European Union report focuses on campylobacter and salmonella

The European Union recently reported on its comprehensive baseline survey on the prevalence of campylobacter in broiler flocks and campylobacter and salmonella on broiler carcases that was undertaken throughout 2008. In this article we will review its findings.

In the first part of the survey batches of broilers, which were defined as broilers that have been raised in the same flock and slaughtered on one day, were screened.

The sampling of broilers was based on a random selection of slaughterhouses, sampling days in each month and the batches to be sampled on each sampling day (Fridays and days preceding national holidays were excluded). The randomisation process aimed to select broiler batches proportionate to the number of broiler flocks and the different types of production (conventional, free range and organic) with an even distribution throughout the year so seasonal effects could be investigated.

For each batch of broilers intact caecal contents from 10 slaughtered broilers were taken for campylobacter screening (one whole carcase was taken for salmonella and campylobacter screening – see later).

Isolation and confirmation of campylobacter was in accordance with ISO 10272-1:2006(E) 'Microbiology of food and animal feedstuffs – Horizontal method for detection and enumeration of Campylobacter Spp. Part 1: Detection method'. At least one campylobacter isolate per batch was speciated by the methods described in ISO 10272-1:2006(E) or published molecular methods such as PCR. Campylobacter enumeration was carried out in accordance with ISO/TS 10272-2:2006 'Microbiology of food and animal feedstuffs – Horizontal method for detection and enumeration of Campylobacter Spp. Part 2: Colony count technique'. The prevalence of campylobacter was reported in three ways – as Campylobacter

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Austria	63.0	Hungary	107.9	Romania	160.7
Belgium	242.2	Ireland	65.4	Slovakia	53.0
Bulgaria	35.7	Italy	400.0	Slovenia	34.1
Cyprus	11.1	Latvia	13.9	Spain	594.7
Czech Republic	130.3	Lithuania	8.2	Sweden	76.1
Denmark	102.0	Luxembourg	0.04	UK	816.2
Estonia	8.3	Malta	3.2	**Total EU**	**5,308.1**
Finland	55.2	Netherlands	451.6	Norway	62.2
France	706.3	Poland	557.3	Switzerland	48.5
Germany	438.4	Portugal	173.1	**Total in survey**	**5,418.9**

Table 1. Total number of slaughtered broilers (millions) in EU in 2008.

Table 2. Campylobacter findings.

Member state	Prevalence in broilers			Contaminated carcases (%)		
	Campylobacter	C. jejuni	C. coli	Campylobacter	C. jejuni	C. coli
Austria	47.8	30.8	15.2	80.6	60.1	26.2
Belgium	31.0	20.0	9.2	52.7	38.7	11.2
Bulgaria	29.6	8.8	21.8	45.2	17.0	28.6
Cyprus	30.6	23.8	10.7	14.1	10.4	3.8
Czech Rep.	61.3	51.9	14.7	68.6	59.7	17.0
Denmark	19.0	17.0	1.8	31.4	28.4	2.6
Estonia	2.0	2.0	0.0	4.9	4.9	0.0
Finland	3.9	3.9	0.0	5.5	5.5	0.0
France	76.1	42.9	42.4	88.7	72.0	57.5
Germany	48.9	38.0	10.9	60.8	48.7	11.5
Hungary	50.1	22.7	26.0	55.3	32.4	20.7
Ireland	83.1	56.1	26.1	98.3	54.0	53.5
Italy	63.3	30.6	31.6	49.6	22.3	26.3
Latvia	41.0	34.4	6.6	33.6	31.1	2.5
Lithuania	41.5	33.4	8.9	45.8	37.1	8.9
Luxembourg	100.0	19.5	91.9	100.0	16.2	75.0
Malta	96.8	21.7	74.2	94.3	41.4	49.9
Netherlands	24.4	19.1	4.4	37.6	31.3	5.3
Poland	78.9	48.2	30.9	80.4	53.5	30.2
Portugal	82.0	18.8	53.1	70.2	49.3	41.8
Romania	77.0	54.6	30.3	64.2	40.8	22.4
Slovakia	73.6	56.4	23.7	79.1	62.3	20.1
Slovenia	78.2	48.7	35.9	77.8	53.7	32.3
Spain	88.0	38.3	61.4	92.6	47.0	65.2
Sweden	13.2	13.2	0.0	14.6	14.6	0.0
UK	75.3	55.8	19.5	86.3	65.0	26.0
Total EU	**71.2**	**40.6**	**31.9**	**75.8**	**51.0**	**35.5**
Norway	3.2	3.2	0.0	5.1	5.1	0.0
Switzerland	59.0	40.1	18.9	71.7	52.2	22.2

Table 3. Campylobacter enumeration distributions.

Member state	Contaminated counts as cfus per g (%)					
	<10	10-39	40-99	100-999	1,000 10,000	>10,000
Austria	35.8	9.1	11.0	21.1	15.4	7.6
Belgium	49.5	5.3	5.0	19.5	17.4	3.4
Bulgaria	58.2	0.4	5.4	18.6	10.0	7.5
Cyprus	98.6	0.0	0.3	0.6	0.6	0.0
Czech Rep.	48.6	1.0	1.9	21.8	18.5	8.3
Denmark	76.3	2.5	2.8	9.6	7.3	1.5
Estonia	0.0	1.0	0.0	1.0	0.0	0.0
Finland	97.8	1.1	0.5	0.3	0.3	0.0
France	24.2	12.8	11.1	36.5	12.8	2.6
Germany	56.9	6.3	4.4	16.9	11.6	3.9
Hungary	50.2	11.5	5.6	20.3	7.8	4.7
Ireland	3.8	15.2	6.9	32.2	33.0	8.9
Italy	62.6	5.9	3.3	15.8	8.7	3.8
Latvia	66.4	11.5	4.1	13.9	4.1	0.0
Lithuania	54.0	19.8	4.8	16.0	4.8	0.5
Luxembourg	–	–	–	–	–	–
Malta	5.5	0.3	1.4	13.4	47.7	31.9
Netherlands	67.6	4.9	2.3	14.7	8.2	2.3
Poland	23.4	3.6	3.8	32.2	29.1	7.9
Portugal	39.0	7.6	4.5	24.7	20.0	4.3
Romania	37.0	1.1	2.2	12.0	33.3	14.3
Slovakia	31.3	4.7	7.8	25.6	25.4	5.2
Slovenia	19.4	39.0	12.4	23.5	5.6	0.2
Spain	7.5	10.8	4.1	33.4	28.3	15.9
Sweden	91.0	2.2	2.2	3.7	1.0	0.0
UK	32.9	3.7	5.0	31.2	22.4	4.7
Total EU	**47.0**	**7.5**	**4.7**	**19.3**	**15.8**	**5.8**
Norway	98.7	0.5	0.3	0.5	0.0	0.0
Switzerland	48.0	5.2	4.7	21.8	17.2	3.2

	Detection method			Enumeration method		
	Number of carcases	Carcases (%)	Number of countries	Number of carcases	Carcases (%)	Number of countries
C. jejuni	3,775	67.9	28	1,072	62.6	19
C. coli	2,191	39.4	24	560	32.7	14
C. lari	15	0.3	7	8	0.5	4
Other Spp.	49	0.9	9	70	4.1	5
Not done				94	5.5	3

Table 4. Details of campylobacter by method.

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Spp., as Campylobacter jejuni and as C. coli.

The total number of slaughtered broilers during 2008 per country in the EU (except Greece who did not participate in the survey) and two non-member states (Norway and Switzerland) is shown in Table 1.

Data contained 10,132 broiler batches from 551 (549 for campylobacter in caecal samples) slaughterhouses in 28 countries.

Campylobacter survey conclusions

- Campylobacter found in all countries.
- In EU 71.2% of all broiler batches were contaminated.
- Low prevalence in Nordic countries.
- The countries slaughtering most broilers had some of the highest prevalences of campylobacter.
- Campylobacter levels of >10,000 cfus on 5.8% of carcases.
- Parallel testing (detection and enumeration) increased probability of finding campylobacter.
- Two thirds of isolates C. jejuni.
- Broiler meat is an important source of human campylobacteriosis.

Campylobacter was detected in pooled caecal samples in all countries and prevalence ranged from 2.0% in Estonia to 100.0% in Luxembourg. The EU prevalence was 71.2% and the EU median prevalence was 57.1%. C. jejuni was detected in all countries and the EU prevalence was 40.6% ranging from 2.0% in Estonia to 91.9% in Luxembourg. The EU prevalence was 40.6% and the median prevalence was 30.7%. C. coli was found in most countries and the EU prevalence was 31.9% and the median prevalence was 20.7%. These findings are detailed in Table 2.

Table 2 also shows the proportions of carcases contaminated with campylobacter. Prevalence of campylobacter ranged from 4.9% in Estonia to 100% in Luxembourg.

The EU prevalence was 75.8% and the median prevalence was 62.6%.

For C. jejuni and C. coli the EU prevalence was 51.0 and 35.5 and median prevalence figures 39.7 and 21.6% respectively.

Table 3 details the campylobacter enumeration data. It should be noted that Ireland, Norway, the Netherlands, Poland, Portugal and the UK used a modification of the testing method that had a higher sensitivity. In total there were 6,030 campylobacter isolates from carcases and these came from 5,558 positive broiler carcases. C. jejuni was detected in 67.9% of positive samples, while C. coli and C. lari were isolated from 39.4 and 0.3% of positive carcases respectively. Other Campylobacter Spp. were detected in 0.9% of positive samples. The details of campylobacter isolates by method is detailed in Table 4.

A proportion of campylobacter isolates were submitted to the Community Reference Laboratory for cross checking. Almost 5% could not be analysed because they were not viable or heavily contaminated.

For the majority of the viable isolates (91.7%) identification was confirmed. In the salmonella part of the survey testing was confined to carcase testing and the findings are summarised in Table 5.

Overall, there were 56 different serotypes isolated and S. infantis was the commonest at 29.2% (see Table 6). Some observations on these results are:

- This is the first EU survey of broilers and broiler carcases for campylobacter so historical comparisons are not possible.
- The examination of broilers was at time of kill and so they could have become colonised with campylobacter during catching and transportation.
- This survey of broilers can not be taken as an accurate reflection of the on farm situation.
- Campylobacter prevalence was lowest in the Nordic countries and Estonia and the countries with the highest prevalences included the four that slaughter most broilers (France, Poland, Spain and UK).
- In the Nordic countries the role of cold winters in decreasing campylobacter loads is probably important.
- Countries that have actively implemented a strategy to control campylobacter (eg Denmark, Sweden and Norway) show significant broiler and carcase reductions of the organism.
- Carcases were sampled 'after chilling and before further processing'.
- When it came to campylobacter speciation PCR methods tended to give more reliable results.
- Reducing the overall load of campylobacter presented to the consumer will lower the number of cases of human campylobacteriosis.
- Salmonella contamination of carcases in this survey could arise from cross contamination during transportation or the early stages of processing.
- The low levels of S. enteritidis and S. typhimurium indicate that EU salmonella control programmes for these serotypes are working well.
- There appears to be a correlation between low broiler flock salmonella prevalence and a low prevalence of contaminated carcases.
- Although S. infantis was the most frequently isolated serotype in the EU, it was only the most dominant serotype in only two EU countries.

The main conclusions are shown in the two boxes. ■

Salmonella survey conclusions

- Salmonella less frequently detected than campylobacter.
- 22 of 26 EU countries found salmonella on broiler carcases.
- Hungary has a S. infantis problem.
- EU prevalence of S. enteritidis or typhimurium of 3.6% (Range 0-9.6%).
- Broiler meat is an important source of human salmonellosis.

Percentage of serotypes	Serotypes
29.2	infantis
13.6	enteritidis
6.2	kentucky
4.4	typhimurium
4.3	bredeney
4.1	virchow
3.8	hadar and paratyphi B var. java
3.0	agona
2.9	indiana
2.6	montevideo
2.4	mbandaka
1.8	blockley
1.7	4,12:d:- and thompson
1.2	4,[5],12:i:-
1.0	livingstone
0.9	6,7:-:- and ohio
0.8	derby
0.7	kottbus and anatum
0.6	bareilly and newport
0.4	haifa and isangi
0.3	havana, kiambu, mendenand seftenberg
0.2	braenderup, tennessee, brandenburg, 6,7:z10:-, 8,20:-:-, berkeley, corvallis, emek, heidelberg and saintpaul
0.1	3,13:-:-,6,8:-:1,5,O rough:r:1,2, bonariensis, carnac, coeln, concord, djugu, irumu, kedougou, lexington, oakey, parkroyal, redba, schwarzengrund
4.5	untypeable

Table 6. Salmonella serotypes.

Table 5. Salmonella findings of EU survey of carcases.

Country	A	B	Country	A	B	Country	A	B
Austria	2.7	0.6	Hungary	85.6	4.6	Romania	4.9	0.8
Belgium	18.7	3.2	Ireland	11.2	0.0	Slovakia	22.8	5.6
Bulgaria	26.6	6.6	Italy	17.4	0.3	Slovenia	2.0	0.4
Cyprus	10.5	0.0	Latvia	4.9	4.9	Spain	14.4	6.8
Czech Republic	4.9	0.9	Lithuania	5.4	0.3	Sweden	0.3	0.0
Denmark	0.0	0.0	Luxembourg	0.0	0.0	UK	3.6	0.0
Estonia	0.0	0.0	Malta	19.3	0.0	**TOTAL EU**	**15.6**	**3.6**
Finland	0.0	0.0	Netherlands	10.1	0.2			
France	7.4	0.2	Poland	25.4	9.6	Norway	0.0	0.0
Germany	14.5	2.7	Portugal	10.4	8.3	Switzerland	2.3	0.8

A: Prevalence of salmonella (%); B: Prevalence of S. enteritidis and S. typhimurium