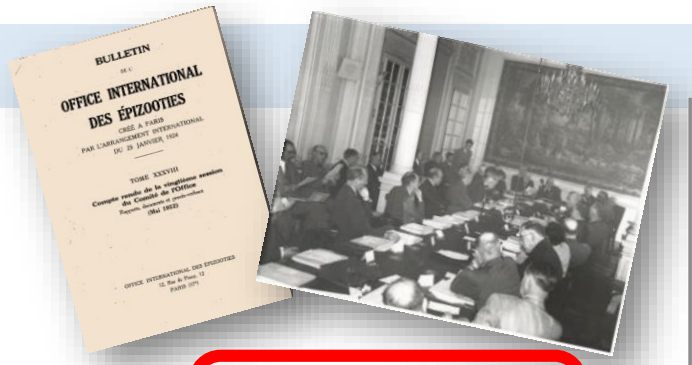
World Organisation for Animal Health
Founded as OIE

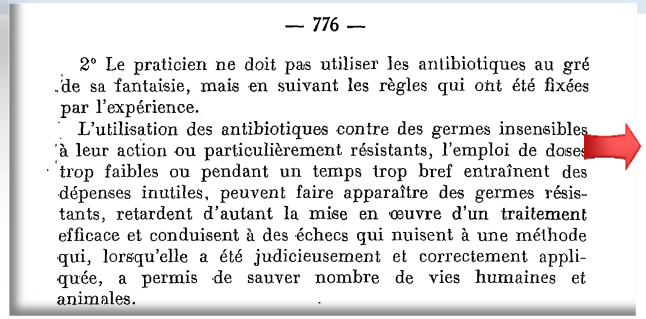
WOAH Standards related to AMR, SFVP and ANIMUSE

Dr Tikiri Wijayathilaka
World Organization for Animal Health

The Fleming Fund
Funded by UK Government



First international resolution around **AMR**, based on scientific evidences reported back in **1948**



— 776 —

2° Le praticien ne doit pas utiliser les antibiotiques au gré de sa fantaisie, mais en suivant les règles qui ont été fixées par l'expérience.

L'utilisation des antibiotiques contre des germes insensibles à leur action ou particulièrement résistants, l'emploi de doses trop faibles ou pendant un temps trop bref entraînent des dépenses inutiles, peuvent faire apparaître des germes résistants, retardent d'autant la mise en œuvre d'un traitement efficace et conduisent à des échecs qui nuisent à une méthode qui, lorsqu'elle a été judicieusement et correctement appliquée, a permis de sauver nombre de vies humaines et animales.

"Practitioner must not use antibiotics at the discretion of his fantasy, but following rules that have been set by experience.

***Use** of antibiotics **against insensitive germs** or specifically resistant, **utilization** of **too weak doses** or through a **too short time frame**, can reveal resistant germs, delaying the set of an efficient therapy and **lead to treatment failures**, **harming a method that, when judiciously and correctly applied, has saved numerous human and animal lives**"*

Alexander Fleming discovers **penicillin** at St. Mary's Hospital, London

1928

1920 **1924**

Rinderpest outbreak in Belgium as a result of zebus originating from India and destined to Brazil. Numerous ravages in livestock and livelihoods across the globe

Office International des Epizooties (OIE) is created by agreement of 28 States, to improve animal health, and to ensure coordinated prevention, preparedness & response, in case of outbreaks

1952

The World Organisation for Animal Health (WOAH)

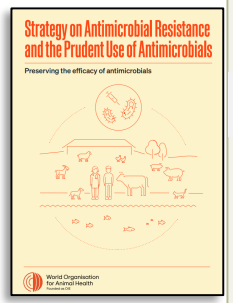
We are an intergovernmental organisation working across borders to improve the health of animals and therefore, our future .

OIE 1st Global Conference on AMR — **2013**

2016

OIE 2nd Global Conference on AMR — **2018**

World Organisation for Animal Health
Founded as OIE — **2022**



Transparency

Ensure transparency in the global animal disease situation

Scientific information

Collect, analyse and disseminate veterinary scientific information

International solidarity

Encourage international solidarity in the control of animal diseases

Sanitary safety

Safeguard world trade by publishing health standards for international trade in animals and animal products

Promotion of veterinary services

Improve the legal framework and resources of national Veterinary Services

Food safety and animal welfare

To provide a better guarantee of food of animal origin and to promote animal welfare through a science-based approach

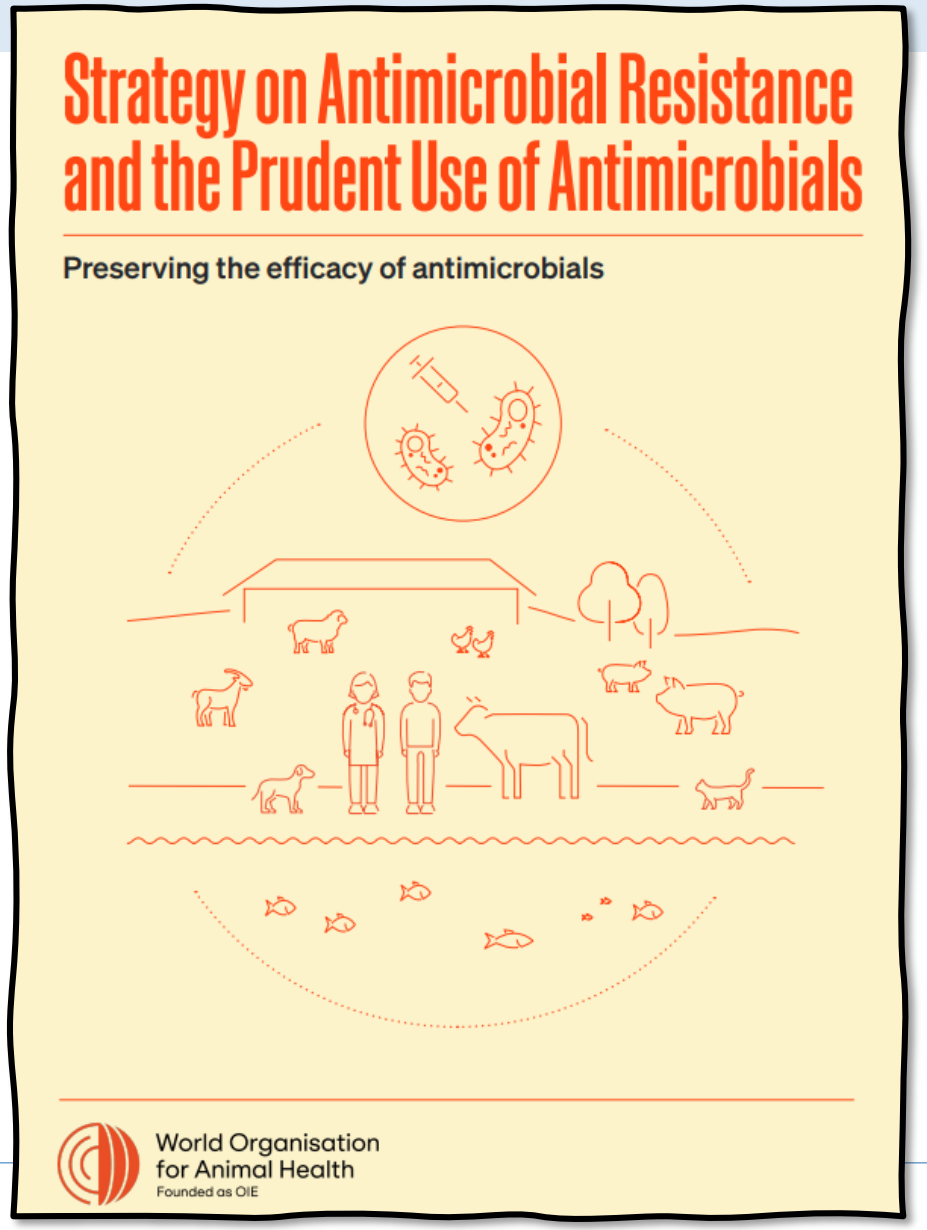
In 2016, WOAH's 84th General Assembly unanimously adopted Resolution 36, which mandated WOAH to compile AMR activities into a strategy – Four Pillars

INCREASE AWARENESS & UNDERSTANDING

STRENGTHEN SURVEILLANCE & RESEARCH

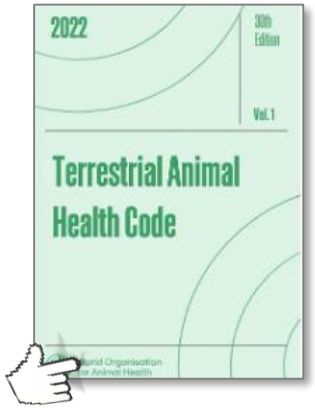
SUPPORT GOVERNANCE & BUILD CAPACITY

IMPLEMENT STANDARDS



Encourage implementation of international standards

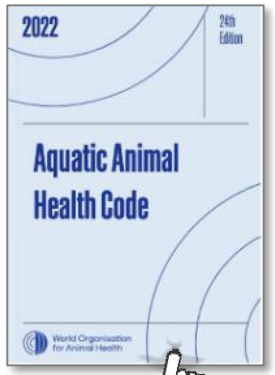
Terrestrial Animal Health Code



- Ch.6.7. **Introduction** to the recommendations for controlling antimicrobial resistance
- Ch.6.8. Harmonisation of national AMR **surveillance and monitoring** programmes (updated in May 2018)
- Ch.6.9. **Monitoring of the quantities and usage patterns** of antimicrobial agents used in food-producing animals (Agreement on definitions)
- Ch.6.10. **Responsible and prudent use** of antimicrobial agents in veterinary medicine
- Ch.6.11. **Risk analysis** for AMR arising from the use of antimicrobial agents in animals

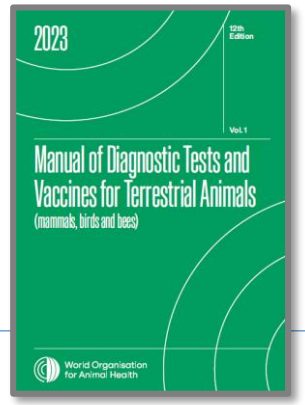
- **Extension** to non-food producing animals
- **Inclusion** of national action plans and need for One Health approach
- **Strengthening** environmental impact of antimicrobial use
- **Clarifying** and detailing responsibilities & actions for all concerned actors
  - ❑ Competent authorities
  - ❑ Pharmaceutical industry
  - ❑ Wholesale & retail distributors
  - ❑ Veterinarians
  - ❑ Animal feed manufacturers
  - ❑ Food animal producers
  - ❑ Owners of non-food producing animals

Aquatic Animal Health Code



- Ch.6.2. Principles for **responsible and prudent use** of antimicrobial agents in aquatic animals
- Ch.6.3. **Monitoring of the quantities and usage patterns** of antimicrobial agents used in aquatic animals
- Ch.6.4. Development and harmonisation of national AMR **surveillance and monitoring** programmes for aquatic animals
- Ch.6.5. **Risk analysis** for AMR arising from the use of antimicrobial agents in aquatic animals

Manual of Diagnostic Tests and Vaccines for Terrestrial Animals



- Ch. 2.1.1 Laboratory methodologies for bacterial **antimicrobial susceptibility testing**

WOAH Terrestrial and Aquatic Codes & Manuals

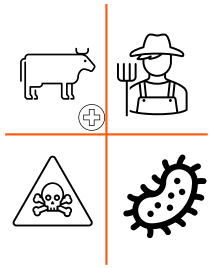
Substandard & Falsified Veterinary Products project

OIE 2nd Global Conference R # 6. To explore the possibility of building an information system of falsified or substandard drugs in the animal sectors illegally circulating within and between countries and building on the experience of the monitoring systems set up by WHO for drugs designated for human use taking a “One Health” approach.

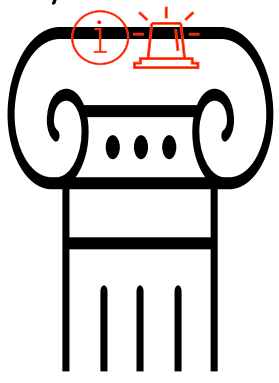
- Worldwide, 1.3 billion people raise livestock
- Global trade of VMPs estimated at US$30 billion/ year

52 % of 1246 VMPs tested in Africa & Asia were SFVPs

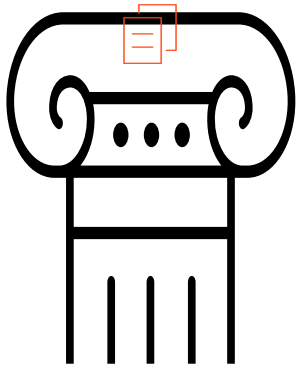
- Negative impact on animal health & farming communities
- Risk of AMR
- Hinders achieving SDGs

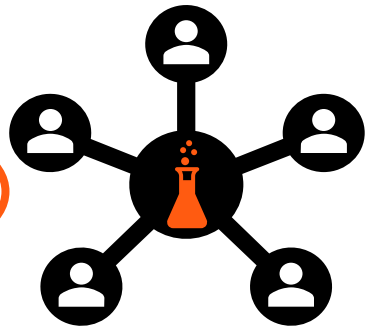


Development an information & alert system for SFVP

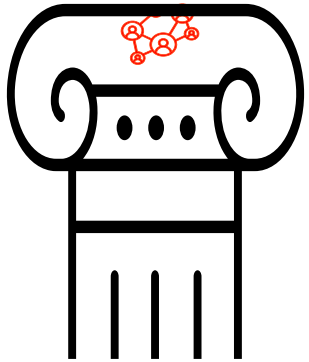


Development of Guidelines on post-marketing surveillance

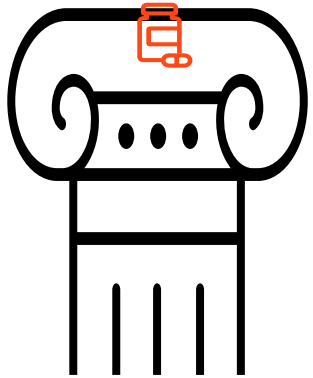




Development Regional Laboratory networks



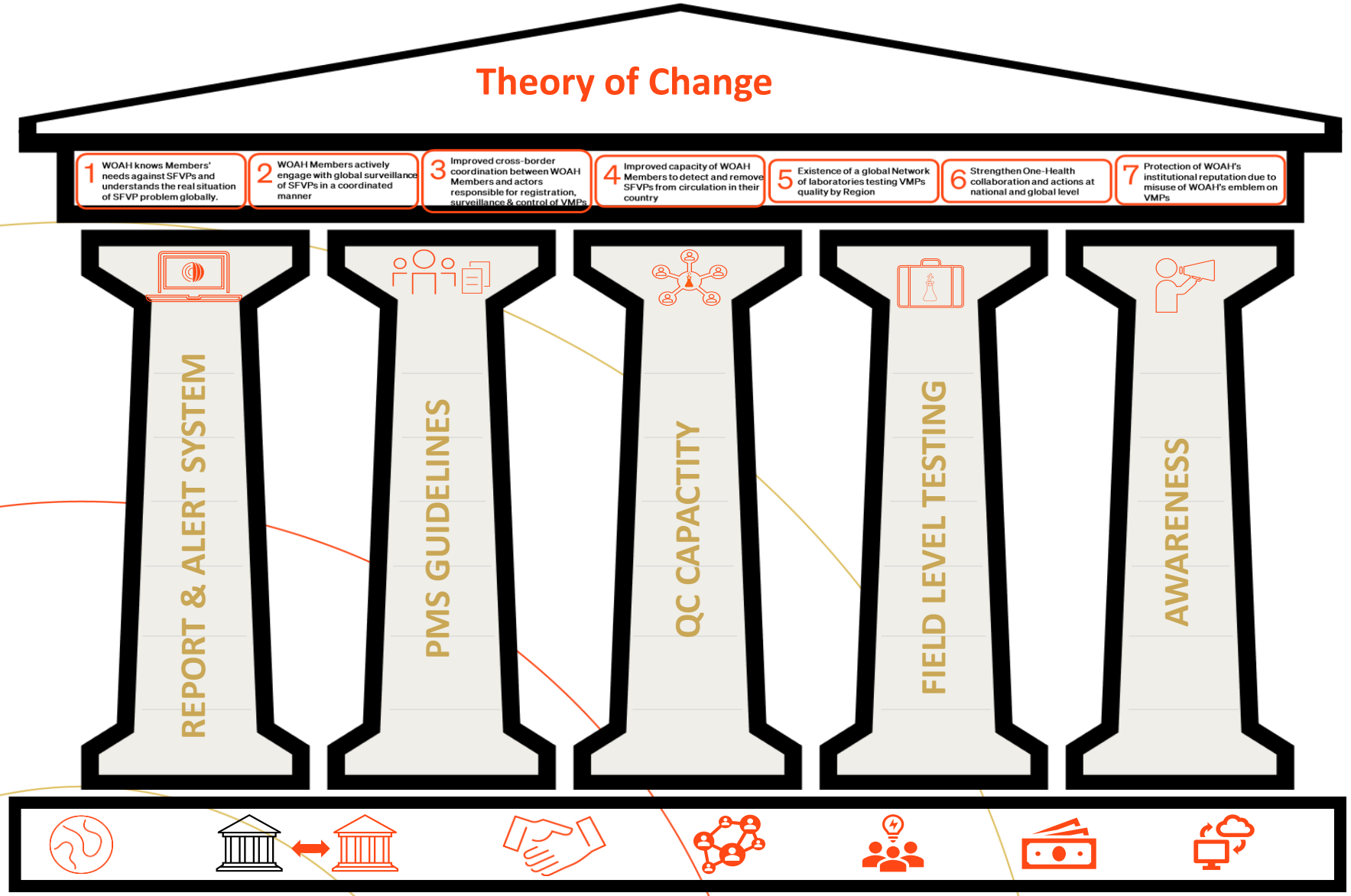
Guidelines & tools for field level surveillance



(Source: Vidhamaly V, Bellingham K, Newton PN, et al. The quality of veterinary medicines and their implications for One Health. BMJ Global Health 2022)

HOW ?

Theory of Change



Impact & Goals

Strengthen within- and cross-sectorial coordination

Fewer SFVPs circulating in WOAH Members

Reduced contribution to AMR & APR

Improved access to good quality VMPs and capacity to effectively manage animal diseases

Reduced impact of infectious diseases on animal health and welfare, food security and economic development

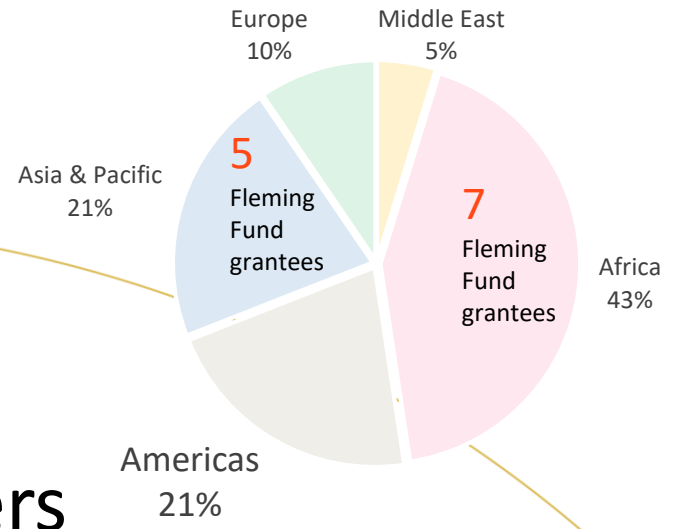
Global Information & Alert System for SFVPs

Pilot Phase 2

2023

42

Members



Prelimina

Classification	Number incidents	Number products		Total Number of VMPs
		Suspect	Confirmed	
Substandard	4	0	4	**4**
Falsified	9	4	6	**10**
Unregistered	10	23	3	**26**
Unknown	6	-	-	**15**
TOTAL	**25**			**55**

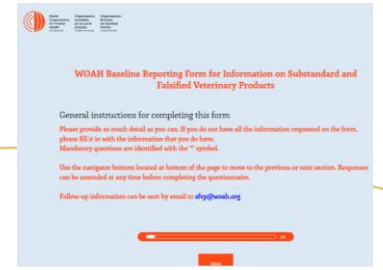
Internal report
available End Q2-2024

New Pilot Phase

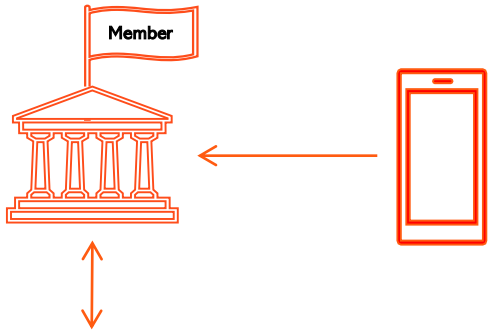
Veterinary Surveillance System for Substandard And FalsifiEd mEdicines

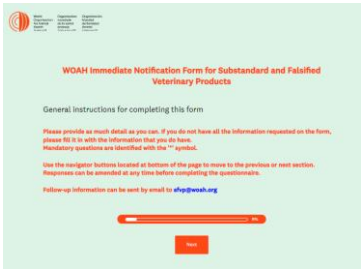
VSAFE

FINAL GOAL : Veterinary Monitoring and Surveillance System for Substandard and Falsified VMPs



To be updated at least 1/y





To be completed every time a member has an incident to report

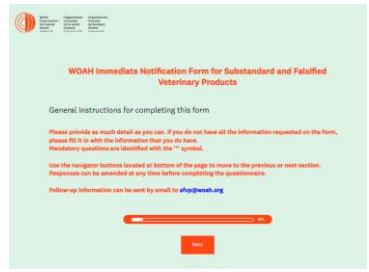
Members with access, control and analysis of their own data

Repository of incidents available at regional level

Public Alerts with recommendations (subject to conditions to fulfill)

Annual report

FINAL GOAL : Veterinary Monitoring and Surveillance System for Substandard and Falsified VMPs



Member

Veterinary Associations

WVA

WORLD ASSOCIATION FOR BUIATRICS

World Health Organization

International Organisations

WORLD CUSTOMS ORGANIZATION

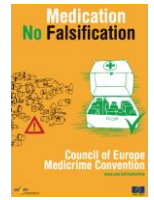
FAO

INTERPOL

NGOs

Private sector

Established Networks



PIC/S

Support communication with Members for validation

Leverage for encouraging participation to Members

Better understanding of the Situation in the field

1st WOAH Workshop on Substandard and falsified veterinary products (SFVP)

- 60 participants from 24 countries including Philippines joined.
- Main purpose was to provide the participants with awareness of detect, prevent and response for SFVP

WOAH List of Antimicrobials of Veterinary Importance

Conclusion 5

- Antimicrobials that are CIAs in vet med should be identified, to complement the id of such antimicrobials used in human med.
- Criteria for identification of CIAs in animals should be established by OIE.
- The overlap of critical lists for human and vet med can allow for the appropriate balance to be struck between AH and PH needs

2003

FAO/OIE/WHO Expert Workshop on Non-Human AMU and AMR (Scientific Assessment)

2004

FAO/OIE/WHO Expert Workshop on Non-Human AMU and AMR (Management Options)

2005

OIE conducted a survey with its Members & relevant stakeholders to develop OIE list

2007

OIE List was adopted at OIE 75th General Session in May 2007

2021

WHO MIA List with revised categorization criteria

2024 (TBC)

202…

Revision of recommendations in WOAH list (Tentative: 2024)

Revision of categorization criteria WOAH list (From 2024 onwards)

Revision of WOAH List of Veterinary Important Antimicrobials

2018

[2nd OIE Global Conference on AMR]

Update WOAH List considering
- antimicrobials only used in companion animals
- subdivision of therapeutic indications in animal species

ANTIMICROBIAL AGENTS (CLASS, SUB-CLASS)	Categorisation VCIA	VHIA	VIA	Molecules	Species	Used/not used in poultry
AMINOCOUMARIN			x	Novobiocin	AVI, BOV, CAP, OVI, PIS	Used
AMINOCYCLITOL	x			Spectinomycin	AVI, BOV, CAP, EQU, LEP, OVI, PIS, SUI	Used
AMINOGLYCOSIDES	x			Dihydrostreptomycin	AVI, BOV, CAP, EQU, LEP, OVI, SUI	Used
				Streptomycin	API, AVI, BOV, CAP, EQU, LEP, OVI, PIS, SUI	Used
AMINOGLYCOSIDES + 2 DEOXYSTREPTAMINE	x			Amikacin	EQU	Not used
				Apramycin	AVI, BOV, LEP, OVI, SUI	Used
				Fortimycin	BOV, LEP, OVI, SUI	Not used
				Framycetin	BOV, CAP, OVI	Not used

Pathogens	Examples of diseases
Bacteria	
Avibacterium (Haemophilus) paragallinarum	Infectious coryza
Bordetella avium	Bordetellosis (Turkey coryza)
Brachyspira pilosicoli	Avian intestinal spirochaetosis
Chlamydia psittaci	
Clostridium spp.	
E. coli	
Enterococcus spp.	
Erysipelothrix rhusiop	
Gallibacterium anatis	
Riemerella anatipesti	

	Avibacterium paragallinarum infection	*Bordetella* spp. infection	*Brachyspira* spp. infection	*Chlamydia psittaci* infection	*Clostridium* spp. infection	*E. coli* infection	*Eimeria* spp. infection	*Enterococcus* spp. infection	*Erysipelothrix rhusiopathiae* infection	*Gallibacterium* spp. infection	*Histomonas* spp. infection	*Mycoplasma* spp. infection
AMINOCOUMARIN						x						
AMINOCYCLITOL						x						
AMINOGLYCOSIDES	x					x						
AMINOGLYCOSIDES + 2 DEOXYSTREPTAMINE	x				x	x					x	
AMPHENICOLS	x					x						x
CEPHALOSPORINS						x						
IONOPHORES							x					
IONOPHORES + ANTICOCCIDIAL							x					
LINCOSAMIDES					x	x		x	x			x
LINCOSAMIDES + AMINOCYCLITOL					x	x						x
MACROLIDES	x		x		x							x
MACROLIDES + TETRACYCLINES												x
ORTHOSOMYCINS					x							
PENICILLINS	x				x	x		x	x	x		
PENICILLINS + MACROLIDES					x							
PHOSPHONIC ACID DERIVATIVES					x	x				x		
PLEUROMUTILINS			x		x							x
POLYMYXINS					x	x						
POLYPEPTIDES					x							
QUINOLONES	x	x				x				x		x
STREPTOGRAMINS					x							
SULFONAMIDES	x					x	x					
SULFONAMIDES + DIAMINOPYRIMIDINES	x				x	x	x		x			
TETRACYCLINES	x	x	x	x	x	x	x	x	x			x

2020 2022 2024 2024

Resolution 35 – Revision of the WOAH List

Revised recommendations for antimicrobials critically important for animals and humans
- Phosphonic acid derivatives
- 3rd & 4th generation cephalosporins, fluoroquinolones and colistin

Resolution #35

Feb 2024: revised WOAH List endorsed by the AMRWG

March 2024: revised WOAH List endorsed by WOAH's Council

May 2024: presented for adoption at the GS after AMRWG presentation

- Harmonisation of recommendations with **WHO MIA List**
- Revision of **categorization criteria of VCIA**
- Inclusion of **cats & dogs**

At 91st GS in 2024 - Revised the recommendations of WOAH's List of Antimicrobial Agents of Veterinary Importance to align with WHO MIA List following a One Health approach, as an essential contribution towards the development of guidelines for responsible and prudent use of antimicrobial agents in both aquatic and terrestrial animals

[WOAH Technical Reference docs]

World Organisation for Animal Health
Founded as OIE

ANIMUSE Global Database : curbing antimicrobial resistance with data

Dr Tikiri Wijayathilaka
World Organization for Animal Health

The Fleming Fund
Funded by UK Government

If you cannot measure it,
you cannot improve it.

Lord Kelvin (1824 – 1907)

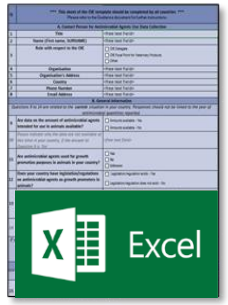
What is ANIMUSE?

- It stands for **ANI**mal anti**M**icrobial **USE** → **ANIMUSE Global Database**
- It started in October 2015
- **9th Round of data** collection started in **September 2023**
- From the 183 WOAH Members, around **150 to 160 Members participate** during each round
- **Eight reports** have been published with data aggregated at global and regional levels

AMU Data collection: A New Phase

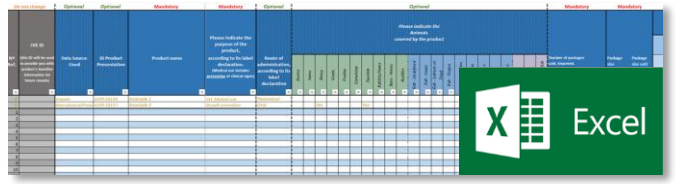
2013 – 1st Global Conference on Antimicrobial Resistance (AMR)

2015 – Launch of WOAH AMU data collection



Only **41 Members** had an official system in place collecting quantitative AMU data

2019 – Launch of WOAH Calculation Tool to assist Members



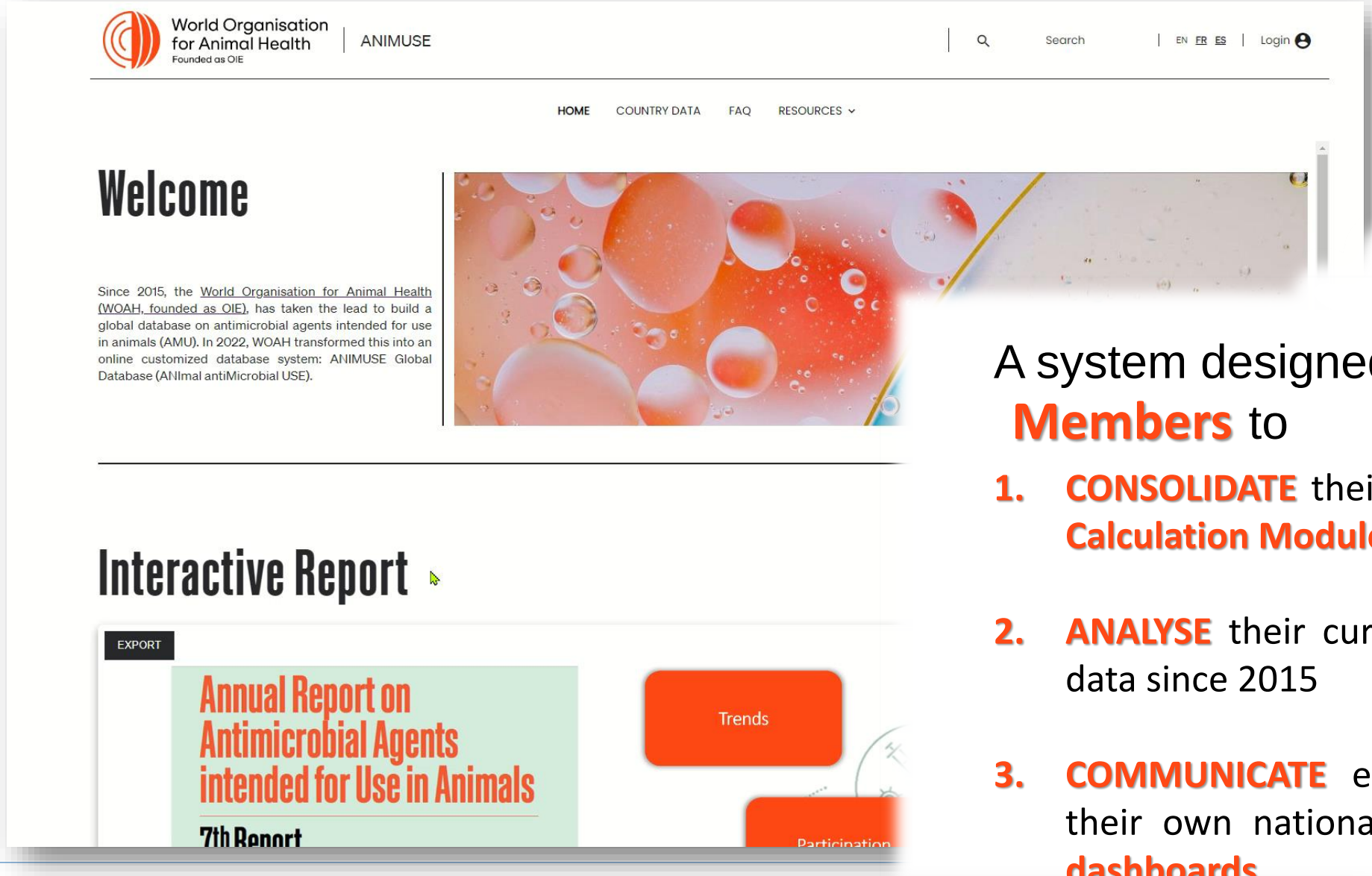
2022 – Launch of **ANIMUSE Global Database**

150/160 Members Reporting **annually**

Antimicrobial use in animals: a journey towards integrated surveillance

M. Jeannin, M. Magongo, D. Gochez, O. Valsson, E. Erlacher-Vindel, M. Arroyo Kuribreña & J. Yugueros-Marcos

ANImal antiMicrobial USE : A New Phase

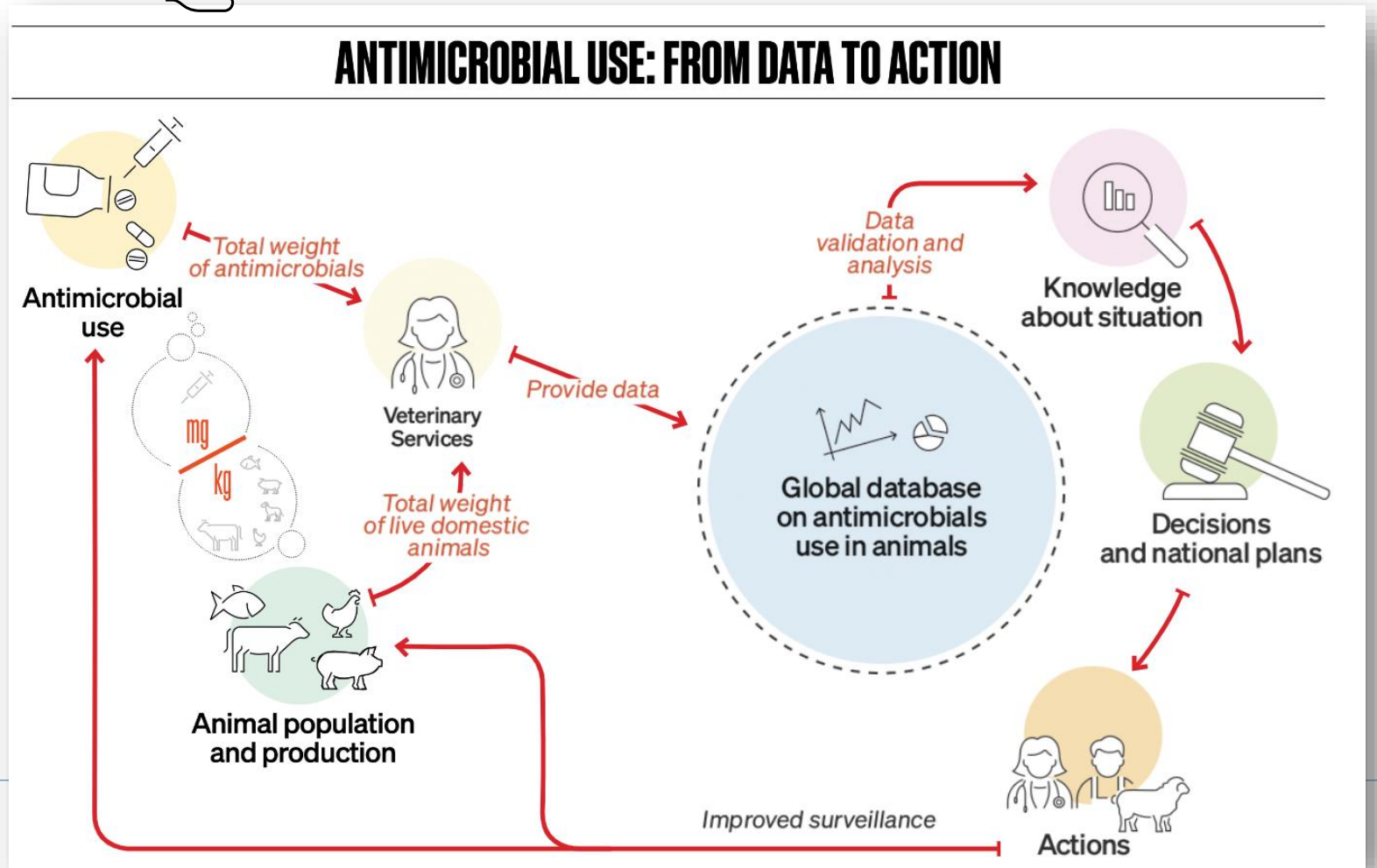


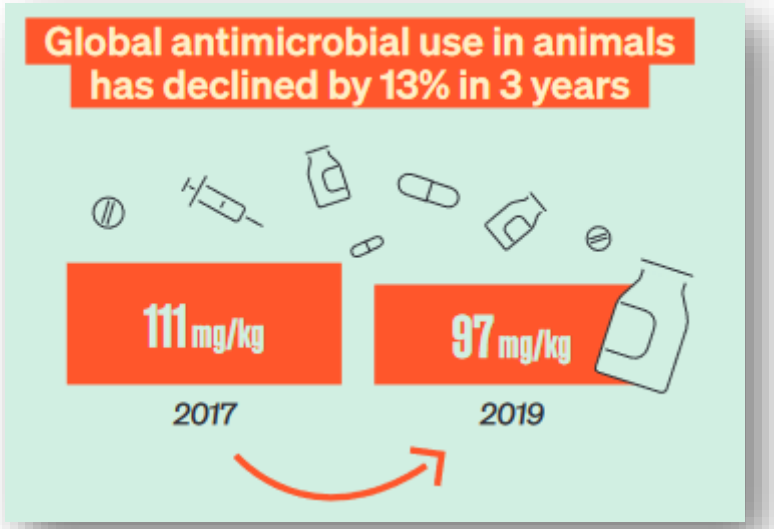
A system designed for **our Members** to

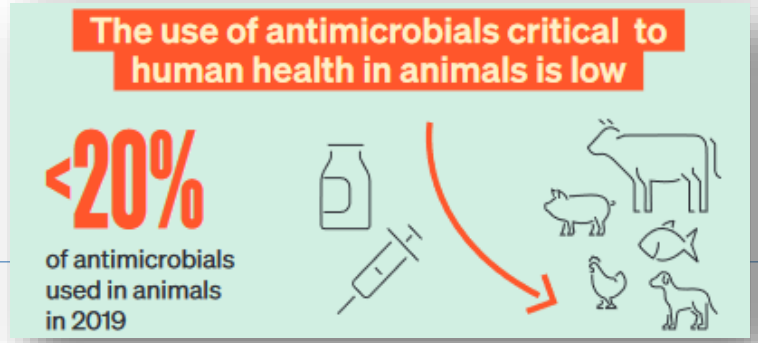
1. **CONSOLIDATE** their AMU data through the **Calculation Module**
2. **ANALYSE** their current and historical AMU data since 2015
3. **COMMUNICATE** easily and create you're their own national reports with the **data dashboards**

ANIMUSE Global Database

amu.woah.org







Essential fields to enter data

	A	B	C	D	E	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	A
1	Do not change		Optional	Optional	Mandatory		Mandatory		Mandatory		Mandatory							
2											Active Ingredient 1					Active Ingredient 2 (if the product has more than one antibiot		
3											Chemical compound as declared on the label					Chemical compound as declared on the label		
4	Nº Ref.	WOAH ID (this ID will be used to provide you with product's baseline information for future rounds)	Data Source Used	ID Product Presentation	Product name	Ornamental fish	Number of packages sold, imported, produced, prescribed or used in the period of time declared to WOAH		Package size	Package size unit	Active ingredient #1	Strenght of antimicrobial agent	Unit	Per unit of content	Unit	Active ingredient #2	Strenght of antimicrobial agent	Unit
5	0		Imports	ASFR-20156	Example 1		1,500	Units	100	ml	Sulfamonomethoxine	200.0	mg	1	ml	Trimethoprim	40.0	mg
6	0		Manufacture/Product	ASFR-20157	Example 2		200	Units	25	kg	Colistin sulfate	2,000,000.0	IU	100	g			
21	15																	
22	16																	
23	17																	
24	18																	

Home

World Organisation for Animal Health
Founded as OIE

COUNTRY

USE	Americas	FR	Member	LMICTs	
ISO3 Code	WOAH Region	WOAH Language	WOAH Membership	World Bank Status	Other Affiliation

Lilou Menesses
Person Submitting the Data

FOCAL_POINT
Role to WOAH

Yes
Participation for Current Round

PUBLIC
Confidentiality Chosen

Option 3
Reporting Option Submitted

No
Use of Growth Promoters

No
Legislation / Regulation for Growth Promoters

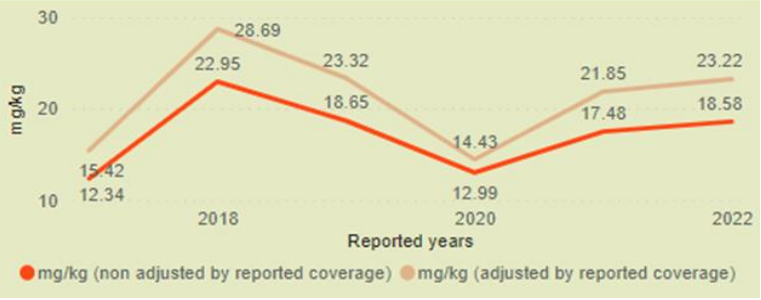
2022
Reported Year

19,342.1
Total Kilograms Reported

Tetracyclines
Antimicrobial Class with Higher Quantities

Ranking of mg/kg

Year	Position*	Number of Participants**
2018	19	116
2017	26	123
2016	28	115
2015	28	96



*Position: The ranking of your country in relation to other countries, with 1 being the highest value for mg/kg.

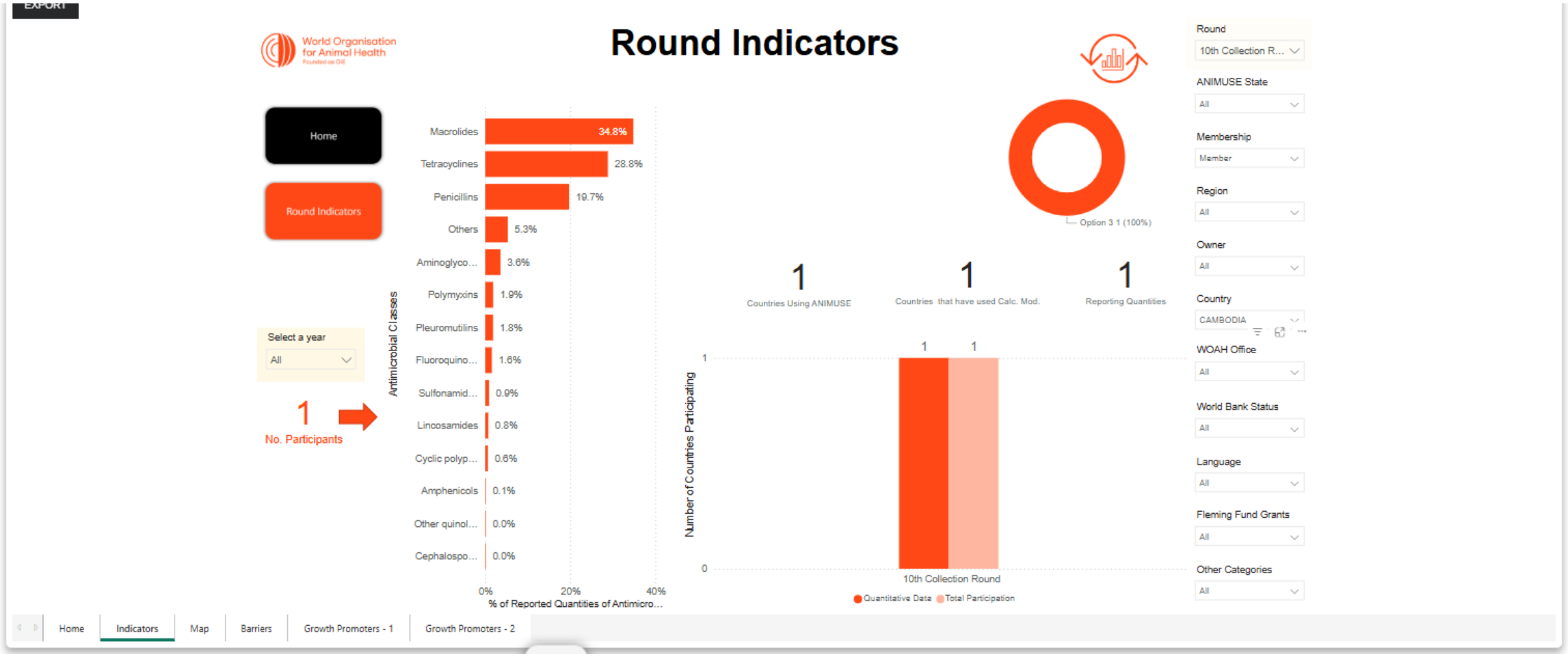
**Number of countries: the total number of countries that provided data for that year

Cambodia

World Organisation for Animal Health | ANIMUSE

Search | EN FR ES | Asia | Tikiri Priyant

HOME FREQUENTLY ASKED QUESTIONS RESOURCES USER SUPPORT AMU FIELD LEVEL



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Total Antimicrobial Quantities

Home

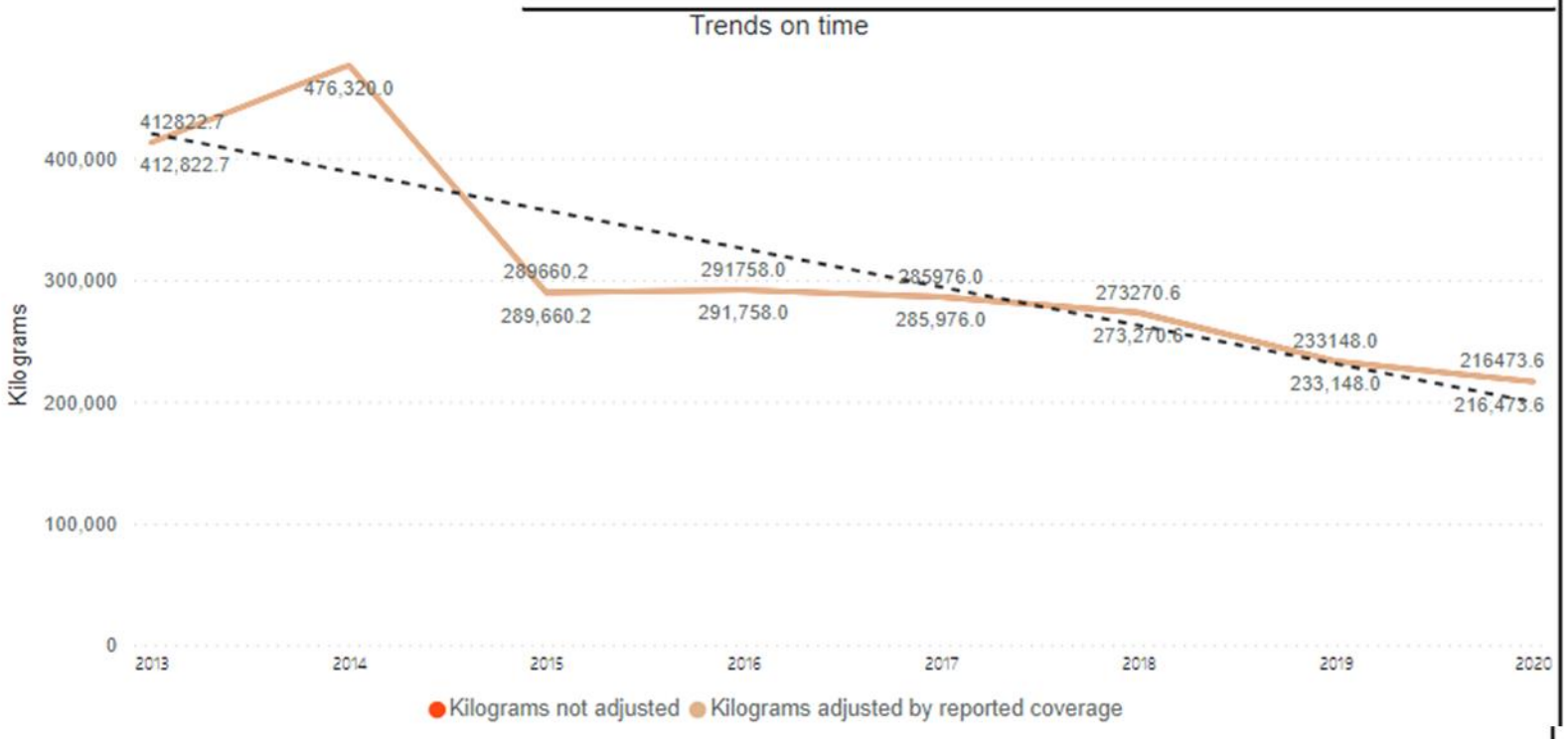
Total Quantities

Antimicrobial Classes

Animal Groups

Routes of Administration

Year	WOAH Validation	Calc. Module	Total	Coverage	Total Adj.
2020	VALIDATED		216,473.60	100 %	216,473.60
2019	VALIDATED		233,148.00	100 %	233,148.00
2018	VALIDATED		273,270.60	100 %	273,270.60
2017	VALIDATED		285,976.00	100 %	285,976.00
2016	VALIDATED		291,758.00	100 %	291,758.00
2015	VALIDATED		289,660.20	100 %	289,660.20
2014	VALIDATED		476,320.00	100 %	476,320.00
2013	VALIDATED		412,822.70	100 %	412,822.70
Total			**2,479,429.10**	**100 %**	**2,479,429.10**



Country

ANIMUSELAND

Class

Multiple selections

Select all	2017
2009	2018
2010	2019
2011	2020
2012	2021
2013	2022
2014	
2015	
2016	

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Antimicrobial Quantities - **Classes**

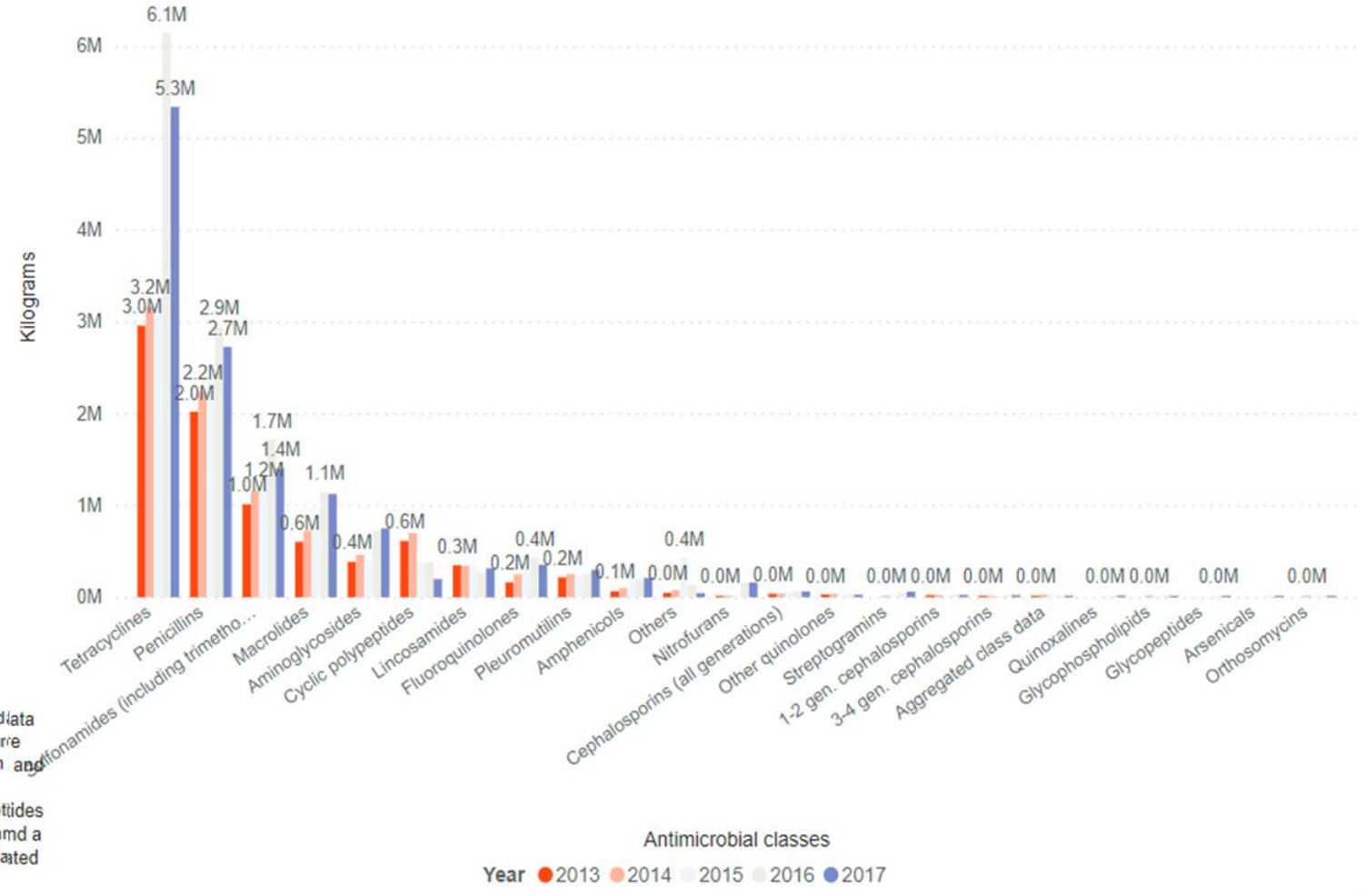
Home

Total Quantities

Antimicrobial Classes

Animal Groups

Routes of Administration



Note: Before the 9th Round of the data collection, cyclic polypeptides (before polypeptides) class included colistin and polymyxin B.
From the 9th Round, cyclic polypeptides excludes colistin and polymyxin B and a new category (polymyxins) was created for these molecules.

Country

ANIMUSELAND

Class

All

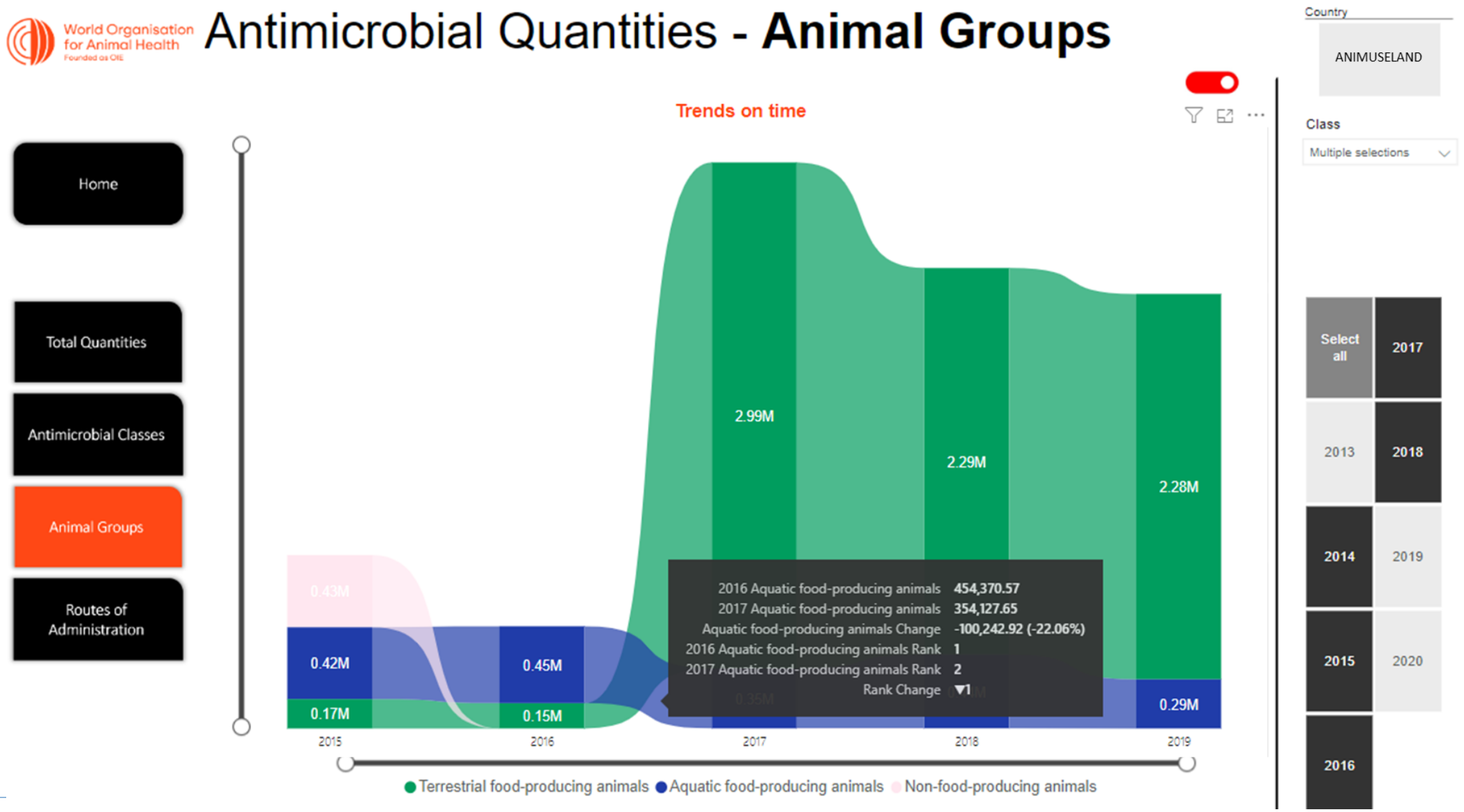
Select all

2020

2018

2021

2019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Antimicrobial Quantities - Animal Groups
Home
Total Quantities
Antimicrobial Classes
Animal Groups
Routes of Administration
Trends on time
Country
ANIMUSELAND
Class
Multiple selections
Select all
2013
2014
2015
2016
2017
2018
2019
2020
0.43M
0.42M
0.17M
0.45M
0.15M
2.99M
2.29M
2.28M
0.29M
2016 Aquatic food-producing animals 454,370.57
2017 Aquatic food-producing animals 354,127.65
Aquatic food-producing animals Change -100,242.92 (-22.06%)
2016 Aquatic food-producing animals Rank 1
2017 Aquatic food-producing animals Rank 2
Rank Change ▼1
2015
2016
2017
2018
2019
Terrestrial food-producing animals
Aquatic food-producing animals
Non-food-producing animals

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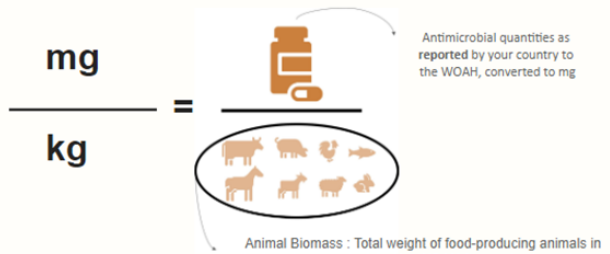
What is a mg/kg?

This figure provides an overview of antimicrobial agents intended for use in animals adjusted by animal biomass (mg/kg). The mg/kg compile the data of the Participants providing data for food-producing animals in different rounds of data collection. The **mg/kg provides an indicator that remains relevant for the purposes of comparison** (e.g. over time and between regions).
The **orange line** presents a mg/kg as represented by the quantitative data reported to WOAH from the Participants. The second **yellow line** 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 a specific year. These coverage estimates are subjective for each reporting Participant, but can provide an upper-level estimate of global antimicrobial use in animals.

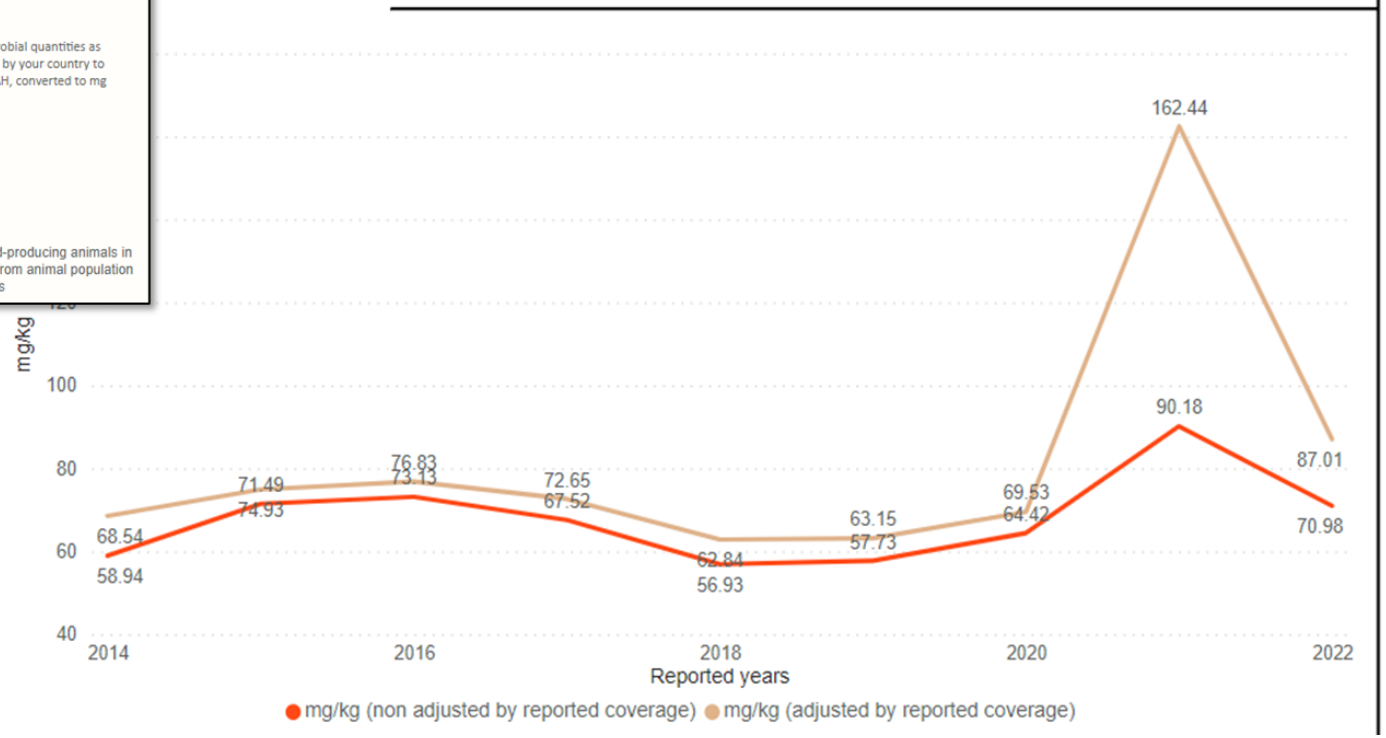


Ranking and mg/kg

Year	Dossier status	Position*	Number of Participants**
2020	VALIDATED	20	123
2019	VALIDATED	19	125
2018	VALIDATED	21	127
2017	VALIDATED	18	115
2016	VALIDATED	19	96
2015	VALIDATED	18	94
2014	VALIDATED	11	61

**Position: The ranking of your country in relation to other countries, with 1 being the highest value for mg/kg.*

***Number of countries: the total number of countries that provided data for that year*



Country
ANIMUSELAND
Round
All
Class
Multiple selections

Select all | 2022
2014
2015
2016
2017
2018
2019
2020
2021

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Growth Promoters - **Quantities**

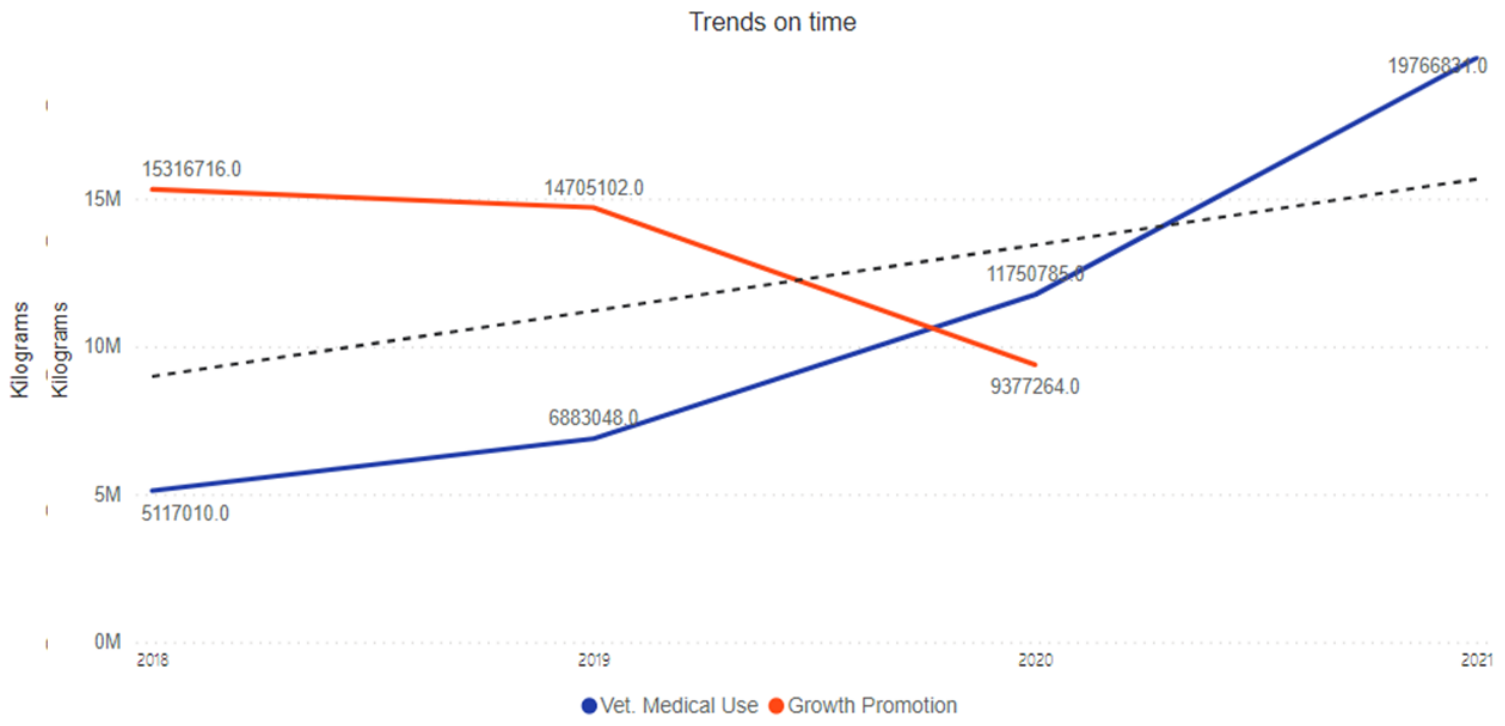
Year	WOAH Validation	Calc. Module	Total	Total Vet. Medical Use	Total Growth Promotion
2021	VALIDATED		19,766,831.00	19,766,831.00	
2020	VALIDATED		21,128,049.00	11,750,785.00	9,377,264.00
2019	VALIDATED		21,588,150.00	6,883,048.00	14,705,102.00
2018	VALIDATED		20,433,726.00	5,117,010.00	15,316,716.00
Total			**82,916,756.00**	**43,517,674.00**	**39,399,082.00**

Home

Use & Legislation

Molecules Declared

Antimicrobial Quantities



Country

ANIMUSELAND

Round

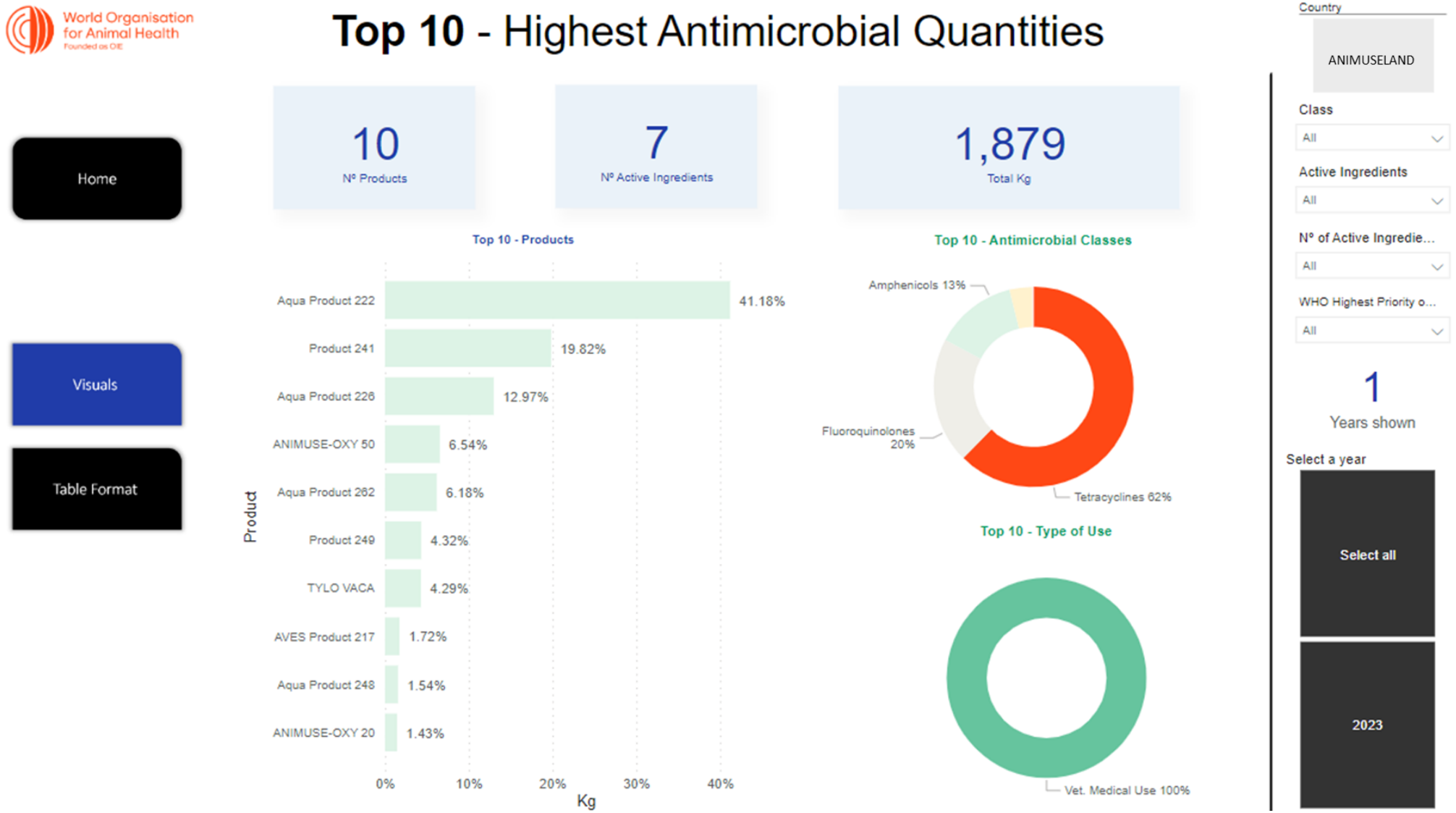
All

Class

All

Select all | 2018 | 2015 | 2019 | 2016 | 2020 | 2017 | 2021

2015


World Organisation for Animal Health
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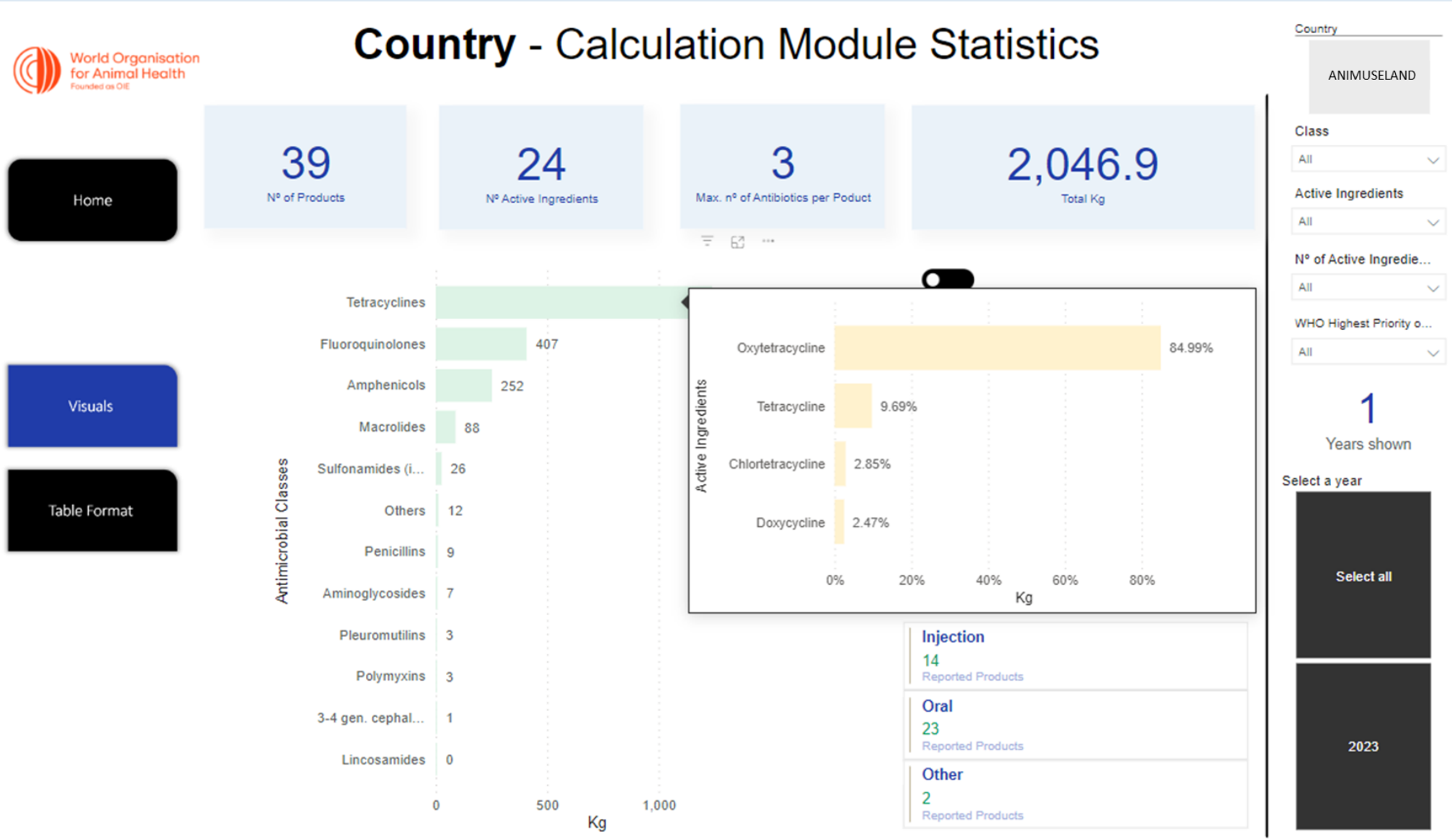
Top 10 - Highest Antimicrobial Quantities
Home
Visuals
Table Format
10
Nº Products
7
Nº Active Ingredients
1,879
Total Kg
Top 10 - Products
Aqua Product 222 41.18%
Product 241 19.82%
Aqua Product 226 12.97%
ANIMUSE-OXY 50 6.54%
Aqua Product 262 6.18%
Product 249 4.32%
TYLO VACA 4.29%
AVES Product 217 1.72%
Aqua Product 248 1.54%
ANIMUSE-OXY 20 1.43%
Product
0% 10% 20% 30% 40%
Kg
Top 10 - Antimicrobial Classes
Amphenicols 13%
Fluoroquinolones 20%
Tetracyclines 62%
Top 10 - Type of Use
Vet. Medical Use 100%
Country
ANIMUSELAND
Class
All
Active Ingredients
All
Nº of Active Ingredie...
All
WHO Highest Priority o...
All
1
Years shown
Select a year
Select all
2023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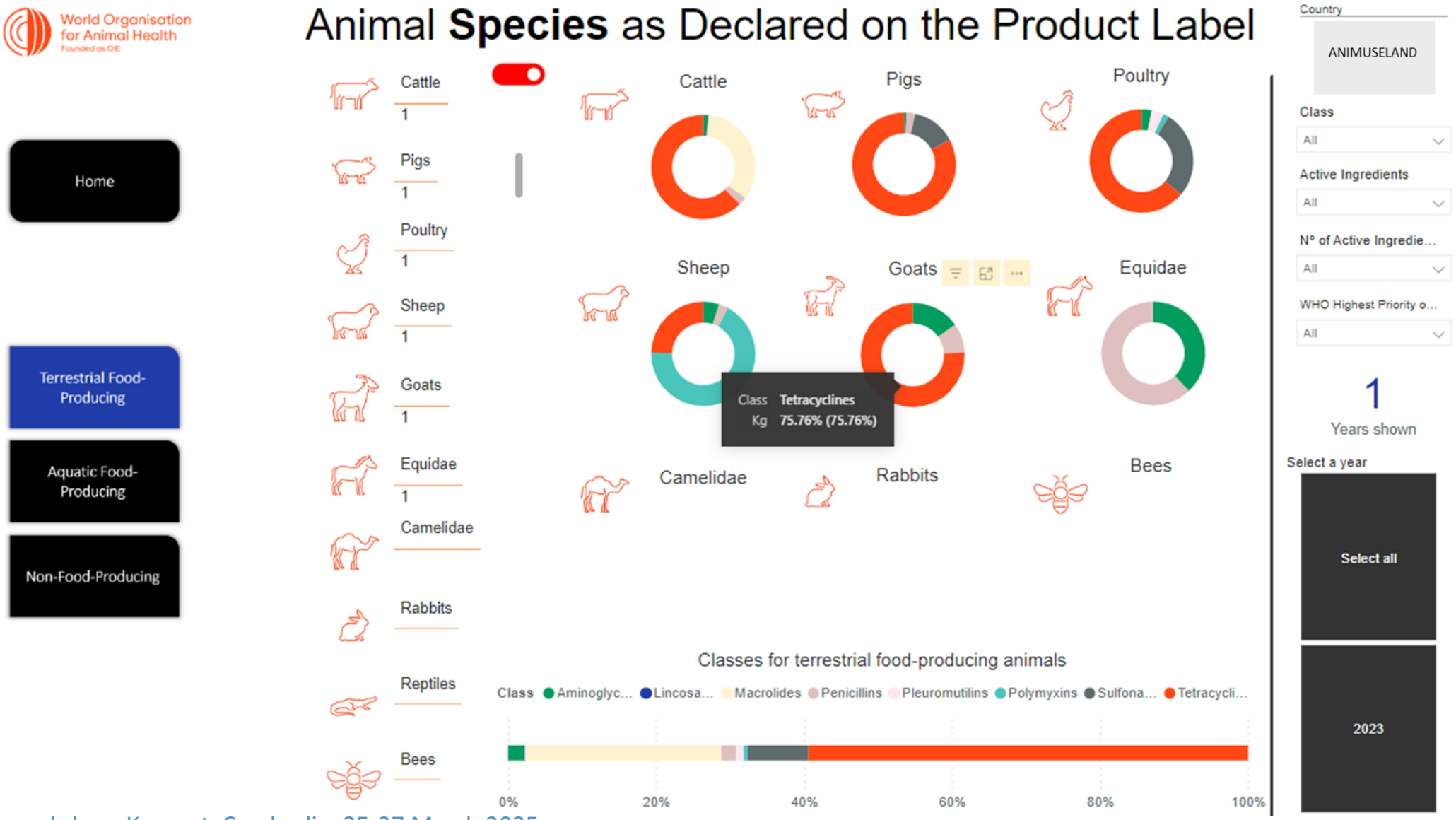
Founded as OIE
Country - Calculation Module Statistics
Home
Visuals
Table Format
39
Nº of Products
24
Nº Active Ingredients
3
Max. nº of Antibiotics per Poduct
2,046.9
Total Kg
Tetracyclines
Fluoroquinolones 407
Amphenicols 252
Macrolides 88
Sulfonamides (i... 26
Others 12
Penicillins 9
Aminoglycosides 7
Pleuromutilins 3
Polymyxins 3
3-4 gen. cephal... 1
Lincosamides 0
Antimicrobial Classes
0
500
1,000
Kg
Active Ingredients
Oxytetracycline 84.99%
Tetracycline 9.69%
Chlortetracycline 2.85%
Doxycycline 2.47%
0%
20%
40%
60%
80%
Kg
Injection
14
Reported Products
Oral
23
Reported Products
Other
2
Reported Products
Country
ANIMUSELAND
Class
All
Active Ingredients
All
Nº of Active Ingredie...
All
WHO Highest Priority o...
All
1
Years shown
Select a year
Select all
2023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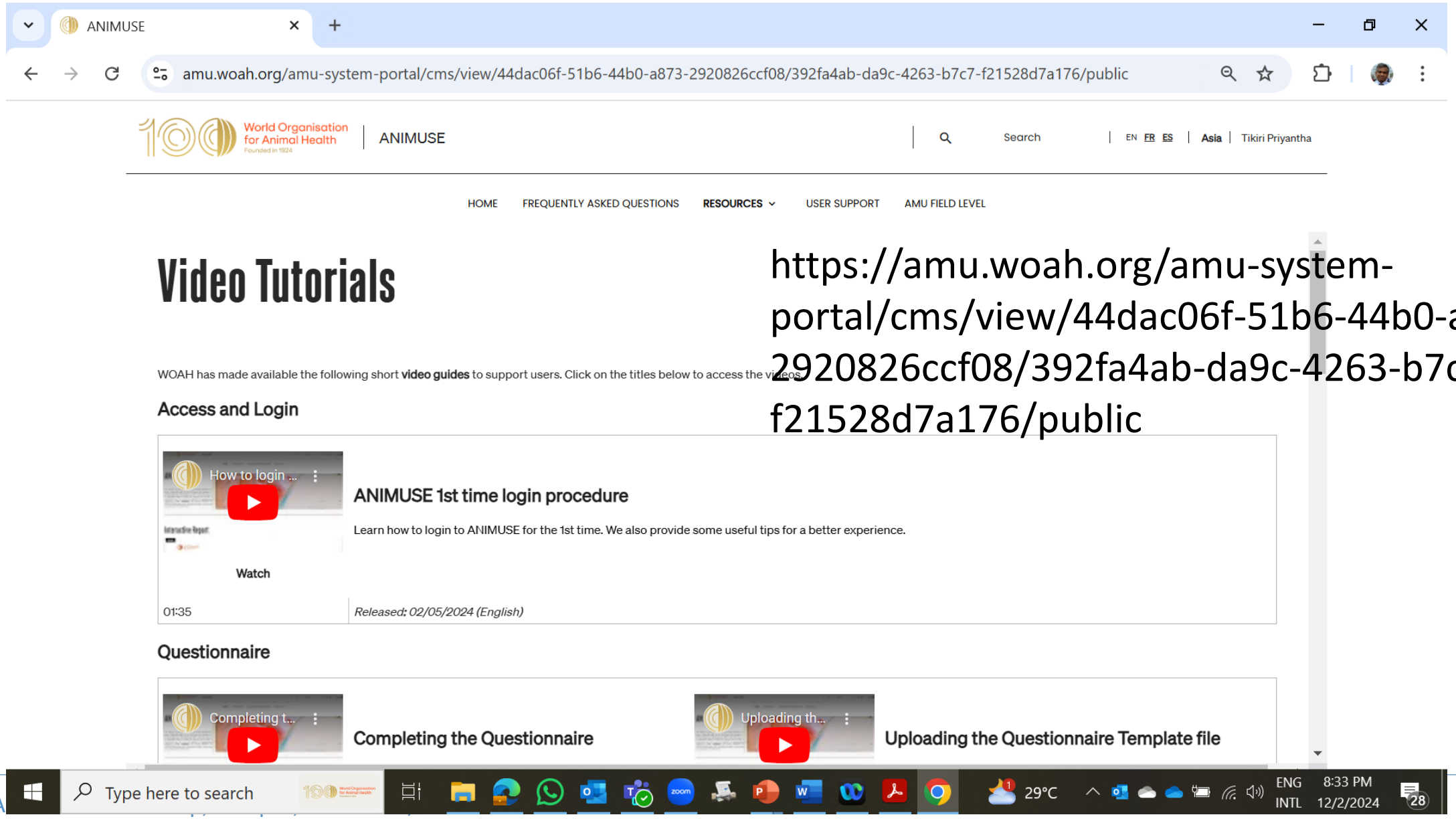
Animal Species as Declared on the Product Label
Home
Terrestrial Food-Producing
Aquatic Food-Producing
Non-Food-Producing
Cattle 1
Pigs 1
Poultry 1
Sheep 1
Goats 1
Equidae 1
Camelidae
Rabbits
Reptiles
Bees
Cattle
Pigs
Poultry
Sheep
Goats
Equidae
Camelidae
Rabbits
Bees
Class Tetracyclines
Kg 75.76% (75.76%)
Classes for terrestrial food-producing animals
Class Aminoglyc... Lincosa... Macrolides Penicillins Pleuromutilins Polymyxins Sulfona... Tetracycli...
0% 20% 40% 60% 80% 100%
Country
ANIMUSELAND
Class
All
Active Ingredients
All
N° of Active Ingredie...
All
WHO Highest Priority o...
All
1
Years shown
Select a year
Select all
2023

Self learning



https://amu.woah.org/amu-system-portal/cms/view/44dac06f-51b6-44b0-a873-2920826ccf08/392fa4ab-da9c-4263-b7c7-f21528d7a176/public

Food and Agriculture Organization of the United Nations

Thank you

Working together to fight antimicrobial resistance

Drawings: FAO/Khin Nyein Chan Oo