

# Il monitoraggio dell'antibioticoresistenza nelle produzioni primarie in Italia e in Europa

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7 ottobre, 11 novembre, 2 dicembre 2021



European  
Commission

# AMR: a major European and Global challenge

## What is AMR?

Antimicrobial Resistance (AMR) is the ability of microorganisms to resist antimicrobial treatments, especially antibiotics.

Excessive and inappropriate use of antimicrobial medicines and poor infection control practices have transformed AMR into a serious threat to public health worldwide.

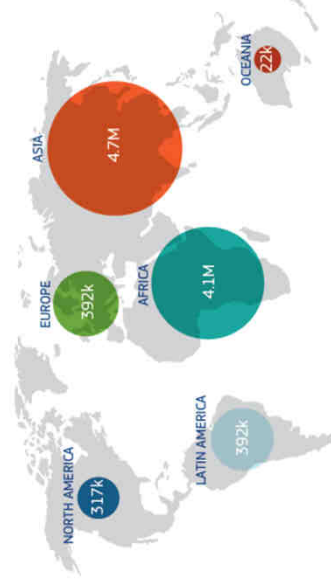
If trends continue we would revert to a world where simple infections are no longer treatable.

## Why is AMR a serious threat to public health?

- **25 000 patients die annually in the EU** alone as a result of infections caused by resistant bacteria.
- **Globally this number could be as high as 700 000.**
- **10 million deaths per year are projected between 2015 and 2050** if current infection and resistance trends are not reversed. Only 0.7 million of these additional deaths would occur in North America or Europe, with the **largest numbers in Africa and Asia.**

## What is the economic cost of AMR?

- **EUR 1.5 billion each year** - Extra healthcare costs and productivity losses due to multidrug-resistant bacteria in the EU.
- **USD 2.9 trillion by 2050** - Expected cumulative losses in OECD countries due to AMR.
- **USD 10 000 to 40 000** - **Additional hospital costs per patient** in OECD countries. The associated impact of lost economic outputs due to increased mortality, prolonged sickness and reduced labour efficiency are **likely to double** this figure.
- **Losses to Trade and Agriculture** - For example, in 2015 chicken sales in Norway dropped by 20% (for some distributors) following the news that a resistant strain of *Escherichia coli* (*E. coli*) was found in chicken meat.



Number of deaths per year attributable to AMR by 2050 if current resistance rates increased by 40%

*Dal 2004 al 2009*

*Direttiva 99/2003/EC recepita Decreto Legislativo 4 aprile 2006, n. 191*

*«Attuazione della direttiva 2003/99/CE sulle misure di sorveglianza delle zoonosi e degli agenti zoonotici»*

L'Antibiotico-resistenza concepita come zoonosi trasversale: la UE chiede agli SM di dotarsi un sistema di sorveglianza; nel 2004 nasce il Network delle Istituzioni di SPV che operano nel settore AMR, iniziano i proficiency testing; nasce EFSA; il CRN-NRL-AR invia i dati dei test di sensibilità (in DD: mm e SIR) **aggregati in tabelle** (già dal 2004).

*DECISIONE DELLA COMMISSIONE del 20 dicembre 2007 «relativa a un contributo finanziario della Comunità per un'indagine sulla diffusione della Salmonella spp. e dello Staphylococcus aureus meticillino-resistente nei branchi di suini da riproduzione da realizzare negli Stati membri»*

Coordinamento, nell'ambito delle attività sul territorio italiano, del campionamento e dell'esecuzione delle prove di laboratorio per Staphylococcus aureus Meticillino-resistenti (MRSA) negli allevamenti di suini riproduttori, con caratterizzazione genotipica degli isolati.

<https://efsa.onlinelibrary.wiley.com/doi/10.2903/j.efsa.2007.129r>

### Dal 2009 al 2013

#### DECISIONE DELLA COMMISSIONE del 12 giugno 2007 (Dec. Comm. 2007/407/EC )

#### «relativa al monitoraggio armonizzato della resistenza antimicrobica della Salmonella nei volatili da cortile e nei suini»

Nasce il Centro di Referenza Europeo CRL-AR, iniziano i test in MIC, vengono dettate le regole per la formazione dei panel armonizzati; i dati devono essere interpretati secondo EUCAST Ecoffs; nasce il portale del NRL-AR per la raccolta dei metadati; i dati prodotti presso il NRL-AR vengono inviati a EFSA aggregati. Iniziano i proficiency testing per i dati di caratterizzazione molecolare.

Dal 2010 NRL-AR entra in sperimentazione volontaria per inviare dati “isolate-based”

### Dal 2014 al 2020

#### Decisione 2013/652/EU DECISIONE DI ESECUZIONE DELLA COMMISSIONE del 12 novembre 2013 «relativa al monitoraggio e alle relazioni riguardanti la resistenza agli antimicrobici dei batteri zoonotici e commensali»

I dati devono essere inviati “isolate-based”; nasce il nuovo portale del NRL-AR, EFSA chiede analisi di caratterizzazione molecolare, cambiano i panels di molecole testate (Data- dictionaries).

### Inizia l'era della NGS, WGS

## DECISIONS

The AMR Monitoring system in the EU, in food-producing animal populations... Repealed (in 2021) by Dec. (EU) 2020/1729

## COMMISSION IMPLEMENTING DECISION

of 12 November 2013

on the monitoring and reporting of antimicrobial resistance in zoonotic and commensal bacteria

(notified under document C(2013) 7145)

(Text with EEA relevance)

(2013/652/EU)

THE EUROPEAN COMMISSION,

put in place a five-year action plan to fight against AMR based on 12 key actions, including strengthened surveillance systems on AMR

Having regard to the Treaty on the Functioning of the European Union,

Having regard to Directive 2003/99/EC of the European Parliament and of the Council of 17 November 2003 on the monitoring of zoonoses and zoonotic agents, amending Council Decision 90/424/EEC and repealing Council Directive 92/117/EEC <sup>(1)</sup>, and in particular Article 7(3) and the fourth subparagraph of Article 9(1) thereof,

- (4) In the Council Conclusions of 22 June 2012 on the impact of antimicrobial resistance in the human health sector and in the veterinary sector — a One Health Perspective <sup>(3)</sup>, that Institution calls upon the Commission to follow up on its Communication of 15 November 2011 through concrete initiatives to implement the 12 actions set out in that Communication, and to collaborate closely with the European Centre for Disease Prevention and Control (ECDC), the European Food Safety Authority (EFSA) and the European Medicines Agency (EMA) in strengthening the assessment and evaluation of the occurrence of AMR in humans, in animals and in food in the Union.

A. Battisti 2015

## ANNEX

### TECHNICAL REQUIREMENTS

#### PART A

#### SAMPLING FRAMEWORK AND ANALYSIS

##### 1. Origin of isolates

Member States shall collect representative isolates for monitoring AMR from at least each of the following animal populations and food categories:

(a) *Salmonella* spp. isolates from:

(i) each population of laying hens, broilers and fattening turkeys sampled in the framework of the national control programmes, established in accordance with Article 5(1) of Regulation (EC) No 2160/2003;

(ii) carcasses of both broilers and fattening turkeys sampled for testing and verification of compliance, in accordance with point 2.1.5 of Chapter 2 of Annex I to Regulation (EC) No 2073/2005;

(iii) carcasses of fattening pigs sampled for testing and verification of compliance, in accordance with point 2.1.4 of Chapter 2 of Annex I to Regulation (EC) No 2073/2005;

(iv) carcasses of bovines under one year of age where the production of meat of those bovines in the Member State is more than 10 000 tonnes slaughtered per year sampled for testing and verification of compliance, in accordance with point 2.1.3 of Chapter 2 of Annex I to Regulation (EC) No 2073/2005.



ANNEX

TECHNICAL REQUIREMENTS

PART A

SAMPLING FRAMEWORK AND ANALYSIS

1. Origin of isolates

Member States shall collect representative isolates for monitoring AMR from at least each of the following animal populations and food categories:

(b) *C. jejuni* isolates from caecal samples gathered at slaughter from broilers and from fattening turkeys where the production of turkey meat in the Member State is more than 10 000 tonnes slaughtered per year;

(c) Indicator commensal *E. coli* isolates from:

(i) caecal samples gathered at slaughter from broilers and from fattening turkeys where the production of turkey meat in the Member State is more than 10 000 tonnes slaughtered per year;

(ii) caecal samples gathered at slaughter from fattening pigs and bovines under one year of age where the production of meat of those bovines in the Member State is more than 10 000 tonnes slaughtered per year;

(d) ESBL- or AmpC- or carbapenemase-producing *E. coli* from:

(i) caecal samples gathered at slaughter from broilers and from fattening turkeys where the production of turkey meat in the Member State is more than 10 000 tonnes slaughtered per year;

(ii) caecal samples gathered at slaughter from fattening pigs and bovines under one year of age where the production of meat of those bovines in the Member State is more than 10 000 tonnes slaughtered per year;

(iii) samples of fresh meat of broilers, pig meat and bovine meat gathered at retail.

Allerta  
domanda!



Bovini e  
suini  
2015  
2017  
2019

Broiler e  
tacchini  
2014  
2016  
2018  
2020

### Subject matter and scope

1. This Decision lays down detailed rules for the harmonised monitoring and reporting of antimicrobial resistance (AMR) to be carried out by Member States in accordance with Article 7(3) and 9(1) of Directive 2003/99/EC and Annex II (B) and Annex IV thereto.

That monitoring and reporting shall cover the following bacteria obtained from samples from certain food-producing animal populations and certain food:

2. This Decision lays down specific requirements for the harmonised monitoring and reporting of the *Salmonella* spp., and *E. coli* producing the following enzymes in certain food-producing animal populations and in certain food:

- (a) Extended-Spectrum  $\beta$ -Lactamases (ESBL);
- (b) AmpC  $\beta$ -Lactamases (AmpC);
- (c) Carbapenemases.

(a) *Salmonella* spp.;

(b) *Campylobacter jejuni* and *Campylobacter coli* (*C. jejuni* and *C. coli*);

(c) Indicator commensal *Escherichia coli* (*E. coli*);

(d) Indicator commensal *Enterococcus faecalis* and *Enterococcus faecium* (*E. faecalis* and *E. faecium*).

**MAINLY “ACTIVE  
MONITORING” AT  
DIFFERENT STAGES...**

**Voluntary for EU MS...**



http://www.efsa.europa.eu/en/biological-hazards-data/reports



and analyses the data on zoonotic infections in humans. These reports illustrate the evolving situation in the EU and identify the pathogens that cause the most common zoonotic infections in humans.

National zoonoses country reports: 2010-2019

National zoonoses country reports are used as a basis for the EFSA and ECDC European Union Summary Reports on Trends and Sources of Zoonoses, zoonotic agents, antimicrobial resistance and food-borne outbreaks in the European Union. The information given covers both zoonoses that are important for the public health in the whole European Union as well as zoonoses, which are relevant on the basis of the national epidemiological situation. The reports include information reported regarding animals, food, feeding stuffs and food-borne outbreaks.

| Country               | 2019                             | 2018                             | 2017                             | 2016                             | 2015                             | 2014                             | 2013                             | 2012                             | 2011                             | 2010 |
|-----------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|------|
| Albania               |                                  |                                  |                                  |                                  |                                  |                                  |                                  |                                  |                                  |      |
| Austria               |                                  |                                  |                                  |                                  |                                  |                                  |                                  |                                  |                                  |      |
| Belgium               |                                  |                                  |                                  |                                  |                                  |                                  |                                  |                                  |                                  |      |
| Bosnia<br>Herzegovina |                                  |                                  |                                  |                                  |                                  |                                  |                                  |                                  |                                  |      |
| Bulgaria              |                                  |                                  |                                  |                                  |                                  |                                  |                                  |                                  |                                  |      |
| Croatia               |                                  |                                  |                                  |                                  |                                  |                                  |                                  |                                  |                                  |      |
| Cyprus                |                                  |                                  |                                  |                                  |                                  |                                  |                                  |                                  |                                  |      |
| Czech<br>Republic     |                                  |                                  |                                  |                                  |                                  |                                  |                                  |                                  |                                  |      |
| Denmark               | <a href="#">Zoonoses<br/>AMR</a> | <a href="#">Zoonoses<br/>AMR</a> | <a href="#">Zoonoses<br/>AMR</a> | <a href="#">Zoonoses<br/>AMR</a> | <a href="#">Zoonoses<br/>AMR</a> | <a href="#">Zoonoses<br/>AMR</a> | <a href="#">Zoonoses<br/>AMR</a> | <a href="#">Zoonoses<br/>AMR</a> | <a href="#">Zoonoses<br/>AMR</a> |      |
| Estonia               |                                  |                                  |                                  |                                  |                                  |                                  |                                  |                                  |                                  |      |

TECHNICAL REPORT

APPROVED: 30 January 2020  
doi:10.2903/sp.efsa.2020.EN-1792

Zoonoses, antimicrobial resistance and food-borne outbreaks guidance for reporting 2019 data

European Food Safety Authority (EFSA),  
Pierre-Alexandre Beloeil, Valentina Bocca, Frank Boelaert, Davide Gibin, Beatriz Guerra,  
Alexandra Papanikolaou and Anca-Violeta Stoicescu

Abstract

This technical report of the European Food Safety Authority (EFSA) presents guidance to reporting European Union (EU) Member States and non-Member States in data transmission using extensible markup language (XML) data transfer covering the reporting of isolate-based quantitative antimicrobial resistance data, as well as reporting of prevalence data on zoonoses and food-borne contaminants, food-borne outbreak data, animal population data and disease status data. For data collection purposes, EFSA has created the Data Collection Framework (DCF) application. The present report provides data dictionaries to guide the reporting of information deriving from 2019 under the framework of Directive 2003/99/EC, Regulation (EU) 1375/2015, Regulation (EU) 854/2004 and Commission Implementing Decision 2013/652/EC. The objective is to explain in detail the individual data elements that are included in the EFSA data models to be used for XML data transmission through the DCF. In particular, the data elements to be reported are explained, including information about the data type, a reference to the list of allowed terms and any additional business rule or requirement that may apply.

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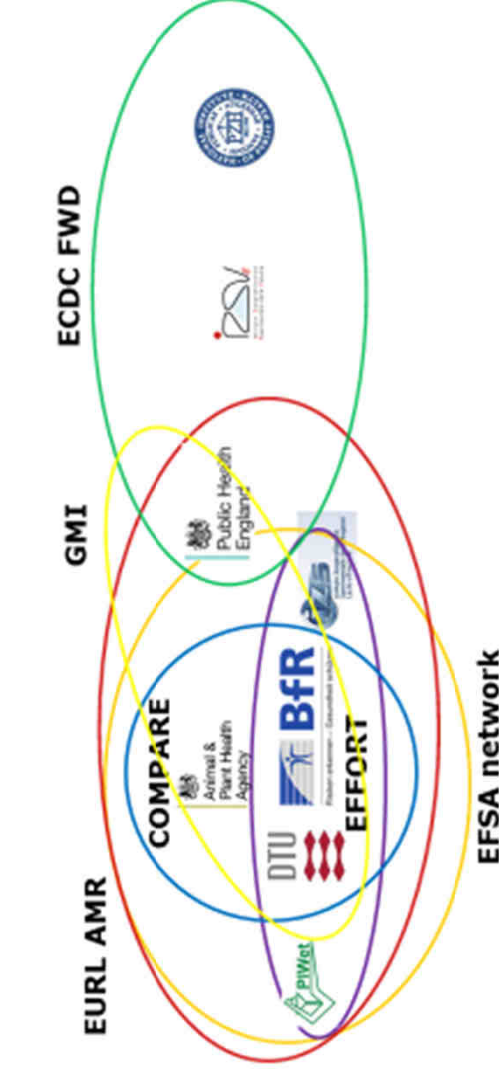
**Key words:** antimicrobial resistance, prevalence, food-borne outbreak, Data Collection Framework, data models



The Community Summary Report on  
Trends and Sources of Zoonoses,  
Zoonotic Agents, Antimicrobial Resistance  
and Foodborne Outbreaks  
in the European Union in 2006

December 2007





## Establishing Next Generation sequencing Ability for Genomic analysis in Europe

EFSA call "GPEFSA/AFSCO 2015/01:  
New approaches in identifying and characterizing microbiological and chemical hazards"

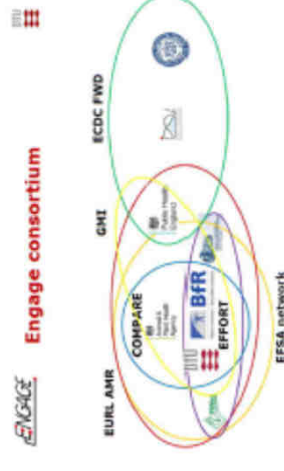
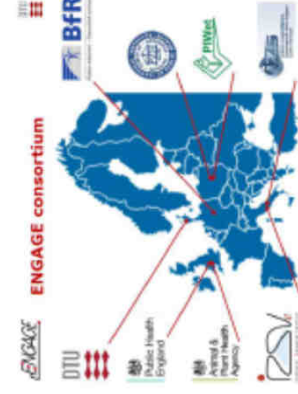
## Establishing Next Generation sequencing Ability for Genomic analysis in Europe

EFSA call "GPEFSA/AFSCO 2015/01:  
New approaches in identifying and characterizing microbiological and chemical hazards"

**ENGAGE Training Course 2017 – 25-27 October 2017**  
**"Training on NGS analysis based on command line tools"**

**LAZIOCREA (Regione Lazio),**  
**Via del Serafico 104, Rome, Italy**

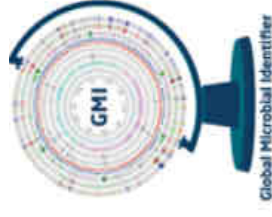
The objective of ENGAGE is to establish collaboration between the Public Health, Food and Veterinary sectors across the European Union for building and enhancing the use of real-time Whole Genome Sequencing and analysis in Food Safety and Public Health protection.





# Global Microbial Identifier

[ABOUT GMI](#) [PEOPLE](#) [WORKGROUPS](#) [NEWS & EVENTS](#) [CONTACT](#)



GMI envisions a global system of DNA genome databases for microbial and infectious disease identification and diagnostics. Such a system will benefit those tackling individual problems at the frontline, clinicians, veterinarians, etc., as well as policy-makers, regulators, and industry. By enabling access to this global resource, a professional response on health threats will be within reach of all countries with basic laboratory infrastructure.

### GMI11 Dates



GMI11 is being held in Geneva, Switzerland.  
The dates are 16-18 May 2018.



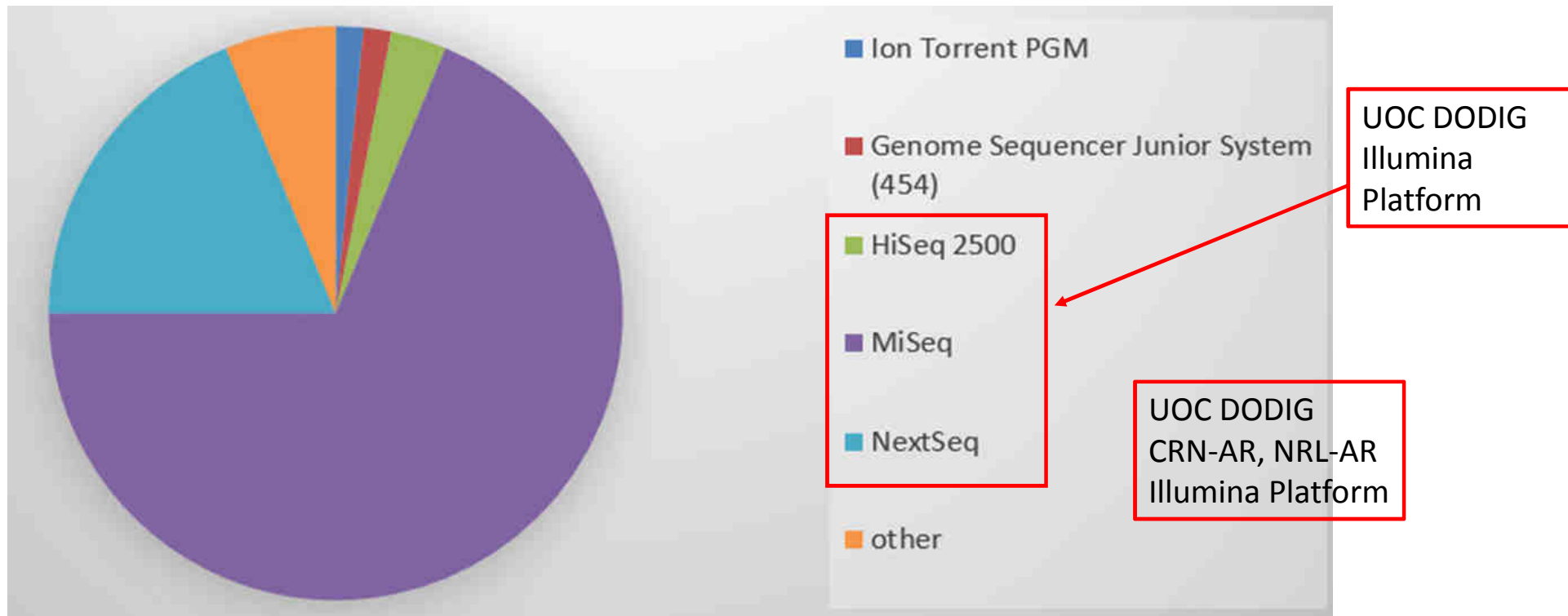
### Watch video on GMI



Video on GMI by David J. Lipman, NCBI, presented at an information meeting at the European Parliament on January 23, 2013.



## Sequencing platform being used GMI PT Scheme 2017



Source: Data from GMI PT 2017- 66 laboratories in 27 countries

# Presente

- **Proficiency Testing Schemes annuali nel contesto GMI e EURL-AR (DTU-Food DK)**
- **Utilizzo continuo di NGS / HTS, specialmente WGS per scopi di Sorveglianza & Monitoraggio su agenti biologici (zoonosici, patogeni animali) nel contesto di studi di popolazione**
- **Priorità: sottoponiamo a NGS / HTS - WGS & Bioinformatics ciò che è rappresentativo a livello di popolazione e di produzioni animali**
- **Per alcuni settori di studi di popolazione, sottoponiamo sistematicamente gli isolati a Whole Genome Sequencing nel 2019, già circa 1000 Whole Genomes**
- **Continuiamo attività di Public Service:**

**Interazione a livello EU (EFSA) come EXPERTS e NRL-AR Italy (in WGs e in SN Zoonoses Monitoring Data) per implementare con dati genomici in WGS il Database EU Zoonoses – AMR**

**– Coautori delle Tech Specs EFSA on AMR Monitoring in EU (2019)**

**COMMISSION IMPLEMENTING DECISION (EU) 2020/1729****of 17 November 2020****on the monitoring and reporting of antimicrobial resistance in zoonotic and commensal bacteria and  
repealing Implementing Decision 2013/652/EU***(notified under document C(2020) 7894)*

- (1) Directive 2003/99/EC requires Member States to ensure that monitoring provides comparable data on the occurrence of antimicrobial resistance ('AMR') in zoonotic agents and, in so far they present a threat to public health, other agents.
- (2) Directive 2003/99/EC also requires Member States to assess the trends and sources of AMR in their territory and to transmit a report every year covering data collected in accordance with that Directive to the Commission.
- (8) Whole genome sequencing ('WGS') is a promising technique to replace conventional phenotypical testing in microbiology and is increasingly used worldwide. However, only a limited number of Member States are currently able to use WGS for AMR monitoring on a routine basis. It is therefore appropriate to authorise the use of WGS as an alternative to the conventional phenotypical techniques on a voluntary basis only, but to impose technical conditions on the WGS technique to ensure data comparability.
- (9) AMR is a global threat that can easily spread across borders. Therefore, in order to improve coordination and gain a deeper understanding of how to help reduce the impact of AMR impact globally, it is essential that food products imported into the Union are also subjected to AMR monitoring requirements.
- (10) In order to ensure continuity of the harmonised AMR monitoring and reporting by Member States after the period covered by Implementing Decision 2013/652/EU, this Decision should apply from 1 January 2021.
- (11) For the sake of legal clarity, Implementing Decision 2013/652/EU should be repealed.

Allerta  
domanda!





# Campionamenti di carne fresca ai Posti di Controllo Frontaliero

## 3.3. At border control posts

### (a) Sampling design:

When designing their sampling plan at border control posts, Member States shall take into account EFSA technical specifications on randomised sampling for harmonised monitoring of antimicrobial resistance in zoonotic and commensal bacteria <sup>(3)</sup>.

Member States shall ensure a proportionate stratified sampling of consignments and meat samples per border control post and country of origin with an even distribution over the monitoring year of the consignments of imported fresh meat sampled at border control posts level. All border control posts designated for fresh meat shall be included in the sampling plan. The consignments to be sampled on a given day shall be randomly selected and when sampling a consignment, samples shall be randomly taken. If a consignment is composed of different batches, the samples shall be taken from different batches. Samples shall not be pooled.

Table 1

**Fresh meat subject to AMR testing at import: indicative sampling frequency rates**

| Type of fresh meat | Recommended annual sampling frequency rates of consignments arrived at the border control posts |
|--------------------|---|
| Broiler meat       | 3 %   |
| Turkey meat        | 15 %  |
| Pig meat           | 10 %  |
| Bovine meat        | 2 %   |

# Introduzione di Genomica (Whole Genome Sequencing e Analisi Bionformatica) nella Normativa EU Food Safety - Zoonoses

- Per la prima volta si introduce Genomica (WGS e analisi bioinformatica), metodologia impiegata, modalità di reportistica e dettagli di esecuzione e di analisi dei dati, in normativa relativa a Zoonoses e Food Safety (Dir. 99/2003/EC, Regulation (EU) 2017/625)

## 6. **Alternative method**

Member States may decide to authorise the use of Whole Genome Sequencing ('WGS') as an alternative method to broth micro dilution using the testing panels of antimicrobial substances of Tables 2 and 5 when carrying out the specific monitoring of ESBL- or AmpC- or CP-producing *E. coli* as referred to in point 5. They may also authorise WGS as an alternative method to broth micro dilution using the testing panel of antimicrobial substances of Table 5 when further testing, in accordance with point 4.2, *E. coli* and *Salmonella* isolates showing resistance to cefotaxime or ceftazidime or meropenem.

Laboratories implementing WGS as an alternative method shall use the protocols of the EURL for AMR <sup>(6)</sup>.

## 2.2. Reporting WGS testing results

The following information shall be included for each individual isolate:

- Unique identifier or code of the isolate
- Bacterial species

19.11.2020

EN

Official Journal of the European Union

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- Food-producing animal population or food category
- Stage of sampling
- Type of sample
- TRACES code of the border control post (for testing of imported meat only)
- CHED reference of the consignment (for testing of imported meat only)
- Country of origin of the consignment (for testing of imported meat only)
- Sampler
- The sampling strategy
- Date of sampling
- Date of start of analysis (isolation)
- Identifier or code of the isolate given by the laboratory
- Date of sequencing
- Version of the predictive tool
- AMR-conferring genes data
- Sequencing technology used
- Library preparation used

Anche la Reportistica WGS seguirà i criteri di Reporting del Monitoring AMR già in vigore dal 2010 (voluntary)

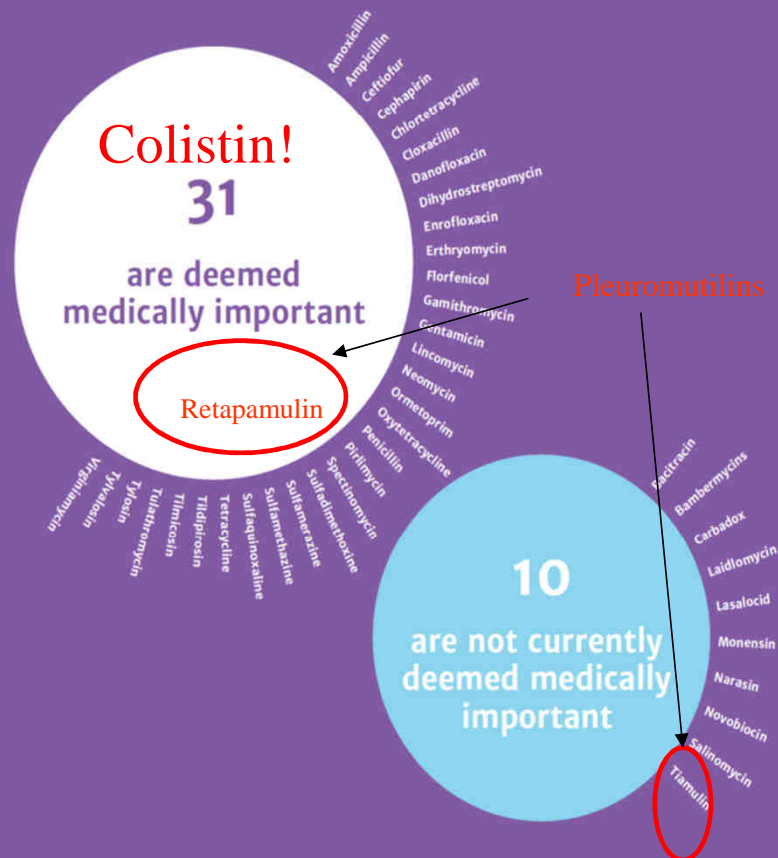
e nel 2014 con la Dec 2013/652/EU (mandatory)

**Ovvero secondo Standard Sample Description 2.0 (at isolate – Epi Unit level)**

**Technical Specifications on Reporting aggiornate da EFSA annualmente (Data Dictionary)**

## MOST ANTIBIOTICS USED IN ANIMALS ARE MEDICALLY IMPORTANT FOR HUMANS

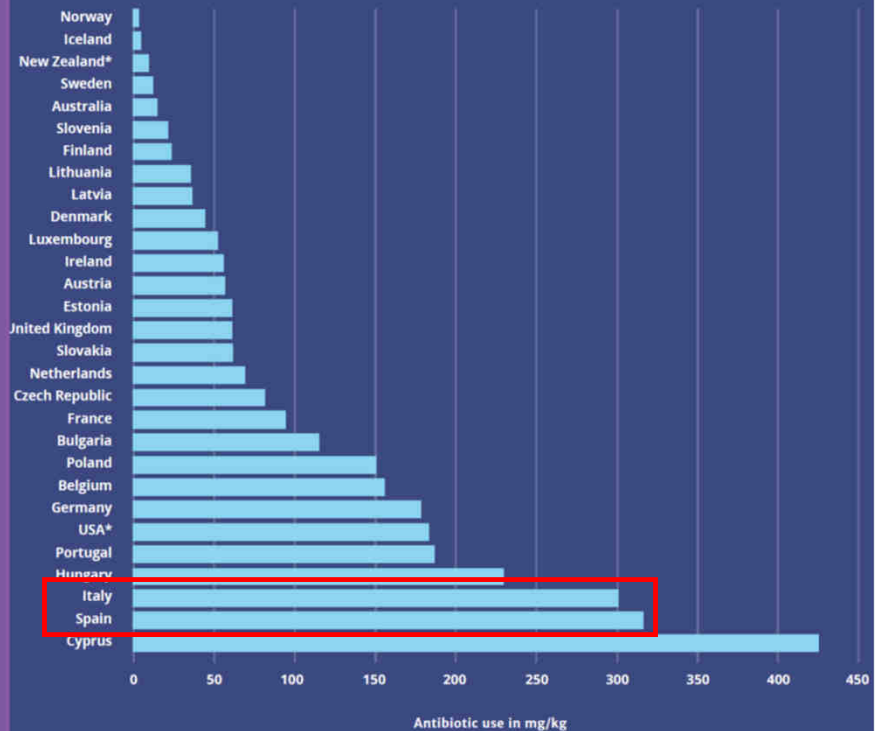
Of the 41 antibiotics\* that are approved for used in food producing animals by the FDA, 31 are categorised as being medically important for human use.



Source: FDA, 2012 Summary report on Antimicrobials sold or distributed for use in Food-producing animals.

\* Includes ionophores

## ANTIBIOTIC USE IN AGRICULTURE VARIES GREATLY BY COUNTRY



Source: European Medicines Agency (2011) and the national governments of the US, Australia and New Zealand.

\* Animal biomass estimated based on number of animals.

NB: All figures are given in milligram (mg) purchased for every kilogram (kg) of livestock biomass and do not include ionophores and oligosaccharides.

Review on  
Antimicrobial  
Resistance

Review on  
Antimicrobial  
Resistance



Priorità: Mantenimento dell'efficacia di tutte le classi di antibiotici, ed uso controllato di Critically Important Antimicrobials registrati anche per uso Veterinario

Specialmente degli H(ighest)P(riority)CIAs:

Classi di antibiotici indispensabili per infezioni invasive nell'uomo causate anche da agenti zoonosici emergenti o ad incidenza rilevante (es. Salmonella, Campylobacter, E. coli, Klebsiella etc).

- Cefalosporine a spettro esteso (3th – 4th generation)
- Fluorochinolonici
- Macrolidi : “probably” still used as “feed additives” = growth promoters”
- Colistina (polymyxins)
- Restricted/controlled use in primary productions

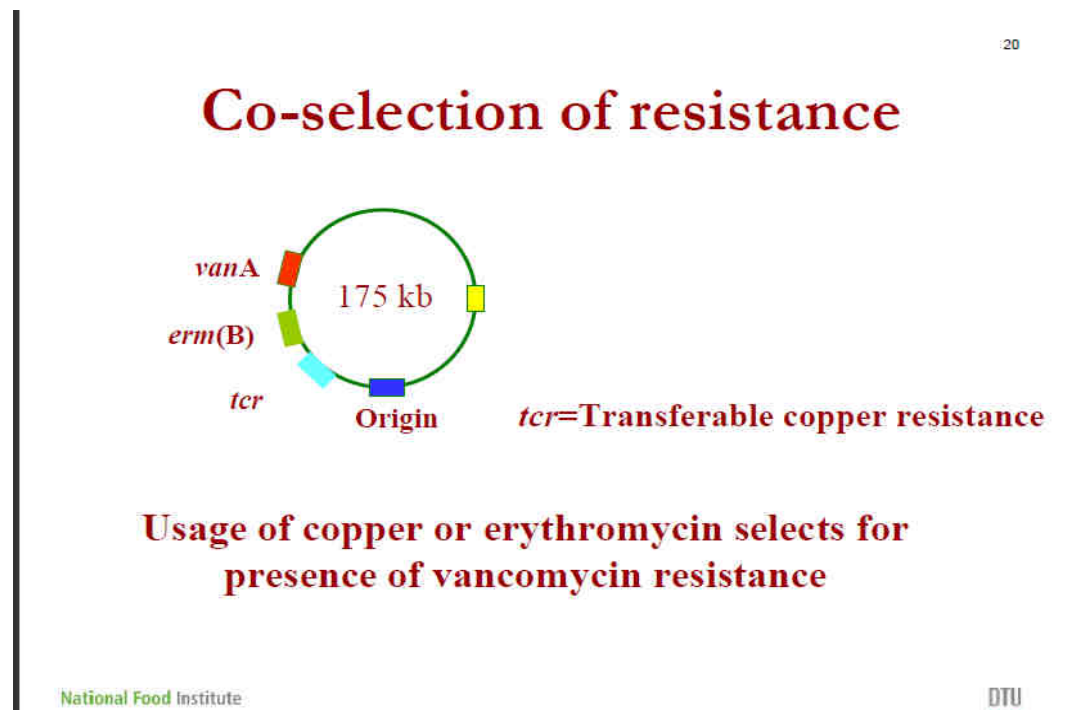
## **COSELEZIONE: Varie sostanze ad azione antimicrobica co-selezionano per resistenze ad altre sostanze e altri antibiotici**

**Antibiotici: Salmonella spp.( es. S. Typhimurium DT104; M-STM); E. coli:**

**AMP, CHL, SUL, TET, STR**

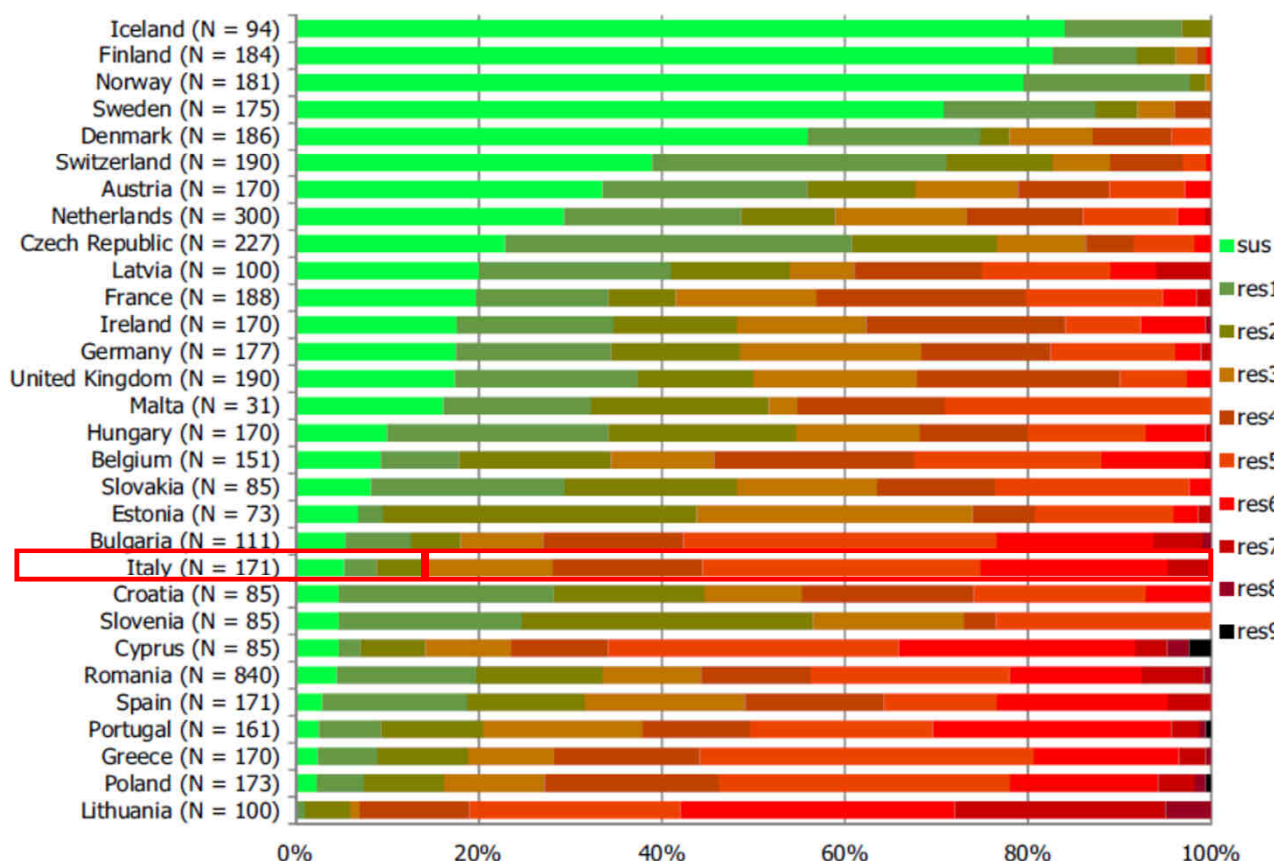
**Oppure: Rame (Cu) per Enterococcus spp.;**

**Zinco (Zn) in LA-MRSA (effetto dose-risposta...)**





Multidrug-resistant isolates (MDR) (i.e. resistant to three or more antimicrobial classes) were reported from all countries, except from Iceland, where none of the reported isolates was resistant to more than two antimicrobials. Among the countries reporting MDR isolates, the proportions varied markedly, being the highest in Lithuania (94.0%) and the lowest in Norway (0.6%) (Table COMESCEBR).



N: total number of isolates tested for susceptibility against the whole harmonised set of antimicrobials for *Escherichia coli*; sus: susceptible to all antimicrobial classes of the harmonised set for *E. coli*; res1–res9: resistance to 1 up to 11 antimicrobial classes of the harmonised set for *E. coli*.

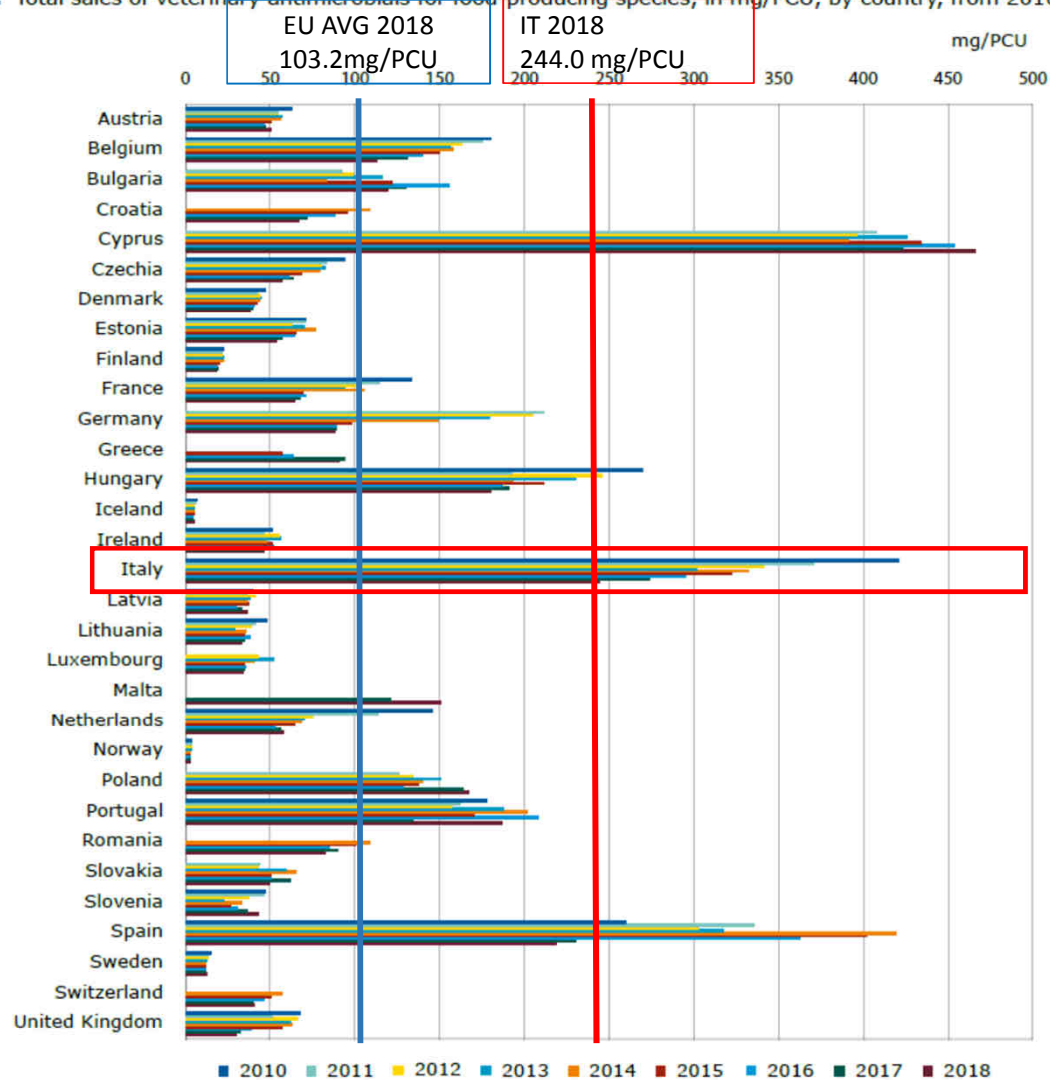
THE OVERALL REDUCTION of usage of ALL antibiotics in primary productions has the aim to **let the WILD-TYPE** (or semi-WT) populations of commensal-opportunistic and pathogenic-zoonotic bacteria **become prevalent again**. Wild-type bacteria are more fit than MDR ones when the selection pressure decreases significantly along the years...

**In Italy in 2016 (commensal *E. coli* in broilers):**  
**5% «Fully Susceptible» vs**  
**85% MultiDrugResistant...**

A complementary approach to data interpretation

### 2.8.3. Changes in overall sales in mg/PCU, by country

Figure 26. Total sales of veterinary antimicrobials for food-producing species, in mg/PCU, by country, from 2010 to 2018<sup>1-9</sup>



-Spain 219 mg/PCU  
 -France 64 mg/PCU,  
 -NL 57 mg/PCU  
 -Germany 88 mg/PCU  
 -UK 29.5 mg/PCU

<sup>1</sup> Corrections to sales data or to PCU data as published in the ESVAC 2017 report are described in Chapter 1.5.



INTER-AGENCY REPORT



## Antimicrobial consumption and resistance in bacteria from humans and animals

Third joint inter-agency report on integrated analysis  
of antimicrobial agent consumption and occurrence  
of antimicrobial resistance in bacteria  
from humans and food-producing animals in the EU/EEA

JIA CRA III  
2016–2018

## Antimicrobial consumption and resistance in bacteria from humans and animals

Third joint inter-agency report on integrated analysis  
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JIA CRA III  
2016–2018

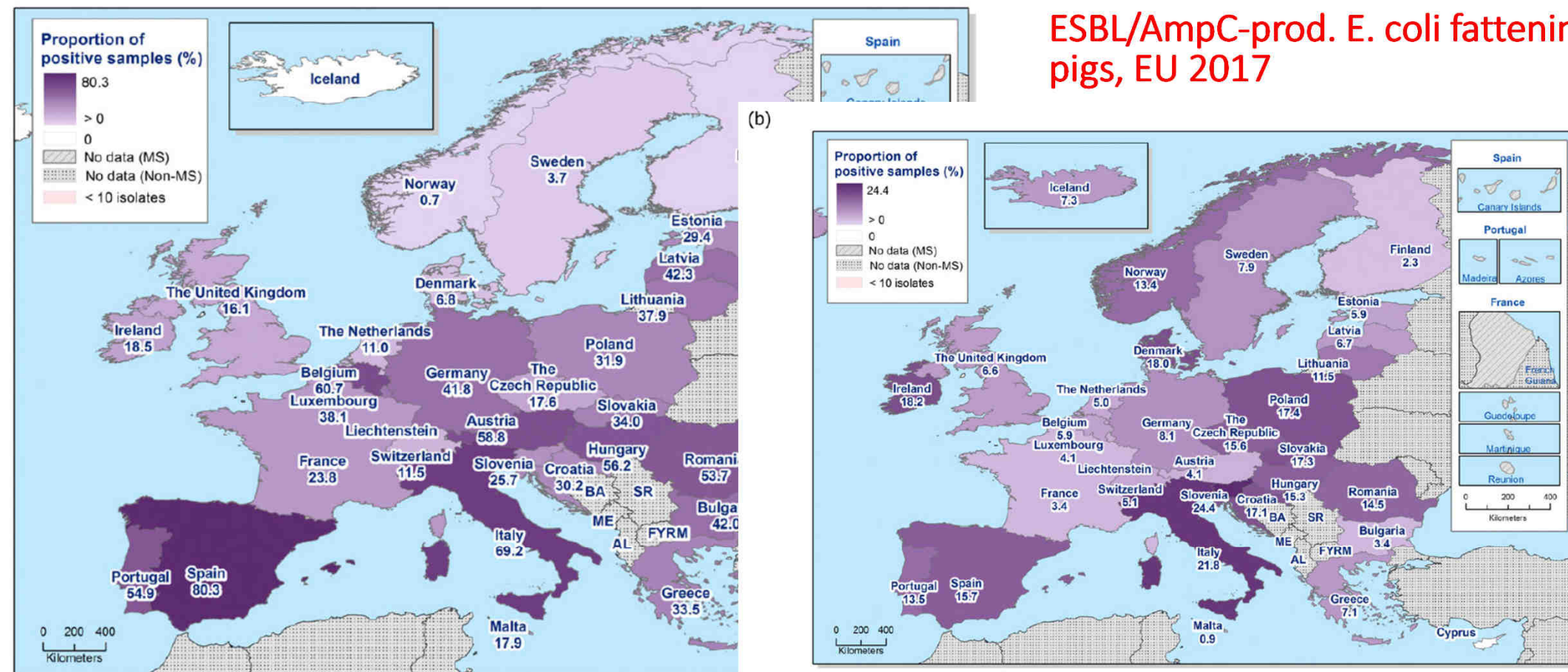
| Year | Country | Study     | Sample Size (n) | Age Range (years) | Gender (M/F) | Prevalence (%) | Risk Factor | Outcome | Reference |
|------|---------|-----------|-----------------|-------------------|--------------|----------------|-------------|---------|-----------|
|      |         |           |                 |                   |              |                |             |         |           |
| 2005 | USA     | ABC Study | 1000            | 18-25             | 500/500      | 15.2           | Smoking     | 15.2    | [15]      |
| 2006 | USA     | ABC Study | 1200            | 18-25             | 600/600      | 16.8           | Smoking     | 16.8    | [16]      |
| 2007 | USA     | ABC Study | 1100            | 18-25             | 550/550      | 17.5           | Smoking     | 17.5    | [17]      |
| 2008 | USA     | ABC Study | 1300            | 18-25             | 650/650      | 18.2           | Smoking     | 18.2    | [18]      |
| 2009 | USA     | ABC Study | 1400            | 18-25             | 700/700      | 19.0           | Smoking     | 19.0    | [19]      |
| 2010 | USA     | ABC Study | 1500            | 18-25             | 750/750      | 19.8           | Smoking     | 19.8    | [20]      |
| 2011 | USA     | ABC Study | 1600            | 18-25             | 800/800      | 20.5           | Smoking     | 20.5    | [21]      |
| 2012 | USA     | ABC Study | 1700            | 18-25             | 850/850      | 21.2           | Smoking     | 21.2    | [22]      |
| 2013 | USA     | ABC Study | 1800            | 18-25             | 900/900      | 22.0           | Smoking     | 22.0    | [23]      |
| 2014 | USA     | ABC Study | 1900            | 18-25             | 950/950      | 22.8           | Smoking     | 22.8    | [24]      |
| 2015 | USA     | ABC Study | 2000            | 18-25             | 1000/1000    | 23.5           | Smoking     | 23.5    | [25]      |
| 2016 | USA     | ABC Study | 2100            | 18-25             | 1050/1050    | 24.2           | Smoking     | 24.2    | [26]      |
| 2017 | USA     | ABC Study | 2200            | 18-25             | 1100/1100    | 25.0           | Smoking     | 25.0    | [27]      |
| 2018 | USA     | ABC Study | 2300            | 18-25             | 1150/1150    | 25.8           | Smoking     | 25.8    | [28]      |
| 2019 | USA     | ABC Study | 2400            | 18-25             | 1200/1200    | 26.5           | Smoking     | 26.5    | [29]      |
| 2020 | USA     | ABC Study | 2500            | 18-25             | 1250/1250    | 27.2           | Smoking     | 27.2    | [30]      |
| 2021 | USA     | ABC Study | 2600            | 18-25             | 1300/1300    | 28.0           | Smoking     | 28.0    | [31]      |
| 2022 | USA     | ABC Study | 2700            | 18-25             | 1350/1350    | 28.8           | Smoking     | 28.8    | [32]      |
| 2023 | USA     | ABC Study | 2800            | 18-25             | 1400/1400    | 29.5           | Smoking     | 29.5    | [33]      |
| 2024 | USA     | ABC Study | 2900            | 18-25             | 1450/1450    | 30.2           | Smoking     | 30.2    | [34]      |
| 2025 | USA     | ABC Study | 3000            | 18-25             | 1500/1500    | 31.0           | Smoking     | 31.0    | [35]      |
| 2026 | USA     | ABC Study | 3100            | 18-25             | 1550/1550    | 31.8           | Smoking     | 31.8    | [36]      |
| 2027 | USA     | ABC Study | 3200            | 18-25             | 1600/1600    | 32.5           | Smoking     | 32.5    | [37]      |
| 2028 | USA     | ABC Study | 3300            | 18-25             | 1650/1650    | 33.2           | Smoking     | 33.2    | [38]      |
| 2029 | USA     | ABC Study | 3400            | 18-25             | 1700/1700    | 34.0           | Smoking     | 34.0    | [39]      |
| 2030 | USA     | ABC Study | 3500            | 18-25             | 1750/1750    | 34.8           | Smoking     | 34.8    | [40]      |
| 2031 | USA     | ABC Study | 3600            | 18-25             | 1800/1800    | 35.5           | Smoking     | 35.5    | [41]      |
| 2032 | USA     | ABC Study | 3700            | 18-25             | 1850/1850    | 36.2           | Smoking     | 36.2    | [42]      |
| 2033 | USA     | ABC Study | 3800            | 18-25             | 1900/1900    | 37.0           | Smoking     | 37.0    | [43]      |
| 2034 | USA     | ABC Study | 3900            | 18-25             | 1950/1950    | 37.8           | Smoking     | 37.8    | [44]      |
| 2035 | USA     | ABC Study | 4000            | 18-25             | 2000/2000    | 38.5           | Smoking     | 38.5    | [45]      |
| 2036 | USA     | ABC Study | 4100            | 18-25             | 2050/2050    | 39.2           | Smoking     | 39.2    | [46]      |
| 2037 | USA     | ABC Study | 4200            | 18-25             | 2100/2100    | 40.0           | Smoking     | 40.0    | [47]      |
| 2038 | USA     | ABC Study | 4300            | 18-25             | 2150/2150    | 40.8           | Smoking     | 40.8    | [48]      |
| 2039 | USA     | ABC Study | 4400            | 18-25             | 2200/2200    | 41.5           | Smoking     | 41.5    | [49]      |
| 2040 | USA     | ABC Study | 4500            | 18-25             | 2250/2250    | 42.2           | Smoking     | 42.2    | [50]      |
| 2041 | USA     | ABC Study | 4600            | 18-25             | 2300/2300    | 43.0           | Smoking     | 43.0    | [51]      |
| 2042 | USA     | ABC Study | 4700            | 18-25             | 2350/2350    | 43.8           | Smoking     | 43.8    | [52]      |
| 2043 |         |           |                 |                   |              |                |             |         |           |

# Primary key indicators of antimicrobial consumption and resistance, EU/EEA countries, 2014 to 2018\*

|          |     | Indicator                | 2014  | 2015  | 2016  | 2017  | 2018  |
|----------|-----|--------------------------|-------|-------|-------|-------|-------|
| Italy    | AMC | AMC Humans**             | 24.5  | 24.5  | 24.0  | 20.9  | 21.4  |
|          |     | AMC Animals***           | 332.4 | 322.0 | 294.8 | 273.8 | 244.0 |
|          | AMR | % 3GCR EC Humans         | 29.7  | 30.8  | 30.5  | 30.5  | 29.7  |
|          |     | % MRSA Humans            | 33.6  | 34.1  | 33.6  | 33.9  | 34.0  |
|          |     | % Complete S EC Animals* |       | 12.8  | 11.3  | 8.7   | 12.9  |
| Slovakia | AMC | AMC Humans**             | 12.6  | 13.1  | 12.9  | 13.9  | 13.3  |
|          |     | AMC Animals***           | 36.7  | 37.6  | 29.9  | 33.3  | 36.1  |
|          |     | % 3GCR EC Humans         | 10.9  | 18.9  | 24.9  | 22.9  | 21.3  |



## ESBL/AmpC-prod. *E. coli* fattening pigs, EU 2017



**Figure 81:** Prevalence of presumptive ESBL-producing (a) and AmpC-producing (b) *E. coli* isolates in fattening pigs, assessed by the specific ESBL/AmpC/carbapenemase-producing *E. coli* monitoring, 28 EU MSs and 3 non-MSs, 2017

With the Agreement of November 2, 2017, between the Government, the Regions and the Autonomous Provinces of Trento and Bolzano, Italy adopted its first **National Action Plan on Antimicrobial Resistance (PNCAR) 2017-2020**.

The PNCAR represents the tool for implementing the Italian strategy.

In order to face the increasing resistance and spread of antibiotic-resistant microorganisms, the PNCAR provides for national coordination, specific objectives and actions through the synergy between national, regional and local levels, the different key stakeholders involved and a governance, in which the roles of the institutions, both in the human and the veterinary sector, are clearly defined. The preparation and the adoption of an operational document defining the responsibilities of the different institutions is expected within 6 months of the adoption of the PNCAR. Since the Plan aspires to have a real and positive impact on human health, the measures defined include the identification and implementation of the priorities to be adopted at the various levels so as to change the current increasing trend of antibiotic resistance and healthcare-associated infections.

With the Decree of the Director General for Health Prevention of November 3, 2017, a multi-sectoral coordination table for the implementation and monitoring of the PNCAR was established. Its mandate is to promote the achievement of the objectives set by the Plan. The skills and expertise of the various sectors both at national and regional level meet on this table.

# PNCAR

## 2

GENERAL  
OBJECTIVES

reducing the frequency of infections caused by antibiotic-resistant microorganisms

reducing the frequency of hospital and community healthcare-associated infections

## 6

AREAS  
OF INTEREST

Antibiotic resistance surveillance and prevention

appropriate use and surveillance of antimicrobial consumption

surveillance, prevention and control of healthcare-associated infections

training of healthcare staff

information and education of the population

research and innovation

## 67

CENTRAL  
ACTIONS

## 59

REGIONAL AND LOCAL  
ACTIONS

3

## ITALIAN STRATEGY *in the human sector*

Reducing the consumption of systemic antibiotics by more than 10% at local level

Reducing the consumption of systemic antibiotics by more than 5% in hospitals

Reducing the consumption of fluoroquinolones by more than 10% at local level

Reducing the consumption of fluoroquinolones by more than 10% in hospitals

Reducing the prevalence of methicillin-resistant *S.aureus* in blood isolates by more than 10%

Reducing the prevalence of Carbapenemase-producing Enterobacteriaceae (CPE) in blood isolates by more than 10%

## ITALIAN STRATEGY *in the veterinary sector*

Reducing the consumption of antibiotics by more than 30%

Reducing colistin consumption to a level of 5 mg/PCU

Reducing the consumption of Critically Important Antimicrobials by more than 10%

Reducing the consumption of orally administered antibiotics by more than 30%

[http://www.salute.gov.it/portale/documentazione/p6\\_2\\_2\\_1.jsp?lingua=italiano&id=2660](http://www.salute.gov.it/portale/documentazione/p6_2_2_1.jsp?lingua=italiano&id=2660)



# Sorveglianza consumi antibiotici

Programma di sorveglianza del consumo degli antibiotici per uso umano

Il **programma di sorveglianza del consumo degli antibiotici**, ha poi i seguenti obiettivi, rispettivamente nel breve (2017-2018) e nel lungo (2019-2020) termine:

- ottimizzare il **monitoraggio del consumo degli antibiotici prescritti a livello nazionale**,
- poi promuovere lo sviluppo di **sistemi regionali per il monitoraggio dell'appropriatezza prescrittiva**.

Programma di sorveglianza del consumo degli antibiotici per uso animale

In ambito veterinario, gli obiettivi del programma di sorveglianza del consumo degli antibiotici sono:

- rendere la prescrizione veterinaria elettronica obbligatoria su tutto il territorio nazionale (Unico strumento per ricettazione: Inizio formale 16 aprile 2019)
- promuovere lo sviluppo di modelli di classificazione delle aziende sulla base della valutazione del rischio di sviluppo di AMR e consumo di antibiotici (miglioramento dei controlli ufficiali), **Vedi Progetto ClassyFarm**
- misurare i dati di prescrizione e di consumo degli antibiotici e non soltanto quelli di vendita. La prescrizione elettronica rende possibili strategie e programmazione

## «Programma su Prudent Use»

### Programma sull'uso corretto e prudente degli antibiotici nell'uomo

Il programma di promozione dell'**uso corretto e prudente degli antibiotici** ha per obiettivi nel breve e nel lungo termine:

- **armonizzare le strategie sull'uso appropriato di antibiotici**, integrandole con quelle di controllo delle ICA. **Rendere specifici e sostenibili i programmi di *antimicrobial stewardship***. Inoltre, **migliorare conoscenze e consapevolezza** negli operatori sanitari e nei cittadini,
- quindi **migliorare e aggiornare costantemente le indicazioni nazionali** sull'uso appropriato di antibiotici. Promuovere anche interventi utili a **ridurre il fenomeno dell'utilizzo di antibiotici "avanzati" a domicilio**.

### Programma sull'uso corretto e prudente degli antibiotici negli animali

Il programma sull'uso corretto e prudente degli antibiotici negli animali prevede di:

- predisporre prima [Linee guida per l'uso prudente di antibiotici in animali produttori di alimenti e animali da compagnia](#),
- poi rafforzare la cooperazione con Industria farmaceutica, Associazioni e Organizzazioni sull'uso prudente degli antibiotici negli animali.

# Piano Nazionale Contrasto AMR 2016-2020

## Strategia italiana nel settore umano

### L'obiettivo in questo settore è la riduzione (nel 2020 rispetto al 2016: 4 anni) del:

- consumo di antibiotici sistemici >10% in ambito territoriale e >5% in ambito ospedaliero,
- consumo territoriale e ospedaliero di fluorochinoloni (riduzione >10%),
- prevalenza di *S. aureus* meticillino-resistenti negli isolati da sangue (riduzione >10%),
- prevalenza di Enterobatteri produttori di carbapenemasi (CPE) negli isolati da sangue (riduzione >10%).

## Strategia italiana nel settore veterinario:

### Focus sulla riduzione dell'uso degli antibiotici!

### L'obiettivo in questo settore è la riduzione (nel 2020 rispetto al 2016: 4 anni):

- - 30% del consumo di antibiotici (riduzione complessiva, tutte le classi)
- - 10% del consumo dei Critically Important Antimicrobials (leggi HPClAs...),
- Giungere ad (almeno) 5 mg/PCU del consumo di colistina,
- - 30% del consumo di antibiotici nelle formulazioni farmaceutiche per via orale.



Grazie per l'attenzione!

Un grazie particolare a tutti i miei colleghi, UOC D. O. Diagnostica Generale,  
CRN-AR e NRL-AR