

The surveillance programme for *Campylobacter* spp. in broiler flocks in Norway 2014

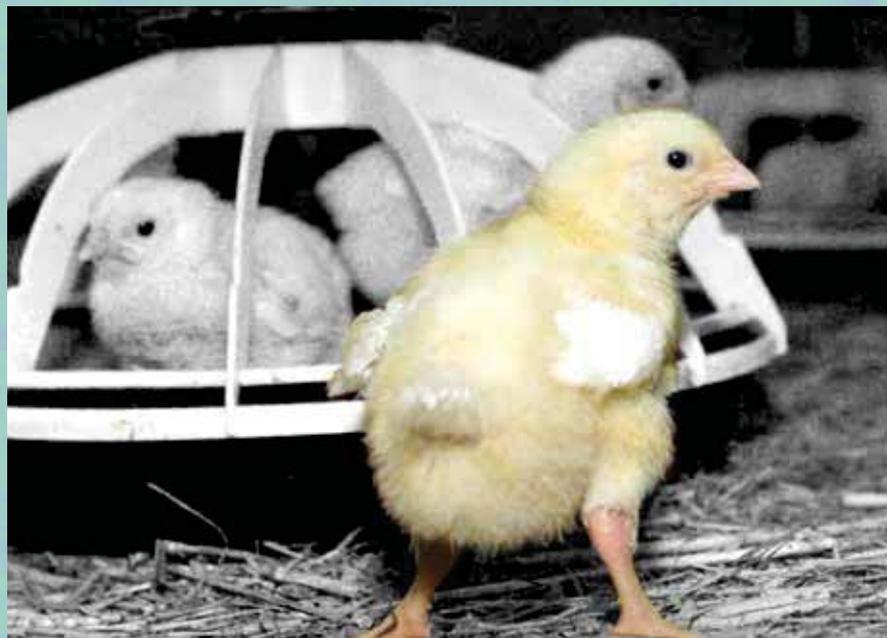
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Surveillance programmes for terrestrial and aquatic animals in Norway

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The surveillance programme for *Campylobacter* spp. in broiler flocks in Norway 2014

Mona Torp, Margrete Vigerust, Bjarne Bergsjø, Chiek Er, Merete Hofshagen

In 2014, a total of 160 (6.0 %) out of 2,685 sampled flocks were positive for *Campylobacter* spp. All flocks were sampled during the months May - October. The result is comparable to previous years.

Introduction

Campylobacteriosis is currently the most commonly reported bacterial infectious disease in the Norwegian human population. In almost half of the cases, the infection is acquired in Norway. Consumption of poultry meat purchased raw has been identified as a significant risk factor together with drinking undisinfected water, eating at barbecues, occupational exposure to animals, and eating undercooked pork (1).

The action plan regarding *Campylobacter* spp. in Norwegian broilers has been running since spring 2001 (2). The action plan is a joint effort involving several stakeholder groups from "stable-to-table". The Norwegian Zoonosis Centre at the Norwegian Veterinary Institute coordinates the programme, and is responsible for the collection and analyses of data and the communication of results.

The action plan is updated regularly and the details for 2014 together with reports and plans from previous years can be found at www.vetinst.no.

Aim

The objective is to reduce the human exposure to thermophilic *Campylobacter* spp. through Norwegian broiler meat products.

Materials and methods

In 2014, all Norwegian broiler flocks that were slaughtered before 51 days of age between 1 May and 31 October were sampled by the owner maximum four days before slaughter. The sample consisted of ten pooled swabs from fresh faecal droppings. The samples were submitted to the Norwegian Veterinary Institute's laboratory in Trondheim, where they were analysed for *Campylobacter* spp. by real-time PCR. The carcasses from the positive flocks were either heat treated or frozen for a minimum of three weeks before being marketed.

In addition, flocks with unknown status at the time of slaughter, were sampled at the slaughter house.

Results

A total of 2,864 samples were taken before or at slaughter, representing 2,685 flocks from 699 farms. The discrepancy between number of flocks and number of samples was due to problems with the postal services being delayed and also to split slaughter of some flocks. A total of 167 samples, representing 160 flocks (6.0 %) were positive for *Campylobacter* spp.

The positive samples originated from 132 (18.9 %) of the farms. One farm had four positive flocks, three farms had three positive flocks, 19 farms had two positive flocks, while 109 had one positive flock. This shows that 23 (3.3 %) of all farms contributed with 31.9 % of the positive flocks. Regional differences in the proportions of positive farms are shown in Table 1 and Figure 3.

The proportion of *Campylobacter* positive flocks has varied substantially since the action plan was launched (Figure 1). In Figure 2, the percentage of flocks (in 2008 - 2014 samples) positive for *Campylobacter* spp. at the pre-slaughter sample in May - October is shown.

Table 1. Farms positive for *Campylobacter* spp. by county in May - October 2014.

County	N	No. Positive	(%)
Østfold	107	21	(19.6)
Akershus	13	3	(23.1)
Hedmark	146	25	(17.1)
Oppland	5	0	(0)
Buskerud	9	3	(33.3)
Vestfold	37	9	(24.3)
Telemark	1	0	(0)
Aust-Agder	5	0	(0)
Vest-Agder	3	0	(0)
Rogaland	145	36	(24.8)
Hordaland	9	1	(11.1)
Møre og Romsdal	1	0	(0)
Sør-Trøndelag	94	15	(16.0)
Nord-Trøndelag	124	19	(15.3)
Total	699	132	(18.9)

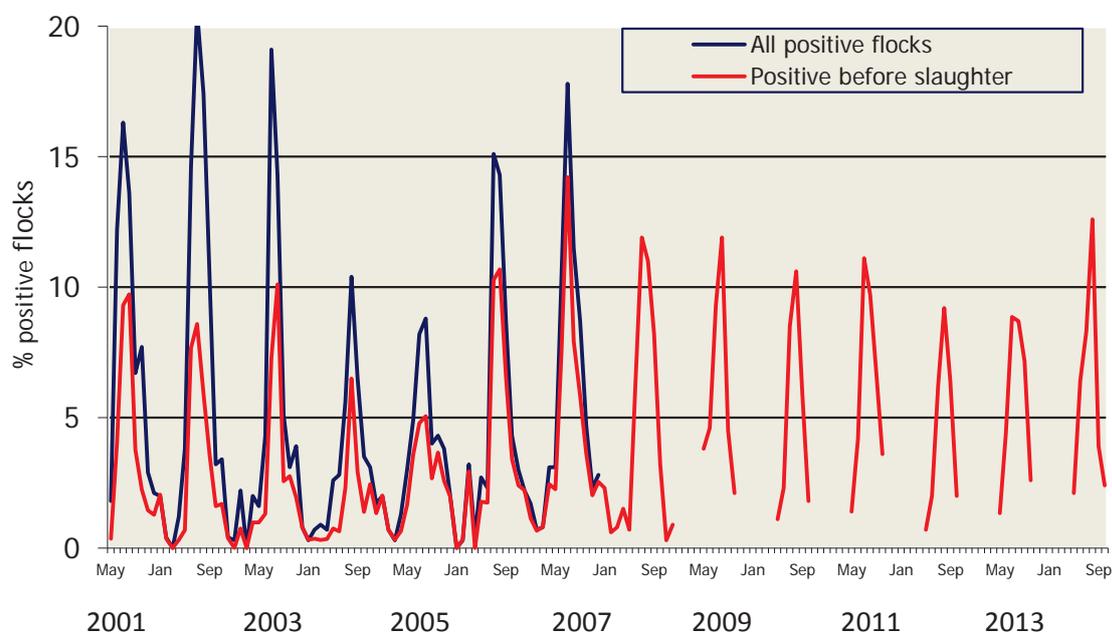


Figure 1. Monthly incidence of *Campylobacter* spp. in slaughtered Norwegian broiler flocks from May 2001 throughout 2014. The blue line represents flocks positive for *Campylobacter* spp., these data are based on two samples; before slaughter and at slaughter. The red line represents flocks positive for *Campylobacter* spp. at the sampling at farm before slaughter (from 2005 onwards: sampling approx. four days before slaughter). No sampling occurred for flocks slaughtered in January - April and November - December in 2009 - 2014.

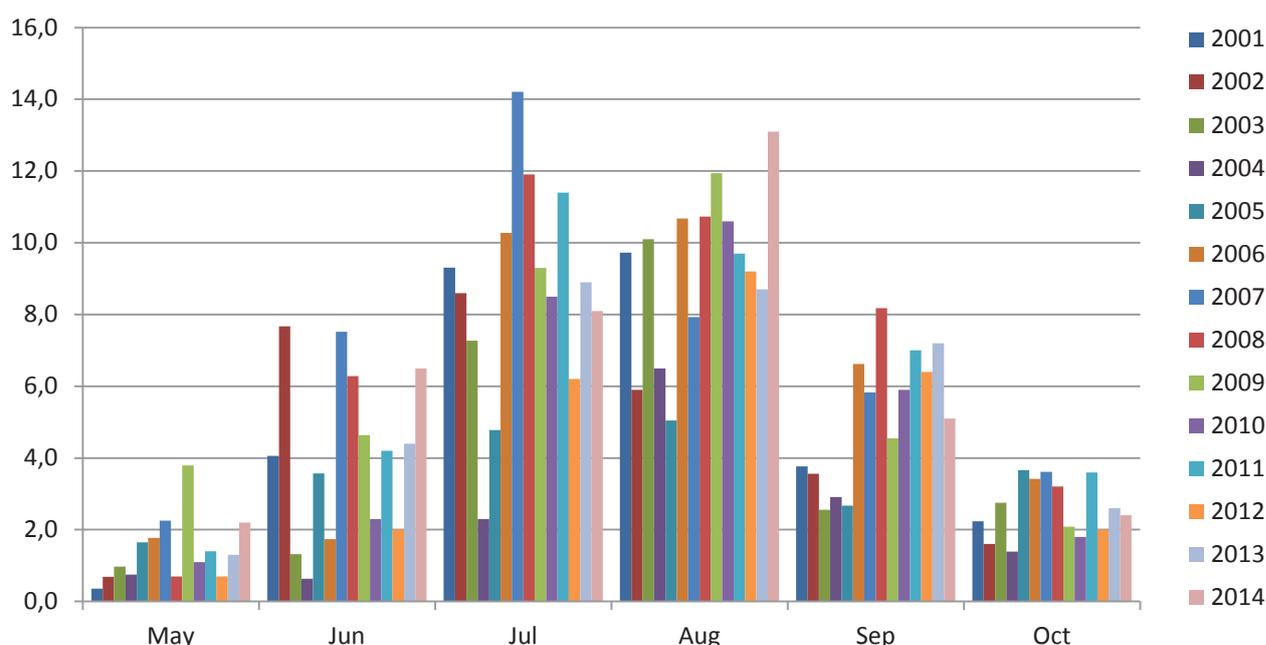


Figure 2. Percentage of flocks positive for *Campylobacter* spp. in the pre-slaughter samples (2001 - 2014). Up to and including 2004, this sample was taken approx. one week before slaughter, from 2005 onwards, approx. four days before slaughter.

Discussion

In the period 2002 - 2007, when all flocks were sampled twice, the results were as indicated in Table 2.

Table 2. Results from the Action Plan against *Campylobacter* spp. in broilers in the period 2002 - 2007.

Year	Number of sampled flocks	Number (%) of positive flocks	Number of positive flocks discovered at slaughter only*
2002	3627	228 (6.3)	127
2003	3550	175 (4.9)	85
2004	3626	118 (3.3)	58
2005	3652	132 (3.6)	42
2006	3908	190 (4.9)	48
2007	4145	237 (5.7)	58

* This is the maximum number of flocks positive for *Campylobacter* spp. which had the possibility to reach the market without previous freezing or heat treatment.

Up to and including February 2005, the pre-slaughter samples were taken approximately eight days before slaughter, and approximately 50 % of the positive flocks were detected only at slaughter. From 1 March 2005 onwards, all flocks were sampled maximum four days before slaughter, and in 2005, 31.8 % of the positive flocks were detected at slaughter only. In 2006 this was further reduced to 25.3 %, and in 2007 the corresponding figure was 24.5 %.

From 2008 onwards, the sampling at slaughter was terminated. Comparable data to evaluate the effect of the Action Plan, and to calculate how many flocks positive for *Campylobacter* spp. which were going on the market without freezing or heat treatment are therefore lacking. Still, if one anticipate that 2008 - 2014 were equal to 2007 in respect to the proportion of positive flocks being identified at the pre-slaughter sample (approx. 75%), the seasonal distribution (approx. 80% of positive flocks are slaughtered during the six summer months) and that the number of samples equals the number of flocks, calculations can be made (Table 3).

Table 3. Estimated results from the Action Plan against *Campylobacter* spp. in broilers in the period 2008 - 2014.

Year	No. of investigated (positive) samples*	Estimated number of flocks the whole year**	Estimated number (%) of positive flocks per year	Estimated number of non-identified positive flocks***
2008	4675 (193)		257 (5.5)	64
2009	1924 (117)	4000	195 (4.9)	78
2010	2170 (110)	4400	184 (4.2)	74
2011	2282 (139)	4560	232 (5.1)	93
2012	2417 (106)	4830	177 (3,7)	71
2013	2710 (149)	5420	248 (4.6)	99
2014	2685 (160)	5370	267 (5.0)	107

* Equals approximately number of slaughtered (positive) flocks.

** In 2009 - 2014, this estimate for the whole year is based upon number of slaughtered flocks in the period May - October.

*** The estimated maximum number of flocks positive for *Campylobacter* spp. which had the possibility to go out on the market without previous freezing or heat treatment.

Regarding the flock prevalence, one can conclude that after some years with a positive development (2002 - 2005), the situation again got worse (2006-2008) and has varied between 3.7% and 5.1% since then. The estimated flock prevalence in 2014 is similar to the last few years, with the exception of 2012 which had the lowest prevalence since 2005.

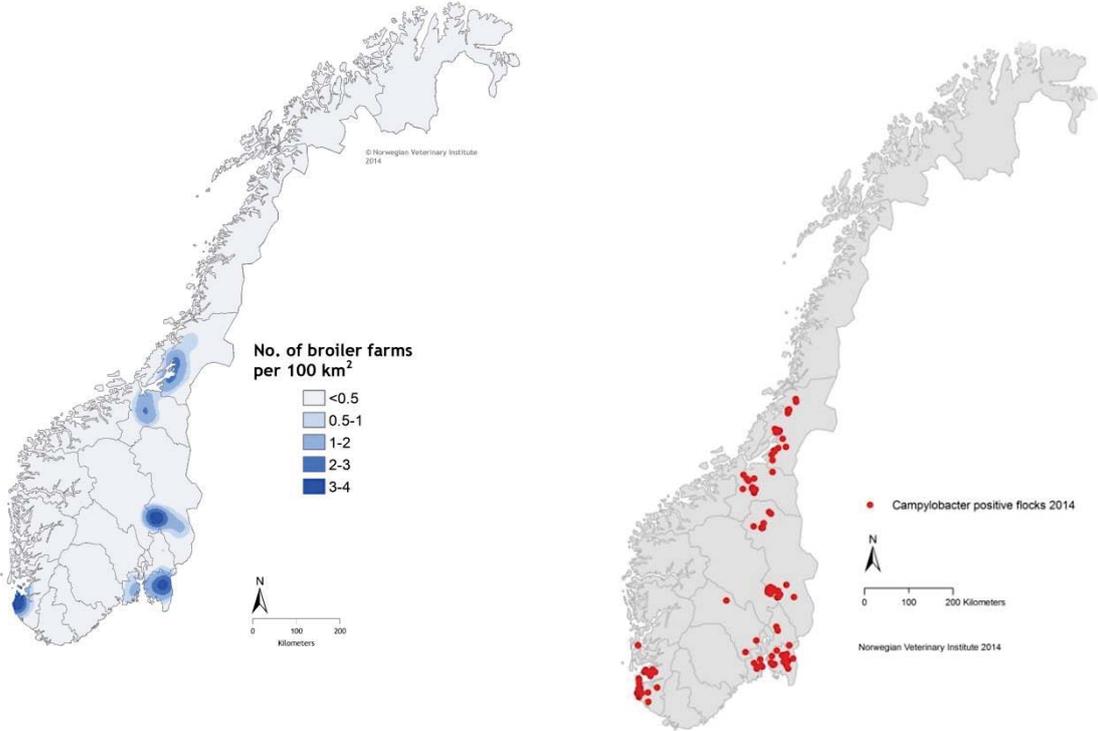
For the number of flocks positive for *Campylobacter* spp. reaching the market without freezing or heat treatment, improvement was seen in 2002 - 2005, but thereafter there has been a negative trend, including 2014.

In 2009-2014, no flocks have been sampled during the six "winter months". Positive flocks in that period therefore had no possibility of being detected and could as a consequence not be scheduled for heat treatment or freezing before being marketed.

References

1. Kapperud G, Espeland G, Wahl E, Walde A, Herikstad H, Gustavsen S, Tveit I, Natås O, Bevanger L, Digranes A. Factors associated with increased and decreased risk for *Campylobacter* infection. A prospective case-control study in Norway. *Am J Epidemiol* 2003; 158 (3): 234-42.
2. Hofshagen M, Kruse H. Reduction in flock prevalence of *Campylobacter* spp. in broilers in Norway after implementation of an action plan. *J Food Prot* 2005; 68: 2220-3.

Figure 3. Geographical distribution in 2014. The location of farms and farms with one or more flock positive for *Campylobacter* spp.



The Norwegian Veterinary Institute (NVI) is a nationwide research institute in the fields of animal health, fish health, and food safety. The primary mission of the NVI is to give research-based independent advisory support to ministries and governing authorities. Preparedness, diagnostics, surveillance, reference functions, risk assessments, and advisory and educational functions are the most important areas of operation.

The Norwegian Veterinary Institute has its main laboratory in Oslo, with regional laboratories in Sandnes, Bergen, Trondheim, Harstad og Tromsø, with about 360 employees in total.

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The NFSA comprises three administrative levels, and has some 1300 employees.

The NFSA advises and reports to the Ministry of Agriculture and Food, the Ministry of Fisheries and Coastal Affairs and the Ministry of Health and Care Services.

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