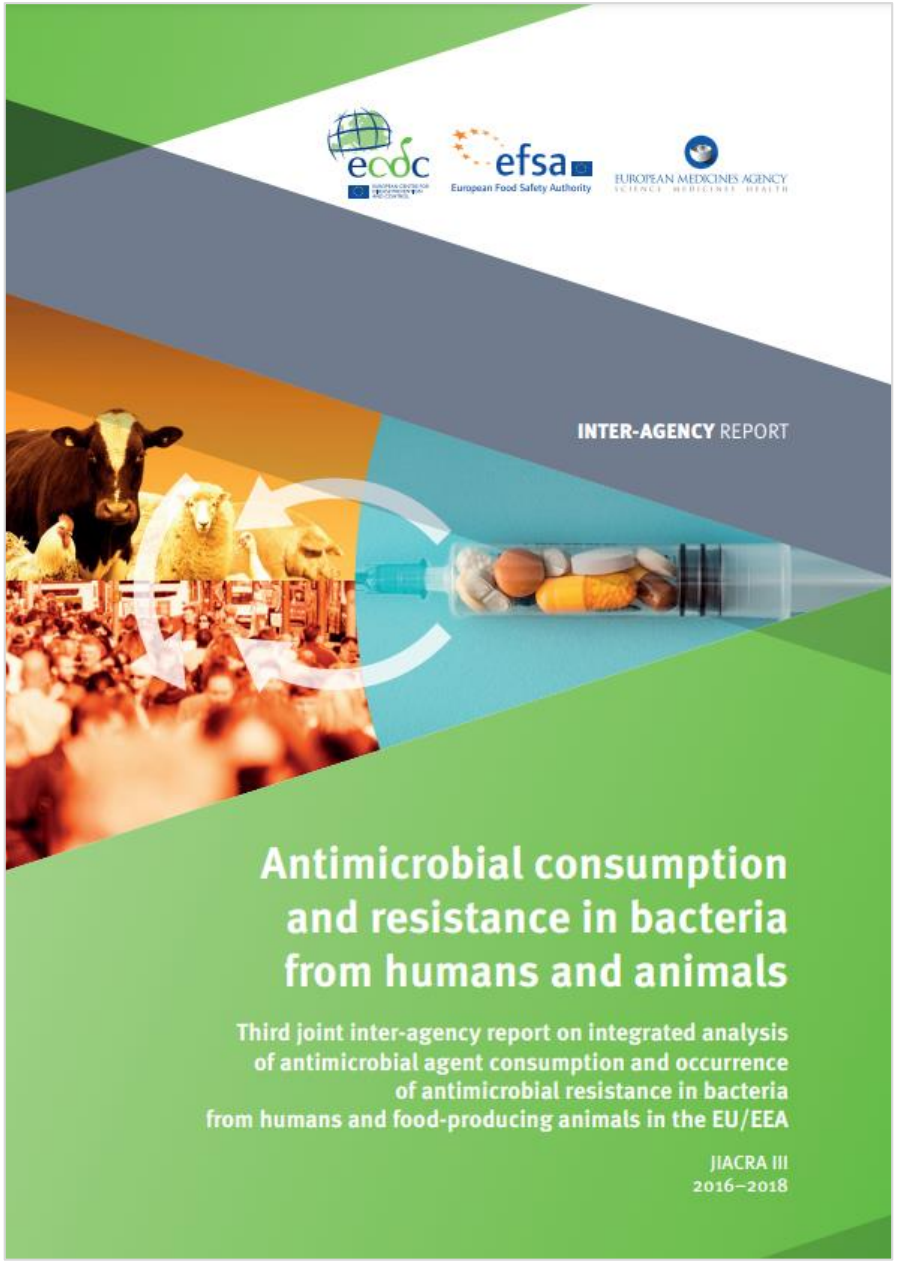
AMR One Health Network (OHN), 25-26 January 2022

Hybrid meeting, Schuman room, Berlaymont, Rue de la Loi 200, B-1040 Brussels



Latest JIACRA III report

(Joint Inter-Agency Antimicrobial Consumption and Resistance Analysis)

and

Scientific Opinion on AMR outcome indicators

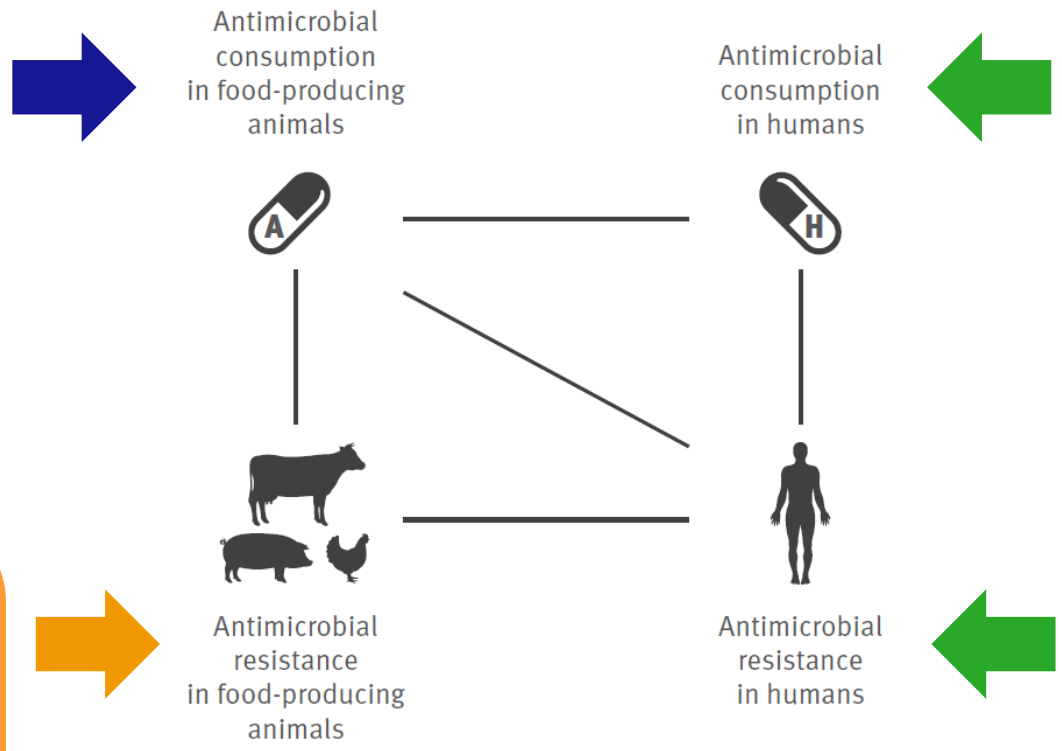
P-A Belœil (EFSA) and
Dominique Monnet (ECDC)

https://www.ecdc.europa.eu/sites/default/files/documents/JIACRA-III-Antimicrobial-Consumption-and-Resistance-in-Bacteria-from-Humans-and-Animals.pdf

Analysis of antimicrobial consumption and antimicrobial resistance

EUROPEAN MEDICINES AGENCY
SCIENCE MEDICINES HEALTH

European Surveillance of Veterinary Antimicrobial Consumption (**ESVAC**)



European Surveillance of Antimicrobial Consumption Network (**ESAC-Net**)

European Antimicrobial Resistance Surveillance Network (**EARS-Net**)

Food- and Water-borne Disease Network (**FWD-Net**)

efsa
European Food Safety Authority

Network on Zoonoses Data Collection

EU Summary Report on AMR in zoonotic and indicator bacteria from humans, animals and food

- Interagency collaboration
- Analysis of the relationships, in humans/animals, between: antimicrobial consumption (AMC) ***vs.*** antimicrobial resistance (AMR)
- To cover the years 2016, 2017 and 2018

Consumption of antimicrobials in humans and food-producing animals, 2017

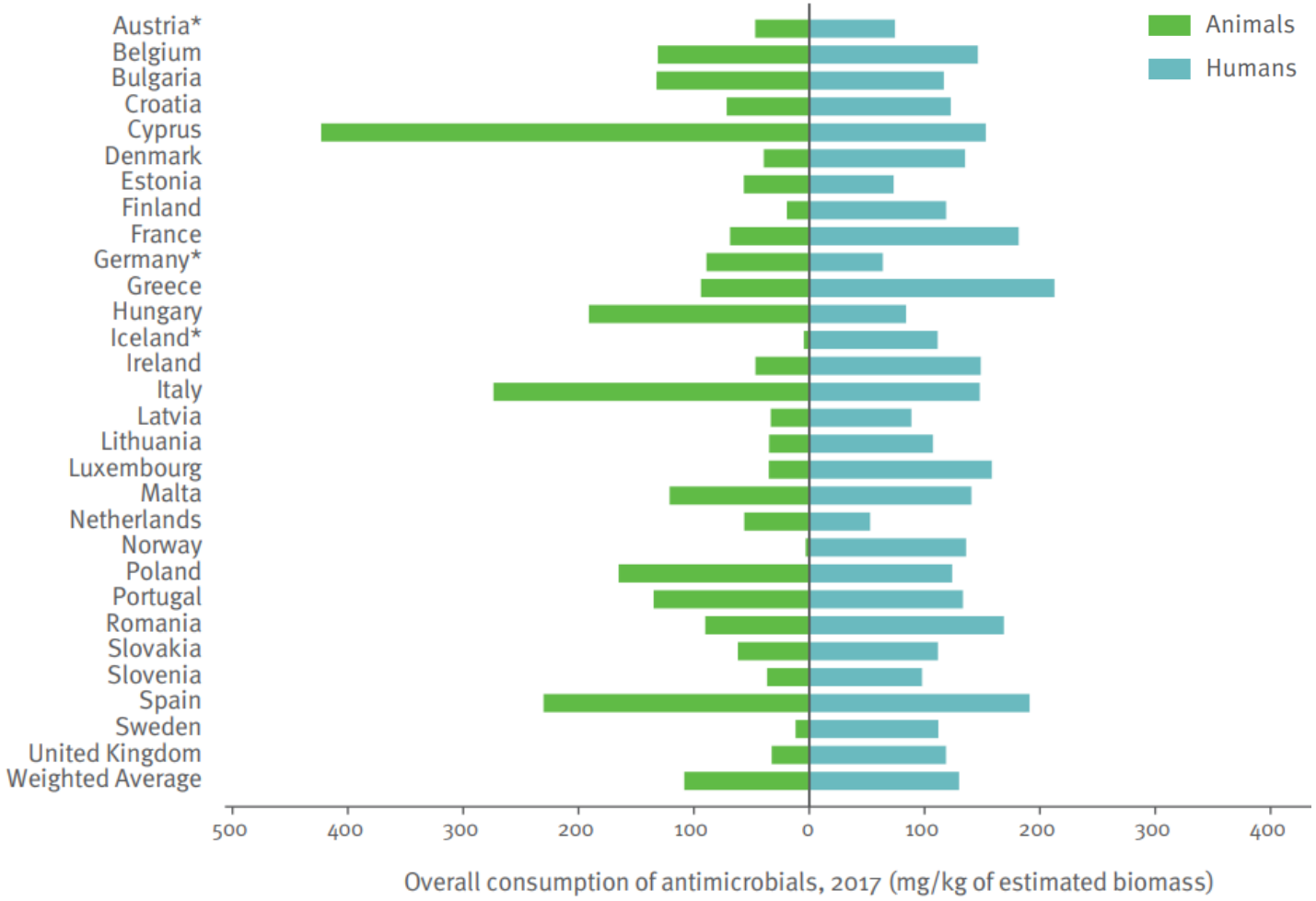
- Population-weighted mean AMC, 2017:

	EU/EEA*	Country range
Animals	108 mg/kg	3 – 423
Humans	130 mg/kg	53 – 213

- Antimicrobial consumption (AMC) varied by country.

  In 2017, among 29 EU/EEA countries, **AMC** in **food-producing animals** was:

  - **lower** than in humans in **20 countries**,
  - **similar** to that in humans in **1 country**,
  - **higher** than in humans in **8 countries**.



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.

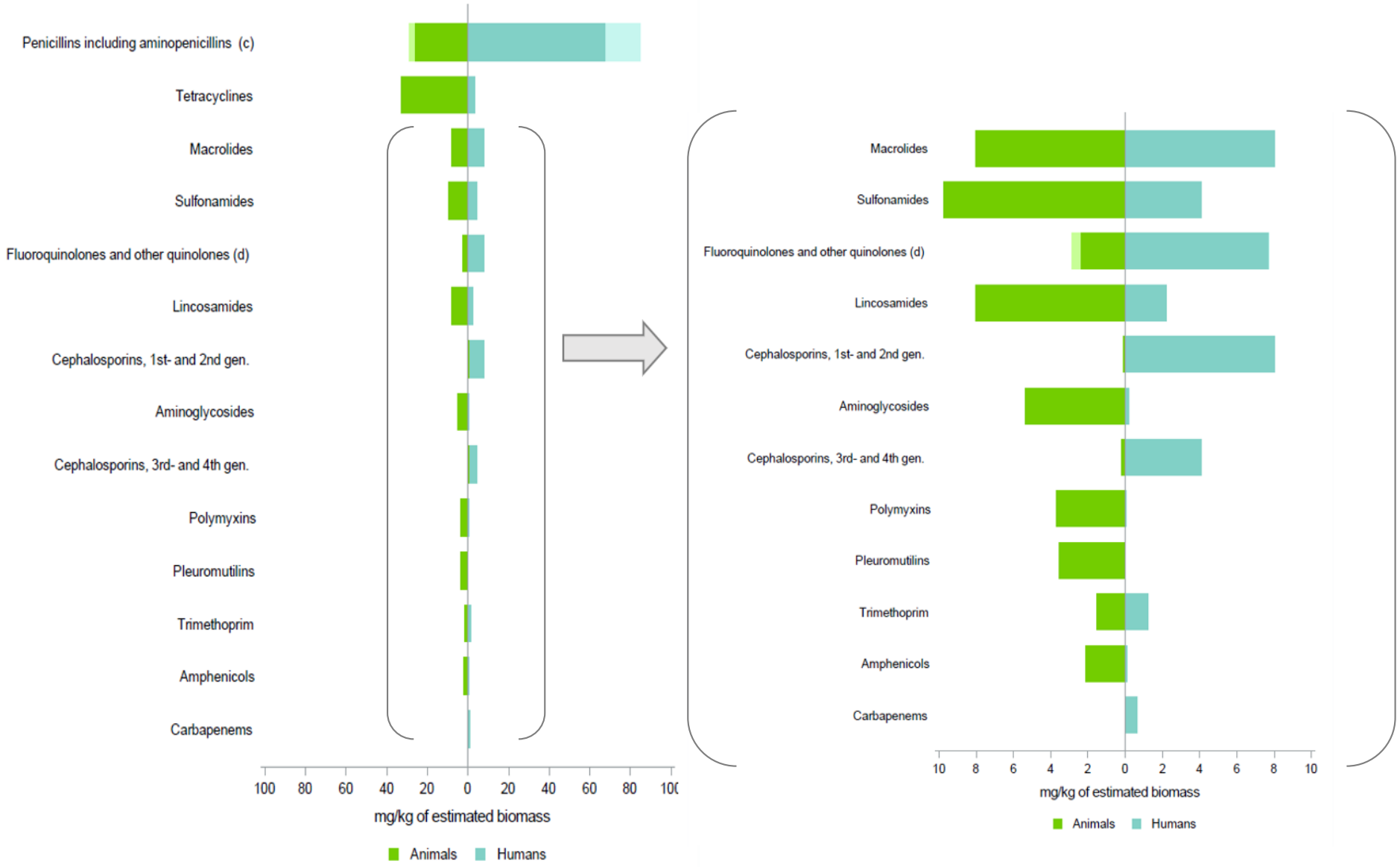
Comparison of consumption of antimicrobial classes in humans and food-producing animals, 2017

- Consumption of **aminopenicillins**, 3rd- and 4th-generation **cephalosporins** and **quinolones**[a] was higher in **humans** than in food-producing animals.

- Consumption of **polymyxins**[b] and **tetracyclines**, for example, was higher in **food-producing animals** than in humans.

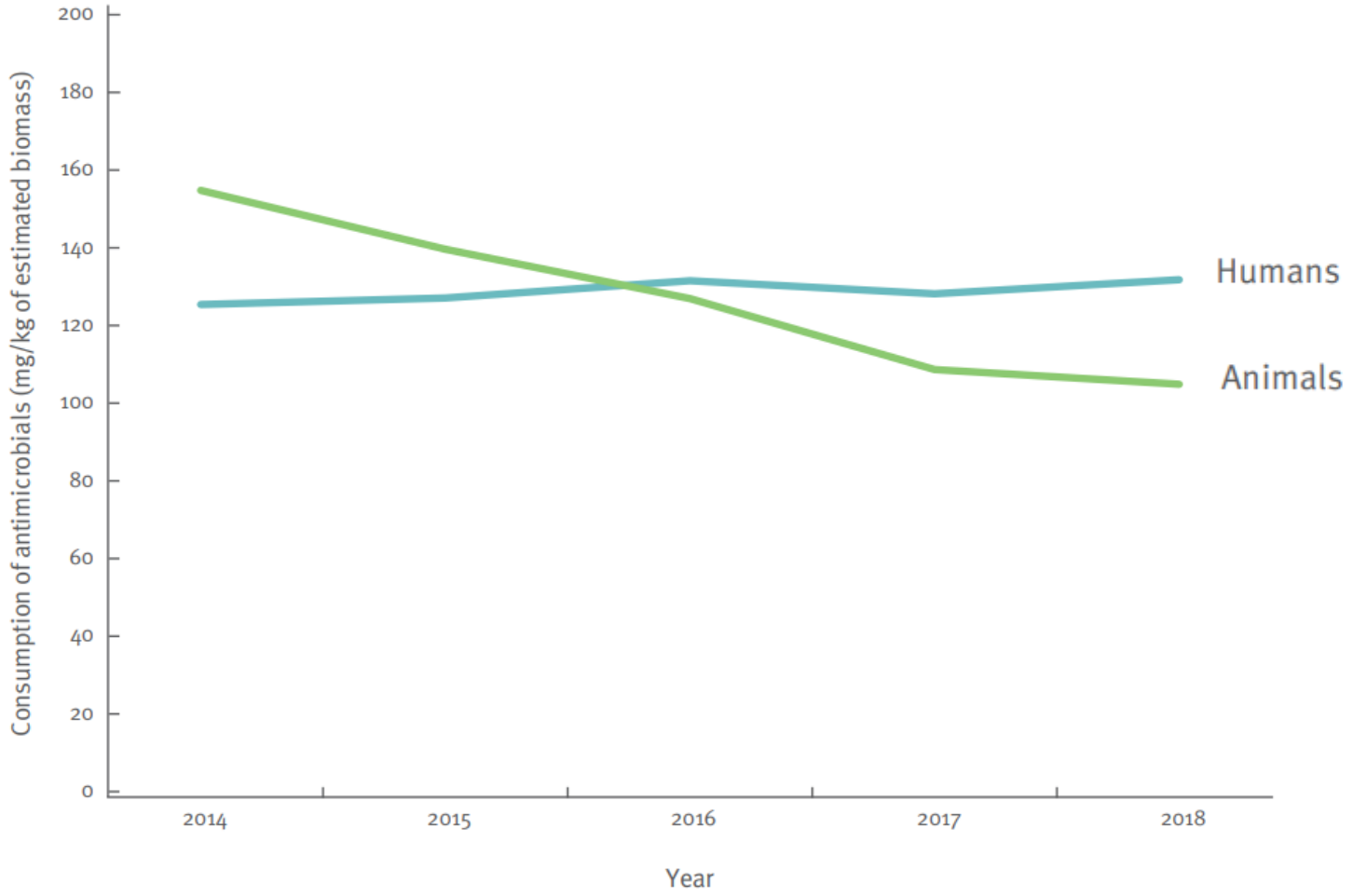
[a]: fluoroquinolones and other quinolones

[b]: colistin: consumption of polymyxins (colistin) nearly halved in food-producing animals



Population-weighted mean antimicrobial consumption in humans and food-producing animals, 2014-2018

- Since 2016, the overall population-weighted mean **AMC** has been **lower** in **food-producing animals** than in humans (27 EU/EEA countries)
- Statistically significant **decrease of 32%** in the population-weighted mean AMC in food-producing animals between 2014 and 2018
- The **measures taken** to reduce the use of antimicrobials in food-producing animals have been **effective**

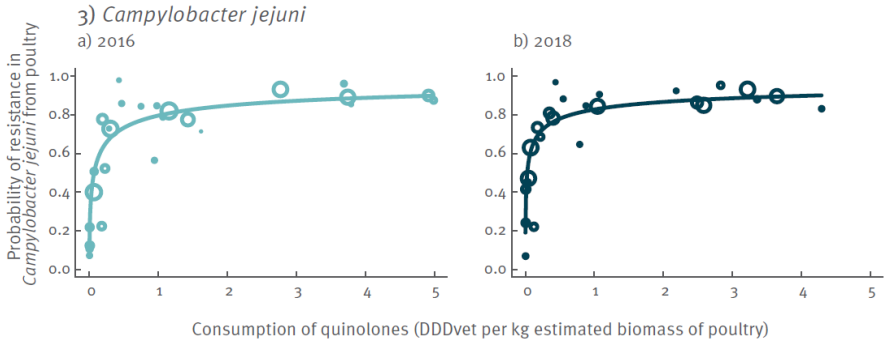


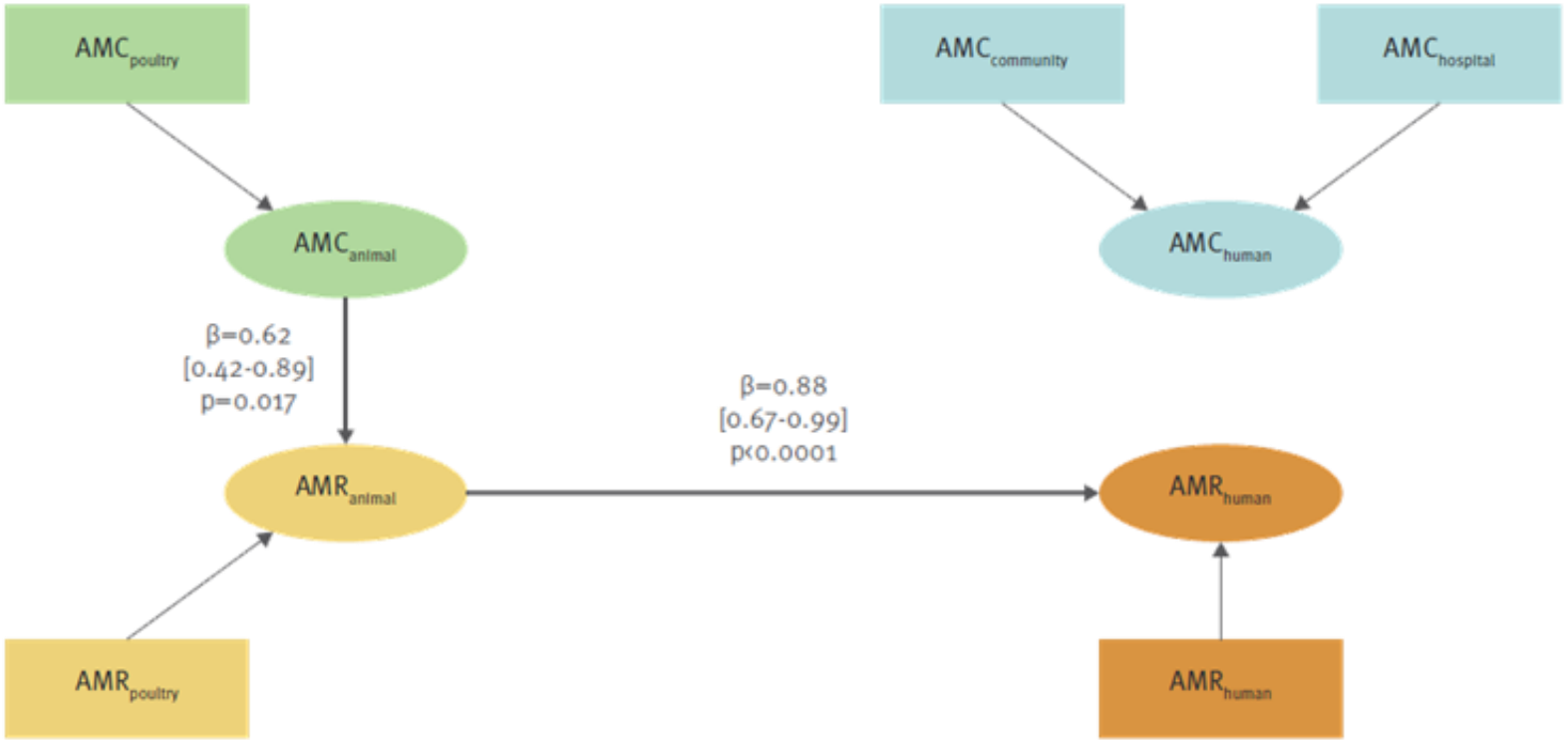
(a) For humans: ATC J01 Antibacterials for systemic use.
(b) For food-producing animals: ATCvet QA07AA, QA07AB, QG01AA, QG01AE, QG01BA, QG01BE, QG51AA, QG51AG, QJ01, QJ51, QP51AG
(c) AT, BE, BG, CY, DE, DK, EE, ES, FI, FR, HR, HU, IE, IS, IT, LT, LU, LV, NL, NO, PL, PT, RO, SE, SI, SK, UK.

AMC *vs.* AMR in *Campylobacter jejuni*

- There are links between **AMC** in animals and **AMR** in bacteria from **food-producing animals**, which in turn is associated with **AMR** in bacteria from **humans**.

- For example, associations were found between consumption of quinolones in food-producing animals and resistance to fluoroquinolons in *Campylobacter spp*. bacteria in food-producing animals and in humans.

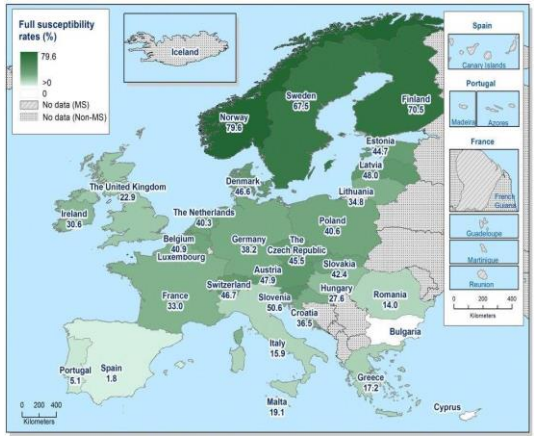


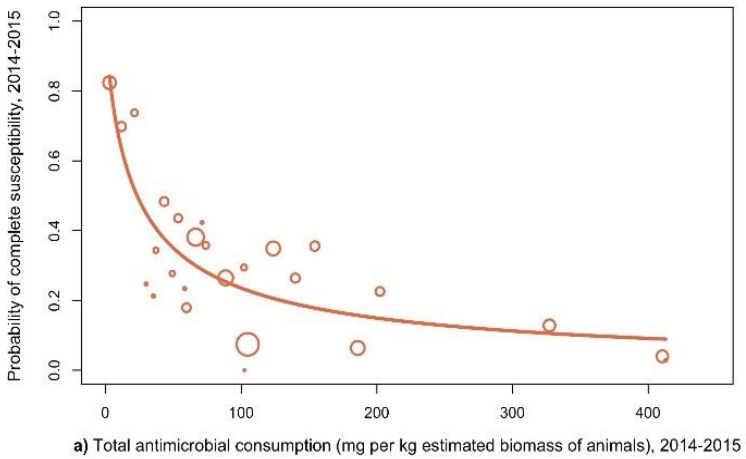


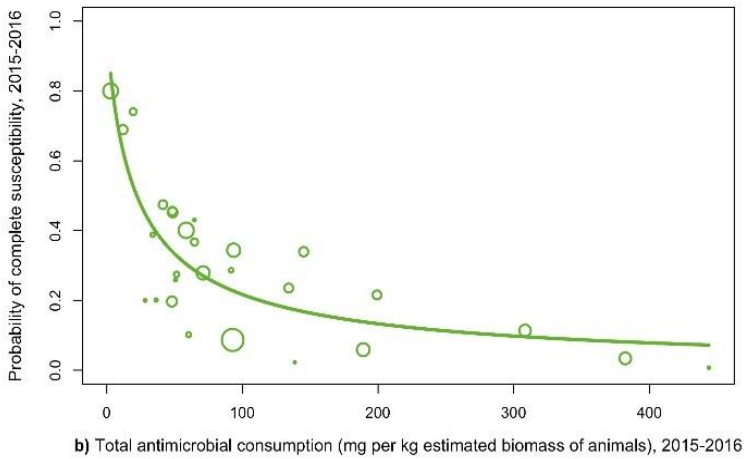
Complete susceptibility in *E. coli* *vs.* AMC in food-producing animals

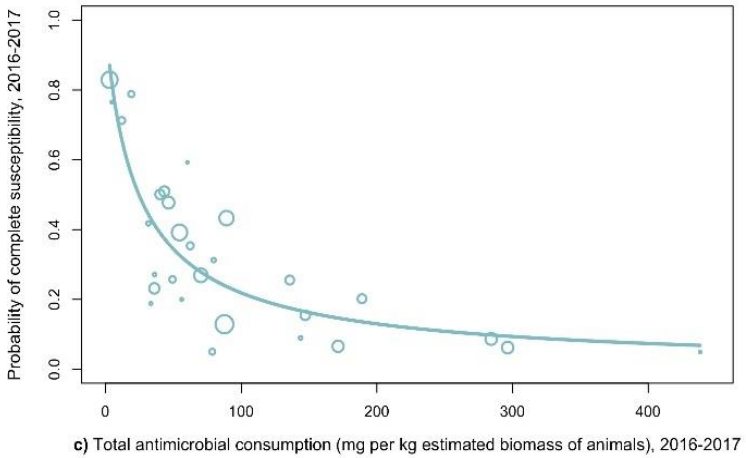
- A statistically significant **negative association** between the **primary key indicators** in food-producing animals, consumption of antimicrobials and the occurrence of completely susceptible indicator *E. coli*.

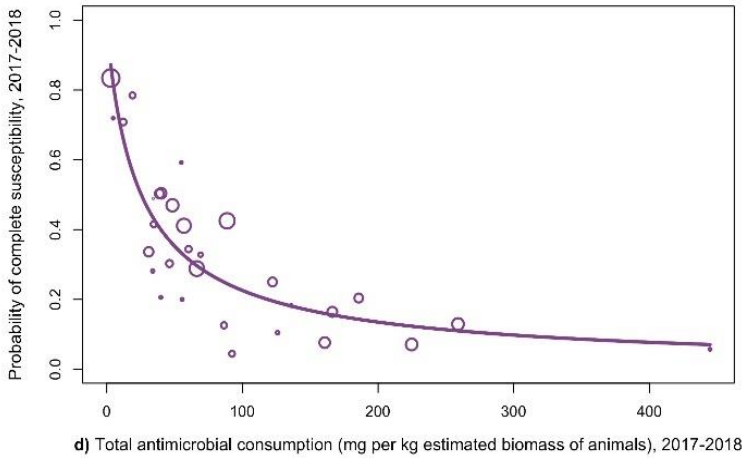
- A clear and consistently lower probability of detecting completely susceptible indicator *E. coli* when AMC was higher.







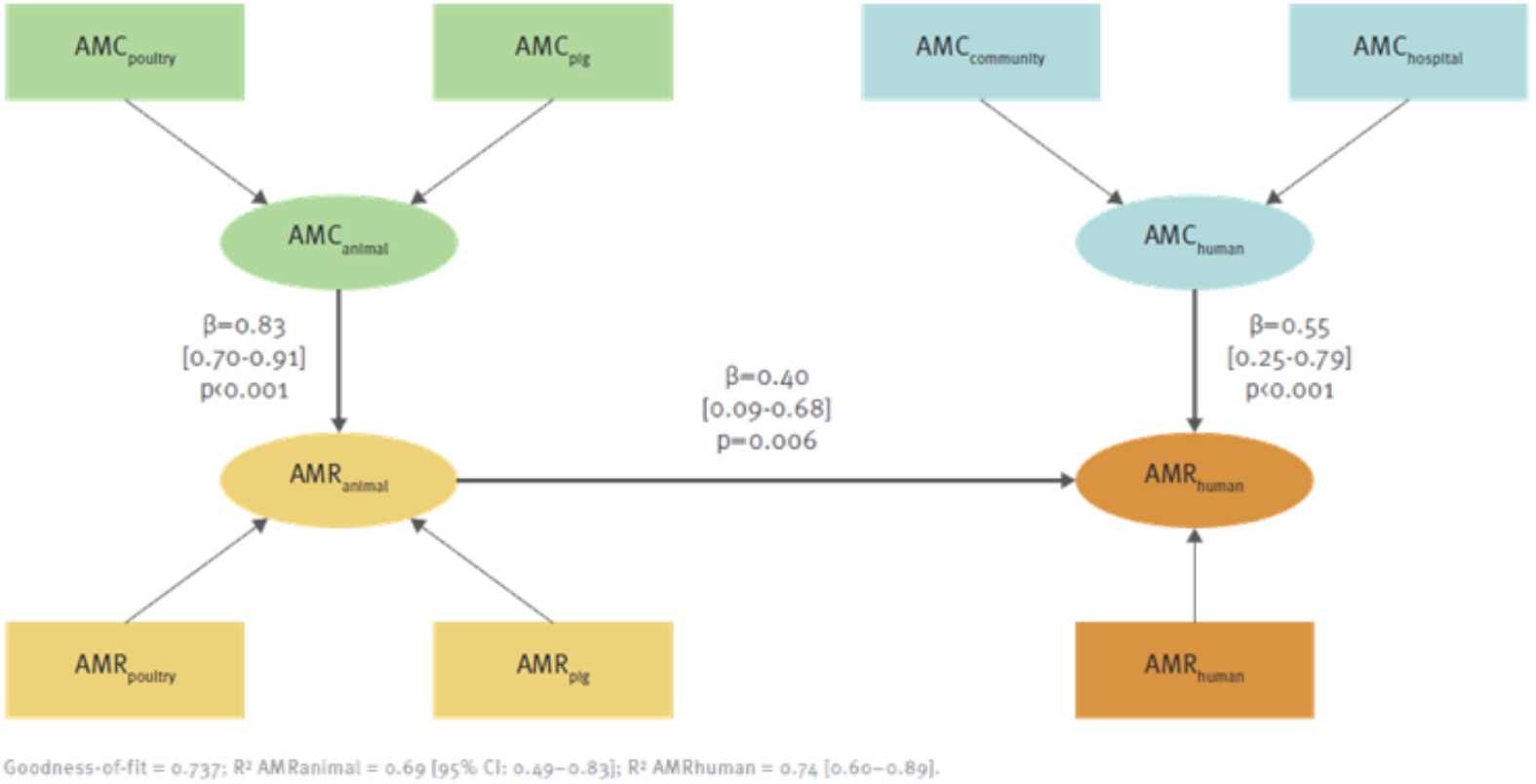


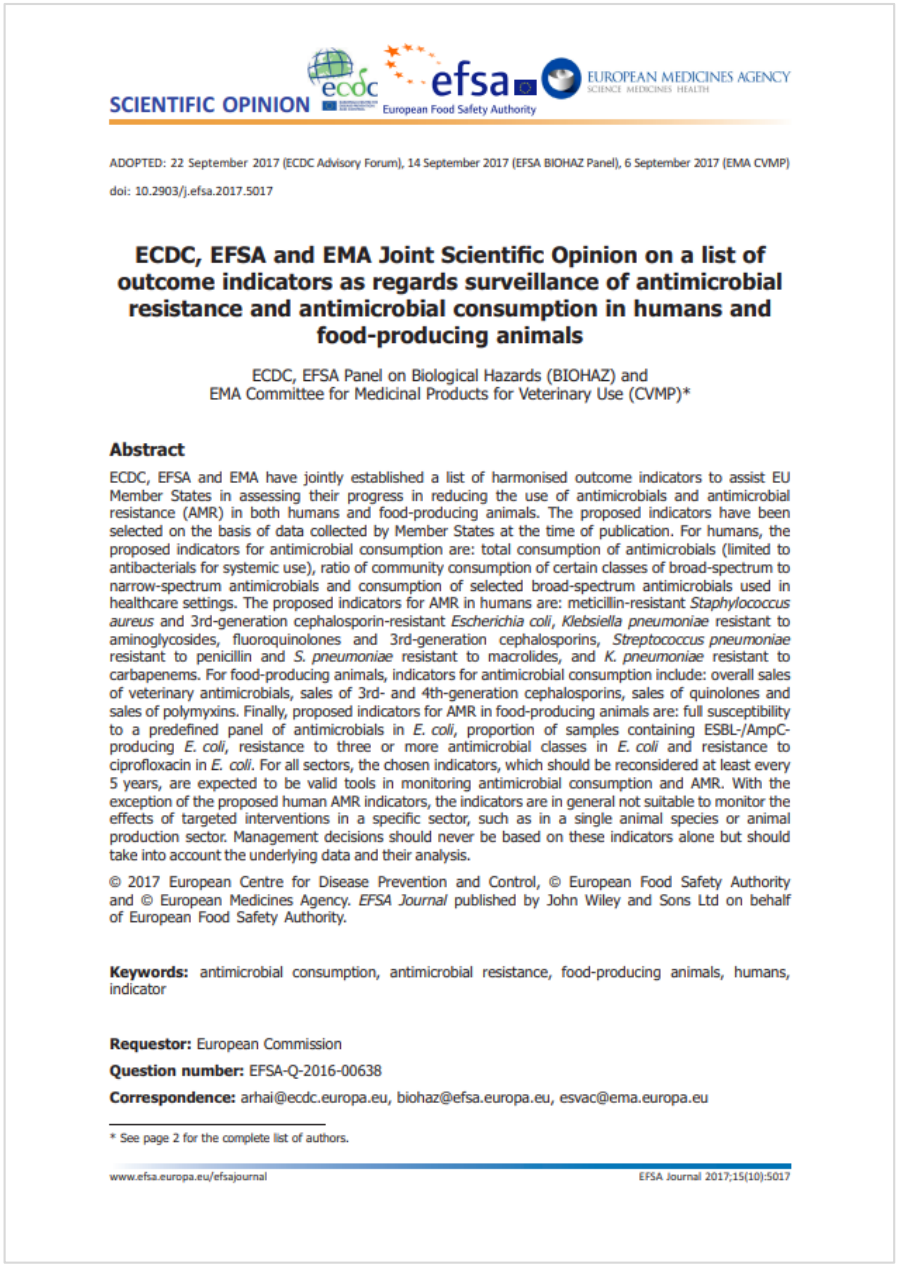


Fluoroquinolone consumption *vs.* fluoroquinolone resistance in *E. coli*

- A significant positive association was observed between fluoroquinolone consumption in food-producing animals, and fluoroquinolone resistance in *E. coli* isolates from food-producing animals and from humans.

- There also was a significant positive association between fluoroquinolone consumption in humans and fluoroquinolone resistance in *E. coli* isolates from humans.





SCIENTIFIC OPINION

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 5 years, are expected to be valid tools in monitoring antimicrobial consumption and AMR. With the exception of the proposed human AMR indicators, the indicators are in general not suitable to monitor the effects of targeted interventions in a specific sector, such as in a single animal species or animal production sector. Management decisions should never be based on these indicators alone but should take into account the underlying data and their analysis.

Keywords: antimicrobial consumption, antimicrobial resistance, food-producing animals, humans, indicator

Requestor: European Commission

Question number: EFSA-Q-2016-00638

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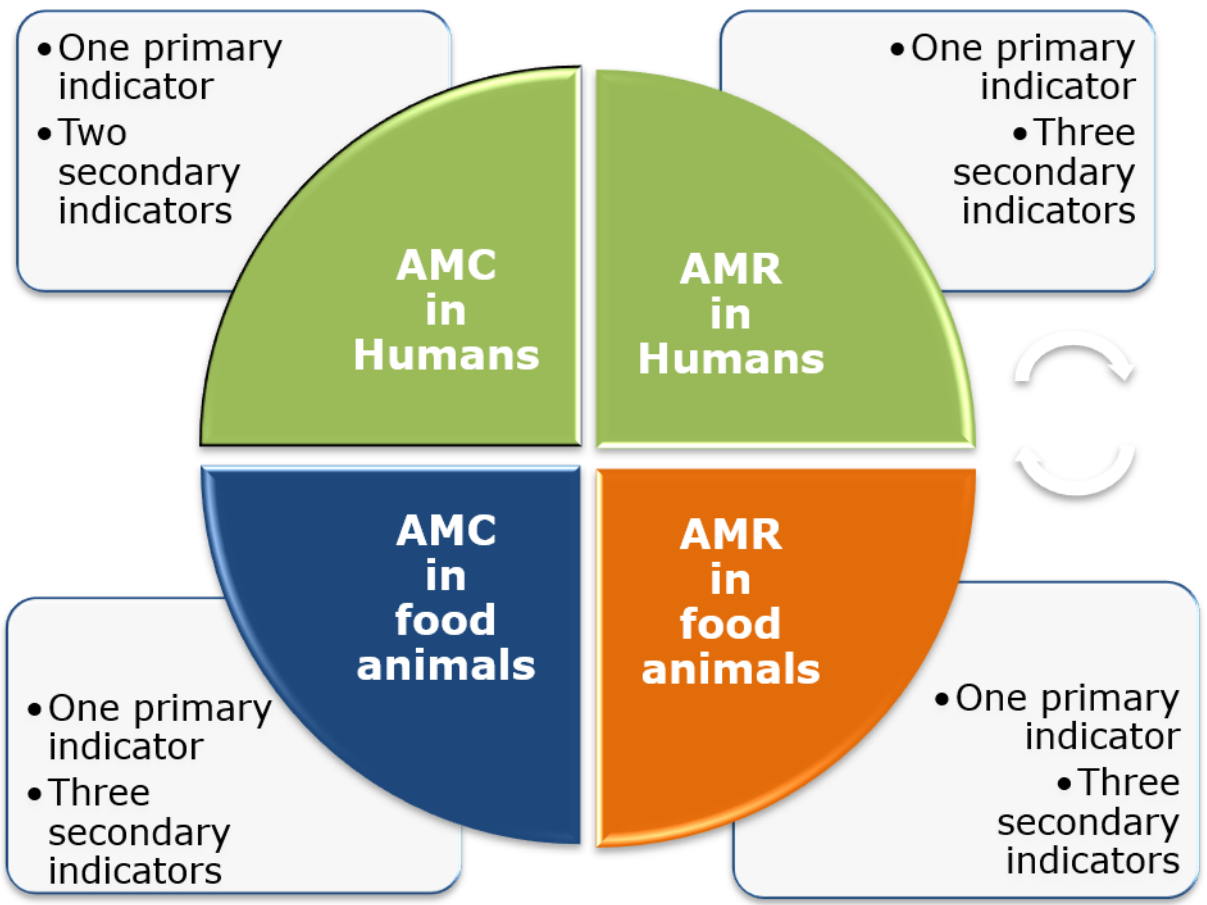
* See page 2 for the complete list of authors.



AMR One Health Network meeting, 5 February 2018

https://www.ecdc.europa.eu/sites/default/files/documents/AMR-indicators-joint-report-Oct-2017.pdf

Outcome indicators for surveillance of AMC and AMR in humans and food-producing animals

	Humans		Food-producing animals	
	AMC	**AMR**	**AMC**	**AMR**
Primary indicators	Total consumption of antibacterials for systemic use (DDD per 1,000 inhabitants and per day)	Proportion of meticillin-resistant *Staphylococcus aureus* (MRSA) and 3rd-generation cephalosporin-resistant *Escherichia coli* (3GCR *E. coli*) given as two individual numbers	Overall sales of veterinary antimicrobials (mg/PCU)	Proportion of indicator *E. coli* from broilers, fattening turkeys, fattening pigs and calves, weighted by PCU, fully susceptible to a predefined panel of antimicrobials
Secondary indicators	Ratio of the consumption of broad-spectrum penicillins, cephalosporins, macrolides (except erythromycin) and fluoroquinolones to the consumption of narrow-spectrum penicillins, cephalosporins and erythromycin	Proportion of *Klebsiella pneumoniae* with combined resistance to aminoglycosides, fluoroquinolones and 3rd-generation cephalosporins	Sales of 3rd- and 4th-generation cephalosporins (mg/PCU)	Proportion of samples positive for presumptive ESBL-/AmpC-producing indicator *E. coli* from broilers, fattening turkeys, fattening pigs and calves weighted by PCU
	Proportion of total hospital AMC that are glycopeptides, 3rd- and 4th-generation cephalosporins, monobactams, carbapenems, fluoroquinolones, polymyxins, piperacillin and enzyme inhibitor, linezolid, tedizolid and daptomycin (DDD per 1,000 inhabitants and per day)	Proportion of penicillin-resistant and macrolide-resistant *Streptococcus pneumoniae*	Sales of quinolones (mg/PCU), specifying the proportion of fluoroquinolones	Proportion of indicator *E. coli* from broilers, fattening turkeys, fattening pigs and calves, weighted by PCU, resistant to at least three antimicrobials from different classes included in a predefined panel of antimicrobials
		Proportion of carbapenem- resistant *Klebsiella pneumoniae*	Sales of polymyxins (mg/PCU)	Proportion of indicator *E. coli* from broilers, fattening turkeys, fattening pigs and calves, weighted by PCU, resistant to ciprofloxacin

AMC: antimicrobial consumption; AMR: antimicrobial resistance; DDD: defined daily doses; PCU: population correction unit.

- **4 primary ('key') indicators**
- 11 secondary indicators

- The chosen indicators should be **reconsidered at least every five years** to evaluate whether they still reflect the data available.
- Data on resistance should be **monitored on a continuous basis**, in order to follow current AMR issues.

Primary key indicators, 2014-2018

		Indicator	2014	2015	2016	2017	2018
Austria	AMC	AMC Humans**	12.1	12.1	11.4	11.9	10.4
		AMC Animals***	56.3	50.7	46.1	46.8	50.1
	AMR	% 3GCR EC Humans	9.7	9.9	10.4	9.9	10.6
		% MRSA Humans	7.8	7.5	7.1	5.9	6.4
		% Complete S EC Animals*		43.5	45.6	47.7	47.1
Belgium	AMC	AMC Humans**	24.0	24.4	24.2	22.8	22.3
		AMC Animals***	158.3	150.1	140.1	131.3	113.1
	AMR	% 3GCR EC Humans	10.7	10.6	11.5	10.5	9.8
		% MRSA Humans	13.5	12.3	12.2	8.5	9.1
		% Complete S EC Animals*		35.6	34.0	25.5	24.6
Bulgaria	AMC	AMC Humans**	20.0	20.1	19.2	20.5	21.0
		AMC Animals***	82.9	121.9	155.3	132.3	119.6
	AMR	% 3GCR EC Humans	40.4	40.0	43.3	41.7	39.0
		% MRSA Humans	20.8	13.1	14.3	13.7	17.6
		% Complete S EC Animals*		0.0	2.3	9.0	10.4
Croatia	AMC	AMC Humans**	19.4	19.7	18.7	18.6	18.8
		AMC Animals***	108.6	95.6	87.9	71.5	66.8
	AMR	% 3GCR EC Humans	11.3	13.4	15.4	17.1	15.7
		% MRSA Humans	21.3	24.5	25.3	28.5	26.4
		% Complete S EC Animals*		29.4	28.6	31.3	32.8
Cyprus*	AMC	AMC Humans**	22.2	26.6	28.4	28.9	NA
		AMC Animals***	391.5	434.2	453.4	423.1	466.3
	AMR	% 3GCR EC Humans	28.8	28.5	30.2	30.8	37.1
		% MRSA Humans	36.0	43.4	38.8	31.2	40.2
		% Complete S EC Animals*		2.8	0.7	4.9	5.7
Czech R	AMC	AMC Humans**	17.1	17.4	NA	NA	NA
		AMC Animals***	79.5	68.1	61.2	63.6	57.0
	AMR	% 3GCR EC Humans	15.7	16.0	16.2	14.6	15.9
		% MRSA Humans	13.0	13.7	13.9	13.2	13.6
		% Complete S EC Animals*		35.8	36.7	35.4	50.4
Denmark	AMC	AMC Humans**	17.1	17.5	17.0	16.2	15.6
		AMC Animals***	44.2	42.2	40.8	39.4	38.2
	AMR	% 3GCR EC Humans	7.8	8.5	8.1	7.8	8.3
		% MRSA Humans	2.5	1.6	2.0	2.5	1.7
		% Complete S EC Animals*		48.3	47.4	50.1	50.3
Estonia	AMC	AMC Humans**	11.9	12.1	12.0	11.6	11.8
		AMC Animals***	77.1	65.2	64.0	56.7	53.3
	AMR	% 3GCR EC Humans	9.8	12.2	10.1	9.1	11.1
		% MRSA Humans	3.1	4.0	3.5	2.1	3.3
		% Complete S EC Animals*		42.3	43.0	59.3	61.8
Finland	AMC	AMC Humans**	19.1	18.1	17.4	15.7	15.5
		AMC Animals***	22.3	20.4	18.6	19.3	18.7
	AMR	% 3GCR EC Humans	6.3	6.6	7.6	7.7	8.3
		% MRSA Humans	2.6	1.9	2.2	2.0	2.0
		% Complete S EC Animals*		73.7	74.1	78.8	78.4
France	AMC	AMC Humans**	24.9	25.6	25.6	24.7	25.3
		AMC Animals***	107.0	70.2	71.9	68.6	64.2
	AMR	% 3GCR EC Humans	10.9	11.9	12.1	10.8	10.2
		% MRSA Humans	17.4	15.7	13.8	12.9	12.1
		% Complete S EC Animals*		26.5	27.9	26.9	28.8
Germany	AMC	AMC Humans**	13.4	13.1	12.8	12.3	11.9
		AMC Animals***	149.3	97.9	89.2	89.0	88.4
	AMR	% 3GCR EC Humans	11.0	10.6	11.5	12.7	12.6
		% MRSA Humans	12.9	11.3	10.2	9.1	7.6
		% Complete S EC Animals*		34.9	34.4	43.3	42.4
Greece	AMC	AMC Humans**	31.0	33.2	33.1	34.2	34.0
		AMC Animals***	NA	57.2	63.5	93.9	90.9
	AMR	% 3GCR EC Humans	21.3	21.1	19.0	19.4	21.3
		% MRSA Humans	37.1	39.4	38.8	38.4	36.4
		% Complete S EC Animals*		NA	10.1	5.0	4.4
Hungary	AMC	AMC Humans**	15.2	15.8	14.4	14.6	14.8
		AMC Animals***	193.1	211.4	187.1	191.0	180.6
	AMR	% 3GCR EC Humans	16.5	16.8	16.8	20.1	22.7
		% MRSA Humans	23.1	24.7	25.2	23.6	23.1
		% Complete S EC Animals*		22.5	21.6	20.2	19.8
Iceland	AMC	AMC Humans**	17.1	17.6	18.2	18.8	20.4
		AMC Animals***	4.9	4.9	4.7	4.6	4.9
	AMR	% 3GCR EC Humans	3.9	1.7	4.7	7.5	8.6
		% MRSA Humans	3.3	0.0	1.3	1.4	0.0
		% Complete S EC Animals*		NA	NA	76.5	71.9
Ireland	AMC	AMC Humans**	21.0	23.0	22.0	20.9	22.7
		AMC Animals***	47.6	51.0	52.1	46.6	46.0
	AMR	% 3GCR EC Humans	11.7	12.4	12.2	12.9	13.9
		% MRSA Humans	19.4	18.1	14.3	16.3	12.4
		% Complete S EC Animals*		27.7	27.4	25.7	30.3

		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
Latvia	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
	AMR	% 3GCR EC Humans	10.9	18.9	24.9	22.9	21.3
		% MRSA Humans	8.2	5.6	4.2	5.7	5.7
		% Complete S EC Animals*		34.3	38.8	41.8	41.5
Lithuania	AMC	AMC Humans**	15.1	15.8	15.6	15.7	17.5
		AMC Animals***	35.5	35.1	37.7	34.8	33.1
	AMR	% 3GCR EC Humans	8.9	16.4	15.0	17.5	16.6
		% MRSA Humans	7.8	8.5	11.3	8.8	8.4
		% Complete S EC Animals*		21.3	20.1	27.1	28.1
Luxembourg	AMC	AMC Humans**	23.2	23.5	22.9	22.6	22.2
		AMC Animals***	40.9	34.6	35.5	35.0	33.6
	AMR	% 3GCR EC Humans	13.3	13.0	13.6	10.4	13.7
		% MRSA Humans	12.0	8.9	10.2	9.5	7.7
		% Complete S EC Animals*		NA	NA	NA	48.9
Malta	AMC	AMC Humans**	22.4	21.2	20.9	22.6	20.9
		AMC Animals***	NA	NA	NA	121.0	150.9
	AMR	% 3GCR EC Humans	11.6	12.2	14.9	16.6	16.0
		% MRSA Humans	43.6	49.4	37.1	42.1	36.4
		% Complete S EC Animals*		NA	NA	NA	NA
Netherlands	AMC	AMC Humans**	10.3	10.4	10.1	9.8	9.7
		AMC Animals***	68.4	64.4	52.7	56.3	57.5
	AMR	% 3GCR EC Humans	6.1	6.3	7.0	6.8	8.0
		% MRSA Humans	1.0	1.3	1.2	1.5	1.2
		% Complete S EC Animals*		38.1	40.1	39.2	41.1
Norway	AMC	AMC Humans**	16.9	16.8	16.2	15.7	15.3
		AMC Animals***	3.1	2.9	2.9	3.1	2.9
	AMR	% 3GCR EC Humans	6.2	6.5	6.1	6.4	7.1
		% MRSA Humans	1.0	1.2	1.2	1.0	0.9
		% Complete S EC Animals*		82.4	80.0	82.9	84.6
Poland	AMC	AMC Humans**	21.2	24.1	22.0	25.4	24.4
		AMC Animals***	140.8	138.9	129.4	165.2	167.4
	AMR	% 3GCR EC Humans	11.2	12.5	14.8	17.1	18.2
		% MRSA Humans	20.6	15.8	16.4	15.2	15.9
		% Complete S EC Animals*		26.4	23.5	15.4	16.4
Portugal	AMC	AMC Humans**	18.0	18.8	19.0	17.8	18.6
		AMC Animals***	201.6	170.2	208.0	134.8	186.6
	AMR	% 3GCR EC Humans	17.3	16.8	16.8	16.2	16.3
		% MRSA Humans	47.4	46.8	43.6	39.2	38.1
		% Complete S EC Animals*		6.4	5.9	6.6	7.8
Romania*	AMC	AMC Humans**	26.6	28.0	24.4	24.5	25.0
		AMC Animals***	109.0	100.5	85.1	90.1	82.7
	AMR	% 3GCR EC Humans	30.1	27.4	23.7	19.9	22.0
		% MRSA Humans	56.0	57.2	50.5	44.4	43.0
		% Complete S EC Animals*		7.4	8.7	12.9	20.1
Slovakia	AMC	AMC Humans**	21.2	24.2	23.6	20.0	22.0
		AMC Animals***	65.9	51.0	50.4	61.9	49.3
	AMR	% 3GCR EC Humans	32.3	31.5	31.2	33.0	31.2
		% MRSA Humans	28.0	28.1	27.1	29.2	26.6
		% Complete S EC Animals*		23.4	25.9	20.0	20.0
Slovenia	AMC	AMC Humans**	13.1	13.3	12.1	12.2	13.2
		AMC Animals***	33.4	26.4	30.3	36.5	43.2
	AMR	% 3GCR EC Humans	13.2	14.0	13.8	13.0	11.4
		% MRSA Humans	13.1	9.2	11.0	9.0	11.7
		% Complete S EC Animals*		24.7	20.0	18.8	20.6
Spain	AMC	AMC Humans**	17.1	17.5	27.5	26.8	26.0
		AMC Animals***	418.8	402.0	362.5	230.3	219.2
	AMR	% 3GCR EC Humans	12.6	12.0	15.4	13.1	13.9
		% MRSA Humans	22.1	25.3	25.8	25.1	24.2
		% Complete S EC Animals*		4.0	3.4	6.2	7.1
Sweden	AMC	AMC Humans**	14.0	13.5	13.2	12.8	12.4
		AMC Animals***	11.5	11.8	12.1	11.8	12.5
	AMR	% 3GCR EC Humans	6.1	6.5	8.7	7.7	8.7
		% MRSA Humans	1.0	0.8	2.3	1.2	1.9
		% Complete S EC Animals*		69.8	68.9	71.3	70.8
UK	AMC	AMC Humans**	20.8	20.1	19.7	19.3	18.8
		AMC Animals***	62.5	56.8	39.3	32.5	29.5
	AMR	% 3GCR EC Humans	10.7	11.8	10.0	11.0	11.8
		% MRSA Humans	11.3	10.8	6.7	6.9	7.3
		% Complete S EC Animals*		17.9	19.7	23.2	33.7

Key AMC indicators

- In most countries, the **key AMC indicators decreased**, both for food-producing animals and in humans.

Key AMR indicators

- The proportion of *E. coli* from **food-producing animals** with **complete** antimicrobial **susceptibility increased** in the majority of EU/EEA countries.
- The proportion of *E. coli* from **humans** with **resistance** to **3rd-generation cephalosporins increased** in 12 countries and **decreased** in 11 countries.
- The proportion of *Staphylococcus aureus* resistant to meticillin (**MRSA**) **decreased** in most EU/EEA countries.
- Substantial variations of all five primary key AMR indicators were observed among EU/EEA countries, and between years within each country.
- In a few countries, the key AMR indicators were all at either a consistently high or consistently low level over the study period (2014-2018).

https://www.ecdc.europa.eu/sites/default/files/documents/JIACRA-III-Antimicrobial-Consumption-and-Resistance-in-Bacteria-from-Humans-and-Animals.pdf; **page 84**.

How to achieve prudent use of antimicrobials?

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

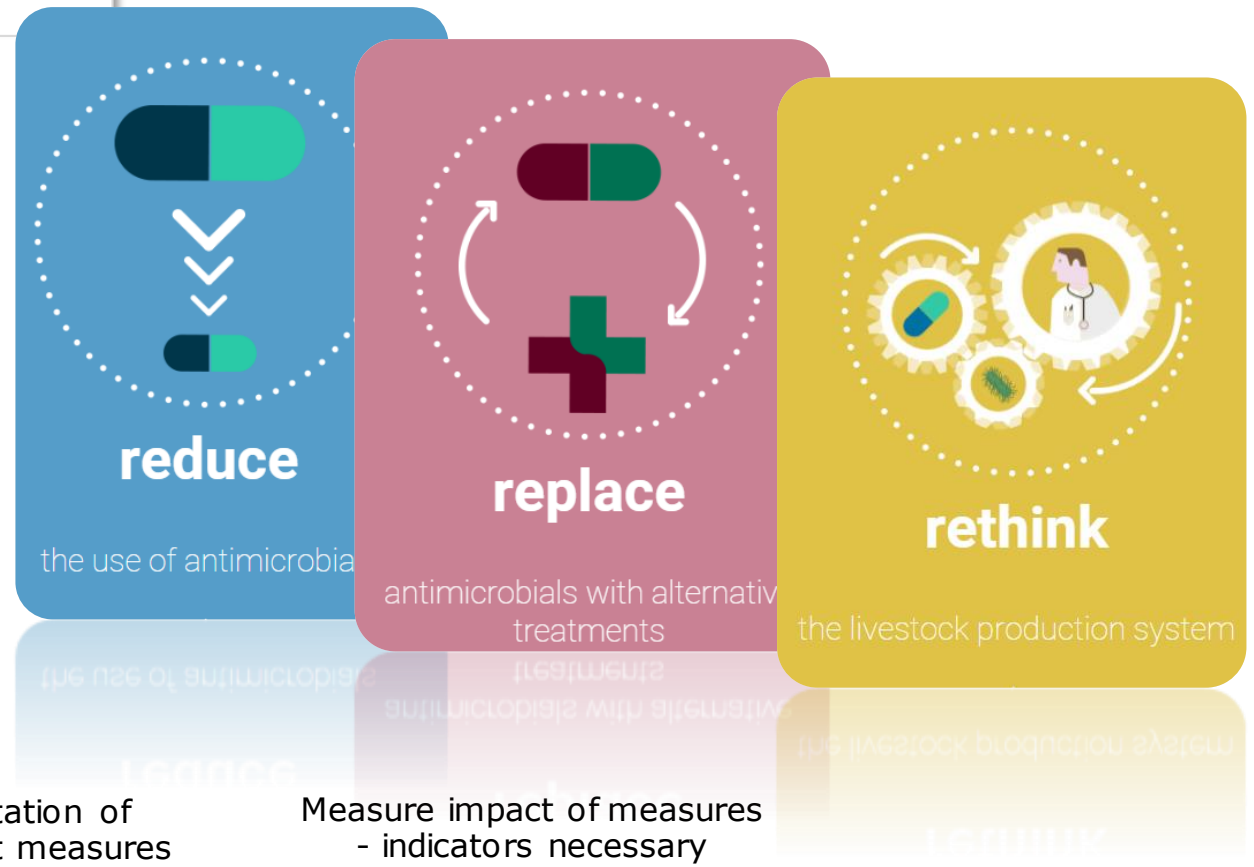
EFSA Journal

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

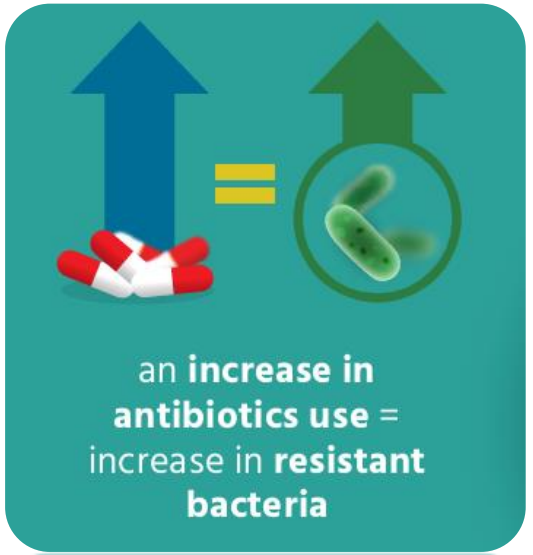
Measure impact of measures - indicators necessary

Conclusions

- Further interventions to **reduce AMC** will have a **beneficial impact on AMR**

- Need to promote, in both humans and food-producing animals:
  - ✓ **prudent use** of antimicrobial agents
  - ✓ **infection prevention and control**,
  - ✓ **prevention of infection**

- High levels of AMC and AMR still being reported
  - ➢ these **interventions to be reinforced**



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- EURL-AR

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KEEPING ANTIBIOTICS WORKING!

Thank you!

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18 November 2022

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