



ADDRESSING ANTIMICROBIAL RESISTANCE THROUGH ONE HEALTH: INSIGHTS INTO EUROPEAN FOOD SAFETY AUTHORITY'S ACTIVITIES

Dr. Ernesto Liebana, BIOHAZ Team Leader

Estonian AMR national information day,
20 November 2024.

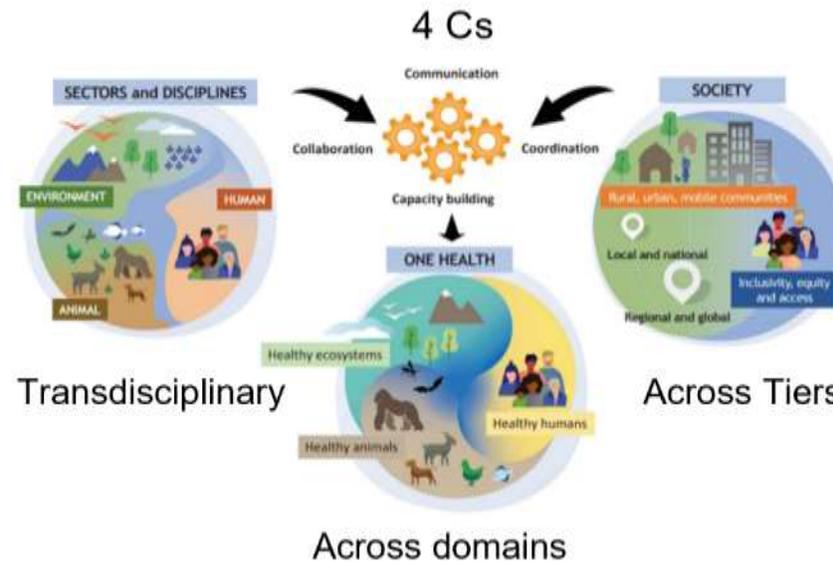
THE EU ONE HEALTH RESPONSE TO AMR



EU AMR One-Health Network

- (i) trans-sectoral and integrated approach
- enhance MSs discussions
 - exchange information and sharing of best practices

2017 EU AMR 'One Health' Action Plan

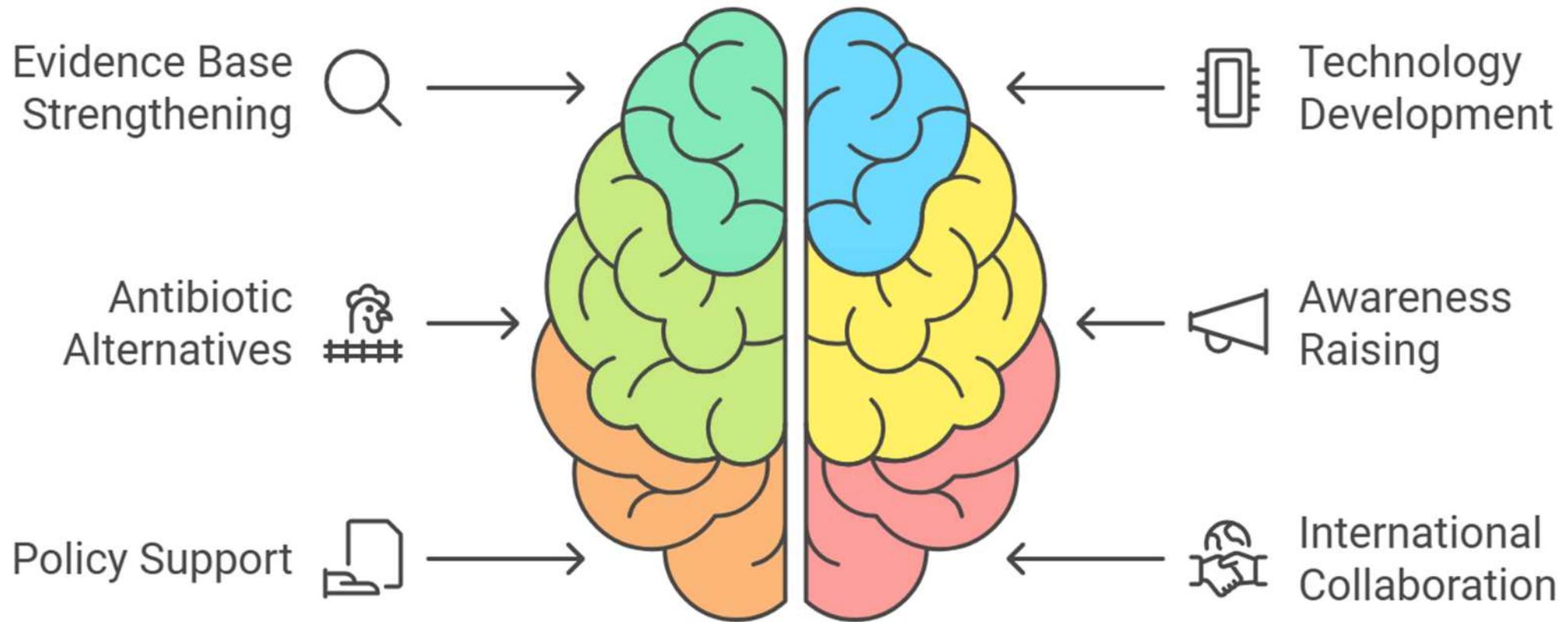


A common approach from the EU MS in implementing actions against AMR:

- (i) possible targets for AMR
- (iii) how to design impactful 'one health' national action plans against AMR
- (v) improvements in surveillance of AMR



EFSA'S AMR STRATEGY OVERVIEW



KEY OUTCOME INDICATOR COMPLETE SUSCEPTIBILITY IN INDICATOR *E. COLI*

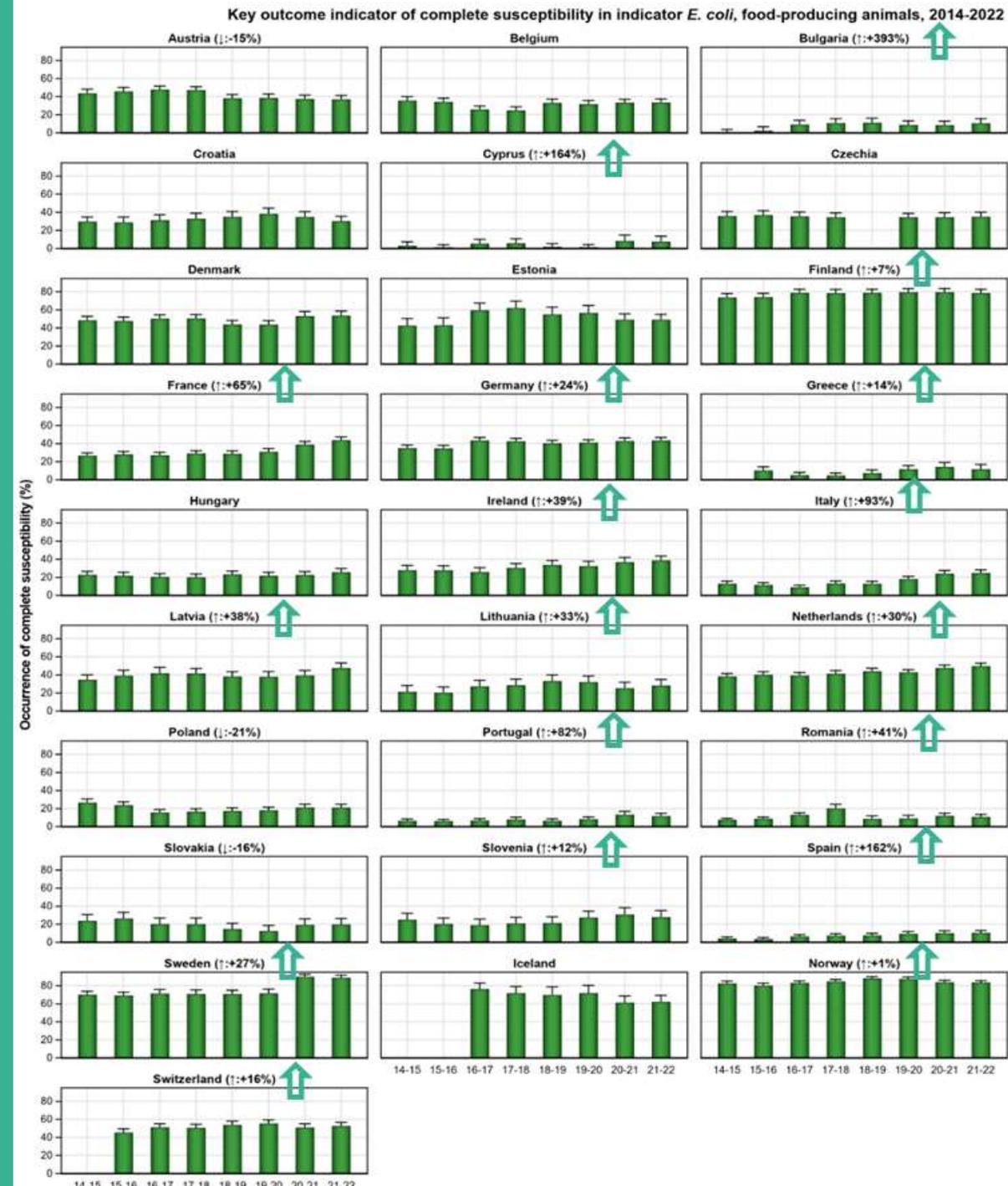


Marked variations among reporting countries

Lower KOI CS were generally observed in countries in eastern and southern Europe and the highest in countries in the northern Europe



Statistically significant increasing trends (from 2014-2022) registered in **64% of the reporting countries** (18 of 28)



KEY OUTCOME INDICATOR PREVALENCE OF ESBL- AND/OR AMPC-PRODUCING *E. COLI*



Marked variations
among reporting
countries

Higher KOI ESBL were generally
observed in countries in eastern
and southern Europe and the
highest in countries in the
northern Europe



Statistically significant
decreasing trends
(from 2015-2022)
have been observed in
**77% of the reporting
countries (23 of 30)**



CARBAPENEM RESISTANCE AND THE FOOD CHAIN: DATA FROM EFSA REPORTS

- Paramount Importance in human medicine
- Monitoring identified emerging (still uncommon) R in bacteria from food-producing animals
- Detected in several countries, different animal species, different genetic determinants.
- Further detailed investigations on origin and dissemination needed (EFSA BIOHAZ Self task and Monopoly Grant starting)
- Risk that the problem becomes endemic in food-producing animals if nothing done.

Table 20: Summary table on carbapenemase-encoding genes reported in *Escherichia coli* sampled in the routine monitoring, the specific monitoring of ESBL-/AmpC-/CP-producers and the specific monitoring of CP-producers in 2021 and 2022.

Year	Matrix	Gene	Number of isolates	Number of countries detecting the isolates
Routine monitoring of indicator <i>E. coli</i>				
2022	Fattening turkeys	<i>bla_{OXA-181}</i>	1	1 (IT)
Specific monitoring of ESBL-/AmpC-/CP-producing <i>E. coli</i>				
2021	Pig meat at retail	<i>bla_{NDM-5}</i>	1	1 (HU)
	Cattle meat at retail	<i>bla_{NDM-5}</i>	2	1 (HU)
2022	Broilers	<i>bla_{VIM-1}</i>	3	2 (AT, IT)
Specific monitoring of CP-producing <i>E. coli</i>				
2021	Fattening pigs	<i>bla_{OXA-48}</i>	3	2 (ES, IT)
		<i>bla_{OXA-181}</i>	20	1 (IT)
		<i>bla_{NDM-5}</i>	3	1 (CZ)
	Cattle under one year of age	<i>bla_{NDM-5}</i>	1	1 (IT)
		<i>bla_{OXA-181}</i>	4	1 (IT)
2022	Fattening turkeys	<i>bla_{OXA-181}</i>	1	1 (IT)



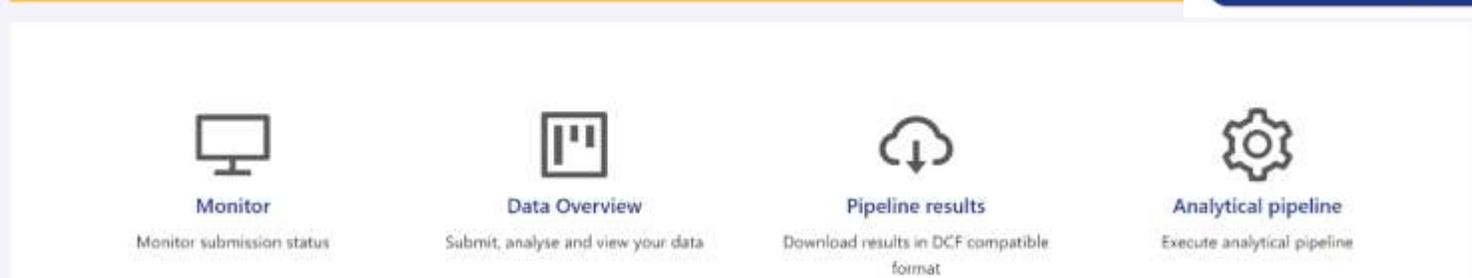
THE EFSA AMR GENE DETECTION SERVICE



To offer to MS the opportunity to use EFSA computing resources for extracting AMR genes from WGS data

To give access to User-Friendly interface for accessing and managing the data in a secured and private environment, no sharing of data

Automate mapping against the PARAM catalogue and different downloads options for the results



The service is available for

Salmonella enterica
Escherichia coli
Campylobacter jejuni
Campylobacter coli



UP-COMING EU-WIDE BASELINE SURVEYS ON AMR

MRSA in pigs

- To assess the **prevalence** of MRSA
- To assess the **AMR profile**
- To assess the **genetic diversity**
- To be performed in **2025**

AMR in bacteria from aquaculture animals

- **Mandate** of the European Commission (2023)
- EFSA Expert Working Group
-> **EFSA Technical Specifications (July 2024)**



Commission
Implementing Decision
2023/1017/EU

Lays down
specific tech.
requirements



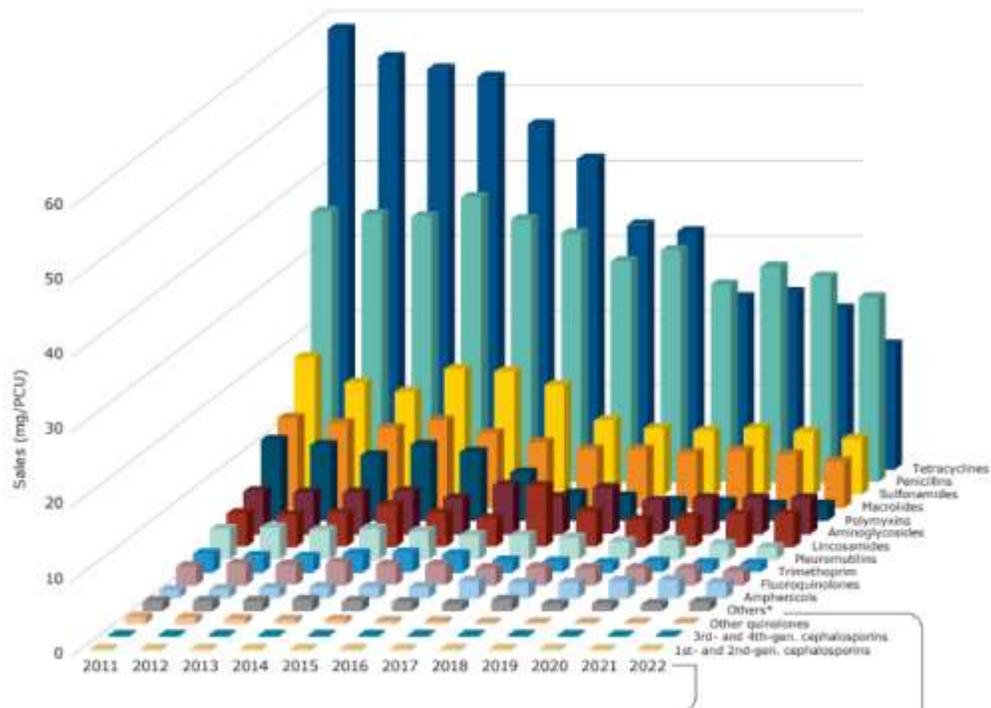
<https://www.efsa.europa.eu/en/efsajournal/pub/8928>



<https://www.efsa.europa.eu/en/efsajournal/pub/7620>

CONSUMPTION IN ANIMALS

Figure 16. Trends of aggregated sales (mg/PCU) by antibiotic class in 25 European countries² from 2011 to 2022²



Farm-to-Fork goal: reduce EU sales of antimicrobials for farmed animals + aquaculture by 50% by 2030



- The ESVAC project formally comes to an end in November 2023 with the publication of its final report.
- From January 2024, all EU / EEA MSs must report their data on the volume of sales and use of antimicrobial medicinal products in animals, in line with the Veterinary Medicinal Products Regulation.
- EU / EEA MSs must use **EMA's Antimicrobial Sales and Use Platform** to report their data.

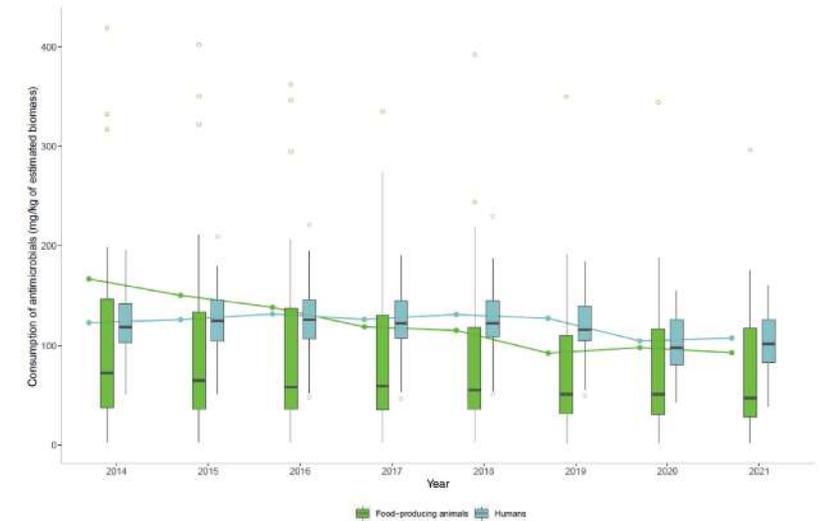
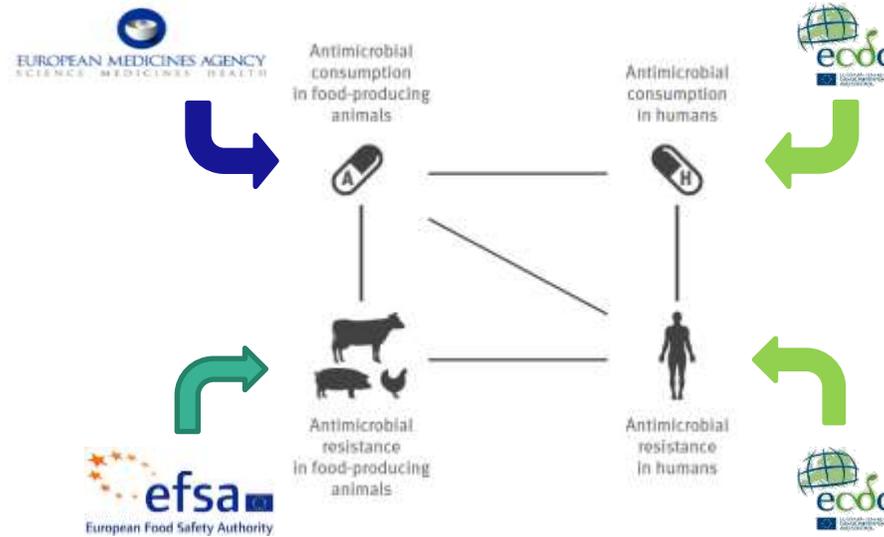
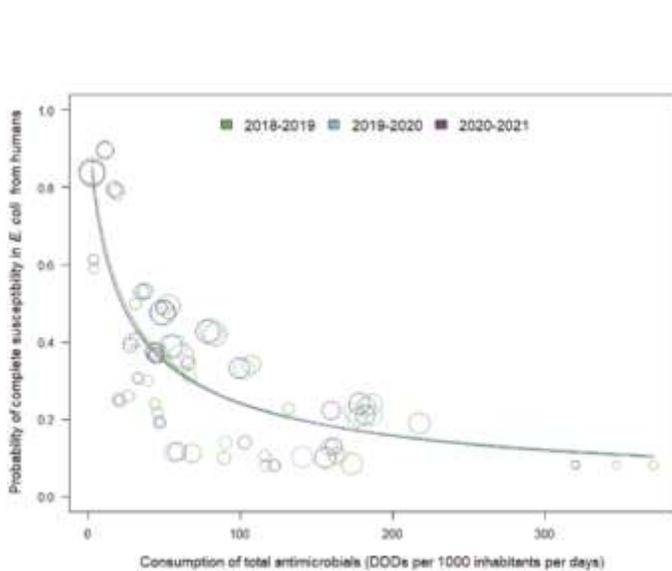


Joint reporting on the consumption of antimicrobial agents and occurrence of AMR in bacteria from humans and food-producing animals (JIACRA)

- As part of the implementation of the EU action plans on AMR, the **European Center for Disease Prevention and Control (ECDC)**, the **European Food Safety Authority (EFSA)** and the **European Medicines Agency (EMA)** have been requested by the European Commission to analyse possible **relationships** between the **consumption of antimicrobial agents** and the **occurrence of antimicrobial resistance** in humans and food-producing animals.
- JIACRA builds on previous collaboration between the three EU agencies, including harmonisation of approaches, expertise and previous joint publications on related subjects.
- So far, four JIACRA reports have been published, with a fifth report expected to be requested later this year.



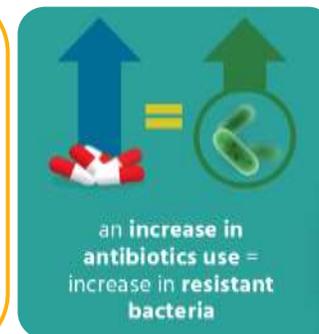
JIACRA: INTEGRATED ANALYSIS OF AB CONSUMPTION & AMR



A consistently **lower probability** of detecting completely susceptible indicator *E. coli* in animals when AMC was higher

Overall Conclusions

- Interventions to **reduce AMC** will have a **beneficial impact** on **AMR**
- Need to promote, in both humans and food-producing animals:
 - ✓ **prudent use** of antimicrobial agents
 - ✓ **infection prevention and control**
- High levels of AMC and AMR still reported: **interventions to be reinforced**



QPS QUALIFICATION ON 'ACQUIRED AMR GENES'

Main conclusions

- The terms 'intrinsic' and 'acquired' AMR genes defined for the purpose of EFSA's risk assessments for bacteria used in the food and feed chains
- A bioinformatic approach proposed for demonstrating the 'intrinsic'/'acquired' nature of an AMR gene.
- Genes identified as responsible for 'intrinsic' resistance considered as being of no concern
- 'Acquired' AMR genes resulting in a resistant phenotype should be considered as a concern.
- If the presence of the 'acquired' AMR gene is not leading to phenotypic resistance, further case-by-case assessment is necessary.
- published on October 2024:

<https://www.efsa.europa.eu/en/efsajournal/pub/8323>

STATEMENT

efsa JOURNAL

ADOPTED: 27 September 2023

doi: 10.2903/j.efsa.2023.8323

Statement on how to interpret the QPS qualification on 'acquired antimicrobial resistance genes'

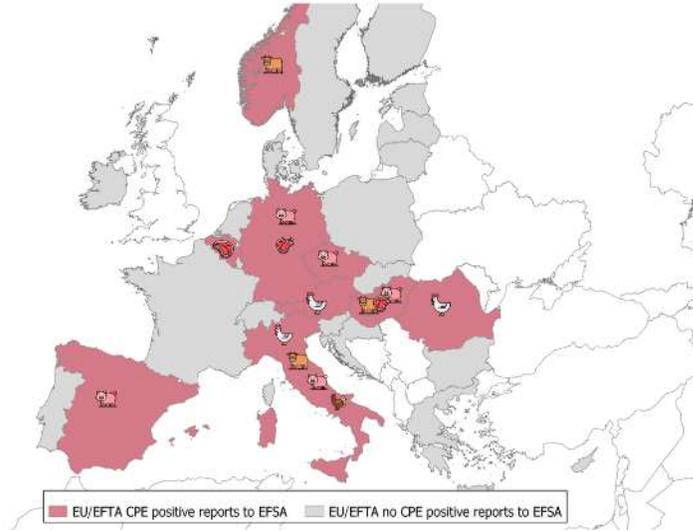
EFSA Panel on Biological Hazards (BIOHAZ),
Konstantinos Koutsoumanis, Ana Allende, Avelino Alvarez-Ordóñez, Declan Bolton, Sara Bover-Cid, Marianne Chemaly, Alessandra De Cesare, Friederike Hilbert, Roland Lindqvist, Maarten Nauta, Romolo Nonno, Luisa Peixe, Giuseppe Ru, Marion Simmons, Panagiotis Skandamis, Elisabetta Suffredini, Pier Sandro Cocconcilli, Juan Evaristo Suarez, Estefanía Noriega Fernández, Frédérique Istace, Jaime Aguilera, Rosella Brozzi, Ernesto Liébana, Beatriz Guerra, Sandra Correia and Lieve Herman



BIOHAZ MANDATE - CPEs IN THE FOOD CHAIN



Carbapenemase-producing E. coli in the food chain in the EU/EFTA



WG Carbapenemases

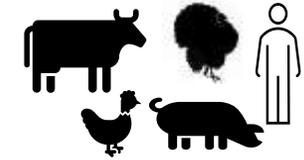
- **ToR1.** State of the art: BIOHAZ scientific opinion (by March 2025)
- **ToR2.** New data generation
- **ToR3.** State of the art 2027: **BIOHAZ** scientific opinion (June 2027)

Framework partnership agreement (FPA)
“data generation on CPEs in the food-chain”
Contract: 2.5 years (2024-2027)
EURL-AR/NRLs



GRANT – CARBACAMP PROJECT

Objectives



wild-type distribution between
C. jejuni and *C. coli* in the different species

ECOFF values ertapenem, imipenem, meropenem

comparability between the EUCAST and CLSI
recommended media for MIC determination of
Campylobacter

monitoring of
Campylobacter



ertapenem
imipenem
meropenem

genomic diversity of susceptible and non-susceptible
C. jejuni and *C. coli*

Investigating resistance mechanisms

Purpose of the study

CarbaCamp
GP/EFSA/BIOHAW/2023/04

September 2023



Extension to February 2026 (TBC)



AMR ENVIRONMENT

SCIENTIFIC OPINION



ADOPTED: 29 April 2021

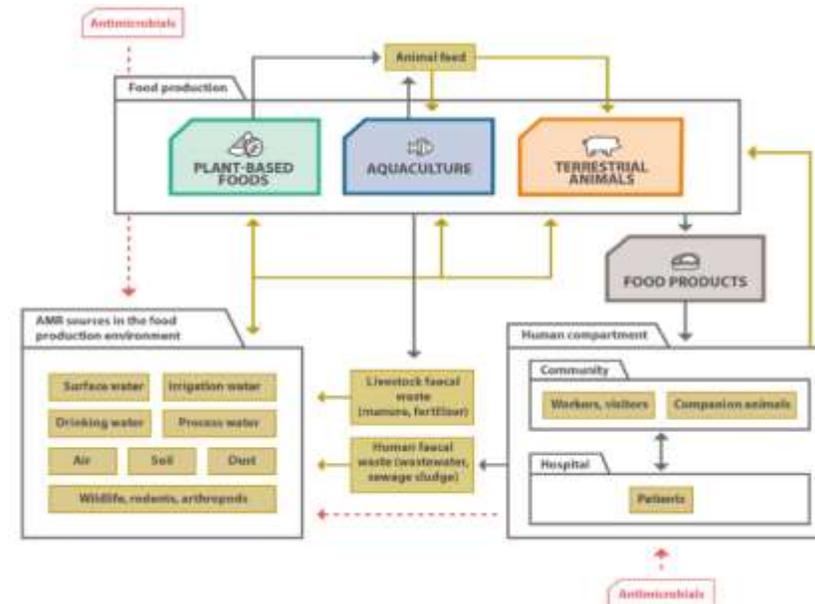
doi: 10.2903/j.efsa.2021.6651

Role played by the environment in the emergence and spread of antimicrobial resistance (AMR) through the food chain

EFSA Panel on Biological Hazards (BIOHAZ),

Konstantinos Koutsoumanis, Ana Allende, Avelino Alvarez-Ordóñez, Declan Bolton, Sara Bover-Cid, Marianne Chemaly, Robert Davies, Alessandra De Cesare, Lieve Herman, Friederike Hilbert, Roland Lindqvist, Maarten Nauta, Giuseppe Ru, Marion Simmons, Panagiotis Skandamis, Elisabetta Suffredini, Hector Arguello, Thomas Berendonk, Lina Maria Cavaco, William Gaze, Heike Schmitt, Ed Topp, Beatriz Guerra, Ernesto Liebana, Pietro Stella and Luisa Peixe

Sources and transmission routes

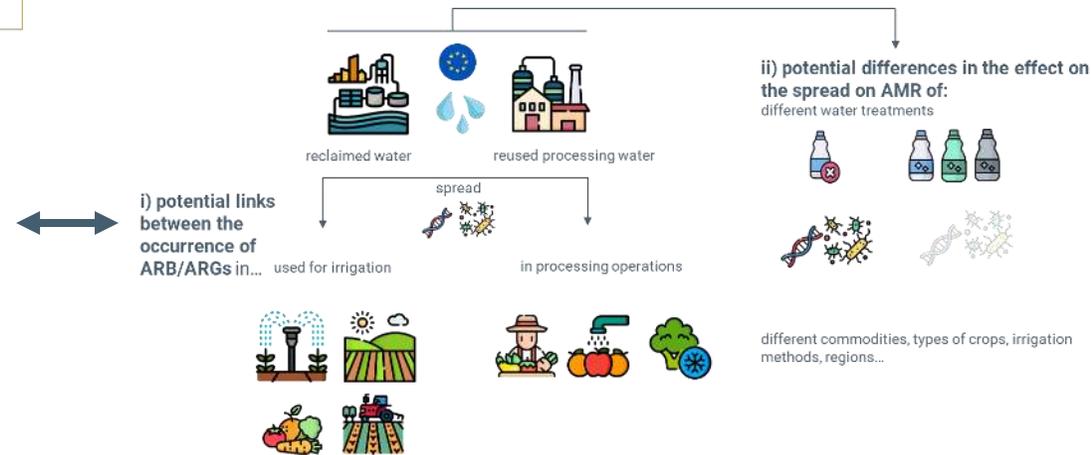
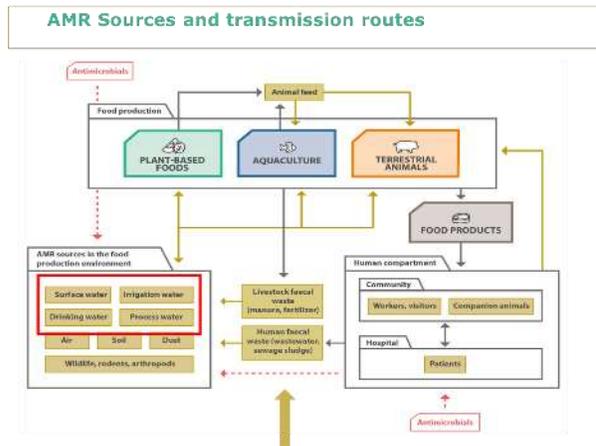


- Faecal matter (fertilisation and irrigation water)
- Feed, and humans
- Water (with human and animal faecal material)



PROCUREMENT: ROLE OF WATER IN THE SPREAD OF AMR-WATERESIST

Direct contract, 950,000 €, ...to gain insights on the occurrence/variety of ARB and ARGs...in order to help to assess the role of reused water in the spread of ARB and ARGs to fruits/vegetables/ herbs (FVH) in different European regions



Timelines: 2024-2027

<https://efsa.onlinelibrary.wiley.com/doi/epdf/10.2903/j.efsa.2021.6651>

Objective 1: Optimize ARB/ARGs detection methods: culture, PCR-based, metagenomics

Objective 2: Occurrence ARB/ARGs, using reclaimed water for irrigation

Objective 3: Occurrence ARB/ARGs using “reused/recycled” water during handling/processing



EC MANDATE - AZOLE RESISTANCE

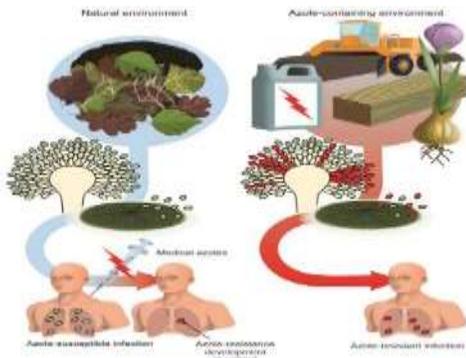


Use of azole fungicides in the environment, **4 regulatory regimes**:

- Plant protection products (EFSA)
 - Biocides (ECHA)
 - Industrial chemicals (ECHA),
e.g. wood preservatives, cosmetics
 - Veterinary medicines (EMA)
-
- Infection in human with *Aspergillus* spp. resistant to treatment with azoles is a health issue:
 - Resistance may develop following clinical treatment, use in the environment.

Joint EC Mandate to ECDC-ECHA-EFSA-EEA-EMA(+JRC), overall coordination by EFSA (**BIOHAW+PREV**), different agencies take responsibility to lead different ToRs:

- **Collect data about use** of azole fungicides in all domains other than human medicines
- Identify **causative link between environmental use and resistance development** and describe epidemiology
- **Assess risks**
- Identify **risk factors and control options**
- **Identify type of studies to be provided by applicants** for approval of azole substances for different types of use (affecting applications to ECHA, EFSA, EMA)
- Identify data **gaps and research needs**

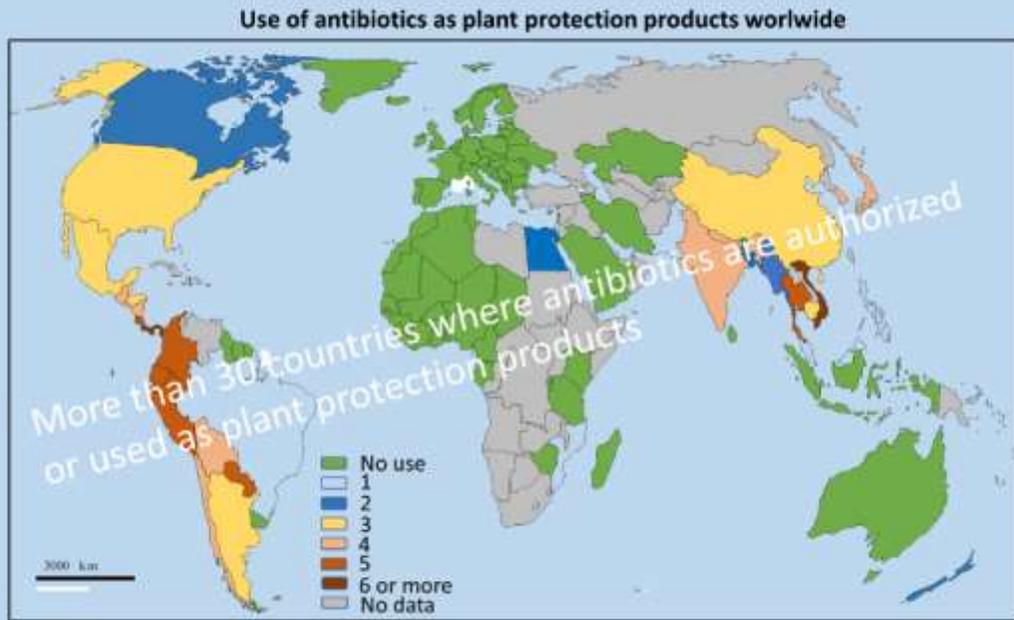


source: Verweij et al., 2020

Deadline: **December 2024**



THE PLANTIBIO PROJECT



Collection, analysis and synthesis of data about...



Antibiotic use for control of PPB



Antibiotic resistance in PPB



Alternatives and innovative treatments for control of PPB

External Scientific Report



APPROVED: 11 December 2023
doi: 10.2903/sp.efsa.2024.EN-8522

Data collection on antibiotics for control of plant pathogenic bacteria

Verhaegen, M., Mahillon, J., Caulier, S., Mingeot-Leclercq*, M.-P., Bragard, C.

UCLouvain, Earth&Life Institute-Applied microbiology, Louvain Drug Institute*

<https://efsa.onlinelibrary.wiley.com/doi/epdf/10.2903/sp.efsa.2024.EN-8522>

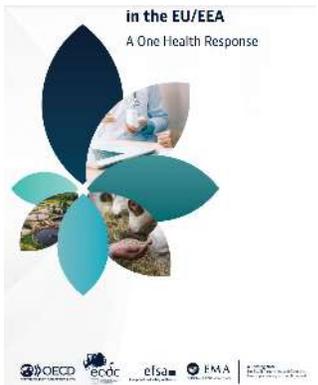
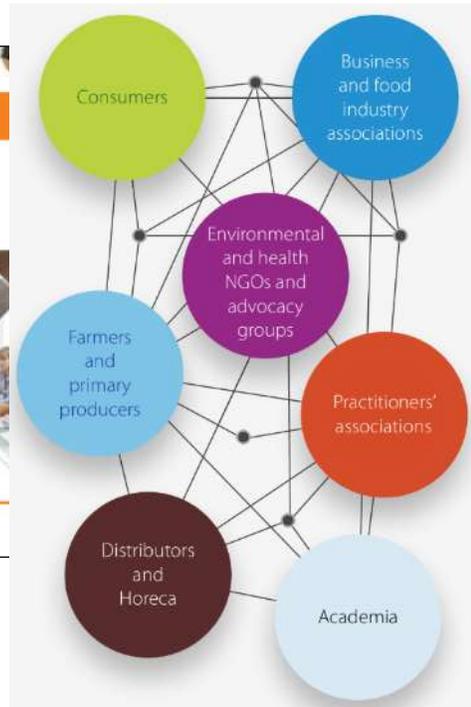


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Storymaps



Podcast | 17 April 2023
Episode 6 – Antibiotics: handle with care



FINAL REMARKS



- Working with a **One health (transdisciplinary, across tiers, across domains) approach** is essential.
- Increased **partnerships** (EU and global) between research funding bodies, risk assessors, risk managers.
- EFSA applies the latest findings and **new technologies** in the fight against AMR. Genomic techniques will help us to identify more effectively where AMR emerges and how it spreads across the food chain.



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