15th EURL-AR Workshop 2021, 21 September 2021

Update from EFSA

P-A Belœil

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Update about recent activities on AMR

- Production of the 2019 EUSR on AMR
- Preparation of the 2021 data reporting (Guidance documents)
- EFSA AMR ENV Scientific Opinion (Beatriz Guerra)
- EFSA WGS platform for supporting AMR data collection (Mirko Rossi)
- JIACRA III report issued in June 2021

Analysis of antimicrobial use and resistance

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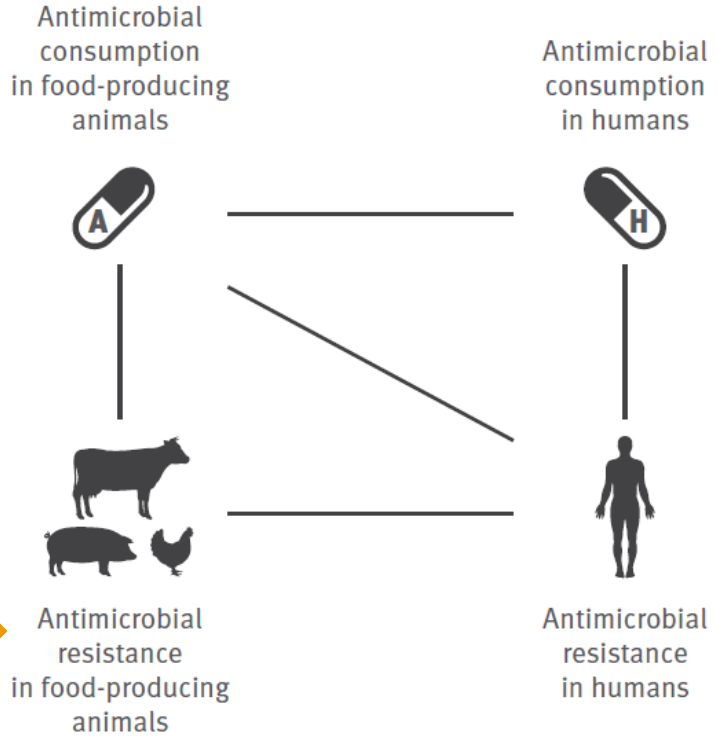
European Surveillance of Veterinary Antimicrobial Consumption (**ESVAC**)



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

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

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

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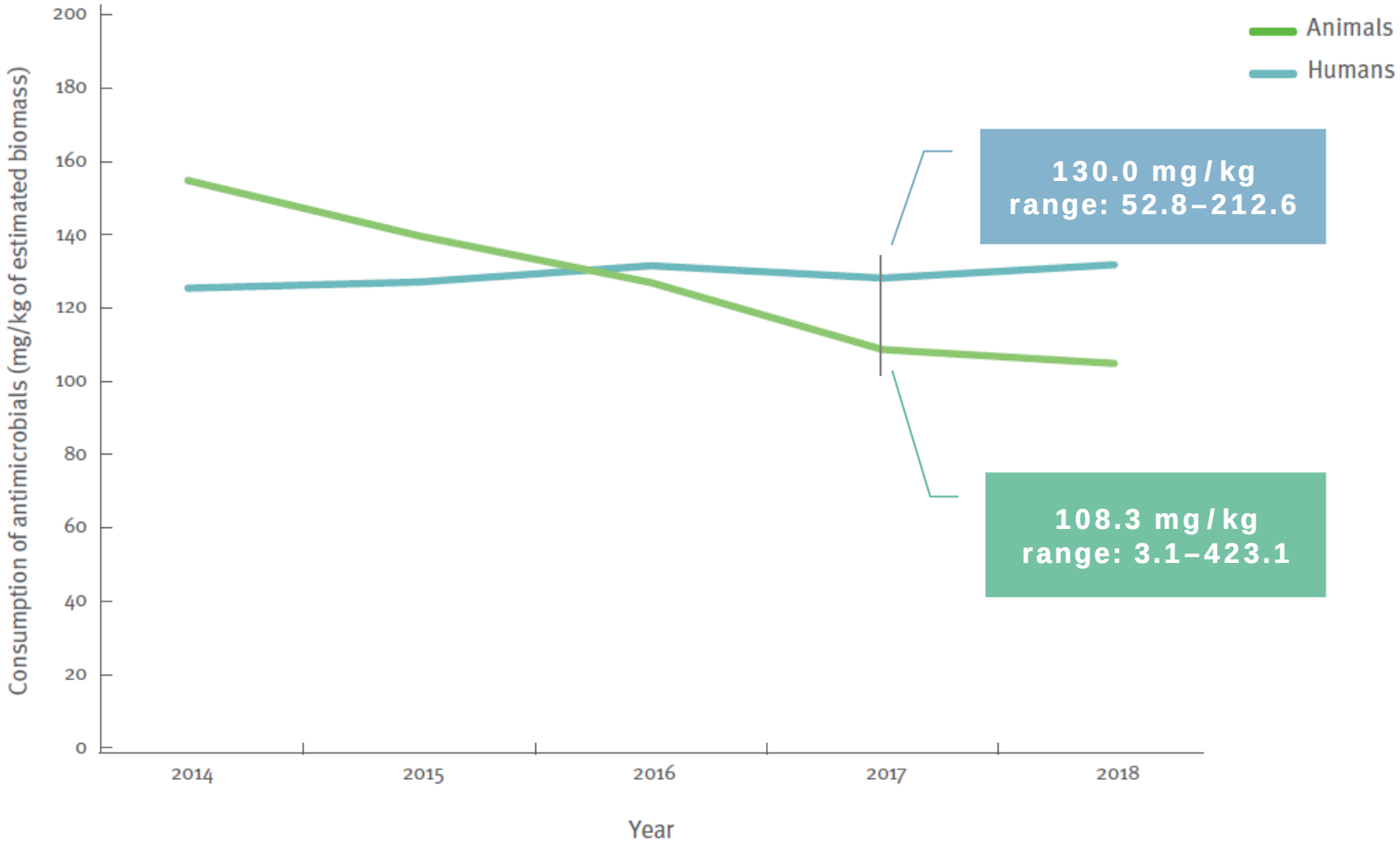
Network on Zoonoses Data Collection

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

Total EU/EEA population weighted mean antimicrobial consumption in humans and food-producing animals

- The overall **AMC** was **lower** in **food-producing animals** than in humans (27 EU/EEA countries) over the 2016-2018 period
- 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**



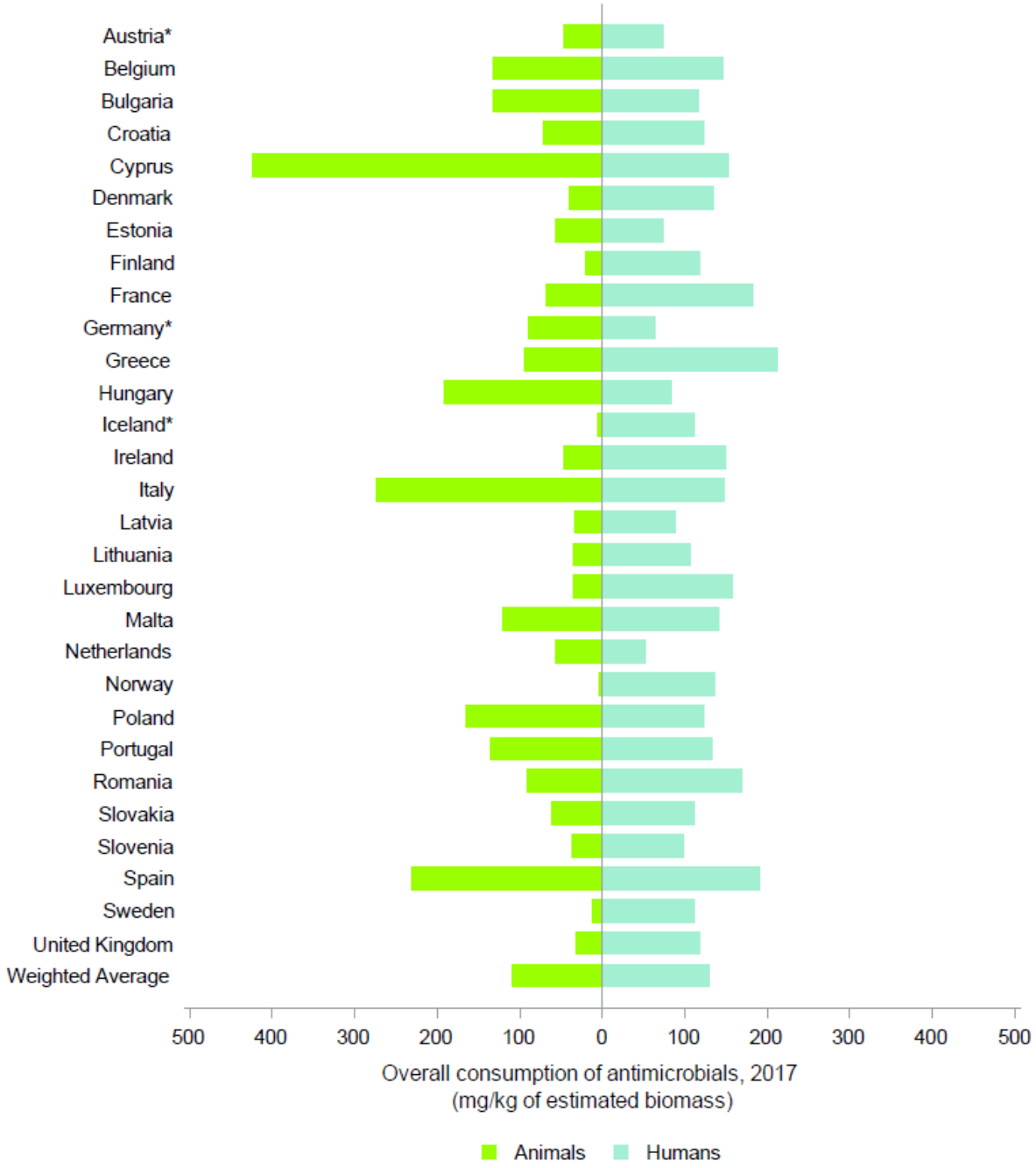
(a) For humans: ATC J01 Antibacterials for systemic use.
(b) For food-producing animals: ATCvet QA07AA, QA07AB, QG01AA, QG01AE, QG01BA, QG01BE, QG51AA, QG51AG, QJ01, QJ51, QP51AG
(c) AT, BE, BG, CY, DE, DK, EE, ES, FI, FR, HR, HU, IE, IS, IT, LT, LU, LV, NL, NO, PL, PT, RO, SE, SI, SK, UK.

Consumption of Antimicrobials in humans and food-producing animals

- Antimicrobial consumption varied by country

- In 2017, among 29 EU/EEA reporting countries:
  - in **20 countries**, AMC was **lower**
  - in **1 country**, AMC was **similar**
  - in **8 countries**, AMC was **higher**

in food-producing animals than in humans



Comparison of biomass-corrected consumption of antimicrobials in humans and food-producing animals by country in 29 EU/EEA countries, 2017

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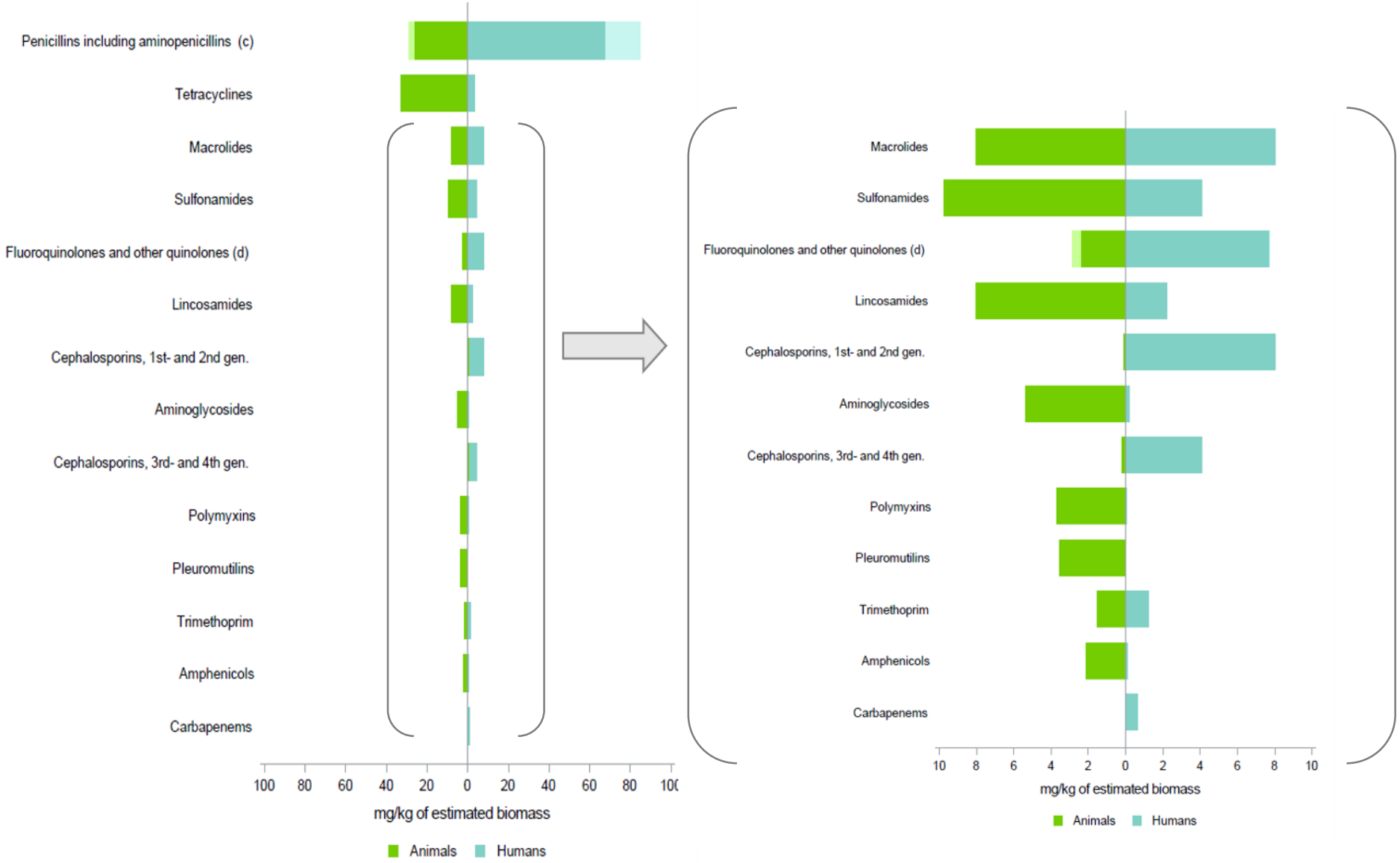
Comparison of consumption of antimicrobial classes in humans and animals

- **Aminopenicillins**, 3rd- and 4th-generation **Cephalosporins**, **Quinolones**[a] were used more in **humans** than in food-producing animals

- **Polymyxins**[b] and **Tetracyclines** were used more in **food-producing animals** than in humans



[a]: fluoroquinolones and other quinolones

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

AMC *vs.* AMR in *E. coli*

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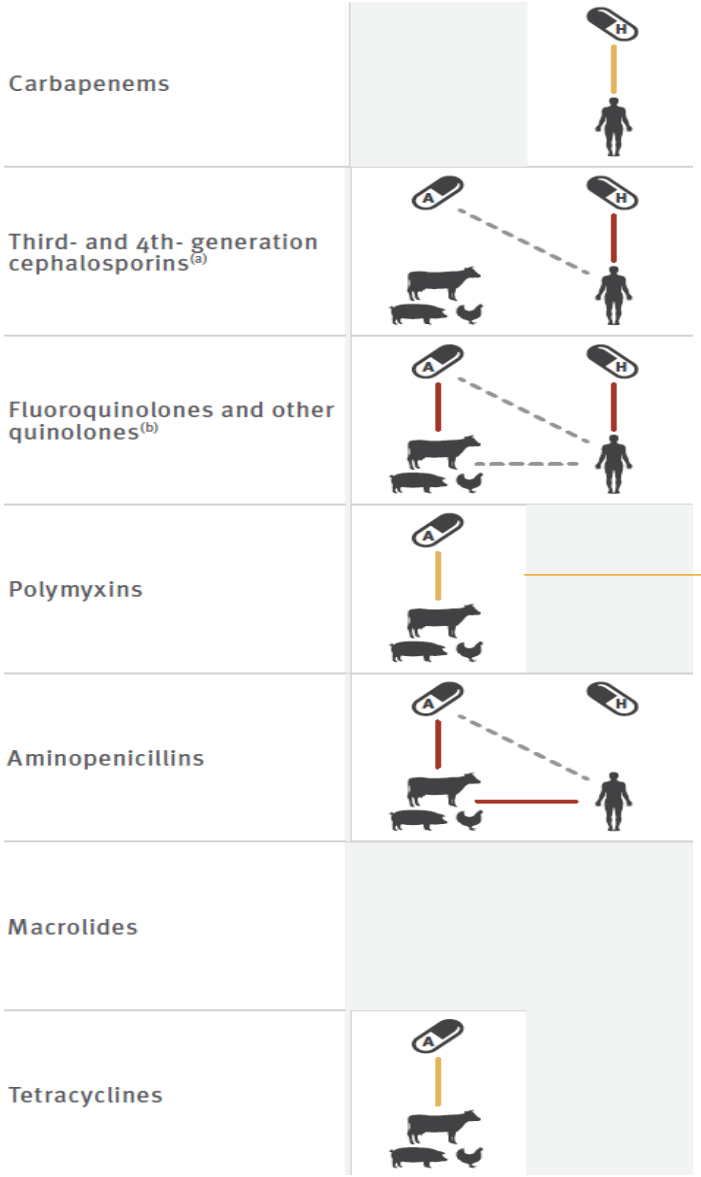
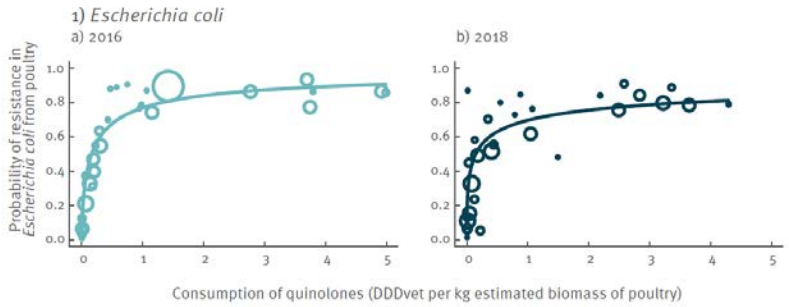
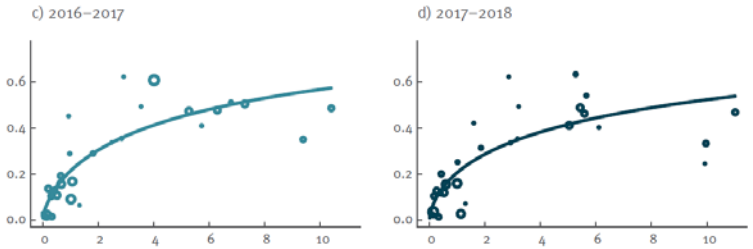
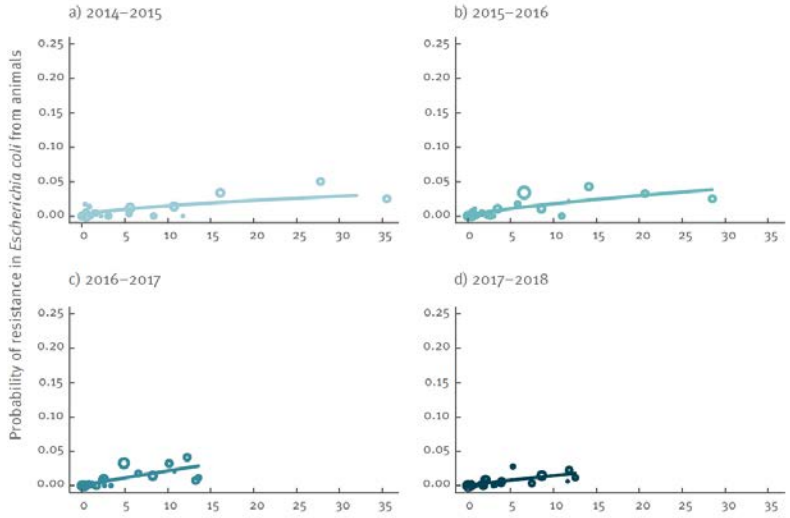
- The use of **carbapenems**, 3rd- and 4th-generation **Cephalosporins**, and **Quinolones** in humans is associated with resistance to these antibiotics in ***E. coli*** infections **in humans**
- Similar associations were found for food-producing animals
- The use of **polymyxins** (colistin) nearly halved in food-producing animals





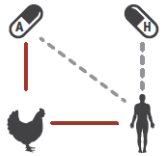


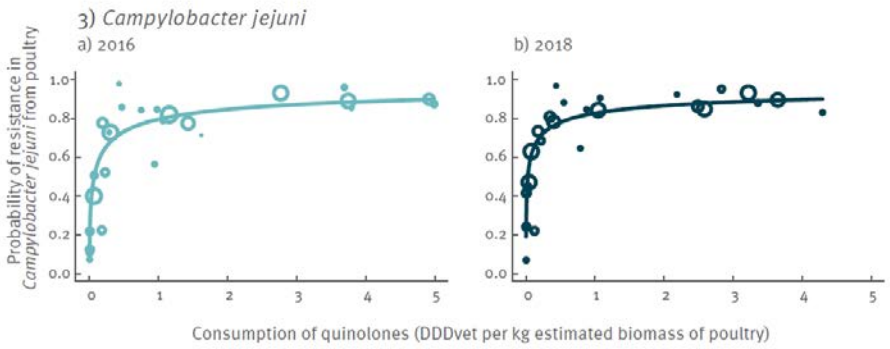


AMC *vs.* AMR in *Campylobacter jejuni*

- 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 resistance to *Campylobacter spp*. bacteria in food-producing animals and in humans.

Carbapenems	
Third- and 4th- generation cephalosporins[a]	
Fluoroquinolones and other quinolones[b]	
Polymyxins	
Aminopenicillins	



Primary Key Indicators over 2014-2018

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Key AMC Indicators

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

		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	42.4	46.0	43.3	41.7	39.8
		% 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	9.3	9.2
		AMC Animals***	68.4	64.4	52.7	56.3	57.5
	AMR	% 3GCR EC Humans	6.1	6.3	7.0	6.9	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***	3.3	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	84.4
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 AMR Indicators

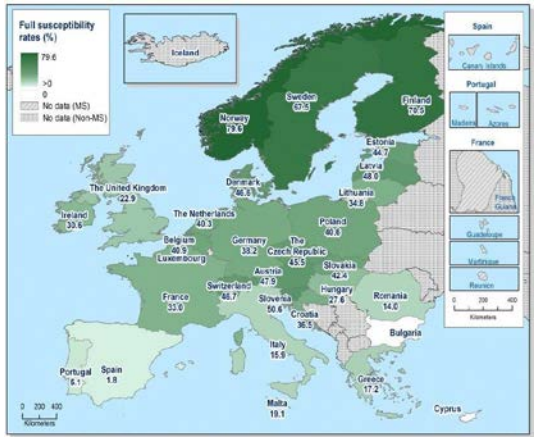
- The proportion of *E. coli* from food-producing animals with **complete** antimicrobial **susceptibility increased** in the majority of EU/EEA countries
- The proportion of *E. coli* from humans with **resistance** to **3rd-generation cephalosporins** increased in 12 countries and decreased in 11 countries.
- The proportion of *Staphylococcus aureus* resistant to methicillin (**MRSA**) **decreased** in most EU/EEA countries.

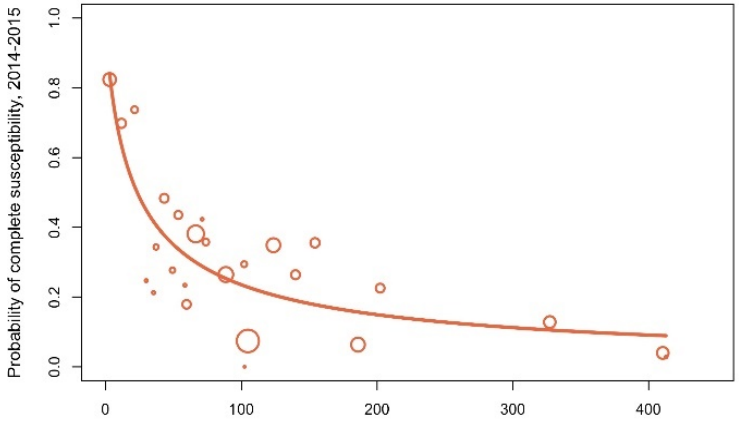
- Substantial variations of all five primary key indicators were observed among EU/EEA countries, and between years within each country.
- In a few countries, the key indicators were all at either a consistently high or consistently low level over the study period (2014-2018).

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

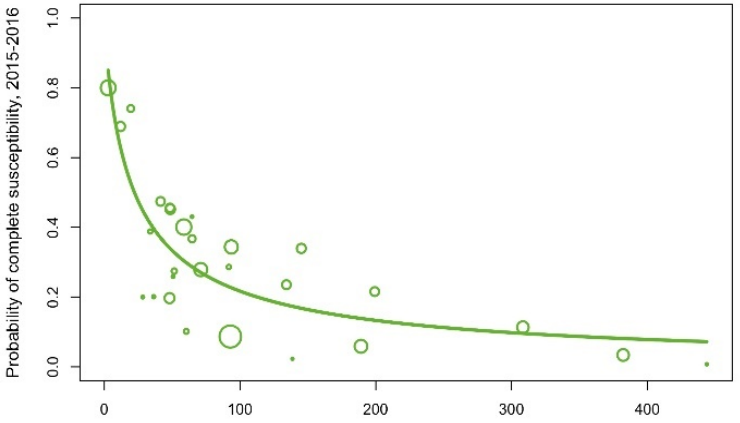
- A statistically significant **negative association** between the **primary key indicators** in food-producing animals, consumption of antimicrobials and the occurrence of completely susceptible indicator *E. coli*.

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

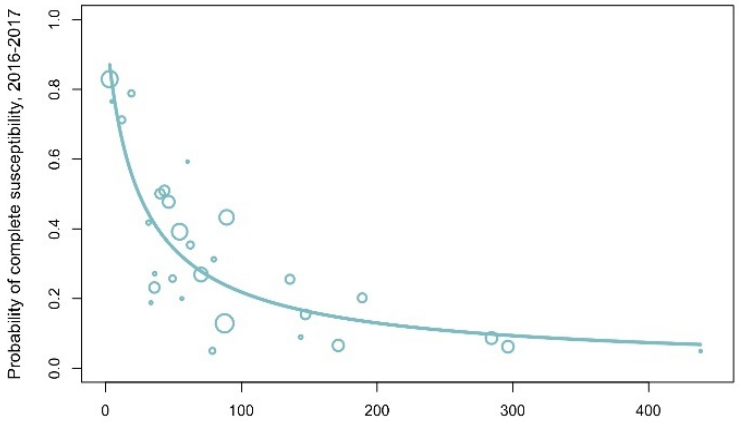




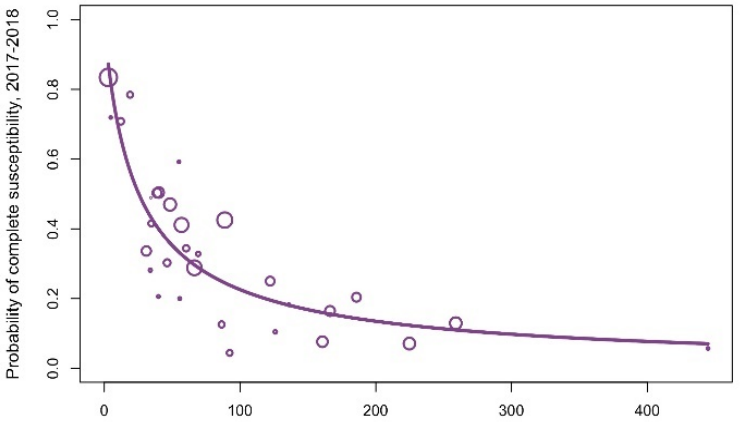
a) Total antimicrobial consumption (mg per kg estimated biomass of animals), 2014-2015



b) Total antimicrobial consumption (mg per kg estimated biomass of animals), 2015-2016



c) Total antimicrobial consumption (mg per kg estimated biomass of animals), 2016-2017



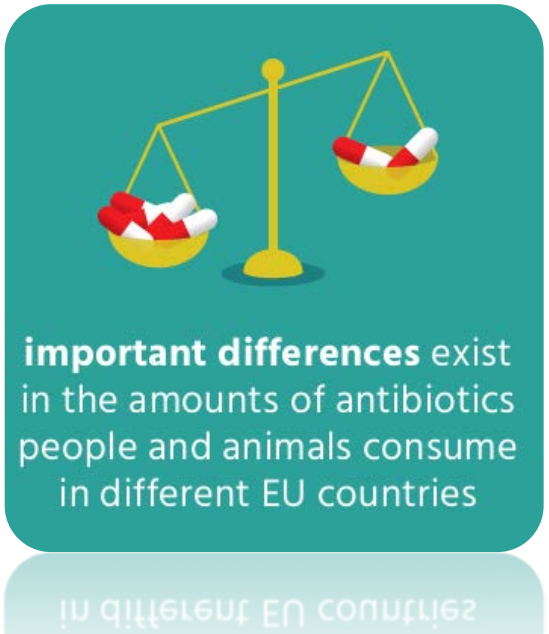
d) Total antimicrobial consumption (mg per kg estimated biomass of animals), 2017-2018

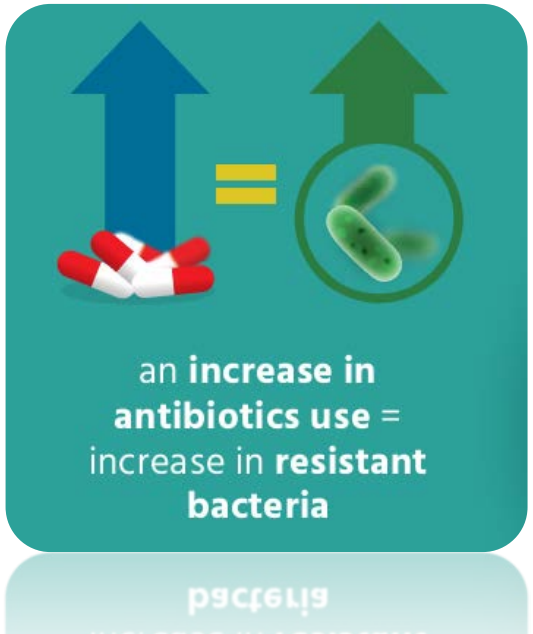
Conclusions

- 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 control**,
  - ✓ **prevention of infection**

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





Gr	AMR	% 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	[illegible]	[illegible]	[illegible]
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	12.3	12.9	13.9