Shiga-toxin producing *Escherichia coli* O26 infection and unpasteurised cows cheese, France, 2005

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**Introduction**

- In France, no routine screening for Shiga-toxin producing *E. coli* (STEC) in clinical laboratories
- Surveillance of STEC infections based on surveillance of hemolytic uremic syndrome (HUS) in children under 15 years
- Nation-wide HUS surveillance since 1996
- STEC related HUS cases: 48/100 000 children under 15 years
- Most sporadic cases
- Majority of cases due to *E. coli* O157:H7 (84% of confirmed cases)
- A national outbreak of *E. coli* O157:H7 infections

**Outbreak alert** on the 25 Nov 2005

- Three HUS cases notified to the National public health institute by one hospital in Northern part of France
- These cases were hospitalized over a period of one week and resident in 2 neighbouring districts
- No evidence of *E. coli* O157:H7 infection
- Prompted outbreak investigation to identify causal agent, vehicle of transmission and implement control measures

**Case definition**

- 16 cases between October 14 and December 30 2005
- 12 females and 4 males
- From 10 months to 6 years
- Clinical symptoms
- HUS with 13 bloody diarhoea and 3 non bloody diarhoea
- One neurological sequelae
- No death
- 916 (56%) of cases consumed unpasteurized cows cheese

**Microbiological samples**

- Culture, serotyping, PCR stx2+ eae+ and PFGE
- Milk of each herd
- Cheeses from cases’ homes and production plant
- Food and drink consumption, contact with diarrhea cases
- Pediatric services of all hospitals of Northern part of France
- National surveillance network of HUS

**Method**

- Microbiological results
- NT*: undetermined serotype

**Veterinary and environmental investigations**

- At the production plant
  - Production of raw milk cheeses, pasteurized cream and butter
  - Inspection: no deficiencies in the hygienic practices
  - Routine controls for *E. coli* O157:H7 (food and environment) negative
- At the farms
  - 48 herds for a daily production of 3 600 liters of milk
  - An unusual high number of starlings present

**Microbiological results**

- No death

**Control measures**

- First outbreak of STEC non O157 in unpasteurised cows’ cheese in France
- Suspected origin: environmental contamination with a possible role of starlings

**Results**

**Case characteristics**

- 16 cases between October 14 and December 30 2005
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**Microbiological results**

- Food samples at the production plant
  - Cows cheeses:
    - *E. coli* O26:H11 (stx2+ eae+) strains
    - *E. coli* O26:H11 (eae+) strains
  - Pooled milk:
    - *E. coli* O26:H11 (eae+) strains

**Microbiological investigation**

- Serology (O26, O55, O91, O103, O111, O128, O145, O157)
- HUS case with Shiga-toxin producing *E. coli* O26:H11 (eae+)
- Incidence per year: 0.70 / 100 000 children under 15 years
- Voluntary network of 31 pediatric nephrology services
- Children under 15 years
- Surveillance of STEC infections based on surveillance of HUS cases (n=16), France 2005

**Epidemiological investigation**

- Case definition
  - *E. coli* O26 or undetermined serotype Shiga-toxin producing *E. coli O26:H11 (eae+ stx2+)
- Stool: *E. coli* O26:H11 strains (4 were stx2+ eae+): 7 cases
- STEC strains with undetermined serotype (stx2+ eae+): 9 cases (results available at the time of the investigation, but 6 strains were later identified as *E. coli* O80:H2)

**Microbiological investigation**

- Serology: *E. coli* O26:10 cases
- Stools: *E. coli* O26:H11 strains (4 were stx2+ eae+): 7 cases
- STEC strains with undetermined serotype: 9 cases

**Environmental samples at the farms**

- Pooled milk
- Unpasteurised cows’ cheeses
- Farm drinking water
- Feed (ensilage)
- Faeces of starlings

**Control measures**

- First outbreak of STEC non O157 in unpasteurised cows’ cheese in France
- Suspected origin: environmental contamination with a possible role of starlings

**VETERINARY AND ENVIRONMENTAL INVESTIGATION**

- Retrospective and prospective case finding
- National surveillance network of HUS
- Pediatric services of all hospitals of Northern part of France

**Microbiological investigation**

- Serology: *E. coli* O26-10 cases
- Stools: *E. coli* O26:H11 strains (4 were stx2+ eae+): 7 cases
- STEC strains with undetermined serotype: 9 cases (results available at the time of the investigation, but 6 strains were later identified as *E. coli* O80:H2)

**Microbiological results**

- Food samples: cheeses
  - *E. coli* O26:H11 (stx2+ eae+) strains
  - *E. coli* O26:H11 (eae+) strains
  - Pooled milk:
    - *E. coli* O26:H11 (eae+) strains

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**Microbiological results**

- Food samples: cheeses
  - *E. coli* O26:H11 (stx2+ eae+) strains
  - *E. coli* O26:H11 (eae+) strains
  - Pooled milk:
    - *E. coli* O26:H11 (eae+) strains

**Conclusions**

- Multiple contamination by at least two different serotypes of STEC (E. coli O26:H11, E. coli O80:H2 and undetermined serotype)
- Interpretation of the results of STEC O26 research
  - Extensive genetic diversity
  - Recent toxigenic evolution, including changes in Stx genotypes
- Need for survey of prevalence of STEC in food, animals and environment
- Survey studies of cheeses made with unpasteurised cows’ milk in 2007 and 2008