Veterinary antimicrobial resistance monitoring in Italy: a One Health perspective according to the new EU legislation

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"Fighting AntiMicrobial Resistance:
smart weapons against smart microorganisms"
Rome, 22-23 December 2014 – Ministry of Health
*(Conference of the Italian Semester of Presidency)*

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Microbes may be exposed to **environmental selection pressure** (in a "natural" or artificial "niche"), so that new virulence (incl. AMR) traits emerge and are transmitted between animals and humans.

Thus, health of humans also depends upon health of animals and the environment - a concept called One Health.

One Health

People, Animals, and the Environment

EDITED BY
Ronald M. Atlas and Stanley Maloy
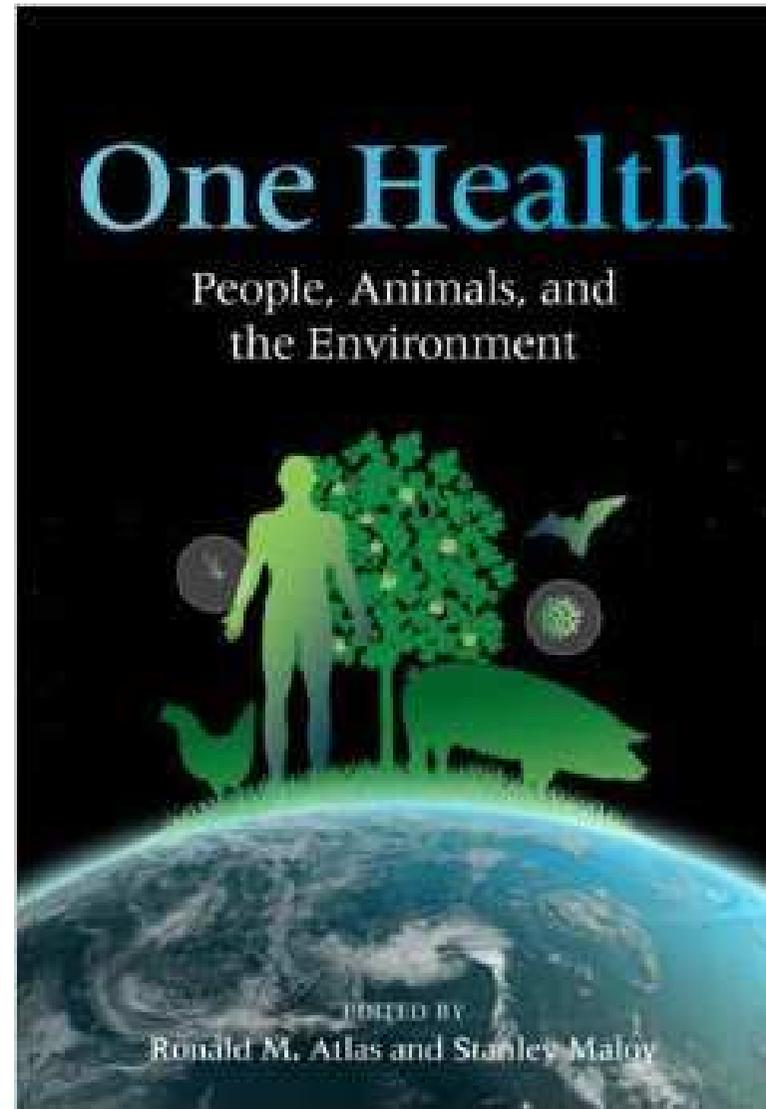
"… We need to have an insight into the mechanisms of microbial evolution toward pathogenicity and the many causes behind the emergence of antibiotic resistance…."

AMR is a Public Health Priority in the EU!

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European Commission

The 12 actions

Human	Veterinary

"Responsible" use "Rational" Use…

Incentives/Disincentives TO FARMERS?

Through CAP "new discussion" on subsidies?

Financial support to Pharmaceutical Industry???

Intersectoral…

1. Appropriate use

4. Prevention of infections

6. New antibiotics

9. Surveillance

8. International cooperation

11. Research & Innovation

12. Communication, education

2 & 3. Appropriate use

5. Prevention of infections

7. Need for new antibiotics

10. Surveillance

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Action 10: Surveillance systems in veterinary medicine

■ **Surveillance and monitoring should provide data about:**

- resistant bacteria (animal, food, environment, human)
- use or consumption of veterinary antimicrobials

■ **Harmonised (= comparable) data is the key to:**

- Greater understanding of epidemiology, origin, transmission, spread AMR

- Having evidence-based risk assessment and management

- Evaluation of policy measures

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Table 5. Sales, in tonnes of active ingredient, of veterinary antimicrobial agents marketed mainly for food-producing animals[1] (including horses), population correction unit (PCU) and sales in mg/PCU, by country, for 2012

Country	Sales (tonnes) for food-producing animals	PCU (1,000 tonnes)	mg/PCU
Austria	53.0	966	54.9
Belgium	267.2	1,658	161.1
Bulgaria	38.4	388	98.9
Cyprus	45.0	113	396.5
Czech Republic	53.7	673	79.8
Denmark	107.0	2,424	44.1
Estonia	7.3	131	56.0
Finland	12.2	511	23.8
France	761.5	7,419	102.6
Germany	1,707.5	8,338	204.8
Hungary	178.5	727	245.5
Iceland	0.7	116	5.9
Ireland	100.0	1,725	58.0
Italy	1,534.3	4,500	341.0
Latvia	6.7	162	41.1
Lithuania	13.4	339	39.4
Luxembourg	2.2	50	43.6
Netherlands	245.7	3,279	74.9
Norway	7.1	1,851	3.8
Poland	516.4	3,908	132.2
Portugal	156.5	996	157.1
Slovakia	10.2	235	43.2
Slovenia	6.8	183	37.0
Spain	1,693.0	6,996	242.0
Sweden	10.6	783	13.5
United Kingdom	447.4	6,749	66.3

[1] Tablets excluded as almost solely used in companion animals; injectable antimicrobial VMPs can also be used in companion animals; a few other products may solely be used in companion animals, but as the proportional use is minor, these are included in the sales for food-producing animals.

Action 10: Surveillance systems in veterinary medicine

- **Monitoring Consumption of AM → ESVAC** (European Surveillance on Veterinary Antimicrobial Consumption)

- **Conclusions 3rd ESVAC report (15/10/2013)**
  (Data for 2011 of 25(26*) of 29 EU/EEA countries)

  - Prescribing patterns vary between countries

  - 56% of the sales of veterinary antimicrobials for group treatment

  - Differences observed between sales in countries

  DG SANCO

>90% sales: drugs for ORAL ROUTE…

Data delivery
- Data not provided/available
- Data delivered
- Not in EU/EEA

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European Commission
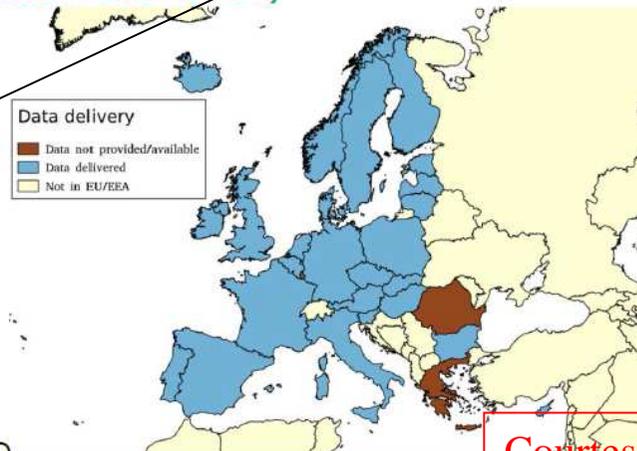
IZSLT Rome, NRL-AR Italy: activities

Veterinary Public Health Institution under the Ministry of Health. As a VPH government institution:

- Coordinates monitoring of AMR in zoonotic pathogens, indicator bacteria, animal pathogens (EU legislation) in:

-Primary production (priority);

-Food of animal origin;

-[Companion animals (pets, horses, etc.)]

- Provides technical and scientific advice & RMOs to MoH, Vet Dept.

- Collaborates with:

- other IZSs, EURL-AR, NLRs (zoonoses) , ISS (Italian NIH)

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AMR in major zoonotic pathogens in Italy

EU summary report on zoonoses, zoonotic agents and food-borne outbreaks 2012

Figure SU1. Reported notification rates of zoonoses in confirmed human cases[1,2] in the EU, 2012

- Campylobacteriosis (N = 214,268)
- Salmonellosis (N = 91,034)
- VTEC infections (N = 5,671)
- Listeriosis (N = 1,642)
- Q fever (N = 643)
- Brucellosis (N = 328)
- Trichinellosis (N = 301)
- West Nile fever (N = 232)
- Tuberculosis caused by *M. bovis* (N = 125)
- Rabies (N = 2)

Zoonoses

Notification rate per 100,000 population
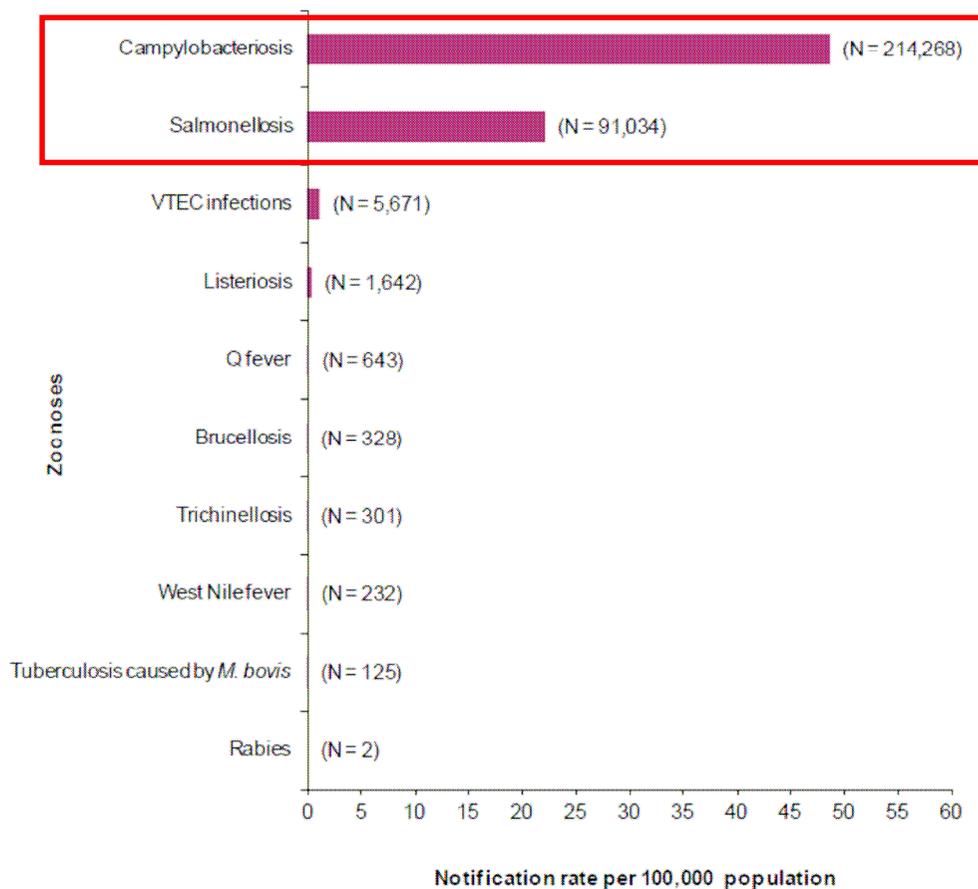
Spatial distribution of <u>ciprofloxacin*</u> resistance among *Campylobacter jejuni* **from *Gallus gallus*** in countries reporting quantitative data in 2008
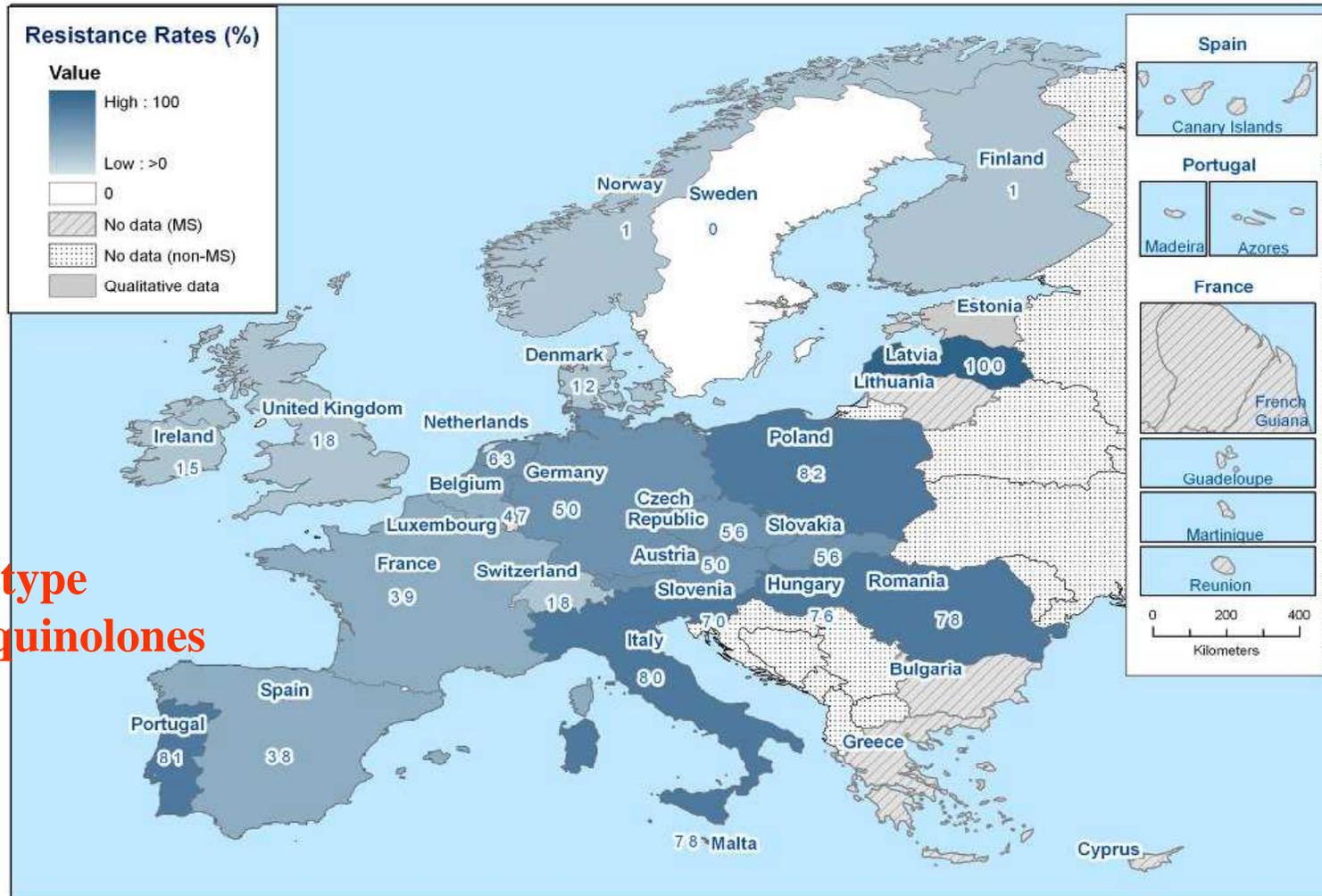
*Prototype fluoroquinolones
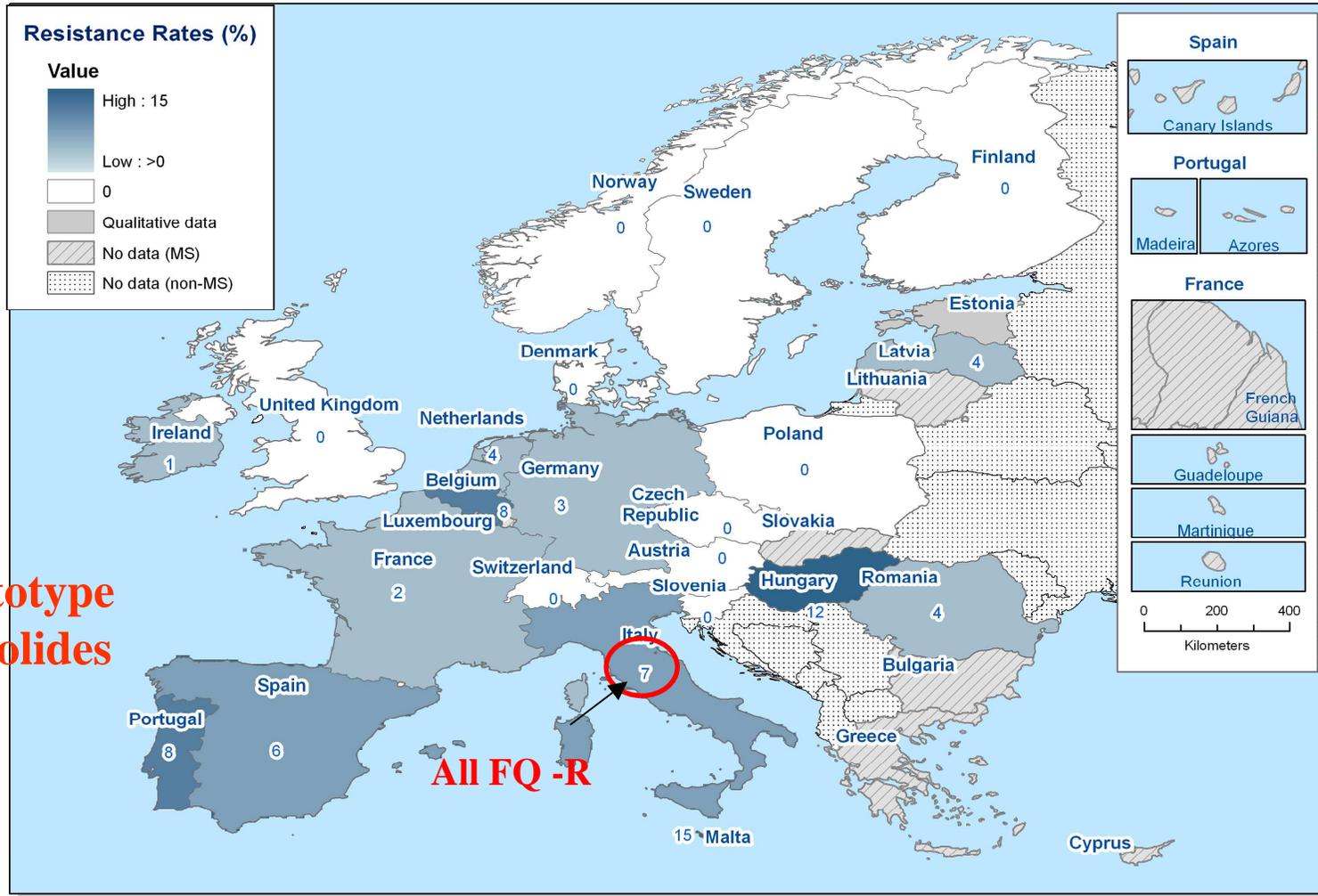
Spatial distribution of erythromycin* resistance among *Campylobacter jejuni* from ***Gallus gallus*** in countries reporting quantitative data in 2008


Resistance Rates (%)

Value

High : 15

Low : >0

0
Qualitative data
No data (MS)
No data (non-MS)

Prototype macrolides

All FQ -R

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Table CA4. Antimicrobial resistance in Campylobacter jejuni from humans per country in 2012, using clinical breakpoints[1]

Country	Amoxicillin		Ampicillin		Ciprofloxacin		Erythromycin		Gentamicin		Nalidixic acid		Tetracyclines	
	N	% Res	N	% Res	N	% Res	N	% Res	N	% Res	N	% Res	N	% Res
Austria	345	0	345	28.4	345	61.2	345	1.4	345	0	345	59.4	345	31.3
Estonia	89	5.6	86	40.7	219	63.9	200	0.5	91	1.1	93	66.7	189	16.4
France	3,852	0	3,853	30.9	3,843	50.7	3,852	0.6	3,852	0	3,853	50.8	–	–
Hungary	–	–	–	–	34	79.4	34	0	–	–	–	–	–	–
Italy	–	–	139	68.3	201	64.7	202	5.4	141	2.8	125	70.4	142	54.2
Lithuania	–	–	–	–	99	91.9	114	0.0	–	–	–	–	–	–
Luxembourg	493	0	493	48.5	493	60.4	493	0.8	493	0.0	493	60.6	493	43.6
Malta	–	–	–	–	138	71.7	138	10.9	–	–	–	–	–	–
Netherlands	–	–	–	–	3,076	58.0	2,624	2.0	–	–	–	–	1,249	32.5
Romania	–	NA	–	–	3	NA	3	NA	3	NA	3	NA	3	NA
Slovakia	3	NA	115	27.8	1,044	30.7	1,162	1.5	13	NA	–	–	1,151	11.6
Slovenia	695	5.8	869	37.4	869	70.7	869	0.7	869	0.2	695	60.3	869	22.6
Spain	182	0.5	182	52.2	182	84.1	182	3.3	182	0.5	182	96.2	182	72.0
United Kingdom	10	NA	2	NA	1,005	43.1	862	1.5	7	NA	976	40.8	56	41.1
Total (14 MSs)	**5,669**	**0.8**	**6,084**	**34.7**	**11,551**	**54.1**	**11,080**	**1.4**	**5,996**	**0.2**	**6,765**	**53.3**	**4,679**	**28.3**
Iceland	–	–	–	–	27	33.3	27	0	–	–	–	–	–	–

MS: Member State; N: number of isolates tested; % Res: percentage of resistant isolates; –: no data reported; NA: not applicable - if fewer than 20 isolates were tested resistance was not calculated.

1. Isolates from cases reported as related to travel outside the country were excluded from this table. For the proportion of tested isolates from travel-associated, domestic and unknown cases by country please see table MM4.
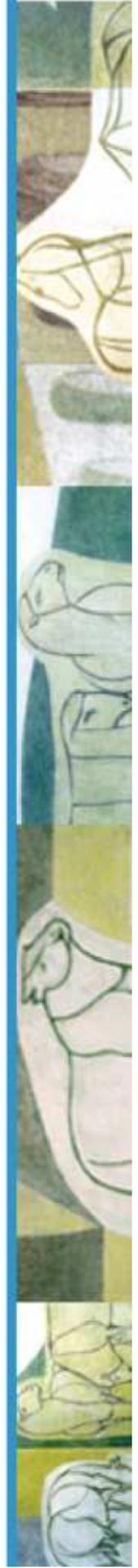
EU summary report on antimicrobial resistance in zoonotic and indicator bacteria
from humans, animals and food 2012

Table SA17. Resistance (%) to ampicillin, cefotaxime, chloramphenicol, ciprofloxacin, gentamicin, nalidixic acid, sulfonamides and tetracyclines among Salmonella spp. isolates from broilers in MSs reporting MIC data in 2012, using harmonised epidemiological cut-off values

Country	Ampicillin		Cefotaxime		Chloramphenicol		Ciprofloxacin		Gentamicin		Nalidixic acid		Sulfonamides		Tetracyclines	
	N	% Res	N	% Res	N	% Res	N	% Res	N	% Res	N	% Res	N	% Res	N	% Res
Austria	113	3.5	113	0	113	0	113	22.1	113	0	113	22.1	113	18.6	113	23.9
Czech Republic	351	4.0	351	0.3	351	0	351	20.8	351	1.4	351	20.5	351	19.4	–	–
Denmark	24	29.2	24	0	24	0	24	0	24	0	24	0	24	29.2	24	29.2
Hungary	175	6.9	175	0.6	175	1.1	175	90.3	175	1.1	175	90.3	175	77.7	175	73.7
Ireland	38	10.5	38	0	38	0	38	2.6	38	0	38	2.6	38	10.5	38	7.9
Italy	105	37.1	105	13.3	105	4.8	105	32.4	105	6.7	105	30.5	105	31.4	105	38.1
Netherlands	130	27.7	130	6.2	130	3.1	130	24.6	130	7.7	130	21.5	130	16.9	130	6.2
Poland	189	6.3	189	0.5	189	0.5	189	40.7	189	0	189	36.5	189	14.8	189	10.1
Portugal	27	18.5	122	3.3	122	4.1	122	27.9	122	0	122	26.2	122	15.6	122	9.0
Romania	784	43.9	784	6.4	784	12.2	784	73.0	784	17.5	784	62.0	784	57.4	784	48.7
Slovakia	55	0	55	0	55	0	55	41.8	55	0	55	41.8	55	34.5	55	34.5
Spain	29	34.5	29	3.4	29	3.4	29	65.5	29	13.8	29	62.1	29	20.7	29	31.0
United Kingdom	170	5.3	170	0	170	2.9	170	2.4	170	5.9	170	2.4	170	21.8	170	25.3
Total (13 MSs)	2,190	22.6	2,285	3.5	2,285	5.2	2,285	46.0	2,285	7.7	2,285	41.5	2,285	37.2	1,934	36.0

MS: Member State; MIC: minimum inhibitory concentration; N: number of isolates tested; % Res: percentage of resistant isolates; –: no data reported.
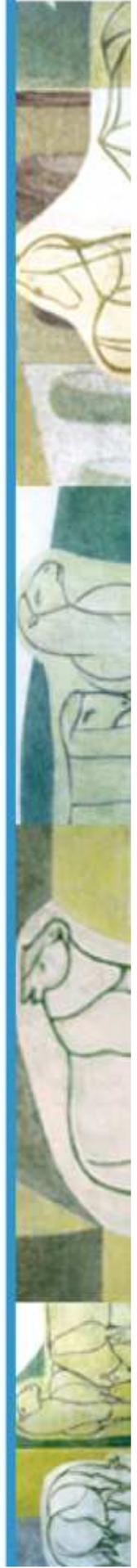
Table SA24. Complete susceptibility, multi-resistance and index of diversity in Salmonella spp. from broilers in MSs reporting isolate-based data, 2012

Country	Susceptible to all		Multi-resistant		Index of diversity	Co-resistant to Cip and Ctx	
	n	%	n	%		n	%
Austria (N=113)	82	72.6	23	20.4	0.243	0 (0)	0 (0)
Czech Republic (N=351)	271	77.2	67	19.1	0.385	0 (0)	0 (0)
Denmark (N=24)	17	70.8	7	29.2	0	0 (0)	0 (0)
Hungary (N=175)	13	7.4	128	73.1	0.279	0 (0)	0 (0)
Ireland (N=38)	31	81.6	3	7.9	0.264	0 (0)	0 (0)
Italy (N=105)	55	52.4	43	41.0	0.67	13 (0)	12.4 (0)
Romania (N=781)	135	17.3	474	60.7	0.648	41 (2)	5.2 (0.3)
Spain (N=29)	6	20.7	10	34.5	0.394	1 (0)	3.4 (0)
United Kingdom (N=17)	5	29.4	2	11.8	0.162	0 (0)	0 (0)

*Table SA25. Complete susceptibility, multi-resistance and index of diversity in Salmonella spp. from laying hens in MSs reporting isolate-based data, 2012*

Country	Susceptible to all		Multi-resistant		Index of diversity	Co-resistant to Cip and Ctx	
	n	%	n	%		n	%
Austria (N=63)	47	74.6	9	14.3	0.361	0 (0)	0 (0)
Germany (N=51)	44	86.3	1	2.0	0.221	0 (0)	0 (0)
Hungary (N=86)	59	68.6	16	18.6	0.38	0 (0)	0 (0)
Italy (N=161)	111	68.9	23	14.3	0.372	2 (0)	1.2 (0)
Romania (N=145)	72	49.7	55	37.9	0.450	0 (0)	0 (0)
Spain (N=150)	119	79.3	8	5.3	0.321	0 (0)	0 (0)
United Kingdom (N=11)	10	90.9	1	9.1	0	0 (0)	0 (0)

MS: Member State; N: total number of isolates tested for susceptibility against the whole common antimicrobial set for *Salmonella*; n: number of isolates.

Susceptible to all: isolate susceptible to all antimicrobial substances of the EFSA common set for *Salmonella*.

Multi-resistant: resistant to at least three different antimicrobial substances, belonging to any three classes from the common set.

Index of diversity: see definition in Section 8.4.2.1 of Chapter 8 Materials and methods.

Co-resistant to ciprofloxacin (Cip) and cefotaxime (Ctx): the frequencies and percentages of *Salmonella* isolates not susceptible to concentrations greater than epidemiological cut-off values (Ctx:>0.5 mg/L and Cip:>0.06 mg/L). Figures in parentheses indicate the occurrence of resistance determined using the European Committee on Antimicrobial Susceptibility Testing (EUCAST) clinical breakpoints (Ctx:>2 mg/L and Cip: >1mg/L).

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Figure SA20. Frequency distribution of Salmonella spp. in turkeys completely susceptible or resistant to one to nine antimicrobials, in MSs reporting isolate-based data, 2012
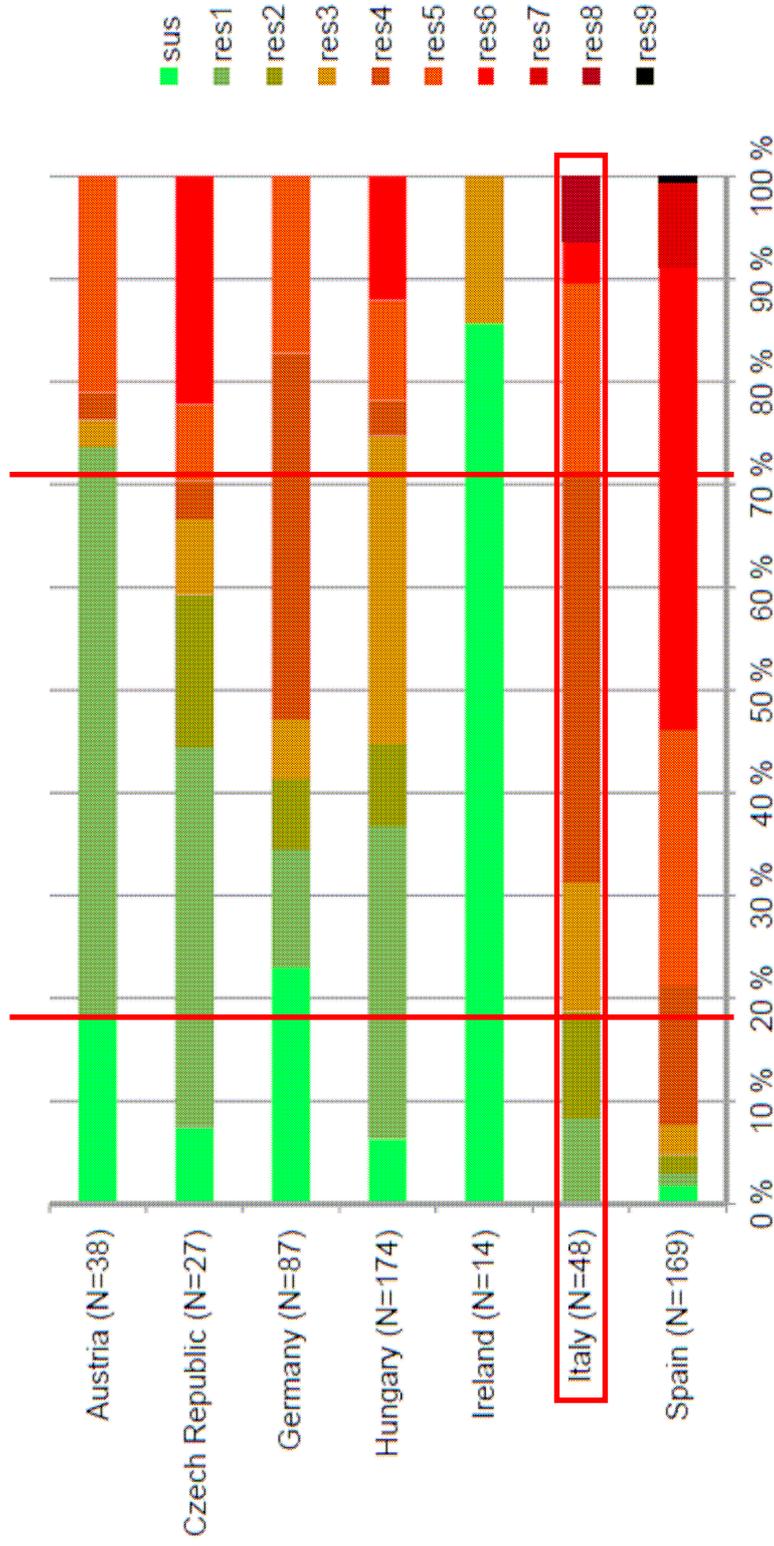
MS: Member State; N: total number of isolates tested for susceptibility against the whole common antimicrobial set for *Salmonella*; sus: susceptible to all antimicrobial substances of the EFSA common set for *Salmonella*; res1–res9: resistance to one antimicrobial substance/resistance to nine antimicrobial substances of the common set for *Salmonella*.

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EU summary report on antimicrobial resistance in zoonotic and indicator bacteria
from humans, animals and food 2012

Table SA30. Complete susceptibility, multi-resistance and index of diversity in Salmonella spp. from turkeys in MSs reporting isolate-based data, 2012

Country	Susceptible to all		Multi-resistant		Index of diversity	Co-resistant to Cip and Ctx	
	n	%	n	%		n (0)	%
Austria (N=38)	7	18.4	10	26.3	0.231	0 (0)	0 (0)
Czech Republic (N=27)	2	7.4	11	40.7	0.427	0 (0)	0 (0)
Germany (N=87)	20	23.0	51	58.6	0.365	0 (0)	0 (0)
Hungary (N=174)	11	6.3	96	55.2	0.426	0 (0)	0 (0)
Ireland (N=14)	12	85.7	2	14.3	0	0 (0)	0 (0)
Italy (N=48)	0	0	39	81.2	0.554	1 (0)	2.1 (0)
Spain (N=169)	3	1.8	161	95.3	0.601	2 (0)	1.2 (0)

MS: Member State; N: total number of isolates tested for susceptibility against the whole common antimicrobial set for *Salmonella*; n: number of isolates.

Susceptible to all: isolate susceptible to all antimicrobial substances of the EFSA common set for *Salmonella*.

Multi-resistant: resistant to at least three different antimicrobial substances, belonging to any three classes from the common set.

Index of diversity: see definition in Section 8.4.2.1 of Chapter 8 Materials and methods.

Co-resistant to ciprofloxacin (Cip) and cefotaxime (Ctx): the frequencies and percentages of Salmonella isolates not susceptible to concentrations greater than epidemiological cut-off values (Ctx:>0.5 mg/L and Cip:>0.06 mg/L). Figures in parentheses indicate the occurrence of resistance determined using the European Committee on Antimicrobial Susceptibility Testing (EUCAST) clinical breakpoints (Ctx:>2 mg/L and Cip:>1 mg/L).

MDR Salmonella in meat from pigs, Italy, 2012

Table SA14. Complete susceptibility, multi-resistance and index of diversity in <u>Salmonella spp.</u> from <u>meat from pigs</u> in MSs reporting isolate-based data, 2012

Country	Susceptible to all		Multi-resistant		Index of diversity	Co-resistant to Cip and Ctx	
	n	%	n	%		n	%
Czech Republic (N=33)	12	36.4	14	42.4	0.464	0 (0)	0 (0)
Denmark[1] (N=41)	12	29.3	24	58.5	0.315	0 (0)	0 (0)
Estonia (N=22)	19	86.4	3	13.6	0.189	0 (0)	0 (0)
Germany (N=163)	62	38.0	79	48.5	0.46	0 (0)	0 (0)
Ireland (N=69)	15	21.7	41	59.4	0.545	0 (0)	0 (0)
Italy (N=85)	32	37.6	43	50.6	0.5	0 (0)	0 (0)
Romania (N=125)	30	24.0	70	56.0	0.427	1 (0)	0.8 (0)

MS: Member State; N: total number of isolates tested for susceptibility against the whole common antimicrobial set for *Salmonella*; n: number of isolates.

Susceptible to all: isolate susceptible to all antimicrobial substances of the EFSA common set for *Salmonella*.

Multi-resistant: resistant to at least three different antimicrobial substances, belonging to any three classes from the common set.

Index of diversity: see definition in Section 8.4.2.1 of Chapter 8 Materials and methods.

Co-resistant to ciprofloxacin (Cip) and cefotaxime (Ctx): the frequencies and percentages of *Salmonella* isolates not susceptible to concentrations greater than epidemiological cut-off values (Ctx:>0.5 mg/L and Cip:>0.06 mg/L). Figures in parentheses indicate the occurrence of resistance determined using the European Committee on Antimicrobial Susceptibility (EUCAST) clinical breakpoints (Ctx:>2 mg/L and Cip:>1 mg/L).

1. Denmark reported only monophasic *S.* Typhimurium and *S.* Typhimurium isolates.
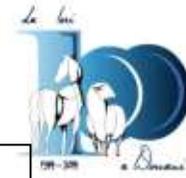
MDR Salmonella in meat from pigs, Italy, 2012

Appendix Table MDR2. Frequency distribution of completely susceptible isolates and resistant isolates to from one to nine antimicrobials, in Salmonella spp. from meat from pigs in MSs reporting isolate-based data, 2012

Country	Susceptible to all		Resistant to 1 AMB		Resistant to 2 AMB		Resistant to 3 AMB		Resistant to 4 AMB	
	n	%	n	%	n	%	n	%	n	%
Czech Republic (N=33)	12	36.4	2	6.1	5	15.2	2	6.1	6	18.2
Denmark (N=41)	12	29.3	3	7.3	2	4.9	9	22.0	14	34.2
Estonia (N=22)	19	86.4	0	0	0	0	2	9.1	1	4.6
Germany (N=163)	62	38.0	15	9.2	7	4.3	9	5.5	44	27.0
Ireland (N=69)	15	21.7	6	8.7	7	10.1	5	7.3	21	30.4
Italy (N=85)	32	37.6	9	10.6	1	1.2	9	10.6	21	24.7
Romania (N=125)	30	24.0	24	19.2	1	0.8	33	26.4	18	14.4

Country	Resistant to 5 AMB		Resistant to 6 AMB		Resistant to 7 AMB		Resistant to 8 AMB		Resistant to 9 AMB	
	n	%	n	%	n	%	n	%	n	%
Czech Republic (N=33)	5	15.2	1	3.0	0	0	0	0	0	0
Denmark (N=41)	0	0	1	2.4	0	0	0	0	0	0
Estonia (N=22)	0	0	0	0	0	0	0	0	0	0
Germany (N=163)	17	10.4	9	5.5	0	0	0	0	0	0
Ireland (N=69)	6	8.7	7	10.1	2	2.9	0	0	0	0
Italy (N=85)	7	8.2	5	5.9	1	1.2	0	0	0	0
Romania (N=125)	14	11.2	5	4.0	0	0	0	0	0	0

N: total number of isolates tested for susceptibility against the whole common set of antimicrobial substances.

n: number of resistant isolates per category of susceptibility or multiple resistance.

%: percentage of resistant isolates per category of susceptibility or multiple resistance.

AMB: antimicrobial substance(s).

15% MDR 5+

DECISIONS

The New AMR Monitoring system in the EU, in food-producing animal populations…

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,

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,

put in place a five-year action plan to fight against AMR based on 12 key actions, including strengthened surveillance systems on AMR.

(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.

A. Battisti 2014

Subject matter and scope

1. This Decision lays down detailed rules for the harmonised 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.

That monitoring and reporting shall cover the following bacteria obtained from samples from certain food-producing animal populations and certain food:

(a) *Salmonella* spp.;

(b) *Campylobacter jejuni* and *Campylobacter coli* (*C. jejuni* and *C. coli*);

(c) Indicator commensal *Escherichia coli* (*E. coli*);

(d) Indicator commensal *Enterococcus faecalis* and *Enterococcus faecium* (*E. faecalis* and *E. faecium*).

2. This Decision lays down specific requirements for the harmonised monitoring and reporting of the *Salmonella* spp., and *E. coli* producing the following enzymes in certain food-producing animal populations and in certain food:

(a) Extended-Spectrum β-Lactamases (ESBL);

(b) AmpC β-Lactamases (AmpC);

(c) Carbapenemases.

MAINLY "ACTIVE MONITORING" AT DIFFERENT STAGES…

Voluntary for EU MS…

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Istituto Zooprofilattico Sperimentale
delle Regioni Lazio e Toscana

Table 1

Panel of antimicrobial substances to be included in AMR monitoring, EUCAST thresholds for resistance and concentration ranges to be tested in *Salmonella* spp. and indicator commensal *E. coli* (First panel)

Antimicrobial	Species	Interpretative thresholds of AMR (mg/L)		Range of concentrations (mg/L) (No of wells in brackets)
		ECOFF [a]	Clinical breakpoint [b]	
Ampicillin	*Salmonella*	> 8	> 8	1-64 (7)
	E. coli	> 8	> 8	
Cefotaxime	*Salmonella*	> 0,5	> 2	0,25-4 (5)
	E. coli	> 0,25	> 2	
Ceftazidime	*Salmonella*	> 2	> 4	0,5-8 (5)
	E. coli	> 0,5	> 4	
Meropenem	*Salmonella*	> 0,125	> 8	0,03-16 (10)
	E. coli	> 0,125	> 8	

Table 4

Panel of antimicrobial substances, EUCAST epidemiological cut-off values (ECOFFs) and clinical resistance breakpoints and concentrations ranges to be used for testing only *Salmonella* spp. and indicator commensal *E. coli* isolates resistant to cefotaxime or ceftazidime or meropenem — (Second panel)

Antimicrobial	Species	Interpretive thresholds of AMR (mg/L)		Range of concentrations (mg/L) (No of wells in brackets)
		ECOFF (a)	Clinical breakpoint (b)	
Cefoxitin	*Salmonella*	> 8	NA	0,5-64 (8)
	E. coli	> 8	NA	
Cefepime	*Salmonella*	NA	NA	0,06-32 (10)
	E. coli	> 0,125	> 4	
Cefotaxime + clavulanic acid (*)	*Salmonella*	NA (**)	NA (**)	0,06-64 (11)
	E. coli	NA (**)	NA (**)	
Ceftazidime + clavulanic acid (*)	*Salmonella*	NA (**)	NA (**)	0,125-128 (11)
	E. coli	NA (**)	NA (**)	
Meropenem	*Salmonella*	> 0,125	> 8	0,03-16 (10)
	E. coli	> 0,125	> 8	
Tenocillin	*Salmonella*	NA	NA	0,5-64 (8)
	E. coli	NA	NA	

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Table 2

Panel of antimicrobial substances to be included in AMR monitoring, EUCAST interpretative thresholds for resistance and concentration ranges to be tested in *C. jejuni* and *C. coli*

Antimicrobial	Species	Interpretative thresholds of AMR (mg/L)		Range of concentrations (mg/L) (No of wells in brackets)
		ECOFF (^{a})	Clinical breakpoint (^{b})	
Erythromycin	*C. jejuni*	> 4	> 4	1-128 (8)
	C. coli	> 8	> 8	
Ciprofloxacin	*C. jejuni*	> 0,5	> 0,5	0,12-16 (8)
	C. coli	> 0,5	> 0,5	
Tetracycline	*C. jejuni*	> 1	> 2	0,5-64 (8)
	C. coli	> 2	> 2	
Gentamicin	*C. jejuni*	> 2	NA	0,12-16 (8)
	C. coli	> 2	NA	
Nalidixic acid	*C. jejuni*	> 16	NA	1-64 (7)
	C. coli	> 16	NA	
Streptomycin (^{c})	*C. jejuni*	> 4	NA	0,25-16 (7)
	C. coli	> 4	NA	

(^{a}) EUCAST epidemiological cut-off values.
(^{b}) EUCAST clinical resistance breakpoints.
(^{c}) At a voluntary basis.
NA: not available.

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AMR Monitoring scheme in VPH (Italy)

Isolation, ID, Susceptibility tests: Distribution of MICs, harmonised panel of drugs to be tested, EUCAST (Epidemiological cutoffs) of:

a. At farm-level (every year, already in place)

All Salmonella isolates from National Control Programmes (broilers, layers, turkeys) received from IIZZSS (Network of Vet Public Health Laboratories);

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AMR Monitoring scheme in VPH (Italy)

b. At slaughter

Every other year (2014 poultry, 2015 cattle & pigs, etc., to 2020):

- **Caecal samples at slaughter from herd/flocks:**

- C. jejuni (& C. coli) in broilers/turkeys (C. jejuni pigs & cattle);

- Indicator (commensal) & ESBL/AmpC/CPE/+ve E. coli;

- **Carcases:** Salmonella isolates 2.1.4 & 2.1.5 Ch. 2 of Annex I (Reg. 2073/2005) from IIZZSS

c. at retail (from 2015 onwards):

- Indicator (commensal) E. coli & ESBL/AmpC/CPE+ve E. coli;

- [C. jejuni (& C. coli)];

- (Salmonella)

2014: Study Design in broilers & turkeys at slaughter

- Six Regions involved (>90% productions in Italy)
- Stratification of the total n. of samples (one sample per epidem. unit)
  -by Region (production)

  -by Slaughterhouse (capacity)

-850 samples from broiler flocks

(300 for ESBL/AmpC/CPEs)

-850 samples from turkey flocks

(300 for ESBL/AmpC/CPEs)

	Broiler capi	% per Regione	N campioni Regione	N medio campioni mese	N medio campioni mese
Veneto	198658064	45	379	32	42
Emilia-Romagna	85048112	19	162	14	18
Lombardia	58806334	13	112	9	12
Marche	44540473	10	85	7	9
Abruzzo	37667713	8	72	6	8
Piemonte	20785544	5	40	3	4
Totale Top Regioni	**445506240**	**100**	**850**	**71**	**94**

Totale Italia	**479053581**	
% Top regioni su totale It	**92,99716309**	

	Tacchini capi	% per Regione	N campioni Regione	N medio Campioni mese	N medio Campioni mese
Veneto	18493659	62	528	44	59
Emilia-Romagna	8073168	27	230	19	26
Lombardia	3206473	11	92	8	10
Toscana	2059213	7	59	5	7
Totale Top Regioni	**29773300**	**100**	**850**	**76**	**101**

Totale Italia	**31968859**	
% Top regioni su totale It	**93,13219468**	

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Sampling & shipping activity

- N.**10 caeca** per broiler flock sampled;

- N. **3 caeca** per turkey flock sampled;

- Shipped and <u>delivered by courier service with 24 hours from sampling</u>

- Metadata from the National Register of Holdings; other data <u>entered by the Vet Services in an online sampling form</u>.

  (SINVSA web system, Ministry of Health, Vet Department, collaboration with IZS AM, Teramo)

Printout of the sampling form

SCHEDA N. 2014001488I

PIANO PER IL MONITORAGGIO ARMONIZZATO DELLA RESISTENZA ANTIMICROBICA NEL POLLAME

A. PARTE GENERALE

Tipologia di campionamento

A0. Motivo del campionamento: (*)
PIANO COFINANZIATO PER IL MONITORAGGIO ARMONIZZATO DELLA RESISTENZA ANTIMICROBICA NEL POLLAME

A1. Strategia di campionamento: (*)
CASUALE

A1b. Metodo di campionamento: (*)

Campione da pool / lotto

A2. Prelevatore (Nome e cognome):	**A3. Ente di appartenenza/ASL di competenza:** I102 A.S.L. PARMA
A5. Luogo di prelievo: STABILIMENTO DI MACELLAZIONE CARNE DI POLLAME E LAGOMORFI	**A6. Codice Luogo di prelievo:** AA000008027PRIT

A7. Indirizzo del luogo di prelievo:
VIA DELLE ROSE, 4

A8. Comune: PARMA	**A8b. Provincia:** PR	**A9. Nazione:** ITALIA

A12. Ragione sociale/Proprietario animali (*): SECONE & C. PROSCIUTTI S.P.	**A13. Rappresentante legale / Proprietario animali (*):** SECONE MARCO
A14. Codice fiscale/ Proprietario animali (*): GRSSMN07C26L103L	**A15. Detentore/Responsabile sede produttiva (*):**
A10e. Telefono:	**A11. Data di prelievo(*):**

A12. Localizzazione geografica del punto di prelievo (WGS84 – Formato decimale) (*):

| Latitudine:	Longitudine:
A13. Targa mezzo di trasporto:	**A14a. Numero di unità (chiechi) campionate :**
A16. Riferimento N. verbale	☐ 10 ☐ 3

Some experiences on Campylobacter at the NRL-AR Italy…

Campylobacter jejuni & C. coli isolation rates (ongoing study 2014)

Species	Total samples	% C. jejuni +ve	% C. coli +ve	% Campy jejuni OR C. coli +ve
Turkey	563	27.18	71.58	86.50
Chicken	710	39.72	43.69	72.11

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…)

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Conclusions

- For Surveillance (monitoring) purposes:

Harmonization is "the key action"

-study design

-field (& laboratory) methods (e. g. AMR monitoring)

-reporting

For comparability among countries (VPH), and for PH prevention purposes (analysis of trends of vet and human data…)

in a perspective of "One Health"

Thank you for attention!

Special thanks to all personnel at the Diagnostic Dept.,
IZSLT, NRL-AR Italy

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