

Il Monitoraggio AMR negli animali in Italia, e nel contesto dell'Unione Europea

Antonio Battisti, DVM ECVPH_{PM}

UOC Direzione Operativa Diagnostica Generale

National Reference Laboratory for Antimicrobial Resistance

Centro di Referenza Nazionale per l'Antibioticoresistenza

Istituto Zooprofilattico Sperimentale del Lazio e della Toscana, Roma

Antimicrobicoresistenza (AMR)

L'approccio «One Health» al tempo della pandemia COVID-19

Workshop Annuale del CRN-AR e NRL-AR 2021

IZSLT, SEDE Centrale, Roma 18-19 Novembre 2021

Antimicrobial resistance as an example of «Tragedy of the Commons»

Tragedy of the Commons

From Wikipedia, the free encyclopedia

In economic science, the **tragedy of the commons** is a situation in which individual users, who have open access to a resource unhampered by shared social structures or formal rules that govern access and use,^{[1][2]} act independently according to their [own self-interest](#) and, contrary to the common good of all users, cause depletion of the resource through their uncoordinated action.^[3] The concept originated in an essay written in 1833 by the British economist [William Forster Lloyd](#),^[4] who used a hypothetical example of the effects of unregulated grazing on [common land](#) (also known as a "common") in [Great Britain](#) and [Ireland](#).^[5] The concept became widely known as the "tragedy of the commons" over a century later after an article written by [Garrett Hardin](#) in 1968.^[6]

PubMed.gov

Search PubMed

Search

Advanced

User Guide

Save

Email

Send to

Display options

> J Law Med Ethics. Summer 2015;43 Suppl 3:33-7. doi: 10.1111/jlme.12272.

Antibiotic Resistance Is a Tragedy of the Commons That Necessitates Global Cooperation

Aidan Hollis¹, Peter Maybarduk²

Affiliations + expand

PMID: 26243241 DOI: 10.1111/jlme.12272

Abstract

Antibiotics may be thought of as a common pool resource that can be depleted over time; the economics of this problem are relatively well known. The importance of antibiotics to human health means that limiting access through privatization is undesirable. Therefore, other solutions to prevent overuse are essential - stewardship programs, and for non-human use, taxation, all within the context of an international agreement. To solve problems of access while offering adequate rewards for innovation, a key tool is delinking prices from payment to innovators.

© 2015 American Society of Law, Medicine & Ethics, Inc.

Similar articles

Antibiotic resistance as a tragedy of the commons: An ethical argument for a tax on antibiotic use in humans.

Giubilini A.

Bioethics. 2019 Sep;33(7):776-784. doi: 10.1111/bioe.12598. Epub 2019 May 20.

PMID: 31107562 [Free PMC article.](#)

FULL TEXT LINKS

[SAGE Journals](#)

ACTIONS

“ Cite

☆ Favorites

SHARE



PAGE NAVIGATION

< Title & authors

Abstract

Similar articles

Cited by

MeSH terms

LinkOut - more resources

The EU has launched a New (II°) Action Plan (2017-2022)

Three Pillars:

-Making the EU a best practice Region on AMR in the World

-Boosting Research, Development and Innovation on AMR

-Shaping the Global Agenda on AMR

Integrated approach to combat AMR: no measure alone sufficient

Development of national Strategies!



European Commission

English 

Search

Home > Live, work, travel in the EU > Public health >

Antimicrobial Resistance

EU ACTION ON AMR

Action at a Global Level

Research, Projects & Studies

ALL TOPICS

TWITTER FEED

EU Action on Antimicrobial Resistance

Antimicrobial resistance (AMR) – the ability of microorganisms to resist antimicrobial treatments, especially antibiotics – has a **direct impact on human and animal health** and carries a heavy economic burden due to higher costs of treatments and reduced productivity caused by sickness. AMR is responsible for an estimated **33,000 deaths per year in the EU**. It is also estimated that AMR costs the EU **EUR 1.5 billion per year in healthcare costs and productivity losses**.

- **Factsheet** - AMR: A major European and Global challenge  
- **Video** - "The EU Action Plan against Antimicrobial Resistance"
Available languages: English, Français (Français subtitle), English (English subtitle), Română, български, Slovenščina, Slovenčina, Polski, Malti, Magyar, Lietuvių, Latviešu, Eesti, Čeština, Svenska, Suomi, Dansk, Nederlands, Português, Ελληνικά, Español, Italiano, Deutsch, Français



EU One Health Action Plan against AMR

In June 2017 the Commission adopted the **EU One Health Action Plan against AMR**  , as requested by the Member States in the Council conclusions of 17 June 2016. It builds on the 2011 action plan (see below), its **evaluation** , the feedback received on a **European Commission Roadmap**   on AMR and an **open public consultation**.

LATEST NEWS

- [Minutes of the meeting - AMR One-Health Network \(15 October 2019\)](#)  
- [Fighting antimicrobial resistance: the AMR One-Health Network meets in Brussels on 15 October 2019](#)
- [Implementation of the EU One Health Action Plan against AMR : new progress report available](#)  
- [Call for Proposals of EU Health Programme 2019 Project Grants: Stakeholder actions to implement the EU guidelines on prudent use of antimicrobials in human health. Deadline for submission: 10 September 2019](#)
- [First Regional Workshop on Antimicrobial Resistance: Cape Town, South Africa, 5-8 February 2019](#)

All news on AMR

EVENTS

All events on AMR

CONSULTATIONS

All consultations

RECOMMENDATIONS

What can we do?

Scientific Opinion Reduction of the Need to use Antimicrobials in Food-producing Animals (RONAFA), EFSA, 2017

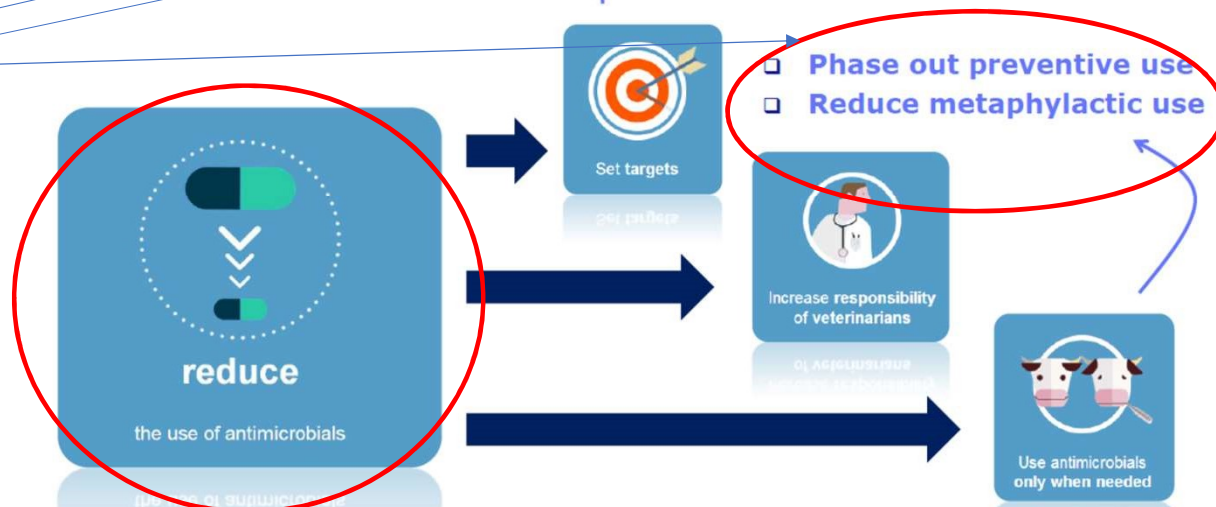


RECOMMENDATIONS

What can we do?

- Targets to reduce overall use
- Targets at national level (ideally at species/farm level if consumption data allow)

National Action Plans in the EU, at Member State Level



Necessità per un “Uso prudente” degli antibiotici per uso veterinario: focus negli animali nell’approccio “One Health”

- Mantenere l’efficacia per poter **continuare a curare le malattie infettive batteriche** degli animali per meglio garantire la produttività dei sistemi di allevamento e la Salute (anche di animali da compagnia)
- Ridurre la pressione di selezione sugli agenti patogeni zoonosici, commensali/opportunisti che **genera emergenza e diffusione di agenti batterici antibioticoresistenti e di elementi genetici di antibioticoresistenza** lungo le filiere produttive.

Questa strategia riduce l’impatto sulla Salute Umana (oltre che sulla Salute Animale) degli agenti AMR e dei geni AMR di origine animale AMR come «Zoonosi trasversale» (concetto già in Dir 99/2003/EC)

Priorità nelle Produzioni Animali/Medicina Veterinaria:



- a. Riduzione dei consumi totali (tutte le classi di antibiotici registrati)
- b. Riduzione consumi per mantenimento dell'efficacia ed uso controllato di Critically Important Antimicrobials registrati anche per uso Veterinario

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

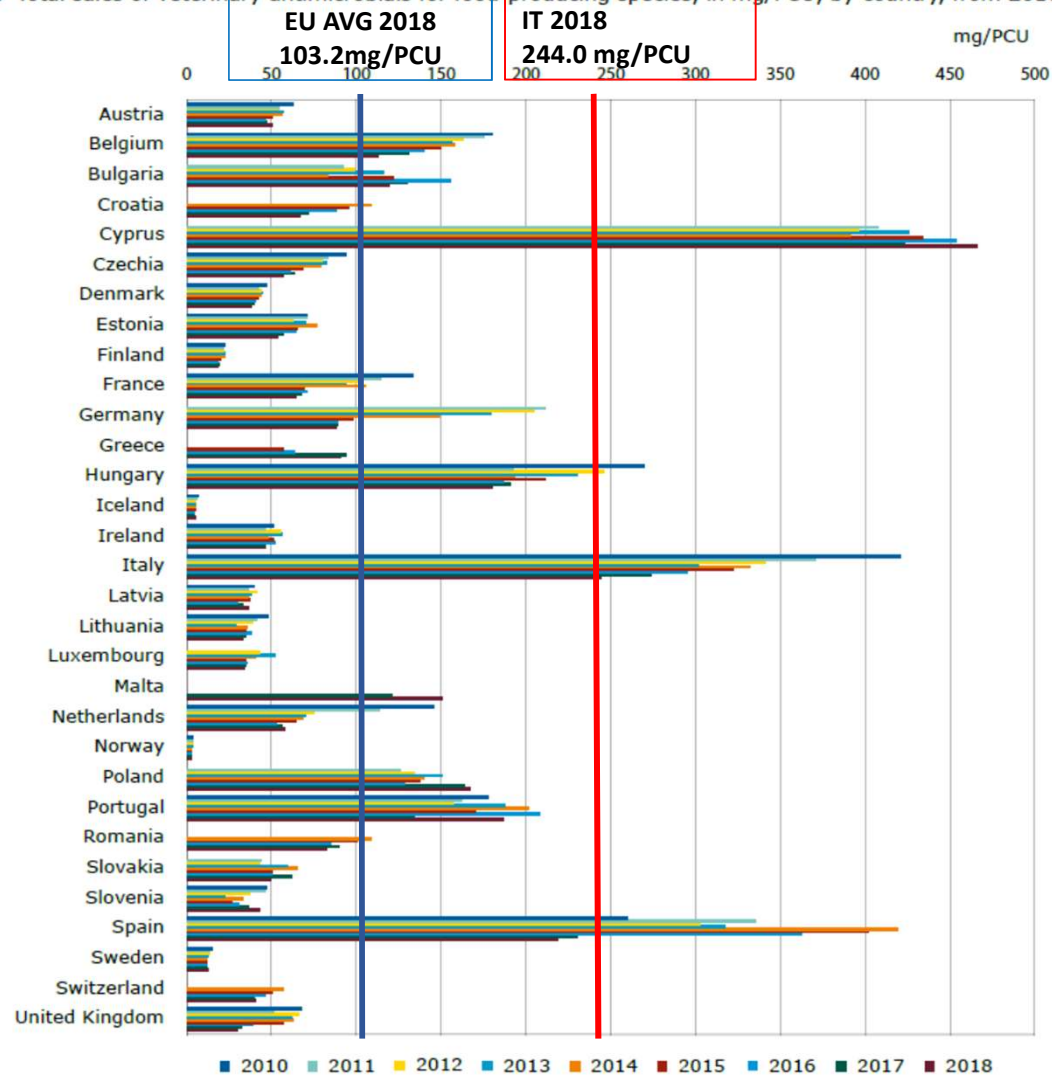
Classi di antibiotici indispensabili per infezioni invasive nell'uomo causate anche da agenti zoonosici emergenti o ad incidenza rilevante (es. Salmonella, Campylobacter, E. coli, Klebsiella etc).

- 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?

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

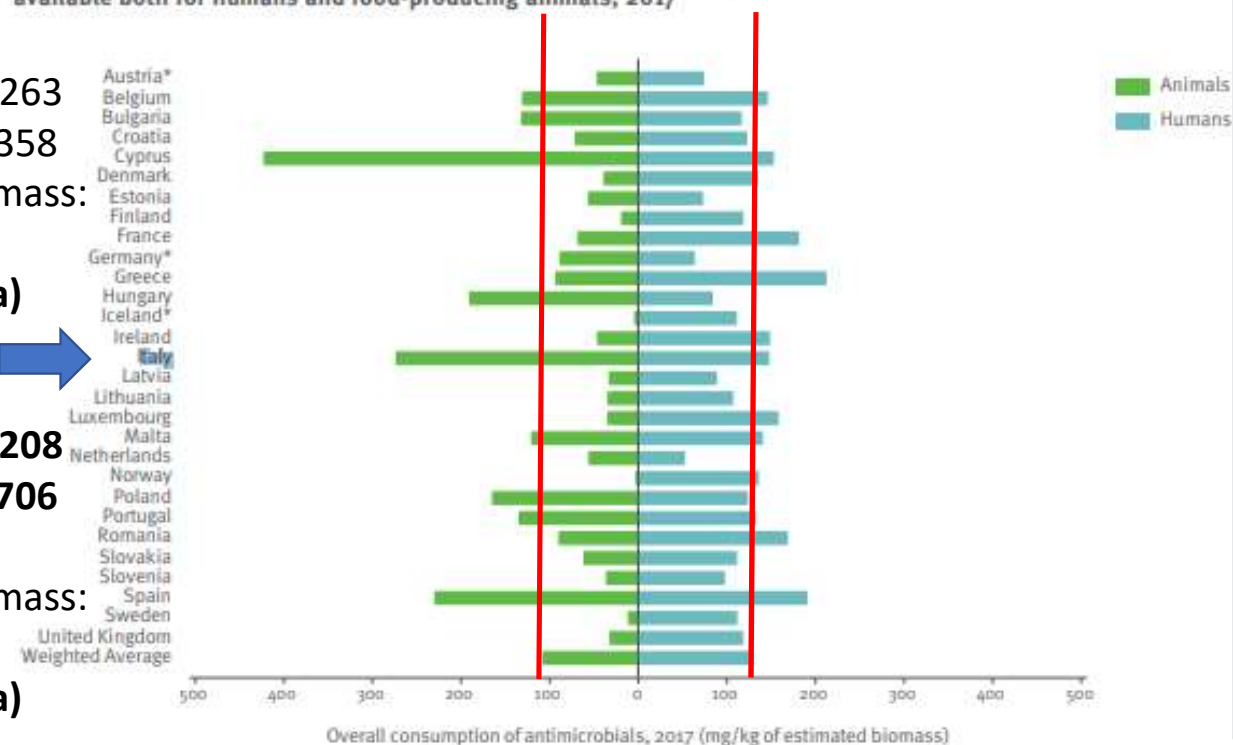
Figure 26. Total sales of veterinary antimicrobials for food-producing species, in mg/PCU, by country, from 2010 to 2018¹⁻⁹



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

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

Figure 6: Comparison of biomass-corrected consumption of antimicrobials (milligrams per kilogram estimated biomass) in humans (a) and food-producing animals (b) by country, in 29 EU/EEA countries for which data were available both for humans and food-producing animals, 2017



2018:

Tonnes Humans 4 263

Tonnes Animals 6 358

Animal (estm) biomass:

60 792

(103 mg/PCU circa)

2016:

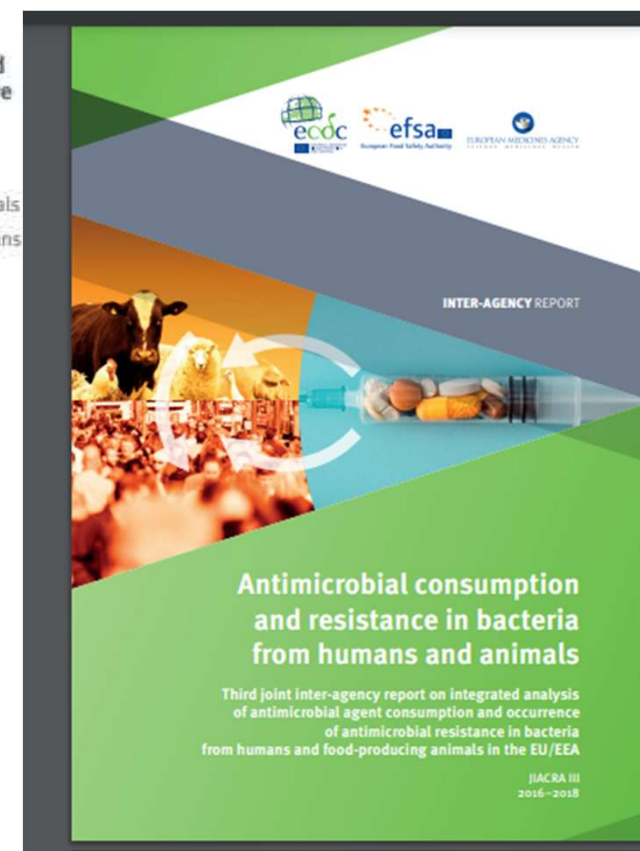
Tonnes Humans 4 208

Tonnes Animals 7 706

Animal (estm) biomass:

61 026

(126 mg/PCU circa)



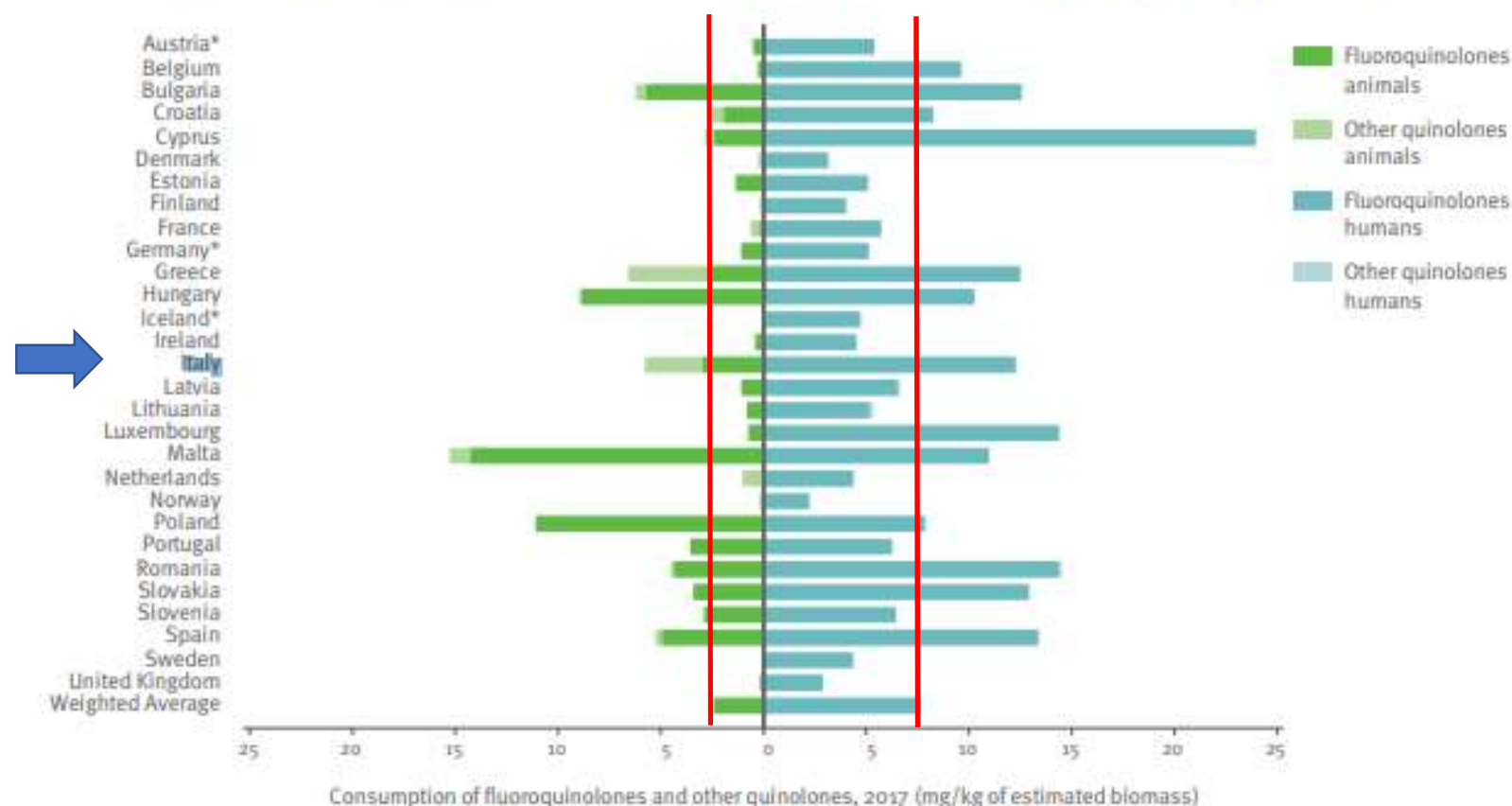
Asterisk (*) denotes that only community consumption was provided for human medicine. The population-weighted mean proportion (%) of hospital sector AMC out of the 2017 total national AMC for EU/EEA countries that provided data for both sectors is 15%.

Notes: 1) The estimates presented are crude and must be interpreted with caution. For limitations hampering comparison of antimicrobial consumption in humans and food-producing animals, see Section 15.1. The weighted mean figure represents the population-weighted mean of data from those countries included.

(a): ATC J01 Antibacterials for systemic use.

(b): ATCvet QA07AA, QA07AB, QG01AA, QG01AE, QG01BA, QG01BE, QG51AA, QG51AG, QJ01, QJ51, QP51AG.

Figure 19: Population-corrected consumption of fluoroquinolones and other quinolones in humans and food-producing animals in 25 EU/EEA countries for which data were available both for humans and food-producing animals, 2017



An asterisk (*) denotes that only community consumption was provided for human medicine. The population-weighted mean proportion (%) of the hospital sector from the 2017 total national consumption of quinolones and fluoroquinolones for EU/EEA countries providing data for both sectors was 12.4%.

Notes: 1) The estimates presented are crude and must be interpreted with caution. For limitations hampering the comparison of antimicrobial consumption in humans and food-producing animals, please see Section 14. 2) The weighted mean figure represents the population-weighted mean of data from those countries included.

2.4.1. Distribution of overall sales of antimicrobials for food-producing animals

Figure 9. Spatial distribution of overall sales of all antimicrobials for food-producing animals, in mg/PCU, for 31 countries, for 2018



EU AVG 2018
29.3 mg/PCU

Penicillins

IT 2018
69.7 mg/PCU

Italy 2018
Penicillins (Amox)
68.7 mg/PCU (29.3 mg/PCU)
Modestissima riduzione
(Tetracyclines: 72.5 mg/PCU)

mg/PCU

0 20 40 60 80 100

Austria
Belgium
Bulgaria
Croatia
Cyprus
Czechia
Denmark
Estonia
Finland
France
Germany
Greece
Hungary
Iceland
Ireland
Italy
Latvia
Lithuania
Luxembourg
Malta
Netherlands
Norway
Poland
Portugal
Romania
Slovakia
Slovenia
Spain
Sweden
Switzerland
United Kingdom

■ 2010 ■ 2011 ■ 2012 ■ 2013 ■ 2014 ■ 2015 ■ 2016 ■ 2017 ■ 2018

Penicillins (Amoxicillina per uso orale):
68.7 mg/PCU (29% vendite totali)

Modestissima riduzione nell'ultimo triennio

(Tetracyclines: 72.6 mg/PCU (30% vendite tot))

DECISIONS

The AMR Monitoring system in the EU, in food-producing animal populations... Repealed by 2021

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 ⁽¹⁾, 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 ⁽³⁾, 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.

Article 1

Subject matter and scope

1. This Decision lays down harmonised rules for the period 2021-2027 for the 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.

2. The monitoring and reporting of AMR shall cover the following bacteria:

- (a) *Salmonella* spp.;
- (b) *Campylobacter coli* (*C. coli*);
- (c) *Campylobacter jejuni* (*C. jejuni*);
- (d) Indicator commensal *Escherichia coli* (*E. coli*);
- (e) *Salmonella* spp. and *E. coli* producing the following enzymes:
 - (i) Extended Spectrum β -Lactamases (ESBL);
 - (ii) AmpC β -Lactamases (AmpC);
 - (iii) Carbapenemases (CP).

Isolates from National Control Programmes (NCPs) & Cross-sectional studies at slaughter

Isolates from cross-sectional studies at slaughter, at retail (meat), at BCPs (imported meat in the EU)

MAINLY "ACTIVE MONITORING" AT DIFFERENT STAGES...

3. The monitoring and reporting of AMR may cover indicator commensal *Enterococcus faecalis* (*E. faecalis*) and *Enterococcus faecium* (*E. faecium*).

4. The monitoring and reporting of AMR shall cover the following food-producing animal populations and food:

- (a) broilers;
- (b) laying hens;
- (c) fattening turkeys;
- (d) bovine animals under one year of age;

L 387/10

EN

Official Journal of the European Union

19.11.2020

Voluntary for EU MS...

- (e) fattening pigs;
- (f) fresh meat from broilers;
- (g) fresh meat from turkeys;
- (h) fresh meat from pigs;
- (i) fresh meat from bovine animals.

5. Member States shall monitor and report AMR in specific combinations of bacteria/antimicrobial substances/food-producing animal populations and fresh meat derived thereof in accordance with Articles 3 and 4.

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

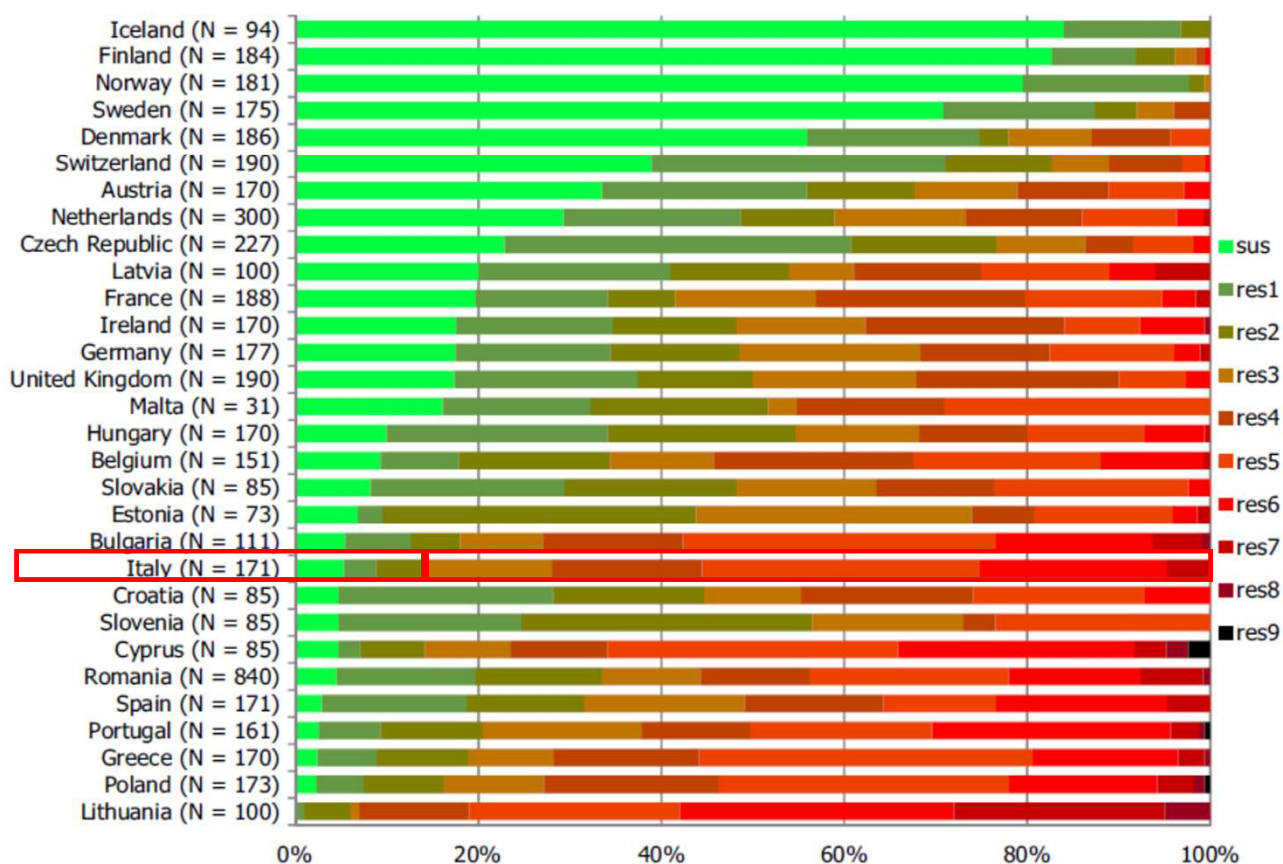
- Per la prima volta si introduce Genomica (WGS e analisi bioinformatica), metodologia impiegata, modalità di reportistica e dettagli di esecuzione e di analisi dei dati, in normativa relativa a Zoonoses e Food Safety (Dir. 99/2003/EC, Regulation (EU) 2017/625)

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 ⁽⁶⁾.

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 COMESCHEBR).



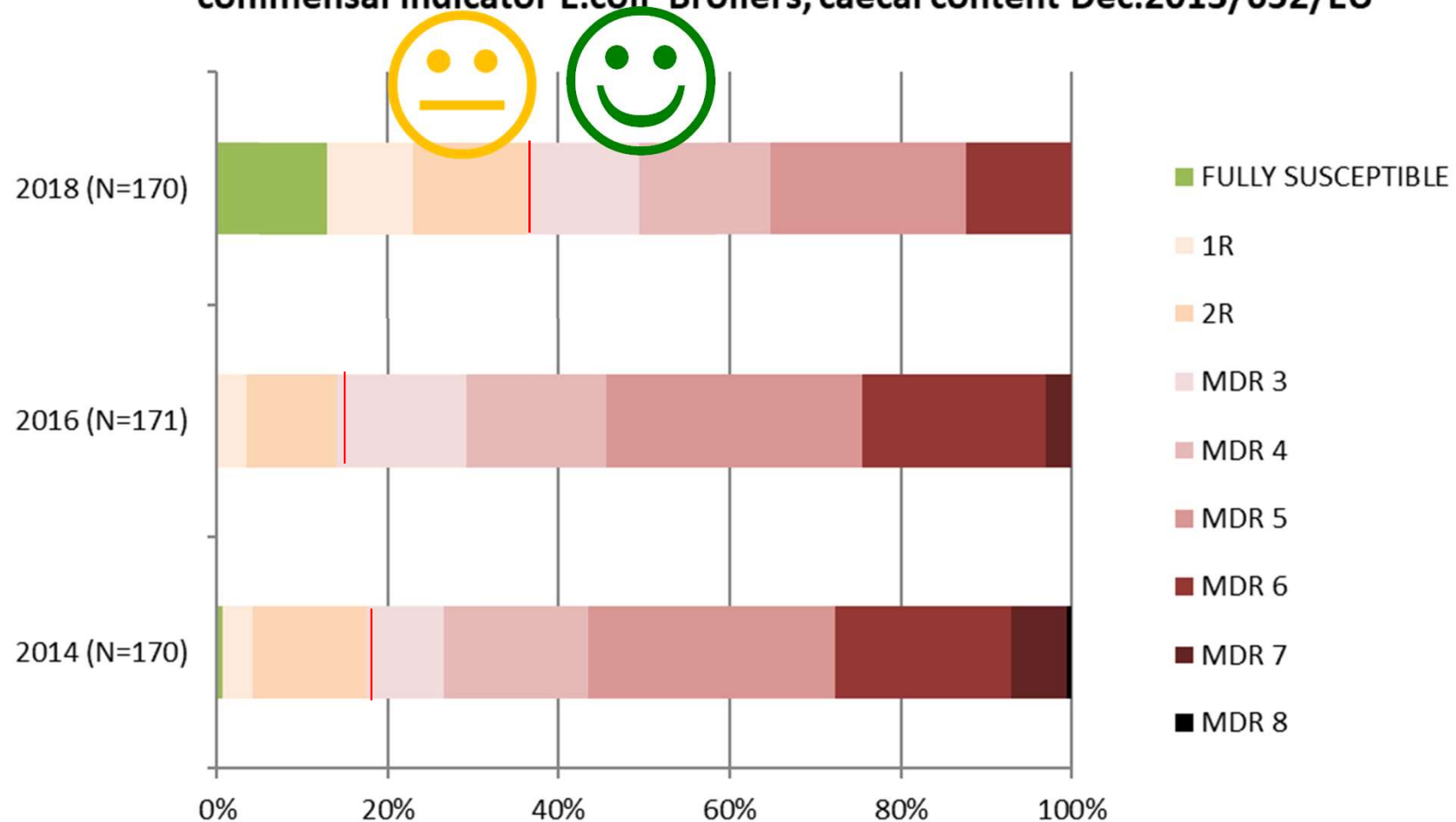
N: total number of isolates tested for susceptibility against the whole harmonised set of antimicrobials for *Escherichia coli*; sus: susceptible to all antimicrobial classes of the harmonised set for *E. coli*; res1–res9: resistance to 1 up to 11 antimicrobial classes of the harmonised set for *E. coli*.

LA RIDUZIONE COMPLESSIVA dell'uso di tutte le classi e subclassi di antibiotici ha lo scopo di consentire alla popolazione «pienamente suscettibile» di riprodursi in modo differenziale e di «tornare ad essere prevalente» nel corso degli anni...)

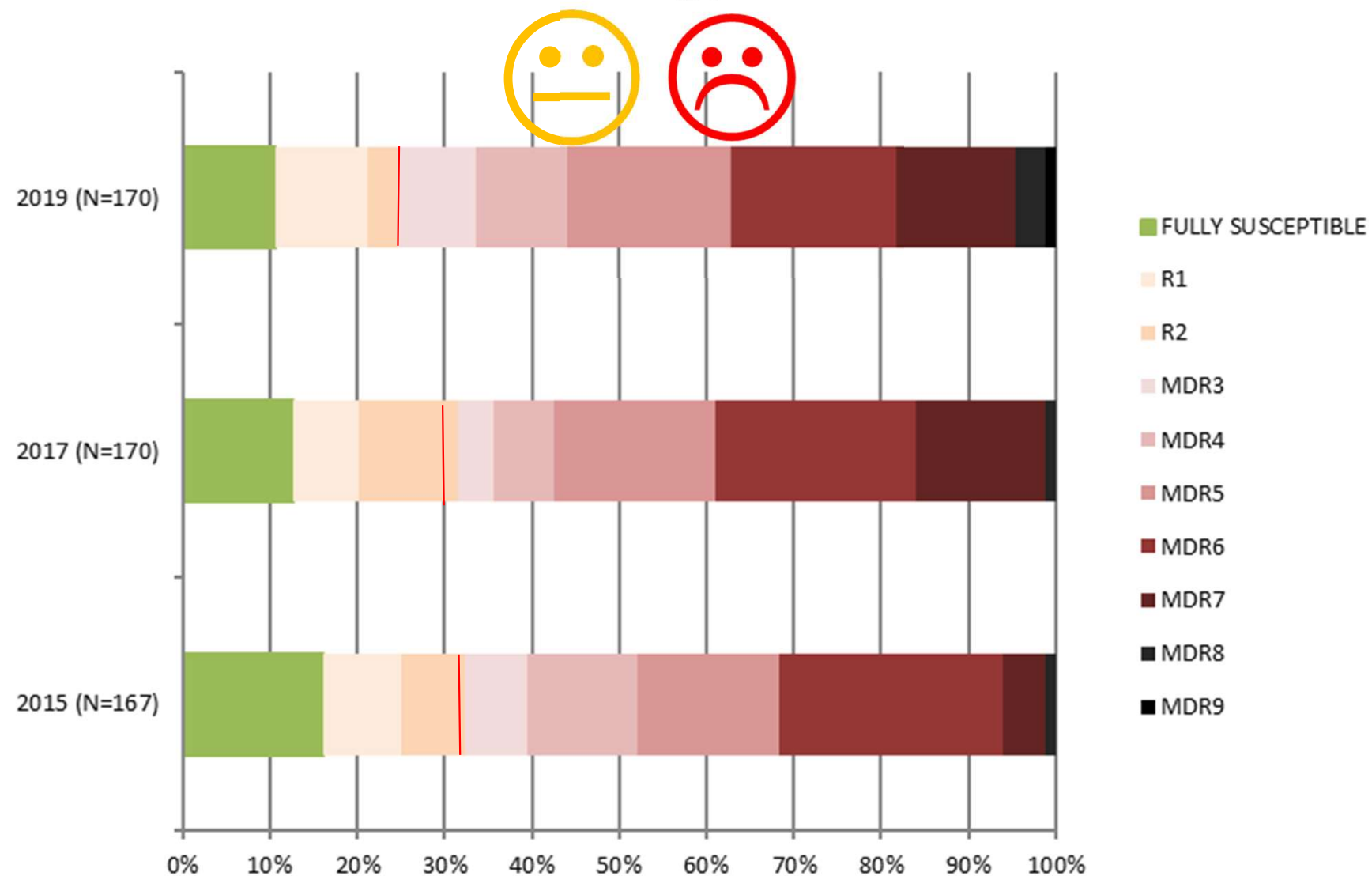
In Italia nel 2016:
5% «Fully Susceptible» vs
85% MultiDrugResistant...

A complementary approach to data interpretation

Multidrug-resistant isolates (MDR, 3+R)
commensal indicator E.coli Broilers, caecal content Dec.2013/652/EU

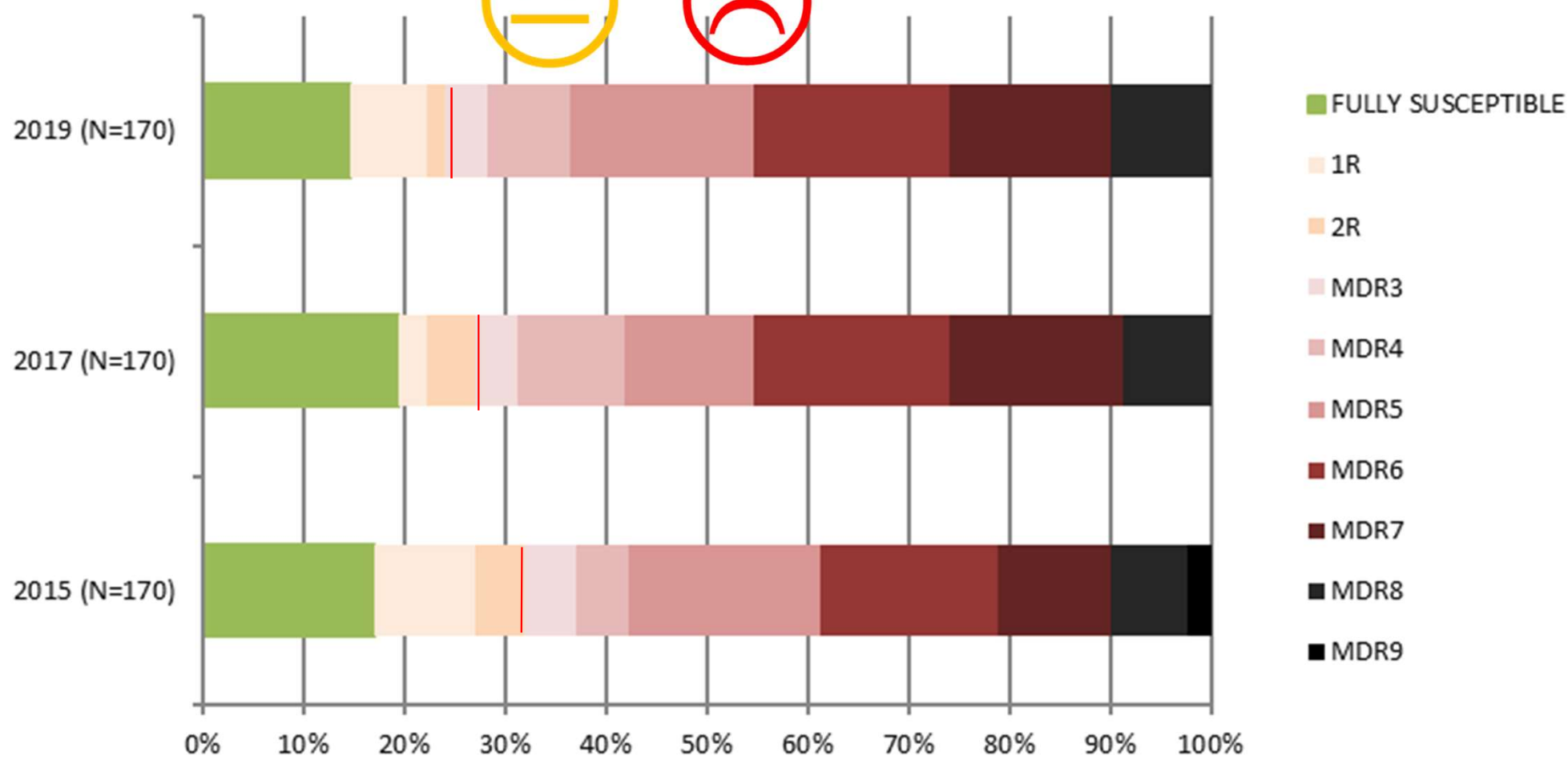


Multidrug-resistant isolates (MDR, 3+R)
commensal indicator E.coli - Pigs, caecal content, Dec. 2013/652/EU

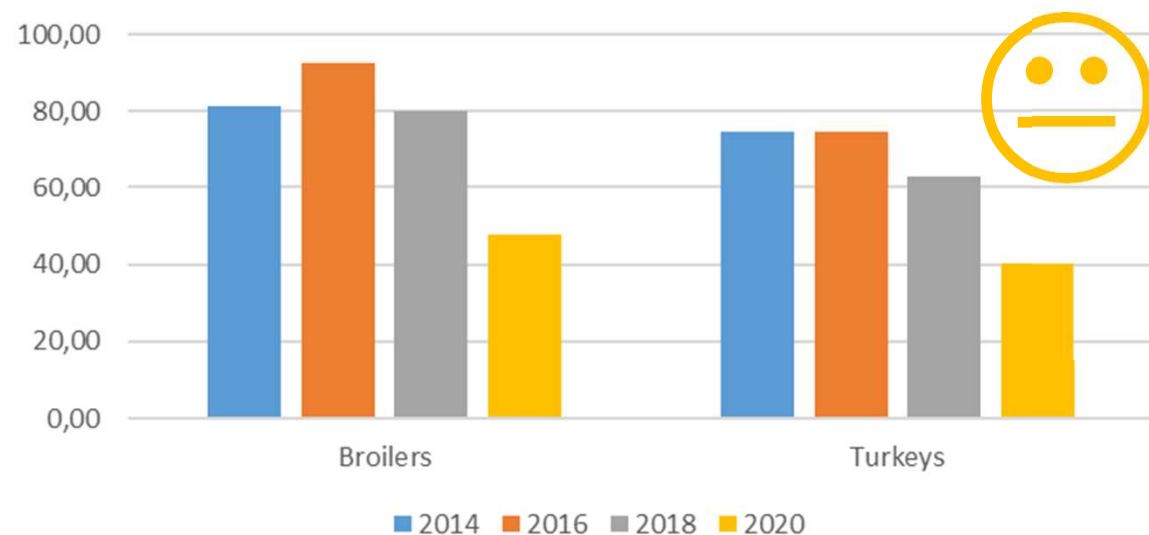


**Multidrug-resistant isolates (MDR, 3+R)
commensal indicator E.coli - Bovine <12 mo, caecal content Dec.**

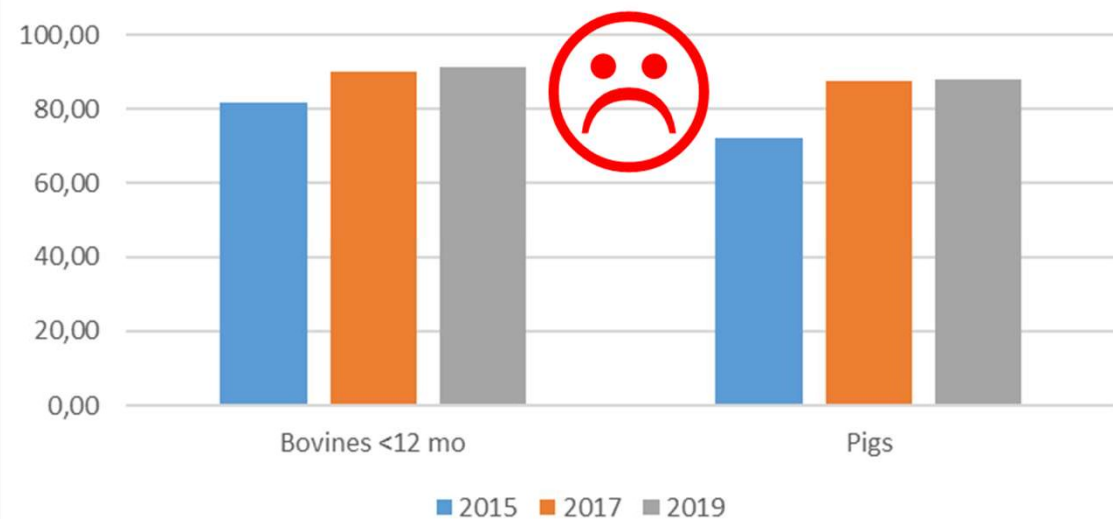
2013/652/EU



Broilers & Turkeys: Prevalence epi units
ESBL/AmpC producing Ecoli, Italy 2014-2020



Bovines <12 mo & Pigs: Prevalence epi units
ESBL /AmpC producing Ecoli, Italy, 2015-2019



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

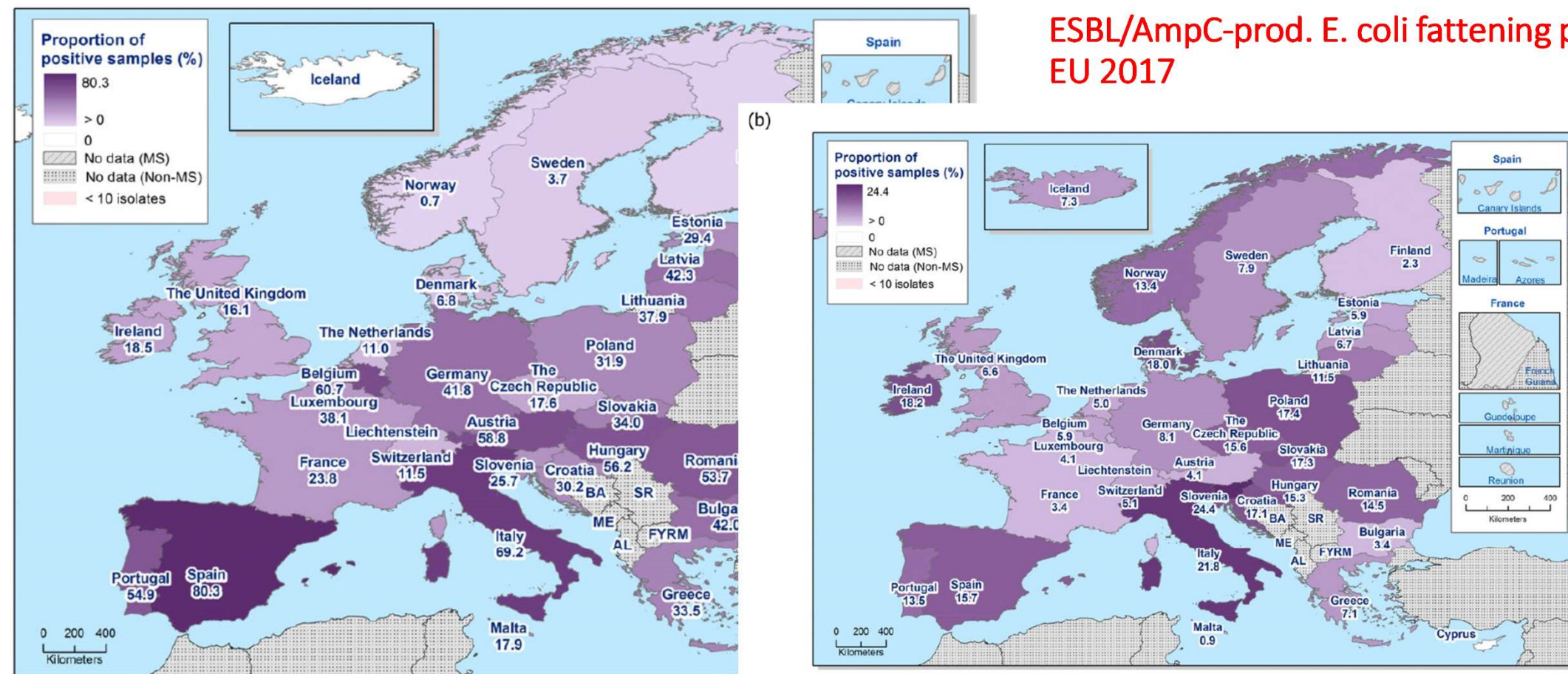
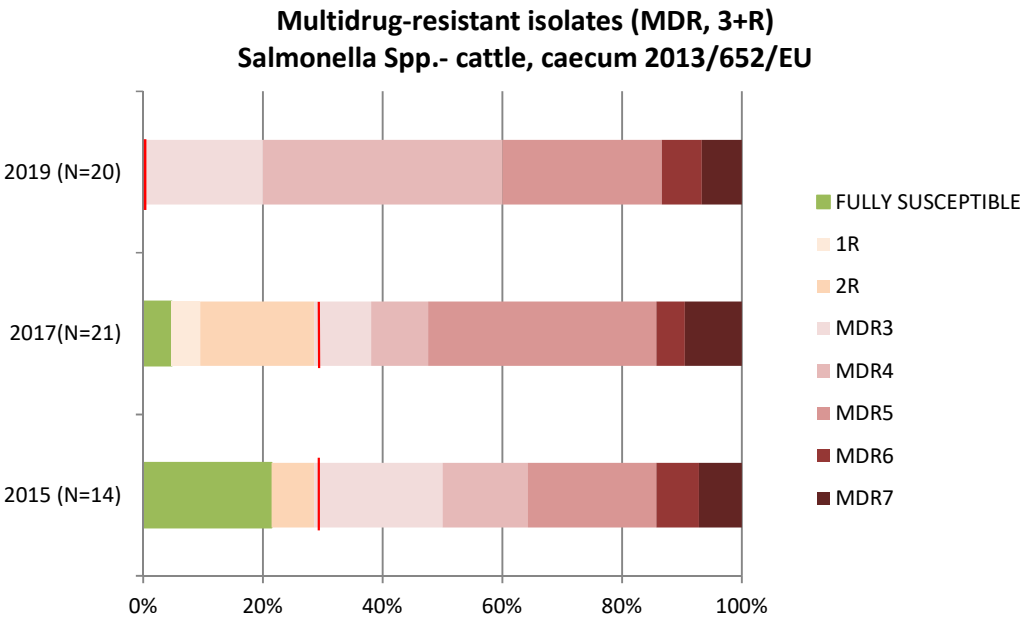
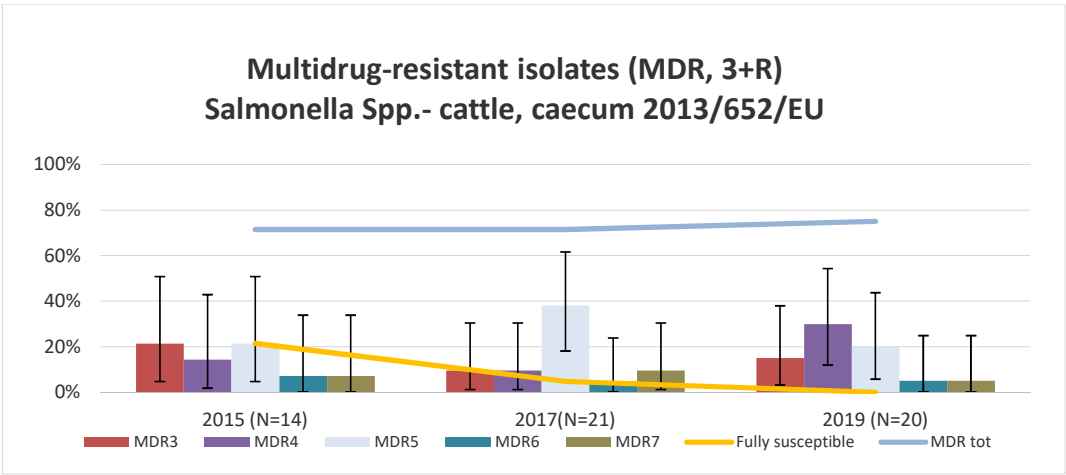
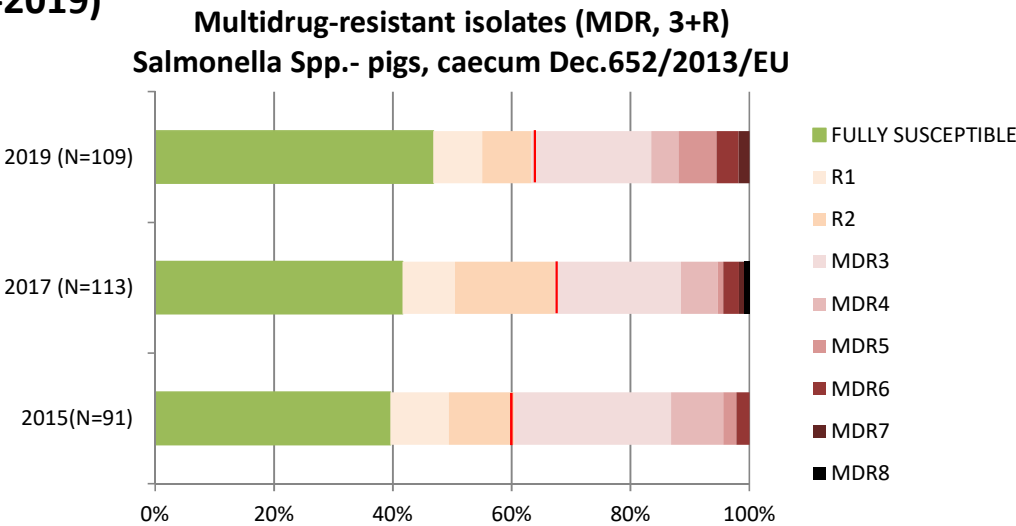
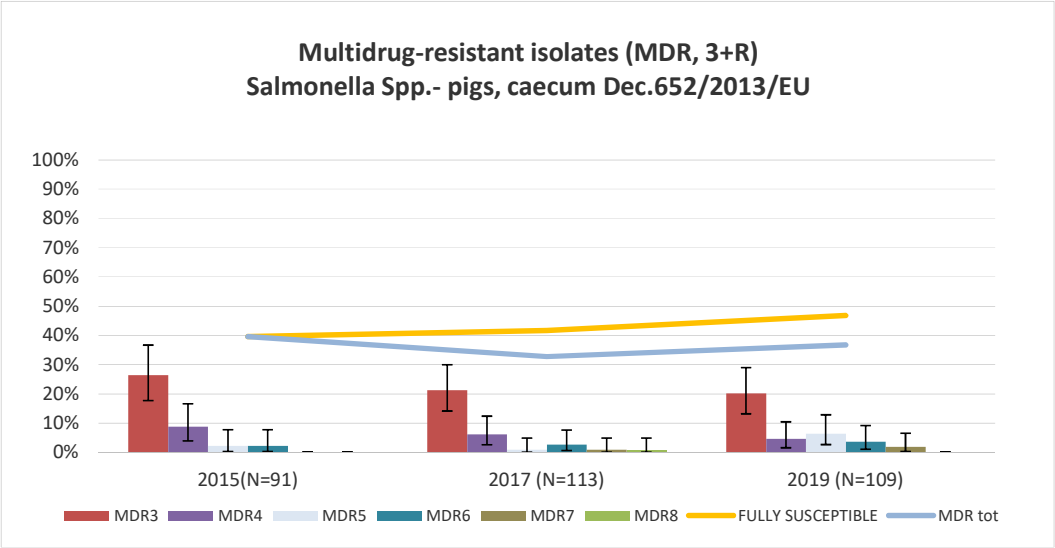
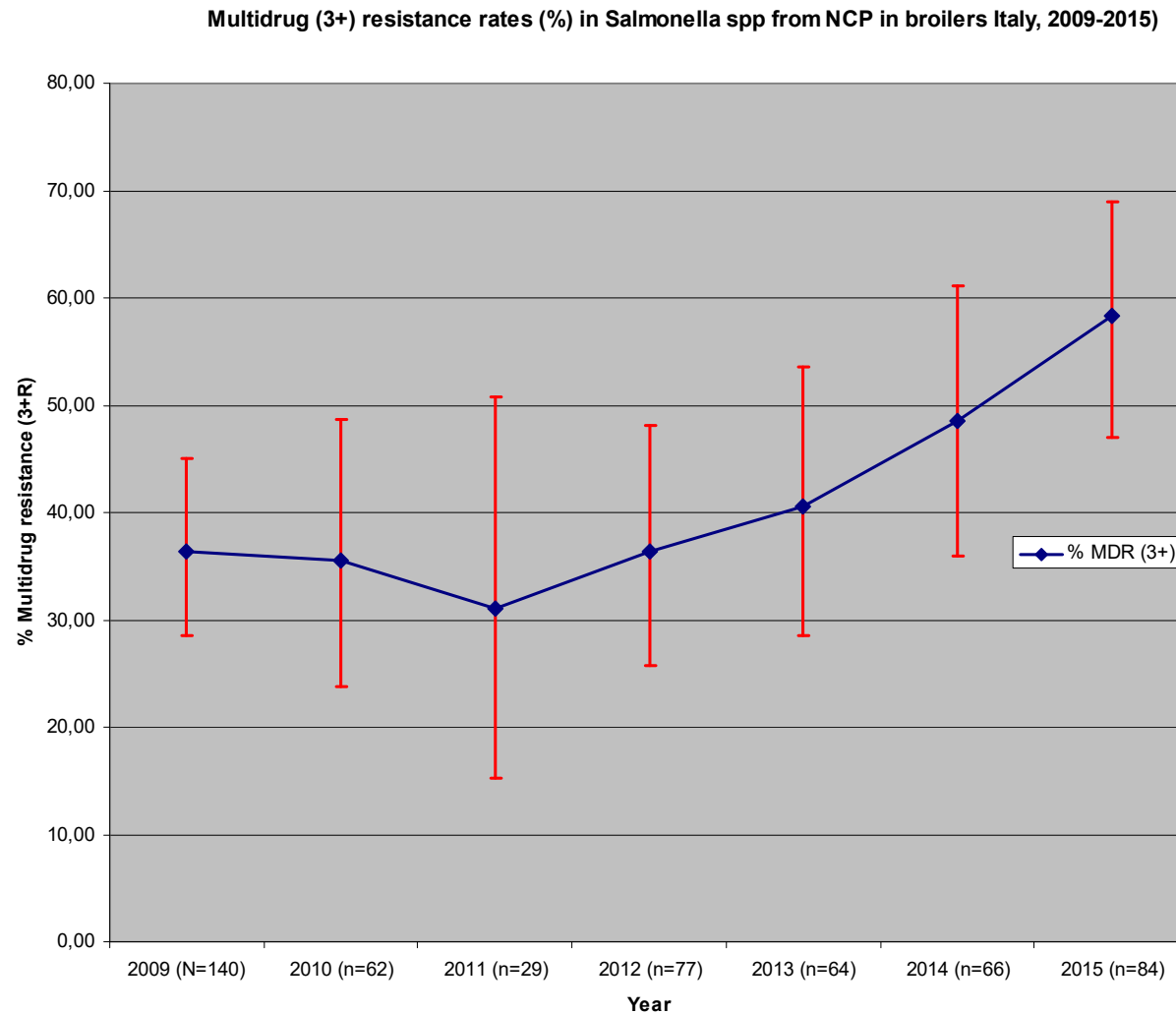


Figure 81: Prevalence of presumptive ESBL-producing (a) and AmpC-producing (b) *E. coli* isolates in fattening pigs, assessed by the specific ESBL/AmpC/carbapenemase-producing *E. coli* monitoring, 28 EU MSs and 3 non-MSs, 2017

Salmonella spp: AMR e MDR in suini e bovini <12m, Italia (2015-2019)



L'industria del pollo da carne in Italia e MDR Salmonella Infantis





Ministero della Salute
Direzione generale della sanità animale
e dei farmaci veterinari
Ufficio IV - Medicinali veterinari

Relazione sulla resistenza agli antimicrobici dei batteri zoonotici e commensali

2014

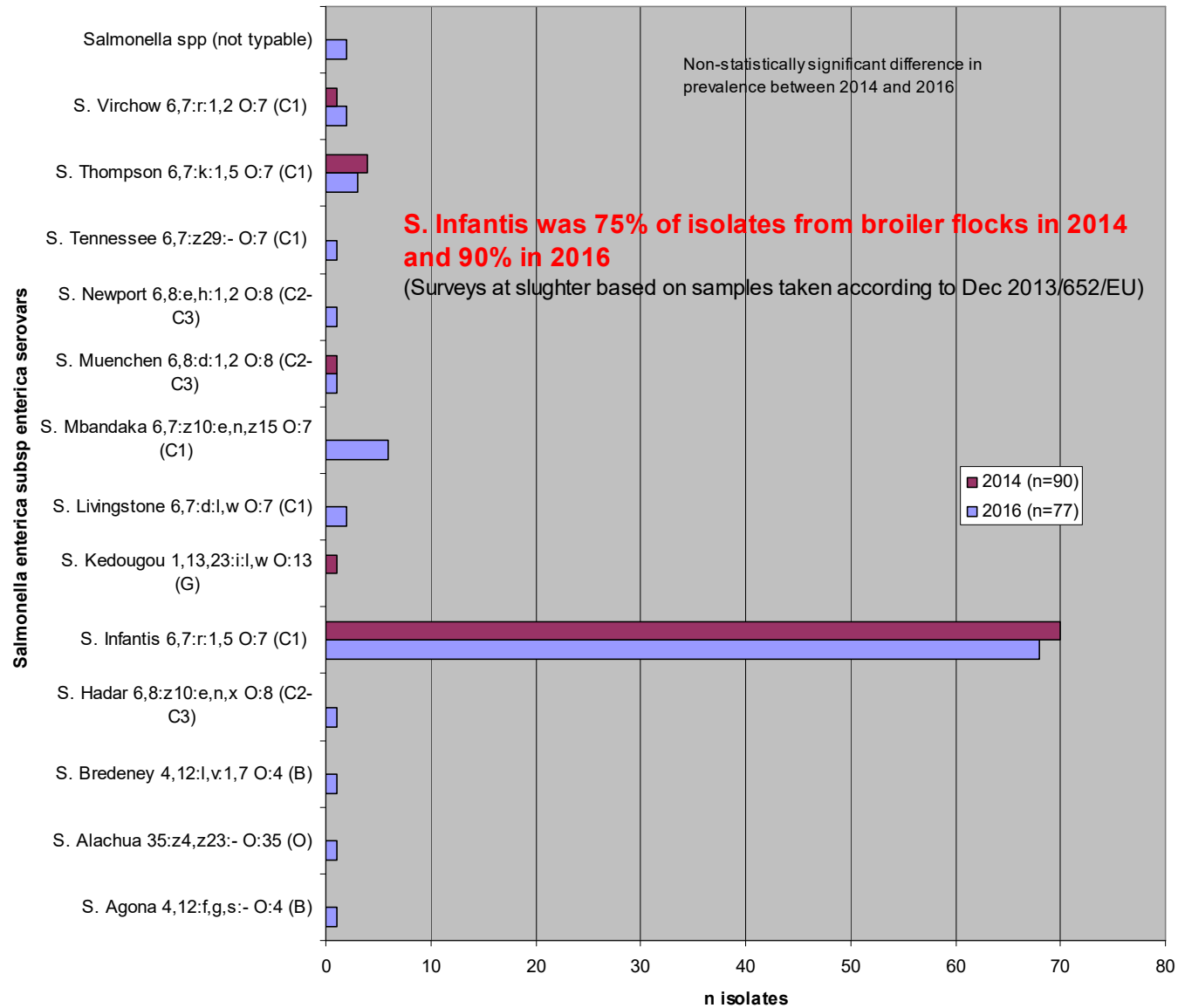
Settore avicolo

ai sensi della decisione 2013/652/UE

http://www.salute.gov.it/portale/documentazione/p6_2_2_1.jsp?lingua=italiano&id=2476

Salmonella serovar distribution broiler chicken flocks, Italy, 2014 (n=90) and 2016 (N=77):

Among-flock prevalence S. Infantis 2014 9.6% (68/709); 2016 8.7% (70/807)



MDR S. Infantis is common in EU in humans, including Italy

Minimum common AMR pattern: TET+SUL+ TMP+[CIP]

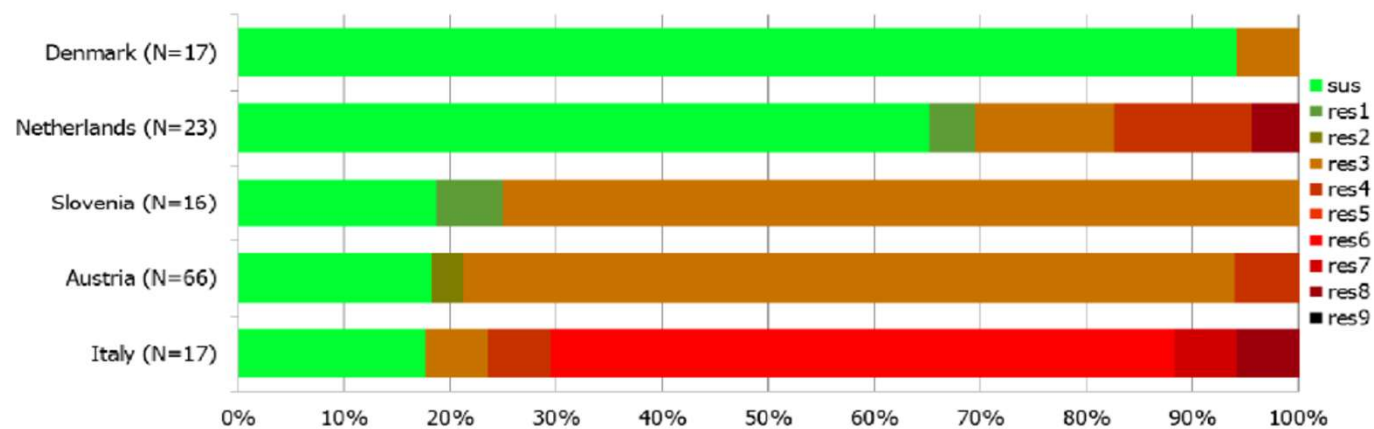


Data from: European Food Safety Authority, European Centre for Disease Prevention and Control, 2016. The European Union Summary Report on antimicrobial resistance in zoonotic and indicator bacteria from humans, animals and food in 2014. EFSA Journal 2016;14(2):4380. doi:10.2903/j.efsa.2016.4380

©EFSA/ECDC, 2016. Reproduction is authorised, provided the source is acknowledged.



Figure 13: Frequency distribution of *Salmonella* Infantis isolates from humans completely susceptible or resistant to one to nine antimicrobial classes in 2014

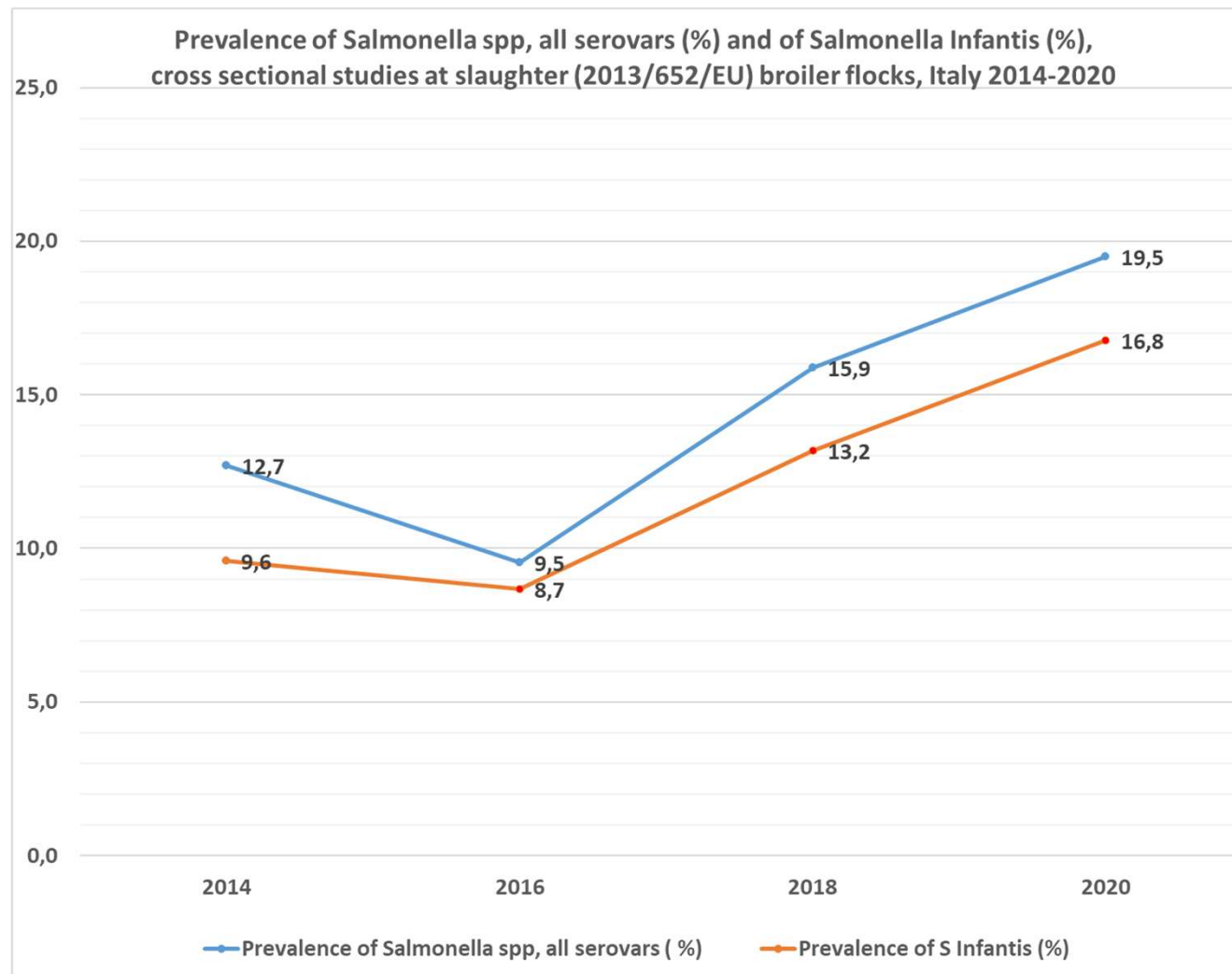


N: total number of isolates tested for susceptibility against the whole common antimicrobial set for *Salmonella*;

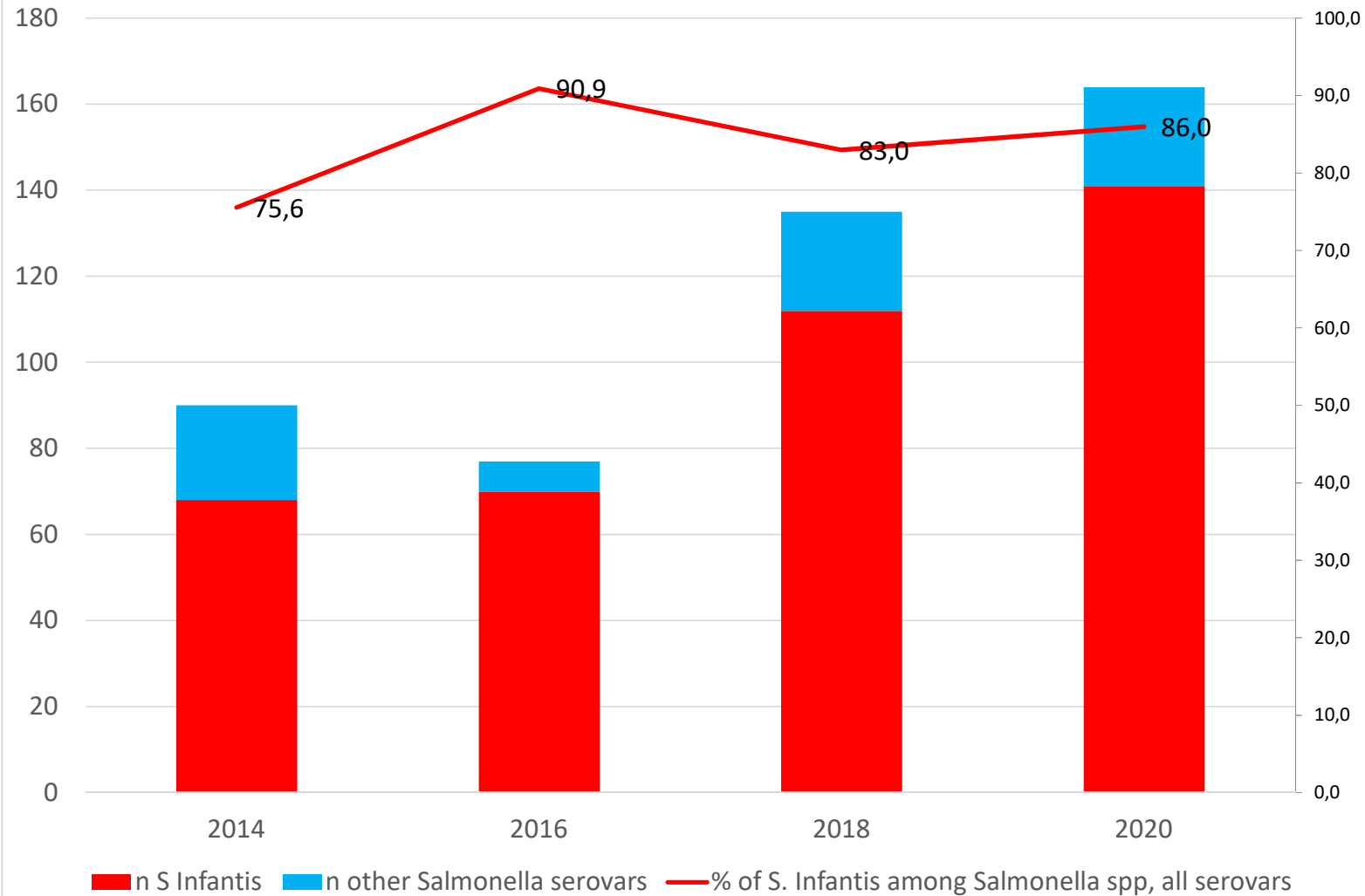
sus: susceptible to all antimicrobial classes of the common set for *Salmonella*;

res1–res9: resistance to one up to nine antimicrobial classes of the common set for *Salmonella*.

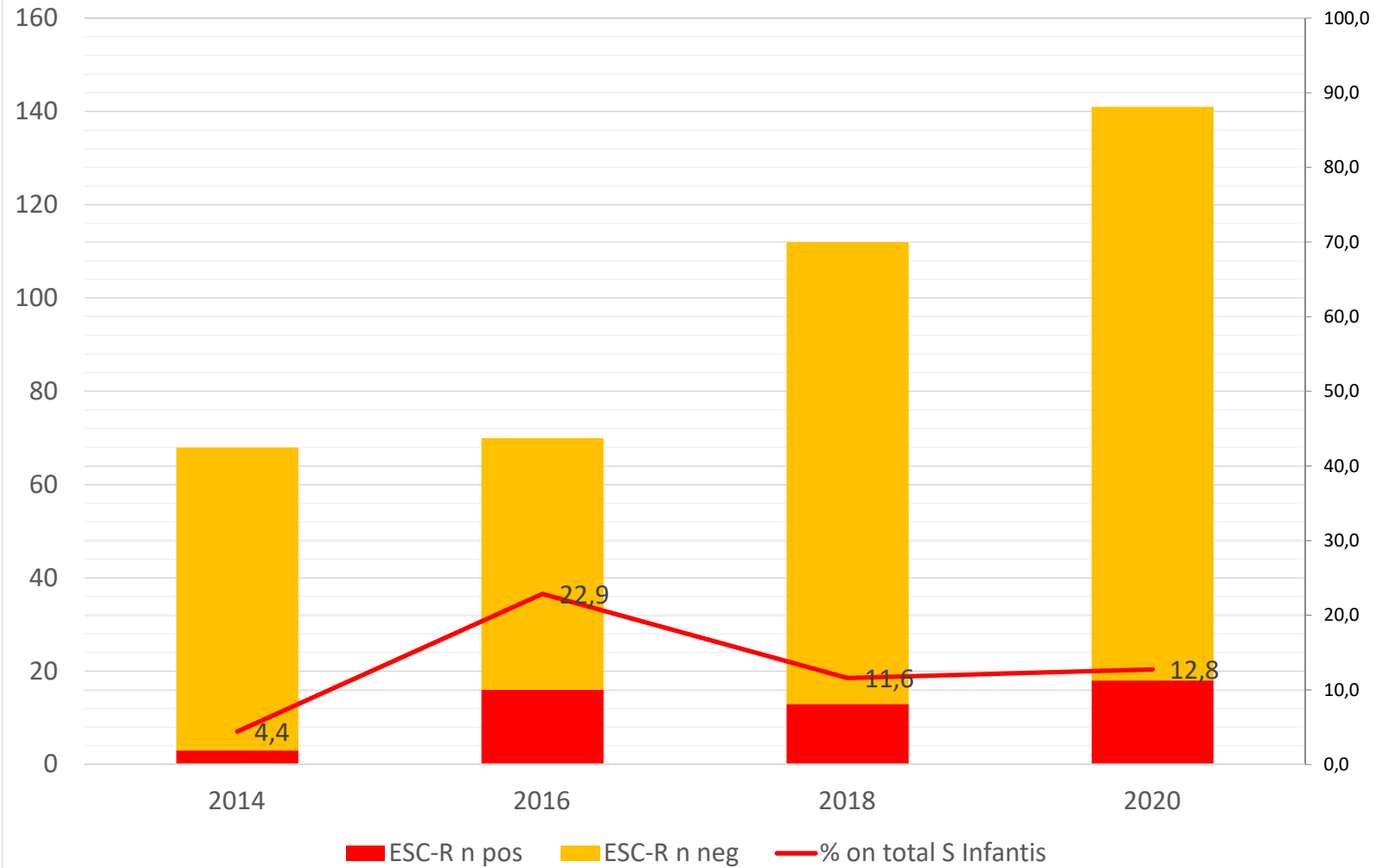
Trend prevalenza Salmonella spp. & S. Infantis, polli da carne, (Unità Epidemiologiche campionate: gruppi, Dec. 2013/652/EU)



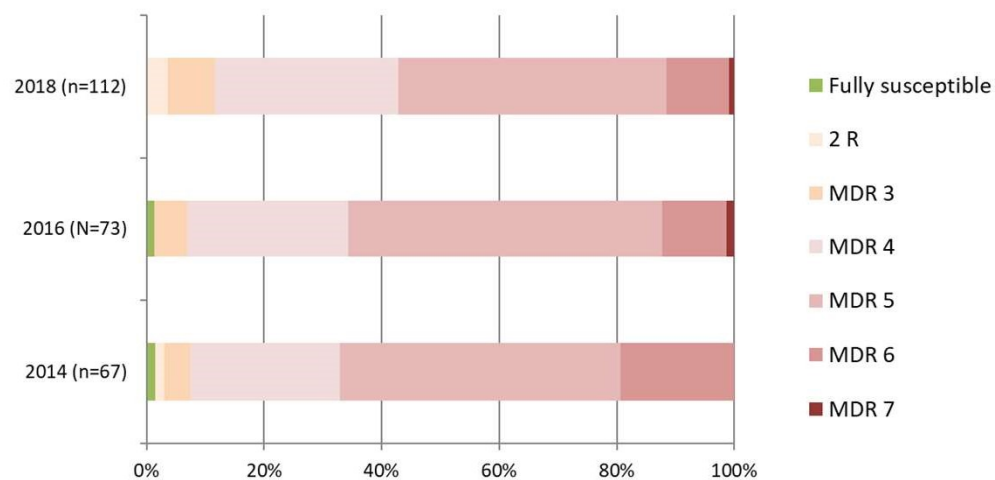
Number and % of S Infantis on total Salmonella spp isolates, cross sectional studies at slaughter (2013/652/EU) , broiler flocks, Italy 2014-2020



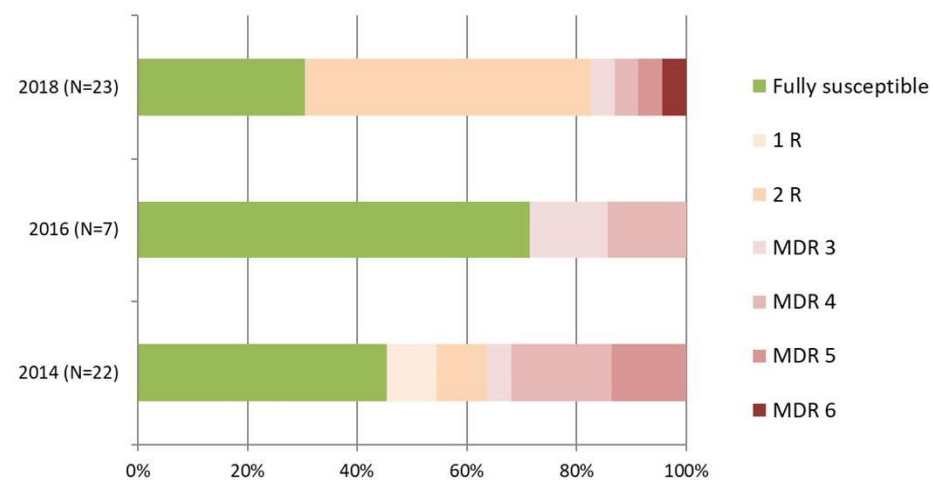
Number and % of **ESC-R S Infantis** on total S Infantis isolates,
cross sectional studies at slaughter (2013/652/EU) ,
broiler flocks, Italy 2014-2020



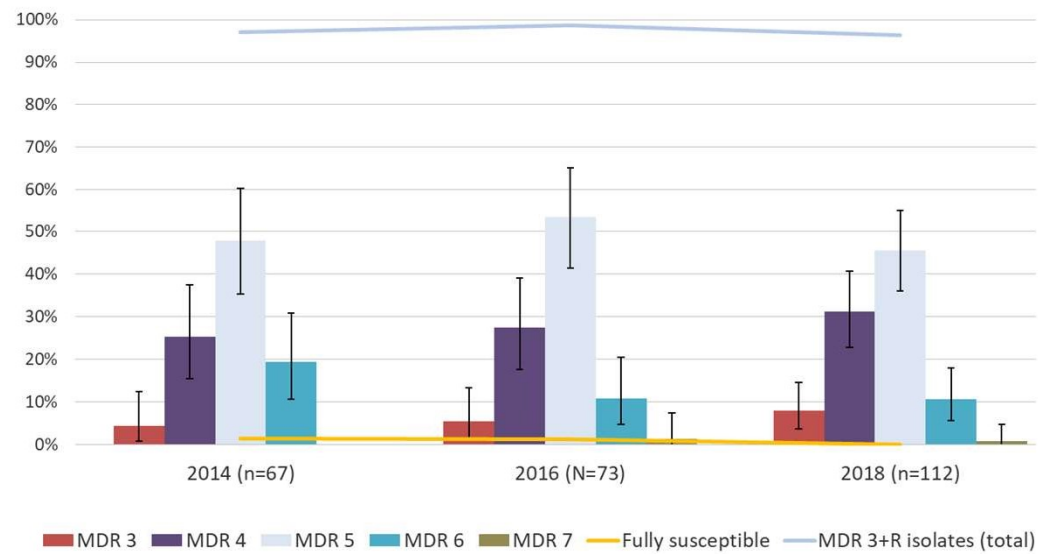
Multidrug-resistant isolates (MDR, 3+R)
Salmonella Infantis - Broilers, caecum - Dec.652/2013/EU



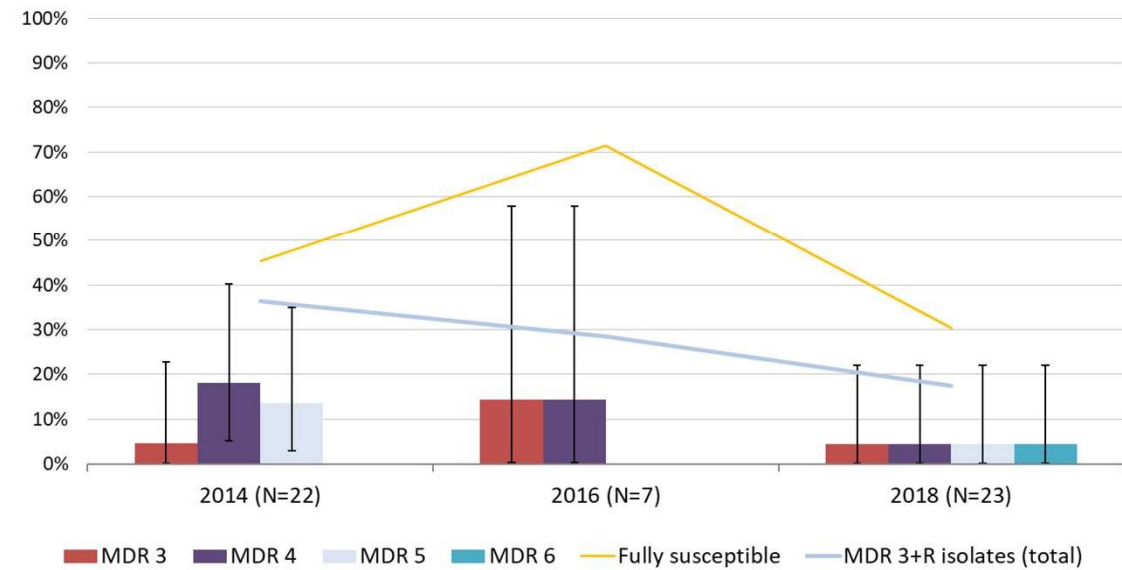
Multidrug-resistant isolates (MDR, 3+R)
Salmonella Other than Infantis (OTI) - Broilers, caecum - Dec.652/2013/EU



Multidrug-resistant isolates (MDR, 3+R)
Salmonella Infantis - Broilers, caecum - Dec.652/2013/EU



Multidrug-resistant isolates (MDR, 3+R)
Salmonella Other than Infantis (OTI) - Broilers, caecum - Dec.652/2013/EU



«Any Good News»? Ebbene sì...



- **Riduzione della resistenza alla colistina nel settore avicolo** (soprattutto tacchini, ma anche broilers, nel 2018 rispetto al 2014 e al 2016)
- Nel tacchino, in *E. coli* indicatori intestinali, **drastica riduzione da 22,94% del 2016 a 1,18%;**
- Nel pollo, **non riscontrati nel 2018, nel 2016 circa il 3%**
- Nel tacchino anche in *Salmonella* spp. (**da 8,28% del 2016 a 1,14% del 2018**)
- **E' tuttavia più semplice e anche immediato registrare il decremento delle resistenze a colistina se si riduce in modo importante la vendita (l'uso...)**
- Diversa situazione per le resistenze a cefalosporine a spettro esteso di 3a e 4° generazione... Improbabile il decremento senza importante riduzione dell'uso di varie classi di antibiotici (sulfonamidi e TMP, tetracicline, amoxicillina...)

Oggetto: Uso responsabile dei medicinali veterinari contenenti colistina al fine di ridurre il rischio della resistenza antimicrobica

In data 27 luglio u.s., è stato pubblicato sul sito dell'Agenzia Europea dei Medicinali (EMA), il documento EMA/CVMP/CHMP/231573/2016 che aggiorna il precedente parere sull'impatto per la salute pubblica e negli animali dell'impiego della colistina (EMA/755938/2012).

Prot. 0018992-05/08/2016-DGSF-MDS-P

Via Giorgio Ribotta, 5 – 00144 Roma – Fax. 06 5994 6676

Tuttavia, i risultati del progetto *European Surveillance of Veterinary Antimicrobial Consumption* (ESVAC) mostrano come tale molecola rappresenti oltre il 99% del venduto per la classe delle polimixine e che nel 2014, tale classe si pone al 5° posto per volumi di vendita (6,6%). Circa l'80% della colistina impiegata negli animali destinati alla produzione degli alimenti è usata in Spagna, Italia e Portogallo.

Il parere dell'EMA richiama la necessità di una generale riduzione, in un arco temporale di 3-4 anni, di circa il 65% degli attuali volumi di vendite dei medicinali veterinari contenenti colistina. Nello specifico, è richiesto agli Stati membri "alti e medi consumatori di tale molecola" di raggiungere livelli target di 5 mg/PCU (Population Correction Unit) e livelli desiderabili di 1 mg/PCU, sulla base di quelli già osservati in altri Stati membri.

È importante sottolineare che, per l'Italia, i report ESVAC riferiscono di livelli di oltre 25 mg/PCU.

Una siffatta riduzione, però, non deve condurre ad un aumento di altre classi di agenti antimicrobici, in particolare dei Critically Important Antimicrobials (fluorochinoloni, cefalosporine di 3ª e 4ª generazione e macrolidi), ma deve essere raggiunta attraverso l'applicazione dei principi fondamentali di buona *governance* in materia di sanità animale e di buone prassi di allevamento, rispetto delle misure di biosicurezza, programmi di vaccinazione. A tal fine, si rimanda ai principi di uso responsabile degli antimicrobici ampiamente descritti nel Manuale di Biosicurezza e uso corretto e razionale degli antibiotici in zootecnica, disponibile al seguente link http://www.salute.gov.it/portale/temi/p2_6.jsp?lingua=italiano&id=1450&area=veterinari&menu=antibiotici.

Si invitano, inoltre, gli Assessorati a verificare, attraverso l'attività di farmacovigilanza, l'aderenza da parte del territorio ai principi sull'uso responsabile della colistina, in particolare:

- impiego come ultima risorsa qualora nessun efficace trattamento alternativo sia disponibile;
- impiego unicamente sulla base di test di sensibilità;
- impiego conforme alle istruzioni riportate nel riassunto delle caratteristiche del prodotto;
- limitazione dell'uso in deroga di premiscele, anche in combinazione, in ragione delle conclusioni del CVMP secondo cui *"la valutazione rischi/benefici per i medicinali veterinari contenenti colistina in associazione con altri antimicrobici per somministrazione orale sia negativa e potrebbe costituire un potenziale rischio per la salute umana"*.

Transferable (*mcr*-mediated) Colistin resistance, 2014-2015 in IT primary productions:
Around 25% prevalence in *E. coli* from turkeys (also in ESBL-producing)

Around 5% from broilers; 6% from pigs, and 4% in bovines <12m



Diverse variants of *mcr* genes (variants of *mcr-1* to *mcr-4* genes)



Antimicrobials, Resistance and
Chemotherapy

The world's most-cited Microbiology journal

Login Register

IMPACT
FACTOR 4.019

SECTION ABOUT ARTICLES RESEARCH TOPICS FOR AUTHORS EDITORIAL BOARD ARTICLE ALERTS

< Articles

EDITED BY



Axel Cloeckaert

Institut National de la Recherche
Agronomique (INRA), France

REVIEWED BY



Séamus Fanning

University College Dublin, Ireland



Isabelle Kempf

Agence Nationale de Sécurité Sanitaire de
l'Alimentation, de l'Environnement et du
Travail (ANSES), France

The editor and reviewers' affiliations are
the latest provided on their Loop research
profiles and may not reflect their situation
at the time of review.

TABLE OF CONTENTS

Abstract

Introduction

ORIGINAL RESEARCH ARTICLE

Front. Microbiol., 12 June 2018 | <https://doi.org/10.3389/fmicb.2018.01217>

Molecular Epidemiology of *mcr*-Encoded Colistin Resistance in *Enterobacteriaceae* From Food-Producing Animals in Italy Revealed Through the EU Harmonized Antimicrobial Resistance Monitoring

Patricia Alba¹, Pimlapas Leekitcharoenphon², Alessia Franco¹, Fabiola Feltrin¹, Angela Ianzano¹, Andrea Caprioli¹, Fiorentino Stravino¹, Rene S. Hendriksen², Valeria Bortolaia² and Antonio Battisti^{1*}

¹Department of General Diagnostics, National Reference Laboratory for Antimicrobial Resistance, Istituto Zooprofilattico Sperimentale del Lazio e della Toscana, Rome, Italy

²WHO Collaborating Centre for Antimicrobial Resistance in Foodborne Pathogens and Genomics and European Union Reference Laboratory for Antimicrobial Resistance, National Food Institute, Technical University of Denmark, Kongens Lyngby, Denmark



Download Article



Export citation

1,145
TOTAL VIEWS



View Article Impact



We use cookies on this website to improve your user experience. [Learn more](#)

CLOSE



ORIGINAL RESEARCH article

Front. Microbiol., 16 July 2021 | <https://doi.org/10.3389/fmicb.2021.705230>

Download Article



Export citation

Emergence of IncHI2 Plasmids With *Mobilized Colistin Resistance (mcr)-9* Gene in ESBL-Producing, Multidrug-Resistant *Salmonella* Typhimurium and Its Monophasic Variant ST34 From Food-Producing Animals in Italy

Elena Lavinia Diaconu, Patricia Alba, Fabiola Feltrin, Paola Di Matteo, Manuela Iurescia, Eleonora Chelli, Valentina Donati, Ilaria Marani, Angelo Giacomi, Alessia Franco and Virginia Carfora*

National Reference Laboratory for Antimicrobial Resistance, General Diagnostics Department, Istituto Zooprofilattico Sperimentale del Lazio e della Toscana "M. Aleandri," Rome, Italy

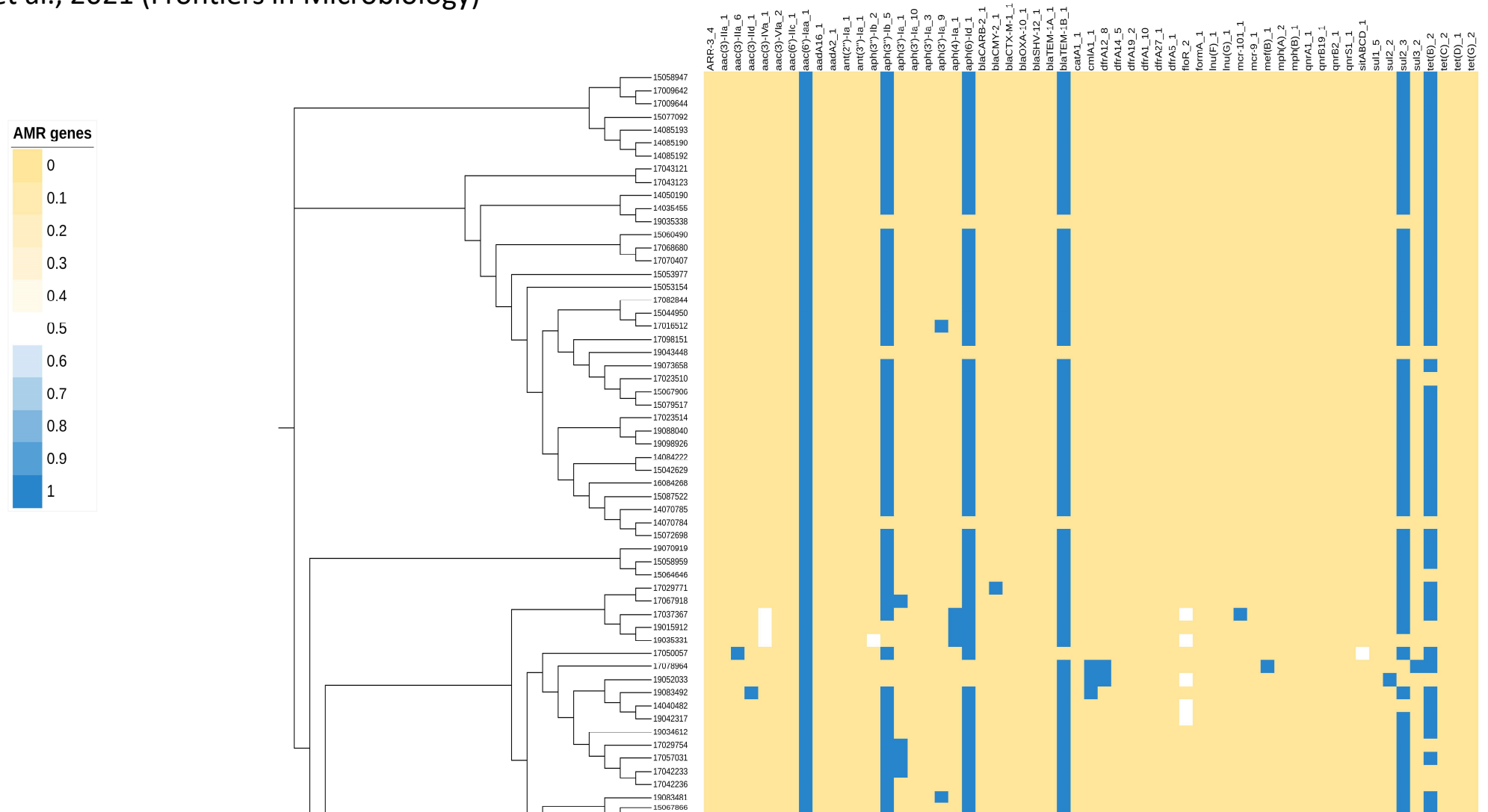
A collection of 177 genomes of *Salmonella* Typhimurium and its monophasic variant isolated in 2014–2019 from Italian

816

TOTAL VIEWS

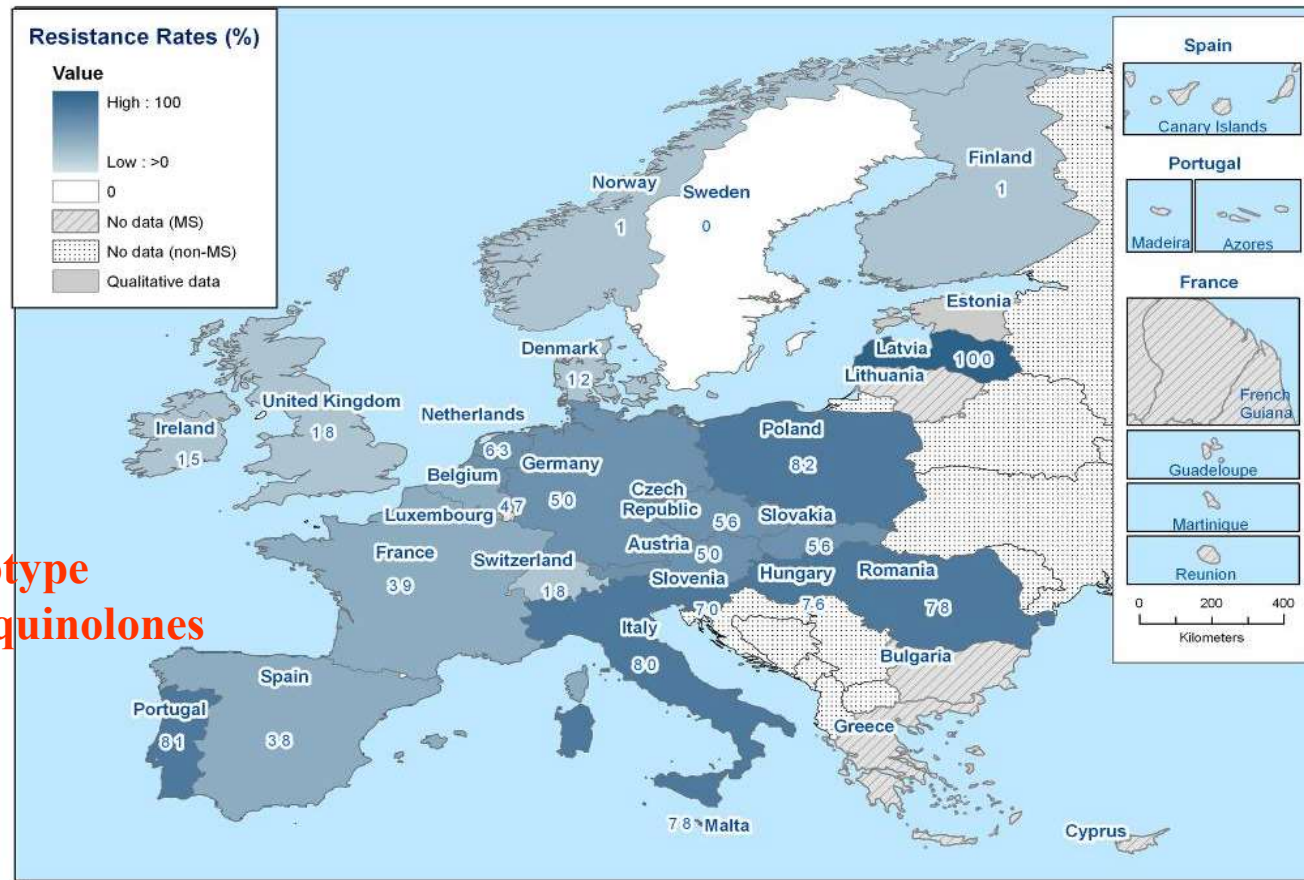
[View Article Impact](#)

S Typhimurium and its monophasic var ST34 (+SLVs): MDR and mobilisable colisin resistance (mcr)-9 gene
Alba et al., 2021 (Frontiers in Microbiology)



Spatial distribution of ciprofloxacin* resistance among Campylobacter jejuni from Gallus gallus in countries reporting quantitative data in 2008

*Prototype
fluoroquinolones





Ministero della Salute
Direzione generale della sanità animale
e dei farmaci veterinari
Ufficio IV - Medicinali veterinari

Relazione sulla resistenza agli antimicrobici dei batteri zoonotici e commensali

2014

Settore avicolo

ai sensi della decisione 2013/652/UE

http://www.salute.gov.it/portale/documentazione/p6_2_2_1.jsp?lingua=italiano&id=2476

Some experiences on Campylobacter at the NRL-AR Italy...

Campylobacter jejuni & C. coli isolation rates (2013/652/EU, 2014)

Species	Total tested	% C. jejuni +ve	% C. coli +ve	% Campylobacter spp +ve
Turkey	558	27.96 (156/558)	72.58 (405/558)	87.63 (489/558)
Chicken	709	40.34 (286/709)	34.98 (248/709)	72.92 (517/709)

Statistically significant differences (same lab procedures, same personnel etc. ...)

Chi-square, 1 df 22.52; $p < 0.001$ for each combination of animal species & agent

Practical information for future sampling size (exp. prevalences...)

Spatial distribution of ciprofloxacin and erythromycin resistance in *C. jejuni* from broilers

The spatial distribution of ciprofloxacin resistance in *C. jejuni* from broilers (Figure 76) showed that the highest levels of resistance to ciprofloxacin were reported in eastern and southern Europe, whereas northern Europe tended to report lower resistance levels. Although erythromycin resistance was generally either not detected or registered at low to very low levels across Europe, much higher resistance, with a magnitude of around 10%, was observed in Portugal, Italy and Bulgaria.

Campylobacter jejuni in broilers: Fluoroquinolone & Macrolide resistance EU, 2016

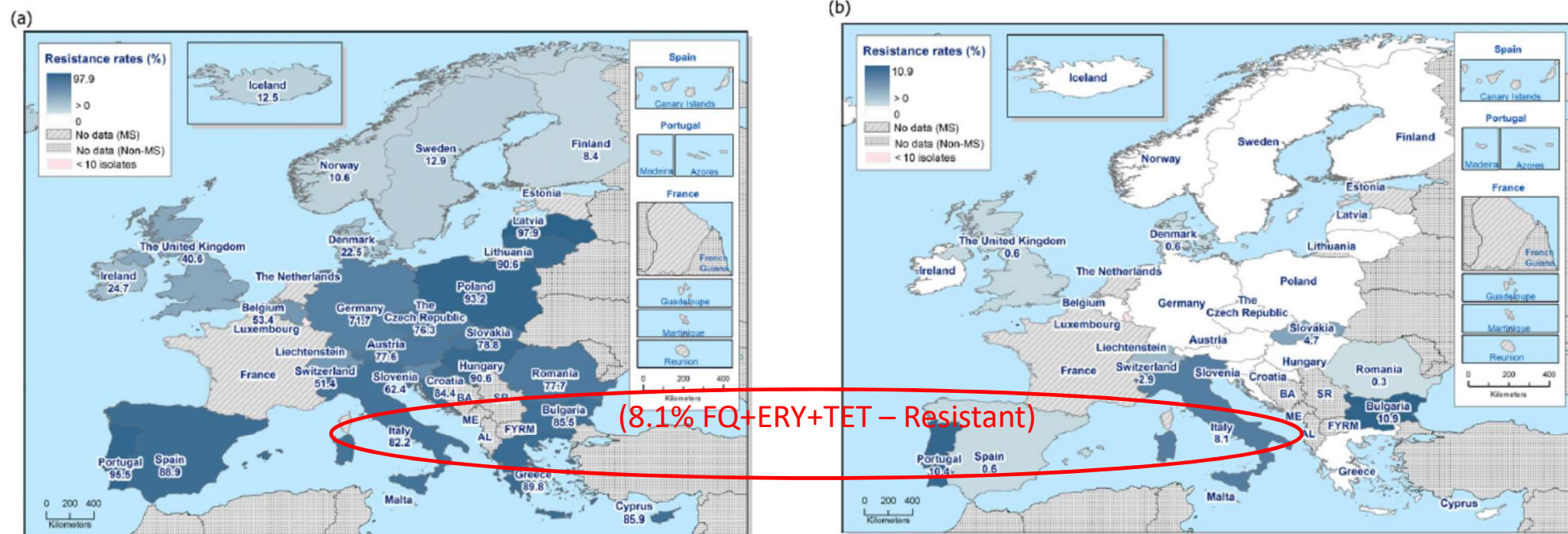
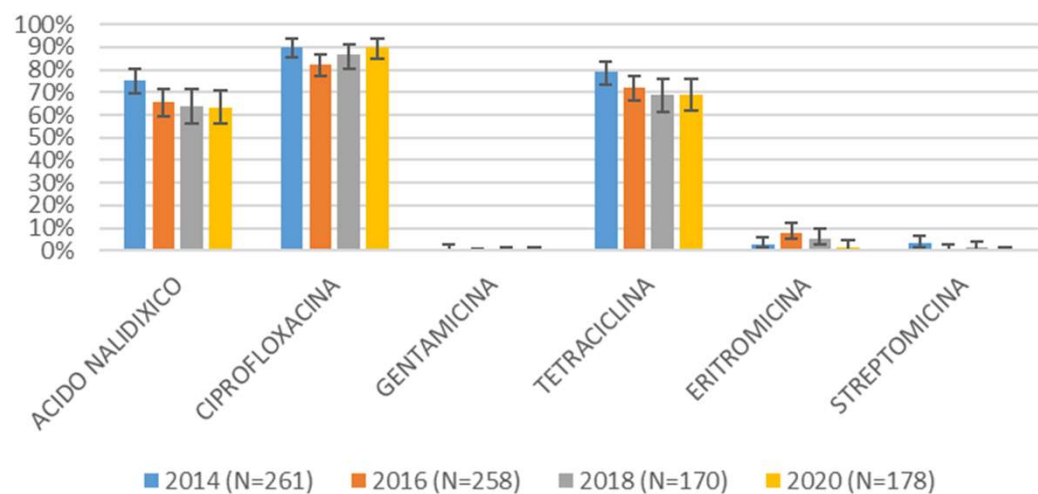


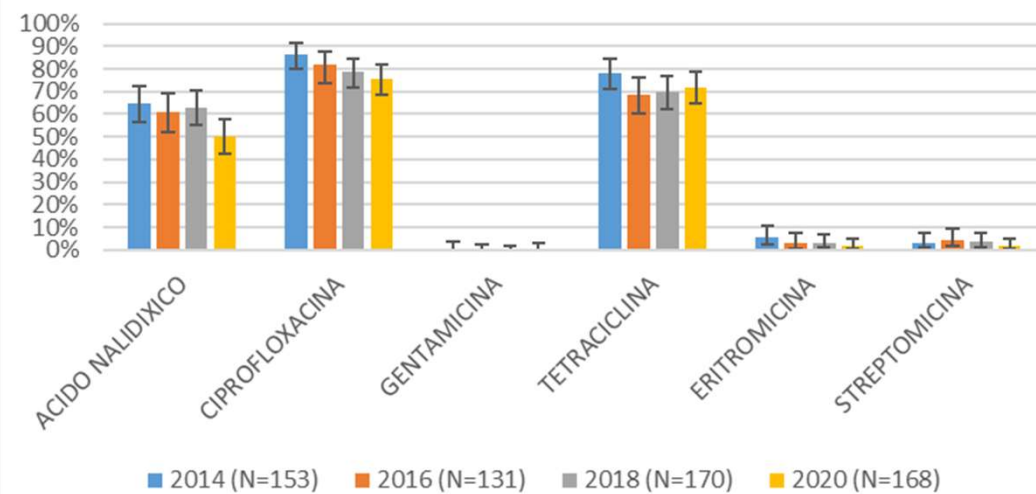
Figure 76: Spatial distribution of ciprofloxacin (a) and erythromycin (b) resistance in *Campylobacter jejuni* from broilers of *Gallus gallus*, EU/EEA MSs, 2016

Piano Monitoraggio AMR Italia (2014-2020): Campylobacter jejuni

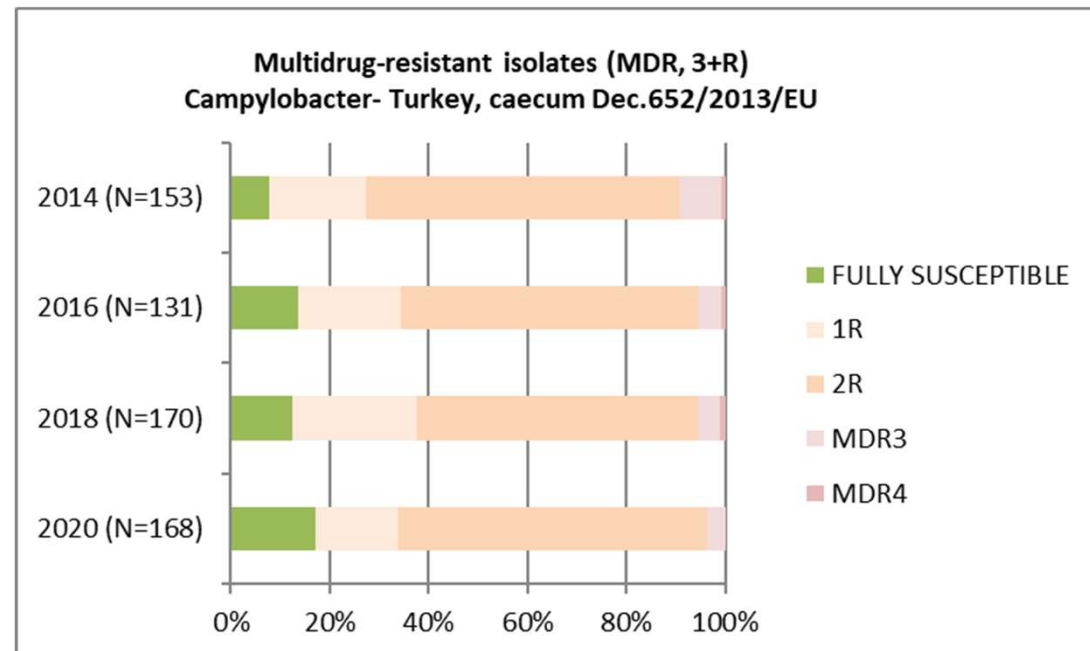
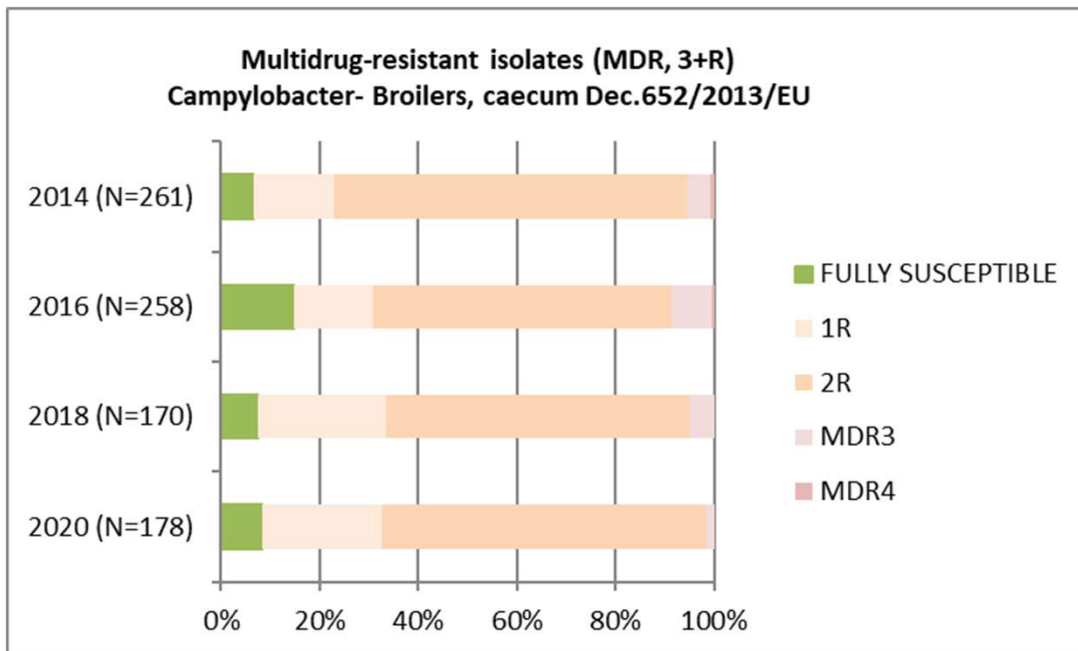
Prev. Resistenza% CAMPYLOBACTER JEJUNI
BROILERS-caecum 652/2013 CE



Prev. Resistenza% CAMPYLOBACTER JEJUNI
Turkey-caecum 652/2013 CE

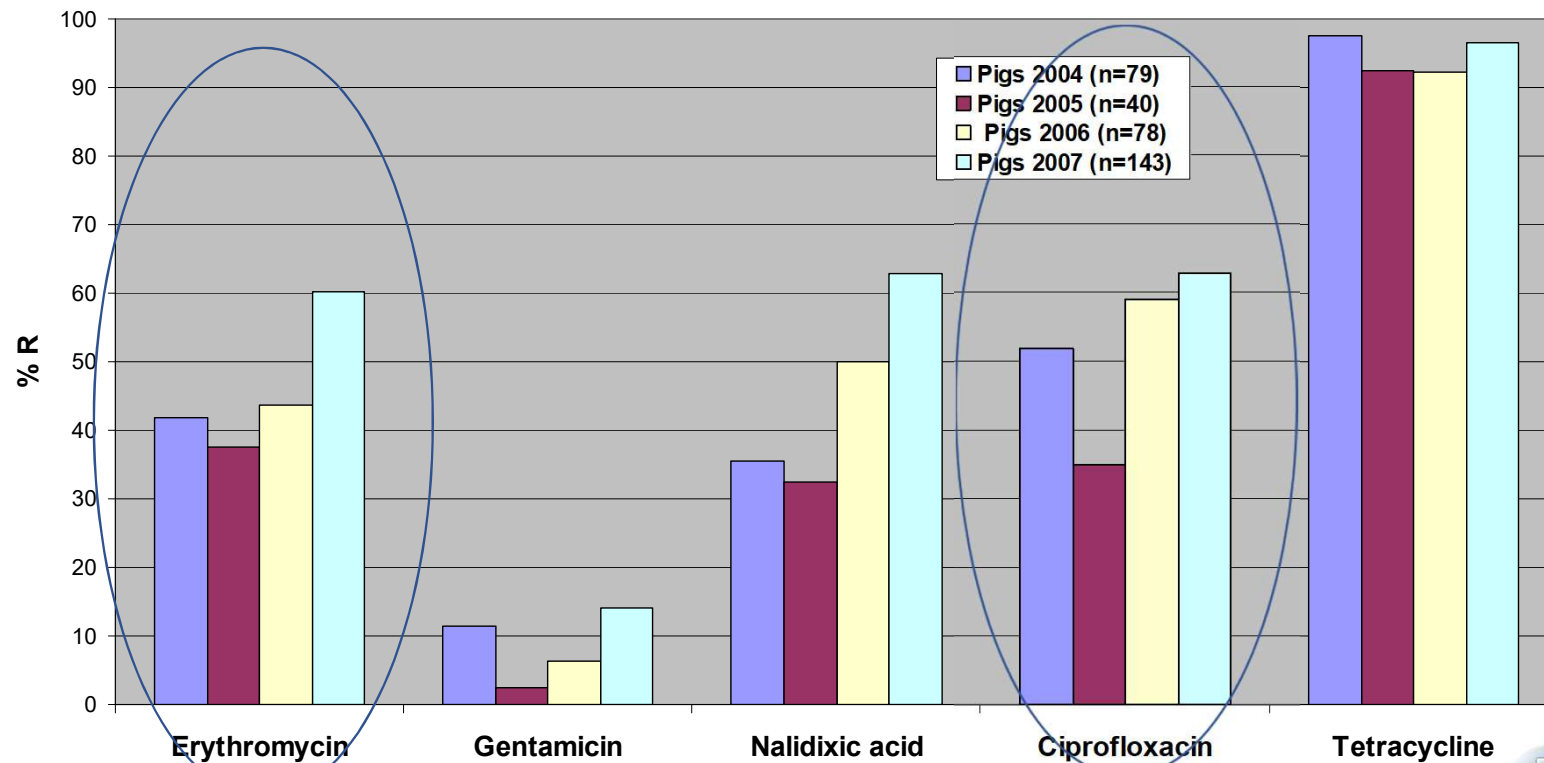


Piano Nazionale Monitoraggio AMR Italia: Fully susceptible e MDR *Campylobacter jejuni*, pollo da carne e tacchino (2014-2020)



Campylobacter coli in suini al macello: % Resistenze, Italia, 2004-2007

Slaughter Pigs: Resistance (%) in Campylobacter coli, Italy 2004-2007



Heterogeneity among methicillin-resistant *Staphylococcus aureus* from Italian pig finishing holdings

A. Battisti ^{a,*,} A. Franco ^{a,} G. Meriardi ^{b,} H. Hasman ^{c,} M. Iurescia ^{a,} R. Lorenzetti ^{a,} F. Feltrin ^{a,} M. Zini ^{a,} F.M. Aarestrup ^c

Antimicrobial susceptibility testing performed on 64 isolates (Table 3) showed that 100% were tetracycline-resistant. A high proportion of isolates were also resistant to trimethoprim (44/64, 68.8%) and to erythromycin (39/64, 60.9%). The overall resistance rate to ciprofloxacin was 35.9% (23/64). No resistance to linezolid, quinopristin–dalfopristin and vancomycin was observed.

Table 3. Distribution of non-beta-lactam antimicrobial resistance of 64 selected MRSA isolates of different spa-types and sequence types from pig holdings, Italy 2008.

Spa- type	ST	n (%) of resistant isolates ^a											
		n tested	CIP	CHL	CLI	ERY	KAN	GEN	LIN	STR	SUL	SYN	
t011	398	4	1 (25)	0 (0)	3 (75)	3 (75)	1 (25)	2 (50)	0 (0)	1 (25)	0 (0)	0 (0)	
t034	398	7	2 (29)	4 (57)	6 (86)	6 (86)	4 (57)	4 (57)	0 (0)	5 (71)	4 (57)	0 (0)	
t108	398	4	1 (25)	1 (25)	4 (100)	3 (75)	1 (25)	1 (25)	0 (0)	1 (25)	1 (25)	0 (0)	
t2510	398	1	0 (0)	0 (0)	1 (100)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	
t4838	398	1	0 (0)	0 (0)	1 (100)	0 (0)	0 (0)	0 (0)	0 (0)	1 (100)	0 (0)	0 (0)	
t2922	398	4	1 (25)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	3 (75)	1 (25)	0 (0)	
t899	398	23	0 (0)	6 (26)	15 (65)	12 (52)	7 (30)	6 (26)	0 (0)	7 (30)	11 (48)	0 (0)	
t4794	9	1	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (100)	0 (0)	
t4795	97	3	2 (67)	0 (0)	1 (33)	0 (0)	0 (0)	0 (0)	0 (0)	1 (33)	0 (0)	0 (0)	
t1730	1476	10	10 (100)	2 (20)	9 (90)	9 (90)	3 (30)	3 (30)	0 (0)	3 (30)	3 (30)	0 (0)	
t127	1	6	6 (100)	0 (0)	6 (100)	6 (100)	3 (50)	3 (50)	0 (0)	3 (50)	1 (17)	0 (0)	

Negli allevamenti suini italiani elevata % (60%) di resistenza a macrolidi/lincosamidi in LA-MRSA già riscontrata a partire dal 2010

EMA (AMEG) non include i macrolidi nella stessa categoria di rischio in funzione «One – Health» di altri HPCIA registrati per uso veterinario: cefalosporine di 3°-4° gen, (fluoro)chinolonici, colistina

Per le «poche alternative» ai macrolidi (per uso orale...) si invocano, a livello EMA - AMEG, le «infezioni» da *L. intracellularis*...

**La scelta del termine «infezioni» (anche senza malattia) rischia di favorire il permanere di uso non prudente dei macrolidi
Vigilanza!**

SPONSORED DOCUMENT FROM

VACCINE

ELSEVIER
FREE Full-Text ArticleVaccine. 2018 Mar 7; 36(11): 1500–1508.
doi: [10.1016/j.vaccine.2017.12.049]PMCID: PMC5846845
PMID: 29336925

A novel inactivated vaccine against *Lawsonia intracellularis* induces rapid induction of humoral immunity, reduction of bacterial shedding and provides robust gut barrier function

F. Roerink,^{a,*} C.L. Morgan,^a S.M. Knetter,^a M.-H. Passat,^b A.L. Archibald,^b T. Ait-Ali,^{b,*} and E.L. Strait^a[Author information](#) ► [Article notes](#) ► [Copyright and License information](#) ► [Disclaimer](#)This article has been [cited by](#) other articles in PMC.

Abstract

Go to:

Porcine proliferative ileitis is a major economic burden for the swine industry, affecting growing pigs and young adult pigs. In this study, the protective efficacy of an inactivated, injectable whole-cell bacteria vaccine against *L. intracellularis* – Porcilis® Ileitis was evaluated under field conditions.

Eighty-five, three-week-old pigs on a commercial farrow-to-finish farm were vaccinated by the intramuscular route, either with a dose of injectable vaccine, or with saline. A subset of vaccinates and control pigs were necropsied at 21 days post-challenge. Incidence and severity of ileitis were evaluated by gross and microscopic observation of ileal tissues. Colonization of the gut after challenge was examined by *L. intracellularis*-specific immunohistochemistry, and qPCR of ileal scrapings. Integrity of the intestinal barrier was evaluated to quantify a range of intestinal markers including secreted mucin and intestinal alkaline phosphatase, and innate immune markers including Caspase-3 and Calprotectin. A second subset of pigs was monitored for fecal shedding of *L. intracellularis*, until resolution of shedding.

Our investigation indicated that Porcilis Ileitis provided robust protection against ileitis, reduced bacterial shedding 15-fold ($p < .05$) and preserved normal gut barrier function in the face of an experimental challenge with virulent *L. intracellularis*.

Keywords: Swine, Ileitis, *Lawsonia intracellularis*, Intestinal integrity, Vaccine, Efficacy

Formats:

[Article](#) | [PubReader](#) | [ePub \(beta\)](#) | [Printer Friendly](#) | [Citation](#)

Share

Facebook Twitter Google+

Save items

Add to Favorites

Similar articles in PubMed

Vaccination of pigs with attenuated *Lawsonia intracellularis* induced acute phase protein responses and prime [Vaccine. 2015]

Evaluation of protective immunity in pigs following oral administration of an avirulent live vaccine of [Am J Vet Res. 2004]

Primary infection protects pigs against re-infection with *Lawsonia intracellularis* in experimental challenge studies [Vet Microbiol. 2011]

[Literature review of the diagnosis of porcine proliferative enteropathy]. [Berl Munch Tierarztl Wochenschr. 2005]

Proliferative enteropathy: a global enteric disease of pigs caused by *Lawsonia intracellularis*. [Anim Health Res Rev. 2005][See reviews...](#)[See all...](#)

Cited by other articles in PMC

Lawsonia intracellularis: Revisiting the Disease Ecology and Control of This Fastidious Pathogen [Frontiers in Veterinary Science. 2018][See all...](#)

Links

[MedGen](#)[PubMed](#)

Attualmente in EU e in Italia esistono validissime alternative all'uso dei macrolidi **per contrastare la malattia! (Ileite) da L. intracellularis:**
Vaccini attenuati e inattivati!

L'Italia è uno dei pochi Paesi in EU che tuttora vende più macrolidi (HPClAs) per gli animali che per l'Uomo (in mg/PCU)



Antimicrobial Usage and Resistance in Companion Animals: A Cross-Sectional Study in Three European Countries

by Philip Joosten ^{1,*}, Daniela Ceccarelli ^{2,†}, Evelien Odent ¹, Steven Sarrazin ¹, Haitske Graveland ³, Liese Van Gompel ⁴, Antonio Battisti ⁵, Andrea Caprioli ⁵, Alessia Franco ⁵, Jaap A. Wagenaar ^{2,3}, Dik Mevius ^{2,3} and Jeroen Dewulf ¹

¹ Veterinary Epidemiology Unit, Department of Obstetrics, Reproduction and Herd Health, Faculty of Veterinary Medicine, Ghent University, Salisburylaan 133, 9820 Merelbeke, Belgium

² Department of Bacteriology and Epidemiology, Wageningen Bioveterinary Research, Houtribweg 39, 8221 RA Lelystad, The Netherlands

³ Department of Infectious Diseases and Immunology, Faculty of Veterinary Medicine, Utrecht University, Yalelaan 1, 3584 CL Utrecht, The Netherlands

⁴ Institute for Risk Assessment Sciences, Utrecht University, Yalelaan 2, 3584 CM Utrecht, The Netherlands

⁵ Istituto Zooprofilattico Sperimentale del Lazio e della Toscana "M. Aleandri", Department of General Diagnostics, National Reference Laboratory for Antimicrobial Resistance, Via Appia Nuova, 1411, 00178 Rome, Italy

* Author to whom correspondence should be addressed.

† Current address: Research Executive Agency, European Commission, Brussels, Belgium.

Antibiotics 2020, 9(2), 87; <https://doi.org/10.3390/antibiotics9020087>

Received: 30 January 2020 / Revised: 12 February 2020 / Accepted: 13 February 2020 / Published: 16 February 2020

(This article belongs to the Section [Antibiotics Use and Antimicrobial Stewardship](#))

[Download PDF](#)

[Browse Figures](#)

[Review Reports](#)

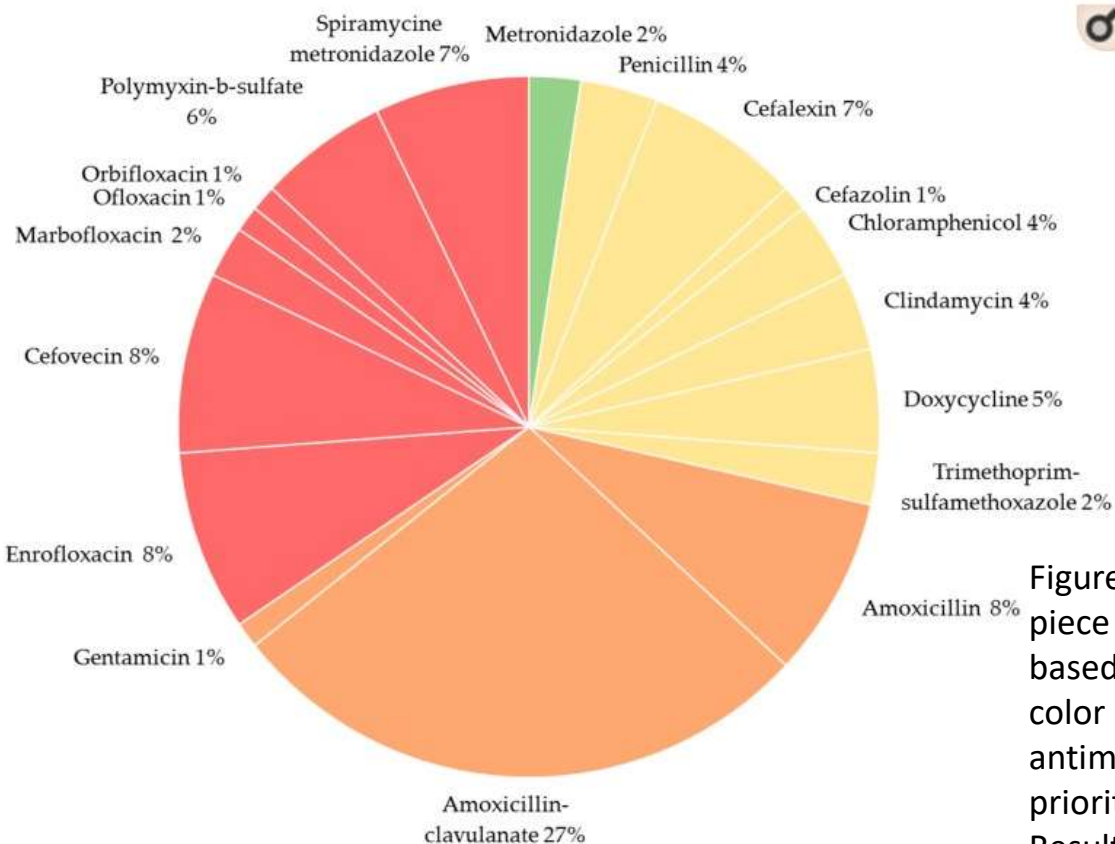
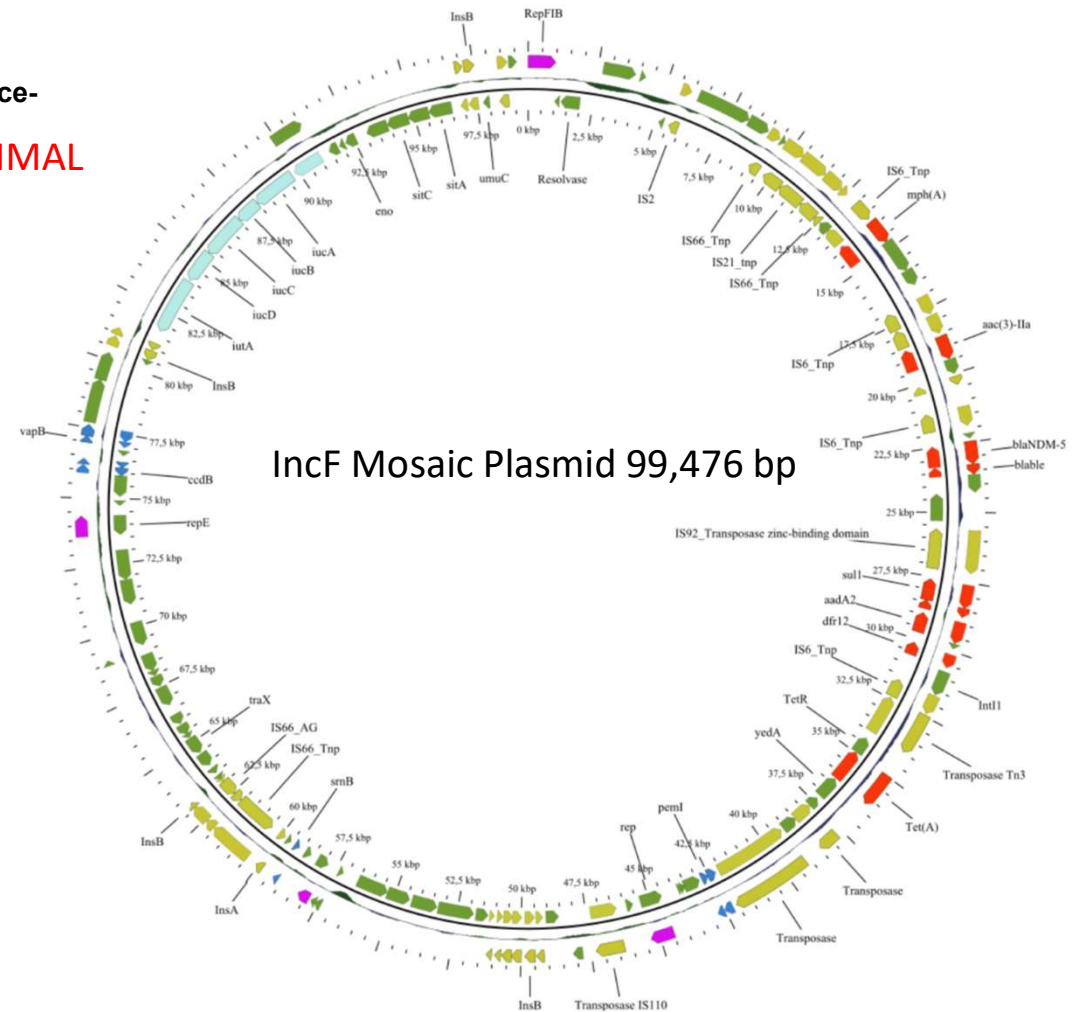


Figure 1. Percentage of antimicrobial treatments per active compound. Every piece of the pie chart is colored in the corresponding assigned color code based on the classification of the World Health Organization (WHO). Green color = important antimicrobial; yellow color = highly important antimicrobial; orange color = critically important antimicrobial of high priority; red color = critically important antimicrobial of highest priority; Results at species and country level are shown in [Table S2](#).



https://www.efsa.europa.eu/sites/default/files/event/2020/10th-specific-meeting-antimicrobial-resistance-data-reporting-scientific-network-zoonoses-monitoring_0.pdf

- Importance of **applying a global One Health approach**, **integrating human and animal surveillance systems and comparing consumption data of AMU, phenotypic data of AMR, and genomic data from different sources and different geographic areas**, to help control the spread of major zoonotic pathogens, especially when MDR or potentially MDR, such as *Salmonella* & *Enterobacteriaceae*, *Campylobacter*, *S. aureus*/MRSA etc.
- Importance of Insights into: phylogeny, virulence, fitness, host-adapted features of MDR agents
 - In clones
 - In plasmids
 - and other mobile genetic elements across and beyond Europe,

Insights into predictors of their success in animal productions, are considered of further help in the surveillance of zoonotic disease agents

Alba P., Franco A, Battisti A.

6.5. Molecular epidemiology of *Salmonella* Infantis in Europe: insights into the success of the bacterial host and its parasitic pESI-like megaplasmid
EFSA 10^o Scientific Network Zoonoses Monitoring Data – AMR 2020

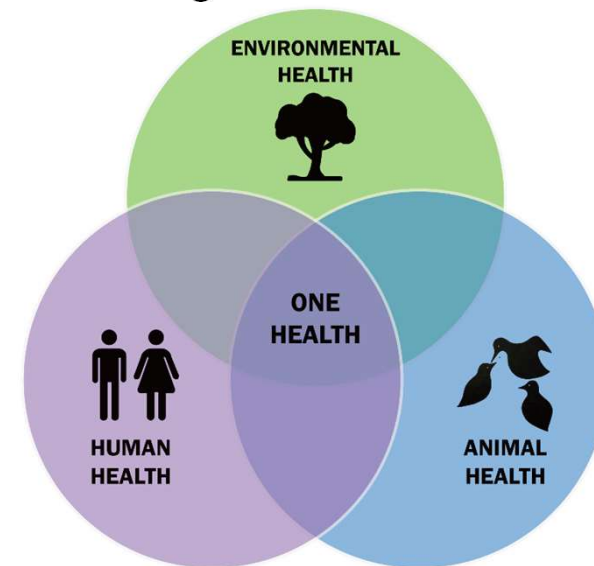


Photo: Thddbfk, CC BY-SA 4.0
<<https://creativecommons.org/licenses/by-sa/4.0/>>, via Wikimedia Commons



Grazie per l'attenzione! Grazie ad IZSLT, ed un grazie particolare a:

- Tutto il personale della UOC Direzione Operativa Diagnostica Generale, CRN-AR e NRL-AR;
- Tutto il personale dei Servizi Veterinari che in Italia **ha consentito di adempiere completamente** a quanto previsto dal Piano Nazionale Monitoraggio AMR 2020 e 2021, in periodo pandemico, e anche quando altre attività di sorveglianza, controllo, monitoraggio, erano considerate «differibili»...