



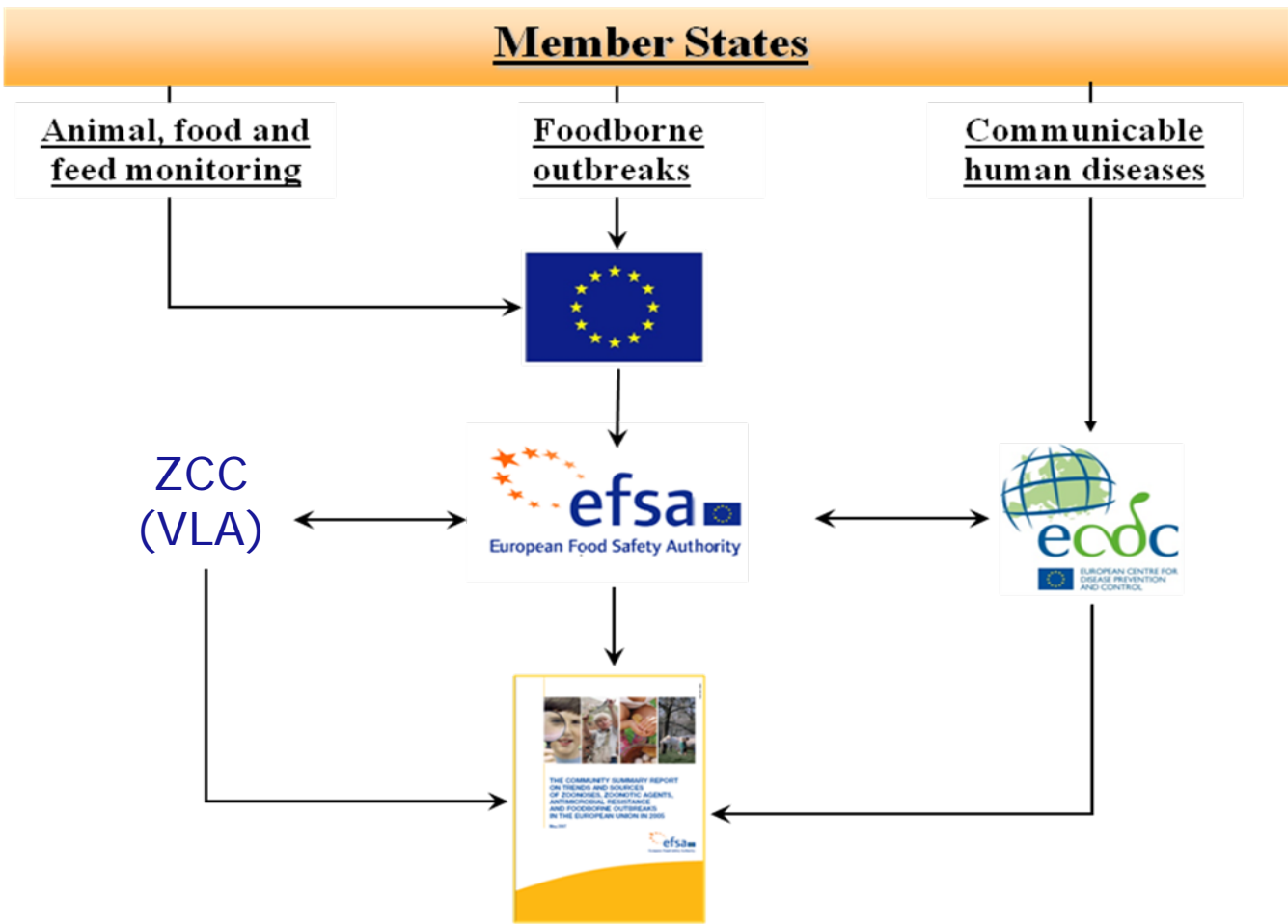
The European Union Summary Report on antimicrobial resistance in zoonotic and indicator bacteria from humans, animals and food for 2009

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Unit on Zoonoses Data Collection

Workshop of EU RL AMR, Copenhagen, 4 April 2011

Collection of data on zoonoses, zoonotic agents, AMR and food-borne outbreaks in the EU



Data on humans are collected through The European Surveillance System (TESSy) maintained by ECDC



- Clinical isolates of salmonellosis and campylobacteriosis
- Only S/I/R interpretation of ASTs
- Large panel of antimicrobials tested and reported
- Guidelines for AST method and interpretation differed
 - Mixture of disc diffusion, E-test and dilution
 - Different thresholds used for interpretation

Antimicrobial susceptibility testing guidelines

Salmonella

Country	No. reported antimicrobials	Guidelines
Austria	11	CLSI M100 breakpoints
Denmark	11	EUCAST epidemiological cut-offs (ECOFFS)
Estonia	11	CLSI
Germany	8	National + CLSI for NAL
Ireland	11	CLSI
Italy	11	CLSI
Latvia	6	CLSI
Lithuania	11	CLSI
Luxembourg	11	CLSI
Malta	4	Modified CLSI
Netherlands	8	EUCAST ECOFFS with EFSA modification for STR, CLSI for SSS
Romania	11	CLSI
Slovakia	8	CLSI
Slovenia	11	CLSI
Spain	11	CLSI
UK	11	National
Iceland	5	CLSI

Antimicrobial susceptibility testing guidelines

Campylobacter

Country	No. reported antimicrobials	Guidelines
Austria	4	National
Estonia	4	SRGA-M + CLSI M45-A
Italy	6	CLSI adapted to all antimicrobials
Lithuania	5	BSAC
Luxembourg	3	CA-SFM
Malta	2	CA-SFM
Netherlands	3	Not specified
Slovakia	3	CLSI
Slovenia	7	CA-SFM + CLSI
Spain	7	CA-SFM + CLSI
UK	7	BSAC + modified CLSI
Iceland	2	CLSI?



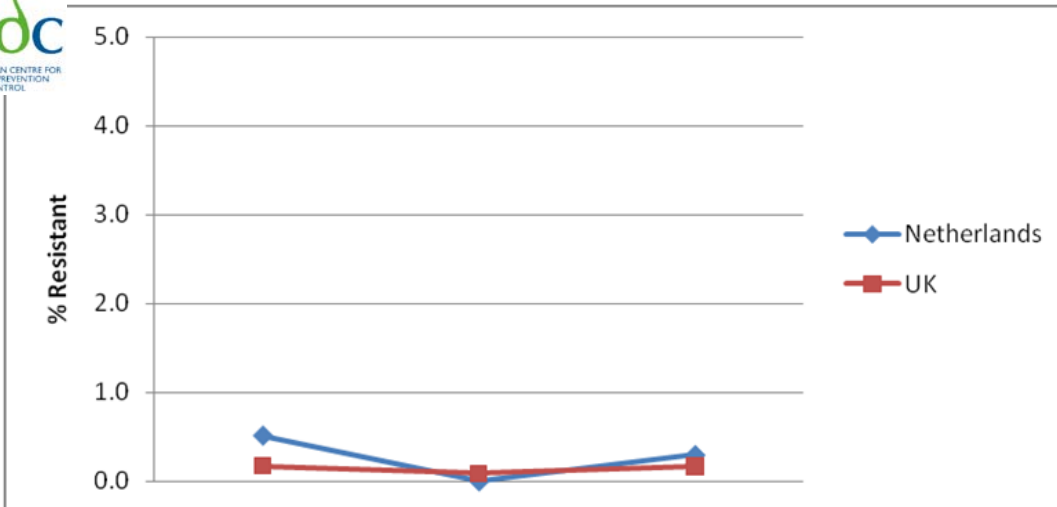
- *Salmonella* spp., *S. Enteritidis* and *S. Typhimurium*
 - Results presented as % resistant isolates for each antimicrobial
 - Three-year trends visualised for cefotaxime and ciprofloxacin
- *Campylobacter*, *C. jejuni* and *C. coli*
 - Results presented as % resistant isolates for each antimicrobial
 - Three-year trends visualised for ciprofloxacin and erythromycin



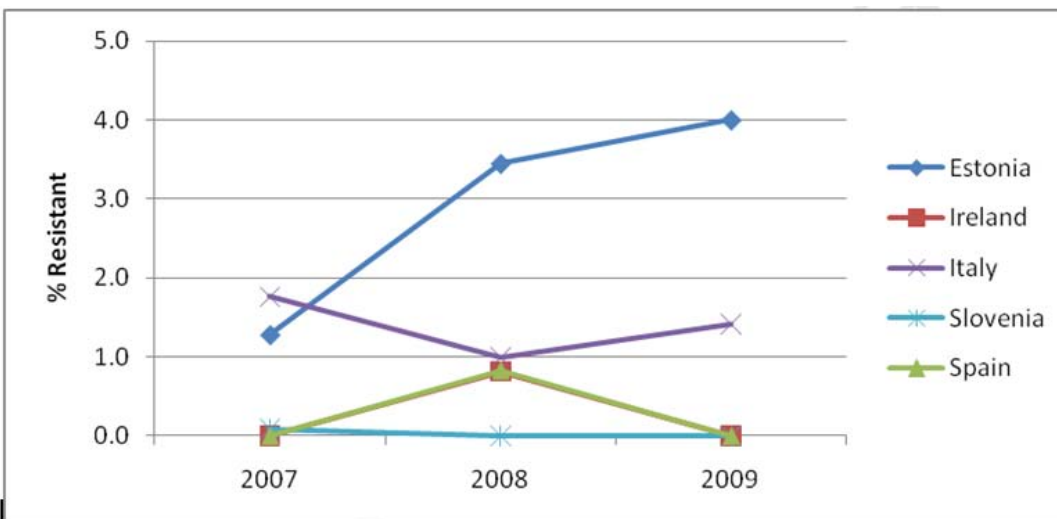
- ***Salmonella***

- 16 MSs and 1 non-MS reported AST data in *Salmonella*
- Numer of isolates representing 24% of reported salmonellosis cases in EU/EEA in 2009
- High resistance for ampicillin, tetracyclines and sulphonamides, especially for *S. Typhimurium* (around 50%)
- Low resistance (0-4%) for cefotaxime and ciprofloxacin, with the exception of countries using epidemiological cut-off values

Cefotaxime resistance in *S. Enteritidis* from human samples, 2007-2009



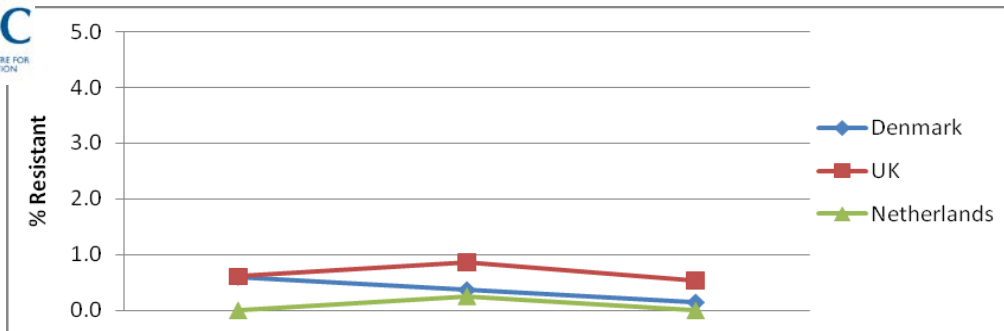
Countries that use
**EUCAST ECOFF (>0.5 mg/L) or
similar standard (1 mg/L).**



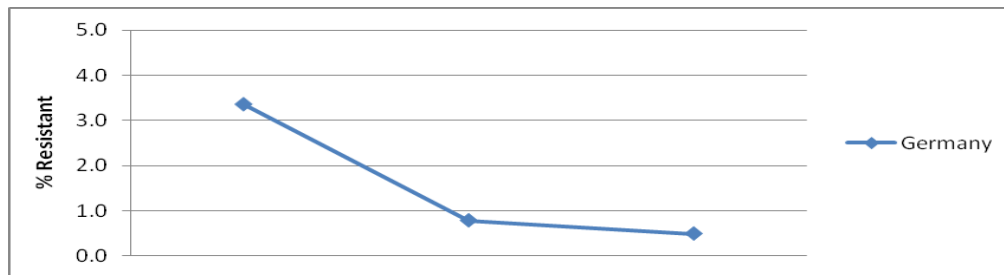
Countries that use
CLSI breakpoint (≥ 64 mg/L)

Countries that reported 0% resistance
throughout this period are not shown:
Germany and Luxembourg.

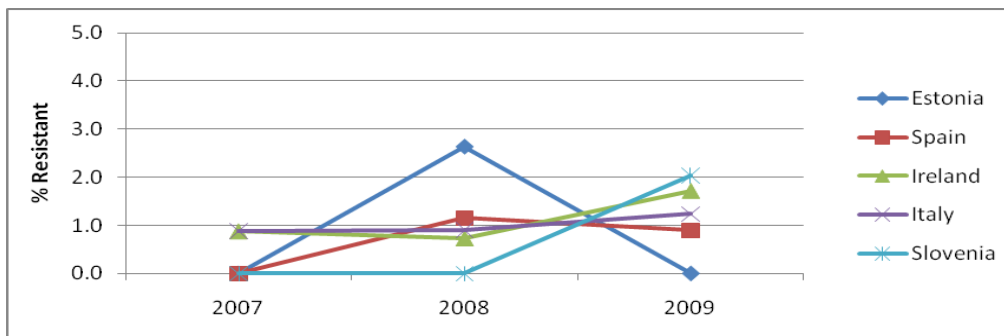
Cefotaxime resistance in *S. Typhimurium* from human samples, 2007-2009



Countries that use **EUCAST ECOFF (>0.5 mg/L) or similar standard (1 mg/L).**



Country that uses **a national standard (>8 mg/L)**



Countries that use **CLSI breakpoint (≥ 64 mg/L).**

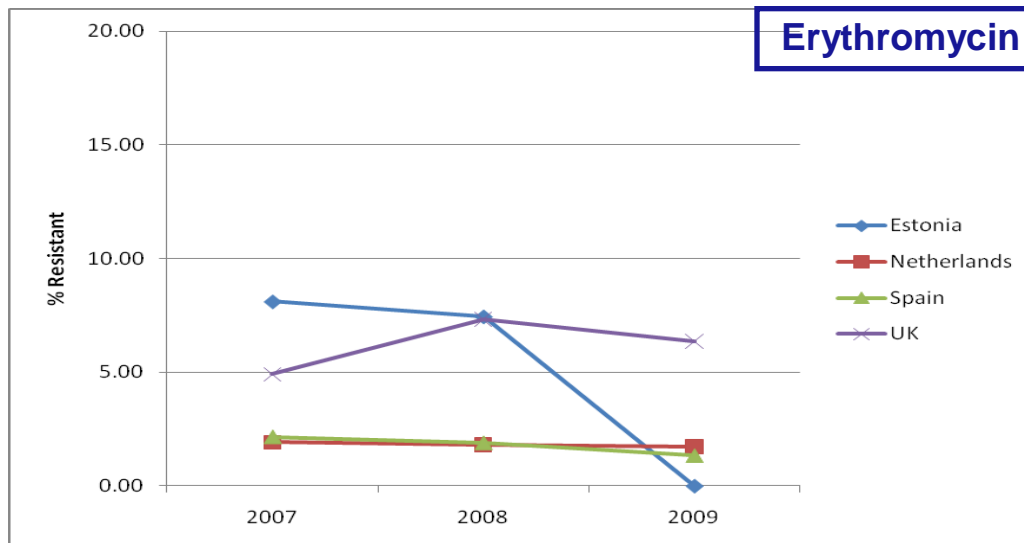
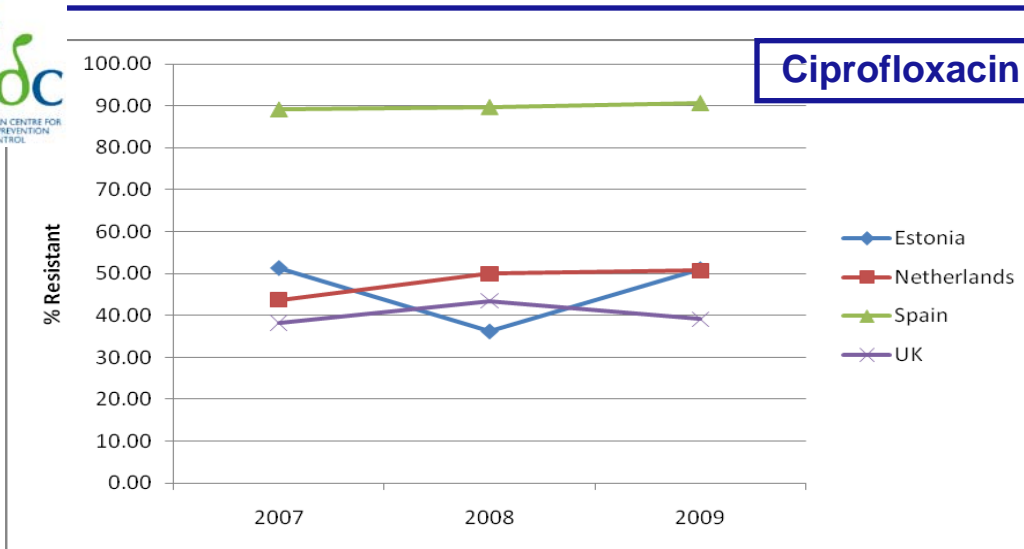
Countries that reported 0% resistance throughout this period are not shown: **Luxembourg.**



- ***Campylobacter***

- 11 MSs and 1 non MS reported AST in *Campylobacter*
- Number of isolates representing 14% of reported *Campylobacter* infection cases in EU/EEA in 2009
 - High resistance for ampicillin, ciprofloxacin and nalidixic acid
 - Low resistance (0-10%) for erythromycin

Antimicrobial resistance in *C. jejuni* from human samples, 2007-2009



Direct comparisons between countries should be avoided due to use of different standards for testing:

- Estonia (SRGA-M)
- Netherlands (unspecified)
- Spain (CLSI)
- UK (modified CLSI)

Countries that reported 0% resistance throughout this period are not shown:
Malta.

Human AMR data available in 2009

Issues identified for human data

- Assessment of EU situation difficult when 2/5 and 3/5 MSs do not report AST data for *Salmonella* and *Campylobacter*, respectively
- Harmonisation needed on which guidelines to use when interpreting human data
- Many countries use disc diffusion for *Campylobacter* antimicrobial susceptibility testing though known problem with poor reproducibility
- International standards on breakpoints for several antimicrobials missing for *Campylobacter*

- Data mainly from fowl (*Gallus gallus*), pigs and cattle, and less data from meat thereof
 - 24 MSs + 2 non-MSs reported on AMR in *Salmonella*
 - 16 MSs + 2 non-MSs reported on AMR in *Campylobacter*
 - 12 MSs + 2 non-MSs reported on AMR in indicator *E. coli*
 - 9 MSs + 1 non-MSs reported on AMR in indicator enterococci
- The number of MSs reporting quantitative data on AMR increased from 18 MSs to 24 MSs from 2004 to 2009
- Quantitative data were mainly reported as MICs
- Scarce quantitative disk diffusion data (only reported for *Salmonella*) were analysed in the qualitative chapter

- Harmonised **epidemiological cut-off values** used for MICs

Epidemiological cut-off values ↔ Microbiological Resistance

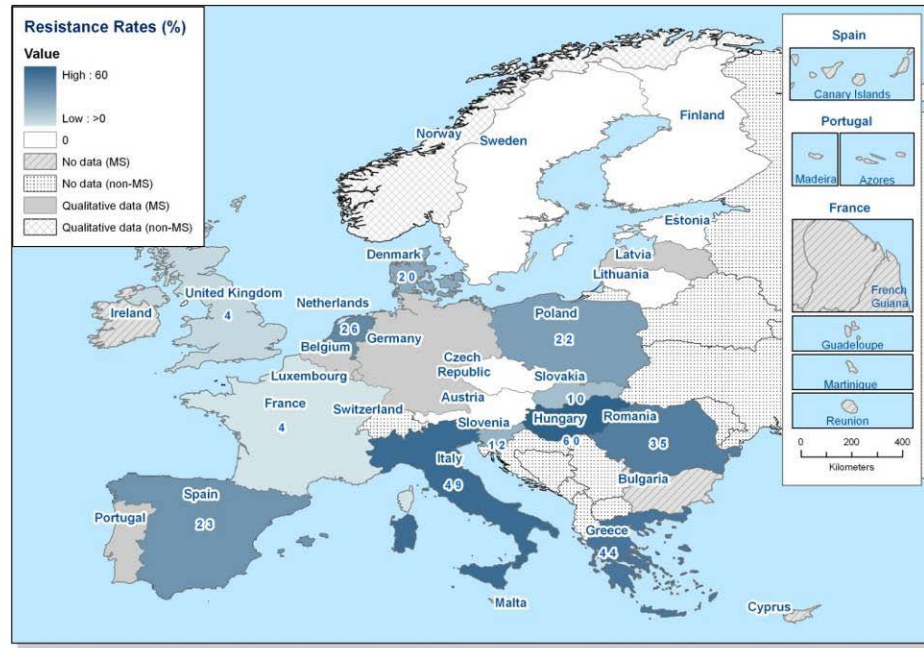
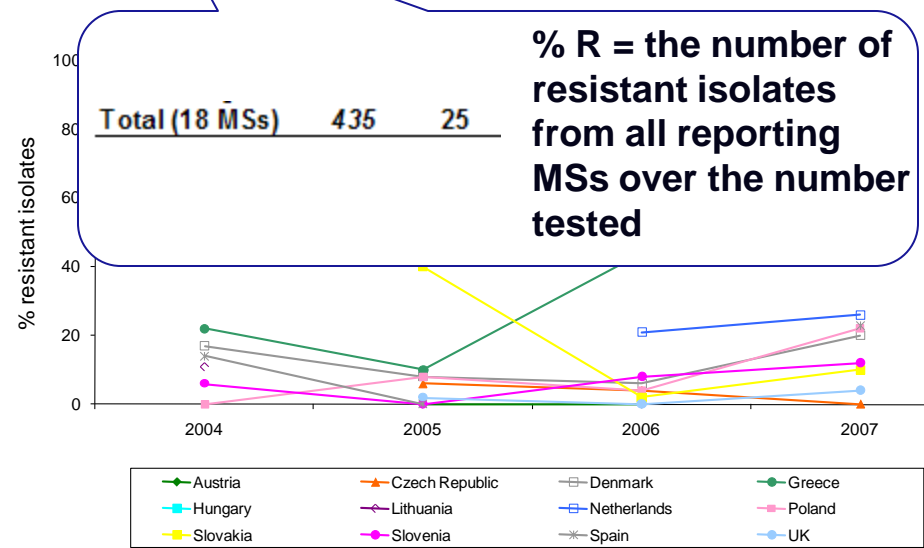
- Analyses of **trends** over the years (in MS / in the EU)
 - Developments in the EU and in MSs
 - Emerging resistance
- Spatial (geographical) distributions through **maps**
- EFSA is in a process of developing the analyses of AMR data at the Community level (supra-national)

Presentation of AMR data

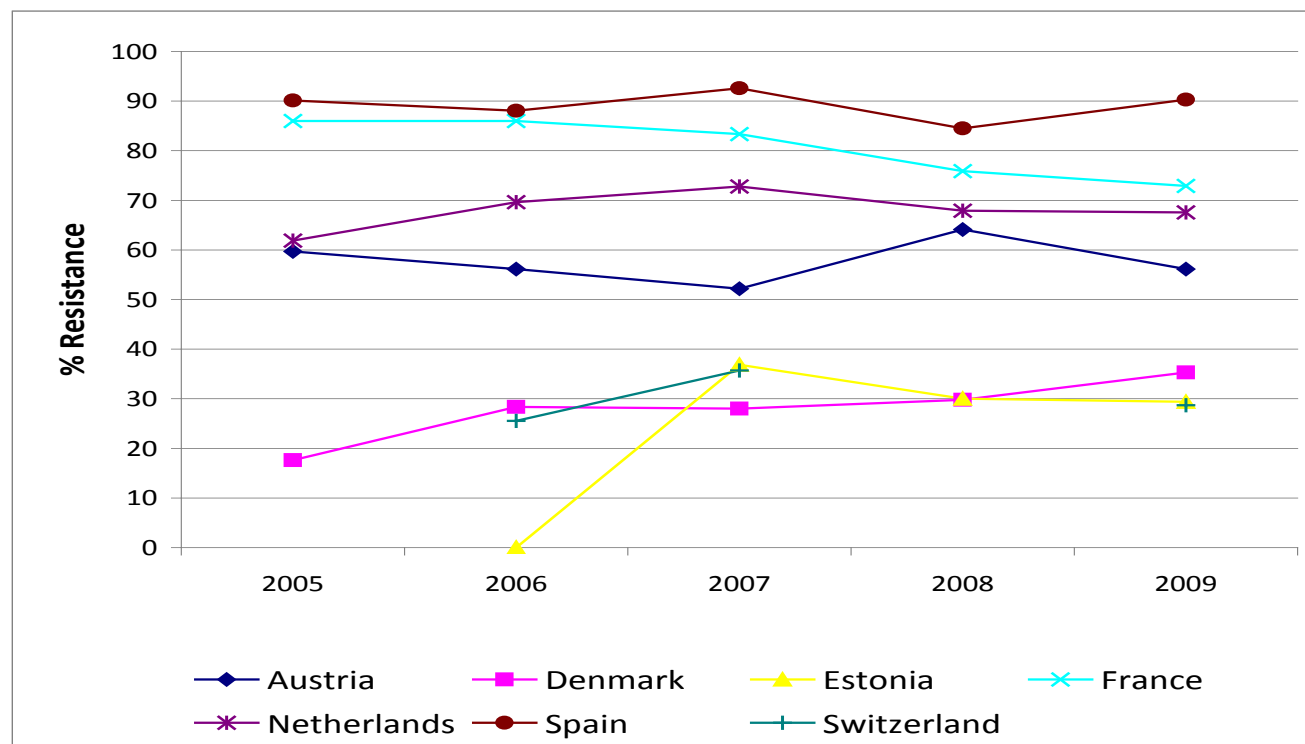
Country	Tetracycline								Chloramphenicol								Ampicillin								Ceftiofur								Cefotaxime																																		
	2004		2005		2006		2007		2004		2005		2006		2007		2004		2005		2006		2007		2004		2005		2006		2007		2004		2005		2006		2007																												
	N	% Res	N	% Res	N	% Res	N	% Res	N	% Res	N	% Res	N	% Res	N	% Res	N	% Res	N	% Res	N	% Res	N	% Res	N	% Res	N	% Res	N	% Res	N	% Res	N	% Res	N	% Res	N	% Res	N	% Res																											
Total (18 MSs)	435	25	1025	12	741	21	1457	18	436	78	0	28	0	31	6	25	4	234	0	30	13	18	17	78	1	28	14	78	0	28	0	153	1	178	0	25	0	33	0	36	8	18	6	110	0	89	0	137	0	295	8	15	0	0	0	402	0	53	0	36	8	128	1	141	1	991	5

Tetracycline			
2005		2006	
N	% Res	N	% Res
78	0	28	0
31	6	25	4

% R = the number of resistant isolates over the number tested



- **Microbiological Resistance** to antimicrobials was commonly found in isolates of *Salmonella*, *Campylobacter* and indicator *E. coli* and enterococci from animals and food in the EU
- For many of the antimicrobials tested, there were large differences in the occurrence of resistance in different MSs



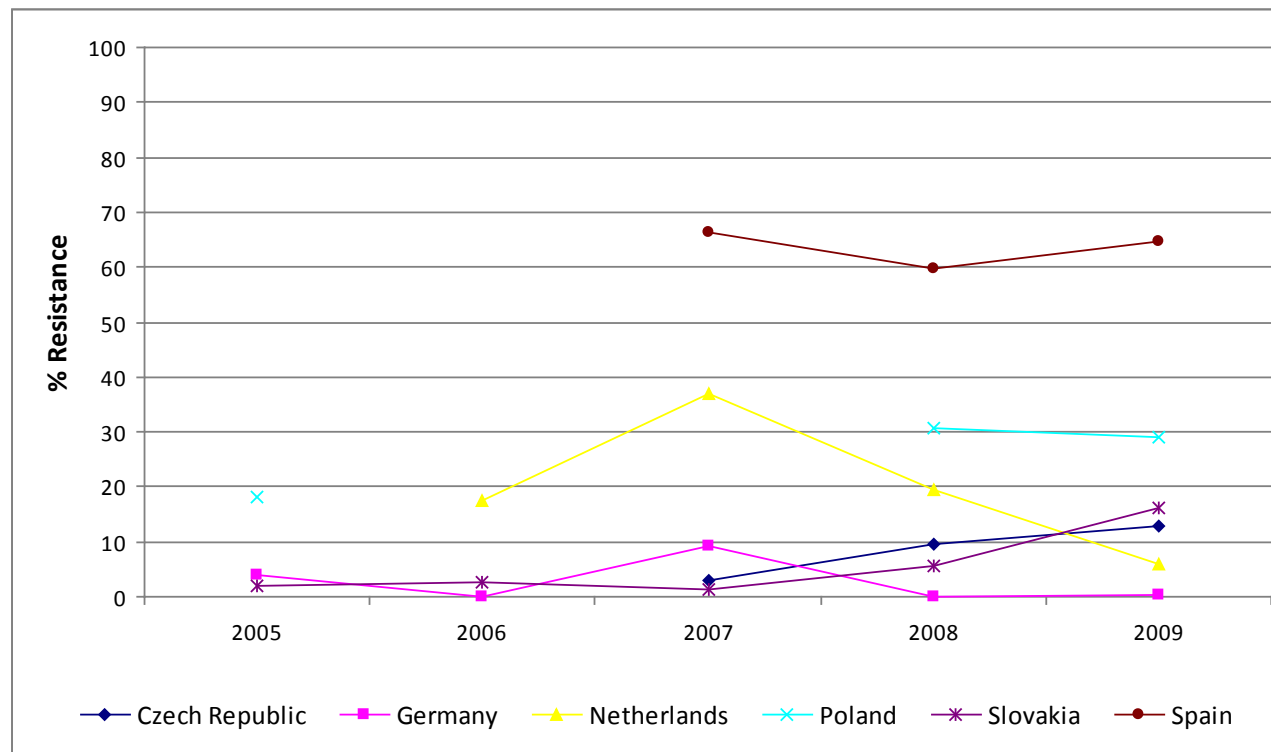
AMR in indicator *E. coli*
Tetracycline - pigs

Main findings (2)

Fluoroquinolones

- In food and animal isolates, the highest occurrence of resistance to ciprofloxacin was noted in *Salmonella* isolates from fowl (*Gallus gallus*) and broiler meat, where moderate resistance rates were reported.

S. Enteritidis - *Gallus gallus* - Ciprofloxacin

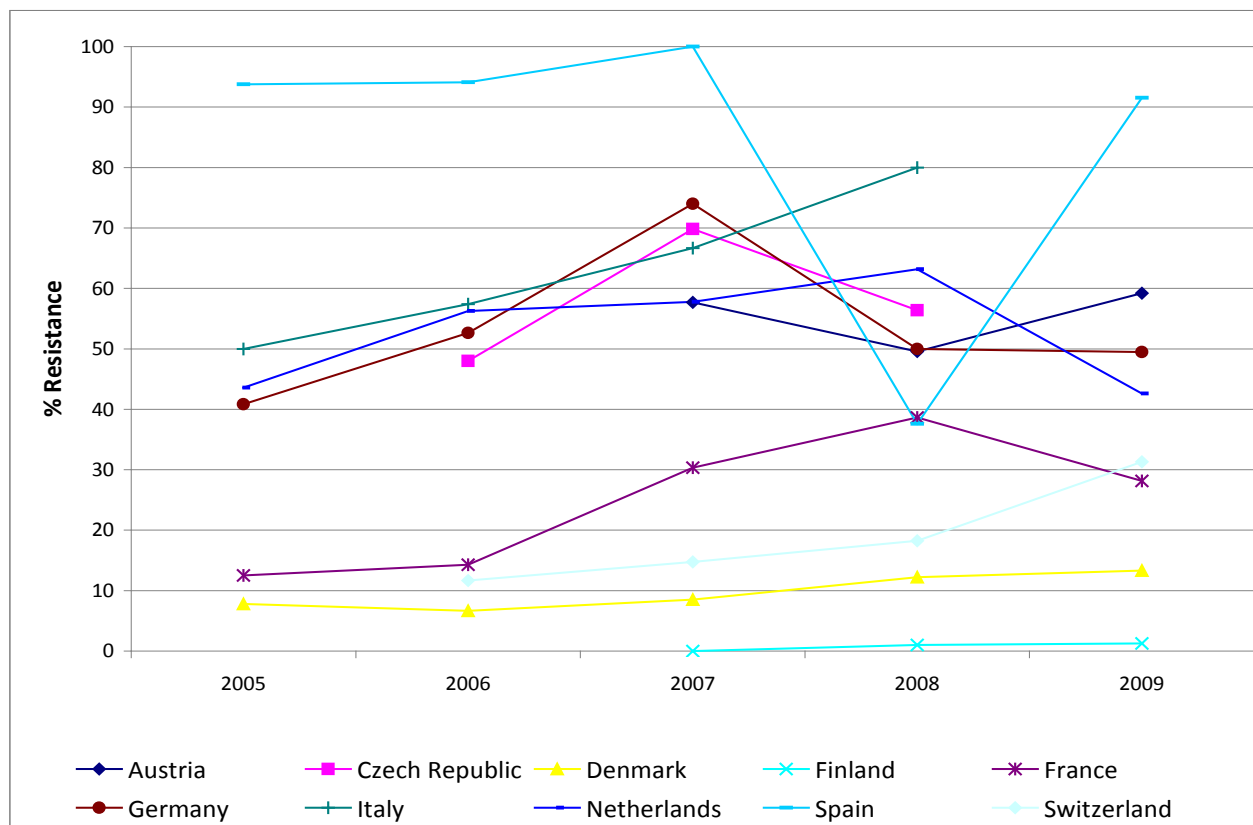


Main findings (2)

Fluoroquinolones

- High resistance to fluoroquinolones was commonly observed in *Campylobacter* isolates from *Gallus gallus* and broiler meat, as well as from pigs and cattle.

C. jejuni - *Gallus gallus* - Ciprofloxacin



- Resistance to third-generation cephalosporins was observed in *Salmonella* and indicator *E. coli* isolates from *Gallus gallus*, pigs and cattle, and the meat derived from those species, but at low or very low levels in the EU.

<i>Salmonella</i> spp.	MS-group level
• <i>Gallus gallus</i>	2% (0 - 12%)
• Pigs	0.7% (0 - 2%)
• Cattle	0.4% (0 - 0.9%)

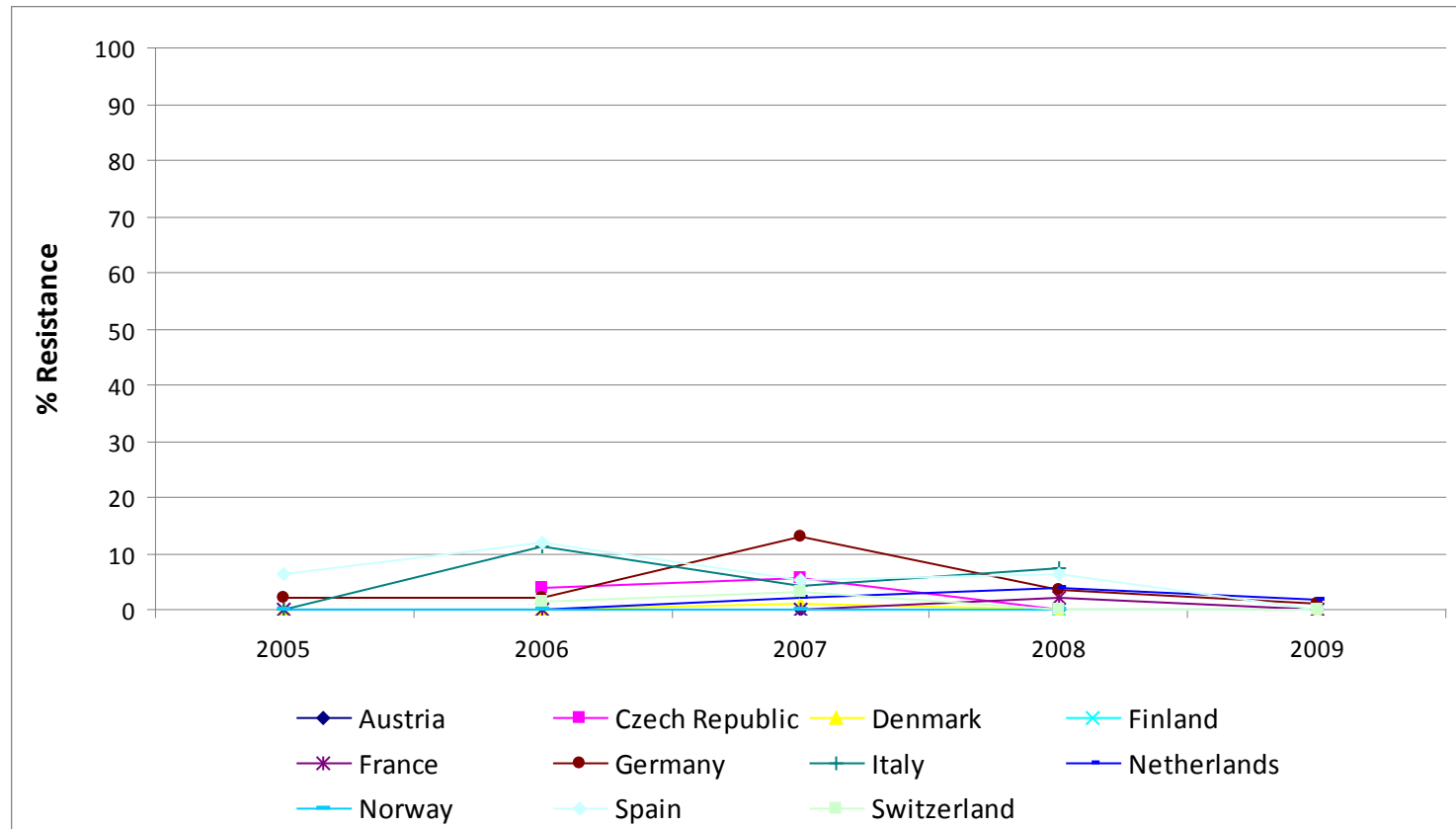
Indicator <i>E. coli</i>	MS-group level
• <i>Gallus gallus</i>	9% (0 - 26%)
• Pigs	2% (0 - 4%)
• Cattle	0.7% (0 - 4%)

Main findings (3)

Macrolides

- Resistance to erythromycin was detected in *Campylobacter* isolates from *Gallus gallus* and poultry meat. The highest occurrence of resistance to erythromycin was in *C. coli* from pigs.

C. jejuni - *Gallus gallus* - Erythromycin



- Farm-to-Fork Analysis
 - Comparison between human and animal and food data difficult due to use of clinical breakpoints vs. epidemiological cut-off (ECOFF) values
 - Presenting resistance along the food chain: animal, food, human
- MRSA
 - Baseline survey on MRSA + “routine” monitoring
 - Countries are encouraged to monitor and to report
- Third Generation Cephalosporin resistance
 - *Salmonella* and indicator *E. coli*
 - Data to be used in the framework of a mandate on ESBLs

- First joint report on AMR ever published by ECDC and EFSA
- AMR commonly found in zoonotic bacteria from animals and food
- Low levels of clinical resistance to “CIA” in humans
- AMR to critically important antimicrobials in human medicine detected in *Salmonella* and *Campylobacter*
 - High levels for fluoroquinolones
 - Low levels for macrolides in *Campylobacter*
 - Low levels for 3rd generation cephalosporins
- AMR varies among animal species

- Coordination meeting with ECDC on 11 March
- General structure similar to that of 2009 EU-SR
- Some enhancements are planned
 - monophasic *S. Typhimurium*
 - Statistical tests for trends
 - Farm-to-fork analysis in broilers and pigs
 - Analyses of isolate level data collected by pilot exercise (in depth presentation tomorrow)

In the future...

- Integrated monitoring of antimicrobial resistance and antimicrobial consumption in humans and animals
 - ECDC, EFSA, EMA
 - Joint report is planned
 - Relationship between resistance and consumption
 - Discussions are on-going between Agencies and EC
- Enhancement of monitoring of resistance in animals
 - Indicator bacteria (mandatory)
 - Isolate level data needed to account for co-resistance



- EFSA wishes to thank the MSs and non-MSs for providing the AMR data
- The Veterinary Laboratories Agency (VLA) is kindly acknowledged for analysing the 2009 AMR data
- ECDC is kindly acknowledged for providing for and analysing the AMR data in human isolates of *Salmonella* and *Campylobacter*
- 2009 EU Summary Report on AMR to be published soon on www.efsa.europa.eu (zoonoses unit)

**Thank you for
your attention!**

