

Control of Campylobacter infection in broiler flocks through  
two-steps strategy: nutrition and vaccination

-CAMPYBRO-  
FP7-SME-2013-605835

**Campylobacter: un reto para la  
avicultura de carne europea**



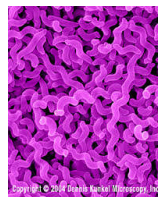
Murcia, 13/12/2013



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## ¿Quién es Campylobacter?

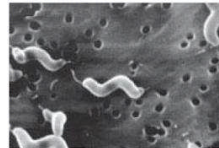
- ❑ **Género *Campylobacter* spp.**
  - ❑ **Bacilos gram negativos**
  - ❑ **Curvados o con forma espiral**
  - ❑ **Móviles mediante un flajelo uni ó bipolar**
  - ❑ **No esporulados**
  - ❑ **Microaerofílicos**
    - ❑ **Óptimo 5-10% O<sub>2</sub> y 1-10% CO<sub>2</sub>.**



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## ¿Quién es *Campylobacter*?

- ❑ 23 especies
- ❑ Termófilos (32-47°C, Óptimo: 42°C)
  - ❑ 25°C no crecen
  - ❑ Causantes gastroenteritis humanas
  - ❑ *C. jejuni*, *C. coli*, *C. lari*, *C. upsaliensis* y *C. helveticus*
- ❑ Alta sensibilidad
  - ❑ Oxígeno
  - ❑ Desección o baja actividad de agua
  - ❑ Luz ultravioleta, desinfectantes
  - ❑ Calor: 55°C, 1min
  - ❑ NaCl 2%
  - ❑ pH<4,7



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## ¿Quién es *Campylobacter*?

- ❑ Sensible a la congelación
- ❑ No crece en los alimentos
- ❑ Sobreviven en medios externos si se evita la desecación
  - ❑ Aguas superficiales hasta 3 meses



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## ¿Quién es *Campylobacter*?

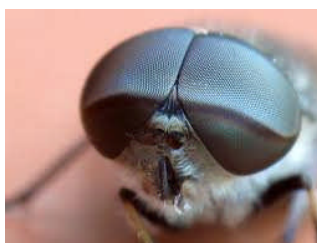
- ❑ Parece una bacteria débil...
- ❑ Pero una vez en su hábitat



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## ¿Quién es *Campylobacter*?

- ❑ Reservorios
  - ❑ Comensales en tracto gastrointestinal de animales domésticos y salvajes
  - ❑ Principal: aves (pollos, gallinas, patos, pavos..)
  - ❑ Otros: bovino, porcino, ovino, roedores, perros, gatos, insectos
  - ❑ *C. jejuni* más difundido, *C. coli* más en porcino



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## **Campylobacter vs campylobacteriosis**



- ❑ La campilobacteriosis en el ser humano cursa con enterocolitis aguda que se manifiesta con malestar, fiebre, dolores abdominales severos y diarrea acuosa o sanguinolenta.
- ❑ El periodo de incubación oscila entre 1 y 11 días (normalmente de 1-3 días).
- ❑ En la mayoría de los casos la diarrea tiende a remitir por sí misma.
- ❑ Complicaciones se atribuyen a su dispersión gastrointestinal e incluyen colecistitis, pancreatitis, peritonitis y hemorragias gastrointestinales (Van Vliet y Ketley, 2001).
- ❑ Bacteriemias <1%
- ❑ Mortalidad: 0,05 personas por 1.000 afectados.

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## **Campylobacter vs campylobacteriosis**



- ❑ *C. jejuni* y *C. coli* responsables de la mayoría de las infecciones
- ❑ Otras: *C. upsaliensis* y *C. lari*.
- ❑ Respuesta inmune humoral y celular, que pueden conferir protección en exposiciones sucesivas.
- ❑ En países desarrollados, la mayoría de las infecciones son asintomáticas.
- ❑ Incertidumbre acerca de los mecanismos biológicos de su actividad patógena
- ❑ *Campylobacter spp.* invade las células epiteliales humanas mediante fenómenos de adhesión e invasión celular lo que origina lesiones celulares, pérdida de funcionalidad y diarrea

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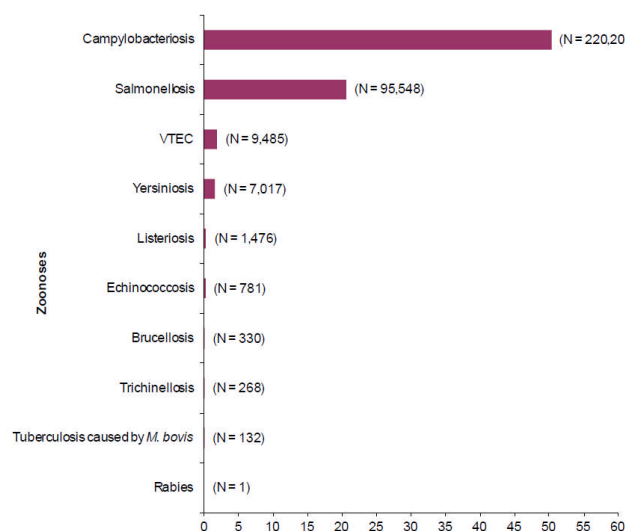
## Campylobacter vs campylobacteriosis

- ❑ Factores de virulencia
  - ❑ Flagelos polares: movilidad por el tracto intestinal, adherencia, invasión de las células epiteliales humanas, e inmunidad.
  - ❑ Producción de toxinas: enterotoxinas y citotoxinas
  - ❑ *C. jejuni* manifiesta una estructura antigénica diversa derivada de sus componentes lipopolisacáridos (LPS, lípido A) o lipooligosacáridos (LOS)
  - ❑ *C. jejuni* posee, asimismo, dos plásmidos (pVir y pTet) posiblemente implicados en su virulencia

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## Campylobacteriosis en la UE, 2011

Figure SU1. Reported notification rates of zoonoses in confirmed human cases in the EU, 2011



EFSa Journal 2013;11(4):3129

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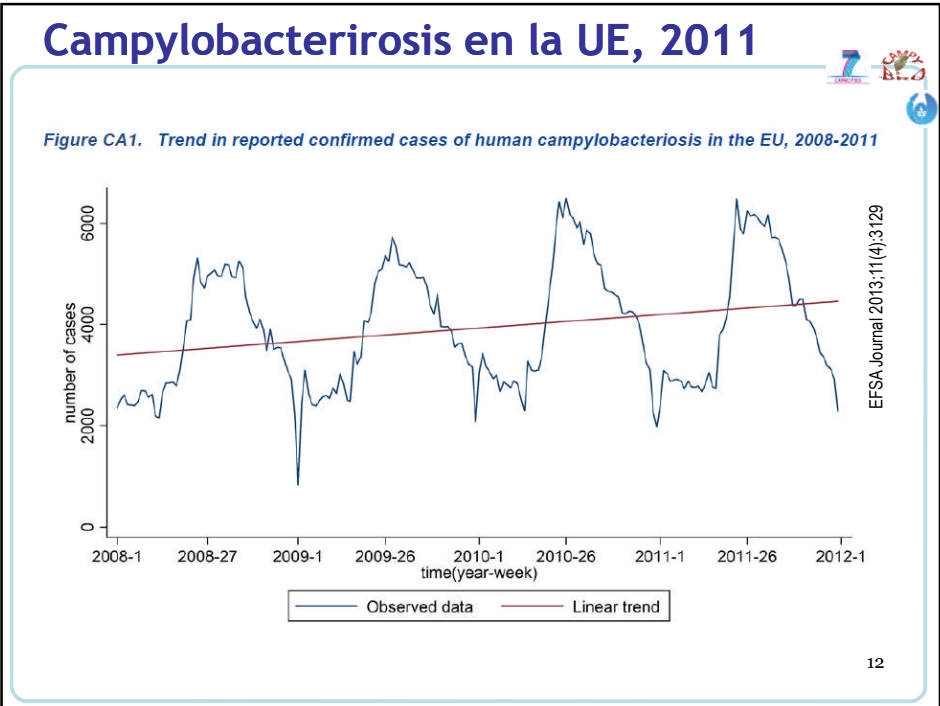
### Campylobacteriosis en la UE, 2011

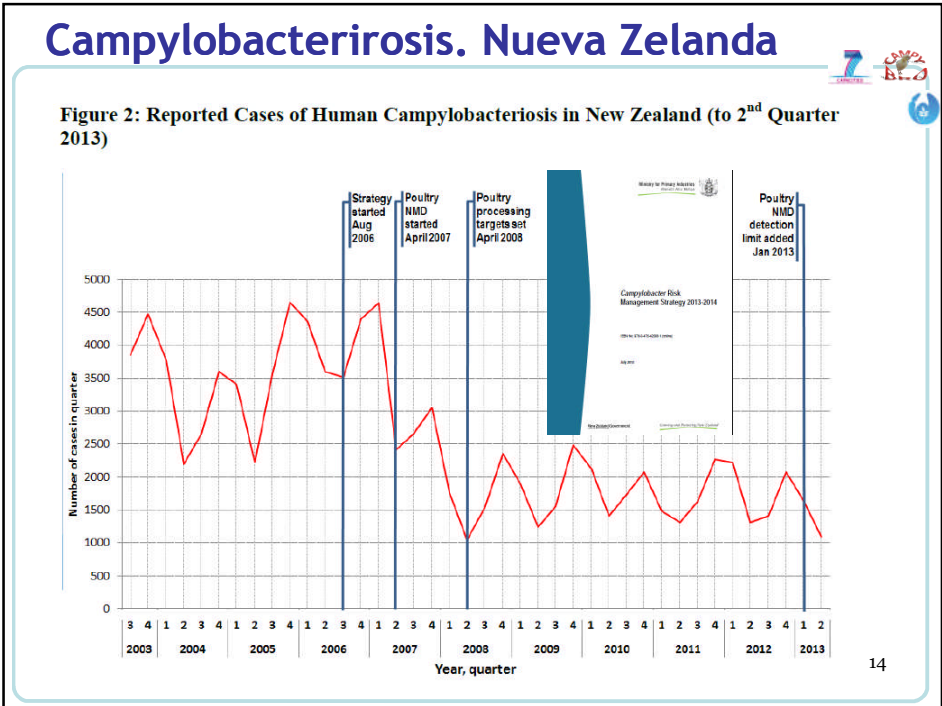
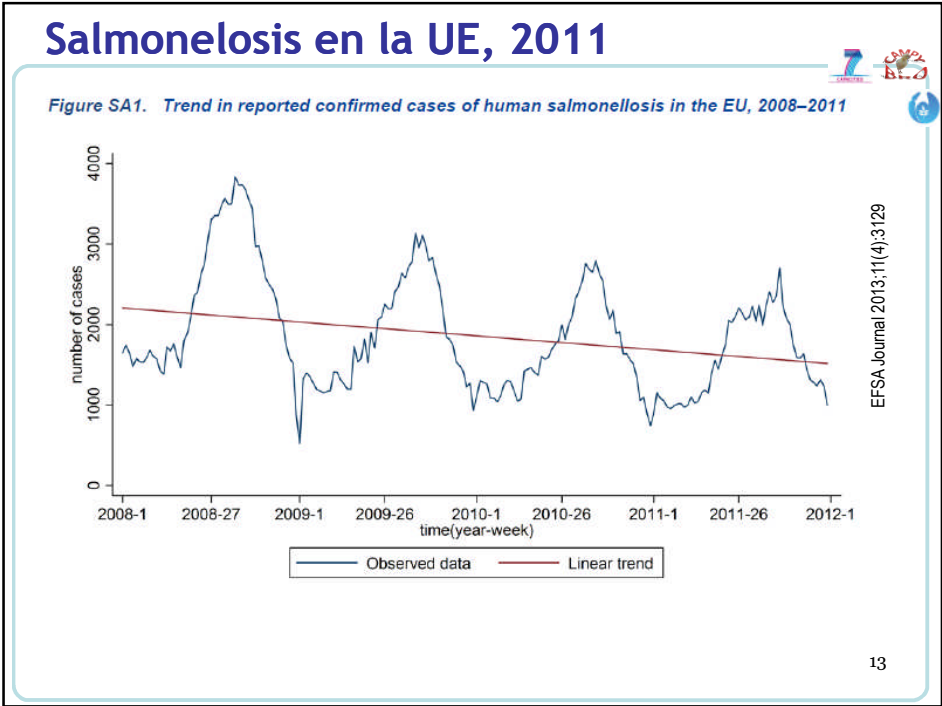
Table CA2. Reported cases of human campylobacteriosis in 2007–2011 and notification rates for confirmed cases in the EU, 2011

Country	Report Type <sup>a</sup>	2011			2010	2009	2008	2007
		Cases	Confirmed Cases	Confirmed cases/100,000				
Austria	C	5,130 <sup>2</sup>	1,345	16.00	4,404	1,516 <sup>3</sup>	4,280	5,822
Belgium	C	7,716	7,716	70.46	6,047	5,697	5,111	5,895
Bulgaria	A	73	73	0.97	6	26	19	38
Cyprus	C	62	62	7.71	55	37	23	17
Czech Republic	C	18,811	18,743	177.95	21,075	20,259	20,067	24,137
Denmark	C	4,060	4,060	73.01	4,037	3,353	3,470	3,868
Estonia	C	214	214	15.97	197	170	154	114
Finland	C	4,262	4,262	79.29	3,944	4,050	4,453	4,107
France	C	5,538	5,538	8.51	4,324	3,956	3,424	3,058
Germany	C	71,307	70,812	66.62	65,110	62,787	64,731	66,107
Greece	– <sup>5</sup>	–	–	–	–	–	–	–
Hungary	C	6,135	6,121	61.30	7,180	6,579	5,516	5,809
Ireland	C	2,435	2,433	54.30	1,660	1,810	1,782	1,885
Italy	C	468	468	0.77	457	531	265	676
Latvia	C	7	7	0.31	1	0	0	0
Lithuania	C	1,124	1,124	34.64	1,055	812	762	564
Luxembourg	C	704	704	137.54	600	523	439	345
Malta	C	220	220	52.68	204	132	77	91
Netherlands <sup>4</sup>	C	4,408	4,408	50.89	4,322	3,782	3,341	3,462
Poland	C	354	354	0.93	367	359	270	192
Portugal	– <sup>5</sup>	–	–	–	–	–	–	–
Romania	C	149	149	0.70	175	254	2	0
Slovakia	C	4,736	4,565	83.99	4,476	3,813	3,064	3,380
Slovenia	C	998	998	48.68	1,022	962	898	1,127
Spain <sup>6</sup>	C	5,469	5,469	47.40	6,340	5,106	5,160	5,331
Sweden	C	8,214	8,214	87.24	8,001	7,175	7,692	7,106
United Kingdom	C	72,150	72,150	115.44	70,298	65,043	55,609	57,849
EU Total		224,744	220,209	50.28	215,397	198,725	190,579	200,980
Iceland	C	123	123	36.62	55	74	98	93
Norway	C	3,005	3,005	61.07	2,682	2,848	2,875	2,836
Switzerland <sup>7</sup>	C	7,964	7,964	100.80	6,604	7,795	7,552	5,834

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### Campylobacteriosis en la UE, 2011

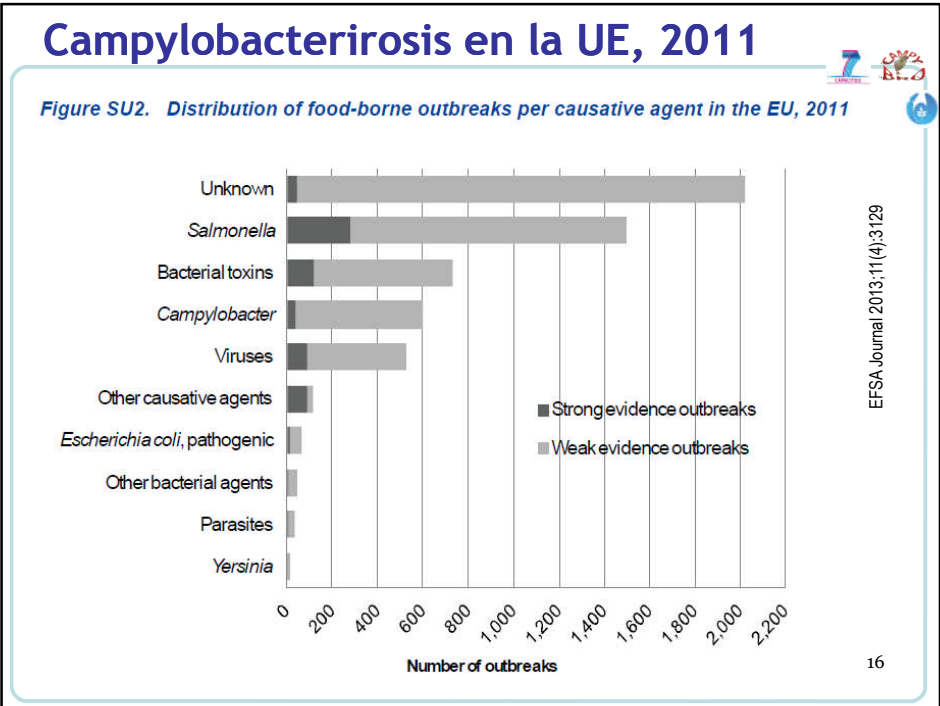
Table SU1. Reported hospitalisation and case-fatality rates due to zoonoses in confirmed human cases in the EU, 2011

Disease	Number of confirmed human cases	Hospitalisation				Deaths			
		Confirmed cases covered <sup>1</sup> (%)	Number of reporting MS <sup>2</sup>	Reported hospitalised cases	Hospitalisation rate (%)	Confirmed cases covered <sup>1</sup> (%)	Number of reporting MS <sup>2</sup>	Reported deaths	Case-fatality rate (%)
Salmonellosis	95 548	10.4	9	4 557	45.7	49.0	14	56	0.12
Campylobacteriosis	220 209	7.7	9	8 137	47.9	52.1	13	43	0.04
Listeriosis	1 476	43.7	16	604	93.6	71.4	19	134	12.7
VTEC infections	9 485	22.5	14	721	33.8	79.0	16	56	0.75
Yersiniosis	7 017	11.0	9	427	55.2	70.1	12	1	0.02
Brucellosis	330	53.9	8	118	66.3	41.2	8	1	0.74
Trichinellosis	268	76.9	9	153	74.3	76.5	12	1	0.49
Echinococcosis	781	18.2	10	96	67.6	28.4	12	2	0.90
Rabies	1	100	27	1	100	100	27	1	100

1. The proportion (%) of confirmed cases for which the information on hospitalisation or death was available.  
2. Not all countries observed cases for all diseases.

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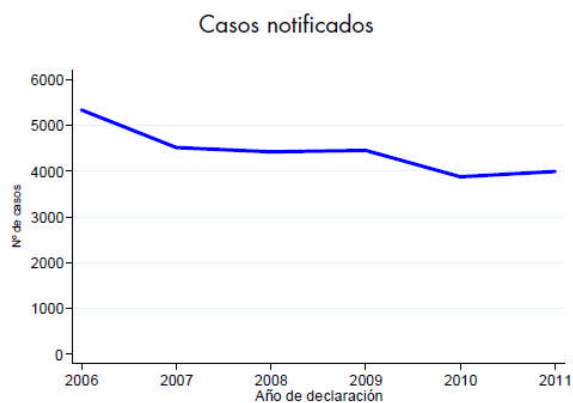
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## Campylobacteriosis en España, 2011

Figura 1. Vigilancia de *Campylobacter*. 2006-2011



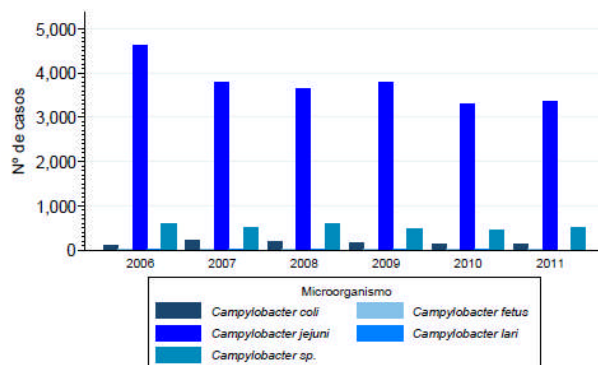
Fuente: Sistema de Información Microbiológica (SIM)

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## Campylobacteriosis en España, 2011

Figura 2. Vigilancia de *Campylobacter*, 2006-2011

Casos por año y microorganismo aislado



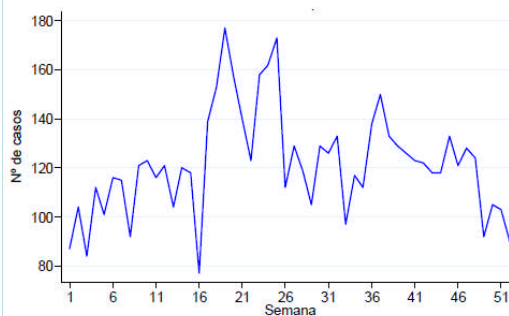
Fuente: Sistema de Información Microbiológica (SIM)

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## Campylobacteriosis en España, 2011

Figura 3. Vigilancia de *Campylobacter*, 2011

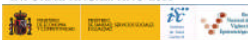
Casos notificados por semana



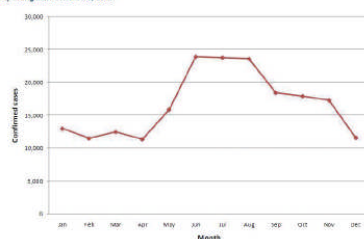
Fuente: Sistema de Información Microbiológica (SIM)



RESULTADOS DE LA VIGILANCIA  
EPIDEMIOLÓGICA DE LAS  
ENFERMEDADES TRANSMISIBLES.  
INFORME ANUAL. AÑO 2011



Number of reported confirmed campylobacteriosis cases in humans by month, TESy data for reporting Member States, 2010



Source: All MSs except Greece, Portugal and Romania (N=205,435)

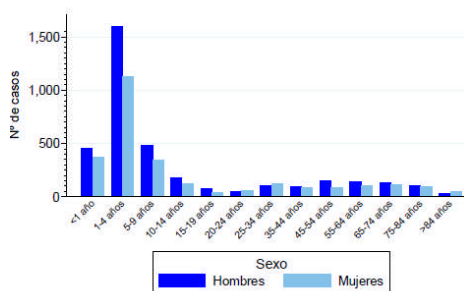
EFSA, ECDC. EU Summary Report 2010. EFSA Journal 2012;10(3):2597

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## Campylobacteriosis en España, 2011

Figura 4. Vigilancia de *Campylobacter*, 2011

Casos por grupos de edad y sexo



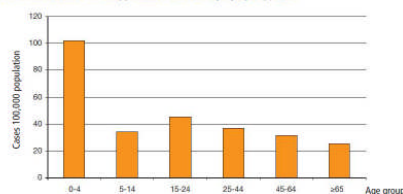
Fuente: Sistema de Información Microbiológica (SIM)



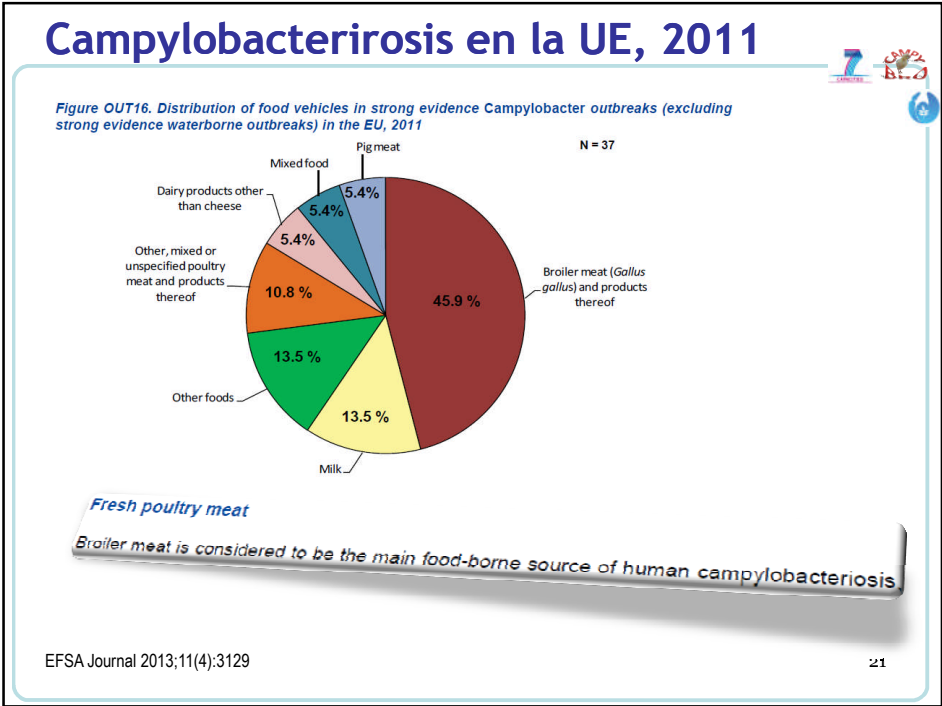
RESULTADOS DE LA VIGILANCIA  
EPIDEMIOLÓGICA DE LAS  
ENFERMEDADES TRANSMISIBLES.  
INFORME ANUAL. AÑO 2011



Figure CA3. Incidence of Campylobacter infection by age group, 2006



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# Campylobacteriosis y carne de pollo, EU 2011

Table CA4. Campylobacter in fresh broiler meat, 2011

Country	Description	Sample unit	Sample weight	2011		
				N	N pos	% pos
At slaughter						
Belgium	Carcase, neck skin	Batch	1 g	335	130	38.8
Denmark <sup>1</sup>	Fresh - chilled	Single	-	898	95	10.6
Estonia	Carcase, neck skin	Batch	25 g	47	3	6.4
Germany	Carcase, neck skin, domestic production	Batch	25 g	337	138	40.9
Hungary	Carcase, meat	Single	25 g	31	9	29.0
Ireland <sup>2</sup>	Carcase	Single	25 g	68	49	72.1
Poland	Carcase, carcass swab	Single	-	405	226	55.8
Spain	Carcase, meat	Single	-	138	76	55.1
At processing plant or cutting plant						
Belgium	Fresh, meat	Batch	1 g	711	99	13.9
Hungary	Fresh, meat	Single	25 g	193	90	46.6
Luxembourg	Fresh, meat	Single	10 g	26	22	84.6
Netherlands	Fresh, meat	Single	25 g	180	62	34.4
Portugal	Fresh	Single	25 g	81	17	21.0
Spain	Fresh, meat	Single	-	69	26	37.7
At retail						
Belgium	Fresh, meat	Batch	-	403	69	17.1
Denmark <sup>1</sup>	Fresh - chilled, domestic production	Single	-	829	279	33.7
	Fresh - frozen, domestic production	Single	-	428	129	30.1
Germany	Fresh meat, surveillance	Single	25 g	1096	343	31.3
	Fresh, meat, monitoring	Single	25 g	402	127	31.6
Hungary	Fresh, meat	Single	25 g	206	85	41.3
Ireland	Fresh, meat	Single	25 g	291	154	52.9
Luxembourg	Fresh, meat	Single	10 g	49	23	46.9
Netherlands	Fresh, meat	Single	25 g	500	114	22.8
Poland	Fresh, meat	Single	10 g	110	91	82.7
Romania	Fresh, meat	Batch	25 g	485	111	22.9
Spain	Fresh, meat	Single	-	260	197	75.8
Sampling level not stated						
Austria	Fresh, domestic production	Single	25 g	279	9	3.2
EU Total (13 Member States)				8,857	2,773	31.3

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## Campylobacteriosis en broilers, EU 2011

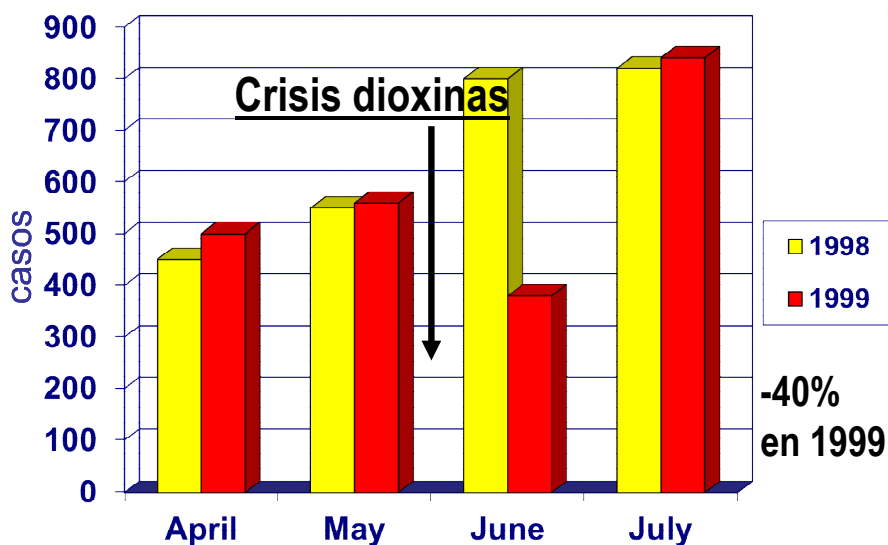
Table CA6. Campylobacter in broilers,<sup>1</sup> 2011

Country	Description	2011		
		N	N pos	% pos
Broilers (flock-based data)				
Czech Republic <sup>2</sup>	At slaughterhouse, caecum, monitoring, official sampling	145	92	63.4
Denmark <sup>3</sup>	At farm (before slaughter), boot swabs, control and eradication programmes	3,379	487	14.4
Ireland	At slaughterhouse, caecum, domestic production, monitoring	201	162	80.6
Sweden	At slaughterhouse, domestic production, monitoring	2,788	357	12.8
	At slaughterhouse, domestic production, small scale slaughterhouses, national survey	143	86	60.1
Total flock-based (4 MSs)		6,656	1,184	17.8
Norway <sup>4</sup>	At farm (before slaughter), faeces, surveillance	2,282	139	6.1
Iceland <sup>5</sup>	At farm, faeces, monitoring	628	33	5.3
Broilers (slaughter batch-based data)				
Austria <sup>5</sup>	At slaughterhouse, cloacal swab, domestic production, monitoring-active, official sampling	342	165	48.2
Estonia <sup>6</sup>	At slaughterhouse, caecum, monitoring, official sampling	47	0	0
Finland <sup>7</sup>	At slaughterhouse, caecum, sampling between June-October, control and eradication programmes, industry sampling	1,486	46	3.1
	At slaughterhouse, caecum, sampling in January-May and November-December, control and eradication programmes, industry sampling	333	9	2.7
Germany	At slaughterhouse, caecum, domestic production, monitoring	331	83	25.1
Slovenia <sup>8</sup>	At slaughterhouse, faeces, monitoring	100	77	77.0
	At slaughterhouse, neck skin, monitoring	100	92	92.0
Spain	At slaughterhouse, cloacal swab, monitoring	237	162	68.4
Total slaughter batch-based (6 MSs)		2,976	634	21.3
Iceland <sup>9</sup>	At slaughterhouse, caecum, domestic production, monitoring	695	60	8.6
Switzerland <sup>10</sup>	At slaughterhouse, cloacal swab, monitoring, official sampling	445	166	37.3

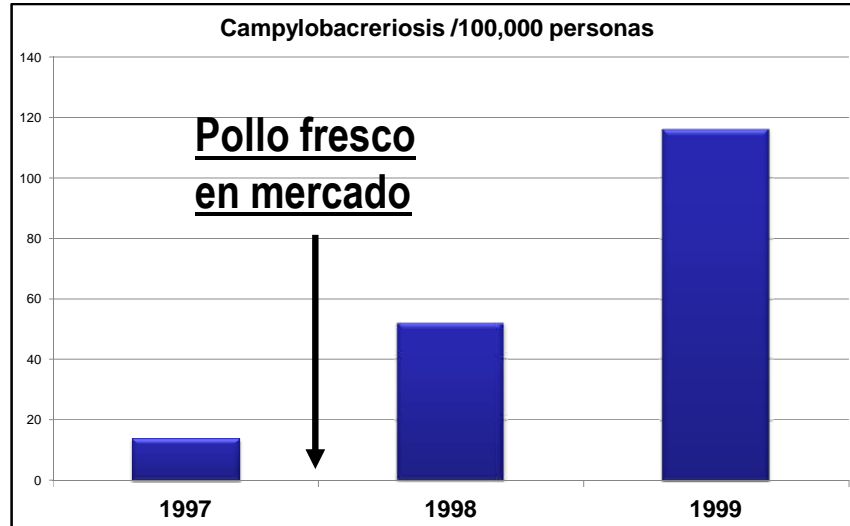
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## Bélgica, 1999



## Islandia



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## Campylobacteriosis y carne de pollo, EU 2011

- Campylobacteriosis is now the most frequently reported zoonotic illness in the EU. There is considerable underascertainment and underreporting, and the true number of cases of illness is likely to be 10-100 times higher than the reported number. Serosurveillance indicates that European citizens may be exposed to *Campylobacter* sufficiently to produce an immune response every 1-3 years. There may be not less than 2 million and possibly as high as 20 million cases of clinical campylobacteriosis per year in the EU27.

EFSA Journal 2010; 8(1):1437

It is estimated that there are approximately nine million cases of human campylobacteriosis per year in the EU27. The disease burden of campylobacteriosis and its sequelae is 0.35 million disability-adjusted life years (DALYs) per year and total annual costs are 2.4 billion €.

Campylobacteriosis is largely perceived to be food-borne, with poultry meat as a major source.

EFSA Journal 2011; 9(4):2105

Despite all efforts during the past decade there is still no effective, reliable and practical intervention measure available to prevent or to reduce *Campylobacter* colonization in broilers (Lin, 2009). As a consequence, neither the

Hermans, et al., 2011

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## Campylobacteriosis y carne de pollo, EU 2011



### Resumen

**Campylobacteriosis** continued to be the **most commonly reported zoonosis in humans in the EU since 2005**. In **2011**, the number of notified cases of thermotolerant *Campylobacter* in the EU **increased by 2.2 %** compared with 2010. The EU notification rate of confirmed cases of human campylobacteriosis has shown a **statistically significant increasing trend in the last four years (2008–2011)**. The reasons for this increasing

Considering the high number of campylobacteriosis cases, the **severity in terms of fatalities reported was low (0.04 %)**. The proportion of hospitalised cases was, on the other hand, larger than expected taking into

**Broiler meat is considered to be a major source of human campylobacteriosis, as a result of undercooking and cross-contamination of RTE foods, as well as through direct hand-to-mouth transfer during food preparation.** The EFSA's Panel on Biological Hazards (BIOHAZ) concluded in its scientific opinion<sup>26</sup> that **handling, preparation and consumption of broiler meat may account for 20 % to 30 % of human campylobacteriosis cases in the EU, while 50 % to 80 % may be attributed to the chicken reservoir as a whole.** *Campylobacter* strains from the broiler reservoir may also be transmitted to humans via routes other than food (e.g. via the environment or by direct contact). **The principal reservoirs of *Campylobacter* spp. are the alimentary tracts of wild and domesticated birds and mammals.** There are multiple pathways of human

In 2011, fresh broiler and other poultry meat were again the foodstuffs in which *Campylobacter* was most frequently reported. Overall, about one third of the samples were reported as positive, although there were

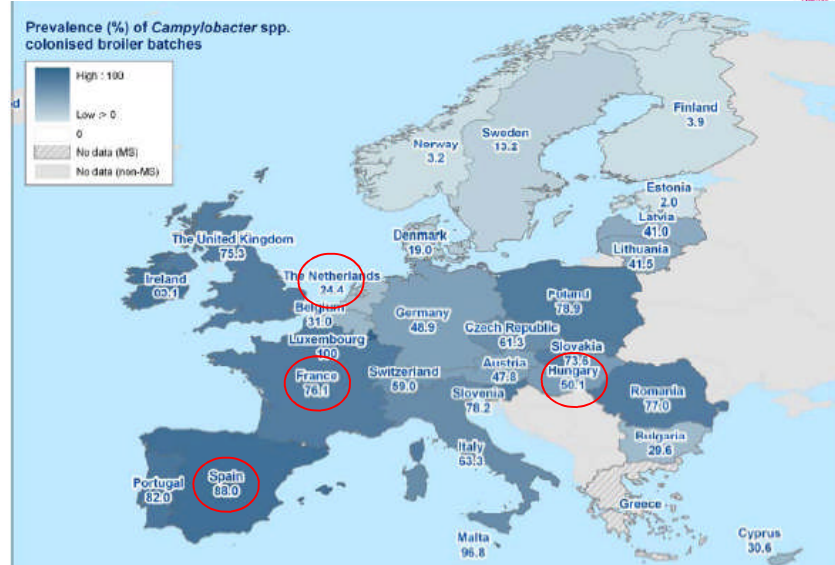
EFSA Journal 2013;11(4):3129

□ **≈ 9.000.000 casos/año (UE-27)**

□ **Coste estimado: 2.400 M€/año**

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## Estudio prevalencia, manadas

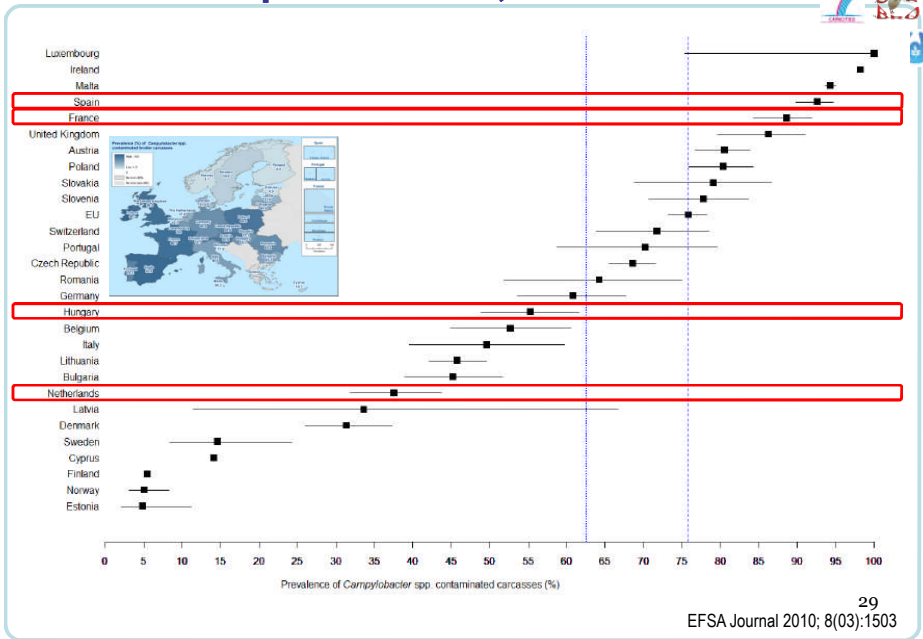


EFSA Journal 2011; 9(4):2105

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## Estudio de prevalencia, canales



## UK

### A UK survey of *Campylobacter* and *Salmonella* contamination of fresh chicken at retail sale.

A UK-wide survey was undertaken by the Agency between May 2007 and September 2008 to determine *Campylobacter* and *Salmonella* prevalence on fresh chicken at retail. During the course of the survey 3363 samples were collected, with 3274 being acceptable for testing and microbiological examination using a presence/absence method for the detection of *Campylobacter* and *Salmonella*. *Campylobacter* enumeration tests were conducted on 927 samples, collected between April 2008 and August 2008.

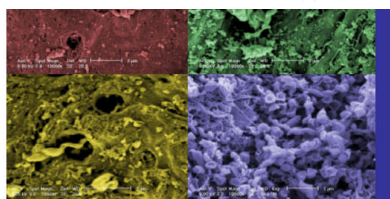
The prevalence of *Campylobacter* in chicken at retail in the UK was 65.2%, based on the results from both methods combined, for the 927 samples tested.

A total of 1519 *Campylobacter* isolates were tested for their sensitivity to a series of antimicrobial drugs. Of these isolates, 197 (13.0%) were sensitive to all the drugs tested. This figure represents an increase in the frequency of antimicrobial resistance among *Campylobacter* isolated from retail chicken compared to that seen in the 2001 survey. There has also been an increase in resistance to the quinolones ciprofloxacin and nalidixic acid. The increase

## UK



Food security is an increasing priority for the UK Government and food safety is a key component of this. **Campylobacter is the most common cause of food poisoning in the UK** and is responsible for an estimated 321,000 estimated cases in England and Wales in 2008<sup>1</sup>, with over 15,000 hospitalisations and 76 deaths. **Campylobacter accounts for a third of the cost of food-borne illness in England and Wales**, estimated at £583 million in 2008. It is found **mainly in poultry** but also in red meat, unpasteurised milk and untreated water. Although it does not normally grow in or on food, it can transfer easily. Illness can arise from only a few bacteria in undercooked chicken, or in ready-to-eat foods that have been cross-contaminated from raw chicken. *Campylobacter* infections do not usually cause vomiting, but diarrhoea can be severe and bloody, with additional abdominal cramps.



A number of partners involved in this strategy are also members of the Global Food Security programme.

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## Resistencias a antibióticos: humanos

The European Union Summary Report on antimicrobial resistance in zoonotic and indicator bacteria from humans, animals and food in 2011<sup>1</sup>

European Food Safety Authority<sup>2,3</sup>

European Centre for Disease Prevention and Control<sup>2,3</sup>

Table CA3. Antimicrobial resistance in *Campylobacter jejuni* from humans per country in 2011, using clinical breakpoints

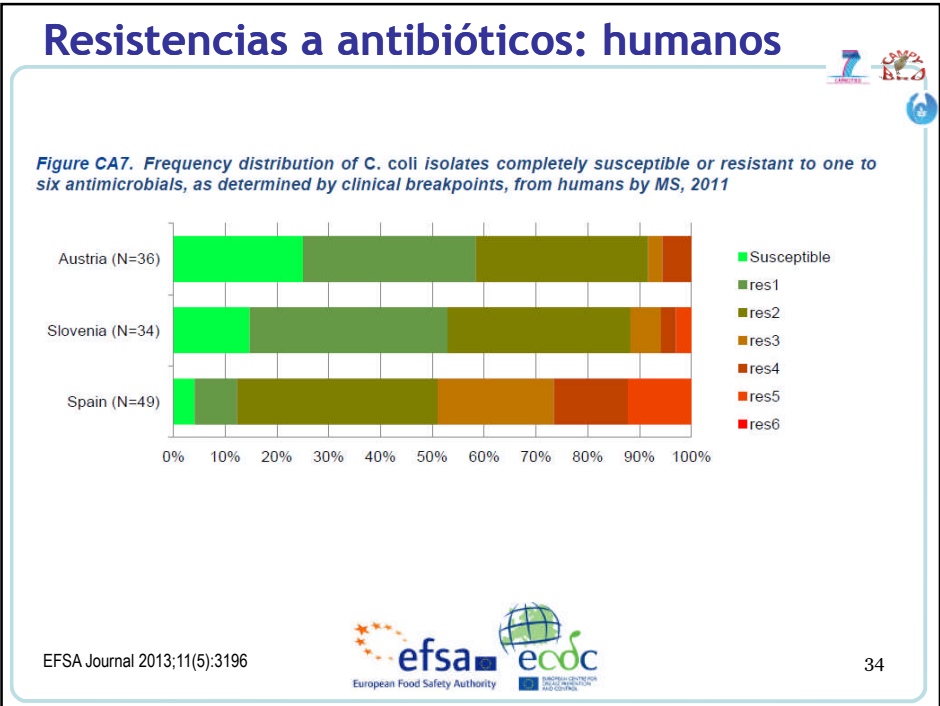
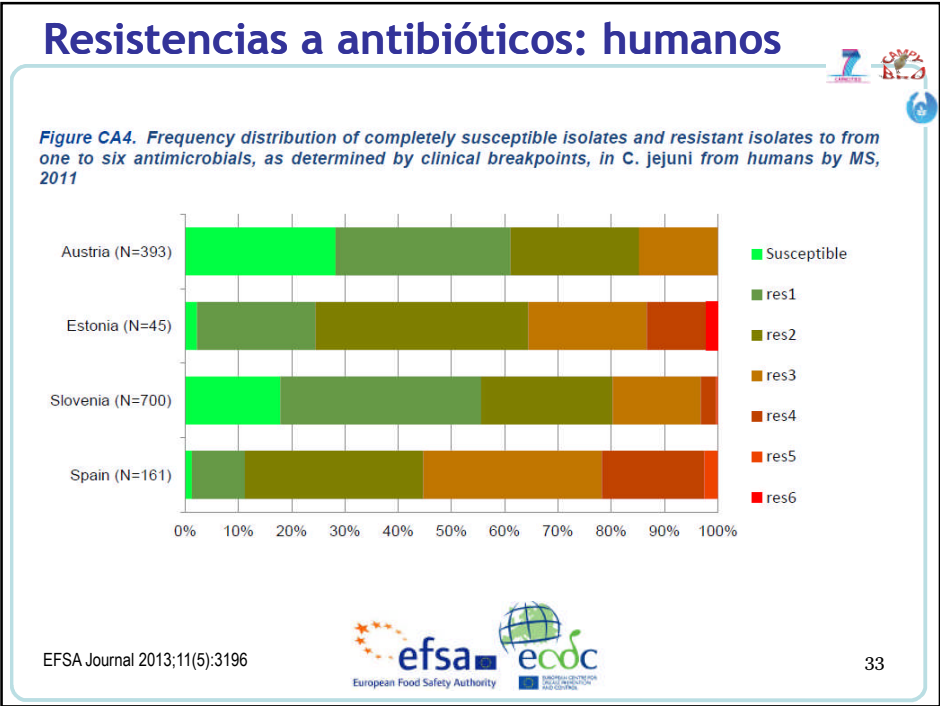
Country	Amoxicillin		Ampicillin		Ciprofloxacin		Erythromycin		Gentamicin		Nalidixic Acid		Tetracyclines	
	N	% Res	N	% Res	N	% Res	N	% Res	N	% Res	N	% Res	N	% Res
Austria	393	0	393	28.0	393	65.4	393	0.3	393	0.5	393	64.4	393	30.0
Estonia	58	10.3	59	37.3	183	58.5	183	2.2	62	1.6	23	47.8	150	29.3
France	4,278	0	4,279	32.1	4,278	51.3	4,278	1.6	4,278	0	4,279	49.4	-	-
Hungary	-	-	-	-	27	59.3	-	-	-	-	-	-	-	-
Italy	-	-	91	70.3	162	69.8	189	6.3	104	1.9	103	75.7	136	59.6
Lithuania	-	-	-	-	260	83.1	296	0.3	-	-	-	-	-	-
Luxembourg	-	-	-	-	623	51.8	623	0.6	-	-	623	52.5	-	-
Malta	-	-	-	-	147	69.4	149	0.7	-	-	-	-	-	-
Slovakia	-	-	74	18.9	868	20.9	962	0.5	4	NA	-	-	937	7.9
Slovenia	701	5.3	882	39.9	882	67.2	882	1.0	882	0.2	701	58.2	881	18.4
Spain	166	10.8	166	56.6	166	87.3	166	4.8	161	3.1	175	94.9	166	80.1
United Kingdom	1	NA	3	NA	658	44.1	687	2.2	6	NA	568	45.4	83	34.9
Total (12 MSs)	5,597	1.1	5,947	34.2	8,647	52.5	8,808	1.5	5,890	0.2	6,865	52.7	2,746	23.3
Iceland	-	-	-	-	120	45.8	121	0	-	-	-	-	-	-

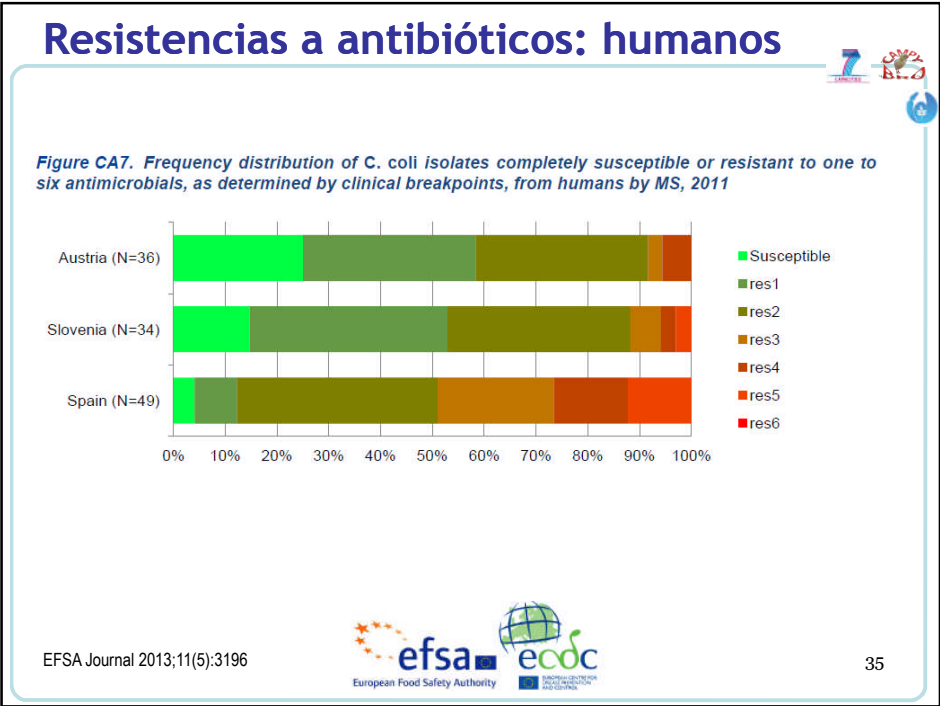
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### Resistencias a antibióticos: carne pollo

**Table CA8. Resistance (%) to ciprofloxacin, erythromycin, gentamicin, nalidixic acid and tetracyclines among *Campylobacter jejuni* from meat from broilers in MSs reporting MIC data in 2011, using harmonised epidemiological cut-off values**

Country	Ciprofloxacin		Erythromycin		Gentamicin		Nalidixic acid		Tetracyclines	
	N	% Res	N	% Res	N	% Res	N	% Res	N	% Res
Austria	84	53.6	84	0	84	0	84	50.0	84	23.8
Belgium	259	36.7	259	7.7	259	1.9	259	39.0	259	49.0
Denmark	61	11.5	61	0	61	0	61	11.5	61	9.8
Germany	188	64.9	188	0.5	188	0	188	58.5	188	46.3
Hungary	33	84.8	33	0	33	6.1	-	-	33	54.5
Italy	13	76.9	13	0	13	0	13	61.5	13	76.9
Netherlands	83	63.9	83	3.6	83	0	83	63.9	83	49.4
Poland	174	90.2	174	0	174	0	174	89.7	174	56.9
Romania	52	84.6	52	9.6	52	17.3	52	82.7	52	69.2
Total (9 MSs)	947	59.2	947	3.1	947	1.7	914	56.9	947	46.9

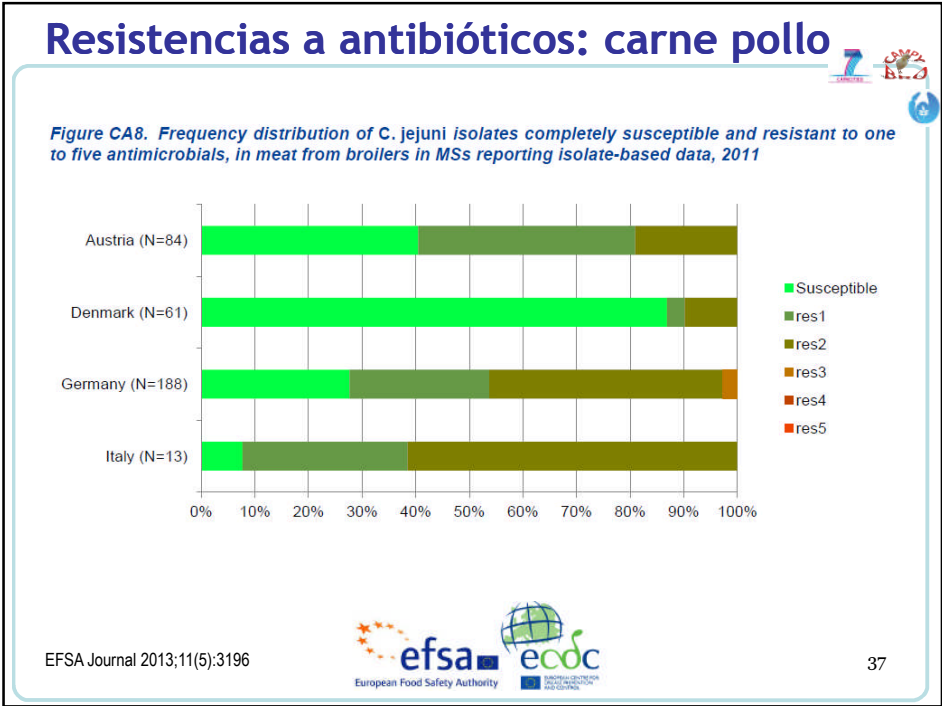
N = number of isolates tested.  
% Res = percentage of resistant isolates.  
- = no data reported.

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### Resistencias a antibióticos: broilers

Table CA11. Resistance (%) to ciprofloxacin, erythromycin, gentamicin, nalidixic acid and tetracyclines among *Campylobacter jejuni* from *Gallus gallus* (mainly broilers) in countries reporting MIC data in 2011, using harmonised epidemiological cut-off values

Country	Ciprofloxacin		Erythromycin		Gentamicin		Nalidixic acid		Tetracyclines	
	N	% Res	N	% Res	N	% Res	N	% Res	N	% Res
Austria	116	69.0	116	0	116	0	116	60.3	116	17.2
Czech Republic	57	54.4	57	0	57	0	57	54.4	57	14.0
Denmark	43	23.3	43	0	43	0	43	23.3	43	18.6
Finland	40	0	40	0	40	0	40	0	40	0
France	51	56.9	51	0	51	0	51	60.8	51	66.7
Germany	59	62.7	59	3.4	59	0	59	57.6	59	50.8
Hungary	36	86.1	36	5.6	36	5.6	36	83.3	36	38.9
Ireland	114	40.4	114	0.9	114	0	114	39.5	114	49.1
Italy	10	60.0	10	20.0	10	0	10	60.0	10	80.0
Netherlands	104	67.3	104	1.9	104	0	104	68.3	104	51.0
Spain	55	94.5	55	3.6	55	7.3	55	94.5	54	87.0
Total (11 MSs)	685	57.2	685	1.6	685	0.9	685	55.5	684	40.6
Norway	48	4.2	48	0	48	0	48	6.3	48	2.1
Switzerland	150	40.7	150	5.3	150	1.3	150	42.0	150	20.7

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