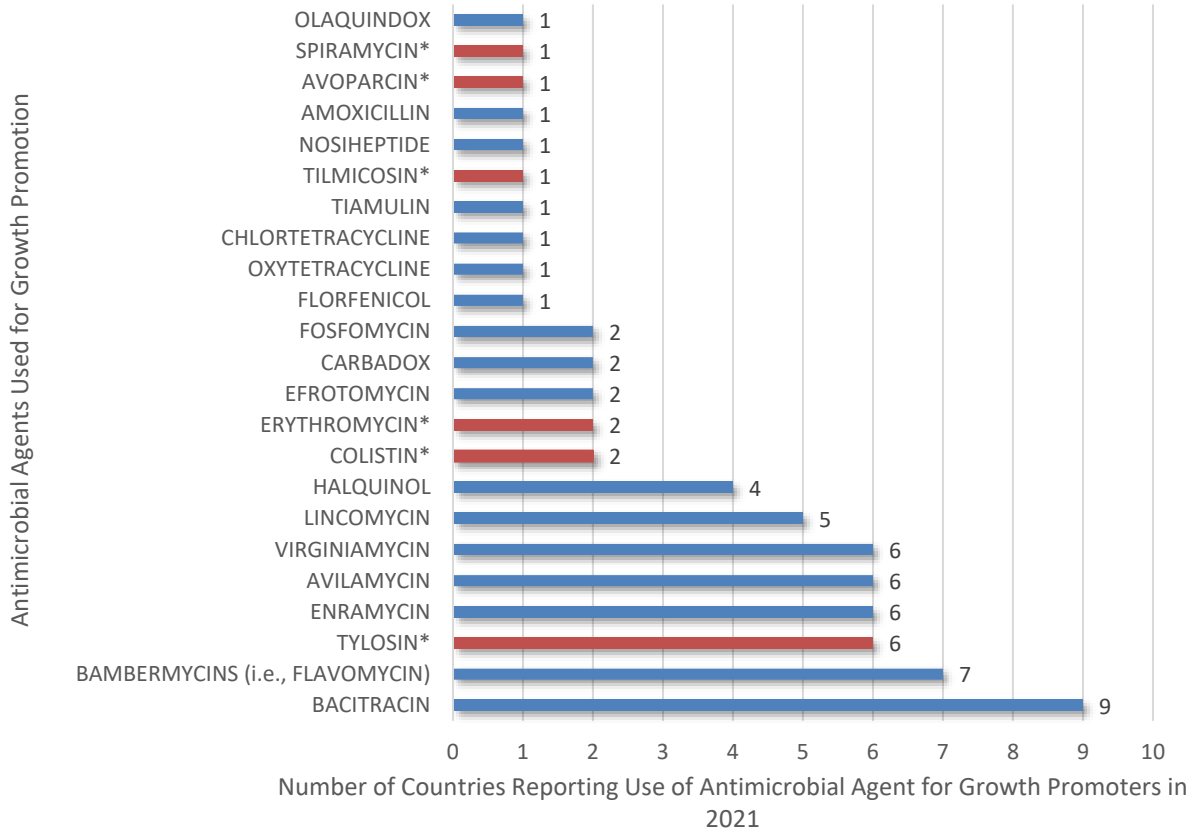


Antimicrobial Agents Used for Growth Promotion

Eighteen Participants (n = 30; 60%) in the Americas used antimicrobial agents as growth promoters in 2021. Of these, 13 Participants (n = 18; 72%) provided a list of antimicrobials used for growth promotion, with bacitracin and bambermycin (i.e. flavomycin) most commonly named (Figure A10).

Ionophores were excluded from reporting as they are mostly used for parasite control and have different regulatory classifications in different countries; however, seven Participants in the Americas reported the use of these molecules as growth promoters. Salinomycin and monensin were most commonly mentioned by these Participants.

Figure A10. Antimicrobial Growth Promoters Used in 13 Participants in the Americas in 2021



* The classes in the WHO category of Highest Priority Critically Important Antimicrobials should be the highest priority for Countries when phasing out the use of antimicrobial agents as growth promoters.

Americas is the second WOAH Region with most Participants reporting a lack of legislation or regulation for antimicrobials used as growth promoters (12 out of 18 Participants, 67%).

2019 Analysis of Antimicrobial Quantities

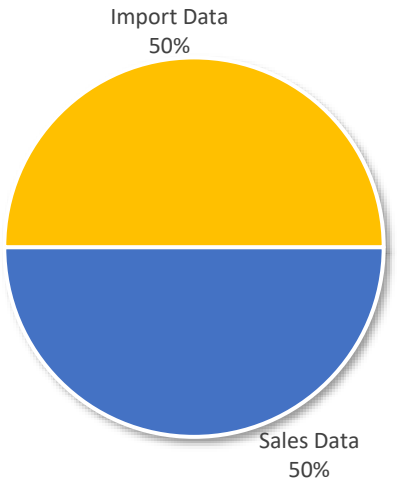
This section provides additional analysis of reported quantitative data on antimicrobial agents intended for use in animals adjusted by animal biomass, focusing on 2019. This analysis represents the antimicrobial quantities reported to WOAH from 15 Participants in the Americas during different rounds of data collection.

QUANTITATIVE DATA SOURCES CAPTURED

All Participants' data sources in the Americas were analysed, and Participants where data duplication was considered to be a risk were asked for clarification of their answers and/or data collection systems. Two Participants data sources (n = 15, 13%) were considered to present a risk of duplication; after the clarifications, the two Participants changed their original data sources. For a full explanation of quantitative data sources, see the Guidance for Completing the WOAH Template for the Collection of Data (Annex 8).

From the list of data source options provided in WOAH's template, import and sales data were the main data sources used by the Participants in the Americas (Figure A11).

Figure A11. Data Sources Selected by 15 Countries in the Americas Reporting Quantitative Information for 2019

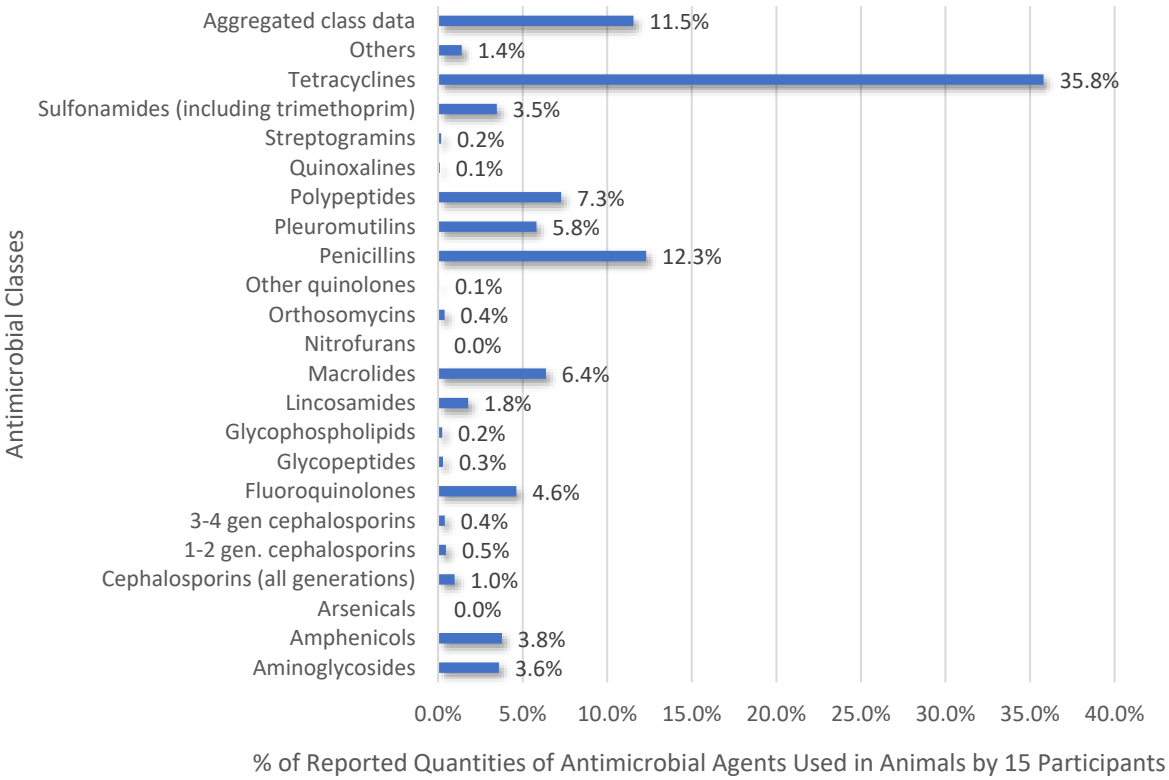


ANTIMICROBIAL QUANTITIES REPORTED IN 2019

For 2019, 15 Participants in the Americas provided validated antimicrobial quantities intended for use in animals. Of the 15 Participants, seven stated 100% coverage of the data source used to report the data. The eight Participants that did not cover 100% of available antimicrobial quantity data sources were asked to provide further information on uncaptured data sources. Among all Participants, the estimated data coverage was 86%. More information on the data coverage for the Americas is available in Table 5 of this report.

In the Americas, the largest proportion of all reported antimicrobial classes were tetracyclines, followed by penicillins and polypeptides (Figure A12). The *aggregated class data* category is used for confidentiality purposes at the national level, and it was reported by three Participants; therefore, the classes under this category cannot be disclosed.

Figure A12. Proportion of Antimicrobial Classes Reported for Use in Animals by 15 Participants in the Americas 2019

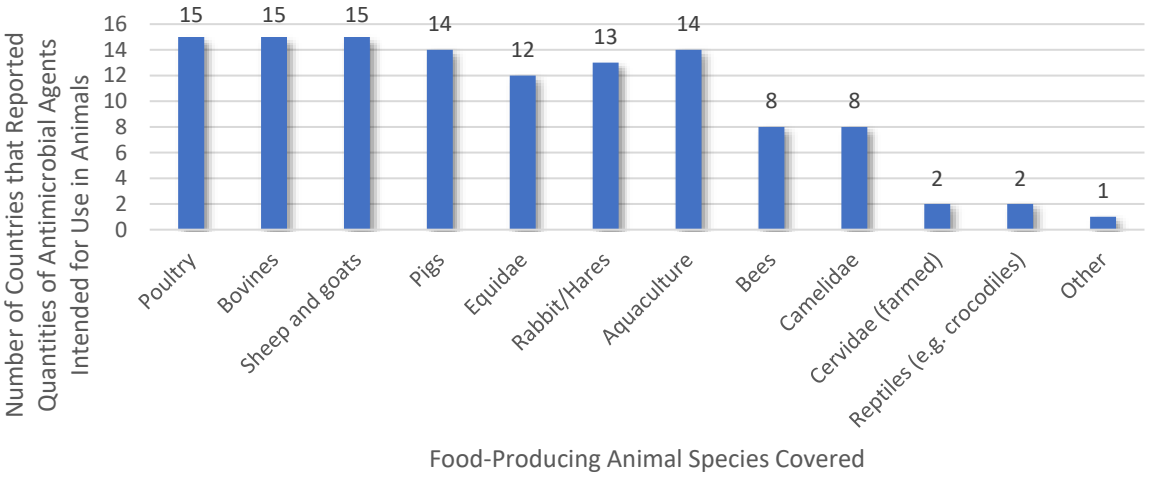


FOOD-PRODUCING TARGET SPECIES ON THE LABEL OF REPORTED VETERINARY PRODUCTS

Irrespective of whether the data could be differentiated by animal groups, all 15 Participants were asked to select the food-producing animal species covered by their data from a list supplied in WOAH's template and according to the products target species label. For descriptive purposes, some animals were grouped in categories, for more information on the grouping of animals see page 38 of this report.

In the 15 Participants from the Americas that reported antimicrobial quantities for 2019, the food-producing species most frequently covered by the data were poultry, bovines, and sheep and goats followed by pigs (Figure A13).

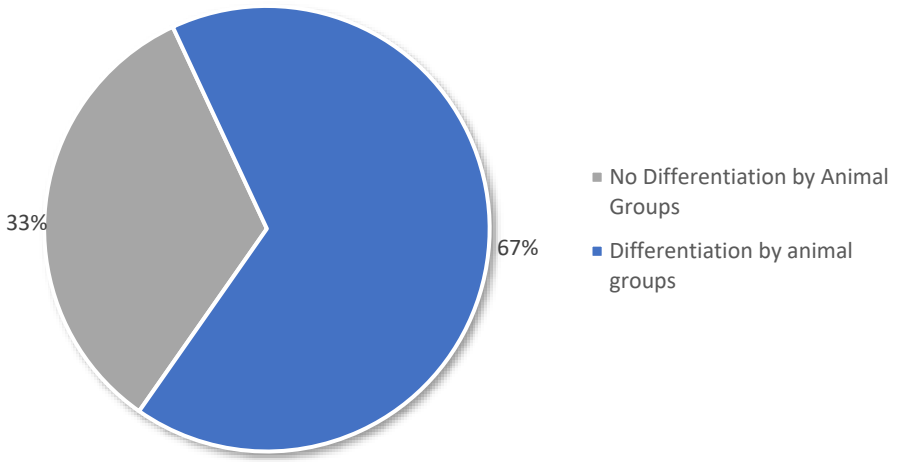
Figure A13. Food-Producing Animal Species Included in Quantitative Data Reported by 15 Countries in the Americas in 2019



QUANTITATIVE DATA DIFFERENTIATION BY ANIMAL GROUP

Most of the quantitative data from the Americas can be differentiated by animal group (Figure A14). For the Participants that were able to distinguish antimicrobial quantities by animal group, data were mainly provided for terrestrial food-producing animals and non-food-producing animals.

Figure A14. Differentiation by Animal Groups among 15 Participants in the Americas Reporting Quantitative Data in 2019

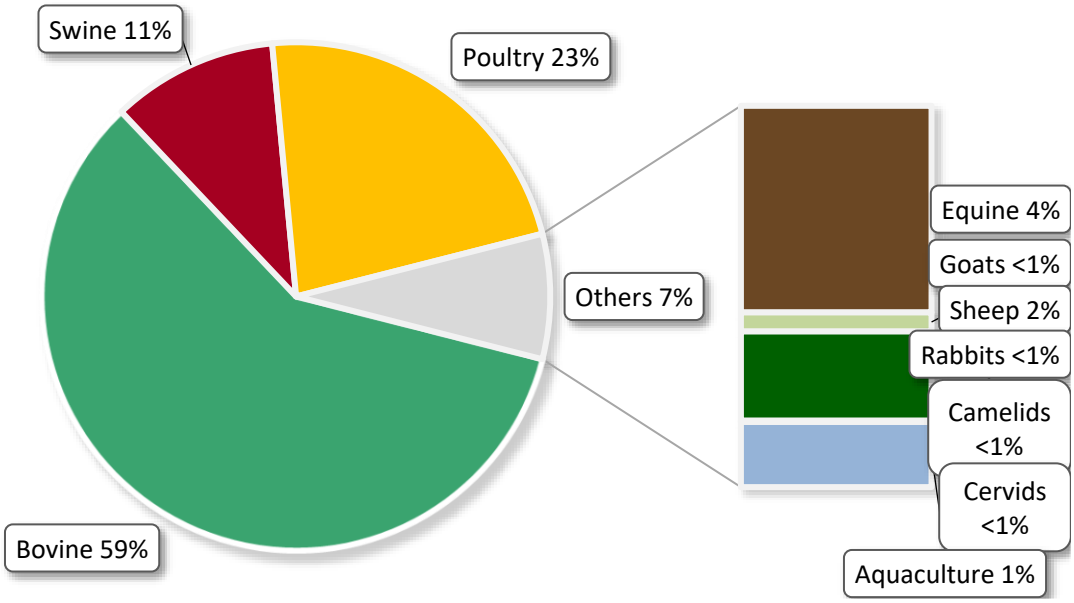


ANIMAL BIOMASS

The bovine species make an important contribution (59%) to the total biomass of the Americas. In comparison to other regions, small ruminants (sheep and goats), have a relatively low impact on the region's biomass.

For one Participant of this region, animal population data was unavailable in the public databases; therefore, animal biomass was not calculated, and the Participant was not included in the mg/kg analysis.

Figure A15. Species Composition of Animal Biomass for the 14 Participants in Americas Included in 2019 Quantitative Data Analysis



ANTIMICROBIAL QUANTITIES ADJUSTED BY ANIMAL BIOMASS

In the Americas, the mg/kg estimate for 2019 for 14 Participants is 82.29 mg/kg, with an upper-level estimate of 99.48 mg/kg when adjusted by estimated coverage.

Changes in mg/kg results from 2014 to 2018

The updated mg/kg estimate for 2014 for six Participants in the Americas is 94.93 mg/kg, with an upper-level estimate of 98.61 mg/kg when adjusted by estimate coverage.

The updated mg/kg estimate for 2015 for six Participants in the Americas is 94.97 mg/kg, with an upper-level estimate of 97.86 mg/kg when adjusted by estimate coverage.

The updated mg/kg estimate for 2016 for ten Participants in the Americas is 87.78 mg/kg, with an upper-level estimate of 107.20 mg/kg when adjusted by estimate coverage.

The updated mg/kg estimate for 2017 for 15 Participants in the Americas is 69.44 mg/kg, with an upper-level estimate of 87.42 mg/kg when adjusted by estimate coverage.

The updated mg/kg estimate for 2018 for 16 Participants in the Americas is 68.16 mg/kg, with an upper-level estimate of 83.60 mg/kg when adjusted by estimate coverage.

Annex 4 Asia, Far East and Oceania, Regional Focus

Table A4. General Information for Asia during the Seventh Round of Data Collection

General Information for Asia, Far East and Oceania	
Number of WOAH Members	32
Number of WOAH Members responding to the questionnaire	27 (84%)
Number of WOAH Members providing qualitative data only	3 (11%)
Number of WOAH Members providing quantitative data	24 (89%)

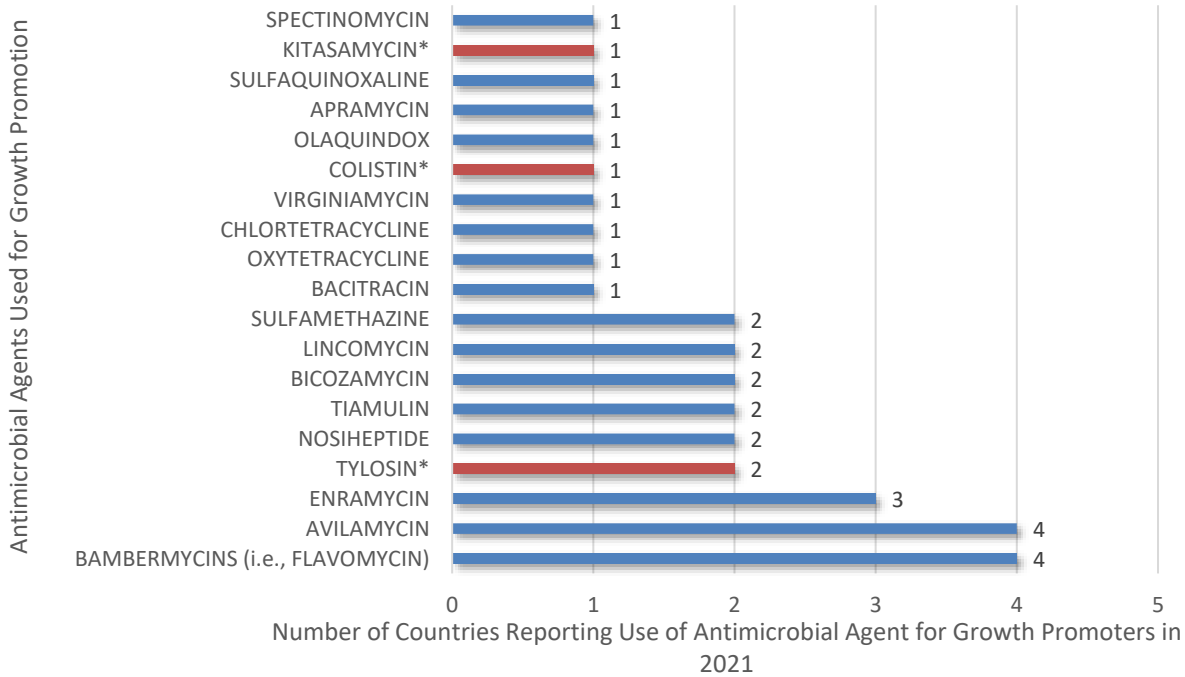
Barriers to Providing Quantities of Antimicrobial Agents in Animals

For the seventh round, three Members responded with Baseline Information (qualitative data) with no quantitative data on antimicrobial agents used in animals. Only one Member explained the reasons for not providing quantitative data, which belong to the category of lack of a regulatory framework to collect the data and explained that the Ministry of Health was the one responsible for authorising the import permits of the veterinary products in the country.

Antimicrobial Agents Used for Growth Promotion

Eleven Members (n = 27; 41%) reported the use of antimicrobials as growth promoters. Of these, six Members (n = 11; 55%) provided a list of utilised agents, the most frequently listed antimicrobial agents for this purpose were bambermycin (i.e. flavomycin) and avilamycin (Figure A16).

Figure A16. Antimicrobial Growth Promotors Used in Animals in Asia, Far East and Oceania in 2021 as reported by Six Members



* The classes in the WHO category of Highest Priority Critically Important Antimicrobials should be the highest priority for Countries when phasing out the use of antimicrobial agents as growth promoters.

2019 Analysis of Antimicrobial Quantities

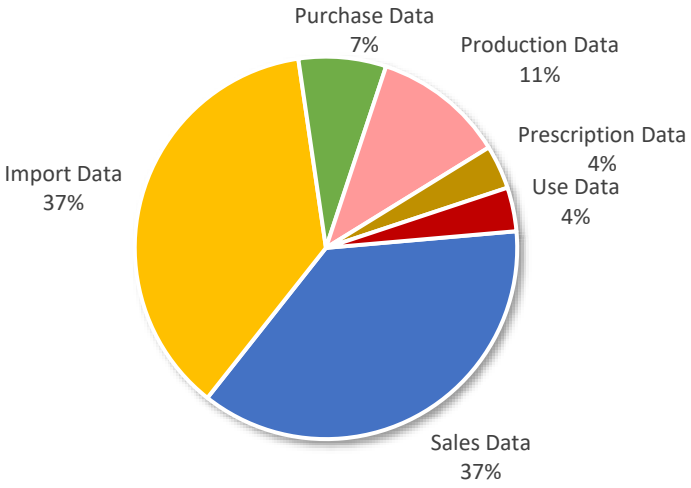
This section provides additional analysis of reported quantitative data on antimicrobial agents intended for use in animals adjusted by animal biomass, focusing on 2019. This analysis represents the antimicrobial quantities reported to WOAH from 22 Members in Asia, Far East and Oceania during all four rounds of data collection.

QUANTITATIVE DATA SOURCES CAPTURED

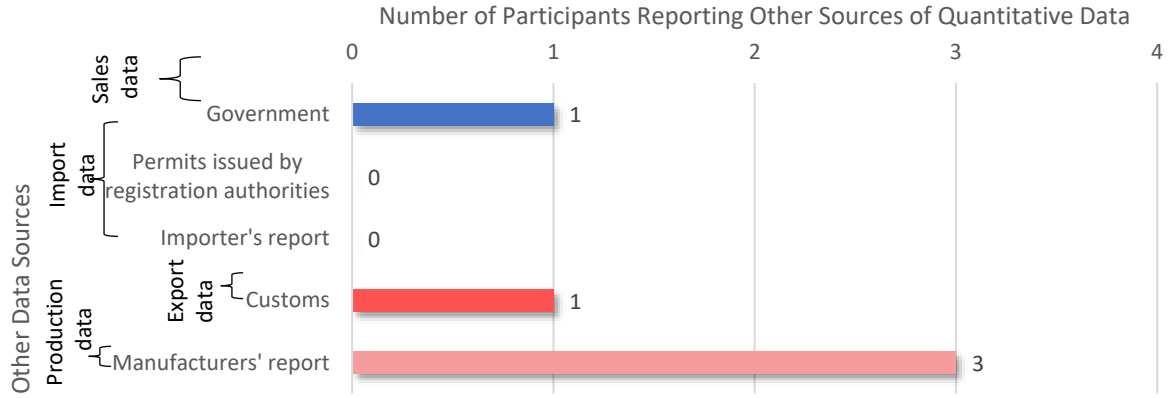
All Member's data sources in Asia, Far East and Oceania were analysed, and all Members where data duplication was considered a risk were asked for clarification on their answers and/or data collection systems. Six Member's data sources (n = 22; 27%) were considered to present a risk of duplication; after clarifications, five Countries (n = 6; 83%) changed their answers or proved there was no duplication or overlapping of data sources. The one remaining Country that did not provide clarifications was excluded from the analysis of data sources in Figure A17. For a full explanation of quantitative data sources, see the Guidance for Completing WOAH's Template for the Collection of Data (Annex 8).

From the list of data source options provided in WOAH's template, import and sales data were most commonly chosen (Figure A17). In addition, four Members described other data source not included in WOAH List, relating mainly to import and production data (Figure A18).

Figure A17. Data Sources Selected by 21 Members in Asia, Far East and Oceania Reporting Quantitative Information for 2019



'Other' Sources of Data as Explained by Four Members in Asia, Far East and Oceania Reporting Quantitative Information for 2019

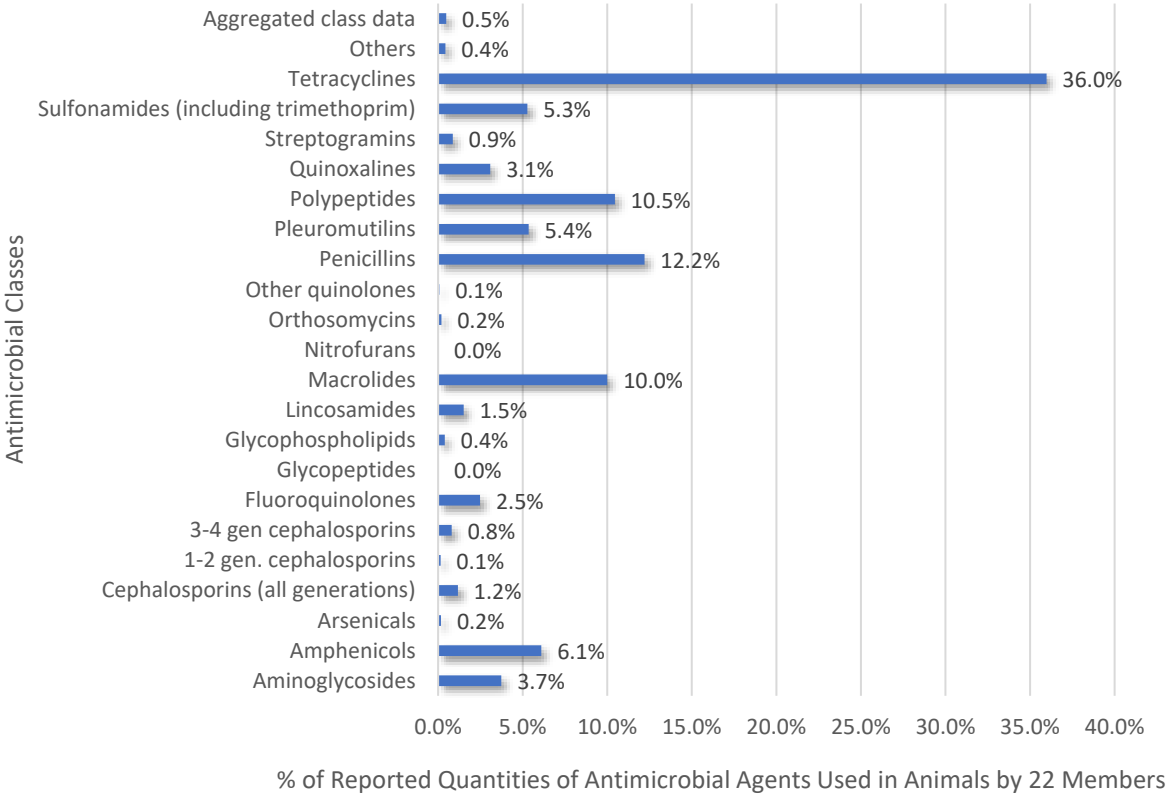


ANTIMICROBIAL QUANTITIES REPORTED IN 2019

For 2019, 22 Participants in Asia, Far East and Oceania provided validated antimicrobial quantities intended for use in animals. Of these 22 Members, nine stated 100% coverage of the data sources used to report the data. The 13 Members that did not cover 100% of available antimicrobial quantities data sources were asked to provide further information on uncaptured data sources. For the 22 Members, the estimated data coverage was 92%. More information on the data coverage for Asia, Far East and Oceania, is available in Table 5 of this report.

In Asia, Far East and Oceania, the largest proportion of all reported antimicrobial classes were tetracyclines, followed by penicillins and polypeptides (Figure A18).

Figure A18. Proportion of Antimicrobial Classes Reported for Use in Animals by 22 Members in Asia, Far East and Oceania in 2019

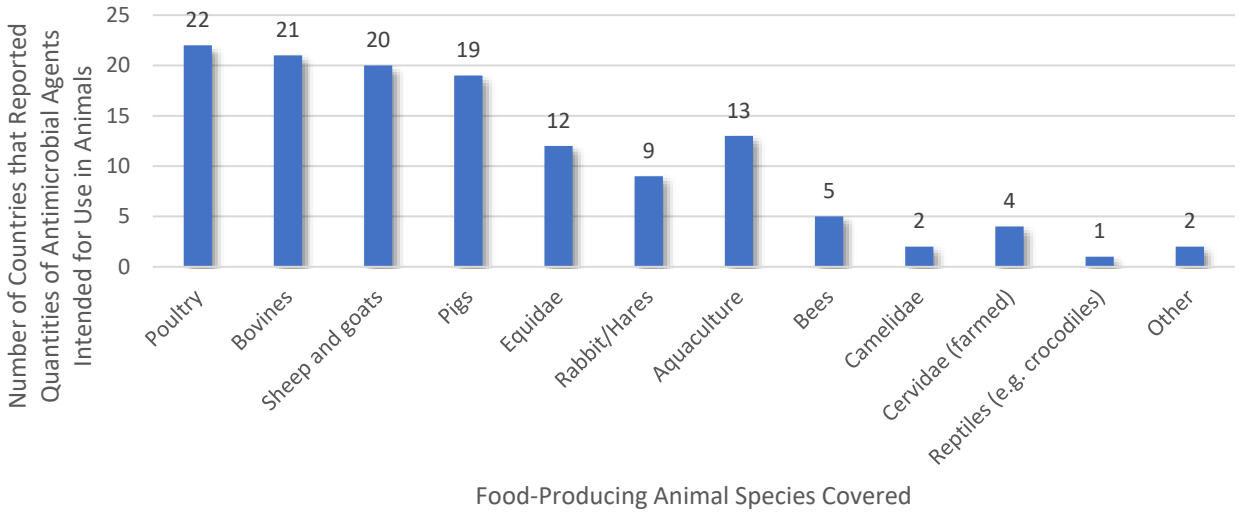


FOOD-PRODUCING TARGET SPECIES ON THE LABEL OF REPORTED VETERINARY PRODUCTS

Irrespective of whether the data could be differentiated by animal groups, all 22 Members were asked to select the food-producing animal species covered by their data from a supplied list in WOAH's template and according to the products target species label. For descriptive purposes, some animals were grouped into categories, for more information on the grouping of animals see page 38 of this report.

Of the 22 Members from Asia, Far East and Oceania that reported antimicrobial quantities for 2019, the food-producing species most frequently covered by the data were poultry, followed by bovines, sheep and goats, and swine (Figure A20). Asia, Far East and Oceania is the second WOAH region that has more Participants whose data cover aquaculture.

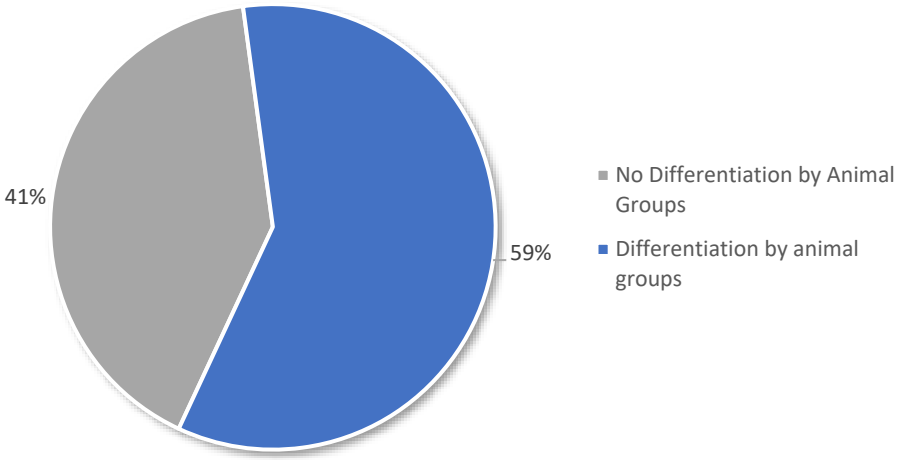
Figure A19. Food-Producing Animal Species Included in Quantitative Data Reported by 22 Members in Asia, Far East and Oceania in 2019



QUANTITATIVE DATA DIFFERENTIATION BY ANIMAL GROUP

Most of the quantitative data from Asia, Far East and Oceania can be differentiated by animal group (Figure A21). For the Members that were able to distinguish antimicrobial quantities by animal group, data were mainly provided for terrestrial food-producing animals and companion animals.

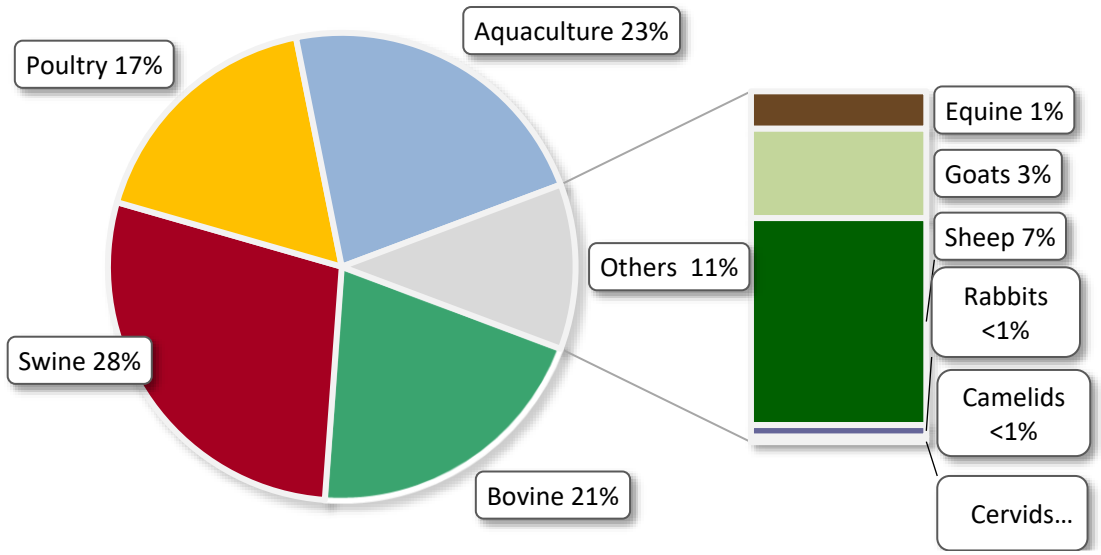
Figure A20. Differentiation by Animal Groups among 22 Members in Asia, Far East an Oceania Reporting Quantitative Data in 2019



ANIMAL BIOMASS

In contrast to the three other regions, the species contributing the most to the total biomass in Asia is swine, totalling 28% of the biomass followed by 23% for aquaculture and 21% for bovines. However, as detailed previously, *percentages of aquaculture should be interpreted with caution as the aquaculture biomass was only included for those Countries reporting that their data on antimicrobial agents covered aquaculture*. Therefore, the effect of aquaculture on biomass is skewed by the number of Participants in that WOAH Region for which antimicrobials used in aquaculture were included.

Figure A21. Species Composition of Animal Biomass for the 22 Members in Asia, Far East and Oceania Included in 2019 Quantitative Data Analysis



ANTIMICROBIAL QUANTITIES ADJUSTED BY ANIMAL BIOMASS

In Asia, Far East and Oceania, the mg/kg estimate for 2019 of 22 Members is 161.22 mg/kg, with an upper-level estimate of 166.72 mg/kg when adjusted by estimated coverage.

Changes in mg/kg results from 2014 to 2018

The updated mg/kg estimate for 2014 for five Asian Members is 95.09 mg/kg, with an upper-level estimate of 95.09 mg/kg when adjusted by estimate coverage.

The updated mg/kg estimate for 2015 for 15 Asian Members is 206.22 mg/kg, with an upper-level estimate of 208.07 mg/kg when adjusted by estimate coverage.

The updated mg/kg estimate for 2016 for 17 Asian Members is 205.60 mg/kg, with an upper-level estimate of 206.95 mg/kg when adjusted by estimate coverage.

The updated mg/kg estimate for 2017 for 20 Asian Members is 192.41 mg/kg, with an upper-level estimate of 198.15 mg/kg when adjusted by estimate coverage.

The updated mg/kg estimate for 2018 for 22 Asian Members is 147.35 mg/kg, with an upper-level estimate of 158.12 mg/kg when adjusted by estimate coverage.

Annex 5 Europe, Regional Focus

Table A5. General Information for Europe during the Seventh Round of Data Collection

General Information for Europe	
Number of WOAH Members	53
Number of WOAH Members responding to the questionnaire	51 (96%)
Number of WOAH Members providing qualitative data only	5 (10%)
Number of WOAH Members providing quantitative data	46 (90%)

Barriers to Providing Quantities of Antimicrobial Agents in Animals

For the seventh round of data collection, only five contributing Participants in Europe did not report antimicrobial quantities. From these Participants, only one explained that lack of IT tool to collect AMU data was the main reason for not sending antimicrobial quantities.

Antimicrobial Agents Used for Growth Promotion

From Europe, one Participant (n = 51; 2%) reported the use of antimicrobial growth promoters in animals but did not send the list of the molecules used for this purpose. Another Member (n = 51; 2%) reported that the use of growth promoters in the field was unknown and one cited a lack of legislation or regulation for these molecules.

2019 Analysis of Antimicrobial Quantities

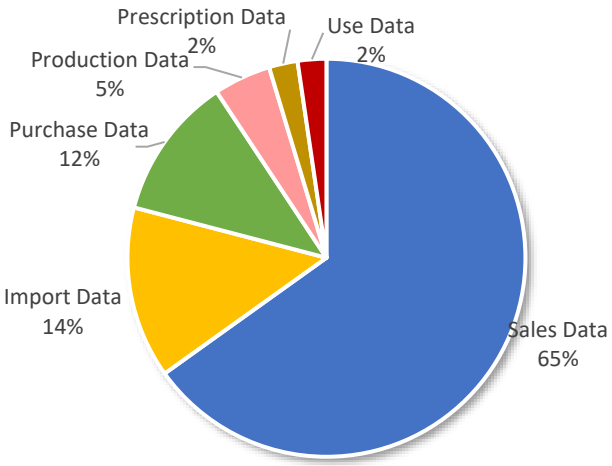
This section provides additional analysis of reported quantitative data on antimicrobial agents intended for use in animals adjusted by animal biomass, focusing on 2019. This analysis represents the antimicrobial quantities reported to WOAH from 42 Countries in Europe during different rounds of data collection.

QUANTITATIVE DATA SOURCES CAPTURED

All Member's data sources in Europe were analysed, and all Members where data duplication was considered a risk were asked for clarification of their answers and/or data collection systems. Four Participant's data sources (n = 42; 10%) were considered to present a risk of duplication; after clarifications, three Participants (n = 4; 75%) changed their answers or proved there was no duplication or overlapping of data sources, the remaining Participant was excluded from this analysis. For a full explanation of quantitative data sources, see the Guidance for Completing WOAH's Template for the Collection of Data (Annex 8).

From the list of data source options provided in WOAH's template, sales data for veterinary products as declared by wholesalers was most commonly chosen, with 19 Members (n= 41; 46%) selecting this option (Figure A23).

Figure A22. Data Sources Selected by 41 Countries in Europe Reporting Quantitative Information for 2019

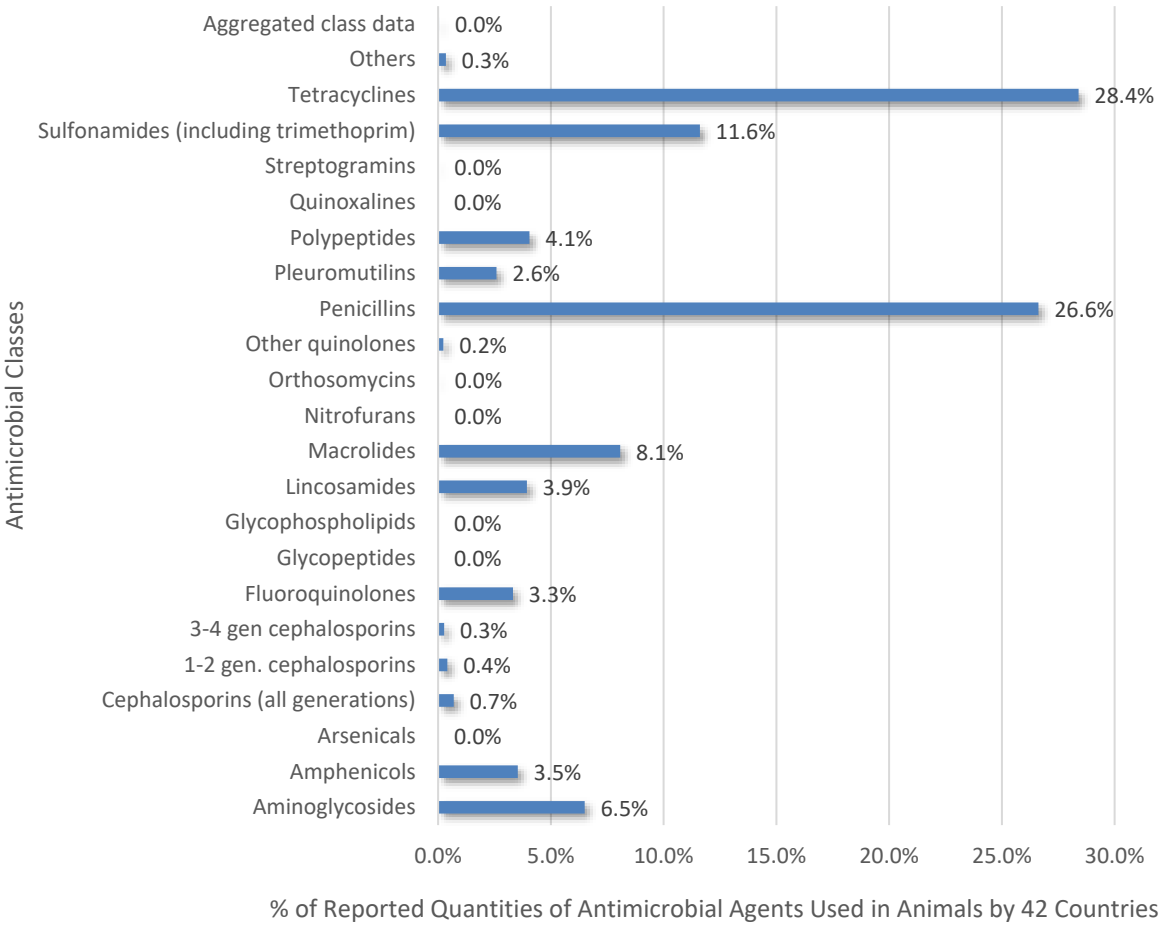


ANTIMICROBIAL QUANTITIES REPORTED IN 2019

For 2019, 42 Countries in Europe provided validated antimicrobial quantities intended for use in animals. Of the 42 Countries, 26 stated 100% coverage of the data source used to report the data. The 16 Countries that did not cover 100% of available antimicrobial quantities were asked to provide further information on uncaptured data sources. For the 42 Countries, the estimated data coverage was 95%. For more information on the data coverage for Europe, please refer to Table 5 of this report.

In Europe, the largest proportion of all reported antimicrobial classes were tetracyclines, followed by penicillins and sulfonamides (Figure A23).

Figure A23. Proportion of Antimicrobial Classes Reported for Use in Animals by 42 European Members in 2019

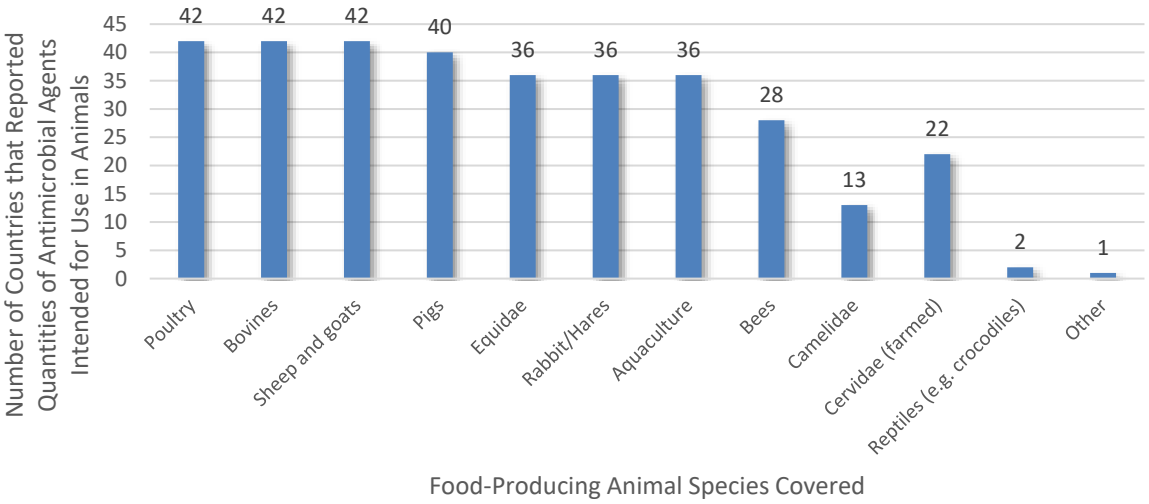


FOOD-PRODUCING TARGET SPECIES ON THE LABEL OF REPORTED VETERINARY PRODUCTS

Irrespective of whether the data could be differentiated by animal group, all 42 Participants were asked to identify the food producing animal species covered by their data from a list supplied in WOAH's template and according to the products target species label. For descriptive purposes some animals were grouped into categories, for more information on the grouping of animals see page 38 of this report.

From the 42 Members from Europe that reported antimicrobial quantities for 2019, the food-producing species most frequently covered by the data were poultry, bovines, sheep and goats followed by pigs (Figure A25). Europe is WOAH's region with the greatest number of Countries covering aquaculture.

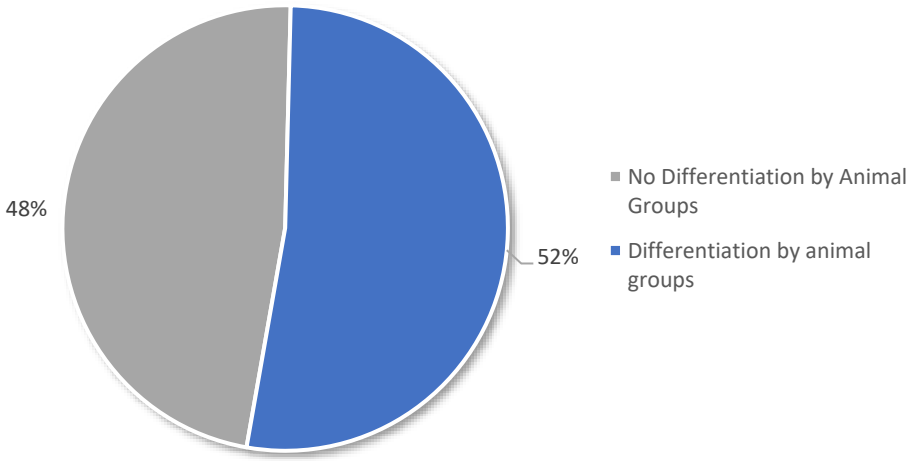
Figure A24. Food-Producing Animal Species Included in Quantitative Data Reported by 42 Members in Europe in 2019



QUANTITATIVE DATA DIFFERENTIATION BY ANIMAL GROUPS

Most of the quantitative data from Europe can be differentiated by animal group (Figure A26). For the Members that were able to distinguish antimicrobial quantities by animal groups, data were mainly provided for food-producing animals (terrestrial and aquatic combined).

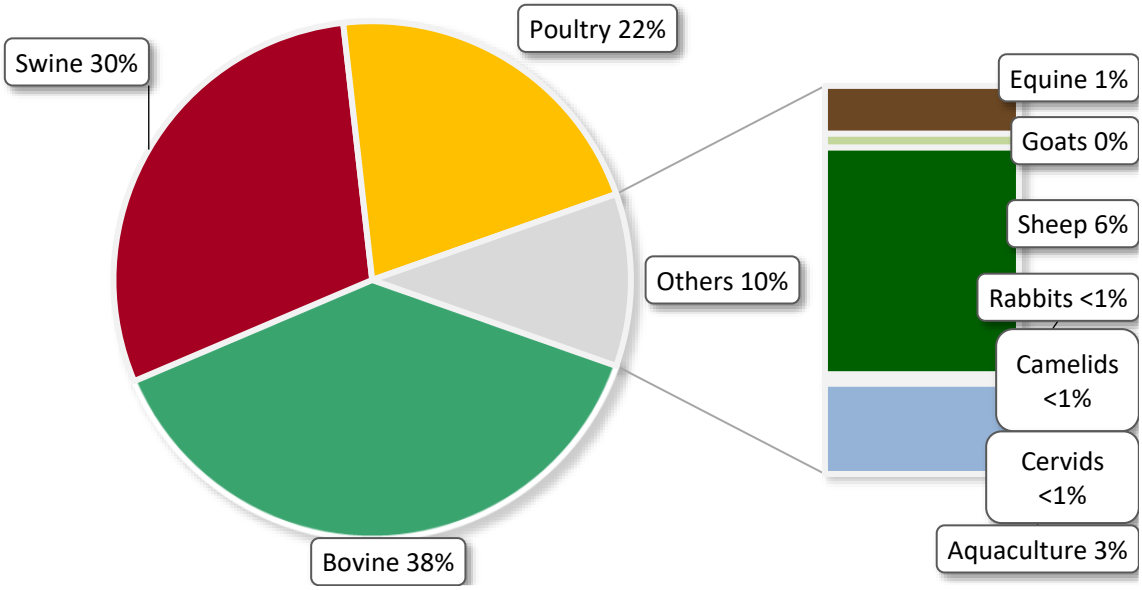
Figure A25. Differentiation by Animal Groups among 42 Members in Europe Reporting Quantitative Data in 2019



ANIMAL BIOMASS

The relative species composition of animal biomass in Europe is very similar to the global composition of animal biomass, with the four main species bovine, swine, poultry and sheep, representing more than 95% of the total biomass of the region. One country was excluded from this analysis as there was no data from WAHIS nor FAOSTAT.

Figure A26. Species Composition of Animal Biomass for the 41 Members in Europe Included in 2019 Quantitative Data Analysis



ANTIMICROBIAL QUANTITIES ADJUSTED BY ANIMAL BIOMASS

In Europe, the mg/kg estimate for 2019 for 41 Members is 52.14 mg/kg, with an upper-level estimate of 53.55 mg/kg when adjusted by estimated coverage.

Changes in mg/kg results from 2014 to 2018

The updated mg/kg estimate for 2014 for 31 European Members is 91.53 mg/kg, with an upper-level estimate of 93.19 mg/kg when adjusted by estimate coverage.

The updated mg/kg estimate for 2015 for 35 European Members is 79.65 mg/kg, with an upper-level estimate of 83.52 mg/kg when adjusted by estimate coverage.

The updated mg/kg estimate for 2016 for 39 European Members is 69.74 mg/kg, with an upper-level estimate of 71.35 mg/kg when adjusted by estimate coverage.

The updated mg/kg estimate for 2017 for 39 European Countries is 59.42 mg/kg, with an upper-level estimate of 61.56 mg/kg when adjusted by estimate coverage.

The updated mg/kg estimate for 2018 for 43 European Countries is 57.49 mg/kg, with an upper-level estimate of 59.22 mg/kg when adjusted by estimate coverage.

Annex 6 Middle East, Regional Focus

Table A6. General Information for the Middle East during the Seventh Round of Data Collection

General Information for the Middle East	
Number of WOAH Members	12
Number of WOAH Members responding to the questionnaire	8 (67%)
Number of WOAH Members providing qualitative data only	4 (50%)
Number of WOAH Members providing quantitative data	4 (50%)

Barriers to Providing Quantities of Antimicrobial Agents in Animals

During the seventh round, four Members (n = 8; 50%) responded with Baseline Information (qualitative data) with no quantitative data on antimicrobial agents intended for use in animals (Table A6). Two out of four explained their barrier to reporting quantities of antimicrobial agents used in animals. Both mentioned the lack of staff and IT tools to collect, analyse and submit the antimicrobial quantities.

Antimicrobial Agents Used for Growth Promotion

From the Middle East, one Member reported that there was a use of antimicrobial growth promoters in animals. This Member stated that there was a legislation/regulation for the authorisation of growth promoters but did not provide any list to WOAH.

2019 Analysis of Antimicrobial Quantities

Due to confidentiality concerns, most variables included in the analysis of 2019 cannot be published in this report for the Middle East as the data represents only a small number of Countries. Higher participation in the Middle East Region in the future would allow a more in-depth study of the data.

Annex 7 WOAH Template

Q	*** This sheet of the OIE template should be completed by all countries *** Please refer to the Guidance document for further instructions.	
A. Contact Person for Antimicrobial Agents Use Data Collection		
1	**Title**	<free text field>
2	**Name (First name, SURNAME)**	<free text field>
3	**Role with respect to the OIE**	☐ OIE Delegate ☐ OIE Focal Point for Veterinary Products ☐ Other National Competent Authority
4	**Organisation**	<free text field>
5	**Organisation's Address**	<free text field>
6	**Country**	<free text field>
7	**Phone Number**	<free text field>
8	**Email Address**	<free text field>
B. General Information		
*Questions 9 to 14 are related to the **current** situation in your country. Responses should not be linked to the year of antimicrobial quantities reported.*		
9	**Are data on the amount of antimicrobial agents intended for use in animals available?**	☐ Amounts available - Yes ☐ Amounts available - No
10	*Please indicate why the data are not available at this time in your country, if the answer to Question 9 is 'No'*	*<free text field>*
11	**Are antimicrobial agents used for growth promotion purposes in animals in your country?**	☐ Yes ☐ No ☐ Unknown
12	**Does your country have legislation/regulations on antimicrobial agents as growth promoters in animals?**	☐ Legislation/regulation exists - Yes ☐ Legislation/regulation does not exist - No
13	**If your country has legislation/regulation on antimicrobial agents as growth promoters in animals, could you please indicate the appropriate case that applies in your country?**	☐ All antimicrobial agents banned for use as growth promoters ☐ Some antimicrobial agents banned for use as growth promoters ☐ One or more antimicrobial growth promoters are authorised for use
14	*Please provide a list of antimicrobial agents used or authorised as growth promoters, if any*	*<free text field>*
*If your response to Question 9 is '**No**', please kindly send this template, once validated by the OIE Delegate and with your OIE Delegate in copy, to the OIE Antimicrobial Use Team at:* antimicrobialuse@oie.int *If your response to Question 9 is **'Yes**', please kindly complete Section C "Data Collection".*		

C. Data collection of Antimicrobial Agents Intended for Use in Animals		
*** Please provide data for **2018** If you have data for another year, please select the year from the list below ***		
15	**Year for which data apply** (Please select only one year per template)	☐ 2019 (target year) ☐ 2020 (optional) ☐ 2021 (optional)
16	**Time period for which data are provided** (e.g., from 1 January to 31 December 2019)	**from:** <DD-MM-YYYY> **to:** <DD-MM-YYYY>
17	**Data source**	**Sales data** ☐ Sales data - Wholesalers ☐ Sales data - Retailers ☐ Sales data - Marketing Authorisation Holders ☐ Sales data - Registration Authorities ☐ Sales data - Feed Mills ☐ Sales data - Pharmacies ☐ Sales data - Farms Shops/Agricultural Suppliers ☐ Sales data - Industry Trade Associations **Purchase data** ☐ Purchase data - Wholesalers ☐ Purchase data - Retailers ☐ Purchase data - Feed Mills ☐ Purchase data - Pharmacies ☐ Purchase data - Agricultural Cooperatives ☐ Purchase data - Producer Organisations **Import data** ☐ Import data - Customs declarations - Veterinary Medicinal Product ☐ Import data - Customs declarations - Active Ingredient **Veterinary data** ☐ Veterinary data - Sales ☐ Veterinary data - Prescriptions **Antimicrobial use data** ☐ Antimicrobial use data - Farm Records **Other data source(s)** ☐ Other
18	*Clarification of the data source, if your response to Question 17 is 'Other'*	*<free text field>*
19	**Estimated coverage of accessible data out of total amount (in %)**	**0%**
20	*Explanation of estimated coverage*	<free text field>
21	**Is the information extrapolated from representative samples?**	☐ Data extrapolated from representatives samples - Yes ☐ Data extrapolated from representatives samples - No
22	*Explanation of extrapolations carried out, if your response to Question 21 is 'Yes'*	*<free text field>*
23	**Can data be differentiated by animal group?**	☐ Data differentiated by animal group - Yes ☐ Data differentiated by animal group - No
24	**Animal groups <u>covered by the data</u>**	☐ Data with no differentiation (all animals combined) ☐ Data for terrestrial and aquatic food animals (all food-producing animals combined) ☐ Data for terrestrial food-producing animals and non-food-producing animals (combined) ☐ Data for terrestrial food-producing animals ☐ Data for aquatic food-producing animals ☐ Data for non-food-producing animals

25	**Food-producing animal species covered by the information on antimicrobial quantities**	**Terrestrial food-producing animals** ☐ Cattle ☐ Pigs - commercial ☐ Pigs - backyard ☐ Sheep ☐ Goats ☐ Sheep and goats (mixed flocks) ☐ Layers - commercial production for eggs ☐ Broilers - commercial production for meat ☐ Other commercial poultry ☐ Poultry - backyard ☐ Buffaloes (excluding Syncerus caffer) ☐ Cervidae (farmed) ☐ Camelidae ☐ Equidae ☐ Rabbits ☐ Bees - honey ☐ Reptiles (e.g. crocodiles) **Other terrestrial food-producing animals** ☐ Other **All terrestrial food-producing animals** ☐ All - terrestrial food-producing animals **Aquatic food-producing animals (aquaculture)** ☐ Fish - Cyprinidae ☐ Fish - Salmonidae ☐ Fish - Cichlidae ☐ Fish - Siluriformes ☐ Fish - Marine ☐ Fish - Undefined ☐ Crustaceans - Penaeidae ☐ Molluscs ☐ Amphibians **Other aquatic food-producing animals (aquaculture)** ☐ Other **All aquatic food-producing animals (aquaculture)** ☐ All - aquatic food-producing animals (aquaculture)
26	*Clarification of other species considered to be food-producing, if your response to Question 25 is 'Other commercial poultry' or 'Other'*	*<free text field>*
27	**Non-food-producing animal species covered by antimicrobial quantities, if any**	☐ Canines ☐ Felines ☐ Equidae ☐ Ornamental fish ☐ Other
28	*Clarification of other species considered to be non-food-producing animals, if your response to Question 27 is 'Other'*	*<free text field>*
29	**Can data be differentiated by route of administration?**	☐ Data differentiated by route of administration - Yes ☐ Data differentiated by route of administration - No
30	**National report(s) on sales/use of antimicrobial agents in animals available on the web?**	☐ Report available on the web - Yes ☐ Report available on the web - No
31	*Please provide the link to the report, if the answer to Question 30 is 'Yes'*	*<free text field>*

According to your respon ses to the questions above, you are invited to fill in the following Reporting Option:	
REPORTING OPTION	**Appropiate for your Country**
Option 1	NO
Option 2	NO
Option 3	NO

OIE template for the collection of data on antimicrobial agents intended for use in animals

Reporting option 1 - Overall amount sold for/used in animals by antimicrobial class; with the possibility to separate by type of use

Antimicrobial Class	Overall Amount: **Veterinary Medical Use + Growth Promotion**	Amount: **Veterinary Medical Use** (including prevention of clinical signs)	Amount: **Growth Promotion**
	All animal species (kg)	**All animal species (kg)**	**All animal species (kg)**
Aminoglycosides	0		
Amphenicols	0		
Arsenicals	0		
Cephalosporins (all generations)	0	0	0
1-2 gen. cephalosporins	0		
3-4 gen cephalosporins	0		
Fluoroquinolones	0		
Glycopeptides	0		
Glycophospholipids	0		
Lincosamides	0		
Macrolides	0		
Nitrofurans	0		
Orthosomycins	0		
Other quinolones	0		
Penicillins	0		
Pleuromutilins	0		
Polypeptides	0		
Quinoxalines	0		
Streptogramins	0		
Sulfonamides (including trimethoprim)	0		
Tetracyclines	0		
Others	0		
Aggregated class data	0		
Total kg	0	0	0

*If **'Aggregated class data'** are reported , please list the classes combined*	*<free text field>*	List all classes for which the amounts were combined, using whenever possible the 'Antimicrobial class' terms or the terminology of the OIE List of antimicrobial agents of veterinary importance. Substances included in the data aggregation that are not part of the recommended terminology should also be listed. If one class was reported that needs to remain **confidential**, please enter **'Confidential'**.
*If **'Others'** are reported under 'Antimicrobial class', please list the classes reported*	*<free text field>*	Describe the class or classes reported as 'Others', using whenever possible the terminology of the OIE list of antimicrobial agents of veterinary importance.
*Please report any **additional calculations** applied*	*<free text field>*	Please describe the calculations carried out in addition to the ones recommended by the OIE in sections 1 and 2 of the annex to the instructions for the completion of the OIE template.

OIE template for the collection of data on antimicrobial agents intended for use in animals

Reporting option 2 - Overall amount sold for/used in animals by antimicrobial class; with the possibility to separate by type of use and species group

Antimicrobial Class	Overall Amount: Veterinary Medical Use + Growth Promotion	Amount: Veterinary Medical Use (including prevention of clinical signs)					Amount: Growth Promotion
	All animal species (kg)	All animal species (kg)	Companinon animals (kg)	All Food-producing animals (terrestrial & aquatic) (kg)	Terrestrial Food-producing animals (kg)	Aquatic Food-producing animals (kg)	All Food-producing animals (terrestrial & aquatic) (kg)
Aminoglycosides	0	0		0			
Amphenicols	0	0		0			
Arsenicals	0	0		0			
Cephalosporins (all generations)	0	0	0	0	0	0	0
1-2 gen. cephalosporins	0	0		0			
3-4 gen cephalosporins	0	0		0			
Fluoroquinolones	0	0		0			
Glycopeptides	0	0		0			
Glycophospholipids	0	0		0			
Lincosamides	0	0		0			
Macrolides	0	0		0			
Nitrofurans	0	0		0			
Orthosomycins	0	0		0			
Other quinolones	0	0		0			
Penicillins	0	0		0			
Pleuromutilins	0	0		0			
Polypeptides	0	0		0			
Quinoxalines	0	0		0			
Streptogramins	0	0		0			
Sulfonamides (including trimethoprim)	0	0		0			
Tetracyclines	0	0		0			
Others	0	0		0			
Aggregated class data	0	0		0			
Total kg	0	0	0	0	0	0	0

*If **'Aggregated class data'** are reported, please list the classes combined*	*<free text field>*	List all classes for which the amounts were combined, using whenever possible the 'Antimicrobial class' terms or the terminology of the OIE List of antimicrobial agents of veterinary importance. Substances included in the data aggregation that are not part of the recommended terminology should also be listed. If one class was reported that needs to remain **confidential**, please enter **'Confidential'**.
*If **'Others'** are reported under 'Antimicrobial class', please list the classes reported*	*<free text field>*	Describe the class or classes reported as 'Others', using whenever possible the terminology of the OIE list of antimicrobial agents of veterinary importance.
*Please report any **additional calculations** applied*	*<free text field>*	Please describe the calculations carried out in addition to the ones recommended by the OIE in sections 1 and 2 of the annex to the instructions for the completion of the OIE template.

OIE template for the collection of data on antimicrobial agents intended for use in animals

Reporting option 3 - Overall amount sold for/used in animals by antimicrobial class; with the possibility to separate by type of use, species group and route of administration

Antimicrobial Class	Overall Amount: Veterinary Medical Use + Growth Promotion	Amount: Veterinary Medical Use (including prevention of clinical signs)															Amount: Growth Promotion
	All Animal Species	All animal species			Companion animals			All food-producing animals (terrestrial and aquatic)			Terrestrial food-producing animals			Aquatic food-producing animals			All food-producing animals (terrestrial and aquatic)
	All routes (kg)	Oral route (kg)	Injection route (kg)	Other routes (kg)	Oral route (kg)	Injection route (kg)	Other routes (kg)	Oral route (kg)	Injection route (kg)	Other routes (kg)	Oral route (kg)	Injection route (kg)	Other routes (kg)	Oral route (kg)	Injection route (kg)	Other routes (kg)	All routes (kg)
Aminoglycosides	0	0	0	0				0	0	0							
Amphenicols	0	0	0	0				0	0	0							
Arsenicals	0	0	0	0				0	0	0							
Cephalosporins (all generations)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1-2 gen. cephalosporins	0	0	0	0				0	0	0							
3-4 gen cephalosporins	0	0	0	0				0	0	0							
Fluoroquinolones	0	0	0	0				0	0	0							
Glycopeptides	0	0	0	0				0	0	0							
Glycophospholipids	0	0	0	0				0	0	0							
Lincosamides	0	0	0	0				0	0	0							
Macrolides	0	0	0	0				0	0	0							
Nitrofurans	0	0	0	0				0	0	0							
Orthosomycins	0	0	0	0				0	0	0							
Other quinolones	0	0	0	0				0	0	0							
Penicillins	0	0	0	0				0	0	0							
Pleuromutilins	0	0	0	0				0	0	0							
Polypeptides	0	0	0	0				0	0	0							
Quinoxalines	0	0	0	0				0	0	0							
Streptogramins	0	0	0	0				0	0	0							
Sulfonamides (including trimethoprim)	0	0	0	0				0	0	0							
Tetracyclines	0	0	0	0				0	0	0							
Others	0	0	0	0				0	0	0							
Aggregated class data	0	0	0	0				0	0	0							
Total kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

*If **'Aggregated class data'** are reported, please list the classes combined*	*<free text field>*	List all classes for which the amounts were combined, using whenever possible the 'Antimicrobial class' terms or the terminology of the OIE List of antimicrobial agents of veterinary importance. Substances included in the data aggregation that are not part of the recommended terminology should also be listed. If one class was reported that needs to remain **confidential**, please enter **'Confidential'**.
*If **'Others'** are reported under 'Antimicrobial class', please list the classes reported*	*<free text field>*	Describe the class or classes reported as 'Others', using whenever possible the terminology of the OIE list of antimicrobial agents of veterinary importance.
*Please report any **additional calculations** applied*	*<free text field>*	Please describe here calculations carried out in addition to the ones recommended by the OIE in sections 1 and 2 of the annex to the instructions for the compilation of the OIE template.

Annex 8 Guidance for Completing WOAH's Template for the Collection of Data on Antimicrobial Agents Used in Animals

• Introduction

The OIE proposes to collect data on antimicrobial agents intended for use in animals from OIE Members implementing Chapter 6.9, 'Monitoring of the quantities and usage patterns of antimicrobial agents used in food-producing animals' of the OIE *Terrestrial Animal Health Code* and Chapter 6.3 'Monitoring of the quantities and usage patterns of antimicrobial agents used in aquatic animals' of the OIE *Aquatic Animal Health Code*, and to contribute to the global effort against antimicrobial resistance.

OIE Members differ in the degree to which they collect, collate and publish data on antimicrobial sales or use in animals and also in the degree to which they can stratify the quantities of antimicrobial agents intended for use in animals or for use in different animal species.

Through this initiative, by means of a specific template (hereafter 'OIE template'), the OIE seeks to collect data on antimicrobial agent intended for use in animals from all OIE Members in a harmonised way. Using a phased approach, the OIE will initially focus on **sales**[18] of antimicrobial agents intended for use in animals as an indicator of actual use. All antimicrobial agents intended for use in animals and listed in the OIE List of antimicrobial agents of veterinary importance[19], plus certain antimicrobial agents only used for growth promotion should be reported. The exceptions are ionophores, which are mostly used for parasite control and therefore need not be reported as antimicrobial agents. The OIE places highest priority on food-producing animals; however, data on all animals, *including non-food-producing animals*, may be reported. Reporting will occur at antimicrobial class level and, on one occasion, at sub-class level.

For the purpose of reporting data on antimicrobial quantities (amounts sold or imported for use in animals expressed in kilograms (kg) of antimicrobial agent, i.e., chemical compound as declared on the product label, that is to be calculated from the available information as explained in the Annex to this Guidance document), animals are grouped into 'all animal species', 'non-food-producing animals', 'all food-producing animals', 'terrestrial food-producing animals', and 'aquatic food-producing animals'.

Further refinement of the OIE collection of data on antimicrobial agent sales or use in animals is anticipated in light of the experience gained with the utilisation of the OIE template and additional changes might be necessary as countries capabilities of reporting stratified data develop.

Please contact antimicrobialuse@oie.int for any question on the OIE template.

Required Information and Choices for Reporting

As noted before, OIE Members differ in the degree to which data on antimicrobial sales for use in animals is accessible and in the degree to which the quantities of antimicrobial agents used in animals can be further differentiated, for example, by species. Therefore, three different Reporting Options are proposed, using different individual sheets of the OIE template: 'Baseline Information', 'Reporting Option 1', 'Reporting Option 2', and 'Reporting Option 3'.

The Baseline Information sheet allows participation of all countries: and should be completed by all. On this sheet, some fields are formatted in *italics and grey;* these fields are optional, but

[18] **'Sales',** in the context of the OIE data collection on antimicrobial agents used in animals, should be interpreted to include data on import of antimicrobial agents for use in animals.

[19] https://www.oie.int/app/uploads/2021/06/a-oie-list-antimicrobials-june2021.pdf

countries are encouraged to provide information to the greatest extent possible. Subsequently, and in accordance with the level of detail of data on antimicrobial agents used in animals available in the reporting country, either the sheet labelled Reporting Option 1, or the sheet labelled Reporting Option 2 or the sheet labelled Reporting Option 3 should be completed – only one of the three Reporting Options should be selected.

• Baseline Information

This sheet collects administrative information relevant to the data collected with this template. It should be completed by all OIE Members.

Based on the answers provided by the countries, the table at the bottom of the sheet is provided to help OIE Members to decide which Reporting Option is the most adapted to their data available.

	Field name	Information to be provided
	A. Contact Person for Antimicrobial Agents Use Data Collection (Please provide the contact details of the person entering the information)	
1	**Title**	Salutation (e.g., Dr, Ms, Mr).
2	**Name**	First or given name, SURNAME or FAMILY NAME.
3	**Role with respect to the OIE**	Please choose either 'OIE Delegate', 'OIE National Focal Point for Veterinary Products' or 'Other National Authority' to describe your relation to the OIE.
4	**Organisation**	Name of the organisation for which you work, administrative subunit, and position.
5	**Organisation's Address**	Full mailing address of your organisation.
6	**Country**	Country name.
7	**Phone Number**	Please provide the telephone number in the format '(country code) phone number'.
8	**Email Address**	Email address where you can best be reached.

	B. General Information	
	Questions 9 to 14 are related to the current situation in your country. Responses should not be linked to the year of antimicrobial quantities reported.	
9	**Are data on the amount of antimicrobial agents intended for use in animals available?**	Please indicate whether quantitative data (i.e., data on the amount) on antimicrobial agents intended for use in animals are available, by choosing 'Yes' or 'No'. If quantitative data are available for part of your country, choose 'Yes'.
10	*Please indicate why the data are not available at this time in your country, if the answer to Question 9 is 'No'*	Please indicate the reason why the data are not available in this moment in your country. If the answer to the previous question is 'No'.
11	**Are antimicrobial agents used for growth promotion purposes in animals in your country?**	Please indicate if antimicrobial agents as growth promoters are being used in your country, by choosing 'Yes', 'No' or 'Unknown'.
12	**Does your country have legislation/regulations on antimicrobial agents as growth promoters in animals?**	Please respond by ticking either 'Legislation/regulation exists - Yes' or 'Legislation/regulation does not exist - No'.

13	**If your country has legislation/regulation on antimicrobial agents as growth promoters in animals, could you please indicate the appropriate case that applies in your country?**	Please respond by ticking either 'All antimicrobial agents banned for use as growth promoters', 'Some antimicrobial agents banned for use as growth promoters' or 'One or more antimicrobial growth promoters are authorised'.
14	*Please provide a list of antimicrobial agents used or authorised as growth promoters, if any*	If any antimicrobial growth promoters are authorised for use in animals, please list the antimicrobial agents (active ingredient name, not product name) authorised for use as growth promoters in animals.
If data on the amount of antimicrobial agents intended for use in animals are not available in your country, the completion of the OIE template is terminated after completing Question 14 of the Baseline Information sheet.		
C. Data Collection of Antimicrobial Agents Intended for Use in Animals (Reserved to the countries where data are available)		
15	**Year for which data apply** (Please select only one year per template)	Please provide data for 2019. If you have data for another year, please select the year from the list. We will accept data for other years (2020 or 2021), but not from before 2019. If you would like to provide data for additional years, please fill out one template per year of data. If you have found calculation errors in data already submitted to the OIE for previous years, we ask that you please send an updated data template to the Antimicrobial Use Team.
16	**Time period for which data are provided** (e.g., 1 January to 31 December 2019)	Please provide further information regarding the reporting year, especially if the data only covers a portion of the calendar year. Follow the format of DD/MM/YYYY.
17	**Data source**	Please describe the origin of the antimicrobial quantities intended for use in animals, the preferred data at this stage. The template provides options for data sources, and you are asked to report all data sources that apply. Chapter 6.9 of the *OIE Terrestrial Code* and Chapter 6.3 of the *OIE Aquatic Code* provide more detail on potential sources of such information. Possible data sources include: • Sales data - complete data on antimicrobials agents sold to / bought from wholesalers. • Purchase data - data based on sampling of a limited number of wholesalers and requiring extrapolation to estimate the full amount of antimicrobials purchased, but should be used with care. • Import data - complete import data from customs. • Veterinary data - complete or representative sample information obtained from veterinarians; if representative sample information is obtained extrapolation to the estimated full use may be possible. • Antimicrobial use data - complete or representative sample information obtained from farm records; if representative sample information is obtained extrapolation to the estimated full use may be possible. • Other data - all other ways of delivering antimicrobial agents to the animals, including distribution through state veterinary services. It is suggested to develop an overview of the drug distribution system in your country. Mapping out the distribution pathways in your country will help you identify the most appropriate source of information on antimicrobial agents for use in animals. Great care is necessary to avoid duplicate or multiple reporting of quantities; mapping out the distribution will also help you devise measures aimed at avoiding multiple reporting. Ideally, the source of information should

		be as close to the point of use as possible. Experience has shown that whenever possible, sales data at the package level should be collected, keeping in mind that the data will be measured in kg of antimicrobial agent (please refer to the annex of this document for details on the necessary conversions). Good communication between all parties involved in the data collection is critical to obtain good data sets.
18	*Clarification of the data source, if your response to Question 17 is 'Other'*	If under Data source the option 'Other' is selected, please explain here which source of information was used.
19	**Estimated coverage of accessible data on total amount (in %)**	Please provide an estimate of the extent to which the quantitative data you report are representative of the overall antimicrobial agents intended for use in animals.
20	*Explanation of estimated coverage*	Please explain in this field which data were not captured on the antimicrobial agents used in animals reported for your country in the OIE template. Data coverage may vary by geographical aspects; examples include but are not limited to situations that use may be well known for urban but not rural areas, or that use in certain representative regions is well known but not actually measured throughout the whole country. Incomplete data coverage may include situations where importation is not covered, or partial statistical sampling of relevant establishments (farms, veterinary practices, etc.) is carried out. Another source of incomplete data may lie in market segment coverage, where incomplete data is available from certain market segments (e.g., some production systems are not covered, such as extensive versus intensive farming systems or certain wholesalers who do not report their data).
21	**Is the information extrapolated from representative samples?**	Please indicate whether the data provided in your report have been extrapolated from representative samples.
22	*Explanation of extrapolations carried out, if your response to Question 21 is 'Yes'*	Please explain in this field the nature of any extrapolations that were carried out in order to provide the data recorded in the OIE template.
23	**Can data be differentiated by animal group?**	Please respond by ticking 'Yes' or 'No'. For the purposes of the database, animal group means: 'Terrestrial food-producing animals', 'Aquatic food-producing animals' or 'Non-food-producing animals'. If your data is differentiated by any of these groups, please select 'Yes'.
24	**Animal groups covered by the data**	Please indicate here which animal groups are covered by the data provided, by selecting the appropriate category or categories from the list. The choices are: 'Data with no differentiation (all animals combined)', 'Data with no differentiation between terrestrial and aquatic animals excluding non-food-producing animals', 'Data for terrestrial food-producing animals and non-food-producing animals (combined)', 'Data for terrestrial food-producing species', 'Aquatic food-producing animals', 'Data for aquatic food-producing animals' and 'Data for non-food-producing animals'. Multiple selections are possible.
25	**Food-producing animal species covered by the information on antimicrobial quantities**	Animal species considered to be food-producing animals vary between countries. The OIE needs to gain an understanding of how this difference impacts the antimicrobial quantities reported to the OIE and future reporting of summary quantities by the OIE. Please indicate which animals are considered to be food-producing animals covered by the quantities. Multiple selections are possible.
26	*Clarification of other species considered to be food-producing, if your response to Question 25 is 'Other*	Please provide any explanations you may feel necessary to explain which animal species covered by the data are raised for the purpose of providing food for humans.

	commercial poultry' or 'Other'	
27	**Non-food-producing animal species covered by the information on antimicrobial quantities**	The OIE needs to gain an understanding of how this difference could impacts the antimicrobial quantities reported to the OIE and future reporting of summary quantities by the OIE. Please indicate which animals are considered to be non-food-producing animals covered by the quantities. Multiple selections are possible.
28	*Clarification of other species considered to be non-food-producing animals, if your response to Question 27 is 'Other'*	Please provide any explanations you may feel necessary to explain which animal species covered by the data are considered non-food-producing animals (e.g. rabbits).
29	**Can data be differentiated per route of administration?**	Please respond by ticking either 'Yes' or 'No'.
30	**National report(s) on sales/use of antimicrobial agents in animals available on the web?**	Please respond by ticking either 'Yes' or 'No'.
31	*Please provide the link to the report, if your response to Question 30 is 'Yes'*	If answer is 'Yes' to Question 30, please insert the link to the site where the report is available on the internet.

• Classes of Antimicrobial Agents for Reporting

All antimicrobial classes used in animals (for veterinary medical including prevention of clinical signs, as well as growth promotion, whether classified as veterinary medicines or not, *with the exception of ionophores*) should be included in the table by the reporting OIE Member.

Antimicrobial class	Guidance
Aminoglycosides	Includes aminocyclitols (e.g., streptomycin, dihydrostreptomycin and spectinomycin) and all other aminoglycosides (e.g., gentamicin, kanamycin, neomycin, apramycin).
Amphenicols	Includes florfenicol and thiamphenicol.
Arsenicals	Includes nitarsone, roxarsone and others.
Cephalosporins	May be reported as **Cephalosporins (all generations)** or in relevant category groupings (**1-2 generation cephalosporins** and **3-4 generation cephalosporins**).
Fluoroquinolones	Includes danofloxacin, difloxacin, enrofloxacin, marbofloxacin and other fluoroquinolones, but not other quinolones (e.g., flumequine, oxolinic acid, nalidixic acid), which are reported separately.
Glycopeptides	Includes avoparcin and others.
Glycophospholipids	Includes bambermycin (i.e., flavomycin).
Lincosamides	Includes lincomycin, pirlimycin and others.
Macrolides	Includes substances with all macrolide structures, such as erythromycin, spiramycin, tylosin, tylvalosin, gamithromycin, tildipirosin, tulathromycin and others.
Nitrofurans	Includes furazolidone, nitrofurantoin, nitrofurazone and others.
Orthosomycins	Includes avilamycin and others.
Other quinolones	Includes flumequine, nalidixic acid, oxolinic acid and others.
Penicillins	Includes all penicillins (e.g., natural penicillins, aminopenicillins and others), but excludes other beta lactam antimicrobials like cephalosporins.
Pleuromutilins	Includes tiamulin, valnemulin and others.
Polypeptides	Includes bacitracin, colistin, polymyxin B and others.
Quinoxalines	Includes carbadox, olaquindox and others.

Antimicrobial class	Guidance
Streptogramins	Includes virginiamycin, pristinamycin, and others.
Sulfonamides (including trimethoprim)	Includes all sulfonamides, as well as trimethoprim and similar compounds.
Tetracyclines	Includes chlortetracycline, doxycycline, tetracycline, and oxytetracycline.
Others	All others not covered, including coumarin antimicrobials, e.g., novobiocin, fusidic acid, kirromycins, phosphonic acids like fosfomycin, rifamycins, thiostrepton.
Aggregated class data	It may not be possible to individually report sales by class name for one or more antimicrobial classes for animal use (e.g., to protect confidential (proprietary) information or as required by legislation). Such amounts may be reported in this line. Report here the individual or cumulative amounts of antimicrobial classes used in animals that cannot be reported independently for confidentiality / proprietary reasons. If more than one data aggregation exists in your country, please sum them up for the OIE template. In cases where the amounts sold for more than one class are reported as aggregated data, please enter <AGG> in the table for those substances for which sales quantities have been included in the aggregated amount, and list the names of the classes of antimicrobial agents that cannot be reported individually in the field called ***'If 'Aggregated class data' are reported, please list here the classes combined'*** located underneath the table collecting the antimicrobial quantities.

Explanatory notes on the fields below the tables Reporting Options 1, 2 and 3 are provided.

Field name	Information to be provided
If 'Others' are reported under 'Antimicrobial class', list the classes reported	Please indicate the substance or substances reported as 'Others'. If the substance is not listed by the OIE, please indicate the name in the free text field by using whenever possible the terminology of the *OIE List of antimicrobial agents of veterinary importance.*
If 'Aggregated class data' are reported, please list the classes combined	If in your country there are data for one antimicrobial class that need to remain confidential, then the data can be reported in this category. If for your country there are ***Aggregated class data***, please indicate here which antimicrobial classes cannot be reported individually. Multiple selections are possible.
Please report any additional calculations applied	Please describe calculations carried out in addition to the ones recommended by the OIE in Sections 1 and 2 of the Annex to the Guidance for completing the OIE template.

The amount of the antimicrobial agents intended for use in animals in kilograms (kg) should be reported. Where data are available in the form of

- number of packages of a given pharmaceutical preparation sold;
- international units; or
- % weight per volume (% w/v),

a mathematical conversion will be necessary, which is explained in the Annex to this document. In cases where the amount sold for the listed class is part of a data aggregation reported under 'Aggregated class data', please enter the three letters <AGG> in the table for all classes, for which quantities sold have been summarised.

Ideally, the OIE is interested in the amount of active ingredient (moiety), that is, the substance as listed in the *OIE List of antimicrobial agents of veterinary importance* (e.g., benzylpenicillin), not the total weight of the actual chemical compound (salt, ester or other, for example: sodium or potassium benzylpenicillin) contained in a veterinary medicinal product or traded as bulk material. At this stage of the project, the precision gained by the refined reporting of amounts of active ingredient, achieved by mathematical conversion of amounts of chemical compound as declared on the product label, is not justified. Therefore, the OIE template will accept the amounts of chemical compound as declared on the product label. Data on amounts of active ingredients will

also be accepted, but the **additional calculations carried out should be described in the corresponding free-text field on the Reporting Option 1, 2 or 3 sheets in the OIE template.**

For data sourced from customs, import or other bulk trading, information will likely come as tons of chemical compound. **Please convert into kg** for reporting in the OIE template; the Annex provides conversion factors from different weight units to kg.

For veterinary medicinal products, the content of the antimicrobial agent(s) may be stated in one of several ways, including strength in

- milligram (mg) or gram (g) of the active ingredient per volume or weight or other unit, for example millilitre (ml), or kilogram (kg) or tablet,
- International Units (IU) per weight, volume or other unit, or
- in percentage (%) weight per weight (w/w) or weight per volume (w/v).

The Annex provides details on the necessary conversions.

For veterinary medicinal products containing more than one antimicrobial agent, the amounts of each should be added to the respective class columns.

If there are no quantities to report for a class or route of administration, please enter a zero (0) in the corresponding field of the table.

Please refer to the Annex of this document for detailed examples and the calculations necessary to report kg of antimicrobial agents intended for use in animals. As explained above, in most cases the amount of the chemical compound as declared on the product label can be reported, though OIE Members wishing to provide more refined data on amounts of active ingredients are welcome to do so, on the condition that they describe the calculations used.

- **Reporting Option 1**

Overall amount sold for use / used in animals by antimicrobial class, with the possibility to separate **by type of use**.

The sheet Reporting Option 1 is designed for the reporting of data on amount or type of antimicrobial agents used in all animals. Data may be reported overall for all animal species, but can be separated by antimicrobial class and possibly by type of use (veterinary medical including prevention of clinical signs, or growth promotion; see definitions in the Glossary section of this document).

For this Reporting Option 1, complete the columns 'Veterinary Medical' (including prevention of clinical signs) and 'Growth Promotion'. The sum of sales for 'Veterinary Medical' and 'Growth Promotion' should equal the amount entered in the column 'Overall Amount (Growth Promotion + Veterinary Medical)' for each class.

- **Reporting Option 2**

Overall amount sold for use / used in animals by antimicrobial class, with the possibility to separate by type of use **and animal groups**.

If the data can be differentiated by use in all food-producing animals, non-food-producing animals and / or by use in terrestrial and aquatic food-producing animals, Reporting Option 2 is the appropriate choice. Further differentiation by antimicrobial class, Veterinary Medical, including prevention of clinical signs, or growth promotion is possible.

If sales of antimicrobial agents for use in animals can be differentiated into sales for medical purposes, for growth promotion and additionally by animal group, please complete under the heading 'Veterinary Medical (including prevention of clinical signs)' the columns for 'All animal species', 'Non-food-producing animals', 'All food-producing animals (terrestrial and aquatic)', 'Terrestrial food-producing animals', and 'Aquatic food-producing animals'. These animal groups

include all age groups and life stages of the relevant group. The first column of the table 'Overall Amount (Growth Promotion + Veterinary Medical)' allows reporting of the total amount for all uses and animal categories per antimicrobial class. The last column labelled 'Growth Promotion' captures the amounts sold for growth promotion purposes in terrestrial and aquatic food-producing animals.

For Reporting Option 2, 'Growth Promotion' can be reported jointly for terrestrial and aquatic food-producing animals.

- **Reporting Option 3**

Overall amount sold for use / used in animals by antimicrobial class, with the possibility to separate by type of use, animal groups and **route of administration.**

If the data can be differentiated by route of administration, Reporting Option 3 is the appropriate choice. Further differentiation by antimicrobial class, by use in non-food-producing animals, food-producing species and, where possible, by use in terrestrial and aquatic food-producing species as well as veterinary medical, including prevention of clinical signs, or growth promotion, is possible.

In the category of 'Veterinary Medical (including prevention of clinical signs)', the OIE is interested in differentiating the proportion of sales by route of administration for mass treatment (e.g., via feed) versus those more suited for treatment of individual animals (e.g., injection route, other routes). If sales for veterinary medical can be sub-divided by route of administration, please report the quantities used for each route of administration. If further differentiation by animal group is possible, then it should be reported if the data are available.

For Reporting Option 3, 'Growth Promotion' can be reported jointly for terrestrial and aquatic food-producing animals.

Column label	Guidance
Oral route	Includes all orally administered pharmaceutical forms, including 'in water' or 'in feed' administration, but also oral bolus administration.
Injection route	Includes all forms of parenteral administration that readily lead to elevated blood levels of the active ingredient, such as subcutaneous, intramuscular, intravenous, including intravenous infusion (intravenous drips).
Other routes	Summarises all other routes of administration, including intramammary preparations, and, mostly for aquatic animals, the bath route where an animal or a group of animals immersed in a solution containing the active ingredient.

Glossary of Terms

For the purpose of this database, a number of terms require clarification, in order to ensure a harmonised approach to data collection.

- **Active ingredient**

  Antimicrobial agents are chemical compounds that can come in various forms. In order to render an antimicrobial agent suitable for use in a veterinary medicine, or to achieve desirable pharmacokinetic or organoleptic properties, antimicrobial agents can exist as different salts or esters or other chemical compounds. The **active ingredient** is the part of the chemical compound responsible for the antimicrobial action. The name used to refer to an antimicrobial agent listed on the *OIE List of antimicrobial agents of veterinary importance* is generally identical to the **active ingredient** of that agent.

- **Antimicrobial agent**
  As defined in the glossaries of the *OIE Terrestrial Code* and the *OIE Aquatic Code*, this means a naturally occurring, semi-synthetic or synthetic substance that exhibits antimicrobial activity (kill or inhibit the growth of micro-organisms) at concentrations attainable *in vivo*. Anthelmintics and substances classed as disinfectants or antiseptics are excluded from this definition. In the context of the OIE template, this term is being used as a general reference to substances with antimicrobial activity.

- **Antimicrobial classes for use in animals**
  Any antimicrobial agent belonging to the antimicrobial classes listed on the *OIE List of antimicrobial agents of veterinary importance* is included. In addition, antimicrobial agents used exclusively for growth promotion are also included. With the exception of ionophores, which are mostly used for parasite control, all uses of these substances should be reported, whether the antimicrobial agents are categorised as veterinary medicines or not.

- **Chemical compound as declared on the product label**
  As explained for active ingredient, an antimicrobial agent may exist in the form of various chemical compounds. For example, benzylpenicillin (the active ingredient) the sodium, potassium, procaine, benzathine or benethamine salts, and the prodrug penethamine hydroiodide are used in veterinary medicine. In consequence they may be traded as bulk products or be included in veterinary medicinal products containing antimicrobial agents (see explanation below). The term **chemical compound as declared on the product label** refers to the substance as it is reported on the label of a veterinary medicinal product or a bulk container or in the information provided to customs. This may be either the active ingredient (e.g. benzylpenicillin) or the complete chemical compound (e.g. sodium benzylpenicillin).

- **Extrapolation**
  An approach by which the total amount of antimicrobial agents used in animals was derived from a limited, but representative dataset. Details on the approach should be provided. Caution should be exercised in situations where the data sources are not representative of the whole. For example, extrapolation from a limited number of wholesalers may not adequately represent the entire antimicrobial sales market.

- **Food-producing species**
  The animal species that are managed by people for the purpose of producing food for humans. The relevant species may differ between countries.

- **Growth promotion, growth promoters**
  means the administration of antimicrobial agents to animals only to increase the rate of weight gain or the efficiency of feed utilisation.

- **Quantitative data**
  The term ‘quantitative’ refers to a type of information based in quantities or else quantifiable data (objective properties) — as opposed to ‘qualitative’ information which deals with apparent qualities (subjective properties). Quantitative data may also refer to mass, time, or productivity. In the context of this template, **quantitative data** means that the amount of antimicrobial agents used in animals can be determined, for example through information on amount of antimicrobials imported, or number of packages of specific antimicrobial products used in animals, and is reportable in the metric ‘kg antimicrobial agent’.

- **Sales of antimicrobial agent(s) used in animals** versus **use data**

For the purpose of data collection through the OIE template, **sales data**, also referred to as 'amount of antimicrobial agent(s) used in animals' relates to the amounts of antimicrobial agents imported and/or sold within a country for use in animals. Sales data are used as an approximation of actual use. **Use data** refers to the amount of antimicrobial agents actually administered to animals. Such data are difficult to collect in most environments, as the data sources would be at the level of individual farmers or veterinarians.

- **Veterinary Medical use**
  Means the administration of an antimicrobial agent to an individual or a group of animals to treat, control or prevent disease:
  - to treat means to administer an antimicrobial agent to an individual or a group of animals showing clinical signs of an infectious disease;
  - to control means to administer an antimicrobial agent to a group of animals containing sick animals and healthy animals (presumed to be infected), to minimise or resolve clinical signs and to prevent further spread of the disease;
  - to prevent means to administer an antimicrobial agent to an individual or a group of animals at risk of acquiring a specific infection or in a specific situation where infectious disease is likely to occur if the drug is not administered.

- **Veterinary medicinal product containing antimicrobial agent(s)**
  As defined in the glossaries of the *OIE Terrestrial Code* and the *OIE Aquatic Code*, the term *veterinary medicinal product* means any product with approved claim(s) to having a prophylactic, therapeutic or diagnostic effect or to alter physiological functions when administered or applied to an animal. A veterinary medicinal product containing antimicrobial agent(s) refers to veterinary medicinal products used for their antimicrobial effect due to one or more antimicrobial agents they contain.

Annex 9 Annex to the guidance for completing WOAH's template for the collection of data on antimicrobial agents used in animals

Considerations on Converting Content of Antimicrobial Active Ingredients in Veterinary Medicines into Kilograms

Calculating the quantities to report in kilogram (kg)

Data on antimicrobial agents intended for use in animals comes in different forms. The OIE template for the collection of data on antimicrobial agents used in animals (OIE template) is designed to collect data on the amounts of chemical compound as declared on the product label. The information may vary, ranging from bulk quantities of antimicrobial agents to numbers of packs of a veterinary medicinal product. The content of antimicrobial agents in such products can be stated in a number of possible ways. It will be necessary, where appropriate, to calculate the required data to populate the OIE template.

Detailed instructions are provided to harmonise some aspects of data reporting:

- Section 1: Transformation of bulk quantities. Use this section if you need to convert quantities of raw material, e.g. from import data into the required format.
- Section 2: Data on veterinary medicinal products, including conversion from International Units (IU) to kg (section 2. (ii)).
- Section 3: Recommendations for further optional conversions, aimed at achieving refined reporting of active entities, the ultimately desired format. If such calculations are made, they should be reported in the OIE template in the free text field provided on the sheets for Reporting Option 1, 2 and 3.

The following abbreviations and symbols will be used:

Symbol/abbreviation	Explanation
Strength	amount of antimicrobial agent per unit of veterinary product
% w/v	per cent weight per volume
mg	milligram
g	gram
kg	kilogram
t	ton (metric)
ml	millilitre
l	litre

1. For data on bulk quantities

Such information is usually sourced from customs, import or other bulk trading. It will likely come as a weight in a number of possible units (e.g. metric tons) of chemical compound and needs to be converted to kg. When conversion into kg is necessary, follow the steps below. If additional conversion factors are needed, please contact the OIE at antimicrobialuse@oie.int.

Step 1: Multiply the amount of antimicrobial agent, i.e. the chemical compound as declared on the product label with the appropriate conversion factor from the table 1 below.

$$Antimicrobial\ agent\ (kg) = \ antimicrobial\ agent\ (unit\ Z)\ x\ conversion\ factor$$

Table 1: Converting weight units into kg

Unit reported (unit Z)	Conversion factor to kg (for multiplication)
Metric ton	1000
Imperial ton (long)	1016
Imperial ton (short)	907.18
Stone (Imperial)	6.35
Imperial Pound	0.4536
Ounce	0.0283

2. For data on veterinary medicinal products

For veterinary medicinal products containing antimicrobial agents, data on quantities sold is likely to be available as numbers of packages of product sold, with each package containing a specified quantity of medicinal product with a specified amount of antimicrobial agent. In such cases, the amount of antimicrobial agent (chemical compound as declared on the product label) per package needs to be calculated first, and subsequently the result needs to be multiplied with the number of packages of the presentation sold to obtain the overall amount of antimicrobial agent, which should be reported in kg.

The most common ways to indicate the content of the antimicrobial agent(s) of a veterinary medicinal product are:

(i) Strength in mg or g of the active ingredient per volume or weight or other unit, (for example: ml, l, kg, tablet),
(ii) Strength in International Units (IU) per weight, volume or other unit,
(iii) Strength in per cent (%) weight per weight (w/w) or weight per volume (w/v).

Each situation requires a different kind of mathematical conversion.

2. (i) – content of antimicrobial active ingredient (antimicrobial agent) stated in milligram per volume or weight or other unit (for example millilitre, litre, kilogram, tablet) of content

Step 1: Calculation of the content of antimicrobial agent per package

Multiply the amount of antimicrobial agent (chemical compound as declared on the product label) per unit of content, that is, the strength of the product, with the total number of units contained in the package

$$Content\ of\ antimicrobial\ agent\ \ per\ package = Strength\ (amount\ antimicrobial\ agent\ per\ unit) x\ number\ of\ units\ per\ package$$

Example A:
Tiamulin 100 g/kg premix for medicated feeding stuff; package sizes: (a) 1 kg, (b) 5 kg and (c) 20 kg

Calculation of content of antimicrobial agent, tiamulin, per package:

(a) *Pack content = 100 g/kg x 1 kg = 100 g*
(b) *Pack content = 100 g/kg x 5 kg = 500 g*
(c) *Pack content = 100 g/kg x 20 kg = 2000 g*

Example B:
Tetracycline intrauterine tablet containing 2000 mg tetracycline hydrochloride per tablet; package sizes: (a) carton with 1 blister of 5 intrauterine tablets, (b) carton with 4 blisters of 5 intrauterine tablets each (20 tablets), (c) carton with 20 blisters of 5 intrauterine tablets each (100 tablets).

Calculation of content of antimicrobial agent, tetracycline, per package:

(a) Pack content = 2000 mg x 5 = 2 g x 5 = 10 g
(b) Pack content = 2000 mg x 20 = 2 g x 20 = 40 g
(c) Pack content = 2000 mg x 100 = 2 g x 100 = 200 g

Example C:
Tilmicosin 300 mg/ml solution for injection for cattle; package sizes: containers of 100 ml and 250 ml; packs of *(a)* 6, *(b)* 10 and *(c)* 12 units of 100 ml and 250 ml.

Calculation of content of antimicrobial agent, tilmicosin, per package:

(a) Container content = 300 mg/ml x 100 ml = 30000 mg = 30 g
Pack content: (a) 6 x 30 g = 180 g,
(b) 10 x 30 g = 300 g
(c) 12 x 30 g = 360 g
(b) Container content = 300 mg/ml x 250 ml = 75000 mg = 75 g
Pack content: (a) 6 x 75 g = 450 g,
(b) 10 x 75 g = 750 g
(c) 12 x 75 g = 900 g

Step 2: Sum up the antimicrobial agent contained in all presentations and packages sold

Convert all contents of antimicrobial agent calculated under step 1 to the same weight unit and add up the total

Step 3: If necessary: convert the total sum of antimicrobial agent contained in all packages of all presentations sold to kg

Multiply the result from step 2 with an appropriate conversion factor to achieve the result in kg

2. (ii) – content of antimicrobial agent (chemical compound as declared on the product label) in International Units (IU) per weight, volume or other unit (for example millilitre, litre, kilogram, tablet) of content

Where the strength of the antimicrobial agent in the veterinary medicinal product is stated International Units (IU) per unit of finished product, an additional conversion step is necessary to obtain results in mg, g, or kg. Table 2 is used to convert content of antimicrobial agents declared in IU on the product label into mg for reporting to the OIE: either divide the total number of IUs of an antimicrobial agent by the value in the column 'International Units (IU) per mg' for this agent in table 2, or, if multiplication is preferred, multiply the total number of IUs with the conversion factor listed for the agent. To convert mg values into kg, please multiply the result of the conversion with 1×10^{-6} equalling 0.000001.

For some antimicrobial agents in veterinary medicinal products, the IU content or strength may be stated in respect to the active entity rather than to the chemical compound actually included; for example: a product may contain penethamate hydroiodide, or procaine benzylpenicillin, but the stated strength in IU refers to benzylpenicillin (product X containing penethamate hydroiodide, equivalent to xx IU benzylpenicillin, or, product Y containing procaine benzylpenicillin, equivalent to yy IU benzylpenicillin). For such cases, use the conversion factor for the relevant active entity listed in table 2 (in the examples used: benzylpenicillin). To convert mg values into kg, please multiply the result of the conversion with 1×10^{-6} equalling 0.000001.

If additional conversion factors are needed or have been used, please contact the OIE at antimicrobialuse@oie.int.

Step 1: Calculating the content of antimicrobial agent per package in IU

Multiply the amount of IU antimicrobial agent per unit of content with the total number of units contained in the package

$$Content\ of\ antimicrobial\ agent\ \ per\ package\ in\ IU = Strength\ (amount\ IU\ antimicrobial\ agent\ per\ unit)\ x\ number\ of\ units\ per\ package$$

Step 2: Converting the content of antimicrobial agent per package in IU into mg

$$\text{Content of antimicrobial agent per package in } mg = Content\ of\ antimicrobial\ agent\ \ in\ IU\ \text{x}\ conversion\ factor$$

Steps 3-4: Follow steps 2-3 described for (i)

Table 2: Conversion of International Units (IUs) of certain antimicrobial agents into mg and relevant active entities, based on the ESVAC conversion factors[20]

Antimicrobial agent in the veterinary medicine	Antimicrobial active entity for reporting to OIE	International Units per mg	Conversion factor to mg for multiplication
Apramycin	Apramycin	552	0.00181
Bacitracin	Bacitracin	74	0.013514
Benzylpenicillin (penicillin G)[21]	Benzylpenicillin	1670	0.0006
Chlortetracycline	Chlortetracycline	1000	0.001
Colistin methane sulfonate sodium (colistimethate sodium INN)	Colistin	12700	0.000079
Colistin sulfate	Colistin	20500	0.000049
Dihydrostreptomycin	Dihydrostreptomycin	777	0.00129
Erythromycin	Erythromycin	920	0.001087
Gentamicin	Gentamicin	620	0.001613
Kanamycin	Kanamycin	796	0.001256
Neomycin	Neomycin	762	0.00131
Neomycin B (Framycetin)	Neomycin B (Framycetin)	706	0.00142
Oxytetracycline	Oxytetracycline	880	0.00114
Paromomycin	Paromomycin	750	0.00133
Polymyxin B	Polymyxin B	8403	0.000119
Rifamycin	Rifamycin	887	0.001127
Spiramycin	Spiramycin	3200	0.000313
Streptomycin	Streptomycin	760	0.00132
Tetracycline	Tetracycline	982	0.00102
Tobramycin	Tobramycin	875	0.001143
Tylosin	Tylosin	1000	0.001

2. (iii) – content of antimicrobial agent (chemical compound as declared on the product label) *in per cent (%) weight per weight (w/w) or weight per volume (w/v) of content*

The amount of antimicrobial agent contained in a veterinary medicine concerned may be stated in per cent weight per weight (% w/w) (example 1: product X contains tylosin 100% w/w or, example 2, product Y contains amoxicillin 22.2 % w/w) or in per cent weight per volume (% w/v) (example: product Z contains procaine benzylpenicillin 30% w/v). Such figures first need to be converted into mg/g, g/g, or mg/ml, followed by the calculations described under (i).

Converting % w/w: Conversion calculations are performed by relating the content of antimicrobial agent to 1 g of the finished product. Divide the percentage value by 100 to obtain the amount of antimicrobial agent in g per g finished product.

[20] http://www.ema.europa.eu/ema/pages/includes/document/open_document.jsp?webContentId=WC500189269

[21] Applies to all derivatives/compounds of benzylpenicillin.

$$value\ antimicrobial\ agent\ in\ g\ per\ gram\ finished\ product = \frac{\frac{value\ (\%)}{100}\ x\ g}{1\ g\ (finished\ product)}$$

Example 1: Product X containing 100% w/w tylosin will contain 100/100 x g = 1 g tylosin per g finished product.

Example 2: Product Y containing 22.2% w/w amoxicillin will contain 22.2/100 = 0.222 g amoxicillin per g finished product.

Continue with Steps 1-3 of (i)

Converting % w/v: Conversion is based on the assumption that 1 ml of the products weighs 1000 mg. Multiply the percentage value with 10 to obtain the content in mg/ml.

$$value\ antimicrobial\ agent\ in\ g\ per\ ml\ finished\ product = \frac{value\ (\%) x\ 10\ \ x\ mg}{1\ ml\ (finished\ product)}$$

Example: Product Z containing 30% w/v benzylpenicillin will contain (30 x 10 mg)/1ml, equal to 300 mg/ml benzylpencicillin.

Continue with Steps 1-3 of (i)

3. Additional recommendations for further conversions of quantities of antimicrobial agents

For pragmatic reasons the OIE accepts the reporting of antimicrobial agents in amounts of chemical compound as declared on the product label of the veterinary medicinal product. However, OIE Member Countries may wish to carry out further calculations to report amounts of active entity. If such further calculations are carried out, please describe them in the OIE template.

Calculating the total amount expressed in weight of chemical compound as declared on the product label of a veterinary medicinal product into antimicrobial active entity (e.g. salt, ester or prodrug into base

This step may be carried out once the steps described in section 1 or section 2. (i) have been completed.

As an example, for the antimicrobial agent tiamulin that is often available in the form of tiamulin hydrogen fumarate (the chemical compound as declared on the product label), the conversion formula to tiamulin (the active entity) would be:

Salt (including base): Tiamulin hydrogen fumarate MW 609.8
Base: Tiamulin MW 493.7
Conversion factor = MW base/MW salt (including base) = 0.81

Multiply the final result in kg obtained by following steps 1 to 3 with the appropriate conversion factor

$$Content\ of\ active\ entity\ (kg) = Content\ of\ chemical\ compound\ as\ listed\ on\ the\ label\ (kg)\ x\ \ conversion\ factor$$

Taking the conversion factors of certain derivates or compounds used by the European Surveillance of Veterinary Antimicrobial Consumption (ESVAC) program managed by the European Medicines Agency, as a starting point, table 3 lists the suggested conversion factors for relevant derivates or compounds in order to obtain the corresponding amount of the active entity.

If additional conversion factors are needed or have been used, please contact the OIE at antimicrobialuse@oie.int.

Table 3: Conversion of content stated in mg, g or kg of derivates/compounds of antimicrobial agents in the veterinary product into corresponding mg, g or kg antimicrobial active entity for reporting to the OIE, based on the ESVAC conversion factors[22]

Derivate or compound	Active entity	Conversion factor for multiplication
Benethamine benzylpenicillin[23]	Benzylpenicillin	0.61
Benzathine benzylpenicillin[24]	Benzylpenicillin	0.68
Cefapirin benzathine[25]	Cefapirin	0.78
Cefalexin benzathine[26]	Cefalexin	0.74
Cloxacillin benzathine[27]	Cloxacillin	0.78
Oxacillin benzathine[28]	Oxacillin	0.77
Penethamate hydriodide [29]	Benzylpenicillin	0.60
Procaine benzylpenicillin[30]	Benzylpenicillin	0.57

Step 1–3: As described in section 2. (i)

Step 4: Multiply the final result in kg obtained by following steps 1 to 3 with the appropriate conversion factor listed in table 3

$$Antimicrobial\ agent\ (active\ entity)(kg) = antimicrobial\ agent\ (chemical\ compound\ as\ declared\ on\ the\ product\ label)(kg)\ x\ derivate\ or\ compound\ conversion\ factor$$

[22] http://www.ema.europa.eu/ema/pages/includes/document/open_document.jsp?webContentId=WC500189269
[23] Conversion factor for benethamine benzylpenicillin is updated from 0.65 to 0.61
[24] Conversion factor for benzathine benzylpenicillin is updated from 0.74 to 0.68
[25] Conversion factor for cefapirin benzathine is updated from 0.41 to 0.78
[26] Conversion factor for cefalexin benzathine is updated from 0.36 to 0.74
[27] Conversion factor for cloxacillin benzathine is updated from 0.43 to 0.78
[28] Conversion factor for oxacillin benzathine is updated from 0.69 to 0.77
[29] Conversion factor for penethamate hydriodide is updated from 0.63 to 0.60
[30] Conversion factor for procaine benzylpenicillin is updated from 0.61 to 0.57

Annex 10 Distribution of Members by WOAH Region

AFRICA (54)

1. ALGERIA
2. ANGOLA
3. BENIN
4. BOTSWANA
5. BURKINA FASO
6. BURUNDI
7. CAMEROON
8. CABO VERDE
9. CENTRAL AFRICAN (REP.)
10. CHAD
11. COMOROS
12. CONGO (REP. OF THE)
13. CONGO (DEM. REP. OF THE)
14. CÔTE D'IVOIRE
15. DJIBOUTI
16. EGYPT
17. EQUATORIAL GUINEA
18. ERITREA
19. ESWATINI
20. ETHIOPIA
21. GABON
22. GAMBIA
23. GHANA
24. GUINEA
25. GUINEA-BISSAU
26. KENYA
27. LESOTHO
28. LIBERIA
29. LIBYA
30. MADAGASCAR
31. MALAWI
32. MALI
33. MAURITANIA
34. MAURITIUS
35. MOROCCO
36. MOZAMBIQUE
37. NAMIBIA
38. NIGER
39. NIGERIA
40. RWANDA
41. SAO TOME AND PRINCIPE
42. SENEGAL
43. SEYCHELLES
44. SIERRA LEONE
45. SOMALIA
46. SOUTH AFRICA
47. SOUTH SUDAN (REP. OF)
48. SUDAN
49. TANZANIA
50. TOGO
51. TUNISIA
52. UGANDA
53. ZAMBIA
54. ZIMBABWE

AMERICAS (31)

1. ARGENTINA
2. BAHAMAS
3. BARBADOS
4. BELIZE
5. BOLIVIA
6. BRAZIL
7. CANADA
8. CHILE
9. COLOMBIA
10. COSTA RICA
11. CUBA
12. CURACAO
13. DOMINICAN (REP.)
14. ECUADOR
15. EL SALVADOR
16. GUATEMALA
17. GUYANA
18. HAITI
19. HONDURAS
20. JAMAICA
21. MEXICO
22. NICARAGUA
23. PANAMA
24. PARAGUAY
25. PERU
26. SAINT LUCIA
27. SURINAME
28. TRINIDAD AND TOBAGO
29. UNITED STATES OF AMERICA
30. URUGUAY
31. VENEZUELA

MIDDLE EAST (12)

1. AFGHANISTAN
2. BAHRAIN
3. IRAQ
4. JORDAN
5. KUWAIT
6. LEBANON
7 OMAN
8. QATAR
9. SAUDI ARABIA
10. SYRIA
11. UNITED ARAB EMIRATES
12. YEMEN

ASIA, FAR EAST AND OCEANIA (32)

1. AUSTRALIA
2. BANGLADESH
3. BHUTAN
4. BRUNEI
5. CAMBODIA
6. CHINA (PEOPLE'S REP. OF)
7. FIJI
8. INDIA
9. INDONESIA
10. IRAN
11. JAPAN
12. KOREA (REP. OF)
13. KOREA (DEM. PEOPLE'S REP. OF)
14. LAOS
15. MALAYSIA
16. MALDIVES
17. MICRONEISA (FED. STATES OF)
18. MONGOLIA)
19. MYANMAR
20. NEPAL
21. NEW CALEDONIA
22. NEW ZEALAND
23. PAKISTAN
24. PAPUA NEW GUINEA
25. PHILIPPINES
26. SINGAPORE
27. SRI LANKA
28. TAIPEI (CHINESE)
29. THAILAND
30. TIMOR LESTE
31. VANUATU
32. VIETNAM

EUROPE (53)

1. ALBANIA
2. ANDORA
3. ARMENIAA
4. AUSTRIA
5. AZERBAIJAN
6. BELARUS
7. BELGIUMS
8. BOSNIA AND HERZEGOVINA
9. BULGARIA
10. CROATIA
11. CYPRUS
12. CZECH REP.
13. DENMARK
14. ESTONIA
15. FINLAND
16. FRANCE
17. GEORGIA
18. GERMANY
19. GREECE
20. HUNGARY
21. ICELAND
22. IRELAND
23. ISRAEL
24. ITALY
25. KAZAKHSTAN
26. KYRGYZSTAN
27. LATVIA
28. LIECHTENSTEIN
29. LITHUANIA
30. LUXEMBOUR
31. MALTA
32. MOLDOVA
33. MONTENEGRO
34. NETHERLANDS (THE)
35. NORTH MACEDONIA
36. NORWAY
37. POLAND
38. PORTUGAL
39. ROMANIA
40. RUSSIA
41. SAN MARINO
42. SERBIA
43. SLOVAKIA
44. SLOVENIA
45. SPAIN
46. SWEDEN
47. SWITZERLAND
48. TAJIKISTAN
49. TÜRKIYE (REP. OF)
50. TURKMENISTAN
51. UKRAINE
52. UNITED KINGDOM
53. UZBEKISTAN

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