EFSA's activities on Antimicrobial resistance in the food chain

Dr. Ernesto Liebana
Head of BIOCONTAM Unit. EFSA

efsa
European Food Safety Authority

EFSA IS

The reference body for risk assessment of food and feed in the European Union. Its work covers the entire food chain – from field to fork

One of the number of bodies that are responsible for food safety in Europe

WHAT EFSA DOES

BIOLOGICAL HAZARDS IN THE FOOD CHAIN

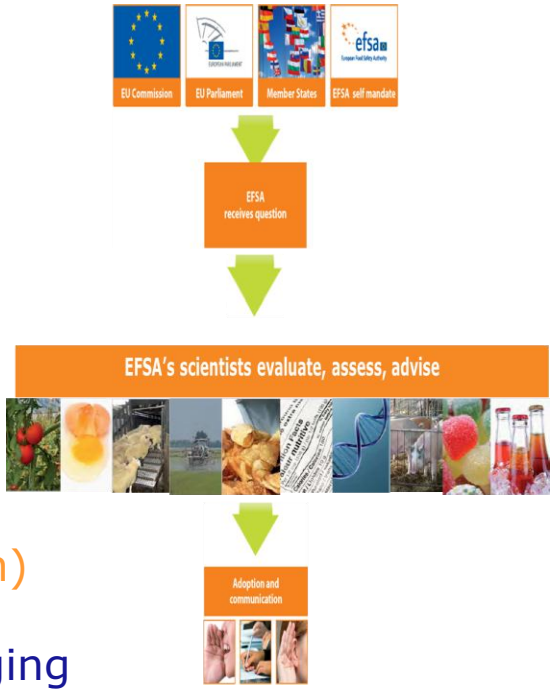
The BIOHAZ and BIOMO Teams and the Panel on Biological Hazards (BIOHAZ) support monitoring activities and provide scientific advice on biological hazards in relation to food-borne diseases, food hygiene, **antimicrobial resistance**, transmissible spongiform encephalopathies, and processing of animal by-products

EFSA AND AMR

EFSA is the EU agency responsible for **risk assessment on** food and feed safety

EFSA provides:

- Independent **scientific advice**
  Scientific Opinions on AMR
- **Scientific and technical support**
  Technical specifications on AMR-monitoring
  Data collection on AMR at EU-level
  Baseline surveys (e.g. MRSA in pig production)
- Clear **communication** on existing and emerging risks

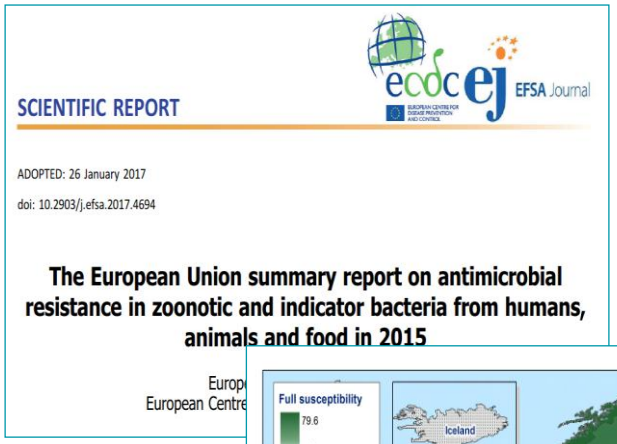


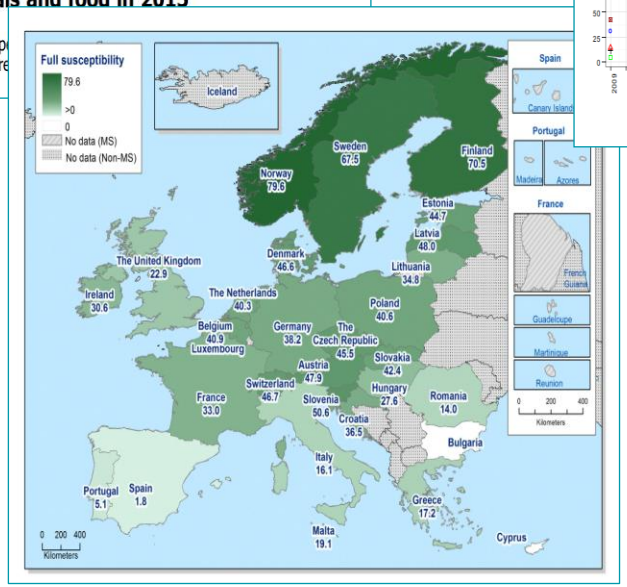
HOT ISSUES IN AMR: EFSA'S RISK ASSESSMENTS

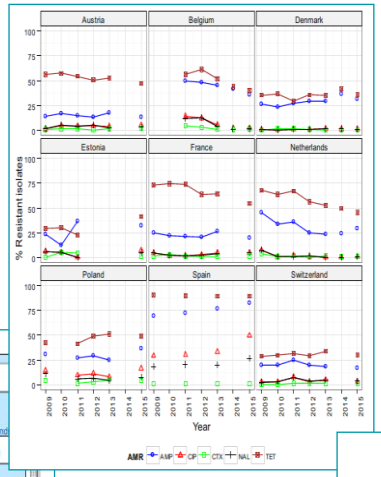
- MRSA
- ESBLs/AMPCs
- Carbapenemases
- Colistin
- Alternatives to antimicrobials

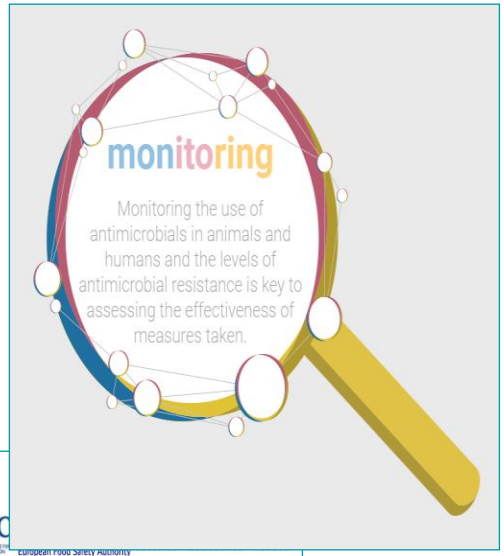
AMR monitoring

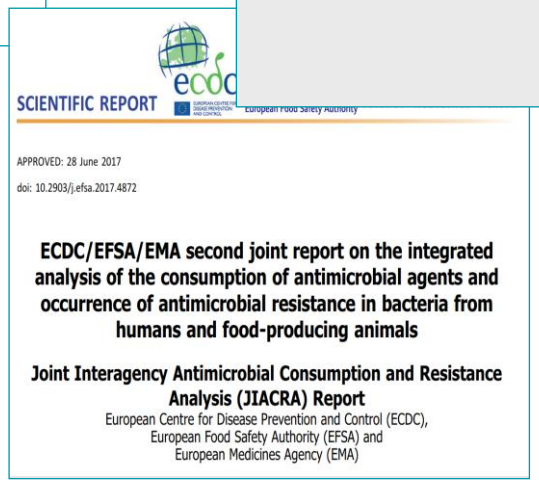
- **Monitoring** of AMR in food-producing animals and food





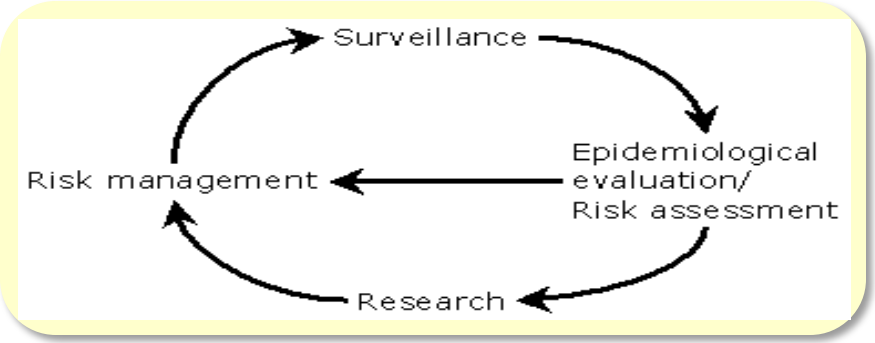






AMR MONITORING – WHY?

- To detect **emergence**, and to understand **dissemination** of AMR
- To provide data relevant for **risk assessment**
- To plan **interventions** and measure their effects.



HARMONIZED MONITORING OF AMR

Commission Implementing Decision 2013/652/EU
of 12 November 2013

Animal/Food

- Poultry
  - Laying hens
  - Broilers
  - Turkeys*
- Pigs
- Calves*< 1year of age

Food

- Meat
  - Beef, Pork, Broiler meat

* +10,000 t/year

Zoonotic Bacteria

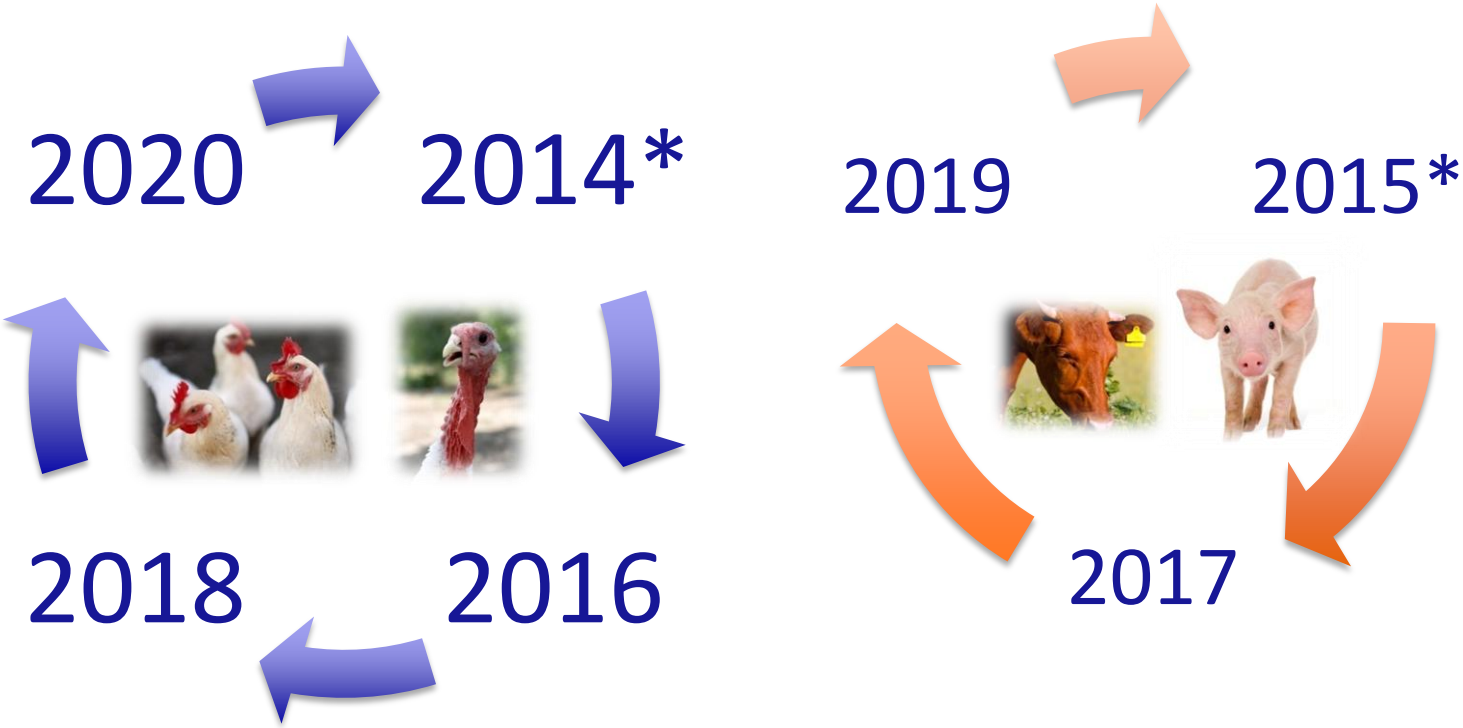
- *Salmonella* spp.
- *C. jejuni* / *C. coli*
- ESBL-/AmpC-/Carbapenemase-producing *Salmonella*

Indicator Bacteria

- *E. coli*
- *E. faecalis* / *E. faecium*
- ESBL-/AmpC-/Carbapenemase-producing *E. Coli*

NEW PROVISIONS OF THE LEGISLATION

Sampling rotation system

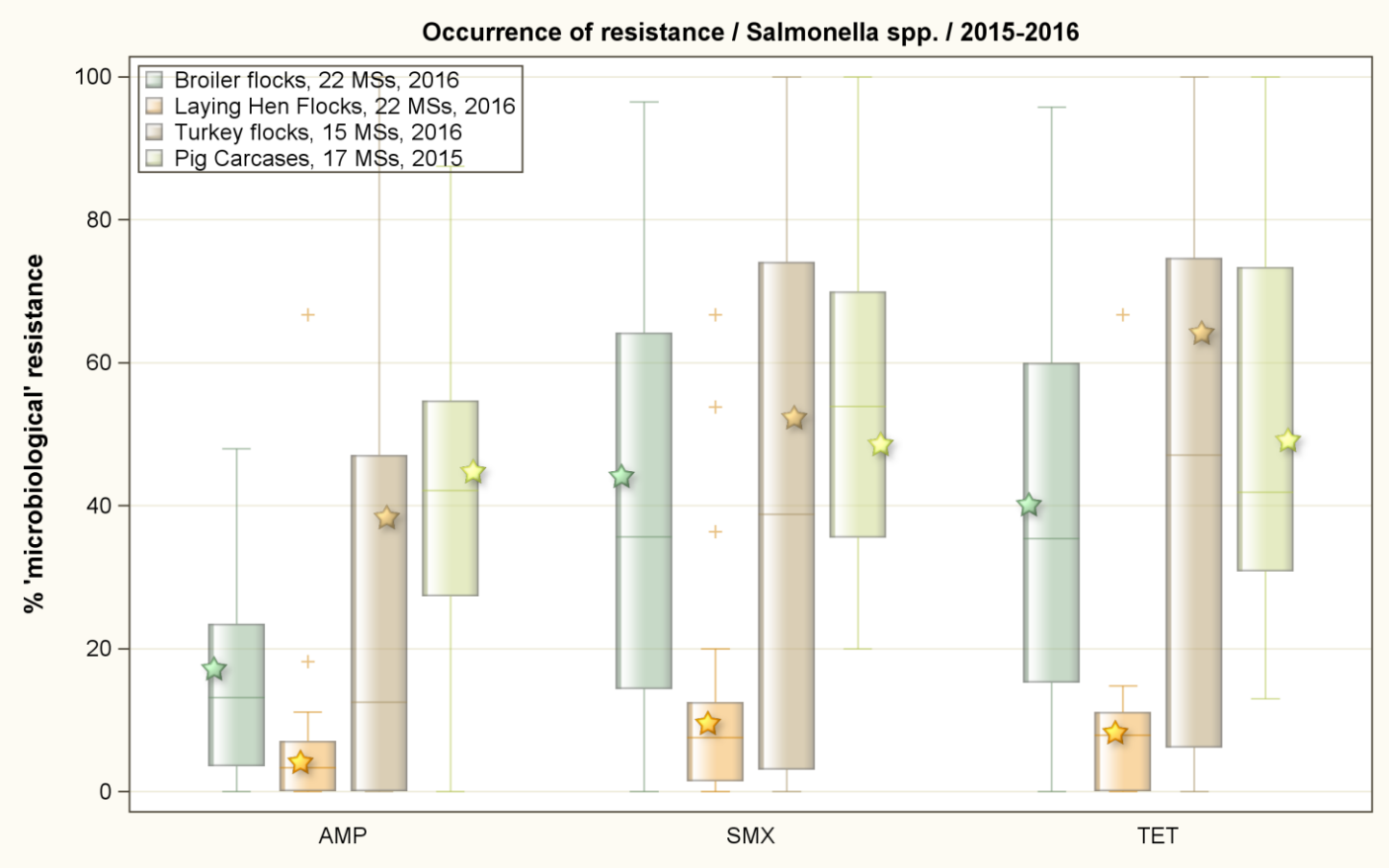


*: No ESBL/AmpC/CP testing in 2014

**: No CP in 2015

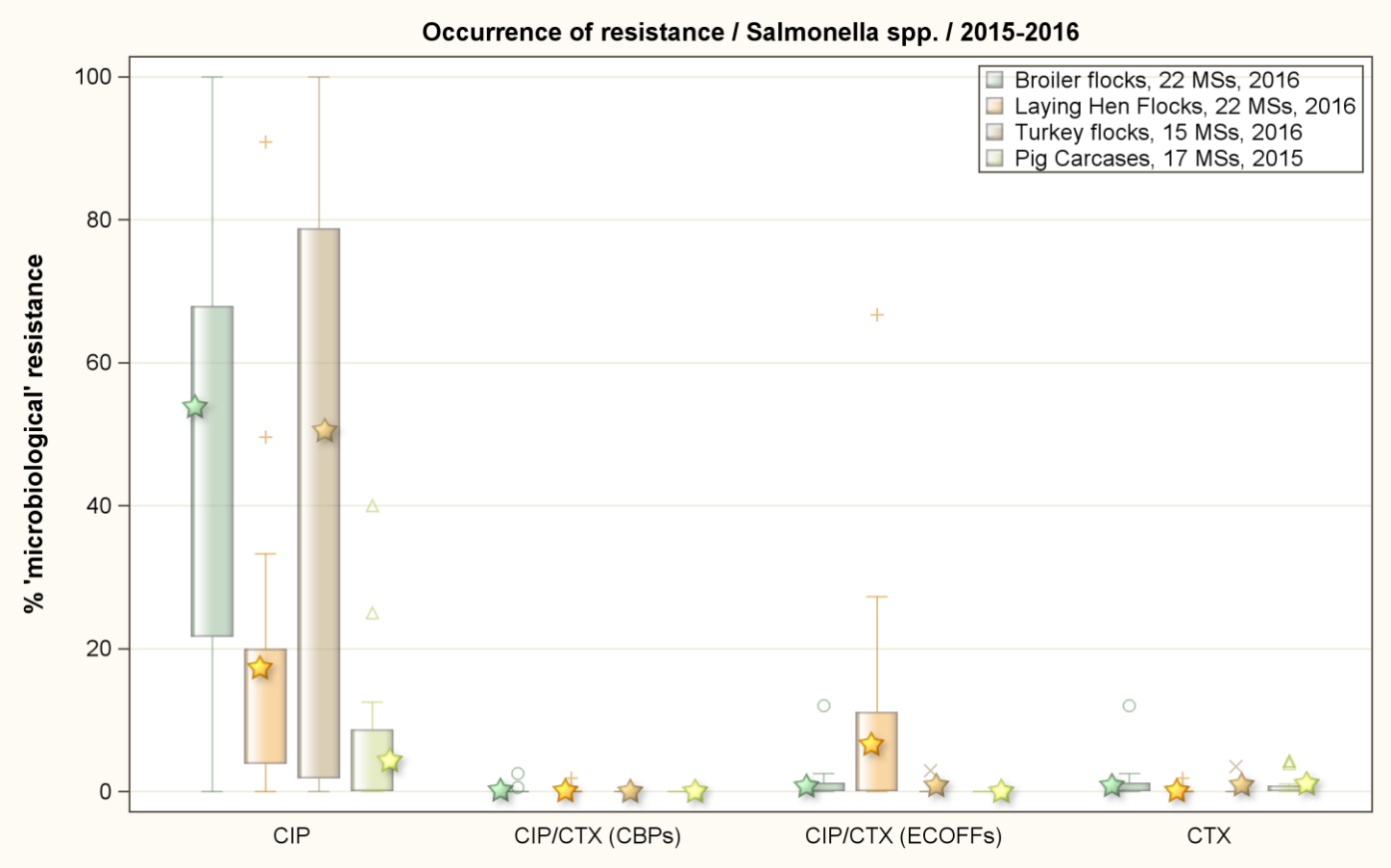
RESISTANCE IN *SALMONELLA* IN FOOD PRODUCING ANIMALS (2015-2016)

- Important resistance levels
- Marked variation between MSs
- Impact of the distribution of serovars

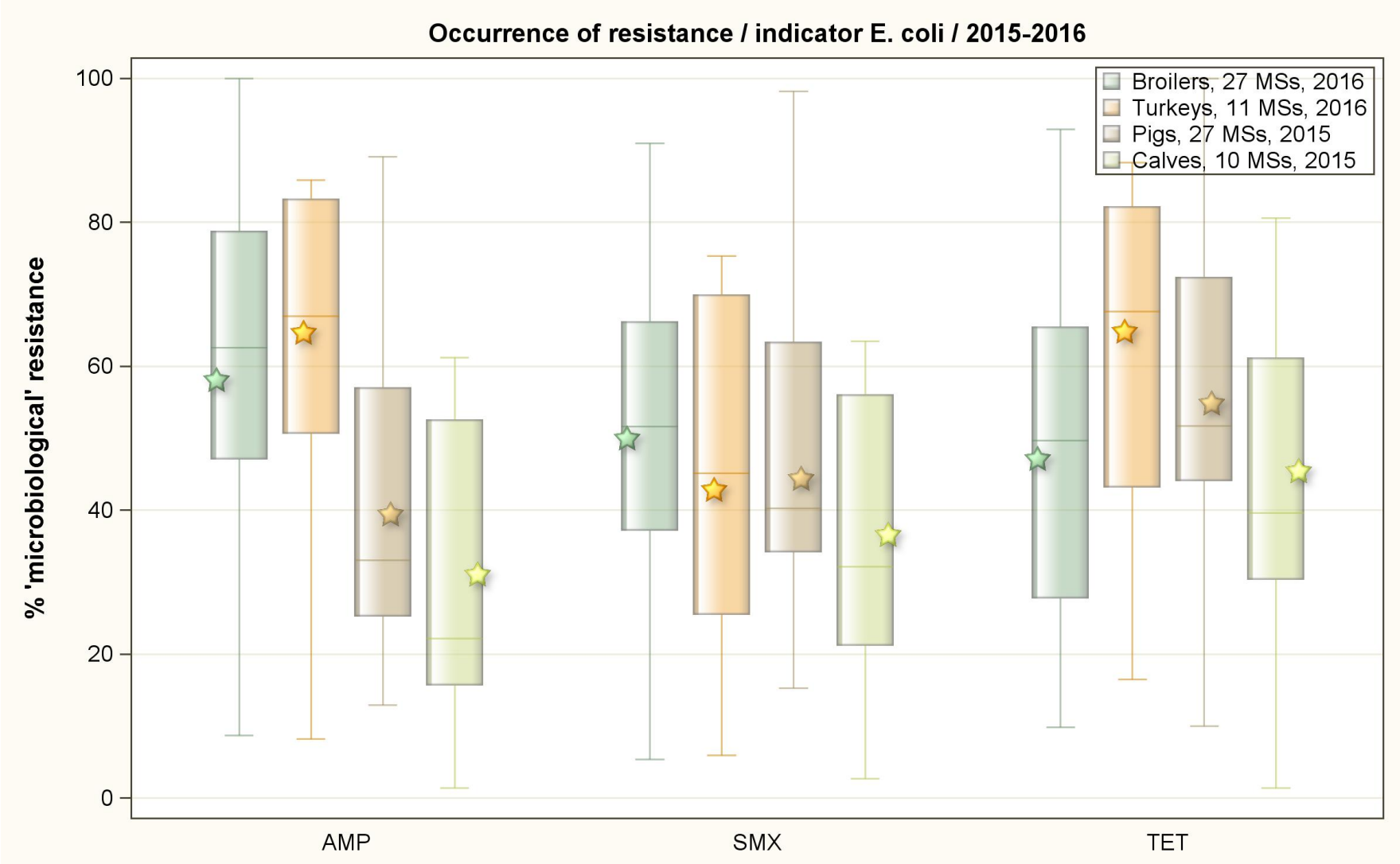


RESISTANCE TO CIA IN *SALMONELLA* (2015-2016)

- Important resistance to fluoroquinolones (CIP) in Broilers and Turkeys
- Very low resistance to C3G (CTX)
- Very low to no co-resistance to CIAs

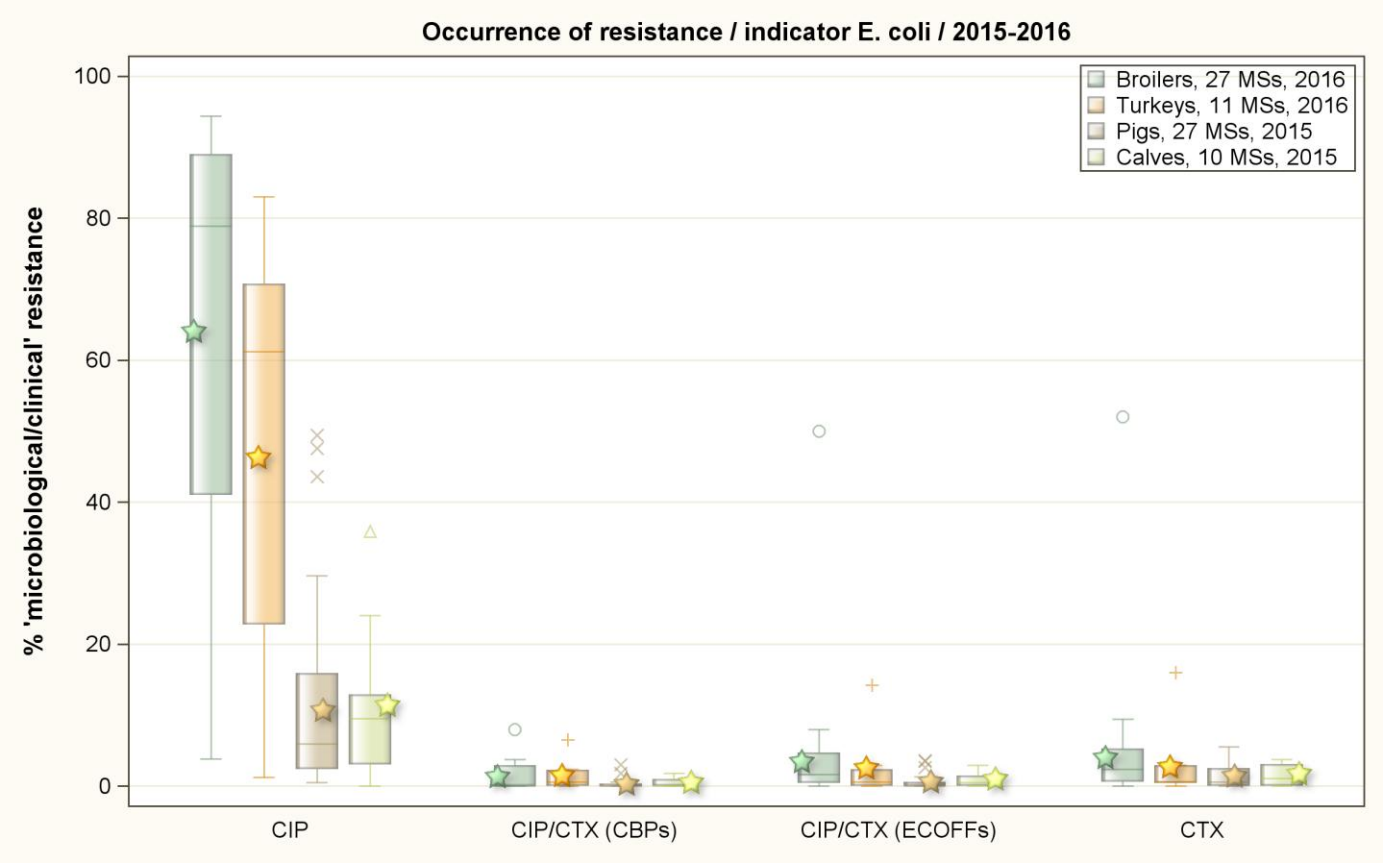


RESISTANCE IN INDICATOR *E. COLI* IN FOOD PRODUCING ANIMALS



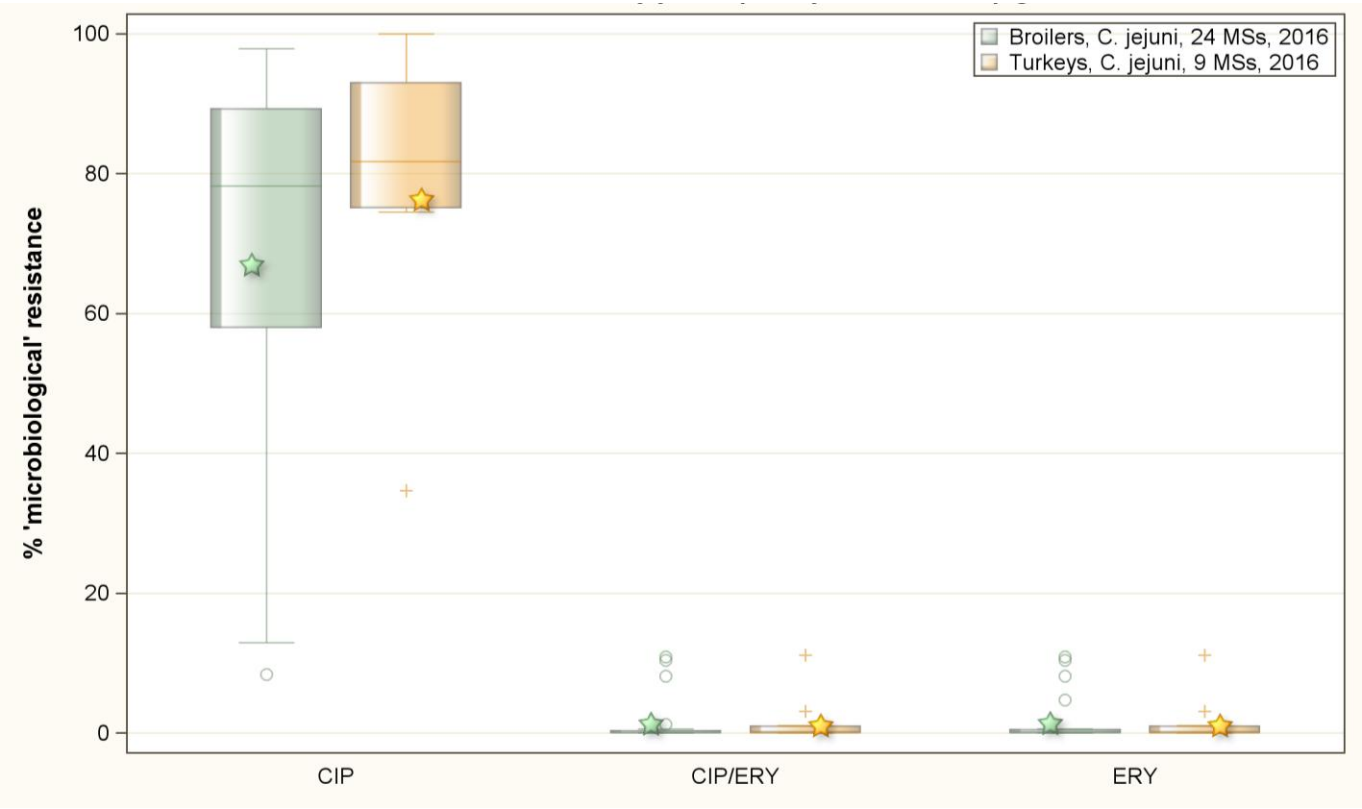
RESISTANCE TO CIAS IN INDICATOR *E. COLI*

- Important resistance to fluoroquinolones (CIP) in Broilers and Turkeys
- Very low resistance to C3G (CTX)
- Very low co-resistance to CIAs: There are outliers for Broilers!



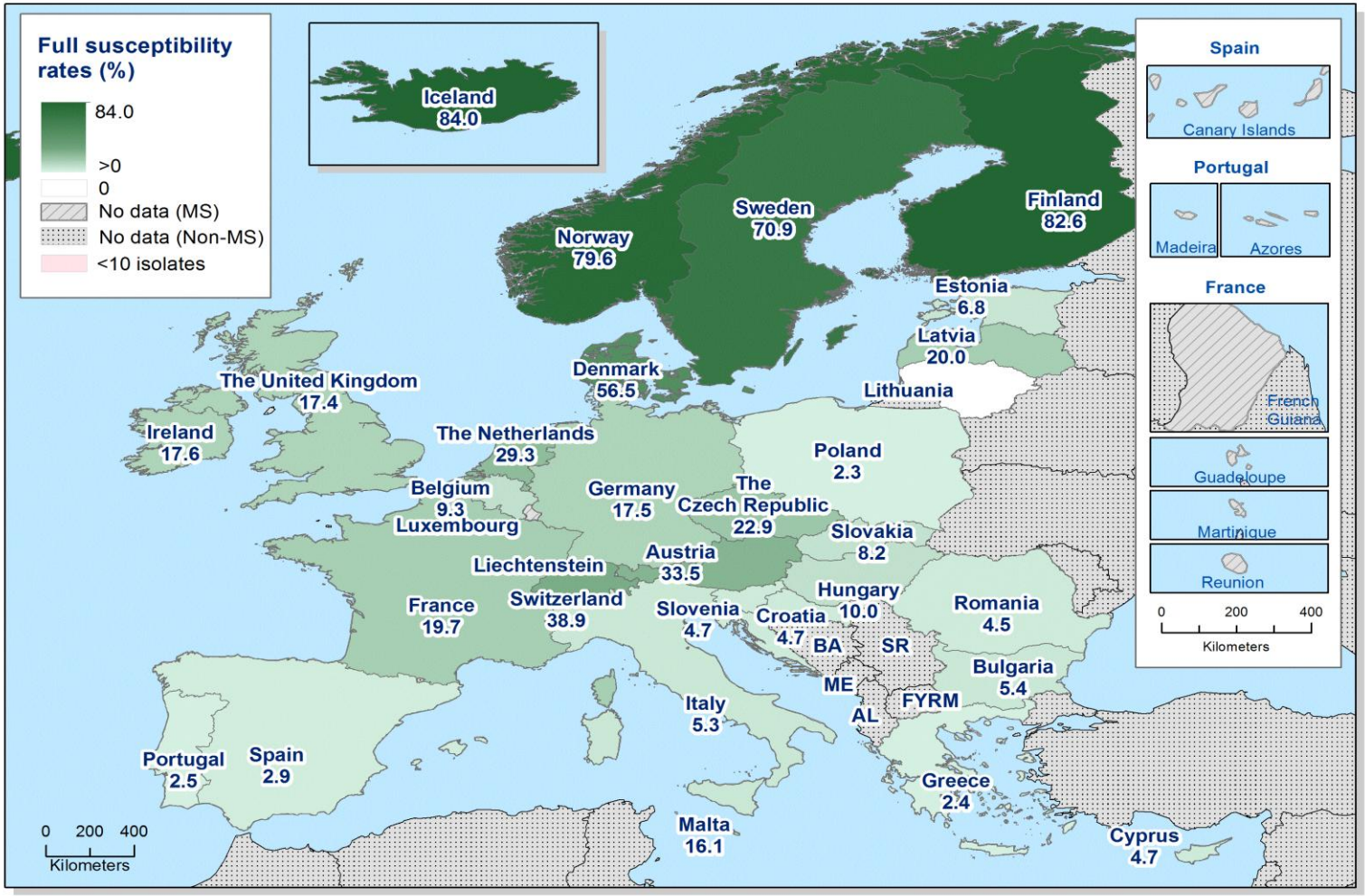
RESISTANCE TO CIA IN *CAMPYLOBACTER*, 2015-2016

- Important resistance to fluoroquinolones (CIP)
- Low resistance to Macrolides (ERY)
- Low combined resistance to CIAs in poultry: there are outliers for broilers!



COMPLETE SUSCEPTIBILITY - INDICATOR *E. COLI* - BROILERS (2016)

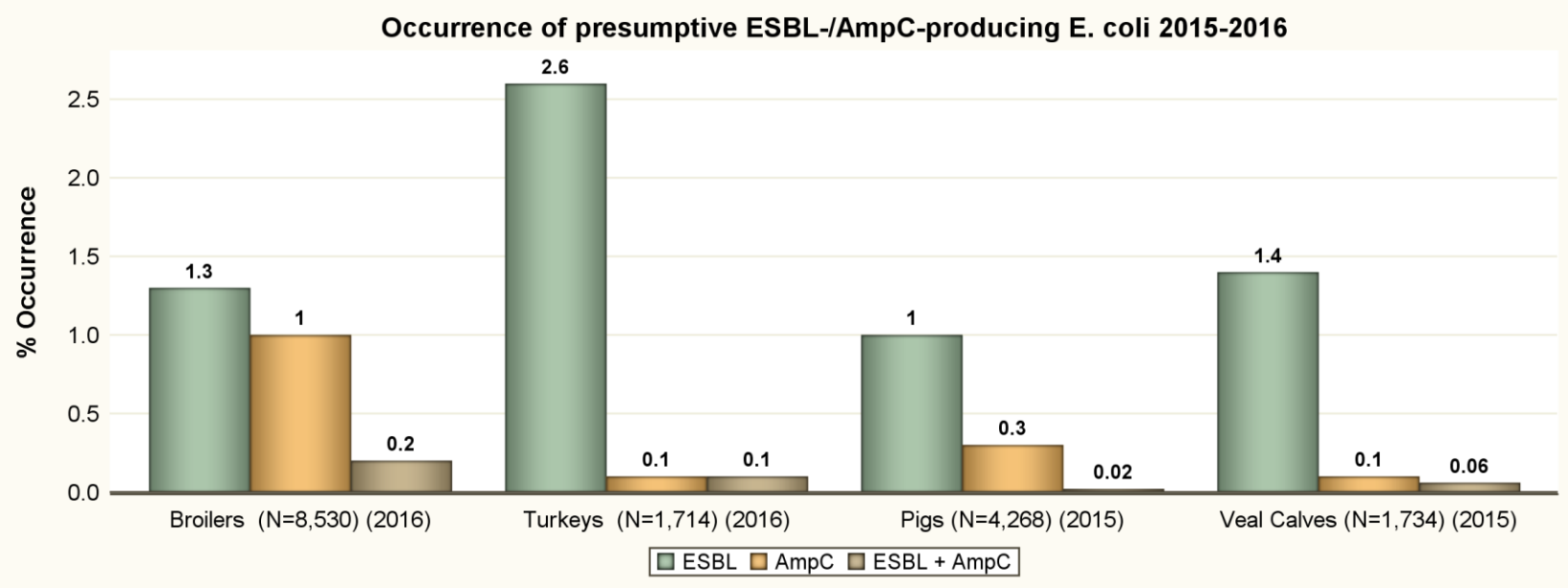
- North-South gradient



3RD-GENERATION CEPHALOSPORIN RESISTANCE

Indicator *E. coli* 2015 - 2016

- Presumptive ESBL/AmpC producing *E. coli*

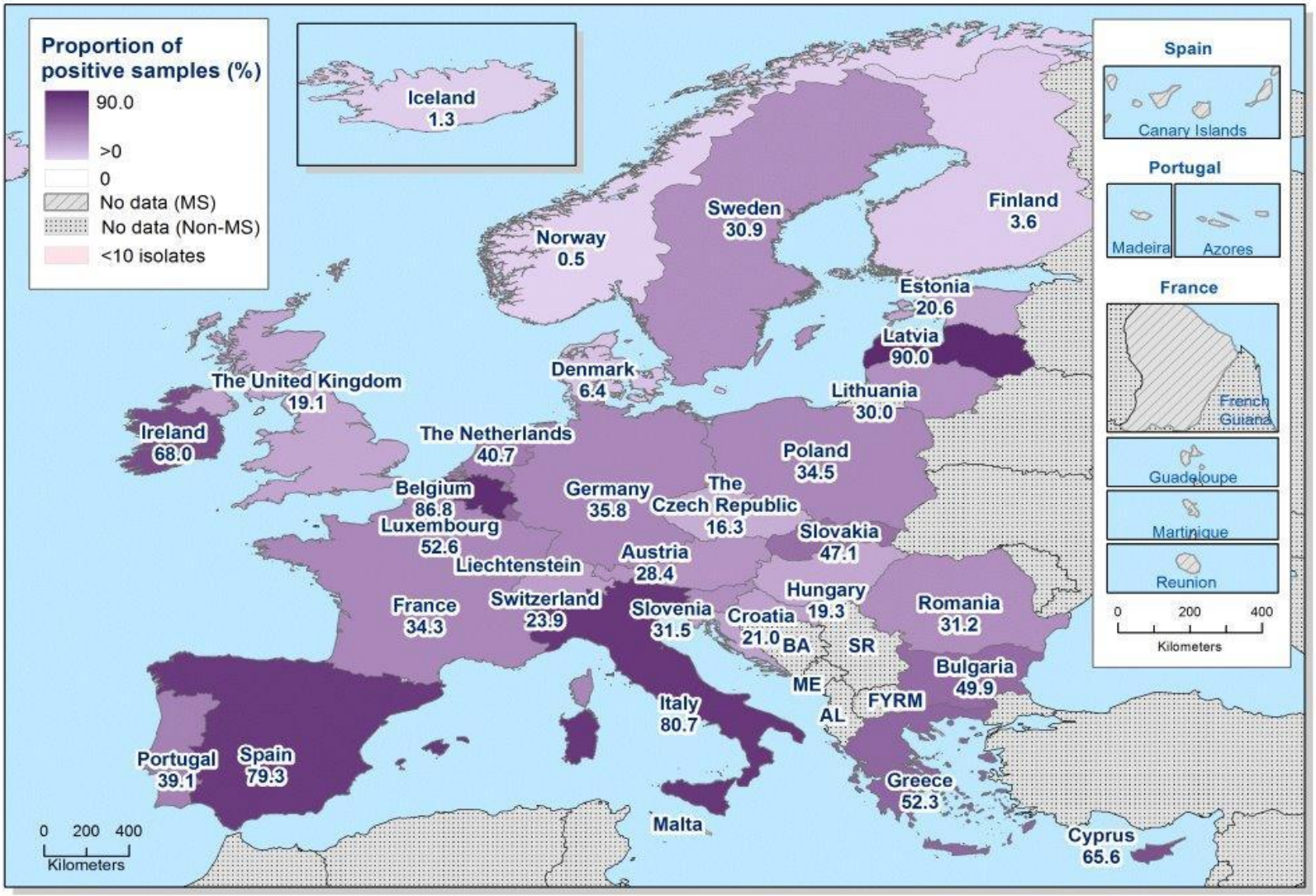


ESBL-/AmpC-producing *E. coli* - 2016

- Prevalence (in %)

	ESBL	AmpC	ESBL + AmpC
Meat from broilers (27 MSs)	35.9	26.8	2.0
Broilers (27 MSs)	35.4	24.4	2.6
Fattening turkeys (11 MSs)	36.6	7.2	1.7

ESBL PREVALENCE IN BROILERS (2016)



RESISTANCE TO CARBAPENEMS IN PIGS 2015

- Specific monitoring of carbapenemase-producing *E. coli*
  - Meat from pigs: 8 MSs – 1,833 samples
  - Fattening pigs: 10 MSs – 2,584 samples
  - Meat from bovines: 8 MSs - 1,818 samples
  - Bovine animals: 3 MSs – 682 samples
  - Calves: 2 MSs – 516 samples

    ➢ No positive results detected

- Other (routine) monitoring
  - 2 carbapenemase-producing *E. coli* detected
  - in the pig sector in **2 MSs** in 2015

RESISTANCE TO CARBAPENEMS IN BROILERS 2016

- **15** carbapenemase producers from **poultry** and its **meat** in 3 MSs
- Routine monitoring of resistance
  - **Cyprus: 1** isolate from **broilers**
- Specific monitoring: ESBL-/ AmpC-/carbapenemase producing *E. coli*
  - **Cyprus: 8 isolates** from **meat from broilers**
  - the **Netherlands: 1 isolate** from **meat from broilers**
- ***Voluntary*** specific monitoring of carbapenem-producing *E. coli*
  - **Romania: 2** isolates from **broilers** and **1** isolate from **broiler meat**
  - **Cyprus: 1** isolate from **broiler meat**, and **1** isolate from broiler.

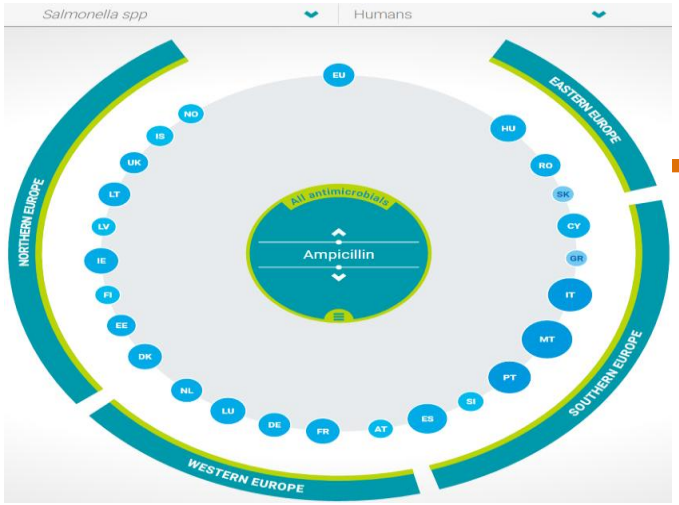
OVERVIEW OF AMR IN THE EU

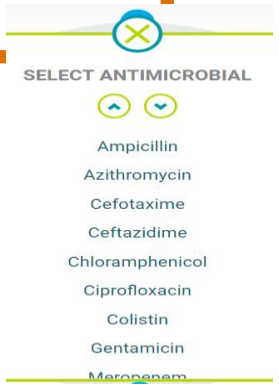
- New legislation successfully implemented by MSs
- Enlarged scope of AMR monitoring
- Frequent resistance to Fluoroquinolones observed
- Low resistance to other Critically Important Antimicrobials
- Low occurrence of ESBL/AmpC producers
- Prevalence of ESBL/AmpC-producing *E. coli* assessed in 2016
- Carbapenemase producers detected in broiler sector in 2016

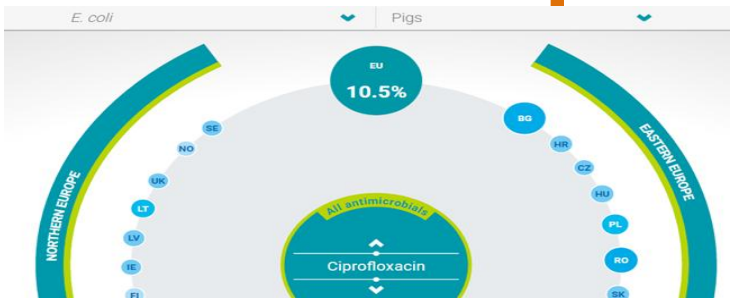
Continually evolving threat from emerging AMR: There is a need to review the data collected, interpret the findings and assess trends.

Infographic

- http://www.efsa.europa.eu/en/interactive_pages/AMR_Report_2015







New EC mandate on AMR monitoring: Background

EFSA Tech. Spec. on the harmonised monitoring and reporting of AMR in *Salmonella*, *Campylobacter,* indicator commensal *E. coli* and *Enterococcus* spp. transmitted through food

EFSA Tech. Spec. on the harmonised monitoring and reporting of MRSA in food-producing animals and food

EFSA Tech. Spec. on randomised sampling for harmonised monitoring of AMR in zoonotic and commensal bacteria

2012

2014

Directive 2003/99/EC

Art. 7(3) and 9(1) + Annexes II (B) IV

Decision 2013/652/EU

2014 - 2020

2011-2016
Action Plan against the rising threats of AMR

June 2017
The European 'One Health' **Action Plan** against AMR

2016 - 2017
Audits of implementation in the MSs performed by Dir. F of the EC

New EFSA Tech. Spec. on the harmonised monitoring of AMR in bacteria transmitted through food
by March 2019

2019

New Decision

2021 - …

2019-2020: Drafting of the legislation by the EC

2020: Negotiation EC - MSs

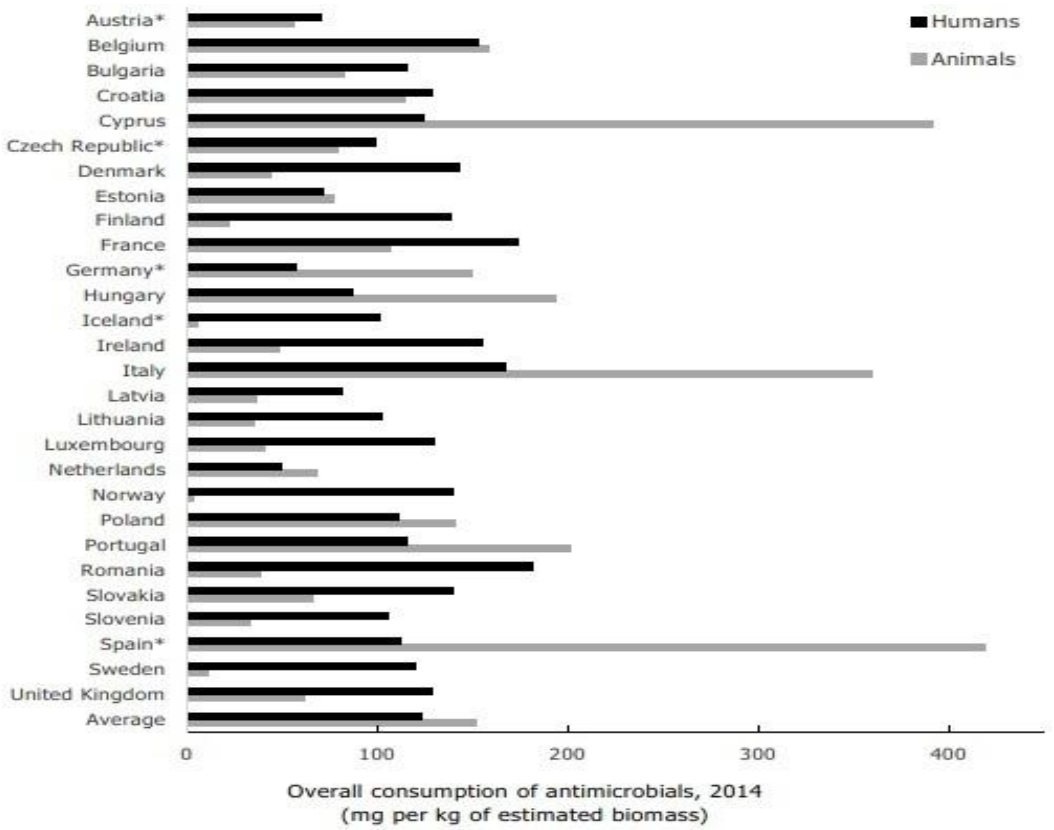
JIACRA: ANALYSIS OF ANTIMICROBIAL USE AND RESISTANCE

- Interagency collaboration
- Analysis of the relationships, in humans/animals, between Antimicrobial Consumption (AMC) and Antimicrobial Resistance (AMR)
- JIACRA I published in January 2015. JIACRA II published in June 2017

Total AMC in 2014
(in mg/kg of estimated biomass)

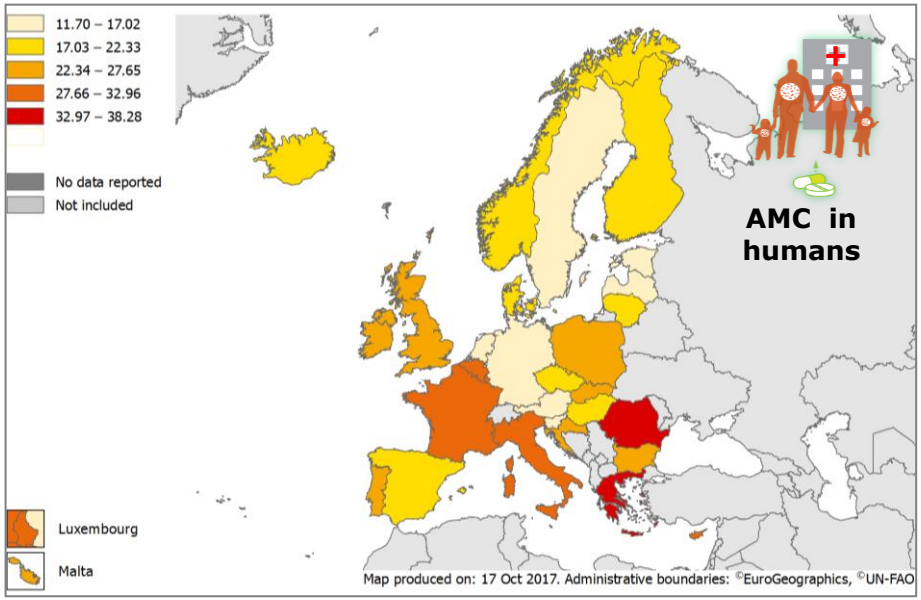
In Humans	In Animals
124 mg/kg range: 50 – 182 mg/kg	**152 mg/kg** range: 3 – 419 mg/kg

- In 18 of 28 countries included in the analysis, AMC was lower or much lower in food-producing animals than in humans
- In 2 countries, AMC was similar
- In the 8 remaining countries, AMC was higher or much higher in food-producing animals than in humans



CONSIDERABLE VARIATIONS IN CONSUMPTION BETWEEN COUNTRIES WITHIN THE ANIMAL AND HUMAN SECTORS, RESPECTIVELY

Consumption of antibacterials for systemic use (ATC group J01) in the community and hospitals, EU/EEA countries, 2015, expressed as DDD per 1 000 inhabitants and per day



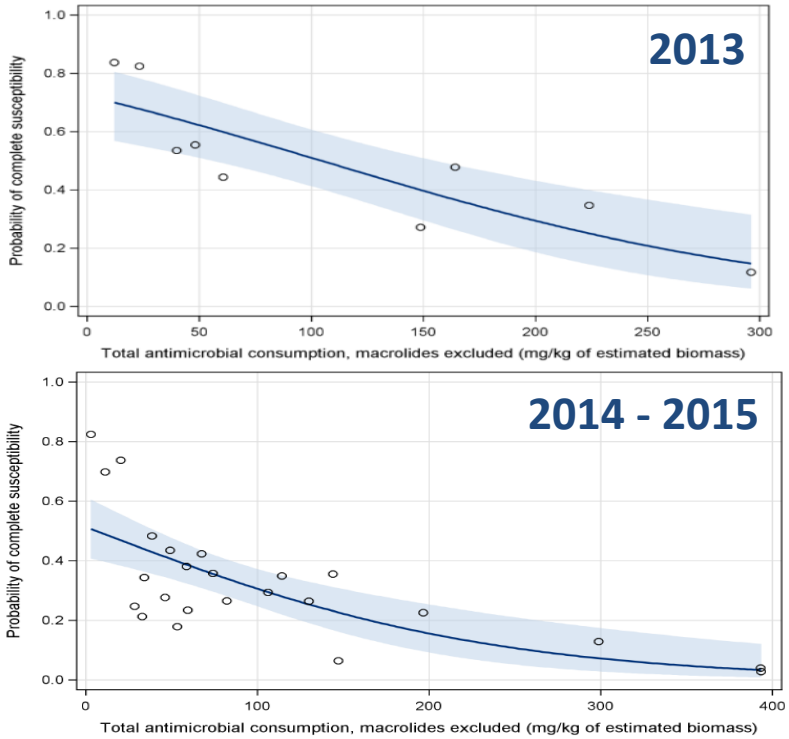
For Austria, Czech Republic, Germany, Iceland and Spain , only community data were reported.

» Indicates that there is an obvious potential for reduction in other countries, particularly among the highest users.

Spatial distribution of overall sales of all antimicrobials for food-producing animals, in mg/PCU, for 30 countries, 2015

» Several countries have reduced their consumption substantially, in particular in the animal sector.

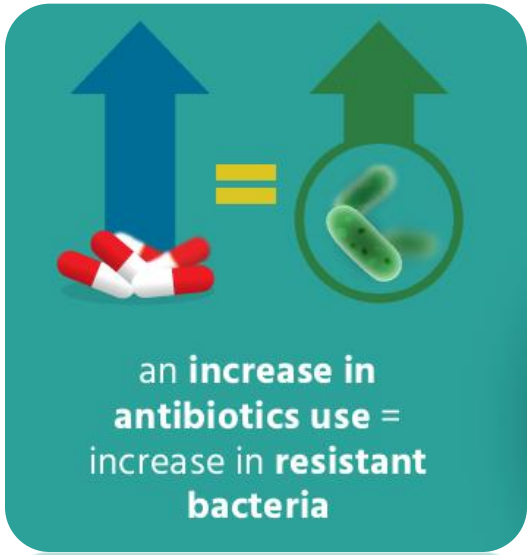
OVERALL LINK AMC - COMPLETE SUSCEPTIBILITY INDICATOR *E. COLI* – FOOD-PRODUCING ANIMALS



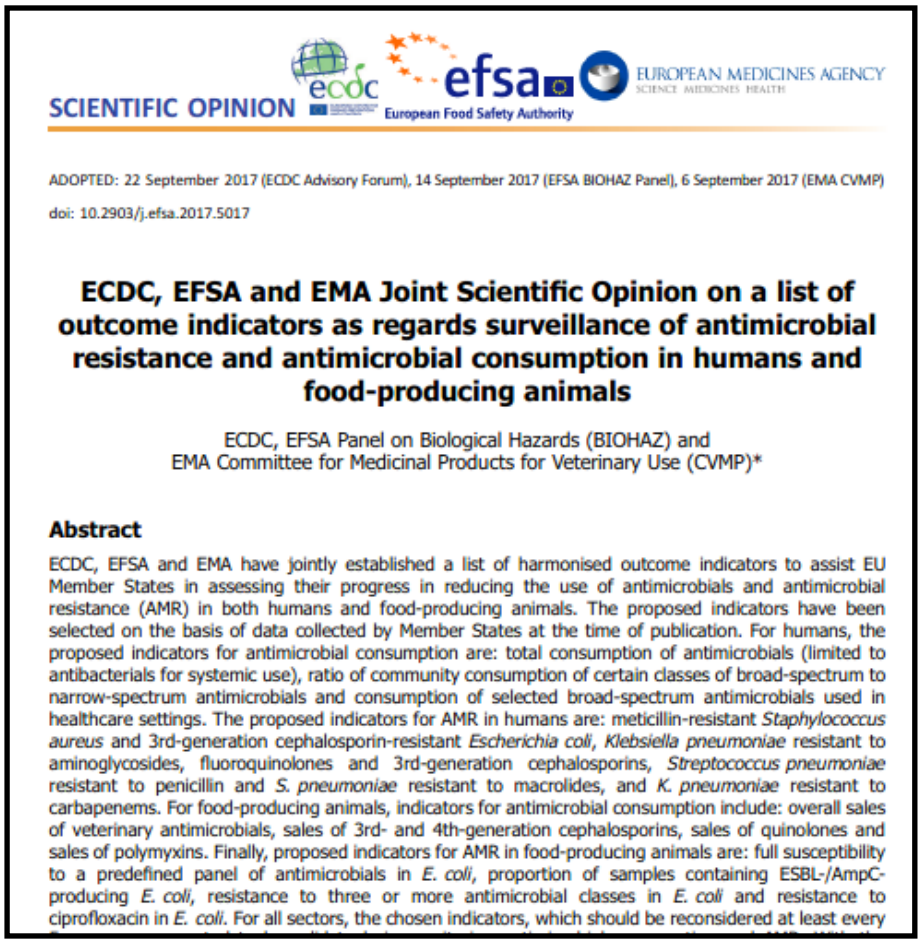
- Statistically-significant negative association between total AMC and complete susceptibility in food-producing animals
- » Prudent use should concern all antimicrobial classes consumed
- » Complete susceptibility: a potential candidate for an epidemiological indicator (wide ranges in AMC and CS)

SUMMARY JIACRA II

"Overall, this report confirms the positive association between AMC and AMR in both humans and food-producing animals and underlines the need to ensure prudent use so as **to reduce the consumption** of antimicrobials in both food-producing animals and humans"



INDICATORS FOR MEASURING PROGRESS MADE IN IMPLEMENTATION OF ACTION PLANS AGAINST AMR



SCIENTIFIC OPINION

European Food Safety Authority

ADOPTED: 22 September 2017 (ECDC Advisory Forum), 14 September 2017 (EFSA BIOHAZ Panel), 6 September 2017 (EMA CVMP)

doi: 10.2903/j.efsa.2017.5017

ECDC, EFSA and EMA Joint Scientific Opinion on a list of outcome indicators as regards surveillance of antimicrobial resistance and antimicrobial consumption in humans and food-producing animals

ECDC, EFSA Panel on Biological Hazards (BIOHAZ) and
EMA Committee for Medicinal Products for Veterinary Use (CVMP)*

Abstract

ECDC, EFSA and EMA have jointly established a list of harmonised outcome indicators to assist EU Member States in assessing their progress in reducing the use of antimicrobials and antimicrobial resistance (AMR) in both humans and food-producing animals. The proposed indicators have been selected on the basis of data collected by Member States at the time of publication. For humans, the proposed indicators for antimicrobial consumption are: total consumption of antimicrobials (limited to antibacterials for systemic use), ratio of community consumption of certain classes of broad-spectrum to narrow-spectrum antimicrobials and consumption of selected broad-spectrum antimicrobials used in healthcare settings. The proposed indicators for AMR in humans are: meticillin-resistant *Staphylococcus aureus* and 3rd-generation cephalosporin-resistant *Escherichia coli*, *Klebsiella pneumoniae* resistant to aminoglycosides, fluoroquinolones and 3rd-generation cephalosporins, *Streptococcus pneumoniae* resistant to penicillin and *S. pneumoniae* resistant to macrolides, and *K. pneumoniae* resistant to carbapenems. For food-producing animals, indicators for antimicrobial consumption include: overall sales of veterinary antimicrobials, sales of 3rd- and 4th-generation cephalosporins, sales of quinolones and sales of polymyxins. Finally, proposed indicators for AMR in food-producing animals are: full susceptibility to a predefined panel of antimicrobials in *E. coli*, proportion of samples containing ESBL-/AmpC-producing *E. coli*, resistance to three or more antimicrobial classes in *E. coli* and resistance to ciprofloxacin in *E. coli*. For all sectors, the chosen indicators, which should be reconsidered at least every

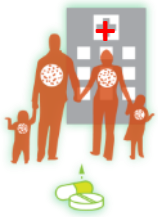
- Set of indicators to assist Member States in assessing their progress in reducing the use of antimicrobials and antimicrobial resistance
- Addressing both humans and food-producing animals
- Based on data collected through existing EU monitoring networks

PROPOSED PRIMARY INDICATORS

AMC in animals

Primary indicator

- Overall sales of veterinary antimicrobials (in mg/PCU)



AMC in humans

Primary indicator

- Consumption of all antimicrobials for systemic use (in DDD/1,000 inhabitants per day)

AMR in bacteria from animals

Primary indicator

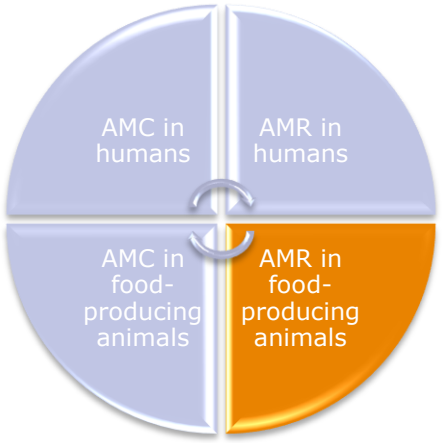
- Proportion of *E. coli* completely susceptible to antimicrobials tested in the EU monitoring

AMR in bacteria from Humans

Primary indicator

- Proportion of meticillin-resistant *Staphylococcus aureus* (MRSA) and
- 3rd-generation cephalosporin resistant *E. coli* (3GCR *E. coli*).

INDICATORS OF AMR IN FOOD-PRODUCING ANIMALS



E. coli as general indicator/ /all species considered, weighted by PCU
Susceptibility to entire panel measuring AMR in relation to total use of AMs

Primary indicator

- Proportion of *E. coli* completely susceptible to antimicrobials tested in the EU monitoring*

Secondary indicators

use of information from specific monitoring on prev. of samples with ESBL-/AmpC-producing *E. coli*

- Proportion of samples containing ESBL-/AmpC-producing *E. coli**

measures MDR (different classes)
relevant to monitor effect of reduced use, useful when prop. fully suscptible is very low

- Proportion of *E. coli* resistant to three or more antimicrobial classes*

ciprofloxacin on WHO list highest priority CIAs
resistance to FQ correlates consistently with usage

- Proportion of *E. coli* resistant to fluoroquinolones*

* All indicators are weighted for all food-producing animals (broilers, turkeys, pigs, calves)

ADDED VALUES

- Based on data already collected
- Summarising overall situation
- Tool for Member States to assess their progress
- Possible tool to set targets

SOME LIMITATIONS

- Summaring = losing some information
- Need to analyse underlying data

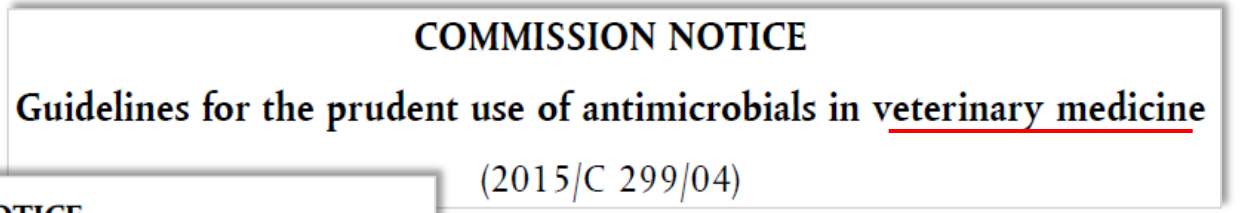
RECOMMENDATIONS

- To be reconsidered at least every five years

CONCLUSIONS

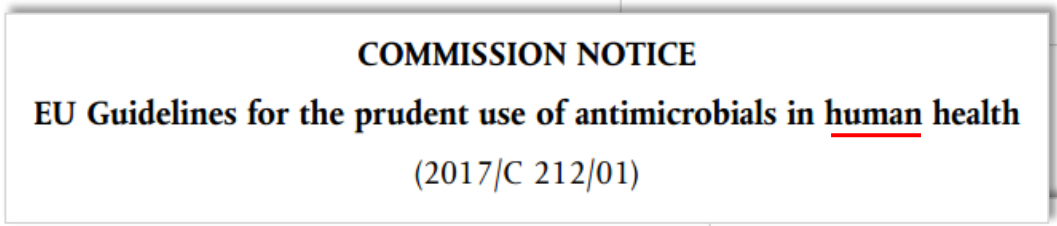
- Added value of linking AMC and AMR data
- Added value of a synthetic view of the AMC and AMR situation through limited number of consistent indicators to follow up the situation over time
- Higher is the AMC, higher is the risk of AMR!

HOW TO REDUCE CONSUMPTION?


COMMISSION NOTICE

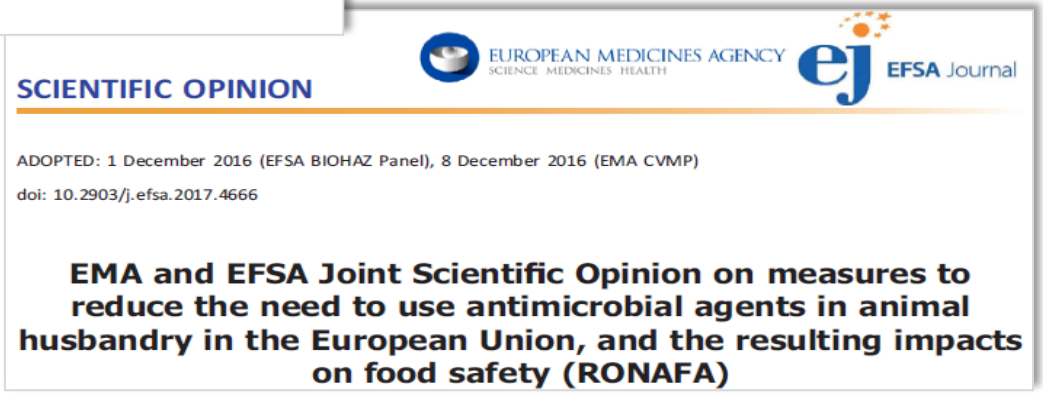
Guidelines for the prudent use of antimicrobials in veterinary medicine

(2015/C 299/04)


COMMISSION NOTICE

EU Guidelines for the prudent use of antimicrobials in human health

(2017/C 212/01)


EUROPEAN MEDICINES AGENCY
SCIENCE MEDICINES HEALTH

EFSA Journal

SCIENTIFIC OPINION

ADOPTED: 1 December 2016 (EFSA BIOHAZ Panel), 8 December 2016 (EMA CVMP)

doi: 10.2903/j.efsa.2017.4666

EMA and EFSA Joint Scientific Opinion on measures to reduce the need to use antimicrobial agents in animal husbandry in the European Union, and the resulting impacts on food safety (RONAFA)

Measure consumption

Implementation of management measures

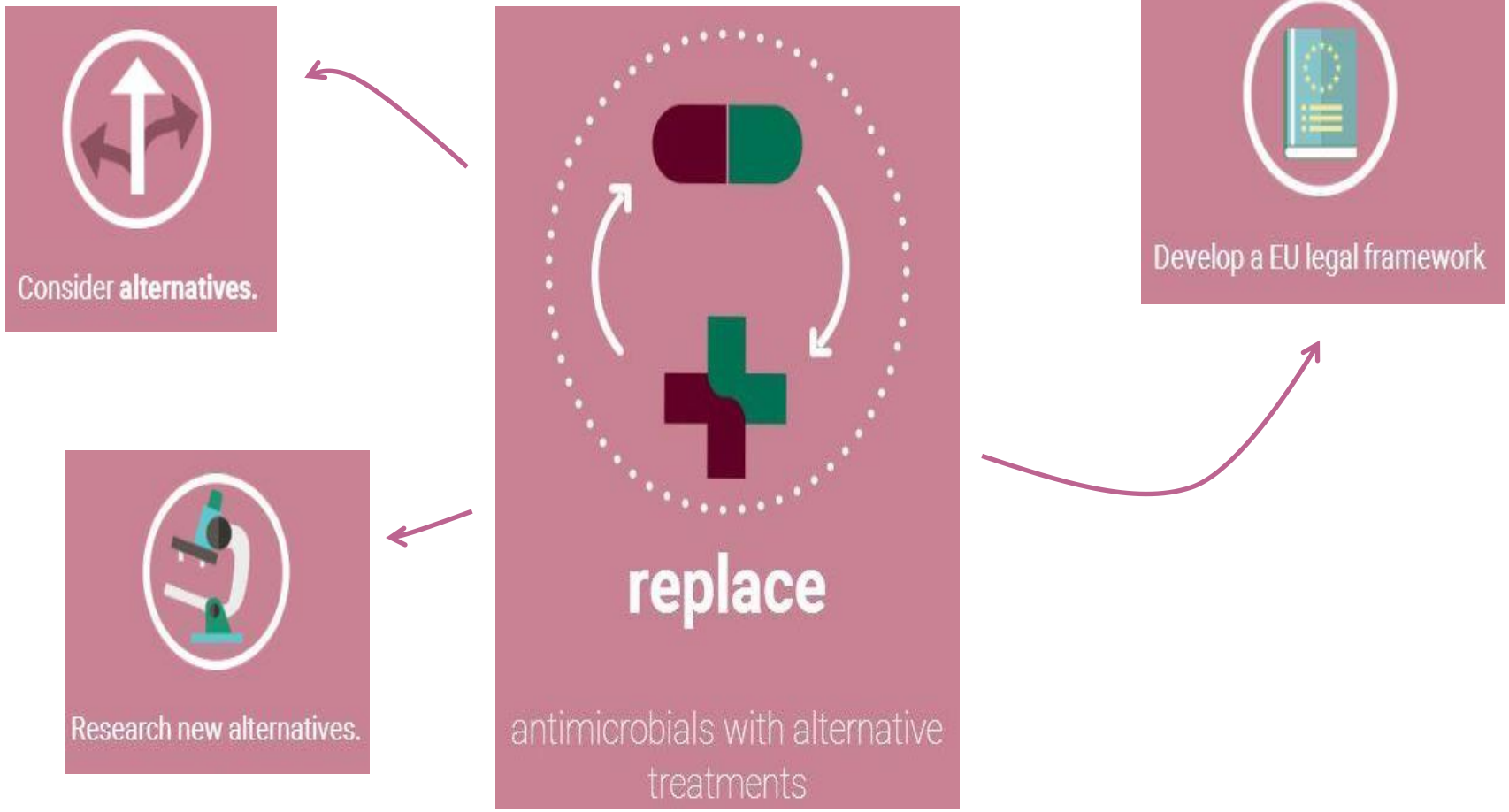
Measure impact of measures - indicators necessary

RONAFA RECOMMENDATIONS

What can we do?

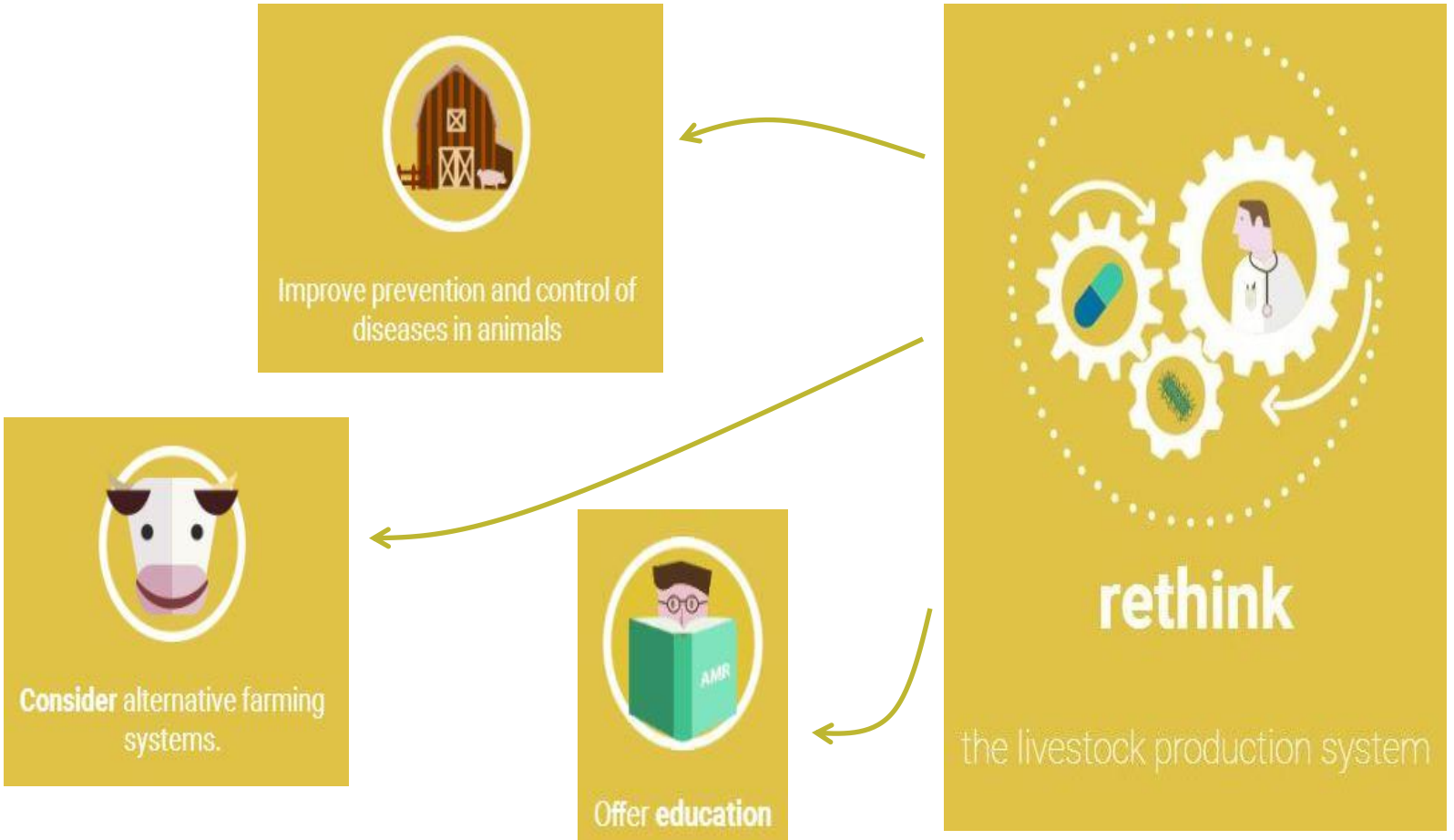
RONAFA RECOMMENDATIONS

What can we do?



RONAFA RECOMMENDATIONS

What can we do?



THANK YOU FOR YOUR ATTENTION !

- Acknowledgements: BIOCONTAM Staff, BIOHAZ Panel, WGs, EMA, ECDC

- Documents presented available at
  - www.efsa.europa.eu

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